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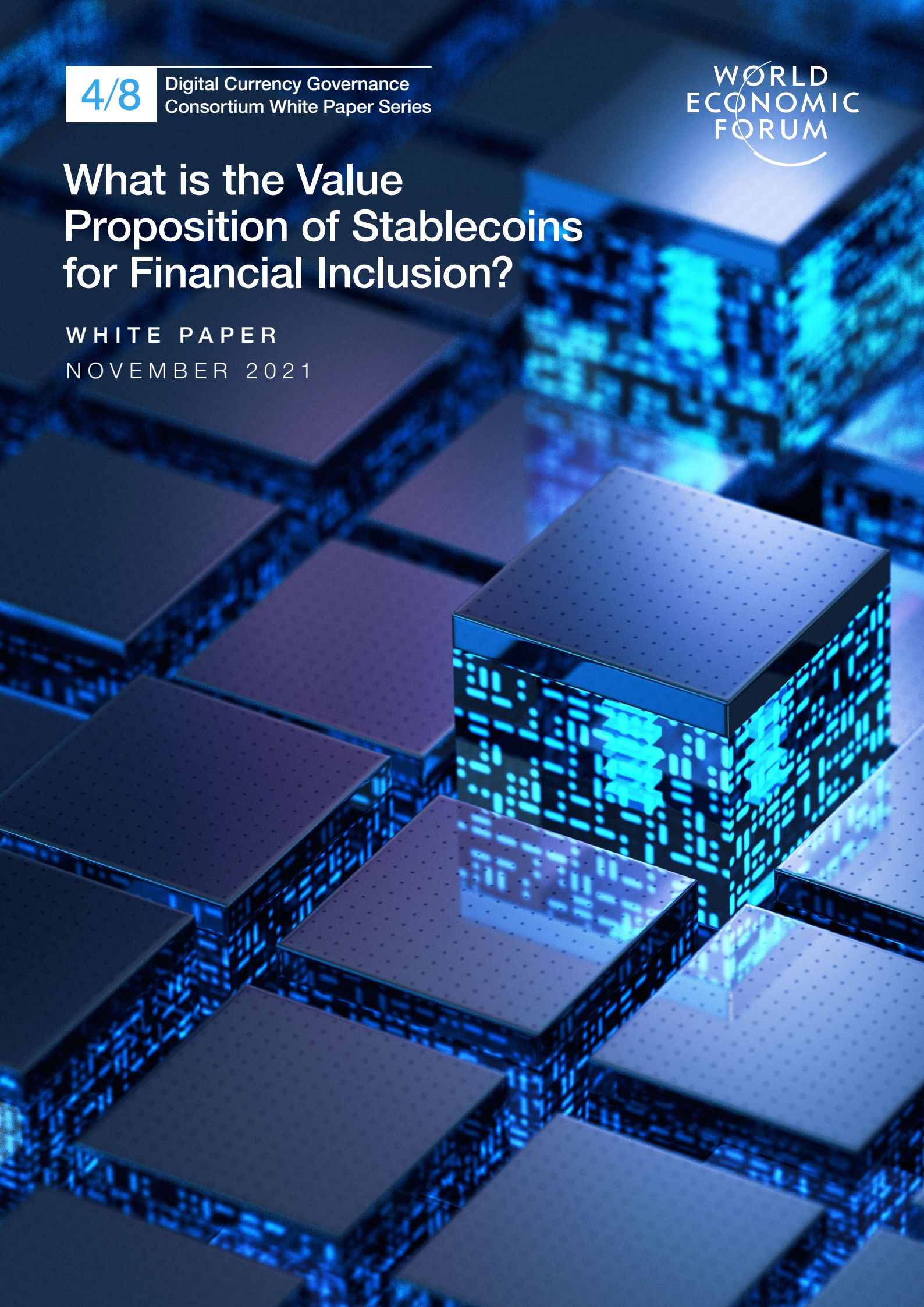
Digital Currency Governance
Consortium White Paper Series

WORLD
ECONOMIC
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What is the Value Proposition of Stablecoins for Financial Inclusion?

WHITE PAPER

NOVEMBER 2021



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This white paper is part of the [Digital Currency Governance Consortium White Paper Series](#). Its authors, contributors and acknowledgements can be found in that compendium report.

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Preface

This white paper investigates the benefits and limitations of stablecoins for supporting financial inclusion in historically excluded or underserved populations. It explores whether and how stablecoins can address common roadblocks to financial inclusion, and it examines the potential new opportunities and risks that stablecoins could introduce.

Financial inclusion is a well-recognized global issue: 1.7 billion people are “unbanked” – lacking an account at a financial institution or mobile-money provider – according to the World Bank.¹ Meanwhile, many small- and medium-sized businesses face challenges in realizing benefits from the current financial system. Individuals and small businesses may not be able to access financial services; if they can, those services may not be of high quality, suitable or affordable. The World Bank defines financial inclusion as the ability of individuals and businesses to access “useful and affordable financial products and services that meet their needs”.² Financial inclusion is a complex global problem that existing systems and offerings have so far failed to solve.

It is often suggested that stablecoins could address the challenges and unlock some of the opportunities around financial inclusion globally.³ Yet very little extensive analysis on the subject has been conducted. This white paper examines real-world case studies and builds on existing research to assess the benefits and risks of stablecoins

for financial inclusion for historically excluded or underserved populations. The case studies or scenarios, while necessarily limited, attempt to capture the breadth as well as the nuances of the challenges faced by these communities. Although they clearly cannot represent the full slate or complexity of all situations, we hope that the conclusions we draw from our scenarios will be applicable to a range of contexts and regions.

To complete the analysis, we compare stablecoins’ capabilities and limitations with those of pre-existing forms of money that do not typically employ blockchain technology, both electronic (e.g. commercial bank money, mobile money and e-money) and physical (e.g. cash). We assess the current barriers facing each scenario to determine if stablecoins overcome, circumvent or aggravate those barriers.

Our aim is to clarify the conditions and prerequisites for providing financial inclusion, and to provide policy-makers, businesses, civil society organizations and digital currency issuers with a better understanding of

the opportunities, risks and benefits that stablecoins currently offer and could in the future bring to financial inclusion. Notably, this paper does not assess the merits of stablecoins outside the context of financial inclusion, and our intent is not to make normative statements about whether individuals, communities or jurisdictions should or should not engage with stablecoins as a general matter.

This white paper is organized into six chapters. Chapter 1 presents the wider context of challenges to financial inclusion and our approach to analysing

the capabilities of stablecoins to address those challenges. Chapter 2 highlights the key findings from our research, including both the advantages and limitations that stablecoins offer in the context of financial inclusion. Chapter 3 presents some requirements and conditions for stablecoins to improve financial inclusion. Chapters 4-6 detail three case studies around which our research is focused and offer a potential framework which future researchers could use to analyse the capabilities of different types of stablecoins in specific contexts and geographies.



Financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way

The World Bank



1.1 Existing barriers to financial inclusion

Many well-known barriers prevent the financially excluded from obtaining access to and meaningfully using formal financial services.⁴ A subset of barriers pertinent to this analysis, identified from [The Global](#)

[Findex Database 2017](#), published by the World Bank, can be grouped into three broad categories as follows: socio-cultural/demographic barriers, infrastructure barriers and financial barriers.

Socio-cultural and demographic barriers

These factors, which are unique to a particular nation, demography or culture, influence both access to and adoption of financial services. They can include:

- Distrust of financial services providers and/or government (including privacy concerns)
- Challenges around digital and financial literacy, as well as general literacy and numeracy challenges
- Physical safety concerns around accessing services
- Social, cultural and political barriers (including religious and gender-based barriers, and cultural views of money)

Infrastructure barriers

These factors relate to the broader capacity of the environment within which an individual lives. They can include:

- Weak or unreliable electricity supply
- Limited internet connectivity
- Limited access to mobile phones (smartphone or feature phone)
- Lack of government-issued personal identity documentation
- Lack of physical proximity to a bank or availability of services that fit needs

Financial barriers

These factors revolve around the lack of high-quality, affordable and relevant financial services, and include barriers such as:

- High prices and fees for financial products and services
- Minimum balance requirements
- Lack of digital financial history

1.2 Questions addressed by this white paper

It is suggested with some regularity that stablecoins can meaningfully address financial inclusion barriers. These claims tend not to reference specific known barriers in a region or explain in detail how stablecoins would address them. This paper aims to address that gap and evaluate in an objective manner whether stablecoins as currently deployed overcome specific barriers to financial inclusion, and to identify the principal benefits, risks and limitations of using stablecoins for this purpose.

Specifically, this white paper seeks to answer the following questions:

1. How, if at all, do stablecoins improve financial inclusion, compared to other pre-existing options; and what conditions must be met for stablecoins to succeed in supporting financial inclusion among underserved individuals and communities?
2. What new challenges or risks, if any, might stablecoins introduce?
3. What is the net conclusion for stablecoins' current value proposition, considering benefits, trade-offs and limitations?

1.3 Three case studies – three scenarios

“ It makes sense to evaluate the impact of stablecoins on financial inclusion based not on which financial services they can enable, but on whether they help meet the fundamental needs of those who are financially excluded

Our research investigation is grounded in three case studies from different parts of the world, each of which is intended to represent a different real-world financial scenario or challenge. These are described in Chapters 4-6. Stablecoins are evaluated in terms of their ability to address the specific needs and challenges in each case study. The countries were selected to capture a range of geographic, regulatory and other differences. However, they carry their own unique considerations that do not scale across geographic barriers. The challenges in scaling solutions across different contexts are not unique to stablecoins but are reflected across a variety of pre-existing options.

The three case studies or scenarios are as follows:

Scenario 1: An undocumented individual in an urban area of the United States (US), sending remittances home to Honduras

Scenario 2: A small business in India, making domestic payments

Scenario 3: A digitally savvy “gig economy” individual in urban Cameroon, receiving wages from the US

Consumers of financial services are driven by unmet needs in their lives. As such, it makes sense to evaluate the impact of stablecoins on financial inclusion based not on which financial services they can enable, but on whether they help meet the fundamental needs of those who are financially excluded. Each persona represented by our case studies has multiple financial needs, which can be summarised in line with the ground-breaking “[financial needs framework](#)” commissioned by the Bill & Melinda Gates Foundation in partnership with The MasterCard Foundation as follows:⁵

- **Transferring value:** the ability to transfer value for activities such as making a purchase, paying a supplier or sending remittances or wages
- **Maintaining liquidity:** the ability to meet one's expenses at any point in time
- **Resilience to financial shocks:** the ability to handle unexpected expenses and return to the same financial position as before the shock
- **Meeting future goals:** the ability to afford irregular but planned expenses that meet consumptive expenses (e.g. wedding), life-cycle costs (e.g. education) or productive needs (e.g. expanding one's business assets)

In each of our three scenarios, the pre-existing conditions that limit financial access and inclusion are identified up-front. These conditions are based on those that are likely for the persona, drawing from personal interviews, the World Bank's [Global Findex Database](#) (latest available data from 2017), additional online research materials and a site visit in the case of Cameroon.⁶ The scenarios were constructed in advance of the analysis, when results were not yet known. They were not adjusted over the course of the analysis. That said, a scenario written about an individual in rural Kenya, which sought to explore the role of stablecoins in an area of high mobile-money penetration, was removed after finding that there were too few significant barriers to inclusion in the specific scenario's context to be applicable to other jurisdictions (fintech innovations, rapid uptake of mobile money and government initiatives have significantly improved financial services access in Kenya).⁷

All scenarios involve a developing-market economy, since developing economies generally face higher rates of unbanked and financially underserved populations than developed economies.⁸ However, many of the findings may be applicable to historically excluded communities in developed markets as well.

To evaluate the value proposition of stablecoins for inclusion in another country (whether developed or developing), a researcher may apply the framework in this paper, identifying the specific barriers to inclusion that are present and considering the potential for stablecoins to address or bypass them within the relevant context.⁹



1.4 Defining stablecoins

There are several types of stablecoin, each of which differs in its economic and technical design, risk management procedures, quality of backing and legal protections for users.¹⁰ Our research takes a broad approach and includes within its scope any stablecoins conforming to the following definition:

Digital currencies, most often cryptocurrencies, operating primarily on distributed ledger technology (DLT), that are designed to maintain a stable value relative to a reference asset or a basket of assets.

A stablecoin's price may, for example, be pegged to the price of fiat currency such as the US dollar (achieved using US dollar collateral, typically held in banks). It may be backed by the value of other crypto-assets or commodities, or it may be supported by algorithms. Depending on the effectiveness of the stabilization mechanism and backing, the digital currency may or may not hold a stable value relative to its reference asset.

We consider all major current or potential future stablecoins, including the following, organized by market capitalization: Tether, USD Coin, Binance USD, DAI, TerraUSD, TrueUSD, Pax Dollar, Celo Dollar and Diem (formerly the Libra token; not issued at the time of writing).¹¹ Stablecoins are far from monolithic. In addition to varying design

and stabilization mechanisms, the degrees of regulatory compliance and prudence in financial and operational risk management vary greatly. Another distinction is the extent to which the stablecoin operates on a public, permissionless blockchain ledger, which is the case for most stablecoins listed above, versus a closed and permissioned blockchain ledger as is anticipated with Diem.¹²

This high degree of variance between stablecoins makes it hard to generalize. Nevertheless, the conclusions in this white paper are likely to apply across the class of stablecoins described above, while leaving space for meaningful diversity among them. Risks such as the loss of user funds from lost wallet access, insolvency at the stablecoin issuer or technical failure of the stablecoin protocol stand out as varying substantially. While these risks are significant, a detailed analysis of them is beyond the scope of this paper, which focuses specifically on issues unique to financial inclusion.¹³ The intention of this paper is to draw preliminary conclusions, based on our case studies, as to the currently visible capabilities of stablecoins, as a class of digital currency, to contribute towards financial inclusion. Readers are encouraged to employ the framework presented in this paper to evaluate the pros and cons of various types of stablecoins in other geographies and contexts.

2 | Key findings

2.1 | Stablecoins currently offer limited benefits








The principal finding of this white paper is that stablecoins are subject to many of the same barriers that constrain citizens from accessing other financial products and services, such as bank accounts, mobile money accounts or fully digital remittance providers. Where stablecoins are accessible, they generally address financial inclusion barriers to a similar degree as other digital financial services. They may also introduce new risks, which vary depending on the specific system. While different from stablecoins and not the focus of this paper, similar conclusions may be applicable for cryptocurrencies such as bitcoin that are not price-stabilized.

Overall, in the scenarios studied in this report, stablecoins as currently deployed would not provide compelling new benefits for financial inclusion beyond those offered by pre-existing options. Whether this changes over time will depend partly on how stablecoins are regulated and how much attention is paid by stablecoin

providers and services to addressing specific barriers to financial inclusion. Even then, success is not guaranteed given the complexity and scope of the problem and potential requirements related to the use of stablecoins.

Table 1 presents an analysis of how stablecoins help or fail to address existing barriers to financial inclusion in each of the three scenarios or case studies. A green-coloured box would denote that stablecoins are likely to add significant new benefits in overcoming the challenge – however, no boxes are currently coloured green for the three scenarios. A yellow-coloured box indicates mixed or uncertain potential for stablecoins to address financial inclusion challenges. A red-coloured box denotes that stablecoins do not solve the problem and could (in certain cases, depending on design choices) aggravate the situation. Meanwhile, blank boxes indicate that the barrier does not clearly arise in the scenario’s specific context.

TABLE 1 | Impact of stablecoins on financial inclusion barriers, by scenario

Financial inclusion barrier	Scenario 1: Individual in US sending remittances to Honduras	Scenario 2: Small business in rural India	Scenario 3: Digitally savvy, “gig economy” individual in urban Cameroon
Socio-cultural/Demographic barriers			
Distrust of financial service providers and/or government (incl. privacy concerns)			
Digital, financial and/or general literacy & numeracy challenges			
Physical safety concerns accessing services			
Social, cultural & political barriers (incl. religious & gender-based barriers, cultural views of money)			

Infrastructure barriers			
Weak or unreliable electricity supply			✗
Limited internet connectivity	✗	✗	✗
Limited access to mobile phones (smartphone or feature phone)		✗	
Lack of government-issued identity documentation	✗		
Lack of physical proximity to or availability of services that fit needs	✗	✗	✗
Financial barriers			
High prices & fees for financial products & services	✗		✗
Lack of digital financial history	✗	✗	
Minimum account balance requirements			✗

The remainder of this chapter analyses both the benefits and risks of stablecoins for financial inclusion through the following sections:

- Special characteristics of stablecoins for financial inclusion
- Future opportunities related to DLT

- Limitations of stablecoins for financial inclusion
- Risks of stablecoins in the financial inclusion context
- Stablecoins and cross-border transactions



2.2 Special characteristics of stablecoins for financial inclusion

Despite the general finding that stablecoins are subject to the same challenges as pre-existing options that this paper focuses on, with respect to the barriers to financial inclusion that we have identified, there are two special characteristics of stablecoins relative to pre-existing options.¹⁴ First, stablecoins may side-step issues related to consumer mistrust in traditional financial services. Second, they may uniquely provide digital financial accounts that malicious or untrustworthy actors cannot steal from.

These characteristics are shared by non-stabilized cryptocurrency such as bitcoin. While they do not meaningfully address barriers in the specific scenarios studied, these characteristics could present benefits in other situations. That said, they may be two-sided, offering advantages to financial inclusion in some cases but also suffering from drawbacks.

1. Stablecoins (and cryptocurrency) may side-step issues related to consumer mistrust in traditional financial services

In some cases, consumers and merchants who do not trust local financial service providers or the government in their jurisdiction may trust stablecoins more, due perhaps to their more decentralized nature and management. However, further evidence through surveys or other data-gathering is necessary to determine this perspective, which is likely to vary heavily across regions. It is also possible that end-users will be more suspicious of stablecoins if they are associated with fraud or other issues. In other words, trust may also turn out to be weaker for stablecoins.

The type of stablecoin issuer could be a consideration, since a large tech firm such as Facebook, which initiated the Diem project (formerly Libra), could issue stablecoins where their brand may be more trusted than local brands. However, the reverse may also be true. In these cases, the issuer's brand-value drives the level of trust more than fundamental elements of stablecoin technology (end-users may not even be aware they are employing a stablecoin).

2. Stablecoins (and cryptocurrency) may uniquely provide digital financial accounts that malicious or untrustworthy actors cannot steal from

Cryptocurrency accounts operating on public, permissionless DLT through self-custody (or "non-custodial") wallets may be unique in their ability to protect user funds from outside theft, as funds cannot be moved from an account without the correct private key or password. That said, for many end-users today, the overall risk of losing funds through user error, or through financial or technical problems with the digital currency issuer or wallet, is likely to be higher with stablecoins (and cryptocurrency) than with accounts held at regulated financial institutions or providers.¹⁵

Users who have sole knowledge of their private key information would lose access to their funds if they were to lose that information. Thus, while stablecoins and their wallet infrastructure present a unique characteristic regarding account security, they currently do not necessarily resolve barriers related to insecure or unreliable financial services. This might change over time as user interfaces and safeguards are further developed, and as more stablecoins come under regulatory purview.

2.3 Future opportunities related to DLT

If we look towards the future, stablecoins and other DLT-based cryptocurrency could bring certain additional opportunities with respect to reducing barriers to financial inclusion, depending in large part on how the ecosystem develops. This section presents four such potential benefits or opportunities.

Today, however, such identifiable opportunities come with the following limitations:

- They are sub-scale, undemonstrated or unproven, and require further research or technology development
- They are reliant on an absence of clear regulation on stablecoins (which is likely to be a temporary situation in most regions)
- They are also available through other fintech innovations.¹⁶

1. Highly open and interoperable DLT-based ecosystems (which could involve stablecoins) could drive higher competition and more open-loop payment options

“ Public, permissionless blockchains (on which many stablecoins operate) enable fully open access, by default, to the blockchain network and its data

This opportunity centres on the notion of blockchain-based ecosystems (in which stablecoins operate) enabling the growth and development of high-quality and accessible financial products that would not otherwise arise. Higher competition could promote lower-cost services that are better able to meet the needs of end-users.

Public, permissionless blockchains (on which many stablecoins operate) enable fully open access, by default, to the blockchain network and its data. This feature (which is also possible, although uncommon, using centralized technology) may lower barriers to entry and stimulate competition. Research points to lower overall costs of networking in a marketplace based on public, permissionless DLT, because rents from network effects are shared more widely among participants rather than owned by one firm, and no single firm fully controls or has access to underlying data assets.¹⁷

That said, the following unresolved questions remain:

- Will DLT prove over time to support greater openness and access for financial technology innovation and product development than centralized technology infrastructure, which can also employ open-source software or open API access? Open banking and open architectures, where APIs enable information- and data-sharing access to non-bank financial firms and technology start-ups, are examples of pre-existing opportunities for lowering barriers to entry and supporting innovation in retail payments. These are predicated on trust in the institutions involved and on the underlying information, which may vary depending on context.
- How might currently challenging aspects of DLT infrastructure influence the development of financial products and services? Such challenges include constrained scalability, network transaction fees, necessity to operate in cryptocurrency, and security vulnerabilities to smart contracts and underlying networks. Some of these challenges are the subject of intense activity in stablecoin and related ecosystems, but the outcomes are yet to be determined.

2. DLT platforms could offer new, publicly accessible and visible data sources for payment histories and account balances, facilitating credit and insurance underwriting

The premise of this notion is that the public ledgers of stablecoins (and cryptocurrencies) can serve as highly accessible digital payment histories that loan and insurance providers can use to underwrite a customer's risk profile more accurately. With more data and accurate risk profiling, loan and insurance providers could offer more affordable and plentiful services to end-users.

Notably, this activity requires users to employ stablecoins for a sufficiently high quantity of payments to ensure their payment history is informative. It would also require strong privacy protocols, as it implies publicly viewable end-user payment histories. However, such privacy protocols could increase the cost and impede the ability of providers to use such data for underwriting. For

this benefit to materialize, credit bureaus would need to recognize such payment histories, while standardized payment data formats and methods to import or aggregate data would be required.

While payment solutions based on centralized technology could also share payment history

about a customer with loan or insurance providers, cryptocurrency (including stablecoins) operating on public ledgers present information publicly by default and are not subject to the decision of an institution regarding whether to share this information.

3. DLT offers opportunities related to decentralized digital identity and compliance

DLT may potentially enable solutions related to “decentralized digital identity”, or identity credentials controlled by end-users that are verifiable and revocable within distributed ledger technology. Users could employ this digital identity in certain payments and operations conducted with stablecoins or other cryptocurrency. It could also be possible for the analysis of transactions conducted on public ledgers such as blockchains to flag risky activity and “blacklist” certain users, helping mitigate illicit and harmful activity without requiring traditional identity documentation.

The ability for these schemes to meaningfully reduce identity-documentation barriers while meeting compliance goals, and without

compromising user data privacy or creating other issues, must be more thoroughly investigated and demonstrated.

Stablecoins today that do not yet follow regulatory requirements imposed on other payment providers and money transmitters in a given jurisdiction may offer lower-cost transactions. This benefit will almost certainly dissipate when regulatory requirements are imposed, while unregulated activities can present higher risks related to fraud, illicit activity and other issues. For detailed discussions on existing regulatory and policy gaps with respect to stablecoins, refer to the white paper in this series, [Regulatory and Policy Gaps and Inconsistencies of Digital Currencies](#).

4. DLT platforms may fill a gap where financial services are not available in the region

In some regions, stablecoins might fill a gap for a “payment rail” or service that is not fully operational or able to receive transactions domestically or from across borders. This opportunity is highlighted by our case study from India in Chapter 5, where mobile payment services that do not require bank accounts remain under-developed. Stablecoins could serve as an alternative where other solutions have not been developed. In this case, stablecoins are filling a gap that has not been met by existing systems – but they do not necessarily present a unique capability.

In other regions, the gap may result from so-called “de-risking” by international banks or payment service providers, where those institutions deliberately terminate relationships with local financial institutions or money transfer operators, resulting in

a dramatic reduction in access to financial services and a commensurate increase in the cost of completing basic financial transactions, particularly in a cross-border context. Providers often engage in this behaviour because of the cost of compliance with regulations aimed at reducing financial crimes, which can be particularly high in smaller economies. The effects can be profound.¹⁸ This issue may be present in our Cameroon case study in Chapter 6, although it is difficult to confirm. In these cases, stablecoins might fill a gap effectively. That said, future regulation imposed on stablecoins or inadequate first- and last-mile digital infrastructure for the use of stablecoins in those regions may limit this opportunity, as seen in our Cameroon case study. If such infrastructure (also known as “on and off ramps”, for example, local banking) begins to proliferate, this scenario might prove significant.

2.4 Limitations of stablecoins for financial inclusion

Stablecoins and their infrastructure, as they exist today, are subject to the following common barriers to financial inclusion:

- Lack of identity documentation
- Lack of first- and last-mile infrastructure for conversions between physical cash and digital money (given limited acceptance of stablecoin for payments)
- Limited digital and financial literacy and numeracy
- Limited internet or electricity access
- Limited access to smartphones or personal computers¹⁹
- Currency conversion costs in cross-border payments
- Lack of wealth to afford basic financial services

In general, where regulation is evenly applied, stablecoins are subject to the same adoption and inclusion hurdles as other forms of retail finance. Exceptions may be fleeting in nature: for instance, it may currently be possible in some jurisdictions to access and use stablecoins without meeting compliance requirements. However, it appears likely that stablecoins will eventually be subject to similar regulatory requirements as other digital payment services within a country.

It is often suggested that stablecoins (or cryptocurrency in general) can address problems related to hyperinflation or price instability for citizens in some economies. This challenge was not a meaningful barrier in any of the case-study

scenarios, as price levels in the countries studied have remained steady.²⁰ Stablecoins might offer an easy and helpful way for an individual in a country experiencing high inflation to save funds in a hard currency such as the US dollar or Euro. That said, this ability may not be available at scale as it would entail a movement by citizens out of the domestic currency into the hard currency, which could lead to a currency crisis and escalate the price for citizens to purchase the hard currency using the local currency (as the value of the local currency relative to the hard currency would continue to decline).

Such currency substitution could also create other de-stabilizing effects in the economy and interrupt the effectiveness of monetary policy aimed at stemming the crisis (to the extent that any such policy were introduced).²¹ Moreover, the ability for stablecoins to provide easier access to major foreign currencies in local economies with capital controls may be limited by regulation. For economies without capital controls, more research is needed to assess why access to these currencies is more available through stablecoins versus other financial services.

While generally beyond the scope of this white paper, DeFi applications, which extensively operate with stablecoins, are assessed for their ability to meet financial needs, particularly as they relate to lending and insurance.²² While this space is in its early days, DeFi applications do not presently address identified gaps or meet the needs of the individuals and communities contemplated in the scenarios in this paper. It is conceivable that DeFi may provide value to the financially underserved in the future, although the relative benefits and risks will need to be assessed as the space develops, and their value-add relative to centralized financial services, assuming regulatory compliance, is not clear.²³

2.5 Risks of stablecoins in the financial inclusion context

Stablecoins, depending on their design, may introduce new – possibly serious – risks to users. The risks and downsides listed below (divided into financial/technical and non-financial/non-technical risks) are each present in at least one of the three scenarios in this report, with many present in multiple scenarios. The extent to which these risks exist in various stablecoins depends on their specific management and operations. While some stablecoins are demonstrating prudent financial management and are seeking and gaining regulatory approval, others have not yet succeeded in doing so.²⁴ These differences in the regulatory management of stablecoins are highly relevant to the consideration of risks. Some prominent examples of such differences include the following:

- In 2018 the New York Department of Financial Services approved Gemini Trust Company

Financial and technical risks

Stablecoins bring financial risks and downsides. The risk of losing stablecoin funds or losing access to those funds can arise from a number of factors, including:

- Financial failure at the stablecoin provider, due to illiquidity or insolvency caused by a digital “run” on stablecoin reserves, or mismanagement or other failure of the reserve assets or stabilization mechanism²⁸
- Lost access to move funds (e.g. from losing one’s private key or passwords, particularly if the wallet is “self-custody”)
- Stolen access to funds (e.g. if one’s private key or passwords are compromised), where bad actors steal funds
- Accidentally sending funds to the wrong recipient (transactions are irreversible)
- Falling prey to fraudulent schemes (stablecoins do not generally offer fraud protections or the ability to address such issues with human intervention)
- Technical failure at the base-layer blockchain protocol or stablecoin smart contracts, due to software bugs, smart contract exploitation, cyber-attack or other issues²⁹

“ While some stablecoins are demonstrating prudent financial management and are seeking and gaining regulatory approval, others have not yet succeeded in doing so

LLC and Paxos Trust Company LLC to issue dollar-pegged stablecoins (namely, Paxos Standard, now called Pax Dollar, and Gemini Dollar), conditional on robust policies regarding anti-money laundering, anti-fraud and consumer protection measures.²⁵

- Meanwhile, Tether, the largest stablecoin in issuance which is most often used by traders to trade into and out of cryptocurrencies, is pegged to the US dollar and has \$68 billion of outstanding tokens as of the time of writing.²⁶ However, Tether has not historically fully backed its tokens with highly liquid US dollar reserves and has at times held significant reserve shortfalls; it has also been found to repeatedly deceive clients about its reserves and is not permitted to operate in New York State.²⁷

Some of these financial risks are worth examining in more detail:

Lack of deposit insurance and full protections

Several stablecoins today lack important provisions and guarantees that protect users’ funds. As a result, funds with these issuers are likely to be at greater risk of loss than if they were held by regulated financial institutions. Unlike with domestic banking services in many countries, stablecoins are generally not subject to deposit insurance or the full protections offered by regulatory systems with respect to financial management and consumer protection.

Not all stablecoins are fully backed

Reserve and stability management are of particular concern. For stablecoins pegged to a fiat currency, users may lose their funds if the stablecoin issuer is not fully backing the stablecoin with that cash or other highly liquid and high-quality assets denominated in the stablecoin’s currency and held in bankruptcy-remote accounts. Digital “runs”, where an escalating number of users lose confidence and rapidly sell and redeem stablecoins, are a risk for all types of stablecoins.

Even where stablecoin issuance is fully backed by fiat deposits at the issuer’s account at a commercial bank, a run on the stablecoin, if large enough, could

force the commercial bank to rapidly unwind its loan portfolio to meet its deposit redemptions, causing stress to multiple banks. Deposit insurance would generally not be able to cover the stablecoin issuer's entire account (in the US, deposit insurance currently covers up to \$250,000 of deposits per depositor).

Accidental loss of funds

In the absence of consistent education around new stablecoin services, including the differences in how they operate, individuals may be at higher risk of mistakes that could lead them to accidentally lose their funds.

Higher costs

Depending on infrastructure and system design (particularly the consensus algorithm and degree of decentralization in transaction validation), stablecoins in particular and cryptocurrency in general may involve higher costs per transaction than non-blockchain-based payment infrastructure. Higher costs arise from network-level transaction fees to incentivize validators in a public network, and from higher security requirements involved in decentralized transaction verification (for instance, energy-consuming computations in proof-of-work consensus algorithms and locked-up-capital in proof-of-stake consensus algorithms).³⁰



“ Unless the ecosystem focuses deliberately on building inclusive models at scale... stablecoins may risk increasing inequality in financial services and technology access, rather than addressing it

Non-financial and non-technical risks

Stablecoins also present a number of non-financial risks and downsides, outlined below.

Widening the digital divide and gender gap

Rather than strengthen equality, it is possible that stablecoins and their surrounding ecosystems and infrastructure, as well as blockchain-based financial applications in general, could widen the “digital divide” and “gender gap” in access to financial services between those who are digitally and financially savvy, with smartphones and internet access, and those who lack these skills and technology.³¹

Early research indicates that users of cryptocurrency currently tend to be young, educated, male individuals who are already experienced in digital finance.³² Unless the ecosystem focuses deliberately on building inclusive models at scale, this trend may continue and stablecoins may risk increasing inequality in financial services and technology access, rather than addressing it.

Privacy risks

Stablecoins can create privacy risks for users owing to the public visibility of the ledger. While public addresses of users are often “pseudonymous”

(where numbers rather than names are used to identify accounts), the identity of account owners could be compromised if the accounts are associated with certain transactions or patterns. Adequate privacy protections and practices may help to mitigate or even eliminate this risk.

Concerns around illegality

Users may be subject to regulatory penalties if their use of stablecoins is or becomes illegal in a country, or if they improperly report their stablecoin activities for tax or other purposes.³³ Merchants may hesitate to accept stablecoins where they are not confident in their backing or they are suspicious of fraudulent activity.³⁴

Higher complexity

Stablecoins may include an intangible or time-valued “cost of complexity” for individuals who are not accustomed to engaging with stablecoins and cryptocurrency, where individuals perform steps such as visiting a cryptocurrency exchange, setting up a digital wallet and provisioning it with funds, and other new activities. These barriers could be addressed through technical and educational efforts, but in the absence of such efforts, these barriers may prove to be significant.

2.6 Stablecoins and cross-border transactions

Research indicates that the following factors correlate with lower-price remittances for a given corridor: remittance volumes, competition in remittance providers (particularly from money transfer operators) and accommodating AML/CFT regulations.³⁵

While it is true that disintermediation from expensive parties involved with cross-border transactions can reduce costs, doing so does not necessarily require the use of decentralized systems and can also occur through competitive payment providers operating with centralized ledgers. Moreover, payments based on DLT may entail higher costs per transaction than those based on centralized technology, as discussed in section 2.5.

Said otherwise, the decentralization of payment transactions and settlement (in terms of the

operations, agents and ledgers involved) does not fundamentally reduce or eliminate currently unavoidable, and high, costs related to currency exchange and regulatory compliance in cross-border payments. This analysis assumes that any service complies with regulation; further, should regulations change, it is assumed that any potential cost savings would apply across all providers rather than favouring those that operate on decentralized infrastructure. Stablecoin providers thus may look to the world’s most inefficient remittance corridors to provide beneficial services where other providers do not yet operate (including intra-continental corridors such as intra-African).

For additional discussion on the risks and downsides of stablecoins, see the white paper in this series [Digital Currency Consumer Protection Risk Mapping](#).

3

Requirements for stablecoins to improve financial inclusion

For many of the scenarios discussed in this paper, the following requirements and conditions are necessary to achieve financial inclusion via the introduction of stablecoins. They are expected to be relevant in most jurisdictions.³⁶ Several are also relevant requirements for existing digital payment solutions to enable wider access.

3.1 Conditions specific to stablecoins and related infrastructure or other digital payment providers

- High-quality and highly liquid reserve assets that fully back stablecoin issuance, paired with legal protections for users from issuer bankruptcy or insolvency, operational risk, market risk (volatility in cryptocurrency or other asset prices) and cybersecurity risk
- Minimum privacy, account recovery and/or other consumer protection standards and capabilities so the potential for irreversible user error is reduced, particularly for those new to engagement with digital systems
- Infrastructure to provide on-ramps and off-ramps (e.g. physical agent locations or digital services for the transition from digital or physical fiat money to the stablecoin and back again)³⁷
- Adequate transaction scalability and processing speeds³⁸
- Sufficient technical resilience and robustness
- Very low transaction fees for payments
- Sound financial governance and management, including safe and regularly audited custody of fiat or other assets backing stablecoins
- Regulatory clearance and compliance for all relevant activities (e.g. money transmission, reserve fund management, consumer protections etc.) in the country or countries in which the sender and receiver live³⁹
- Acceptance with merchants (for purchases), government (for paying taxes or receiving benefits), employers (for receiving wages) or other relevant parties; interoperability with other payment rails and services⁴⁰

3.2 General conditions for a jurisdiction to achieve financial inclusion, independent of the nature of the offering

- Adequate internet availability and access
- Adequate smartphone penetration (or ability for the financial service to operate on feature phones or other devices)⁴¹
- Education aimed at achieving digital and financial literacy and numeracy, including awareness of digital and financial risks
- Trust in digital and financial products
- Cultural acceptance of digital payments and other financial services
- National ID system or other ID solutions to meet KYC requirements
- Regulatory clarity on the new technologies and financial products that may improve financial inclusion. Specifically for stablecoins, regulatory clarity on their treatment and a comprehensive regulatory framework that governs both domestic and international use cases is necessary in many jurisdictions. This includes guidance on cryptocurrency exchanges and whether banks can connect with them or other businesses engaging with cryptocurrency or stablecoins.

Cross-border remittances to Honduras (scenario 1)

4.1 Background to remittances

“ According to the World Bank... the global average cost of sending \$200 was 6.4% in the first quarter of 2021, which is more than double the Sustainable Development Goal target of 3.0% by 2030

Remittances represent a significant source of livelihood for much of the world and several papers have studied the impact of remittances on economic development.⁴² Remittance flows to low- and middle-income countries reached \$540 billion in 2020 – more than the sum of FDI and overseas development assistance combined – and they are projected to reach \$553 billion in 2021.⁴³ Migrant inflows account for more than 6% of GDP (on average) for developing market economies, with some as high as 40% of GDP.⁴⁴ The traditional costs of securely and efficiently managing and moving money across borders have been relatively high. According to the World Bank’s Remittance Prices Worldwide Database, the global average cost of sending \$200 was 6.4% in the first quarter of 2021, which is more than double the Sustainable Development Goal target of 3.0% by 2030.⁴⁵

In addition to monetary cost, the time-cost of remittances is also high. Research has measured

the time-costs associated with sending and receiving remittances by surveying recipients in Mexico and senders in the US. The average time spent standing in line for people who *send* funds using traditional remittances is 30 minutes – this adds up to 10 days over a lifetime.⁴⁶ For people *receiving* traditional remittances, the spent waiting per transaction is 41 minutes or 15 days over a lifetime. On aggregate, Americans spend nearly 300 million hours standing in line and walking to and from a remittance-sending location. On the receiving end, Mexicans spend over 100 million hours standing in line and walking to and from a remittance pick-up location.⁴⁷ Remittances also entail an aspect of physical danger for the individuals who send or pick up physical cash from a designated location, especially for women and the elderly.

This scenario will explore the challenges associated with remittances and whether stablecoins can mitigate them in meaningful ways.

4.2 A contemporary remittance story: José

José is an immigrant from Honduras who currently lives in Houston, Texas. He emigrated to the United States recently. José’s wife Maria and their children did not make the journey north with him and live with Maria’s family in a rural village approximately 30km outside of San Pedro Sula in Honduras.

Every week, José sends money back to Maria to support their family and save up to buy a house.⁴⁸ However, as José is an undocumented worker in the US, without a government-issued ID, social security number or credit score, he faces barriers to opening a local bank account. Maria does have a bank account, but the closest commercial bank is approximately one hour away from her home.

Both José and Maria have access to smartphone devices and are reasonably comfortable with using

technology.⁴⁹ Coverage of electricity and cell service is not an issue for José, as he’s located in a large, urban area. Meanwhile, Maria generally has adequate electricity but occasionally experiences internet connectivity outages in her village.

José and Maria have enough general wealth to engage in financial services (namely remittances), although many other Hondurans are not as fortunate. Honduras is one of the poorest countries in the world, with more than 66% of its population living in poverty and approximately one in five of its rural residents living in extreme poverty (less than \$1.90 per day), according to the World Bank.⁵⁰ Indeed, 46% of adults report not having a bank account due to insufficient funds or lack of money.⁵¹

The need to transfer value

With his wages paid in physical cash and without access to a bank account to transfer value across international borders, José must use a money transmitter in the US that accepts physical cash, such as MoneyGram or Western Union. On the receiving end, Maria can receive the remittances to either her bank account or her mobile phone. She uses TIGO Money, a popular mobile money

platform operated by one of the country's largest telecom providers. MoneyGram and Western Union serve as agents for TIGO Money in the US, enabling José to send US dollars in cash through the agents to Maria, who receives the funds to her TIGO Money account.⁵² The remittance generally arrives within the hour or on the same day and costs about 2-4% depending on how much money José sends.⁵³

The need to maintain liquidity

As an undocumented worker in the US, José's income stream is cash-based and dependent on his ability to find and maintain regular employment. Given his reliance on cash, José needs to carry a certain amount to meet his expenses at any point in time. Thus, José's ability to maintain enough liquidity requires constant cash management, balancing the risk of carrying extra cash should it be needed, compared to the time it would take to retrieve additional cash.

Maria's job at the local textile factory provides a more reliable and steady stream of income, but it is insufficient to support her family and save for a house, so she is reliant on the remittances from José each week. Additionally, despite access to a traditional bank account, Maria is also highly reliant on cash; the use of credit and debit cards remains rare in Honduras and she does not have one.⁵⁴

The need to stay resilient to financial shocks

Due to the lack of credit facilities available to them, José and Maria rely on family and friends in Honduras for support during times of unexpected financial hardship, caused for example by illness or job loss. Neither José nor Maria can afford private health insurance, so if either of them (or their children) become ill they are reliant on public health services and may suffer lost wages (or even unemployment) if they cannot get

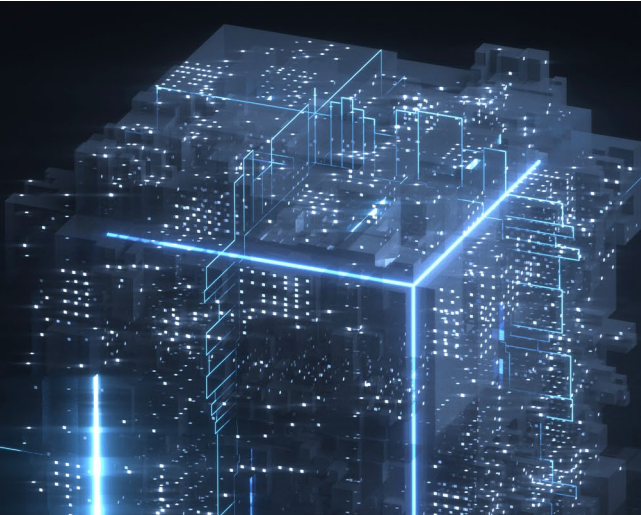
treatment in a timely manner that allows them to return to work.⁵⁵

Additionally, José requires a car to commute to work as he often needs to drive to job sites not served by public transport, while carrying equipment and tools. As such, should José lose access to a car, he may also lose wages or even his job.

The need to meet goals

As they save money to buy a house, Maria can take advantage of her bank access to put money (including funds received from remittances) into a savings account that earns a modest amount of interest. However, Maria has limited access to credit for large purchases, as retail loan markets are very limited in Honduras, with siloed credit scoring programmes and often punitive interest rates.⁵⁶

Meanwhile, José does not have a bank account, but the large Honduran community in Houston affords him the opportunity to join a *tanda* – a community savings and lending circle that allows him to save towards various goals. *Tandas* typically do not offer interest, but they do allow José to save towards known goals or for unexpected expenses that may arise.



4.3 Existing barriers assessment

Socio-cultural/demographic barriers

Financial literacy: José and his wife Maria are digitally and generally literate and comfortable working with numbers, but they have low financial literacy. While they understand the mobile money and savings programmes they engage with, they are unaware of additional financial services that could benefit their family. Although more than 87% of adult Hondurans (age 15+) are literate, the issue of financial literacy remains a serious concern.⁵⁷ According to Standard & Poor's Rating Services Global Financial Literacy Survey, Honduras ranks 123 out of 144 countries, with a financial literacy rate of 23% compared to the world average of 33%.⁵⁸

Distrust and privacy preferences: As an undocumented immigrant, José is wary of

engaging with formal financial services for fear that the US government could learn about his status as an undocumented worker and deport him.

Physical security challenges: For Maria, the issue of security is extremely relevant. Honduras is one of the most violent and dangerous countries in the world, especially for women.⁵⁹ While Maria can receive her remittances digitally and use TIGO Money for some payments, she must still use cash for several day-to-day transactions with merchants in her town. While she carries small amounts of cash, she may be targeted for theft in her daily life, especially after visits to the bank.

Infrastructure barriers

Internet connectivity: Living in a major urban area, José does not typically have issues related to internet connectivity or electricity outages. However, Maria's remote rural location can result in common internet connectivity challenges. Access to electricity has been improving and is no longer an issue: rural populations in Honduras reached 81% electricity access in 2018.

Identity documentation: Access to identification is not an issue for Maria (84% of the Honduran population has a national identity card).⁶⁰ For José, the issue is more complicated. As a non-resident living in the US, he may be eligible for an Individual Tax Identification Number (ITIN) that he could use as a form of ID, which would allow him to open a bank account. However, José's preference is to preserve his privacy, given his immigration status

and concerns around deportation. He has therefore chosen not to explore this possibility.⁶¹

Lack of physical proximity or availability of services that fit needs: For Maria, her bank is one hour away, creating a challenge of physical access and proximity when she needs to conduct banking transactions such as withdrawing cash from the bank to use in town.

Honduras lacks a developed market for retail loans where individuals can access credit for large purchases or expenses and develop a credit history that can be applied nationally. While health insurance is not required to access public healthcare in Honduras, the country lacks an effective public healthcare system that can reliably treat citizens in the event of serious healthcare needs.

Financial barriers

Affordability: José and Maria face some affordability challenges. First, they cannot afford private health insurance. Second, money transmitters in the US that accept cash charge about 3.6% in fees on average to send about \$200 from the US to Honduras.⁶² While this amount is much lower than the 6.4% global average, if José were to remit \$200 a week, he would pay about \$7 per week or \$375 per year in remittance fees, which equate to one or two weeks' worth of income for the average Honduran.⁶³ The average cost of sending \$500 at a time from the US to Honduras is even lower at 2.1%.⁶⁴

Digital financial history: Only about 34% of Honduran adults borrowed money in the past year, lower than the Latin American and Caribbean average of 38%, and well below the average for low-income countries of 46%.⁶⁵ The fact that Hondurans are unlikely or unable to borrow money limits their ability to build a credit history. While both Maria and José take advantage of community-based financial programmes, lending activity in these programmes is unlikely to be reported to credit bureaus.

4.4 Potential impact of stablecoins: filling unmet needs

Areas of unmet need are listed below, followed by a discussion of the benefits that stablecoins could bring to each area.

Unmet need #1: The ability for José to send remittances to Maria at lower cost

José faces barriers – most notably, the lack of a government ID – that currently prevent him from owning and operating a stablecoin account from the US. If some of these barriers were addressed and he were able to open a bank account (allowing him to fund stablecoin purchases) or to access an exchange to purchase stablecoins, then José would also be able to send money using digital remittance services (e.g. World Remit, Remitly or Xoom). Both the stablecoin service and the fully digital remittance service would save José time by eliminating the need to visit a physical agent in Houston. Thus, once certain financial inclusion barriers related to the fiat-to-digital “on-ramp” are addressed, multiple options for smoother digital remittances are available to José, including but not limited to stablecoins.

Stablecoins can serve as an alternative method for sending funds internationally, particularly where there is a lack of competition from remittance providers. In José’s case, the average cost of sending remittances from the US to Honduras is 2-4% and funds arrive often within the hour or the same day.⁶⁶ Once José can access stablecoins, he could compare the total costs of sending remittances through stablecoins versus available blockchain-based money transmitters. If he were

able to access stablecoins, they might provide a cheaper method for remittances than the 2-4% he is currently paying.

Assuming stablecoins are subject to regulation and compliance requirements, it is not axiomatic that sending remittances through a decentralized payment network would be cheaper than with payment networks based on centralized technology. While decentralized technologies such as stablecoins may offer an alternative payment platform and corridors where efficient ones do not exist, centralized and decentralized technologies are equally able to operate payment networks in a manner that includes few intermediaries (i.e. the centralized payment provider may serve as the sole major intermediary in the process, if it is able to operate internationally).

Moreover, in both cases, current AML/KYC/CFT compliance and other regulatory costs are irreducible, and currency exchange costs are unavoidable. Stablecoins might entail an additional currency exchange where users are unable to exchange the stablecoin with local fiat currency. Table 2 displays the cost components of sending a cross-border remittance through stablecoins.⁶⁷

TABLE 2 Cost components of sending a cross-border remittance through stablecoins

	Any on-ramp fees (e.g. from agents, banks, credit cards etc.) necessary for moving fiat money (digital or physical) onto an exchange or other service that enables the purchase of stablecoins
+	Potential exchange cost for converting starting fiat currency to stablecoin <i>(only relevant if stablecoin is denominated in another currency)</i>
+	Network or service-provider transaction fee
+	Potential exchange cost for converting stablecoin to recipient’s fiat currency <i>(only relevant if stablecoin is denominated in another currency)</i>
+	Any off-ramp fees that may be necessary for moving funds from the exchange or other service into fiat money (digital or physical) that can be readily spent in the economy <i>(this could be lessened if stablecoins obtained wide use, including with merchants)</i>
=	Total cost of sending a remittance through stablecoins



“ Biases that can result from data gathering [for insurance and loan underwriting] can arise with both centralized and decentralized technology infrastructure

Unmet need #2: Availability of loan options with affordable pricing and ability to develop a credit history that can be used across many loan providers in Honduras

Currently, neither stablecoins themselves nor applications developed in blockchain and DLT ecosystems (such as DeFi applications) offer lending services that meet this need for Maria and José.

While DeFi applications exist on blockchain technology that allow users to engage in peer-to-peer lending and borrowing, loans are denominated in cryptocurrency (including stablecoins) and usually require over-collateralization due to volatility in collateral assets (particularly in non-stabilized cryptocurrency) and absence of credit evaluation. They also typically entail non-trivial transaction fees and borrowing interest rates (for instance, the current cost to borrow the USD Coin stablecoin in Aave and Compound, two leading DeFi lending protocols, is approximately 8%).⁶⁸ Some DeFi services are starting to perform credit evaluation on borrowers, with a goal to draw from data and financial history outside the blockchain ecosystem in the future.⁶⁹

Assuming consistent regulation is enacted, the advantages these services may present relative

to those based on centralized technology infrastructure are unclear (while disadvantages related to consumer protection and the use of cryptocurrency are present), although they may serve to fill a gap where other lending services do not exist because of a failure to provide such services on the part of existing institutions.

It is also possible that a publicly visible payment history from using stablecoins could be used for credit-underwriting. However, this would require extensive use of stablecoins for payments, which is currently unfeasible in Honduras owing to factors including highly limited acceptance, requirements to employ a smartphone, on/off-ramp and currency exchange frictions and the presence of transaction fees. It also entails privacy risks, as user transactions are generally visible on the public ledger. Lastly, it is possible for payment histories to become visible or shareable using data from mobile money providers operating on centralized technology, which could address this problem without the need for a new system.

Unmet need #3: Access to affordable and suitable health and automotive insurance

Currently, neither stablecoins themselves nor decentralized finance applications developed in blockchain and DLT ecosystems (such as DeFi applications) offer suitable health or automotive insurance policies that fit this need for José and Maria. As a result, they are unable to meet this need today.

Overall, the insurance market suffers from both a lack of data on individual customers for risk assessment and on market data from which to derive risk models. It is possible in the future that if individuals utilize a stablecoin for a wide array of financial activities, that data could potentially be leveraged by insurance companies to offer

tailored services while better understanding the broader environment. That said, this activity can entail privacy risks and is predicated on the extensive use of stablecoins, as discussed above.

Regardless of the technology infrastructure that underlies the insurance solution, data collection for insurance underwriting could create discrimination against those with little activity as they grow their profile or against those with unfavourable activity, resulting in exclusion or high premiums. There is the risk of bias as data informing risk models needs to be representative. Biases that can result from data gathering can arise with both centralized and decentralized technology infrastructure.

4.5 Potential impact of stablecoins: addressing barriers to inclusion

In addition to their ability to address gaps for products and services, stablecoins can also be assessed against their ability to address barriers to financial inclusion. Table 3 describes whether stablecoins meet and address the specific financial inclusion barriers and challenges in this scenario.

TABLE 3 Do stablecoins address financial inclusion barriers in scenario 1?

Financial inclusion barrier	Challenges present in scenario 1	Do stablecoins address the challenges for this scenario?
Socio-cultural/Demographic barriers		
Distrust of financial service providers and/or government (incl. privacy concerns)	✗	MAYBE – Stablecoins often enable transactions from pseudonymous accounts, which could alleviate some of José’s privacy concerns related to deportation. That said, from a technical perspective they are currently no more able to do so than other financial services. In both cases, compliance requirements necessitate José’s identity and documentation to be provided, offsetting this opportunity.
Digital, financial and/or general literacy & numeracy challenges	✗	NO – Stablecoins generally require higher digital literacy than pre-existing services and have weaker consumer protections. They may especially pose a risk to those who are not financially or digitally savvy.
Physical safety concerns accessing services	✗	MAYBE – While Maria has access to mobile and bank payments, she must still use cash for many daily purchases. Any digital payment services (including but not limited to stablecoins) that are widely adopted by merchants and thus reduce Maria’s need for cash would reduce her physical safety risks.
Social, cultural & political barriers (incl. religious & gender-based barriers, cultural views of money)		This barrier is not present in this scenario.
Infrastructure barriers		
Weak or unreliable electricity supply		This barrier is not present in this scenario.
Limited internet connectivity	✗	NO – Stablecoins do not meaningfully resolve barriers related to low internet connectivity. Usually, the internet is needed for transactions with stablecoins. However, as with other financial technology, Bluetooth and near-field communication (NFC) networking could be employed for offline transactions in proximity, and the payment network may tolerate a limited number of offline transactions during short periods. Double spending risk is often present in these activities, as it is hard to account for ownership changes in the digital money.

Limited access to mobile phones (smartphone or feature phone)		This barrier is not present in this scenario.
Lack of government-issued identity documentation	×	MAYBE – Stablecoins will generally be subject to compliance requirements for identity documentation for AML/CFT purposes, particularly for transaction sizes that exceed certain thresholds. Small transaction sizes may not require identity documentation, for stablecoins or pre-existing money transmitter services (no unique value-add of stablecoins, assuming regulation is applied equally to them and pre-existing services).
Lack of physical proximity to or availability of services that fit needs	×	NO – Stablecoins are not currently accessible to José and thus do not solve these barriers. Once accessible, they may resolve Maria's physical proximity challenges, to the extent they serve as a substitute for banking activities. They may also support the development of credit or insurance services in the future, although this possibility is uncertain and it is not clear that such services would be more suitable or available than with centralized technology infrastructure.
Financial barriers		
High prices & fees for financial products & services	×	MAYBE – It is possible, though not guaranteed, that the total cost of a stablecoin transaction for the case of the US-Honduras corridor is cheaper than José's current options, which cost approximately 2-4%. Once stablecoins become accessible to José and Maria, the costs of each method can be identified and compared.
Lack of digital financial history	×	MAYBE – A publicly viewable stablecoin transaction ledger could be used as a new form of information on payment/financial history and account balances to underwrite loans and insurance. That said, the stablecoin would need to be heavily used and this practice entails privacy concerns.
Minimum balance requirements		This barrier is not present in this scenario.

José currently cannot access stablecoins as he lacks identification that would allow him to open a bank or other financial account that would serve as the on-ramp for him to convert his US dollar cash wages to stablecoins. If fiat-to-stablecoin exchange were unnecessary (for instance if José's employers pay him in stablecoin), José may need to have government ID to legally use a stablecoin wallet due to the AML/CFT compliance requirements. In short, the benefits of using stablecoins for remittances will be limited by many of the same financial inclusion barriers José already faces. Moreover, once the barriers that allow for stablecoins are addressed, José would also be able to access a bank account from which he could send funds to Maria using a digital remittance provider.

Applying this scenario to cases around the world, the value proposition for lowering the cost of remittances depends on an analysis of the total costs of sending a stablecoin transaction

versus remittances using pre-existing options. High-potential regions are those where pre-existing remittance costs are high and where local conditions enable the use of stablecoins (e.g. presence of requisite digital infrastructure, regulatory clarity etc.). In these cases, sending remittances through stablecoins might be cheaper. Corridors with low competition from remittance providers, such as intra-African corridors, appear more likely to benefit from new remittance options.

Where remittance corridors are already efficient, the total cost of stablecoins coupled with risks such as accidental loss of funds or private keys may make them less favourable than pre-existing options. Moreover, careful recognition of the pre-requisites for individuals to realistically access stablecoins is necessary. Once many of those are met, pre-existing fully digital remittance options are also likely to become accessible and may provide a viable or even preferable alternative.

5

Financial inclusion for SMEs in India (scenario 2)

5.1 Background: unmet needs of SMEs in India

“ Despite the importance of SMEs to economic growth, access to finance is a key obstacle they face as they attempt to grow their businesses

Small and medium enterprises (SMEs) constitute about 90% of businesses and more than 50% of employment worldwide.⁷⁰ In developing economies, formal SMEs contribute up to 40% of GDP and create 7 out of 10 jobs. These numbers are likely to be significantly higher when informal SMEs are included. Despite their importance to economic growth, access to finance is a key obstacle facing SMEs as they attempt to grow their businesses. It is estimated that 40% of these enterprises in developing countries have unmet financing needs amounting to \$5.2 trillion every year. This funding gap often leaves them relying on personal funds or funding from friends and family.

India has more than 63 million SMEs, accounting for over 80% of all industrial enterprises in the country. The credit gap for Indian SMEs amounts to \$230 billion, posing serious working capital challenges.⁷¹ These challenges are a result of a working capital cycle where SMEs are required to pay upfront for their inputs and employees, while waiting for sales to result in payment. In times of stress, the

likelihood that payments are delayed increases and exacerbates an already vicious cycle.⁷²

These troubles are felt even more strongly by women in India. Social attitudes and biases, difficulty in securing collateral-based loans and low financial literacy are often cited as reasons for a lack of access to institutional finance. As most women do not hold property, they are often excluded from collateralized loans. And since most women-owned SMEs (95%) are unregistered, they are not eligible for institutional finance. Plus, women are turned down for credit at a rate twice that of men. Finally, according to survey data, Indian females leading SMEs that do receive funding are often underserved, with a sanctioned loan amount averaging just 68% of the amount required.⁷³

This scenario will explore whether stablecoins could help bridge the SME funding gap and overcome the gender bias currently evident in access to institutional finance for SMEs in India, among other challenges.

5.2 Challenges of a small business in India: Gita

Gita is an entrepreneur operating an international kitchenware reseller that has enabled last-mile delivery to rural areas a few hours north of New Delhi. Her company sells international goods, typically sourced from China, that she buys in New Delhi and transports to communities around her hometown. Gita leverages intermediaries as her suppliers since her current order sizes are not sufficient to justify freighting separate containers directly from China.

Gita's company currently employs five people: three drivers, an employee responsible for sourcing located in New Delhi and an administrative assistant. Gita focuses on gaining new clients in her surrounding villages while defining the strategy of the company. The company has a small office in Gita's village, rents a small office in New Delhi, and owns two small trucks and a car, which are available to her drivers.⁷⁴

The need to transfer value

Gita has three main needs when it comes to transfer of value. First, Gita needs to pay her employees. This is typically done in cash for deliveries that have already been completed, when the drivers pick up inventory for a new delivery. It is difficult for the drivers as they typically do not return to the company's headquarters soon after a delivery, leaving them without payment for a period. As the

team grows, finding a solution to manage the payroll has become increasingly critical.

Second, Gita needs a convenient way to receive payments from her clients. Payments are typically collected in cash by the drivers at the time of delivery. As a result, her drivers can sometimes be carrying large sums of cash over long distances,

which can put them in danger of theft. They also only deliver the cash to Gita when her town is close to their route, which means she does not have immediate access to those funds. India is very much a cash-economy. Consequently, while Gita would prefer digital payments from her clients, they still prefer to pay in cash. Motivations for cash use by consumers in some regions of India

appear to include the avoidance of sales taxes and expectations that digital payments made to small retailers will entail higher fees than cash payments.⁷⁵

Third, Gita must pay her suppliers, which she typically does by bank cheque. This can occur when she or her drivers visit New Delhi to purchase inventory from the suppliers.

The need to maintain liquidity

Cash usage causes a delay between the time at which Gita pays for her goods from the suppliers to the point at which she receives cash payment for the same goods from her drivers. Gita thus often struggles with cash flow issues. In addition, there is seasonality to her business with summer sales

being much higher than winter sales. While she can lower purchase of inventory during those times, she still has fixed costs she needs to cover such as rent and internet service. Gita wishes she had access to loans or a line of credit that could help her cover costs while she awaits payments.⁷⁶

The need to stay resilient to financial shocks

Gita's primary business risk is her vehicles. They are dated and only have the minimum required third-party liability insurance. This leaves her vulnerable to costs associated with accidents caused by her drivers. She is also unsure whether the personal vehicles that her drivers sometimes use are covered. Many Indians stop purchasing mandatory car insurance after the first few years of car ownership, with over half of vehicles registered still uninsured.⁷⁷

Road accidents are common in India, and they can not only damage the car but also damage the merchandise and injure her driver. In addition, the roads to the villages she serves are of low quality and have damaged her vehicles. If a car needs repair, Gita must worry about paying repair costs as well as dealing with a delay in deliveries or the need to pay her drivers extra to use their own cars. Vehicle theft is also on the rise.⁷⁸

The need to meet goals

When Gita first started her business, she did so with the financial support of her family. However, now that she's looking to expand, her family cannot help her cover the amounts required. Looking to the future, she would first like to start upgrading her vehicles and buying more of them. She needs financing for new vehicles.

Gita would also like to be able to offer faster delivery and more selection by holding an inventory of products. This would require her to rent storage space as well as obtain the capital to purchase additional inventory.

5.3 Existing barriers assessment

Socio-cultural/demographic barriers

Digital and financial literacy: While Gita is digitally and financially literate, some of the people with whom she engages in financial operations may not be (this could include customers, drivers and suppliers). Across India there is a low financial literacy rate of 24%, which is below the world average.⁷⁹

(see section 5.2), limiting the popularity of mobile and bank payments.

Socio-cultural factors: India has a cultural preference for cash over digital payments

Gender inequality, particularly regarding financial access, is a significant issue in India. World Bank Findex data shows that females in India lag their male counterparts in numerous financial areas, including account ownership, debit card ownership, mobile phone subscriptions and access

to emergency funding.⁸⁰ Women also repeatedly report having more difficulty in obtaining financial services. Loan applications of female entrepreneurs are more likely to be delayed or rejected. Over 70% of the total finance requirement of women entrepreneurs in the country is considered unmet.⁸¹

Physical security concerns: Receiving her payments in cash makes Gita very aware of security issues. She is worried for the safety of her drivers that are collecting the cash. Carrying large sums of money makes them vulnerable to theft and physical harm.

Infrastructure barriers

Internet connectivity: Gita, like 95% of Indians, has access to electricity. However, only about 50% of the country has internet access. Gita's small New Delhi office has internet access and she travels there when she needs to perform monthly business activities.⁸² However, many of her clients have limited or no internet access, challenging their ability to engage with internet-based digital payments.

Mobile phone access: Gita does not currently have a smartphone, but she's been considering upgrading to one from a feature phone for her business. While there is a trend that Indians are moving from feature phones to smartphones, only about 26% of Indians (and 14% of Indian women) own a smartphone.⁸³

Lack of availability of services that fit needs: India has a growing mobile payment industry; however, mobile payment transactions remain under 20% of point-of-sale transactions.⁸⁴ India's Unified Payments Interface (UPI) supports mobile money activity; UPI is a banking industry-sponsored protocol that allows for mobile payments to move funds directly to and from an individual's bank account. Mobile money systems that do not require a bank account have slowed down in growth, leaving those without bank accounts with few, if any, options.⁸⁵ Thus, Gita's clients without bank accounts are less able to leverage the mobile payment systems available.

Financial barriers

Lack of financial history: More than 80% of all retail outlets in India – most of them sole proprietorships or “mom-and-pop” shops – operate in the cash-driven economy. Gita's business is included, although she

pays cheques to her suppliers. Because a large part of their trade happens in cash, owners of these businesses often do not generate the strong financial records needed to apply for a bank loan.⁸⁶

5.4 Potential impact of stablecoins: filling unmet needs

Areas of unmet need are listed below, followed by a discussion of the benefits stablecoins could bring to each.

Unmet need #1: Ability to receive sales revenues and to pay employees electronically, in order to maintain cash flow and liquidity, and reduce safety and security risks

With digital payments of any kind (including but not limited to stablecoins), Gita could receive sales revenues and pay employees electronically rather than with cash. Currently, preferences for cash usage instead of digital payments, and barriers related to

internet availability, digital and financial literacy, mobile phone access and other factors inhibit Gita's ability to use pre-existing mobile and bank payment options with her employees and customers. These barriers are not necessarily overcome or avoided by stablecoins.⁸⁷

Unmet need #2: Loans to grow the business and manage liquidity during sales seasonality

Currently, Gita cannot take out loans due to her limited financial history and, potentially, gender

biases. As discussed in scenario 1, transaction history as captured by stablecoins could

possibly be shared with credit providers for loan underwriting. For an SME, this practice would be similar to cashflow-based loans suitable for SMEs with limited collateral. Other forms of digital payments also have this capability and this practice can entail privacy risks.

New DeFi projects and applications might possibly provide Gita with access to suitable and affordable lending services in the future,

notwithstanding the challenges related to DeFi listed in scenario 1. However, assuming even regulation and wide access for both, it is currently unclear (particularly given the nascency of DeFi offerings) in what manner such DeFi lending applications would reduce biases stemming from gender or offer more suitable or accessible services than lending solutions operating on centralized infrastructure. As DeFi evolves, this clarity may emerge.

Unmet need #3: Affordable and suitable insurance options for Gita’s delivery vehicle fleet

As seen in scenario 1, neither stablecoins themselves nor applications developed in blockchain and DLT ecosystems (such as those in the DeFi ecosystem) currently offer insurance policies that suit this need of Gita’s. While such services may be developed in the DeFi ecosystem in the future,

it is not evident that insurance products and services operating on DLT will offer benefits relative to traditional or centralized-technology options (assuming even regulation). They may also present risks to user privacy, as transactions operating on public blockchains are generally publicly visible.⁸⁸

5.5 Potential impact of stablecoins: addressing barriers to inclusion

In addition to their ability to address gaps for products and services, stablecoins can also be assessed against their ability to address barriers

to financial inclusion. Table 4 describes whether stablecoins meet and address the specific financial inclusion barriers and challenges in this scenario.

TABLE 4 Do stablecoins address financial inclusion barriers in scenario 2?

Financial inclusion barrier	Challenges present in scenario 2	Do stablecoins address the challenges for this scenario?
Socio-cultural/Demographic barriers		
Distrust of financial service providers and/or government (incl. privacy concerns)		This barrier is not present in this scenario.
Digital, financial and/or general literacy & numeracy challenges	✗	NO – Stablecoins generally require higher digital literacy than pre-existing services and have weaker consumer protections. They may especially harm those who are not financially or digitally savvy.
Physical safety concerns accessing services	✗	MAYBE – Any digital payment solutions that are widely adopted, including but not limited to stablecoins, could address this issue for Gita’s firm. Cultural preferences towards cash are likely limiting adoption of pre-existing mobile and digital payment solutions.

Social, cultural & political barriers (incl. religious & gender-based barriers, cultural views of money)	×	MAYBE – Stablecoins may enable more equal lending access for Gita in the future, although not necessarily in a manner that is better relative to other technologies. Apart from potentially supporting tax avoidance (which is contradictory to public policy goals and may disappear with mandatory KYC procedures), stablecoins do not generally address cultural preferences in India towards cash.
Infrastructure barriers		
Weak or unreliable electricity supply		This barrier is not present in this scenario.
Limited internet connectivity	×	NO – Stablecoins do not meaningfully resolve barriers related to low internet connectivity (see scenario 1 for further information).
Limited access to mobile phones (smartphone or feature phone)	×	NO – Stablecoins currently require smartphone (or personal computer) access.
Lack of government-issued identity documentation		This barrier is not present in this scenario.
Lack of physical proximity to or availability of services that fit needs	×	MAYBE – Stablecoins might serve as an alternative for mobile money payments in the absence of mobile money options in India for those who lack a bank account. Non-blockchain based mobile money services, to the extent they become available, could equally address this gap.
Financial barriers		
High prices & fees for financial products & services		This barrier is not present in this scenario.
Lack of digital financial history	×	MAYBE – A publicly viewable stablecoin transaction ledger could be used to share payment and financial history and account balances to underwrite loans or insurance. That said, the stablecoin would need to be heavily used and this practice entails privacy concerns.
Minimum balance requirements		This barrier is not present in this scenario.

Overall, stablecoins in their current form generally do not resolve acute areas of unmet need and barriers to financial inclusion for Gita and her small business. They could serve as a method for Gita to engage in digital payments with her clients and staff (in the absence of other digital payment services), but not in a manner that is necessarily more appealing or beneficial (while still being compliant with tax policy) than other pre-existing or future mobile or bank payment options. The benefits that stablecoins can provide largely relate to filling a gap for digital payment

infrastructure and product options available to those without a bank account.

A final and critical issue to consider is that usage of a stablecoin in India could put Gita at risk of legal difficulties. This is due to recently proposed legislation that would criminalize possession, issuance, mining, trading and transferring of crypto-assets within India.⁸⁹ While this legislation may not be passed, it could be risky for Gita to currently adopt any stablecoin that is not officially sanctioned by the Indian government.

6

International wages in the online labour economy (scenario 3)

6.1 Background: international wages and the gig economy

“ Could stablecoins help overcome the current wage payment challenges faced by individuals who work remotely and receive payment for their services from overseas? ”

The internet has given rise to a widespread global online labour economy. Also known as the “gig economy”, it has enabled previously non-existent employment opportunities for millions around the world, including in developing economies. The online labour market in professional services, which engages a significant number of contracted workers from developing nations, constituted \$7.7 billion in gross volume in 2018. It is estimated to grow to \$17.4 billion in 2023.⁹⁰

In particular, the increase in internet penetration on the African continent has meant young Africans, who make up over 60% of Africa’s population,⁹¹ have found paths to employment across national borders. According to GSMA data from 2019, 272 million people in sub-Saharan Africa are mobile internet users, correlating to a penetration rate of 26%. It is predicted that by 2025, the penetration

rate will reach 39%, resulting in 475 million mobile internet users.⁹²

This uptick in internet penetration has led to skilled Africans, especially in the domains of technology, graphic design and website design, providing their skills to the global labour marketplace. With half of the demand for such labour originating from the US, followed by the United Kingdom, Canada and Australia,⁹³ one challenge this new landscape presents is that of international wage payments.

This scenario will explore whether stablecoins could help overcome the current wage payment challenges faced by individuals who work remotely and receive payment for their services from overseas. Do stablecoins improve the ability for tech-enabled “gig economy” workers on the African continent to be paid across borders?

6.2 Wages for a remote worker based in a developing economy: Yannick

Yannick is a 25-year-old web and graphic designer who lives in his own apartment in Yaoundé, Cameroon.⁹⁴ He comes from a lower-middle class family and has three siblings. Apart from fulfilling his own financial needs, he has financial obligations toward his family. He has an elder brother who lives in the US and together they provide financial support for the education of their younger siblings, one of whom is in secondary school and the other at university. They also support their parents financially in meeting all other family needs.

For the past three years, Yannick has been doing freelance work for a variety of companies based abroad. Most recently, he’s been working with a

real estate development company headquartered in Florida, US. Yannick renders his services and gets paid on a per project basis. Therefore, payment is received upon completion of a project, or on the completion of milestones for longer-term projects. This averages out to monthly payments for his services given the nature of most projects.

Yannick is digitally and financially savvy. He has a bank account, government ID and smartphone. He is among the 30% of Cameroonians with an account at a financial institution and his educational status, steady work and urban dwelling allow him greater access to financial services than most of his compatriots.⁹⁵

The need to transfer value

Yannick's employer pays his wages in US dollars to an account at an international payment service provider (PSP), as this is most convenient for the employer. With this, Yannick faces an obstacle: in Cameroon, the PSP does not allow customers to link their PSP account to their domestic bank accounts, which would enable withdrawals. Thus, Yannick cannot directly transfer his wage payments from the PSP to his bank account. Given the need for a workaround solution, the company pays the wages to his brother's US-based PSP account.

Yannick's brother withdraws and sends the money to him in Cameroon through a money transmitter. He can use fully digital or in-person remittance providers. He often makes the choice of provider based on the most favourable exchange rate at the time of sending. To reduce time and expense (the time to travel and wait in line for the in-person money transmitter and the higher fee percentage for sending smaller amounts), his brother typically bundles Yannick's salary and transfers it to him every two months, unless there is an urgent need. Yannick picks up the money at a money transmitter location in Cameroon (e.g. Western Union or MoneyGram).

Yannick incurs a transportation cost as he pays for his ride to and from the location by taxi (approximately 4-6 km away). Sometimes, on arrival at the money transmitter, Yannick is informed they do not have an internet connection and they are unable to process his transaction. When this occurs, Yannick is forced to go to another location to pick up his money. When the exchange rate is more favourable or equivalent through a digital remittance provider, Yannick's brother sends the money directly to Yannick's bank account, eliminating the need for Yannick to go to a physical pick-up location.

Yannick's employer could alternatively use a digital money transmitter service (e.g. World Remit or Xoom) that would allow Yannick's wages to be sent directly to his Cameroonian bank account. His employer would need to go through the extra steps potentially involved and pay the transfer and foreign currency exchange fees (these extra costs may be deducted from Yannick's wages). Unfortunately, for the US-to-Cameroon corridor, these options tend to have less favourable exchange rates than remittance providers that operate with in-person, cash-in and cash-out processes.

The need to maintain liquidity

As a freelancer, Yannick sometimes has periods where he has no work and is searching for new contracts. At times he faces gaps in income for which he must save. He also needs a safe and reliable place to save his money for the two-month period between receiving the wages that his brother sends to him.

Yannick has a checking and savings account at BICEC (Banque International du Cameroun pour l'Épargne et le Crédit). His savings account at

BICEC requires him to contribute a minimum of 20,000 FCFA (XAF) a month (approximately \$37 US dollars). This is because he chose a savings account type that is helping him save towards future purchases such as a home. Yannick also holds short-term savings in his MTN Mobile Money account to plan for the utility bills that he pays using MTN Mobile Money. For this, he can transfer funds directly from his BICEC checking account to his MTN Mobile Money account (and vice versa).

The need to stay resilient to financial shocks

A little over a year ago, Yannick had a serious accident on a motorcycle taxi, a popular means of urban transportation in Cameroon. Fortunately, his brother in the US took care of all the hospital bills, which he was unprepared for. Out of this experience, he has been investigating health

insurance. However, Cameroon lacks a reliable and accessible marketplace for health insurance, and individuals who do not work for major corporations are generally unable to attain it.⁹⁶ Generally, an individual's family and community help to cover their medical costs in the event of a substantial bill.

The need to meet goals

Yannick continually invests in his professional development by taking online courses in web and graphic design. He must save towards these expenses. Yannick also wants to purchase an upgraded laptop within the next year, which will help him to improve the quality and efficiency of his work. If he has not saved enough money, he will take out a small loan. He can access loans through his bank, BICEC, but for small amounts such as the

amount needed for a laptop, he and Cameroonians prefer to borrow from a savings and lending group, called a *Njangi*. He can borrow from the *Njangi* without paying interest. In the *Njangi*, he pools money together with a group of friends and each can draw the total sum contributed on a rotating basis.⁹⁷ Cameroon is among the top seven sub-Saharan African economies where informal savings clubs such as *Njangi* groups are most used.⁹⁸

6.3 Existing barriers assessment

Socio-cultural/demographic barriers

Physical security challenges: Although Yannick does not typically feel unsafe in Yaoundé, he has concerns about transporting the cash picked up

at the money transmitter to the bank for deposit. Therefore, he does his best to conceal the cash, but carrying it remains a risk.

Infrastructure barriers

Internet connectivity: In general, there is high-speed internet connectivity in Yaoundé, but it is expensive and prone to network issues. Yannick relies heavily on his internet connection and thus is willing to pay high fees to ensure access. He subscribes to a monthly internet plan from MTN and connects to the internet on his laptop through a mobile wi-fi modem. Despite subscribing to this monthly plan, he has daily caps on his data usage.⁹⁹ Beyond this, he is at times subject to internet outages that disrupt his connectivity.

Yannick's financial activities. If a money transmitter branch is closed due to a power outage, he cannot withdraw funds with it. If his mobile phone or laptop are out of power from an outage, he cannot use them to conduct financial transactions.

Electricity: Electricity outages occur in Yaoundé and across Cameroon, leading to a disruption in some of

Lack of availability of services that fit needs: Cameroon has a scarcity of health insurance providers that serve individuals.¹⁰⁰ Health insurance is very difficult to obtain for individuals who do not work for major multinational corporations. Relatedly, the historic absence of insurance results in low acceptance by health service providers.

Financial barriers

Affordability challenges: The current process for Yannick to receive his wages from the US is costly in terms of time and price. At a minimum, the process entails foreign exchange costs and fees paid to the money transmitter service used.

requires him to contribute a minimum of 20,000 FCFA (about \$37 US dollars) per month to his savings account, Yannick is under some pressure to maintain a consistent income to keep up with account minimums. The contributions he makes to maintain his BICEC account also limit his funds for an account at a secondary institution that might have provided him a good loan for his laptop.

Minimum balance requirements: As a freelancer and someone banked under an institution that

6.4 Potential impact of stablecoins: filling unmet needs

Areas of unmet need are listed below, followed by a discussion of the benefits stablecoins could bring to each.

Unmet need #1: Ability to receive wages affordably and efficiently for overseas freelance work

Once certain barriers are addressed, stablecoins could serve as an alternative method for Yannick to receive his wages from the US. As with scenario 1, the total cost of sending the wage through stablecoins should be compared with sending wages through other existing options. Most simply, Yannick's employer could open a stablecoin account and transfer Yannick's wages from that account (which would include an exchange operation to the stablecoin from US dollars) to a stablecoin wallet in Cameroon that Yannick could use.¹⁰¹ However, the difficulty of this transaction for Yannick appears to be in the "off-ramp".

Yannick would need to identify an exchange in Cameroon where he could send the funds, exchange them to local currency and transfer those funds to a financial account from which he could spend them. This "off-ramp" would be necessary because cryptocurrency and stablecoins are not currently accepted for payment at the places where Yannick needs to spend money. Moreover, cash is used for most daily purchases in Cameroon and is more prevalent than mobile money or commercial bank money.

"On-ramp/off-ramp" issues exist with cryptocurrencies (including stablecoins) in Cameroon. There is a limited set of cryptocurrency exchanges and they do not connect with bank or other financial accounts. In today's environment in

Cameroon, Yannick faces great difficulty converting his wages from stablecoins into spendable local currency. The Government of Cameroon has not yet issued legislation on cryptocurrencies, so there is currently no regulation or framework for their use.¹⁰² The lack of regulatory clarity has limited the existence of local cryptocurrency exchanges and the willingness of banks and mobile money providers to connect with them.¹⁰³ Regulation is currently underway and may resolve these issues in the future.¹⁰⁴ Notwithstanding, Yannick is relatively privileged, as most Cameroonians would struggle with the basic digital infrastructure needed for stablecoins. Most still use 2G feature phones and lack access to the internet. Many also struggle to meet basic financial needs.

If he received his wages more frequently, Yannick could address some of his current liquidity-management challenges. One challenge results from the fact that his bank requires minimum balances. Stablecoins could potentially serve as an alternative place to store his savings, enabling him to avoid the bank account. However, Yannick may need a bank account for various purposes in his daily life, and he is likely to prefer the safety (e.g. through deposit insurance¹⁰⁵ and other protections) that it provides. Another potential solution for this challenge would be for Yannick to consider alternative bank or account types with easier minimums.¹⁰⁶

Unmet need #2: Ability to obtain affordable and suitable personal health insurance

As discussed in the first scenario, it is unclear how stablecoins would directly benefit Yannick in terms of insurance, aside from the possibility in the future that globally available insurance products and services might arise in the DeFi and blockchain

ecosystems. This possibility may not necessarily occur and it is important to identify why, assuming even regulation, such a gap would be better filled with the presence of a blockchain-based ecosystem rather than the pre-existing environment.

Unmet need #3: Availability of loan options

Yannick currently has some access to loans, although more options could be beneficial to him (for instance, he can currently only take out loans from his community *Njangi* at certain periods). As mentioned in the first scenario, stablecoin and the

blockchain-based DeFi ecosystem might develop capacities to support this in the future (e.g. through DeFi lending protocols), but it is unclear why they would necessarily be more available or suitable than lending based on centralized technology.



6.5 Potential impact of stablecoins: addressing barriers to inclusion

In addition to their ability to address gaps for products and services, stablecoins can also be assessed against their ability to address barriers

to financial inclusion. Table 5 describes whether stablecoins meet and address the specific financial inclusion barriers and challenges in this scenario.

TABLE 5 Do stablecoins address financial inclusion barriers in scenario 3?

Financial inclusion barrier	Challenges present in scenario 3	Do stablecoins address the challenges for this scenario?
Socio-cultural/Demographic barriers		
Distrust of financial service providers and/or government (incl. privacy concerns)		This barrier is not present in this scenario.
Digital, financial and/or general literacy & numeracy challenges		This barrier is not present in this scenario.
Physical safety concerns accessing services	✘	MAYBE – If Yannick were eventually able to conveniently access stablecoins for receiving wages, he would no longer need to carry cash from a money transmitter office. Note: This is also possible using a digital money transfer service.
Social, cultural & political barriers (incl. religious & gender-based barriers, cultural views of money)		This barrier is not present in this scenario.

Infrastructure barriers		
Weak or unreliable electricity supply	×	NO – Stablecoins depend on availability of electricity.
Limited internet connectivity	×	NO – Stablecoins do not meaningfully resolve barriers related to low internet connectivity (see scenario 1 for further information).
Limited access to mobile phones (smartphone or feature phone)		This barrier is not present in this scenario.
Lack of government-issued identity documentation		This barrier is not present in this scenario.
Lack of physical proximity to or availability of services that fit needs	×	NO – Currently, stablecoins do not present suitable insurance or lending products for Yannick.
Financial barriers		
High prices & fees for financial products & services	×	MAYBE – Currently, stablecoins cannot address this barrier owing to “off-ramp” challenges from cryptocurrency to local currency in Cameroon. However, in the future, they may serve as an alternative method for Yannick to receive overseas wages, depending on regulatory guidance, and digital and cryptocurrency infrastructure development in Cameroon. That said, it is not self-evident that stablecoins would enable Yannick’s wages to be sent in a way that is cheaper than or superior to technology based on traditional or centralized infrastructure.
Lack of digital financial history		This barrier is not present in this scenario.
Minimum balance requirements	×	MAYBE – Once Yannick can access stablecoins, a stablecoin account can serve as an alternative deposit account without balance minimums. This may prove beneficial, although it is also available with other bank account options accessible to Yannick today.

Stablecoins are currently unable to solve Yannick’s financial challenges. In the future, depending on regulatory clarity and the development of digital infrastructure and local cryptocurrency services in Cameroon, they may be able to offer an alternative method for him to receive his wages from the US. In this case, convenience relative to pre-existing digital transfer services must be considered, as digital remittance providers today allow for Yannick to receive his wages to his bank account, although in Cameroon they sometimes have unfavourable exchange rates.

Both stablecoins and digital remittance providers would require Yannick’s employer to undergo an additional step of performing a foreign exchange transaction and sending funds to a new service.

Ultimately, to evaluate the options for the most convenient and least expensive manner for Yannick to receive his wages, further study must be conducted comparing the total costs of all three options: money transmitter with in-person offices, digital money transmitter and stablecoins.

As a reminder, Yannick is not representative of the average Cameroonian in his financial access. He has an ID, bank account, strong digital and financial literacy, and sufficient resources to engage in financial services. He does, however, remain partially excluded due to a combination of domestic and international financial infrastructures that limit his ability to access financial services that would meet his needs, particularly without reliance on intermediaries.

Conclusion

In response to strong interest and claims regarding the ability of stablecoins to promote financial inclusion around the world, this white paper builds off prior research and new interviews to investigate the value proposition of stablecoins for this purpose, using three realistic and data-driven case studies.

This paper seeks to answer the following questions:

1. How, if at all, do stablecoins improve financial inclusion, compared to other pre-existing options?
2. What new challenges or risks, if any, might stablecoins introduce, and what conditions must be met for them to be successful in supporting financial inclusion among underserved individuals and communities?
3. What is the net conclusion for their current value proposition, considering benefits, trade-offs and limitations?

Overall, at the present time stablecoins do not present features or capabilities that significantly reduce the specific barriers to financial inclusion in the scenarios studied – compared to pre-existing options, once accounting for consistent legal and compliance requirements. Stablecoins are subject to many of the same adoption and inclusion hurdles as other forms of retail finance, such as reliable internet and electricity, digital and financial literacy, and government identity documentation.

Decentralization in technology infrastructure itself does not reduce the cost of cross-border

transactions. Generally, competition in remittance providers, remittance volumes and accommodating AML/CFT and other regulations are among the leading factors that correspond with lower remittance prices.

To the extent stablecoins are accessible to the financially underserved, they may introduce important risks, including financial failure at the stablecoin provider from illiquidity or insolvency, lost or stolen access to funds in digital wallets or exchanges, and technical failure at the underlying blockchain or smart contract levels. Many of these risks are currently the subject of extensive remedy efforts, but the outcomes are not certain. In addition, without significant investment in education, individuals may be at higher risk of suffering losses from user error or of purchasing stablecoins with riskier technical and financial management practices.

The blockchain, cryptocurrency and stablecoin ecosystems are continuously evolving, and certain capacities may develop in the future that present more benefits to end-users that are unbanked or unable to access relevant and suitable financial services. These opportunities might relate to open and interoperable DLT-based ecosystems, publicly visible payment histories, innovations with decentralized digital identity and compliance, or simply filling gaps where other services do not yet exist. That said, further research or demonstration of stablecoins' abilities to offer these opportunities and address complications (e.g. those related to privacy for publicly visible payment histories) is needed.

Endnotes

1. “Unbanked” individuals, usually the very poor, do not have a bank account or a transaction account at a formal financial institution or mobile money provider. “Underbanked” individuals are those who may have access to a basic transaction account with a formal financial institution but still have financial needs that are unmet. For instance, while they may be able to send or receive money, it may not be in a safe or affordable manner. For further discussion, see: The World Bank, *The Global Findex Database 2017*, <https://globalfindex.worldbank.org/>.
2. “Financial Inclusion”, *The World Bank*, <https://www.worldbank.org/en/topic/financialinclusion>.
3. For instance see: Thomason, Jane, “Stablecoin adoption and the future of financial inclusion”, *CoinTelegraph*, 19 August 2021, <https://cointelegraph.com/news/stablecoin-adoption-and-the-future-of-financial-inclusion>.
4. The extent and complexity of the factors contributing to financial exclusion are beyond the scope of this paper. For further discussion, see: The World Bank, *The Global Findex Database 2017*, <https://globalfindex.worldbank.org/>.
5. Makuvaza, Leonard, et al., *Means to an end: A conceptual framework for outcomes of financial service usage*, insight2impact, July 2018, https://cenfri.org/wp-content/uploads/2018/08/A-conceptual-framework-for-outcomes-of-financial-service-usage_i2i_July-2018.pdf.
6. As of the time of writing, the latest version of *The Global Findex Database* is from 2017. As a result, the data may be outdated and does not capture the effects of the COVID-19 pandemic. Where available, the authors have attempted to identify more recent data using other sources.
7. Central Bank of Kenya, Kenya National Bureau of Statistics (KNBS) and Financial Sector Deepening Kenya (FSD Kenya), *2019 FinAccess Household Survey*, April 2019, [https://www.centralbank.go.ke/uploads/financial_inclusion/1035460079_2019%20FinAcces%20Report%20\(web\).pdf](https://www.centralbank.go.ke/uploads/financial_inclusion/1035460079_2019%20FinAcces%20Report%20(web).pdf).
8. The World Bank, *The Global Findex Database 2017*, <https://globalfindex.worldbank.org/>.
9. The researcher should consider validating the relevance of the framework and assumptions in this white paper to other scenarios on a case-by-case basis.
10. For additional information and a detailed discussion of the risks associated with different types of stablecoins, see: Catalini, C. and de Gortari, A., *On the Economic Design of Stablecoins*, SSRN, Elsevier, 5 August 2021, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3899499.
11. “Today’s Cryptocurrency Prices by Market Cap”, *CoinMarketCap*, <https://coinmarketcap.com/>. Accessed 15 September 2021.
12. For deeper discussion on technology differences and risks among stablecoins, see: Narula, Neha, “The Technology Underlying Stablecoins”, *Neha’s Writings*, 23 September 2021, <https://nehanarula.org/2021/09/23/stablecoins.html>. For an explanation of Diem, see: “Diem White Paper v2.0 – Cover Letter”, *Diem Association*, <https://www.diem.com/en-us/white-paper/#cover-letter>.
13. For further discussion, see the white paper in this series: *Digital Currency Consumer Protection Risk Mapping*.
14. In India, stablecoins and cryptocurrency may also overcome a cultural preference towards cash that results from an effort to evade taxes. This could occur where individuals are not required to submit identifying information in stablecoin wallets or exchanges, allowing them to utilize stablecoins without necessarily being subject to tax reporting or other oversight. As this issue strengthens illicit activity and is contradictory to public policy goals, it is not listed as a benefit in this report.
15. Abramova, Svetlana, et al., *Bits Under the Mattress: Understanding Different Risk Perceptions and Security Behaviors of Crypto-Asset Users*, Association for Computing Machinery, May 2021, http://lersse-dl.ece.ubc.ca/record/337/files/bits_mattress.pdf. For example, see p.13: “Cypherpunks opt for self-managed security solutions, whereas hodlers and rookies appear to face a non-trivial dilemma between risk-prone but convenient custodial solutions and secure but more burdensome non-custodial wallets.”
16. The World Economic Forum’s Global Future Council on Cryptocurrencies issued a paper that includes examples of opportunities relating to cryptocurrencies; the same opportunities may exist for stablecoins. For further discussion, see: World Economic Forum, *Crypto, What Is It Good For? An Overview of Cryptocurrency Use Cases*, December 2020, https://www3.weforum.org/docs/WEF_Cryptocurrency_Uses_Cases_2020.pdf. The Forum’s newly launched Crypto Impact & Sustainability Accelerator (CISA) will engage in research focused on assessing under what circumstances cryptocurrency systems might provide increased social benefit.
17. Catalini, Christian, and Joshua S. Gans, *Some Simple Economics of the Blockchain*, 2016, https://www.nber.org/system/files/working_papers/w22952/w22952.pdf.
18. “Remittances to Developing Countries Decline for Second Consecutive Year”, *The World Bank*, 21 April 2017, https://www.worldbank.org/en/news/press-release/2017/04/21/remittances-to-developing-countries-decline-for-second-consecutive-year?utm_content=buffer0dcae&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer.

19. Stablecoins currently require the use of smartphones rather than feature phones because of their large transaction byte size. For example, the average bitcoin transaction size is 732 bytes (calculated over a 30-day period ending 15 June 2021, by dividing a 1.3MB average block size by the 1,774 average number of transactions over the same period). Feature phones typically employ Unstructured Supplementary Service Data (USSD) for mobile money and instant messaging. USSD only supports 160-byte transactions.
See:
1) “Average Transactions Per Block”, *Blockchain.com*, <https://www.blockchain.com/charts/n-transactions-per-block>.
2) Calabia, Christopher, *Could the Poor Bank on Stablecoins?*, July 2020, p.4, https://www.findevgateway.org/sites/default/files/publications/submissions/72141/Calabia_Could_the_Poor_Bank_on_Stablecoins_20200721_Final.pdf.
Note that hardware options that are not reliant on smartphone technology, such as cards, are the subject of much development activity.
20. The price levels of Honduras, the US, India and Cameroon have all been subdued in recent years, as of the time of writing.
21. See:
1) Auer, Raphael et al., *CBDCs beyond borders: results from a survey of central banks*, Bank for International Settlements, June 2021, <https://www.bis.org/publ/bppdf/bispap116.pdf>.
2) Berg, Andrew and Borensztein, Eduardo, *The Pros and Cons of Full Dollarization*, International Monetary Fund, 2000, <https://www.imf.org/external/pubs/ft/wp/2000/wp0050.pdf>.
22. “Use of stablecoins in DeFi has risen sharply in the last year, with more than 25% of a top USD stablecoin’s supply locked in the top DeFi protocols such as Uniswap, Sushiswap, Curve, MakerDAO, Aave, and Compound.” Source: Catalini, Christian and de Gortari, Alonso, *On the Economic Design of Stablecoins*, SSRN, 5 August 2021, p.6, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3899499:
23. For more information on DeFi, see: World Economic Forum, *Decentralized Finance (DeFi) Policy-Maker Toolkit*, June 2021, https://www3.weforum.org/docs/WEF_DeFi_Policy_Maker_Toolkit_2021.pdf.
24. This discussion focuses on first-order impacts to individuals and small businesses; any macroeconomic challenges and risks that may exist are outside the scope of this white paper.
25. “DFS Continues to Foster Responsible Growth in New York’s Fintech Industry with New Virtual Currency Product Approvals” [Press release], *Department of Financial Services*, 10 September 2018, https://www.dfs.ny.gov/reports_and_publications/press_releases/pr1809101.
26. “Today’s Cryptocurrency Prices by Market Cap”, *Coinmarketcap*, <https://coinmarketcap.com/>. Accessed 15 September 2021.
27. See:
1) “Reserves Breakdown at March 31, 2021”, *Tether*, <https://tether.to/wp-content/uploads/2021/05/tether-march-31-2021-reserves-breakdown.pdf>.
2) “Independent Accountant’s Report – Tether Holdings Limited”, *Moore Cayman*, 6 August 2021, https://tether.to/wp-content/uploads/2021/08/tether_assuranceconsolidated_reserves_report_2021-06-30.pdf.
3) “Attorney General James Ends Virtual Currency Trading Platform Bitfinex’s Illegal Activities In New York” [Press release], *Letitia James, NY Attorney General*, 23 February 2021, <https://ag.ny.gov/press-release/2021/attorney-general-james-ends-virtual-currency-trading-platform-bitfinexs-illegal>.
28. For illustration, see: Catalini, Christian and de Gortari, Alonso, *On the Economic Design of Stablecoins*, SSRN, 5 August 2021, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3899499.
29. For deeper discussion on technology differences and risks among stablecoins, see: Narula, Neha, “The Technology Underlying Stablecoins”, *Neha’s Writings*, 23 September 2021, <https://nehanarula.org/2021/09/23/stablecoins.html>.
30. See:
1) Ali, Robleh and Narula, Neha, *Redesigning digital money: What can we learn from a decade of cryptocurrencies?*, MIT Digital Currency Initiative, 2020, <https://dci.mit.edu/research/2020/1/22/redesigning-digital-money-what-can-we-learn-from-a-decade-of-cryptocurrencies-by-robleh-ali-and-neha-narula-of-the-digital-currency-initiative>.
2) Auer, Raphael, *Beyond the doomsday economics of “proof-of-work” in cryptocurrencies*, Bank for International Settlements, January 2019, <https://www.bis.org/publ/work765.htm>.
3) Budish, Eric, *The Economic Limits of Bitcoin and the Blockchain*, National Bureau of Economic Research, June 2018, www.nber.org/papers/w24717.
31. Additional information on the “gender gap” in access to digital or financial services can be found in the following resources:
1) Kuroda, Reiko, *Policy Brief: The Digital Gender Gap*, GSMA, 2019, <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/02/Digital-Equity-Policy-Brief-W20-Japan.pdf>.
2) GSMA, *The Mobile Gender Gap Report 2020*, 2020, <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2020/05/GSMA-The-Mobile-Gender-Gap-Report-2020.pdf>.

32. Based on an analysis of cryptocurrency users in the US. The report further finds no evidence that cryptocurrency is sought as an alternative to mainstream finance. For further discussion, see: Auer, Raphael and Tercero-Lucas, David, *Distrust or speculation? The socioeconomic drivers of U.S. cryptocurrency investments*, Bank for International Settlements, July 2021, <https://www.bis.org/publ/work951.html>.
33. DeFi applications that are unregulated and lack consumer protections can leave individuals at risk of harm from loss of funds related to those applications. These include the risks listed in this section, as well as issues related to lending, leveraged investment and other activities available in DeFi.
34. Gorton, Gary B. and Zhang, Jeffery, *Taming Wildcat Stablecoins*, SSRN, September 2021, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3888752.
35. For further discussion, see:
- 1) Tito Nícias Teixeira da Silva Filho, "No Easy Solution: A Smorgasbord of Factors Drive Remittance Costs", *International Monetary Fund*, 30 July 2021, <https://www.imf.org/en/Publications/WP/Issues/2021/07/30/No-Easy-Solution-A-Smorgasbord-of-Factors-Drive-Remittance-Costs-462130>.
 - 2) Beck, Thorsten et al., "What explains the cost of remittances", *VoxEU*, 28 September 2009, <https://voxeu.org/article/what-explains-cost-remittances>.
 - 3) Martinez Peria, Maria Soledad, "What Drives the Price of Remittances?: New Evidence Using the Remittance Prices Worldwide Database", *World Bank Blogs*, 6 August 2010, <https://blogs.worldbank.org/allaboutfinance/what-drives-the-price-of-remittances-new-evidence-using-the-remittance-prices-worldwide-database>.
36. For additional discussion on this topic, see: Calabia, Christopher, *Could the Poor Bank on Stablecoins?*, July 2020, https://www.findevgateway.org/sites/default/files/publications/submissions/72141/Calabia_Could_the_Poor_Bank_on_Stablecoins_20200721_Final.pdf.
37. For stablecoins to succeed in financial inclusion today, off-ramps to fiat money are necessary as stablecoins are not currently generally accepted for payments.
38. For additional discussion on this topic, see: Calabia, Christopher, *Could the Poor Bank on Stablecoins?*, p.3, July 2020, https://www.findevgateway.org/sites/default/files/publications/submissions/72141/Calabia_Could_the_Poor_Bank_on_Stablecoins_20200721_Final.pdf.
39. Regulatory approval of stablecoins and cryptocurrency also enable infrastructure development related to exchanges and banking connections that can enable greater convenience and access to stablecoins in a jurisdiction. For additional discussion on the topic of whether stablecoins will comply with local e-money regulations that are meant to protect customer funds, see: Calabia, Christopher, *Could the Poor Bank on Stablecoins?*, p.6, July 2020, https://www.findevgateway.org/sites/default/files/publications/submissions/72141/Calabia_Could_the_Poor_Bank_on_Stablecoins_20200721_Final.pdf.
40. Acceptance can be driven by success in the aforementioned issues in this list. As a separate issue, increasingly in the US, major technology providers like PayPal, Visa and Mastercard are enabling more cryptocurrency-to-fiat interconnections. Related to merchant acceptance, PayPal now allows US users who purchase cryptocurrency within its platform to spend that cryptocurrency on purchases with many US merchants. Merchant acceptance in this case does not change as merchants receive fiat currency that is converted from cryptocurrency by PayPal. That said, users are able to spend the cryptocurrency with merchants. Such early examples may point to the ability to side-step issues related to merchant acceptance of cryptocurrency.
- For further discussion, see: Fleishman, Glenn, "PayPal now lets you spend cryptocurrency at millions of U.S. merchants", *Fast Company*, 30 March 2021, https://www.fastcompany.com/90620101/paypal-cryptocurrencybitcoin?partner=rss&utm_source=rss&utm_medium=feed&utm_campaign=rss+fastcompany&utm_content=rss.
41. See Celo with Pesabase and Toca for an example of efforts to enable stablecoin payments on feature phones. For further discussion, see: Calabia, Christopher, *Could the Poor Bank on Stablecoins?*, p.4, July 2020, https://www.findevgateway.org/sites/default/files/publications/submissions/72141/Calabia_Could_the_Poor_Bank_on_Stablecoins_20200721_Final.pdf.
42. See:
- 1) Sobiech, Izabela, "Remittances, finance and growth: Does financial development foster the impact of remittances on economic growth?", *World Development*, Elsevier, vol. 113, 2019, pp. 44-59, <https://ideas.repec.org/a/eee/wdevel/v113y2019icp44-59.html>.
 - 2) Fayissa, Bichaka, and Nsiah, Christian, "The Impact of Remittances on Economic Growth and Development in Africa", *The American Economist*, 2008, www.researchgate.net/publication/5182511_The_Impact_of_Remittances_on_Economic_Growth_and_Development_in_Africa.
 - 3) Portes, Luis San Vicente, "Remittances, Poverty And Inequality", *Journal Of Economic Development*, vol. 34(1), 2009, pp. 127-140, <https://ideas.repec.org/a/jed/journl/v34y2009i1p127-140.html>.

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44. The World Bank, *Remittance Prices Worldwide Quarterly*, Issue 37, March 2021, https://remittanceprices.worldbank.org/sites/default/files/rpw_main_report_and_annex_q121_final.pdf.
45. The World Bank, *Remittance Prices Worldwide Quarterly*, Issue 37, March 2021, https://remittanceprices.worldbank.org/sites/default/files/rpw_main_report_and_annex_q121_final.pdf.
46. Xoom (a PayPal Service), *Time is Money: How Digital Remittances Save Valuable Time for Americans and their Families around the World*, 2020, https://publicpolicy.paypal-corp.com/sites/default/files/policy/Time_is_Money_Xoom_Report.pdf.
47. Xoom (a PayPal Service), *Time is Money: How Digital Remittances Save Valuable Time for Americans and their Families around the World*, 2020, https://publicpolicy.paypal-corp.com/sites/default/files/policy/Time_is_Money_Xoom_Report.pdf.
48. Remittance inflows into Honduras constitute a significant source of income for many people. World Bank data estimates that migrant remittance inflows totalled more than \$5 billion in 2020, representing 23% of the country’s GDP. For further discussion, see: “Personal remittances, received (% of GDP) – Honduras” [infographic], *The World Bank*, 2020, <https://data.worldbank.org/indicator/BX.TRF.PWKR.DT.GD.ZS?locations=HN>.
49. World Bank data shows there are 78 mobile phone subscriptions in Honduras per 100 people, which is well below the averages in Latin America and the Caribbean (100) and the World (109). For further discussion, see: “Mobile cellular subscriptions (per 100 people) – Honduras” [infographic], *The World Bank*, https://data.worldbank.org/indicator/IT.CEL.SETS.P2?locations=HN&name_desc=false.
Additionally, the GSMA notes that although 72% of Hondurans have access to mobile broadband, only 22% subscribe. Security concerns, especially for women in Latin America, are linked to limited cell phone usage, as many cite fears of being robbed due to the possession of mobile phone devices.
For further discussion, see: Sharma, Akanksha and Arese Lucini, Barbara, *Connected Society: Digital inclusion in Latin America and the Caribbean*, GSMA, 2016, <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2015/02/Connected-Society-Digital-inclusion-in-Latin-America-and-the-Caribbean-1.pdf>.
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51. “Honduras, 2017,” *Global Financial Inclusion (Global Findex) Database 2017*, The World Bank, 2018, <https://microdata.worldbank.org/index.php/catalog/3357>.
52. Tigo Money, <https://www.tigo.com.hn/tigo-money/remesas-internacionales>.
53. “Sending money from United States to Honduras”, *Remittance Prices Worldwide*, The World Bank, <https://remittanceprices.worldbank.org/en/corridor/United-States/Honduras>.
54. Only 17% of Hondurans (age 15+) own a debit card, while only 14% used a credit card (or borrowed from a financial institution) in 2017. For further discussion, see: “Honduras, 2017”, *Global Financial Inclusion (Global Findex) Database 2017*, The World Bank, 2018, <https://microdata.worldbank.org/index.php/catalog/3357>.
55. The public health system in Honduras suffers from significant challenges related to underfunding, corruption and lack of medical and physician resources. For further discussion, see:
1) Carmenate-Milián, Lino, et al. “Situation of the Health System in Honduras and the New Proposed Health Model.” *Archives of Medicine*, I MedPub, 2017, <https://www.archivesofmedicine.com/medicine/situation-of-the-health-system-in-honduras-and-the-new-proposed-health-model.php?aid=19759>.
2) Palencia, Gustavo. “Honduras Arrests Ex-Social Security Chief in \$200 Million Graft Bust,” *Thomson Reuters*, 9 September 2014, www.reuters.com/article/uk-honduras-crime-idUKKBN0H41XA20140909;
3) Eppenauer, Alexandra, “Six Facts About Healthcare in Honduras”, *The Borgen Project*, 12 August 2018, <https://borgenproject.org/healthcare-in-honduras/>.
56. Personal interview, Lucia Gallardo, 26 April 2021 (virtual).
57. “Literacy rate, adult (% of people ages 15 and above) – Honduras” [infographic], *The World Bank*, September 2021, <https://data.worldbank.org/indicator/SE.ADT.LITR.ZS?locations=HN>.
58. “S&P Global Finlit Survey”, *Global Financial Literacy Excellence Center (GFLEC)*, 2021, <https://gflec.org/initiatives/sp-global-finlit-survey/>.
59. See:
1) “Intentional homicides (per 100,000 people) – Honduras” [infographic], *The World Bank*, <https://data.worldbank.org/indicator/VC.IHR.PSRC.P5>.
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60. “Honduras, 2017”, *Global Financial Inclusion (Global Findex) Database 2017*, The World Bank, 2018, <https://microdata.worldbank.org/index.php/catalog/3357>.

61. According to research by the American Immigration Council, citing data from the IRS, 4.4 million people used an ITIN to pay taxes in 2015. However, the Office of Immigration Statistics estimated almost 12 million undocumented immigrants were in the US as of January 2015, according to a Brookings report. For further discussion, see:
- 1) “The Facts About the Individual Taxpayer Identification Number (ITIN)”, *American Immigration Council*, 15 September 2021, www.americanimmigrationcouncil.org/research/facts-about-individual-taxpayer-identification-number-itin.
 - 2) Kamarck, Elaine and Stenglein, Christine, “How many undocumented immigrants are in the United States and who are they?”, *Brookings*, 12 November 2019, <https://www.brookings.edu/policy2020/votervital/how-many-undocumented-immigrants-are-in-the-united-states-and-who-are-they/>.
62. “Sending money from United States to Honduras”, *Remittance Prices Worldwide*, The World Bank, <https://remittanceprices.worldbank.org/en/corridor/United-States/Honduras>.
63. According to survey data, the average monthly income for a person working in Honduras is HNL 28,100 (equivalent to approximately \$1,158), including housing, transport and other benefits. For further discussion, see: “Average Salary in Honduras 2021”, *Salary Explorer*, 2021, <http://www.salaryexplorer.com/salary-survey.php?loc=96&loctype=1>.
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65. “Honduras, 2017”, *Global Financial Inclusion (Global Findex) Database 2017*, The World Bank, 2018, <https://microdata.worldbank.org/index.php/catalog/3357>.
66. “Sending money from United States to Honduras”, *Remittance Prices Worldwide*, The World Bank, <https://remittanceprices.worldbank.org/en/corridor/United-States/Honduras>.
67. Note that if cryptocurrency that is sent as a remittance has appreciated in value since the user received or purchased it (for instance if the holder is sending bitcoin and the price of bitcoin has risen), that gain may be subject to tax in certain jurisdictions. Stablecoins seek to maintain a stable value and, if successful, would not generally generate significant price appreciation or capital gains.
68. See Compound, <https://app.compound.finance/> and Aave, <https://aave.com/>. Accessed 26 October 2021.
69. TrueFi is one example. It offers uncollateralized loans and in the future hopes to incorporate data generated outside the blockchain ecosystem. For further discussion, see: “Introducing TrueFi, the DeFi Protocol for Uncollateralized Lending”, *TrustToken*, 5 November 2020, <https://blog.trustring.com/introducing-truefi-the-defi-protocol-for-uncollateralized-lending-9bfd6594a48>.
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71. “Understanding the impact of loans on small businesses in India”, *CDC Group*, 20 July 2020, <https://www.cdccgroup.com/en/emerging-markets-investment/understanding-the-impact-of-loans-on-small-businesses-in-india/>.
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73. See:
- 1) Singh, Roshika and Chhabra, Pratibha, *Financial Inclusion for Women-Owned Micro, Small & Medium Enterprises (MSMEs) in India*, International Finance Corporation, World Bank Group, 2021, https://www.indiaspend.com/uploads/2021/02/20/file_upload-417397.pdf.
 - 2) Singh, Shalini, “Why women run fewer than 13% of India’s small businesses”, *Scroll.in*, 2 March 2021, <https://scroll.in/article/988166/why-women-run-fewer-than-13-of-indias-small-businesses>.
74. Digital identity is not a challenge in this scenario. An “Aadhaar” is the unique ID number issued to all Indian residents, who obtain their Aadhaar card by providing their fingerprints, retina scans and face photos. This underlying biometric database holds the information of 1.2 billion enrolments or about 89% of India’s population. See: Aadhaar, <https://uidai.gov.in/>.
75. See:
- 1) Bhat, Swati, and Jadhav, Rajendra, “Love of cash hinders India’s move to digital economy”, *Thompson Reuters*, 14 November 2019, <https://www.reuters.com/article/us-india-demonetisation/love-of-cash-hinders-indias-move-to-digital-economy-idUSKBN1X005J>.
 - 2) Ligon, Ethan et al., “What explains low adoption of digital payment technologies? Evidence from small-scale merchants in Jaipur, India”, *PLoS ONE*, vol. 14, no. 7, 2019, <https://doi.org/10.1371/journal.pone.0219450>. According to p.1: “Therefore, low rates of adoption do not appear to be the result of supply-side barriers, but due rather to demand-side factors or taxes. We find direct evidence of such demand-side factors, such as a perceived lack of customers wanting to pay digitally, and concerns that records of mobile payments might increase tax liability.”
76. A line of credit is a pre-set borrowing limit that can be used at any time. The borrower can take money out as needed until the limit is reached. As money is repaid, it can be borrowed again.
77. Jain, Aashika, “Motor Insurance In India Has A New Hope In Digital”, *Forbes Advisor*, 2020 [updated 17 December 2020], <https://www.forbes.com/advisor/in/car-insurance/motor-insurance-has-a-new-hope-in-digital/>.

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80. See:
- 1) 2017 Findex data: 24% of women and 40% of men report having a debit card; 38% of women vs. 50% of men cite being able to come up with emergency funds; 76% of women and 82% of men report having an account at a financial institution; 1.3% of women and 3.1% of men report having a mobile money account. Source: "India, 2017," *Global Financial Inclusion (Global Findex) Database 2017*, The World Bank, 2018, <https://microdata.worldbank.org/index.php/catalog/3362>.
- 2) According to 2020 GSMA data, 63% of women and 79% of men own or are a primary user of a mobile phone. Moreover, 21% of women and 42% of men are mobile-phone internet users. Source: GSMA, *The Mobile Gender Gap Report 2020*, 2020, <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2020/05/GSMA-The-Mobile-Gender-Gap-Report-2020.pdf>.
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83. See:
- 1) McKinsey Global Institute, *Digital India: Technology to transform a connected nation*, March 2019, <https://www.mckinsey.com/-/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/Digital%20India%20Technology%20to%20transform%20a%20connected%20nation/MGI-Digital-India-Report-April-2019.pdf>.
- 2) GSMA, *The Mobile Gender Gap Report 2020*, 2020, <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2020/05/GSMA-The-Mobile-Gender-Gap-Report-2020.pdf>.
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85. S&P Global, *2020 India Mobile Payments Market Report*, 2020, https://www.spglobal.com/marketintelligence/en/documents/indiamobilepayments_2020finalreport.pdf.
86. McKinsey Global Institute, *Digital India: Technology to transform a connected nation*, March 2019, <https://www.mckinsey.com/-/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/Digital%20India%20Technology%20to%20transform%20a%20connected%20nation/MGI-Digital-India-Report-April-2019.pdf>.
87. Stablecoins might address the reasons why Indians prefer cash – for example, avoidance of taxes or of higher prices for goods purchased at smaller merchants. For the former, stablecoin-based payments may aid in the avoidance of taxes, where tax reporting and customer identity and compliance controls at wallets and exchanges are not effective at reporting taxable transactions to authorities. Of course, from a policy perspective, this activity would be detrimental. In relation to Indians' latter preference for cash, it is not axiomatic that small businesses would be able to process stablecoins more cheaply than other electronic payment processing, as the stablecoins may involve network transaction fees or new merchant acceptance technology. Merchants may also be hesitant to accept stablecoins if they are not confident in their backing.
88. See discussion in scenario 1 on additional risks and issues with insurance operated on decentralized applications.
89. Nahar, Pawan, "Future of Cryptos in India: A blanket ban or birth of a new age asset class?", *The Economic Times*, 20 August 2021, <https://economictimes.indiatimes.com/markets/cryptocurrency/future-of-cryptos-in-india-a-blanket-ban-or-the-new-age-asset-class/articleshow/85489406.cms?from=mdr>.
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91. Africa Growth Initiative at Brookings, *Foresight Africa: Top Priorities for the Continent in 2019*, 2019, p. 11, https://www.brookings.edu/wp-content/uploads/2019/01/BLS18234_BRO_book_007_WEB.pdf.
92. GSMA, *The Mobile Economy: Sub-Saharan Africa 2020*, 2020, p. 6, www.gsma.com/mobileeconomy/wp-content/uploads/2020/09/GSMA_MobileEconomy2020_SSA_Eng.pdf.
93. Kässi, Otto, and Lehdonvirta, Vili, "Online labour index: Measuring the online gig economy for policy and research", *Technological Forecasting and Social Change*, vol. 137, 2018, pp. 241-248, <https://www.sciencedirect.com/science/article/abs/pii/S0040162518301331?via%3Dihub>.
94. This scenario is informed by a series of virtual and on-the-ground interviews with Cameroonians by World Economic Forum staff between February and May 2021. Interviewees are anonymous to preserve their privacy.
95. "Cameroon, 2017", *Global Financial Inclusion (Global Findex) Database 2017*, The World Bank, 2018, <https://microdata.worldbank.org/index.php/catalog/3331>.

96. Micro-insurance only has a 1.8% coverage rate in Cameroon. For further discussion, see: Nana Djomo Jules Médard and Ngouana Koudjou Serges Rodrigue, *Determinants of Demand for Micro-insurance in Cameroon*, African Economic Research Consortium, No. 728, 2020, http://publication.aercafricalibrary.org/bitstream/handle/123456789/1199/PB_728_Nana%20%26%20Ngouana.pdf?sequence=1&isAllowed=y.
97. Also known as tontine, a *Njangi* is a community savings and lending group where individuals pool money together to help each other meet their goals. A fixed amount is contributed by each member of the *Njangi* every month and is held by the treasurer. Each month, one member of the *Njangi* draws the full amount contributed by all members. Therefore, it functions as an interest-free loan because an individual may take the full amount pooled in January but pays it off throughout the rest of the year through his or her monthly contributions to the *Njangi*. The conditions surrounding each *Njangi* may differ according to the established purpose. Many *Njangis* have an account at a formal financial institution and can therefore offer additional access to credit, hence loans, for members.
98. The others are Rwanda, Kenya, Liberia, Malawi, Sierra Leone and Uganda. Source: The World Bank, *The Global Findex Database 2017*, 2018, p. 77, <https://globalfindex.worldbank.org/>.
99. “Data Bundles: Giga Surf”, *MTN Cameroon*, 2021, <https://mtn.cm/personal/internet/data-bundles/giga-surf/>.
100. There are initiatives such as Izikare (a start-up that enables Africans in the diaspora to purchase health insurance policies for their family members on the continent) that are trying to fill this gap. However, it is largely insufficient. Izikare is not a local solution that would enable someone like Yannick to purchase his own insurance. See: “L’Assurance santé facile pour mes proches en Afrique”, *Izikare*, 2021, <https://izikare.com/>.
101. Coinbase presents one example. It supports limited functionality for receiving, exchanging and sending cryptocurrency. See: Coinbase, <https://www.coinbase.com/places/cameroon>.
102. Baker McKenzie, *Blockchain and Cryptocurrency in Africa*, 2018, p. 18, https://www.bakermckenzie.com/-/media/files/insight/publications/2019/02/report_blockchainandcryptocurrencyreg_feb2019.pdf.
103. The cryptocurrency ecosystem in Cameroon is evolving. Some services (e.g. Uphold) allow individuals to purchase cryptocurrency using their debit or credit cards in Cameroon. See: Uphold, <https://uphold.com/en-us>.
104. The high energy consumption of cryptocurrencies and associated costs might hinder supportive policy, as demonstrated by the energy concerns that emerged following the government’s pilot of a digital currency called Trest in 2015. For further discussion, see: Baker McKenzie, *Blockchain and Cryptocurrency in Africa*, 2018, p. 18, https://www.bakermckenzie.com/-/media/files/insight/publications/2019/02/report_blockchainandcryptocurrencyreg_feb2019.pdf.
105. The Central African Deposit Guarantee Fund (FOGADAC) guarantees up to 30 million FCFA in banks and 5 million FCFA in non-deposit collecting financial institutions. For further discussion, see: International Monetary Fund, *Central African Economic and Monetary Community (CEMAC): Financial Stability Assessment*, April 2016, <https://www.imf.org/external/pubs/ft/scr/2016/cr16106.pdf>.
106. An option could be Afriland First Bank which requires a minimum account balance of 50,000 FCFA for a basic savings account. See: “Passbook Savings Account”, *Afriland First Bank*, <https://www.afrilandfirstbank.com/index.php/en/individual1/individuals-account/savings-account>.



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