



Insights for CBDC Design and Adoption

Based on findings from a payments
and human behaviour study in Brazil

Executive Summary

Digital technologies are transforming the way we save, spend and exchange value. In the majority of countries, governments and sovereign issuers of currency are considering the introduction of a retail Central Bank Digital Currency (CBDC)¹.

While the stated ambition of many digital currency projects is to foster greater financial inclusion, few studies explore public needs and desire for this new form of money. Yet the success of any CBDC initiative rests on public acceptance – it must serve public demand and offer compelling incentives for adoption.

To begin to address the knowledge gap, SICPA contracted financial anthropology experts Fintthropology to carry out field research in 2021 among low-income groups in Brazil. The country's large informal sector and rapidly growing adoption of a variety of digital payments provide a unique lens to better understand consumer motivations for payments choice and usage.

Comprising a literature review, 63 qualitative interviews, a survey and observations carried out in rural and urban locations, the field study highlights factors driving how low-income groups choose to pay today. The research showed that access, relevance, network effects, and affordability are important factors influencing the adoption of new forms of currency and payments.

Analysis of the overall study results shines a light on the needs, preferences and contexts influencing payments use, such as diversity of choice, transaction costs, safety, convenience and spending habits. The findings also generated several new insights for retail CBDC design and adoption that have relevance for a global audience.

¹ CBDC Tracker, <https://cbdctracker.org>

The Brazilian context

In preparation for the 63 urban and rural field interviews in low-income Brazil, we present a picture of the country's financial ecosystem including financial service providers, payment type, availability and current innovation initiatives.



31%

of the population received direct social assistance due to Covid-19

4.2 million

Brazilians live and work abroad



35%

financial literacy rate

93%

literacy rate



76%

of the population has access to the internet

Brazil has a population of 212 million people and 87% live in urban areas

68%

smartphone ownership

47%

of Brazil's working population is employed in the informal sector

Ministério do Trabalho e Emprego

98%

of adult Brazilians had a form of ID in 2017, the most common being the Cadastro de Pessoas Físicas (Natural Persons Register), or CPF, issued to all Brazilian citizens and residents by the inland revenue service.

The Brazil single digital ID initiative aims to unite different identity credentials (e.g. ID card, driver's licence, birth certificate and social security card) and make them available under one app.



CARTEIRA DE TRABALHO E PREVIDÊNCIA SOCIAL

Pix is a new electronic payment developed by the Central Bank of Brazil. It allows people that have accounts at different financial institutions to easily make payments to one other.

CBDC – The Central Bank of Brazil (BCB) set up an innovation lab (LIFT) in 2019 and a CBDC study group in 2020. In May 2021 the BCB published guidelines for a CBDC and later launched the LIFT challenge to explore a Digital Real with partners. Discussions around a pilot are ongoing in 2022.

Open banking system developments since 2020 aim to share data, products and services between regulated financial and payments institutions, with customer consent.

FINANCIAL ECOSYSTEM

80%

of the total market is controlled by the five largest banks in Brazil, measured in by credit supply to individuals

1500

non-banks including over 1,000 credit unions

32

neobanks and mobile-only banks

100

community banks

88%

of Brazilians had a bank or fintech account

67%

of people in Brazil have no regular savings

16%

owned or used cryptocurrencies

34 million

people remain unbanked or underbanked post the launch of Pix and post-pandemic

Remittances

USD3.6 billion

in 2020

0.25%

of GDP

PAYMENTS

24.9%

fall in cash transactions after the introduction of the digital payment solution Pix in late 2020

53%

say they use a digital wallet more due to the pandemic

46%

use a credit card more, especially for online payments

1/3

of the adult population uses a credit card

85%

of family debt comes from credit cards

Post-pandemic

35%

use direct debit more

52%

say they use cash less

10%

say they use cash more



Insights for CBDC design and adoption

Ensure functional value

Despite the positive foundations for introducing a CBDC, there does not appear to be a pressing need for a new form of currency or payment method. A better question might be: to what extent would a new payment method offer functional value alongside other services that people already have at their disposal? Any CBDC must consider its place in the wider financial landscape and how it might add functionality to people's existing financial toolboxes.

Provide a service layer

Given some of the service issues that people experience with digital banking and Pix, the introduction of a functional service layer would help users overcome misunderstandings and mistakes (like paying the wrong person) and provide general consumer protection.

Broaden inclusivity

For a CBDC to be a universal and inclusive legal tender, it must be usable and accessible to everyone, regardless of financial status or literacy level. New forms of currency and payment may bring additional benefits for different groups who currently do not have access to Brazil's banking system (including Pix). This includes Brazilian nationals, migrants, business travellers and tourists, and represents some 34 million people who remain unbanked or underbanked post the launch of Pix and post-pandemic².

² <https://labsnews.com/en/news/economy/34-million-brazilians-do-not-have-access-to-banking-services/>

Overcome existing pain points

Trust in, and uptake of, a new digital currency is dependent on the solution offering tangible use value and overcoming current pain points. Value could come from digital solutions that reduce the risks of financial fraud and robbery. There may also be tolerable levels of friction necessary in the authentication of digital payments that may help people feel more secure.

Reduce transaction costs

Both consumers and vendors experience pain points with cash (which accounts for about one third of point of sale payments in Brazil) at every stage of the user journey: ATM access, giving and receiving the correct change and safely storing and carrying it. For digital solutions, transaction costs include the ease of onboarding and the practical user experience. Tackling these transaction costs for people is an essential consideration for CBDC design that will drive consumer preferences and adoption. A question to be further explored is people's level of tolerance for additional transaction costs associated with high assurance and safety in digital payments.

Decrease risk of fraud

Since there is a high awareness of and sensitivity to financial fraud, digital solutions must offer high levels of assurance. A question to be further explored is the acceptable transaction cost of enhancing assurance that people are willing to put up with.

Simplify payments

The field study has shown that in Brazil many people are already well served in terms of payment choice and that they follow their own contextual decision-making paths when deciding how to pay. To maximise adoption, any CBDC design should offer a way to simplify payments rather than add to existing burdens. CBDC must be not only “as easy to use as cash” but also “as easy to use as a debit card, a credit card or Pix”.

Minimise data sharing

Many study participants work in the informal economy and were apprehensive about the possibility of current cash or Pix earnings being taxed. How would such concerns influence design and potential adoption of CBDC as a tool to support fiscal components of monetary sovereignty? Other interviewees expressed concerns about sharing personal and transactional data with banks and authorities. Such perceptions are important to consider in the design of CBDCs alongside consent-based digital identity and decisions on programmability.

Easier money management

Seen from a broader perspective than the current study, there could be value, and lower costs for both financial customers and for financial service providers, in solutions that reduce the number of bank accounts and products used by many individuals. And there could be value in the provision of better tools for accessible money management and savings.

Facilitate payment choice

The combination of Brazil’s open banking infrastructure, the planned development of a national digital identity and the rapid and broad adoption of the Pix instant digital payment scheme since late 2020 provides a positive foundation for the introduction of a CBDC. People adapt quickly if they find that a new financial tool plays a novel and useful function, combines different existing tools and functionality and reduces transaction costs. In this way, new solutions that facilitate improved everyday payments for large numbers of people may overtake existing preferences and quite rapidly, especially when combined with mass media and word-of-mouth promotion.



Observations from the field study

Confirms existing research

One of the key takeaways from the study is the confirmation of existing research. Previous studies indicate that drivers of choice and adoption in payments relate to the consumer's background, the transactions to be undertaken, the characteristics of the solution provided, and the norms and interest in the context.³

Payments are the means to an end

It is not the money itself that matters, but how confident people are in whether money or a payment tool will achieve their goals. People care about convenience and about staying in control. People care about who provides the money or means of payment (trust in the provider) and they care about the price (fees, offers, bonuses, credit rates, etc.).⁴

Choice, convenience, control

The findings support the importance of convenience, control and value and deepen this knowledge in the Brazilian context by showing how individuals take advantage of numerous tools to solve their payments needs. People chose to pay with Pix or card when easier. They use credit cards to pay in instalments for larger purchases, or to stretch funds at the end of the month.

Canny consumers

The interviewees actively choose to keep fees down by using cash when this gives a price reduction. They transfer money between their own accounts to avoid withdrawal fees and also display a high awareness of financial fraud and the risks

involved in payments. Several interviewees had experienced muggings, credit card cloning, or Pix fraud.

Context is king

The findings further support the importance of the context. They show that families play an important role in making ends meet, bringing income and benefits from several people together to pay for necessities. Families also play a role in the introduction of new technologies and ways of paying, with young people helping parents and grandparents make the leap to digital.

Ready to learn

When it comes to adopting new types of payments, there is a steady learning curve. People will adopt technology that is familiar to them faster than a completely new technology. However, the lack of privacy in digital payments is a point of distrust and worry among many people.

Use it or lose it

People adapt quickly if they find a new tool that plays a truly useful function in their financial toolbox. Any new tool must perform a function that is not already in the toolbox, or combine different existing tools to enable novel functions or lower the price or transactions costs.

High flexibility

One of the biggest surprises of the study was the flexibility of interviewees in their use of financial services. Most had several bank accounts and were very willing to try new solutions. They were also very clear about the possibilities of using local credit cards allowing payment in instalments, for example to buy a phone.

Individual decision-making combined with strong community bonds

There is a high degree of individual decision-making among different family members about which payment method to use yet close family and community relationships for managing finances, including sharing smart phones, bank accounts and credit cards and learning from each other.

Risk management

Interviewees were keenly aware of payment risks such as physical robbery, digital fraud, and data sharing. These were generally considered unavoidable but to be minimised and often dictated the ultimate choice of payment. This finding was surprising because discussion of risk usually assumes that people have a choice to take a risk or not. But low-income and precarious populations often have little choice. They take risks not because they are ignorant or make bad decisions, but because they have few alternatives.



³ Bijlsma, M., C. van der Cruisjen, N. Jonker and J. Reijerink. 2021. What triggers consumer adoption of CBDCs? DNB Working Paper No. 709, April.

⁴ Broløs, A. 2016. The future of money. In Batiz-Lazo, Bernardo & Efthymiou, Leonidas (eds.). The Book of Payments—Historical and Contemporary Views on the Cashless Society. Palgrave.

FACTORS DRIVING PAYMENTS ADOPTION AND CHOICE TODAY IN LOW-INCOME BRAZIL

NO ONE SIZE FITS ALL

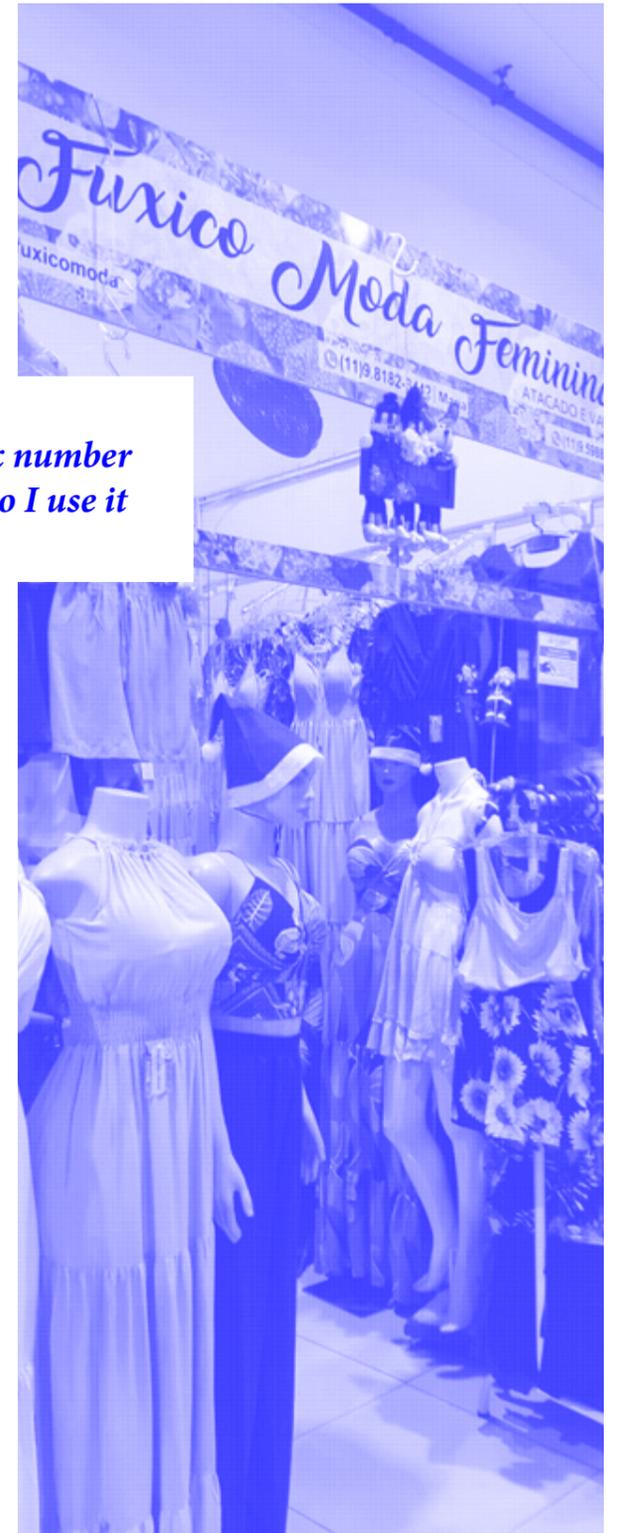
PERSONA: MARIA SILVA

Maria is a 38-year-old woman who works in a clothing store in Sao Paulo. She uses three different bank accounts to serve different needs (for salary payments, child support and expenses) depending on the transaction fees. She uses cash for low value purchases, her debit card for most payments and has also started using Pix instant payments. She only uses a credit card for purchases on an instalment plan.

“I have Pix, it’s on my mother’s CPF [tax number ID] because they don’t accept minors. So I use it with her permission.”

Leandro, age 17, high school student

Many of the people interviewed juggle multiple jobs and bank accounts and use a diversity of payment methods. Most had sufficient access to identity documents, electronic devices (predominantly Android smartphones) and the internet, enabling them to use digital financial services such as banking apps and Pix. Many interviewees used free, public WiFi rather than using their own data, while access to the internet was generally less reliable in the countryside than in the city. People tended not to upgrade their phones until they break and then buy a new one using a credit instalment plan. Sharing phones and financial accounts seemed commonplace and those without full access to digital payments find workarounds, often depending on a family member to make electronic transactions for them. While factors such as transaction costs, convenience and availability clearly influenced payment preferences and decisions, there was a lot of individual variation and the choice was often dependent on highly contextual factors such as the purchase amount, the location and the range of payment options available. Every payment option seems to have its pros and cons and none appears to be a one-size-fits-all solution.



RISE OF REAL-TIME DIGITAL PAYMENTS



“There was advertising practically all night and day on TV saying that Pix would be the innovation and salvation. You would have to update, modernise, and it would be the tool of the future.”

Victor, age 32, shop owner in the countryside

New account-based instant electronic payment methods like Pix in Brazil, which was introduced in late 2020, have changed the way people think about and make payments. By January 2022, Pix was already used by an estimated 71% of the population.⁵ Pix allows transfers between bank accounts within seconds, at any time, and enables all wallets that use QR codes to be interoperable, with no need for intermediaries such as card schemes or issuers. Interviewees said that Pix is “making cash less necessary”. It is effectively free for end-users, was extensively promoted and gained quick acceptance through word-of-mouth. People in the study seemed to treat Pix as they would cash but it was not considered entirely problem-free: interviewees complained about the lack of a responsive customer service layer in the event of erroneous payments.

⁵ <https://business.ebanx.com/en/resources/payments-explained/pix-instant-payment-system>

TRANSACTION COSTS IN TRANSITION

PERSONA: LETICIA CARVALHO

Leticia is a 72 year old pensioner. She owns a mobile phone but does not feel safe using it to manage her money. She would like to use her laptop for banking because the nearest bank and ATM are 15 km away and she does not have a car. Once a week she pays a neighbour to take her to town for a ‘bank day’.

People were generally aware of the different costs to maintain a bank account and make money transfers or withdrawals. They also considered the amount of time and effort to make a transaction and shopped around for more efficient solutions. Physical cash has high transaction costs in terms of time spent to access ATMs and banks, especially in rural areas. Some take a weekly ‘bank day’ to travel to the nearest town with an ATM or bank branch to deposit or withdraw money, pay bills, and run errands. Historically, credit accounts were kept with local shops that provided cash, and while these still exist, their use is declining as individuals increasingly adopt Pix.

People seem to have a growing preference for the simple interfaces and convenience of digital banking. Rather than having to visit or call a bank branch, they can save time by doing everything through a banking app. Many of the people interviewed said that online banking made their lives easier and they tried digital banks in the hope of paying lower fees. However, some were unhappy with the cost of cash withdrawal from digital banks and would transfer money between other bank accounts to avoid these fees.

SAFETY AND CONVENIENCE CONUNDRUM



PERSONA: BRUNO SOUSA

Bruno is a 33-year-old father and vendor in a market in São Paulo. All members of the household work but due to their low incomes they cooperate to ensure all the bills are paid. Bruno and his wife share log-in details. When he sells on the street, Bruno prefers to receive money by Pix rather than card and cash out of fear of being mugged and also because of difficulty getting change to give to customers. Bruno has a point-of-sale machine but feels the transaction fees are too high. He encourages customers to pay him with Pix but is also aware of the downsides.

“I don’t know if the person is buying it using their own money. We hear a lot that they (duplicate) mobile phone numbers and I don’t know if I’ll be receiving the money from the person who has the money or if there’s someone who took it through a stolen phone.”

Juliana, age 57, artisan in São Paulo



The people interviewed had variable views on how safety and convenience influenced payment choice. Many increasingly preferred to pay with a card or instant payment method for convenience and to reduce the risk of mugging. However, Pix was inconvenient when a payment went wrong due to the lack of a customer service layer and general agreement on transaction reversal. Some feared the risk of card cloning, misuse of contactless cards or had experienced other problems using digital payments. Cash was held and used primarily for low value transactions, below the equivalent of about 20 euros. Vendors were also concerned about holding too much cash and used point-of-sale machines (costing as little as 2 euros) to reduce the risk of holding cash. The need to have enough change on hand to complete transactions is seen as an inconvenience for both customers and vendors.

SAVING AND MANAGING MONEY

Two-thirds of people in Brazil have no regular savings⁶ and inflation and disruption due to Covid-19 have caused increasing precarity. Most of the people interviewed were struggling to pay bills and cover basic expenses: saving was not an option. They had learned to save and spend less than their income as children, either from parents or grandparents. Yet many had bad experiences accruing credit card debt, due to the widespread availability of national credit cards (paid back in instalments over long periods), which they considered necessary for purchasing high-value items like a new smartphone. Interviewees often pooled the family's financial resources to make ends meet and some vendors used a Pix account belonging to a family member.

Although past consumer psychology research⁷ on spending habits has shown that the tangible and trackable nature of cash encourages people to be more cautious about spending, in this field study several interviewees said that they spent physical cash faster than money held in a bank account. With the shift towards digital payments, attitudes are changing, and people may increasingly feel that they are able to manage their finances more effectively and safely in digital form.

⁶ Statista. Main types of family debt in Brazil, <https://www.statista.com/statistics/1108878/main-types-family-debt-brazil/>

⁷ <https://psycnet.apa.org/record/2008-12802-002>



INSIGHTS FOR IMPACT

At SICPA we are developing technologies to help solve critical trust issues in sovereign states, including CBDC. To do this we depend on a deeper understanding of how they might be used, and the motivations and needs of the people whose lives they will ultimately impact.

We are pleased to contribute to this research which uncovers new insights, adds to existing knowledge, and warrants wider discussion on the implications of the introduction of CBDCs. Empirical research on financial behaviour remains scarce and while the themes presented in this report can be expected to be similar across regions and income levels, they may be expressed differently in specific contexts.

This report is a call for action for further qualitative research and discourse to better understand how people's lived contexts can subtly influence behaviours and choices. Such insights will help to tailor the development of policies, programmes and technologies for the digital infrastructure that will underpin tomorrow's society.

ACKNOWLEDGEMENTS

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[Access full research report](#)



ABOUT SICPA

Market leader in security inks and leading provider of secured authentication, identification, traceability and supply chain solutions, SICPA is a long-trusted partner to governments, central banks, high security printers and the currency industry. Every day, governments, companies and millions of citizens rely on its expertise, which combines material-based covert features and digital technologies, to protect the integrity and value of currency, personal identity, value documents, e-government services, as well as products and brands. True to its purpose of enabling trust through constant innovation, SICPA aims to further an Economy of Trust worldwide, where transactions, interactions and products across the physical and digital worlds are based on protected, unforgeable and verifiable data. Founded in Lausanne in 1927 and headquartered in Switzerland, the company operates on five continents.

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