

The Future of Our Money

Centering Users in the Design of Digital Currency



MAIDEN

Research made possible by the MIT Digital Currency Initiative

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Executive Summary

Despite the leadership and technical prowess of the United States, its payment system trails behind, struggling to move money in ways that are fast, cheap, and easy.¹ Infrastructural challenges persist, and millions of Americans experience financial pain, insecurity, and uncertainty.

There is a fierce debate about how to upgrade the US payments system. The discussion revolves around five alternative—and potentially complementary—options:

- making incremental improvements to the traditional banking sector,
- investing further in private-sector financial technology innovation,
- advancing regulatory clarity and the mainstream viability of private stablecoins,
- advancing regulatory clarity and the mainstream viability of decentralized cryptocurrencies, and
- issuing a US retail central bank digital currency (CBDC).²

While technologists design the future of money, central bankers from nearly every nation are exploring a digital version of their currency.³ Not since the foundation of the internet have such critical and far-reaching financial technology decisions been on the table.

Web 2.0—the “Social Web”—was built without meaningful user influence at the protocol layers.

Some of the architectural choices made by technologists and entrepreneurs led to socially and politically harmful outcomes, including concentrations of power that continue to pose risks to democracy today, and that have sweeping effects on user privacy, agency, data, security, and trust.

To prevent such outcomes in the rise of digital currency, the MIT Digital Currency Initiative (DCI) and Maiden aim to integrate user research at inception, and to empower policymakers with relevant data about user needs and values, so that their decisions are proactive rather than reactive.

The potential creation of a US retail CBDC is thought to promise systemic efficiency and improved financial

circumstances for millions of Americans.⁴ Yet this hypothesis, and the assumptions about users and use-cases driving the exploration of a US CBDC, remain untested. By conducting user research in close collaboration with leading technologists, we aim to ensure that any attempts to improve the US financial system are grounded in, and guided by, a deep understanding of potential users and use cases.

As a CBDC is only one possible way of improving the financial system, our insights are applicable beyond this use case, intended for anyone critically evaluating the risks and benefits of various approaches to improving the US payments system for users. Our insights are especially designed for technologists, policymakers, and business leaders seeking to design interventions that give people a greater sense of financial agency, security, clarity, and control.

This work seeks to contribute to the vital feedback loops needed—and often missing—between people, technologists, and policymakers that can ensure we are designing and deploying infrastructure-layer technology systems responsibly and equitably.

To help technologists, central bankers, and private-sector leaders begin to distinguish between a hypothetical user (easily conceptualized through unfounded biases), and users and user behaviors that can be verified at scale, we identified and examined a few of the most common assumptions among digital currency designers and decision makers regarding likely users.

Following consultations with technical, policy, and private-sector stakeholders, three research themes emerged:

- What are the needs, pains, behaviors, and attitudes of Americans within the current financial system, specifically regarding their relationship to and use of money and payment systems?
- What are Americans' perceptions regarding financial-transaction privacy that might affect core architectural digital currency design choices?
- What common assumptions can be validated or discarded regarding presumed early users of digital currencies (including, but not limited to, a US retail CBDC), namely assumptions regarding unbanked

Americans, people who send remittances, and Small and Medium Sized Enterprises (SMEs)?

To learn about the unique and personal experiences Americans have with the US payments system, we conducted 91 one-on-one qualitative interviews through recorded video calls with a diverse range of participants. The screened characteristics for interview participants are outlined in Figures 1-4. To generate additional insights at scale, we conducted a national survey of 1,319 people. Respondents were largely representative of the US population (see Figures 5-8 for demographics, as well as Appendix C for a detailed comparative table of our survey respondents to the US population).

Insights

Pain Points for Users in the Current US Payments System

Assumption:

“The existing US payments system is not optimized for users, and a well-designed digital currency (including, but not limited to, a US retail CBDC) might be able to address users’ pain points.”

Insight:

Uncertainty surrounding financial transactions emerged as the least-addressed and most-persistent pain point for Americans.

For those considering systemic improvements to the US payments system, focusing on design features that could alleviate uncertainty for users will be key. Most people have their needs generally met by the range of financial products available to them, but real pains arise when there is uncertainty surrounding financial transactions, also characterized as a sense of not being in control.

Based on our research, alleviating uncertainty would require concrete improvements for users in four areas:

- **Clear expectations:** there are no surprise fees, people are clear what their account status is, and the terms of the payment providers they use are both clear and reliably honored.
- **Visibility:** people always know how much money they have, they can see up front how long transactions might take, and they have access to view a clear and reliable history of their transactions.

- **Speed:** people know that their money is available to them (or anyone they send it to) quickly, they will not experience variable times for money to move, and they will not have to engage in time-intensive, onerous processes to transact.
- **Security:** people know their money is safe, that it can’t be easily stolen or lost, and they trust where it is held.

Unbanked Americans

Assumption:

“An appropriately designed digital currency (including, but not limited to, a US retail CBDC) could provide access to financial services previously out of reach for unbanked people because they will no longer have to experience costly fees.”

Insight:

Distrust of banks by unbanked Americans is rooted in surprise punitive overdraft fees.

Digital currencies should have a low barrier to entry. In the case of a US retail CBDC, any person should be able to access the CBDC regardless of their credit history or previous banking record. Especially due to distrust in banks by unbanked Americans, people should not have to access a CBDC via a traditional retail bank; other avenues should be made available.

People Sending Remittances

Assumption:

“People in the US who make remittance payments to their family and friends abroad pay high fees to do so.⁵ An appropriately designed low-or-no-fee CBDC could be a desirable alternative to existing remittance payment solutions.”

Insight:

The biggest pain point shared by people making international remittances is not fees; it is *poor user experience*.

Despite popular assumptions, our research found that cost was not the main concern shared by people sending remittances (usually money sent abroad to friends or family). Fees are high, but it’s unimaginable to senders that this service would be free.

Overshadowing cost is the anxiety-ridden experience of making such payments, with issues related to speed, unclear

expectations, and low visibility, including long and variable send-times and poor tracking. To address these pains, and remove stressful periods of doubt, any improvement to the status quo would need to be faster, and would need to provide improved clarity through real-time transaction tracking and confirmation.

Small and Medium Sized Enterprises (SMEs)

Assumption:

“Currently, accepting customer payments incurs fees; SMEs will likely be early adopters of a US retail CBDC because it will reduce the costs of doing business.”⁶

Insight:

SMEs tolerate payment fees as the cost of doing business, and see it as a service they expect to pay for.

Current merchant processing (assessment and interchange) fees, including credit cards and third-party payment services can range anywhere from 1.3% to 3.5%.⁷ In interviews, we heard that SMEs understand these payment fees as an inevitable part of doing business, and don't foresee a world where accepting payments is free. This could signify an innovation opportunity, should a new system come along that provides free transactions for businesses. However, when testing the assumption that SMEs would be among the first to adopt a new low-to-no-cost payment system, we learned that SMEs are often customer-led when it comes to adopting new digital payment methods. SMEs may not be the first adopters of alternative payment tools, instead waiting for customers to first demand a shift.

Financial Transaction Privacy

Assumption:

“If the government were to launch a CBDC, people would gravitate towards one that was privacy-centric, because money is a private matter and people would be concerned about the government being able to view their financial transactions.”

Insight:

While financial privacy from the government is desirable, financial privacy from those in one's own social circle or community is even more important.

Americans assume that the government already has access to some of their financial information. While people react differently to this, they accept it as a fact of life.⁸ Far greater

concern arises around the risk of people's financial data not being confidential from people they know, as it could lead to significantly harmful social embarrassment or judgment. Users' concerns related specifically to the government having access to their financial information include: data security, authoritarian use of data, censorship, and lack of control. This suggests that a successful US retail CBDC should be designed to give users confidence that they will maintain control of their finances, that their data will be protected, and that their money is secure.

Conclusion

Standard aspects of the current US financial system create anxiety and undermine a sense of control for users. Unexpected fees create uncertainty, as do outdated processes and obfuscation of data—for example, delayed bank wire clearing, checks bouncing or being delayed, bank accounts being frozen, poor user experience, and unclear fee structures.

Financial technology or “fintech” companies (defined as startups offering a broad set of general banking, payments, investments, and lending services direct to consumers, e.g., PayPal, Venmo, Zelle, and Cash App) have raised the bar for user experience and thus user expectations, going part of the way towards fostering a greater sense of control through more transparent fees, easier-to-use features, and accessible money-management.

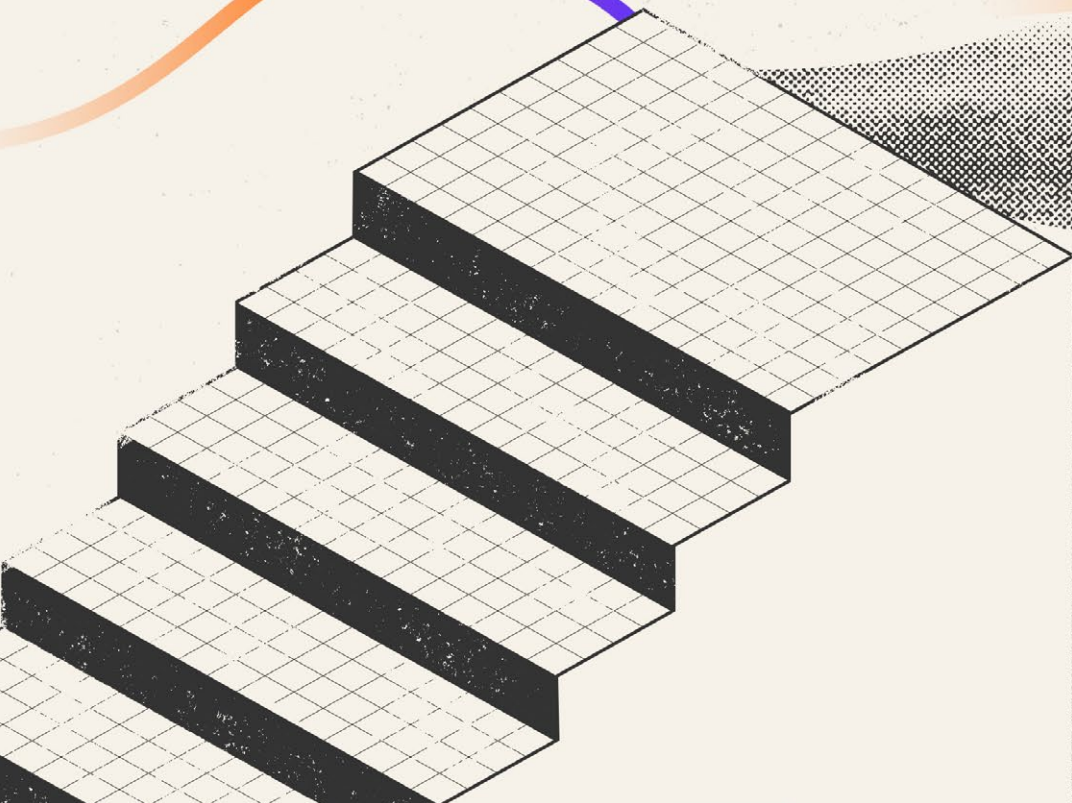
Based on our research, developing a new payment tool or system that would competitively meet people's needs is a tall order. Significantly improving upon Americans' current experience would mean optimizing for removing uncertainty, as well as increasing a sense of control for users in the US payments system.

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User Guide to this Report



What this Report Does:

- Shares insights from qualitative and quantitative user research on themes related to digital currency, including, but not limited to, the potential creation of a US retail CBDC;
- Validates or invalidates commonly shared assumptions among leading technologists about likely use-cases and early adopters for a potential US retail CBDC;
- Includes secondary data sources to add context to our primary research findings;
- Synthesizes key takeaways for consideration by digital currency technologists, designers, and policymakers;
- Provides recommendations for further research.

What this Report Does Not Do:

- Make recommendations regarding whether or not a US retail CBDC should be developed;
- Systematically apply our insights to each of the various policy directions being discussed for financial-system improvement in the US;
- Apply our data or insights in a comprehensive fashion to make recommendations regarding the numerous non-technical design considerations of a potential US CBDC;
- Provide detailed technical design directions for how digital currencies (including, but not limited to, CBDCs) should be built;
- Intend to ignore the complexity of changing the existing financial system, nor negate the efforts already undertaken by many to do so, including those at financial institutions and in government.

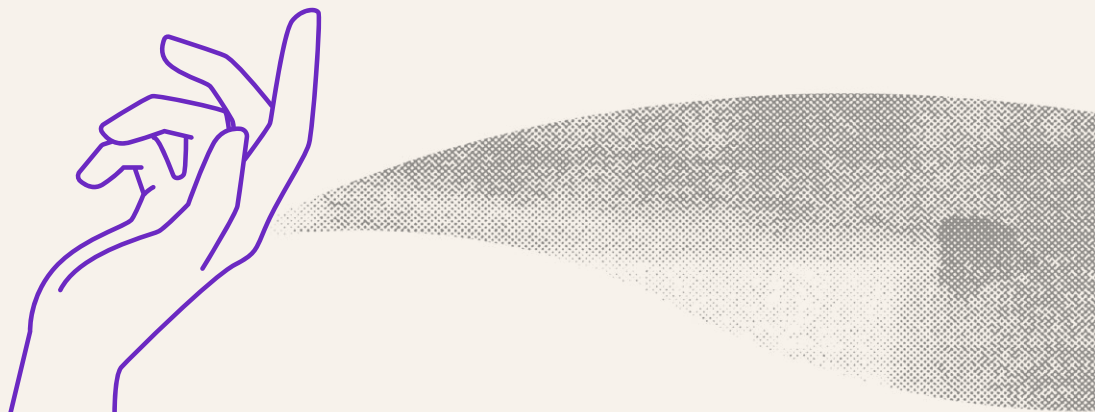
Research Methodology Summary

Please see Appendix B for detailed research methodology.

In May and June of 2021, we held a series of consultative meetings with digital currency technical experts and researchers at the MIT Media Lab's Digital Currency Initiative, along with staff from major central banks and the World Economic Forum. These consisted of one-on-one and small group interviews to establish primary topics and initial questions, followed by formal rounds of consolidation, cross-pollination, and refinement for each institution consulted. Research questions were then developed into a plan for research execution.

Research Themes

- What are the current experiences, motivations, pains, and opportunities for Americans within the current financial system, and how might they inform the various digital-currency interventions being explored by technical, policy, and private-sector stakeholders?
- What are the experiences currently of the three cohorts frequently assumed to be early users of digital currency (including, but not limited to, a potential US retail CBDC), namely: (1) people who are unbanked, (2) people who send remittances, and (3) small and medium-sized enterprises (SMEs)? How might their experiences impact digital currency design decisions? And what evidence is there to validate or invalidate the assumptions about these audiences as likely early adopters?
- What are Americans' perceptions regarding financial-transaction privacy that might affect core architectural digital currency design choices?



Approach

We employed qualitative and quantitative user research techniques in order to meet the objectives of this research and provide a holistic user-focused view. We interviewed 91 respondents in 45-60 minute sessions, who were pre-screened to fit the demographics and behavioral characteristics relevant to the research questions and themes. Each interview was recorded and transcribed for analysis. We ran our user interviews in short phases of 8-15 users, allowing us to pivot and iterate on our findings, and adjust our questions as needed. Interviews loosely followed tailored discussion guides which focused on the specific lived experiences of those we were speaking with, and the discussion theme. While we identified many actors relevant for research, we did not interview actors from commercial banks, financial institutions, or government departments for this study; we recommend that studies of all actors outlined in *Recommendations for Further Research* (page 82) be undertaken.

Intended Outcomes

- Define and test the ecosystem's assumptions and narratives regarding potential digital currency users, with a focus on the cohorts presumed to be likely early-adopters.
- Identify the most-common user-based assumptions among CBDC designers and policymakers to help mitigate potentially harmful setbacks to technical research progress and efficacy down the road, as well as to prevent unintentional harm to users.
- Begin to validate and prioritize key digital currency use cases (including, but not limited to, a US retail CBDC), so that technical frameworks, as well as adjoining policy questions, are grounded in substantiated facts.
- Save time and resources through early and efficient detection of the incorrect assumptions of human behavior and potential barriers to digital currency adoption previously mentioned.
- Better identify, define, and prioritize areas for further digital currency user research at scale.

About Our Research Participants

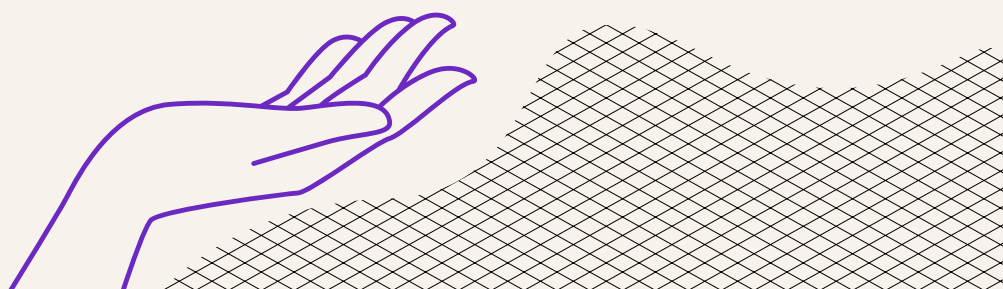
Participants were limited to people with reliable internet access (due to risks of in-person contact during the COVID-19 pandemic).

Qualitative Interview Participants (91)

To learn of the unique and personal experiences Americans have had with money and the financial system, we conducted 91 one-on-one qualitative interviews through recorded video calls across a diverse range of genders, races, and locations. The screened characteristics for interview participants were as follows:

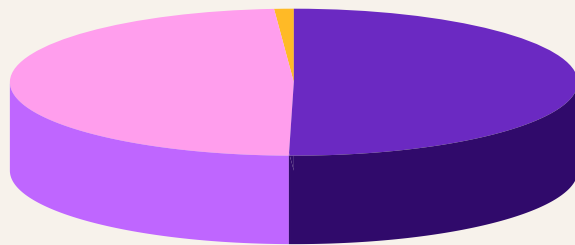
Research Theme	Behavioral Characteristics for Screening Purposes
Rural Americans	US residents who self-classify as the following: <ul style="list-style-type: none"> • Live in a rural setting, whose nearest town is 10+ miles away • Have poor public transport access in their area • Have lived in a rural setting for 3+ years • Who experience lack of cell phone connectivity (>10% on an average day)
Underrepresented Groups	US residents who self-classify as either (or a combination of): <ul style="list-style-type: none"> • Black, African American, Asian, Pacific Islander, Native American, Hispanic or Latino/a/x • Sexual orientation other than heterosexual • Neurodivergent • Transgender • Immigrant to the US <p>Note: For our interviews, we did not screen for US residents who self-classify as people with mental and/or physical disabilities or impairments. We recommend research be performed with this cohort in future studies.</p>
Users of Digital Payment Platforms	US residents who self-classify as the following: <ul style="list-style-type: none"> • Use at least four of the following: Credit cards, PayPal, Venmo, Cash App, Zelle, Apple Pay, Google Pay • Use these services for a range of purposes
Small and Medium Sized Enterprises (SMEs)	US-based SMEs who: <ul style="list-style-type: none"> • Serve consumers and accept payments via multiple, (2 or more), of the following: cash, credit/debit card, bank wire, third-party payment services, and checks
Unbanked Americans	US residents who self-classify as the following: <ul style="list-style-type: none"> • Not currently holding an account with a retail institution such as a bank or credit union
People Who Send Remittances	US residents who self-classify as the following: <ul style="list-style-type: none"> • Make remittance payments from the US to friends or family abroad

Table A. Research Themes and Behavioral Characteristics



Interviewee Demographics (91)

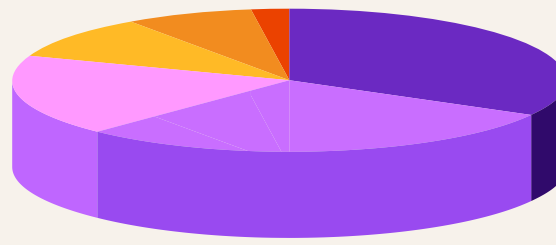
Gender of Interview Participants



- Female ● 50.5%
- Male ● 48.4%
- Non-Binary ● 1.1%

Figure 1.

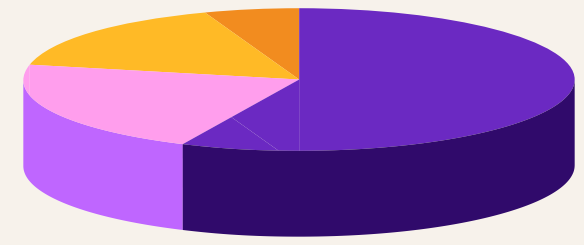
Age of Interview Participants



- 25-34 ● 33.3%
- 35-44 ● 29.0%
- 45-54 ● 18.3%
- 55-64 ● 9.7%
- 18-24 ● 7.5%
- 65+ ● 2.2%

Figure 2.

Race or Ethnicity of Interview Participants



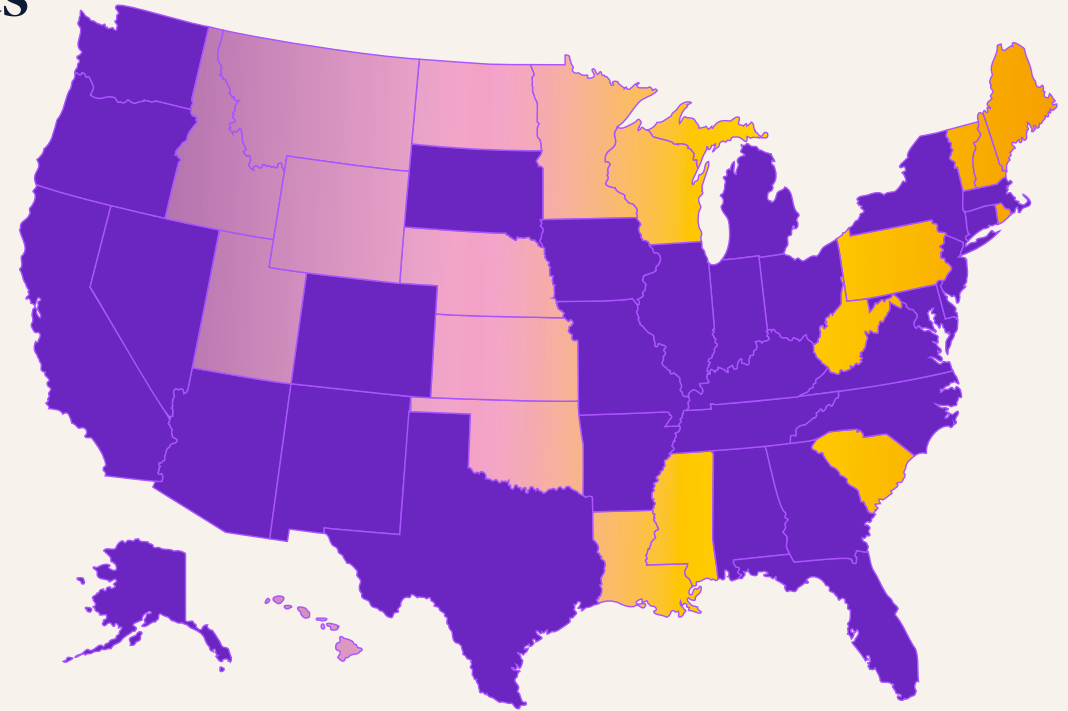
- White ● 57.0%
- Black or African American ● 21.5%
- Asian or Pacific Islander ● 16.1%
- Hispanic or Latino/a/x ● 5.4%

Figure 3.

Location of Survey Respondents

In addition to 91 one-on-one qualitative interviews, we also surveyed 1,319 people to generate additional insights at scale. These respondents were largely representative of the US population, but we did not produce a statistically significant representative sample of respondents along specific demographics (such as age, gender, or race). A detailed comparative table of our survey respondents to the US population can be found in Appendix C.

We advise that survey data findings, where provided in our report, should only be used as indicators for likely outcomes should the research be repeated with a statistically significant sample.

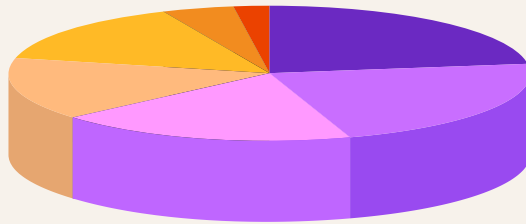


● Participants shown in dark purple states.

Figure 4.

Survey Respondent Demographics (1,319)

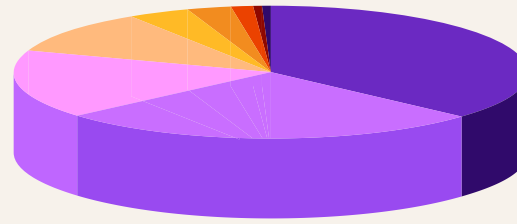
Age of Survey Respondents



35-44	22.9%
25-34	22.2%
55-64	18.7%
18-24	14.9%
45-54	14.8%
Under 17	4.3%
65+	2.2%

Figure 5.

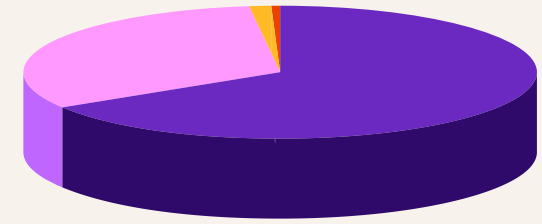
Race or Ethnicity of Survey Respondents



White	36.9%
Black or African American	26.9%
Hispanic or Latino/a/x	16.6%
Asian	10.7%
Multiple Races	3.8%
Native American	2.6%
Other	1.5%
Native Hawaiian or Pacific Islander	0.6%
Prefer not to say	0.4%

Figure 6.

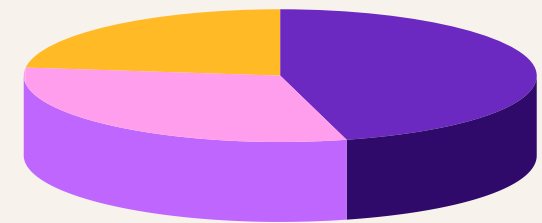
Gender of Survey Respondents



Female	66.2%
Male	31.9%
Prefer not to say	1.4%
Non-binary	0.5%

Figure 7.

Living Habitat of Survey Respondents



Suburban	46.1%
Urban	30.9%
Rural	23.0%

Figure 8.

Survey respondents represent a wide range of age, gender, ethnicity, and location.

A Note on Researching Hypothetical Technologies

In general practice, user research avoids asking people whether they might use something that doesn't exist yet, as this tends to trigger false positives in both quantitative and qualitative research methodologies. In testing attitudes towards a CBDC, and identifying potential blockers to adoption, we designed the research plan to generate useful and reliable insights that removed that bias. While much of our interview and survey addressed presumed attributes of a potential CBDC indirectly, the subject of a CBDC was brought up with research participants towards the end of the interviews or at the end of the survey. This was done to ensure that early answers were unfiltered and unbiased. CBDC was described as digital cash to people (for ease of comprehension, not to indicate a specific architectural design of a CBDC), and we made some assumptions as to the implementation of CBDC in our description of digital cash. These assumptions were: (1) a person would use a smartphone to interact with the CBDC, and (2) transactions would be free. This gave us a concrete baseline from which to spark conversation.

We did not use the term CBDC in our interviews or in our survey, rather we described the following to users: *“Let’s imagine that The Federal Reserve, the US Central Bank, creates a digital version of cash; it’s like physical cash except you’d use your smartphone to make payments to people or businesses, without having to use a bank account, credit card, or payment providers like PayPal, Venmo, Cash App or Zelle. Transactions you make would be free.”*

To test potential attributes of a CBDC we provided scenarios to people, used methods which included Conjoint Analysis, and asked them to make trade-off decisions between potential ways a CBDC could work.⁹ In this report we share only the insights that we have a strong level of confidence in based on qualitative assessment of the outcomes. Some aspects of a CBDC could not be tested with the chosen methods for this study, and we advise readers interested in these to refer to our suggestions for further research.

Glossary

The main definition articulates the particular use of the term within the context of this report, followed by common definitions for reference.

Central Bank Digital Currency (CBDC) **A digital form of fiat currency issued by a Central Bank to individuals and businesses for retail use.¹⁰ (Please note: other CBDC designs, such as two-tiered CBDCs, synthetic CBDCs, tokenized bank accounts, and wholesale CBDCs, were not the subject of study in this report.)**

Common definition for reference: Central bank digital currency (CBDC) is a generic term for a third version of currency that could use an electronic record or digital token to represent the digital form of a nation's currency. CBDC is issued and managed directly by the central bank and could be used for a variety of purposes by individuals, businesses, and financial institutions.¹¹

Cryptocurrency **A new form of digital currency based on decentralized and cryptographic systems that operates without a central bank or central authority for its issuance, management, or security; commonly connected to ideological norms related to increasing people's financial agency, autonomy, sovereignty, privacy, and control.**

Common definition for reference: A digital currency in which transactions are verified and records maintained by a decentralized system using cryptography, rather than by a centralized authority.¹²

Digital Cash **A specific design for a CBDC that emulates core attributes of physical cash, including: that it is accessible; that it doesn't necessarily require signing up for an account with a financial institution to receive funds; that it settles at par, and that transactions are person-to-person. Note: Digital cash was the term used in conversation with research participants towards the end of an interview to describe an unspecified retail CBDC; the term was chosen purely for ease of comprehension with users not to articulate any particular architectural design to research participants.¹³**

Common definition for reference: There is no commonly-used definition yet for digital cash. For reference, it is referred to as the "programmable spending condition attached to every banknote or physical coin in existence, which can be re-programmed when spent" by the Federal Reserve and as the "value stored electronically in a device such as a chip card or a hard drive in a personal computer" by the BIS.¹⁴

Digital Currency **New forms of digital money (emerging after 2008)¹⁵ that often "transcend traditional jurisdictions" — an umbrella term that includes distinct architectures of electronic money as varied as: decentralized forms of cryptocurrency (e.g. Bitcoin), privately-issued fiat-backed currencies (e.g. stablecoins), or centralized, publicly-issued digital currencies (e.g. CBDC).¹⁶**

Common definition for reference: Payments instruments that are: (i) issued in digital form only; (ii) managed under a system that relies on cryptography; (iii) recorded on a ledger that may be in decentralised form; (iv) issued by entities in either the private or public sector, and (v) used as a means of payment. They include cryptocurrencies, stablecoins and CBDCs.¹⁷

**Discovery
User Research**

Discovery user research centers people in the base-layer decisions shaping technology; it is the discipline of understanding the end users of a potential new technology; it employs a mix of qualitative (i.e. interview) and quantitative (i.e. survey) methods to identify people’s needs, pains, behaviors, and attitudes, and translates them into actionable data for key decision makers.

Common definition for reference: User research is the methodic study of target users—including their needs and pain points—so designers have the sharpest possible insights to work with to make the best designs.¹⁸

Polymakers

Government officials who have decision-making power to: (1) define digital currency policies, and (2) develop and deploy digital currencies, including the allocation of funds for digital-currency related R&D, pilots, and other exploratory activities at a national scale.

Common definition for reference: Someone, especially in government or a political party, who decides on new policies.¹⁹

Technologists

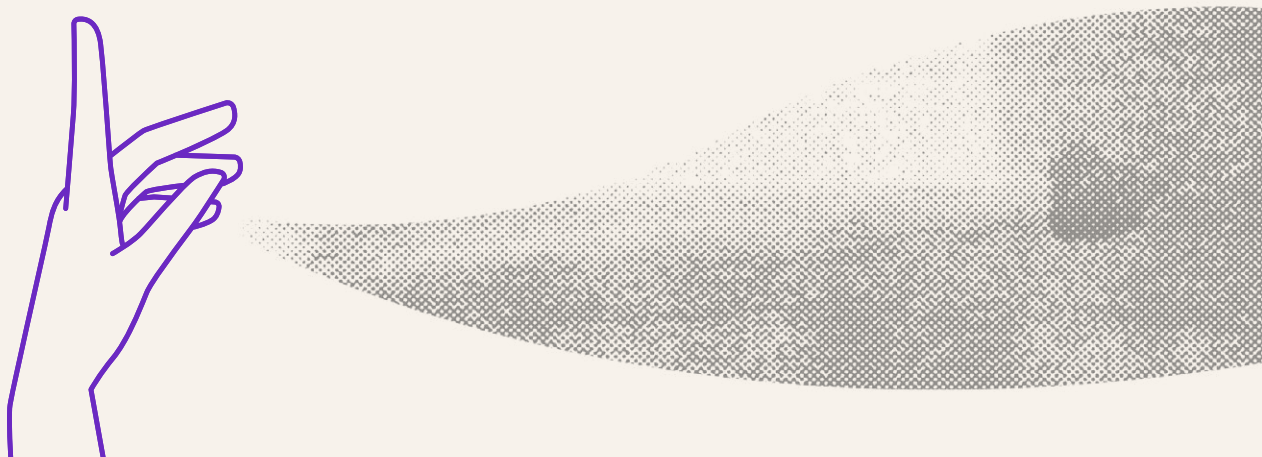
Specialists who apply their technical expertise to research and/or develop the design(s), protocol(s), and capabilities of digital currencies.

Common definition for reference: People who specialize in applying their expertise through the lens of digital tools—thus, they are technologists.²⁰

User(s)

People (or actors) who are (or may be) affected by a new financial technology; could include individuals and/or groups of people, as well as people in institutions who are (or may be) affected by the new technology.

Common definition for reference: Someone who uses a product, machine, or service.²¹



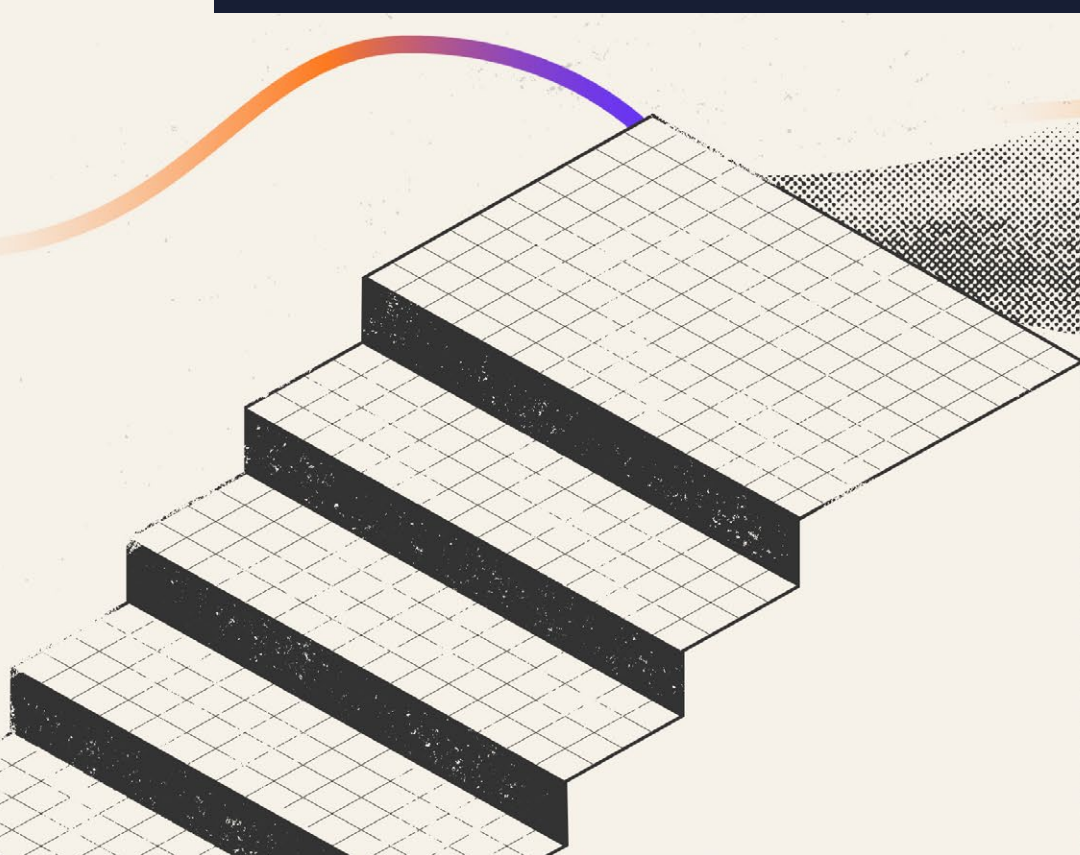



1.0

The Current Financial System

Untested Assumption

"The existing US payments system is not optimized for users, and a well-designed digital currency (including, but not limited to, a US retail CBDC) might be able to address users' pain points."



The Current Financial System

Uncertainty and a feeling of not being in control are major pain points for users in the current financial system.

What we learned:

- **People are averse to uncertainty, and they gravitate towards financial tools that provide a feeling of control to counter this.**
- **A better financial system has concrete attributes for end users: convenient, easy to use, fast, and free.**
- **Digital cash sounds familiar to the ways in which people currently make digital payments.**

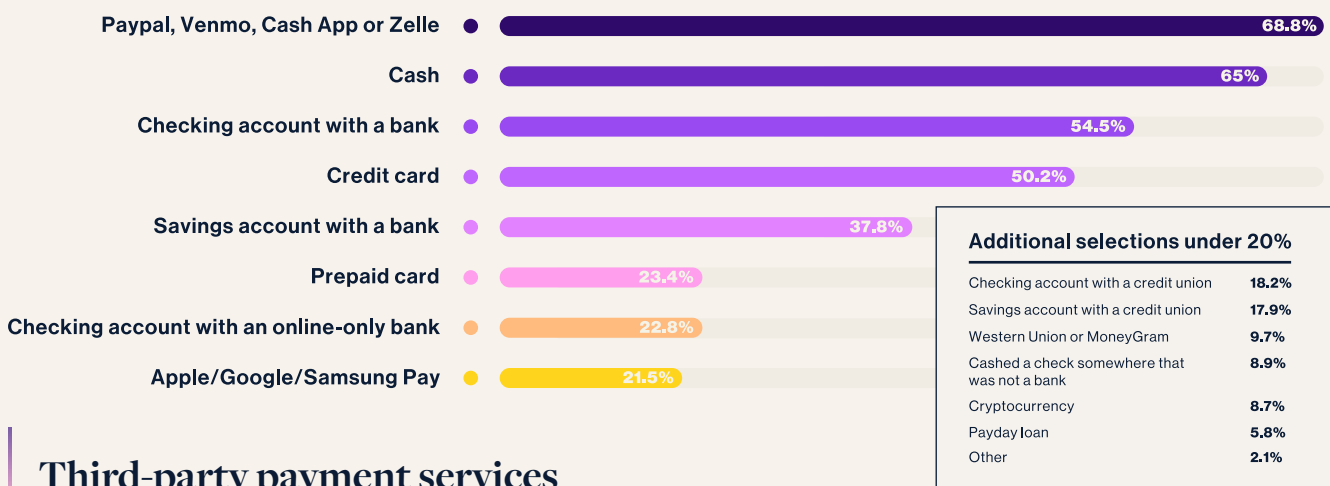
For this research sprint we asked: “What are the common unmet needs and pain points for Americans within the current financial system?” Our findings consider the responses from 91 people interviewed, as well as 1,319 survey respondents. During interviews we asked people to describe their experiences with the current financial system, use of intermediaries and third-party payment services, as well as their attitudes towards the idea of digital cash.²²

1.1 People are averse to uncertainty and they gravitate towards financial tools that provide a feeling of control to counter this.

Today, most people are served by a wide range of financial services and payment methods to manage their money. In our survey, we asked people to tell us what services or tools they had used in the last 12 months, and found third-party payment services to be the most widely used. Over two thirds (68.8%) had used a third-party payment service such as PayPal, Venmo, Cash App or Zelle, 65% had used physical cash, and 54.5% had a checking account

with a bank in the last 12 months. Looking closer at the demographics, unbanked respondents used the same services at nearly the same percentages as those with a bank account, suggesting that banks don't pose a strong barrier to using these services.

**Q • Which of the following have you used in the last 12 months?
• (Select all that apply.)**



Third-party payment services and cash are the two most-used payment methods.

Figure 9.

For most people, their basic financial needs are met by the range of services available to them. However, the overwhelming need that emerged in our study was the desire for people to feel in control of their finances in the face of uncertainty.

Existing research on the subject finds that humans have a high aversion to uncertainty.²³ In interviews, we heard this manifested in many ways, for example daily, manual monitoring of their finances across multiple applications and channels, and careful creation and maintenance of account management:



“I usually check my finances probably daily or every other day, just to keep track. I try to keep track of what I spend when I go to the stores. I have different apps [to track] or put on paper what I spend.”

- Research Participant



“At one point I had about five bank accounts, five checking accounts, five savings accounts for no damn reason at all, just to get the store credit cards and stuff, which was crazy. So I started closing that down. Now it works nicely. I have three checking accounts. One is strictly about me, my home and my monthly bills. The other one is my side hustle money. I'm also a realtor part-time, and I'm becoming a notary, so the second checking account is for play money. The third credit union account is really just about saving every now and then. In an emergency situation, I may have to pull money from there.”

- Research Participant

The need for control was brought up multiple times in every interview, but was raised more often by those with lower incomes and those who do not have a retail bank account. In a discussion with one of our unbanked participants, they stated their strong preference for self-custody as a means of avoiding uncertainty:



“I really don't need an institute to manage my money. [If] something was to happen, their system was to crash, I'll lose my money. If I have money in my possession at all times, if I lose it, then I'll be alright by me losing my money, rather than somebody else losing my money.”

- Research Participant

Existing research states that the cognitive load for managing uncertainty is greater for people with lower incomes: “Limits to cognitive control matter to poor people because poverty raises the stakes of many economic decisions. For poorer people, the same economic decision may represent a more difficult trade-off between more valuable alternatives with less margin for error. Such decisions would demand more costly deliberation—including, but not only, when emotions must be regulated. If cognitive resources are limited, this would leave less remaining cognitive control for other decisions or behaviors.”²⁴

For those who are able to use credit cards, we found that mastering the benefits and points systems of credit cards is a way of feeling in control of their financial situation. For those who are unbanked or with neobanks,

a lack of penalty fees and easy visibility of their transactions through a personally managed or digital ledger allows them to budget and manage their spending effectively, giving them a sense of control.

For a person to feel in control of their finances and experience a sense of certainty, they need:

- **Clear expectations:** There are no surprise fees, I am clear what my account status is, and the terms of the payment providers I use are both clear and reliably honored.
- **Visibility:** I always know how much money I have, I can see up front how long transactions might take, and I have access to a transaction history that supports the management of my finances.
- **Speed:** I know my money is available to me, or the person I send it to, quickly, I will not experience variable times for money to move, and I will not have to engage in time-intensive, onerous processes to transact.
- **Security:** I know my money is safe, that it can't be easily stolen or lost, and I trust where it is held.

Some aspects of the current financial system, particularly unexpected fees, undermine a sense of control and create uncertainty for people. Outdated processes and obfuscation of data in the current banking system (for example, delayed bank wire clearing, checks bouncing or being delayed, bank accounts being frozen, and unclear fee structures) also create uncertainty and undermine that essential sense of control for end users.

Checks

Checks were brought up by multiple participants as an example of a lack of control. Participants shared a feeling of confusion when they experienced long delays or inconsistent time periods between when a check would be deposited and when it would clear. Checks commonly clear with funds accessible within

three business days of deposit, however, extended delays can be caused by a variety of factors, such as the bank placing a hold on access to funds (checks can be held for up to 10 business days), a check getting lost, or mail delivery being behind schedule.²⁵ That said, a person's complete lack of—or significantly reduced—visibility into this process, along with the high variability of these factors creates tremendous frustration and uncertainty. Despite these issues, and the decline in check use, 29.8% of our survey respondents receive checks (in addition to other payment methods) for payment for work.²⁶ A sense of control over transaction timing, in particular, is important. The speed of access to this information (i.e. when funds will become available) is critical for reducing uncertainty, as described by interviewees:



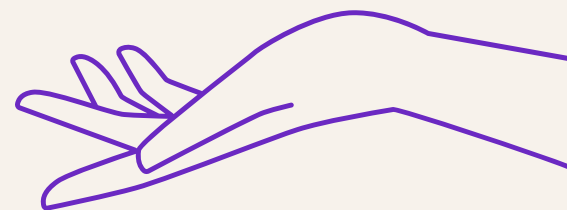
"I started a new job and to make sure it was a legitimate check, the bank would hold the check. I'd have to wait. So you're going three weeks without a paycheck. And then the bank, the day you get paid, you go to cash your check. They want to hold it for another week on top of that, that's a month without pay. And that happened to me a couple of times."

- Research Participant



"Mobile deposits for checks are a lifesaver; you take a picture, you don't have to leave home, that's great. But I don't want to have to wait three days for that to clear. That's a big thing with banks that I don't like: a lot of times, whenever I deposited a check, they would tell me 'you can have these funds, but these funds you can't, you have to wait weeks to get these funds'. I don't think that's right, I should be able to use my money, it's my money."

- Research Participant



Q: How do you receive payment for work? (Select all that apply.)

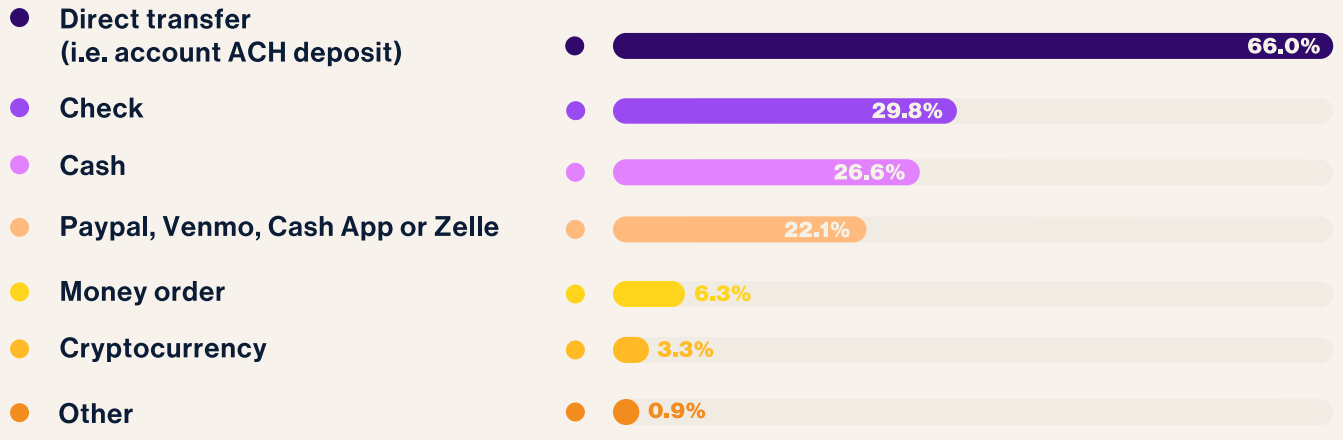
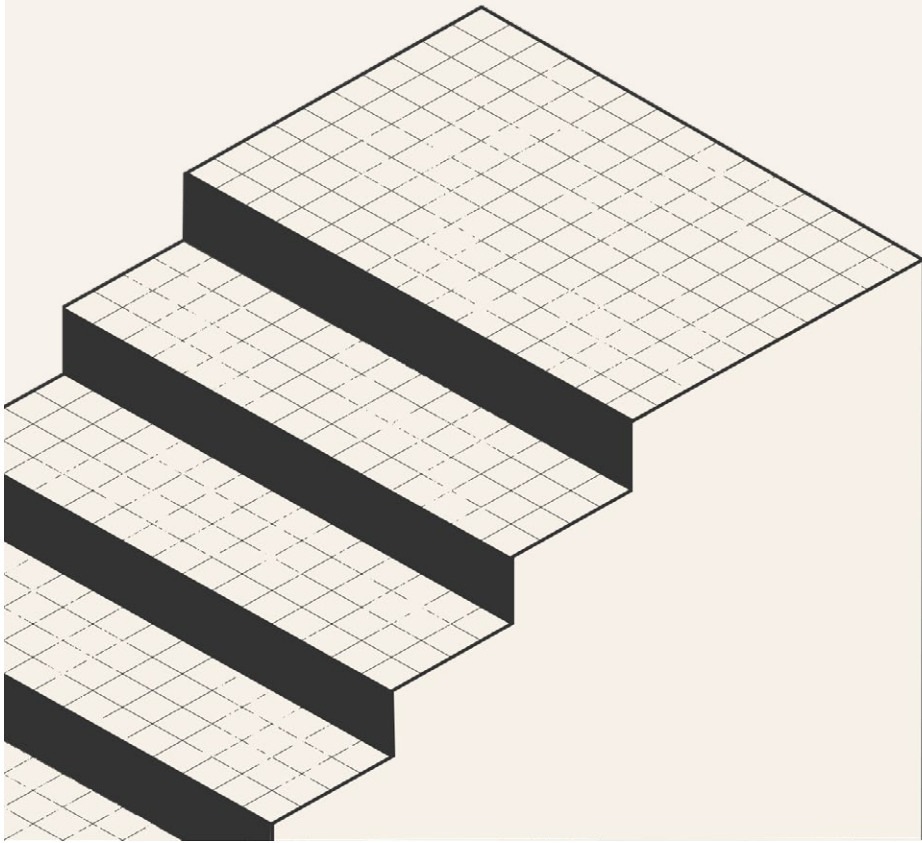
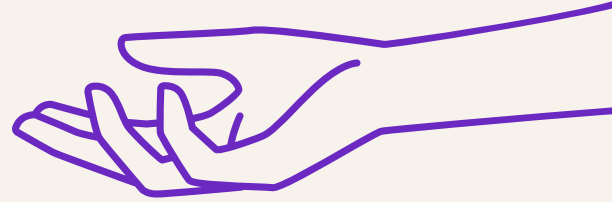


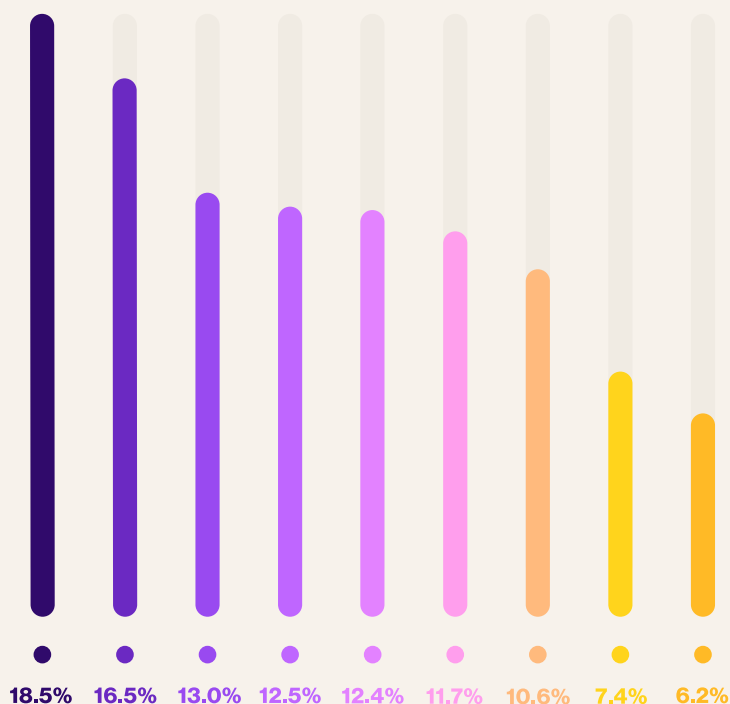
Figure 10.

26.6% of survey respondents receive cash as payment for work.



Q • Which of the following have you been affected by in the last 12 months, if any?
 • (Select all that apply.)

- Paying a fee to pay a bill
- Penalties for being overdrawn
- Paying a fee to load a prepaid card
- Paying a fee to cash a check
- Banking fees being too high
- Checks or deposits taking too long to clear
- Paying a fee to send a wire transfer
- Penalty for not depositing the minimum monthly amount
- Bank account was closed without my knowledge



6.2% of people reported having their bank account closed without their knowledge.

48.5% of respondents reported not having been affected by any of these options.

Figure 11.

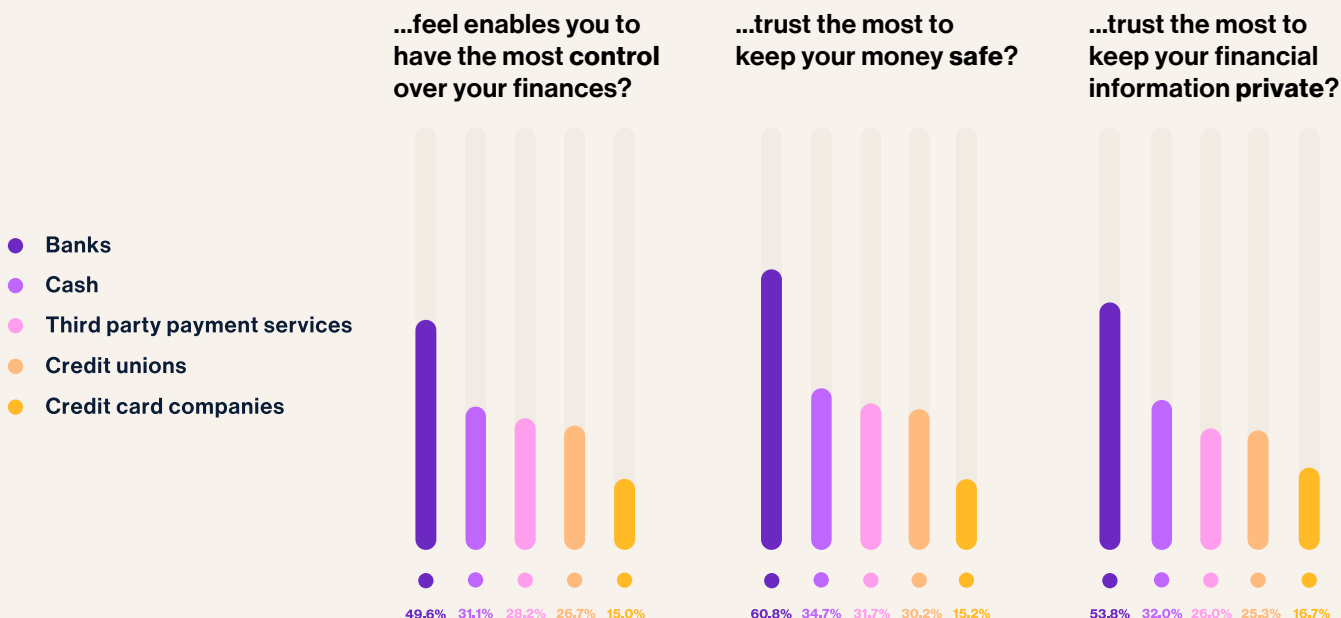
We asked people in our survey to tell us what negative experiences with the financial system they had encountered in the last 12 months. Roughly half (51.5%) selected at least one negative experience. Additionally, 6.2% of people reported that they had experienced a bank account being closed without their knowledge.

Looking closely at the demographics of the 48.5% of respondents who reported *not* having encountered any of these negative experiences in the last 12 months, they tended to be older (45.1% were age 45 or older as compared with 27.2% for the remaining sample), and more commonly to be white (41.7% vs 32.6%) as compared with those that reported any negative experience. Further research on these negative experiences across different demographics may be beneficial to better understand these issues in detail and prepare future innovation with solutions to resolve them.

We also asked people to select up to three financial services or tools that best fit these criteria: (1) which services “enabled them to have the most control over their finances,” (2) what financial services they most “trust to keep their money safe,” and (3) which services they “trust to keep their financial information private.”

For all three criteria (control, safety, privacy), retail banks came out on top. Notably, physical cash was the second most-chosen by people for providing the most control over their finances.

Q • When it comes to your money, which of the following do you...
 • (Select up to a maximum of three options.)



Note: The financial tools listed for respondents to rank in Figure 11 were chosen based on their prevalence. The options listed are not the same kind of payment tool in either form or function; rather they represent a comparative measurement of user sentiment towards a sense of control, safety, and privacy.

Figure 12.

Over 60% of respondents trust banks to keep their money safe.

Cash

According to the Federal Reserve Bank of San Francisco report of 2020, cash use is prevalent among people of all ages, but highest among individuals aged 18 to 24 and those 55 and older. Individuals aged 25 to 44 use cash less often than any other age cohort.²⁷

In interviews, we learned that physical cash provides some people with the feeling of control, because having cash in hand or in a safe place at home provides a sense of financial security. Some of the articulated benefits of cash surfaced by people included: seeing how much money they had, that they were only able to spend what was physically available, that there was no time-delay in paying with or receiving cash, and that there were no fees associated with holding or paying in cash.



“I can go right over here to my safe; my [cash] is right there. I don't have to wait in line. I don't have to sign any papers. I don't have to slide any cards. I don't have to wait for the mailman. If I want it, I go over there in that safe and I get it.”

- Research Participant



“Cash talks. If I'm buying off of Facebook, I know I can take \$30 less than what they're asking.”

- Research Participant

When asked about their use of cash, a minority of survey respondents agreed with the following statement: “I use cash to buy items that I don't want a record of (for anonymity).” Only 25.2% of survey respondents either agreed or strongly agreed with the statement (29.3% were neutral, and 45.5% disagreed or strongly disagreed).

To further analyze attitudes towards cash use, we asked 29 people from our unbanked and remittances interviews to choose what attributes of physical cash were most valuable to them between: (1) “anonymity”, (2) “instantaneous transaction”, and (3) “lack of fees”. Most took a neutral stance or gravitated towards “lack of fees”.

During interviews with rural Americans, not one person we spoke with used cash as their main method of spending or receiving money, but everyone felt that they needed to carry cash because it was likely they would come across cash-only situations.

For many rural Americans, credit cards are a common way of making purchases, and direct deposits or checks are common ways of receiving money. However, tipping for services, buying items from others, travel, and compensation for casual labor services are often paid for with cash. There is still a cash culture in rural areas, and while they foresee a future of digital cash, they don't envision life without physical cash.

Looking at existing research around how people choose what payment methods are right for them, cash usage has seen a steady decline over many decades. The 2021 Findings from the Diary of Consumer Payment Choice found a 7% reduction in cash use since 2019.²⁸

It is important to note that even with cash use being in decline overall in the US, cash storage seems to be increasing since COVID-19. The Federal Reserve's national Cash Product Office (CPO) released 2021 COVID-19 survey data, showing that US consumers continue to hold a greater store of value in cash as compared to pre-pandemic data. Despite physically carrying less cash around, the CPO found that the average store of value in cash rose from \$80 pre-pandemic, to \$325 in April 2021. What we heard during our interviews was consistent with findings from the Congressional Research Service: people are using and will continue to use less physical cash.²⁹



User Uncertainty and Suggestions for Improvement

People are averse to uncertainty and they gravitate towards financial tools that provide them with a sense of greater control to counter this. Uncertainty, we found, was caused by four pain points: (1) unclear expectations, (2) lack of visibility, (3) speed, and (4) insecurity. Based on our research the following improvements would be needed to address the pain points for users in each category.

Pain Point	Need	What Would Help Users
Unclear Expectations	Clear Expectations	<ul style="list-style-type: none"> • There are no surprise fees; I know in advance when and why I might incur fees, and how much they would cost • At the point of transaction I know exactly what will, and will not, happen and why • When I use a payment-service provider, I easily understand their terms and their terms are reliably honored • I am clear what my account status is; if my account is frozen, or if my payment won't complete, I know why and how I can fix it
Lack of Visibility	Visibility	<ul style="list-style-type: none"> • I know exactly how much is available for me to spend at any given time • I know up front how long transactions will likely take • I have access to real-time tracking of money's status in a transaction flow, and if it is blocked, I can clearly see why (e.g. when sending remittance payments) • Looking back, I have access to view a clear and reliable history of my transactions
Speed (slow)	Speed (fast)	<ul style="list-style-type: none"> • My money is available to me, or to the person I send it to, quickly • My money doesn't get stuck in the process of a transaction • I do not experience variable times for money to move which could result in me having an inaccurate understanding of my available capital • I do not have to engage in time-intensive, onerous processes to move money
Insecurity	Security	<ul style="list-style-type: none"> • My money can't be unexpectedly debited without my knowledge or consent • My money can't be easily stolen or lost • My money is safe; I trust the place, institution, or technology where it lives to store it securely

Table B. Pain Points Related to User Uncertainty and Suggestions for Improvement

1.2 A better financial system has concrete attributes for end users: convenient, easy to use, fast, and free.

The benefits of third-party payment services elicited through interviews were:

- **Convenience:** The ability to make a payment from a smartphone anywhere, and knowing that the person they need to pay will likely have at least one of these apps.
- **Ease of use:** Considered to be more user-friendly than sending bank wires.
- **Fast transaction times:** Near-instant peer-to-peer payments are seen as a huge improvement on the current system. When a digital transaction is fast, this reduces uncertainty.
- **Low or no fees:** For the services that do charge fees, users feel more in control because these fees are made visible and understandable at the point of signing up for a service, as well as when making individual transactions.
- **Low barrier to entry:** It is not required to have good credit, a bank account, maintain an account balance, or have a banking history to use most of these services.
- **Additional benefits:** Features within these services often improve upon the online banking experience of traditional retail banks; advanced spending tracking, and the ability to make payment requests directly through the app were examples given in user interviews.

Access considerations

Internet and cell-phone access

Third-party payment services are mostly mobile, and require someone's device to have cellular or wifi connection. We explored the demographic trends in our survey of 1,319 people, and found that 15.3% of respondents

experienced cell phone reception less than 75% of the time on an average day. These people did not differ significantly from other respondents, including, perhaps surprisingly, in their income or whether they lived in rural, suburban, or urban settings. Those that had limited cell coverage did tend to have lower self-reported technical competence than did those respondents who had more consistent cell coverage.³⁰

People who preferred to pay in cash also had a lower mean level of self-reported tech competence.³¹ Additionally, they were more likely to fall on the lower end of the income spectrum (54.3% had a reported income <\$50K compared with 24.3% for those who avoided physical cash), and less likely to have a checking account (72.8% had a checking account compared with 77.6% for those who avoided physical cash).

Since early 2020, COVID-19 has significantly impacted every corner of society, and spending habits are no exception. There has been a sharp increase in the amount of digital payments sent and received since the pandemic started, along with where people choose to hold their money. A survey by McKinsey showed that 42% of respondents use a fintech company, with 6% of these respondents becoming new fintech users since the start of the COVID-19 pandemic.³²

Rural Americans

For residents in rural areas of the US, in-person banking and financial services are often limited, which puts a unique strain on these residents, regardless of their financial status. We found that online and mobile financial services have lessened this burden by reducing the need to make regular, time consuming trips to a physical financial institution. For the rural Americans we interviewed, it takes an average of 46 minutes to get to the nearest bank branch, and often people will plan their entire day around such a journey, incurring costs for travel. Since mobile banking has become available, these trips are less frequent. The ability to manage, send, and receive money through digital banking has been a game changer for rural America.



“I do everything I can to avoid having to make the drive and go in [to a bank], because it’s a hassle.”

- Research Participant



“To go into town it might be because I have something to get notarized, but most of my banking is online nowadays. I even deposit my checks by mobile deposit, so it’s kinda nice that technology now saves me time.”

- Research Participant

Mobile banking has also allowed rural residents to bank with whomever they choose, rather than having to rely on the closest, and often only, bank in their area.

Underrepresented Groups

In our interviews with people from underrepresented groups, we learned that their use of fintech services did not significantly differ from those in other interview groups.³³ When asked, none of these interviewees could recall a negative online experience regarding their money or financial transactions related to an aspect of their identity. Negative financial experiences related to their identity regarded in-person incidents. The experience of being in an underrepresented group may foster a feeling of greater uncertainty when entering into in-person financial transactions with others.



“I was purchasing an item and I knew it was on sale. And I had a coupon that I knew could be used on the sale item. And most of the places say you can't use that on the sale item or whatever, but it was a special coupon code because of a survey that I completed. But there was a Caucasian lady behind me [in the queue], the cashier was white and I didn't want to stand there and argue with the lady. Because if I did, I thought I would look like some angry Black woman arguing and yelling at the lady. So I actually went ahead, purchased the items, paid the full price for it, and then took it to another register and had them refund it and credit the coupon. I felt like I could not stand there and wait and hold up the line because I would just be perceived as some angry Black woman.”

- Research Participant



“Black identity for sure plays a big role in how people perceive me and how they interact with me in terms of things like money. [For instance] I never thought I could buy a house. It never once crossed my mind that I could purchase a home... I think there's a correlation between being a young, Black man. People assume that we're up to no good... I was worried that there was going to be that sort of perception when I started the process of buying a home. And the two lenders that I worked with were actually really awesome. And the realtor that I worked with, he was great. I didn't feel like they were projecting any of those stereotypes on me, but I was worried prior to meeting them that they would think those things about me.”

- Research Participant

Having an account with a bank or credit union for most (barring unbanked people) is seen as a good way to keep a person's money safe. However, third-party payment services such as PayPal, Venmo, and Cash App, which don't require the user to have a bank account, are considered to be better experiences, providing features that give people the feeling of control (although they do not provide the full suite of financial services a person may need, such as loan programs).



“I prefer to pay with PayPal or Venmo, because then I have a digital record for when I'm doing my books. If I'm buying something from someone and I only have an ATM receipt, I have to remember what that was for.”

- Research Participant



“The ability to just pay someone or split a tab is a lot easier. With Bank of America you'd have to go in and set up a bill pay. And that's just so much of a hassle, I need to know their address and all that information. That doesn't make any sense these days.”

- Research Participant



“For receiving money, it's the third-party apps that have changed the game. And I really appreciate that.”

- Research Participant

1.3 Digital cash sounds familiar to the ways in which people currently make digital payments.

When describing the concept of a CBDC to people we interviewed, we heard that the idea of using digital cash doesn't seem very different from how people currently make and receive digital payments.

People perceive all payments, excluding cash and checks, as being digital already. They exhibited an understanding of, and a positivity towards, most payments methods becoming digital.



"If you think about it, any cash that you've loaded into your cash balance and PayPal is digital cash, I don't know if your definition for digital cash will be different than this one. I mean, I kind of consider anything within a bank account, which is not cash but is still money, as digital cash."

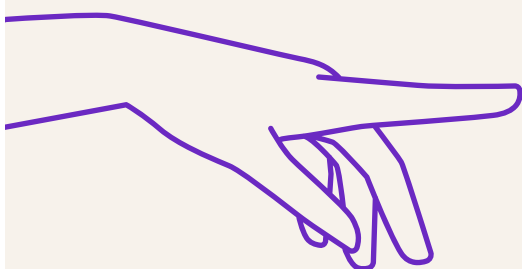
- Research Participant



"But you're already making a digital transaction just by putting money in your ATM, or paying with Venmo or Cashapp. It's really not tangible. You're already making something electronic and digital. For the most part, this is exactly what we're [already] doing."

- Research Participant

This indicates that there may not be a considerable mindset shift for most Americans to use a form of payment like digital cash, assuming the interface they interact with feels just like any other third-party payment service or mobile banking experience.



Design Implications: The Current Financial System

The following design implications are meant to guide anyone seeking to create payment systems to better serve users' needs. Because decisions are being made at the time of publication about possible US retail CBDC design options, the insights in this section are generally framed for CBDC technologists and policymakers, but the ideas outlined below are not limited to the CBDC use case.

A CBDC designed to be convenient, easy to use, fast, and free might meet the baseline payment needs of many of the US population but it may not be sufficient for every use case.

Transaction Speed

To explore what payment transaction times people want for a digital payment service, we tested several potential scenarios in interviews to determine what times were deemed as “fast enough” by interviewees. The options we gave for transaction speeds were 10 seconds, 60 seconds, 1 hour, and the same day. For most people we interviewed, 10 seconds was deemed instant, and 60 seconds was an unacceptable lag depending on the context (i.e. people expect third-party payment services to communicate the transaction speed faster than a credit card). Notably, when we posed the notion of paying a fee for a transaction to be expedited from same-day to a faster time, participants reacted negatively to this idea. Furthermore, these findings come with a considerable caveat; we tested only with potential end consumers and not SMEs, who may have differing needs for transaction speed. Testing real scenarios with prototypes rather than hypothetical scenarios can add further clarity and nuance to these design considerations, as suggested in our recommended further research section.

Incentives

Going cashless tends to deny access to goods and services to a segment of the population, hurting financial inclusion, because it creates a two-tiered system of finance; those who can access bank accounts and credit cards, and those who cannot.³⁴

Introducing a new payment system that is not designed, from the start, to be accessible to, and adopted by, a diverse population runs the risk of creating a similar financially exclusive, two-tiered system.

Thus, a potential feature to consider when designing new payment systems is the creation of incentive structures which are accessible and beneficial to the entire population, regardless of whether a person needs the new tool or not. Before US policymakers consider incentive options, however, a thorough evaluation of the incentive programs employed by other nations introducing new currency services would be advisable. Examples of these programs include: the pilot launch of the Digital Yuan in China where participants have been incentivised to download the “digital RMB app” to be entered into a red packet lottery, and in El Salvador (the first country in the world to permit Bitcoin as legal tender) where, to incentivise adoption, the government gave \$30 of Bitcoin to up to 4 million Salvadorians who use ‘Chivo’, a digital wallet, to start using Bitcoin for day-to-day transactions.³⁵

User Experience

Third-party payment services set the standard for user experience in digital payment services. Given the broad use of third-party payment services and their general ease of use when tracking transactions or managing funds, just meeting the needs of users by being convenient, easy to use, fast, and free may not be sufficient. Capabilities or services that could be an improvement for users when compared to their experience with current third-party payment services include:

- **Fewer restrictions, plus greater clarity and predictability of service terms:** Respondents shared frustrations regarding various limitations and imbalances within third-party payment services. For instance, Zelle users cannot connect multiple bank

accounts, and PayPal merchant users experience a persistent lack of agency based on PayPal's return policies. Improving upon these pain points would mean clearly defining service structures, and also having relatively few restrictions. To support the feeling of personal control, there should be clarity and predictability regarding any limits placed on spending amounts, on how many transactions a person can make, or on what people can purchase.

- **Better customer support:** A major complaint we heard in interviews from users of third-party payment services was the facelessness of these organizations. There was no option to speak to a real person when things went wrong. Attempting to solve feelings of uncertainty by providing sufficient customer support may resolve this issue for users.
- **On- and off-ramps from physical cash to digital currency:** In addition, interviewees expressed that having a clear and easy process for transitioning back and forth between physical cash and digital currency would be important.

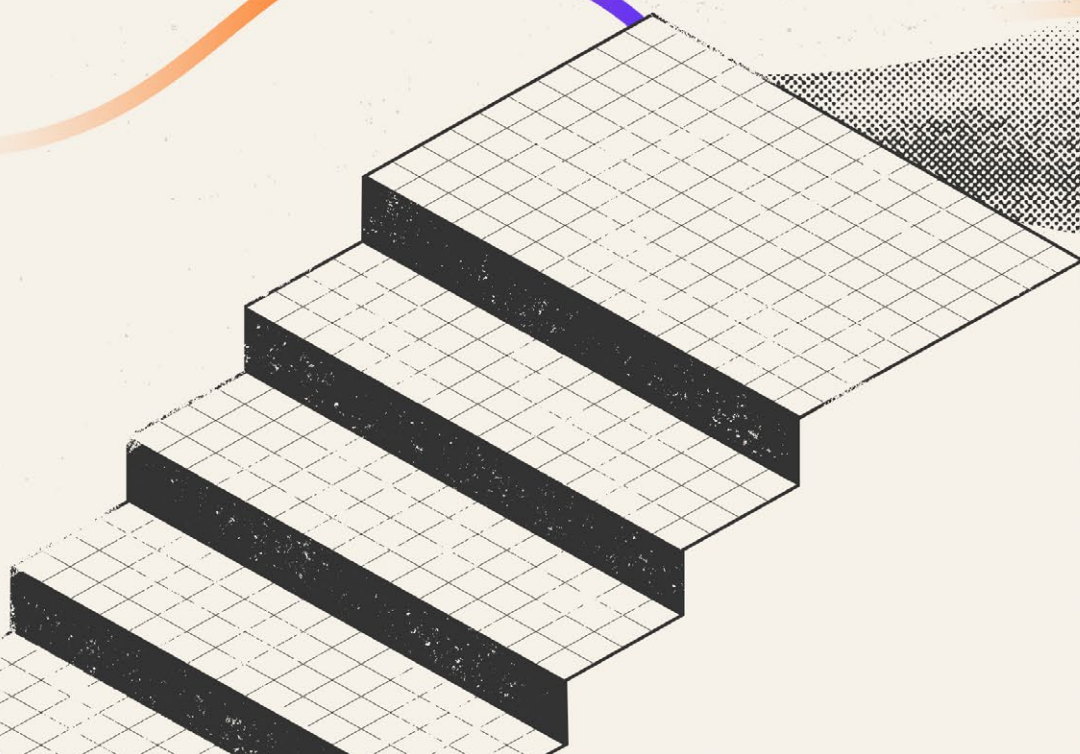


2.0

Unbanked Americans

Untested Assumption

"An appropriately designed digital currency (including, but not limited to, a US retail CBDC) could provide access to financial services previously out of reach for unbanked people because they will no longer have to experience costly fees."



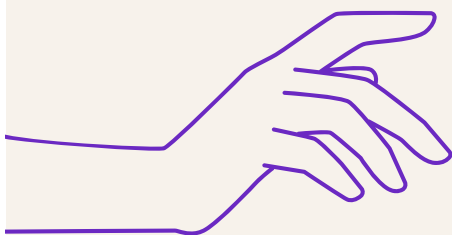
Unbanked Americans

Unbanked Americans don't need banks.

What we learned:

- **Distrust of banks is rooted in surprise overdraft fees.**
- **Neobanks are a trusted alternative to traditional banks for unbanked people because they don't match the mental model of a traditional bank.**
- **Unbanked Americans express openness to using digital cash—especially if it would enable them to avoid engaging with a traditional bank.**

For this research sprint we asked: “What drives people to become unbanked and is it possible for digital currencies (including, but not limited to, CBDCs) to address those dynamics?” Could appropriately-designed digital currencies provide access to financial services previously out of reach for unbanked Americans? Unbanked Americans were defined as people who do not have an account at a federally insured depository institution. It is often assumed that digital currencies have the potential to improve financial inclusion.³⁶ This use case is important to research, especially in the exploration of a US retail CBDC, because if there is no obvious benefit to this core indicator of financial inclusion it may be hard to justify the argument that a CBDC will improve the current financial system for those currently excluded. We interviewed 15 Americans who defined themselves as without a bank or credit union account (4 of whom had spent time unbanked but had more recently opened an account with a neobank), and analyzed the survey responses of 260 people in our survey who stated they did not have an account with either a bank, credit union, or neobank.



2.1 Distrust of banks is rooted in surprise overdraft fees.

For unbanked Americans, transaction clearing times and fees create barriers for personal financial control. Without immediate access to the payments they receive, for example a delayed clearing in a direct deposit, they risk being overdrawn. Overdraft fees most negatively impact those receiving low or no income.

Distrust of banks stems from the broad perceptions and cultural narratives that exist of banks being exploitative.

In interviews we learned that incurring overdraft fees is often the first highly negative experience someone has personally of the banking system. This fee does not “teach them a lesson” but pushes them behind financially.

In many instances, as fees accrue daily, it's impossible for people to make up the difference, and eventually the bank will close their account, or they will cover the fees themselves out of their next deposit (or via a loan) and then leave the bank voluntarily.



“I ended up getting an overdraft. [For] every day that I didn't pay, it was \$35...By the time payday had come, that was my check gone. And I was like, I'll pay them their money. But then I just closed out my account... I'm done with banks.”

- Research Participant



“If my paycheck is \$500, and I owe \$150 in overdraft fees, well guess what? I have \$150 less in my account. So now I'm going to be late on my next payment for utilities. They're going to overdraft it again. It becomes a vicious cycle.”

- Research Participant

When an individual becomes unbanked due to overdraft fees, their negative perception of the entire banking system can permeate through their social circle and even intergenerationally. Every unbanked person we interviewed spoke about overdraft fees being the biggest pain for them in the traditional banking system; either from personal experience, or because someone they knew had become unbanked as a result of incurring fees. We spoke with individuals who had opted not to open a bank account because of the experience of their immediate family.

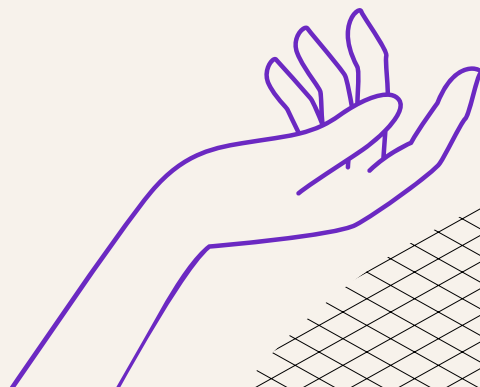


"I keep my money here with me [in a safe]. I know how much is there down to the penny. I do have a couple of older family members who just refuse to use banks. They think they're a rip off and they just won't deposit money in a bank."

- Research Participant

An additional source of distrust found particularly egregious to our study population was the process of opening "free" bank accounts that later incur overdraft fees, or when a bank they have opened an account with suddenly closes without warning.

First-hand experience is not the only way that unexpected fees affect people's perception of banks. Many whom we interviewed mentioned a negative story in the news, for example: "Wells Fargo opening multiple bank accounts in customers names without informing them," made them feel skeptical of banks in general.³⁷ Many do not perceive meaningful differences between the different types of institutions; whether these are local credit unions or nationwide organizations. We heard about perceptions of nepotism in local banking, and that major banks are overly-institutional and impersonal.





“I see a lot of the people that are somehow involved with the [local] bank. My son, who drives a 2002 Pontiac Grand Am, goes to school with the bank owner’s grandson. He pulls up in a 2021 Mercedes. My first thought is that it’s because his dad has got all the interest [from] people that have put that money in the bank, and I understand making money, but you have to give back a little bit, you know? And then they say, we’re going to give you an interest-bearing checking account. You’re going to make money if you leave it in our bank, and don’t touch it for 30 days. I received 4 cents in interest from a \$5,000 deposit. It’s not even worth the ink that they use to print the brochure that says interest-bearing checking account.”

- Research Participant

According to the FDIC, 5.4% of US households (approximately 7.1 million households) were unbanked in 2019.³⁸ The most commonly cited reasons participants in the FDIC survey gave for not having a bank account were:

- **Minimum Balance Requirements:** Not having enough money to meet minimum balance requirements (48.9%)
- **Trust:** Not trusting banks (36.3%)
- **Privacy:** Avoiding a bank gives more privacy (36.0%)

In our own survey, we identified 260 respondents (19.7%) who were unbanked (however some lived in households where someone else had an account at a financial institution).

Our survey findings on why people don’t have bank accounts closely match those of the FDIC report (see Table C below). We asked respondents the same question and found that “I don’t have enough money to meet minimum balance requirements” was the most selected reason in both our survey and the FDIC survey. In our survey, this reason was closely followed by “bank account fees are too high” (19.8%), “I don’t trust banks,” (18.1%) and “I rely on someone else in my household who has an account” (16.4%).

Reasons for Being Unbanked

Q • What is the reason that you don't have a checking account with a bank, online-only bank, or credit union?
 • (Select up to a maximum of 3 options.)

- I don't have enough money to meet minimum balance requirements
- Bank account fees are too high
- I don't trust banks
- I rely on someone else in my household who has an account
- Bank account fees are too predictable
- Bank locations are inconvenient
- Avoiding a bank gives more privacy
- Bank hours are inconvenient
- I cannot open an account due to personal identification, credit, or former bank account problems
- Other
- Banks do not offer products and services I need
- I am a recent immigrant and have not yet opened an account, although I intend to

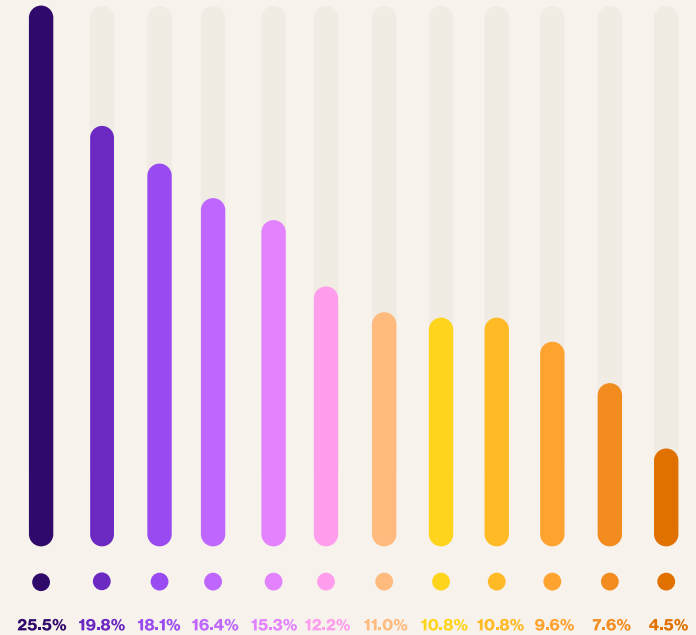


Figure 13.

18.1% of respondents reported they don't have a bank account because they don't trust banks.

	1st most selected	2nd most selected	3rd most selected	4th most selected
Maiden Survey	I don't have enough money to meet minimum balance requirements	Bank account fees are too high	I don't trust banks	I rely on someone else in my household who has an account
FDIC Survey	I don't have enough money to meet minimum balance requirements	I don't trust banks	Avoiding banks gives me more privacy	Bank account fees are too high

Table C. Reasons for Being Unbanked

Of note, more than half of the unbanked people surveyed by the FDIC (56.2%) were not at all interested in having a bank account, which reaffirms the level of distrust in the banking system. A more recent report published by Mercator Advisory Group in 2021 puts the amount of unbanked households with no interest in having a bank account at 75%, and reaffirms that distrust in banks is the main reason for the lack of interest in becoming banked.³⁹ Meanwhile, traditional retail banks are attempting to attract unbanked people through a variety of methods including opening branches in banking deserts, providing second-chance accounts or offering low or no fee checking accounts.⁴⁰ These efforts may prove unfruitful, because of the continued poor practices of some of the banking sector.

In May 2021, CEOs of America's four largest banks testified at a Senate hearing on the amount of profit generated through overdraft fees during the COVID pandemic.⁴¹ Across all four banks they accumulated \$4 billion in such fees last year.

People who live paycheck to paycheck often rely on lines of credit to get through emergencies, and a fee-free overdraft would be of benefit to these people. Efforts are being made by the Cities for Financial Empowerment Fund to encourage Bank On certified accounts at financial service providers, which abide by specific standards which include not charging people overdraft fees.⁴² The level of uptake of these standards is yet to be determined.



2.2 Neobanks are a trusted alternative to traditional banks for unbanked Americans because they don't match the mental model of a traditional bank.

Uptake of digital-only banks, or neobanks, in the US, has grown to approximately 20.2 million this year, with six million new accounts created since 2020.⁴³ In our survey, 6.3% of respondents had only a bank account with a neobank, while 16.5% of all respondents stated they had a neobank account in addition to an account with another financial institution.

When it comes to trust for unbanked Americans, neobanks are an exception. Neobanks are not chartered, therefore they are not technically banks; they operate solely online, and provide bank-like services through relationships with chartered banks. In interviews, we learned that some people consider themselves outside the banking system, despite having an account with one of these neobanks. Exploring this further, we learned that neobanks do not match the “mental model” of a traditional bank; people don't have the same negative preconceptions and experiences that they have with traditional retail banks when considering and opening an account with a neobank.



“I don't know if you can consider Chime a bank, I don't really consider it a bank. It's kind of an online place to put your money, kind of like PayPal I guess.”

- Research Participant



“I had cash sitting in a shoe box and I had nowhere to stow it. And when my buddy said you need to go find a bank. I want my money to be with me or where I know where it's at. That's why I'm with Chime, I don't have monthly fees with Chime. It doesn't cost me anything to have my money there, you know, and I accrue interest for leaving it there. It's kind of like a big savings account.”

- Research Participant

Some are using neobanks as it is easier and possible for them to open an account if they have been denied by previous banks, or are unable to access a “second-chance” account. When asked what people like most about their neobank in our survey, the overwhelming benefits came down to convenience: being able to use their mobile phone to manage everything (40.2%), the app being easy to use (37.9%), it being easy to open an account (26.9%), and there being no hidden fees (26.2%).⁴⁴

**Q • What do you most like about your online-only bank?
• (Select a maximum of 3 options.)**



Figure 14.

Over 25% of respondents like their online-only bank because there are no hidden fees.

Distrust of the traditional retail banking system has presented an opportunity for neobanks to tailor their services specifically to unbanked people.⁴⁵ They put the customer at the very center of their business model from the get-go, unencumbered by some of the outdated processes that traditional banks operate under. Chime, for example, was able to distribute \$1 billion in COVID stimulus payments before most traditional banks had even posted their checks.⁴⁶

2.3 Unbanked Americans express openness to using digital cash—especially if it would enable them to avoid engaging with a traditional bank.

For people who are unbanked, one of the perceived benefits of digital cash would be the ability to avoid having an account with a bank altogether.

Being unbanked does not mean people use no digital financial intermediaries. While those we interviewed who are unbanked spoke about relying on physical cash, almost everyone we interviewed was using third-party payment services, or using prepaid cards to circumvent the requirement to have a bank account for making or receiving digital payments.⁴⁷ These services give them a sense of financial control without having to rely on or interface with a traditional retail bank.



“If [a CBDC] was widely accepted and I were able to use it at most anywhere, that would make it invaluable because I could forgo a bank and maybe just use an app of some kind. Always having [my money] right there at my fingertips without using a bank is just really convenient.”

- Research Participant

Notably, the concept of digital cash was not perceived as different from other services people who are unbanked are using (as seen across our whole interview participant pool, not just unbanked people). Interview participants were able to envisage the use of digital cash, imagining it to provide heightened convenience.



“When I think of digital cash, I think of an app where no money ever changes hands. Does that make sense? There's no paper, there's no checks. I use whatever my digital device is, whether it be my cell phone or my iPad or whatever it is that I'm carrying around. All I have to do is just - look, oh, there it went. I've got my money and I can buy things the same way. So no money actually changes hands.”

- Research Participant

Design Implications: Unbanked Americans

The following design implications are meant to guide anyone seeking to create payment systems to better serve users' needs. Because decisions are being made at the time of publication about possible US retail CBDC design options, the insights in this section are generally framed for CBDC technologists and policymakers, but the ideas outlined below are not limited to the CBDC use case.

Technologists we spoke with assumed that unbanked people would be one of the most likely early adopters of a CBDC, and have been cited as likely users of a CBDC in multiple reports on the topic.⁴⁸ Neobanks offer a competitive service, with customer-centricity at their core, and are well positioned to cater to unbanked people who own a smartphone. However, neobanks are for-profit companies, mostly operating at a loss, which has attracted curiosity and speculation around changes the neobanking industry may need to make.⁴⁹ If market or other factors drove neobanks to become more costly or restrictive, a public-option, free-to-use digital currency (including, but not limited to, a CBDC) could be an alternative, as long as the user experience of the digital currency interface provides them with comparatively useful tools and features.

However, people who are unbanked are less likely to have a smartphone than those who are banked (in 2019, smartphone penetration was reported to be 63.7% amongst unbanked people compared with 85% of the total US adult population).⁵⁰ This means that if a digital currency is to impact financial inclusion rates for the 36.3% of unbanked Americans without a smartphone, then technologists designing digital currencies must consider how those without smartphones will access the service (prepaid cards are one potential way they could do so).

Digital currencies should have a low barrier to entry. In the case of a US retail CBDC, any person should be able to access the CBDC regardless of their credit history or previous banking record. Especially due to distrust in banks

by unbanked Americans, people should not have to sign up to a CBDC via a traditional retail bank; other avenues should be made available.

Finally, for providing a sense of control over their finances, digital currencies (including, but not limited to, CBDCs) should provide the user with their transaction history, to help with their money-management. In addition, the common features of neobanks (such as spending- and saving-tracking) make money management easier for the user and provide reassurance.⁵¹

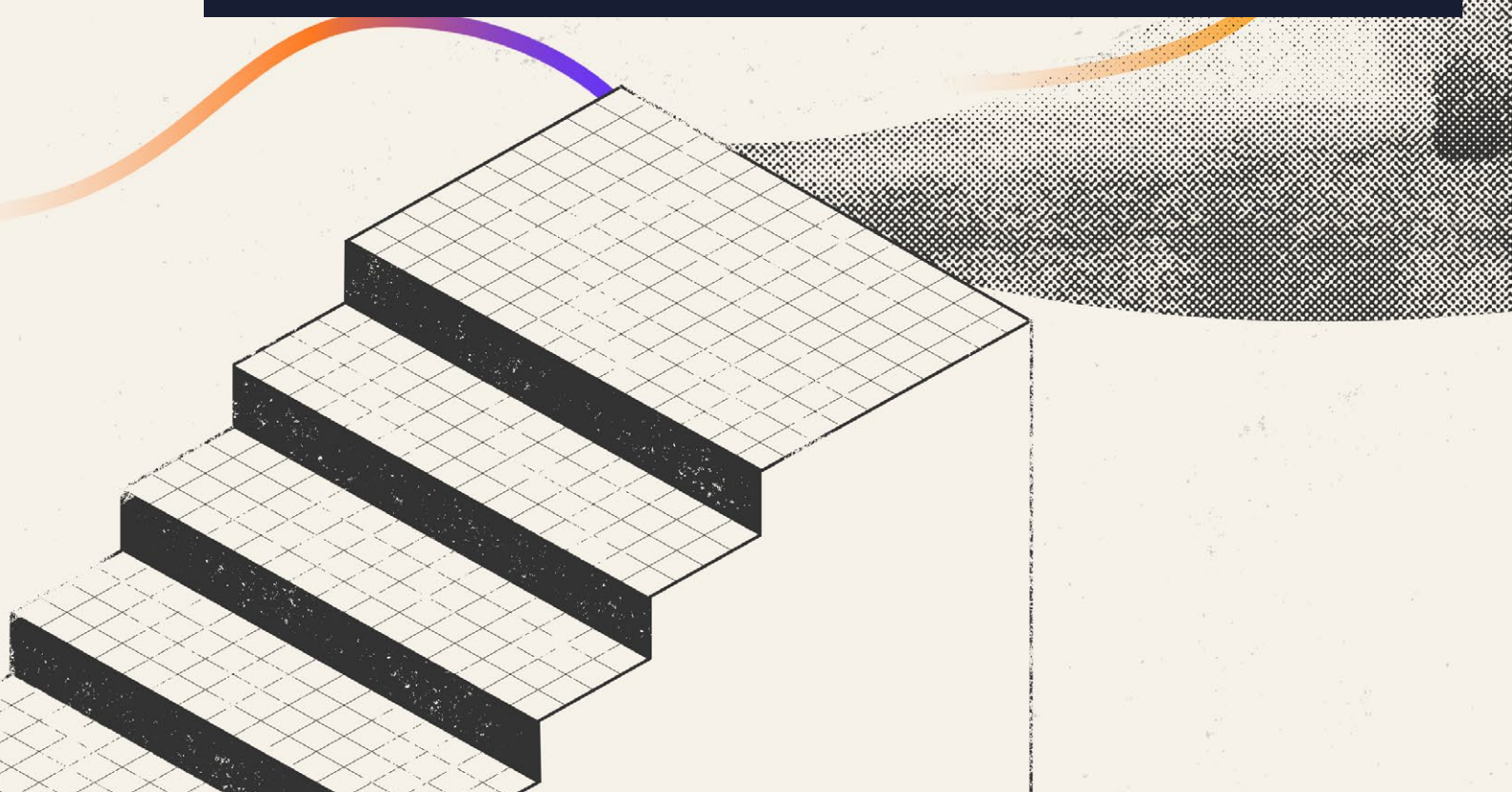


3.0

People Who Send Remittances

Untested Assumption

"People in the US who make remittance payments to their family and friends abroad pay high fees to do so.⁵² An appropriately designed low-or-no-fee CBDC could be a desirable alternative to existing remittance payment solutions."



People Who Send Remittances

Improved user experience would remove uncertainty.

What we learned:

- **Low or no-fee remittance payments would likely entice users.**
- **While fees are high, the biggest pain for people making international remittances is poor user experience.**
- **Long transaction times and delays are the main cause of user doubt and concern when making a remittance payment.**

For this research sprint we asked: “What are the common needs and pains of people sending remittances from the US and how might a digital currency (including, but not limited to, a CBDC) address these?” Remittance payments are expected to be a major use case for digital currencies. The assumption is that senders currently incur substantial fees for sending payments overseas and because digital currencies could significantly reduce that cost, senders could be motivated to use a digital currency instead of current services. We interviewed 15 people living in the US who make regular international remittance payments to friends or family overseas, as well as analyzed the survey responses from 313 people who send money abroad to family or friends.



3.1 Low or no-fee remittance payments would likely entice users.

In 2020, approximately \$68 billion was sent in personal remittances from people in the US to other countries, the highest amount of any nation.⁵³ In 2015, Mexico was the top recipient of US remittance payments, followed by China and India.⁵⁴ Sending money back home is a necessity for many, and the average fees for doing so currently are more than double the UN’s Sustainable Development Goal target of 3% by 2030.⁵⁵ The World Bank estimates that by cutting the cost of sending remittances by a minimum of 5 percentage points, people sending money abroad globally would save \$16 billion a year.⁵⁶

Out of our survey respondents, 23.7% send remittances to friends or family members abroad, with 35.5% of those people sending money once per month or more often, and 38% sending between 1-10% of their monthly income.

Q • Approximately what percentage of your monthly income do you send abroad?

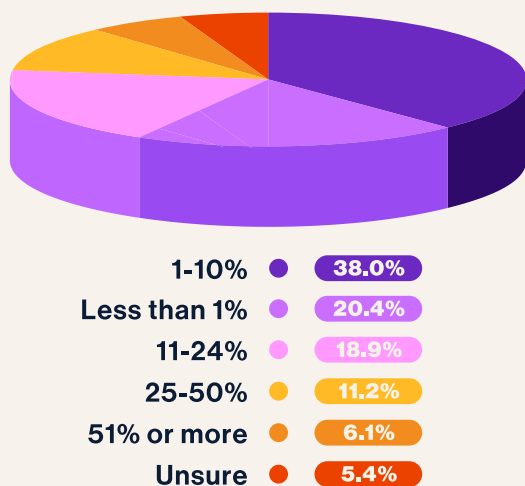
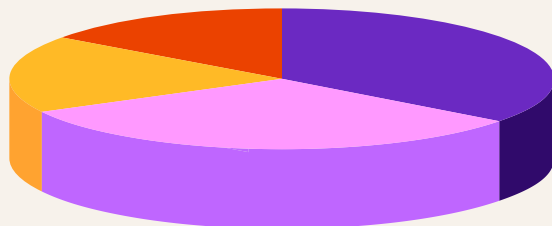


Figure 15.

The majority of people who send remittances are sending between 1-10% of their monthly income.

Q: If you send money abroad, how often?



Once per month or more often	●	35.5%
About every 2 - 5 months	●	31.9%
Every year or less often	●	17.6%
About every 6 - 12 months	●	15.0%

Figure 16.

The majority of people who send remittances are doing so once a month or more.

People who make remittances expect there to be fees. These fees vary by provider and by destination country. According to the World Bank's Remittance Prices Worldwide Database, in the fourth quarter of 2020, the cost of sending \$200 in remittances from the US to Mexico (the most popular remittances corridor from the US) was an average of 3.87% of the total transfer value.⁵⁷



"If I'm sending money to a different country, like Nigeria, that makes sense to me, you need to pay fees. It's international."

- Research Participant



"For the convenience the fee is okay. I think if you send a smaller amount then it feels a bit high, because of minimum charges. But if you send \$500-\$2,000, the fee doesn't [feel to be] as much. I would obviously prefer something free like Venmo, but I'm sending internationally. I'd love it to be free obviously."

- Research Participant

People shop around for the service provider that meets their needs, and by price. Online providers incentivize customers with cost-saving promotions. However, our respondents shared that they struggle to compare services based on cost due to variations in foreign exchange rates. People perceive poor exchange rates as an additional hidden charge, further complicating the process and causing uncertainty.

3.2 The biggest pain for people making remittances is not fees, it is uncertainty and poor user experience.

Though transaction fees are a pain for people making remittance payments, the onerous user experience of the current system is in fact a much larger pain point.

In interviews, we learned that sending an international bank wire, or using services such as Western Union or Moneygram, is a multi-step process that begins well before the transaction has started, involving back and forth communication between sender and recipient to ensure details are correct and sufficient for the payment provider. In a 2018 survey by PayPal, 41% of respondents had experienced a problem with the paperwork associated with making remittance payments through these more traditional providers; whether that be improper transaction number, name, or address.⁵⁸ There is a high chance of human error when making remittances in this fashion, resulting in held or failed transactions.



“You put one digit wrong, you send it to the wrong person and you keep chasing the bank to get that transaction canceled or reversed. It’s such a big risk and such a big pain.”

- Research Participant

People are used to the usability and convenience standards of third-party payment services for domestic peer-to-peer transfers, so the bar is set high in terms of expectations for how international remittances should work. For example, the ability to send money via an easy-to-read unique identifier such as an email address, or from their mobile contacts list.



“PayPal is simple. All you need is an email address. But in order to set up [remittances] through the bank, it requires routing numbers and account numbers. It gets complicated to write down all those numbers.”

- Research Participant

The convenience of services such as PayPal for sending international remittances often outperforms cheaper but more arduous processes, but with only 25 supported currencies, PayPal is not suitable for many.⁵⁹ India and China are the second and third largest receivers of remittance payments from the USA respectively, yet the Indian Rupee and Chinese Yuan are not supported by PayPal.

Automatic fraud prevention and incompatible banking systems are additional hurdles that prevent some people from making successful remittance payments. Participants spoke of countries such as Nigeria and Colombia being difficult to send money to (due to being stereotyped as places where fraudulent financial activity occurs), even if they are sending repeat payments there. What is designed as a safety measure to protect people from fraud, or to prevent money laundering, can become a hurdle. If a payment is held, the sender has to jump through hoops, and speak with customer service representatives to resolve the issue. Users spoke of having to do a “forensic scramble” every time a payment gets stuck.



“So even though I send money all the time to Nigeria, sometimes they’ll still block it and ask ‘is this fraud? Let us know, I mean, I do this every month, so it shouldn’t be a thing.”

- Research Participant

An additional dimension of user experience is the time it takes to make a remittance payment. According to PayPal’s report, people spend 3 minutes on average making an online remittance payment, compared to 30 minutes doing the same at a physical remittance service location.⁶⁰ Physical locations are restricted to opening hours, and standing in line is money lost from not working. There are safety and convenience issues with paying in cash at physical locations which digital service providers remove. However, digital providers rely on links with a person’s bank account, so those without bank accounts have limited access to these time-saving solutions.

3.3 Long transaction times create doubt and concern.

Transaction times for a remittance payment are highly variable depending on multiple factors, including which countries the payment is transacting between, currency, payment method (debit card or bank wire), and receiving method (bank account or cash withdrawal from a physical location).

Remittance transfer times range between 2 minutes to 2 weeks, with an average time of 2-3 days.⁶¹ A high degree of variability in transaction times with no easy way to monitor each transaction's status creates stress for the sender and recipient alike. We learned that when transactions take longer than expected, the responsibility falls on the sender to keep the recipient updated with the status of the transaction.

“Visibility of system status” is a usability design heuristic defined by Jacob Nielsen.⁶² This design principle states “When users know the current system status, they learn the outcome of their prior interactions and determine next steps. Predictable interactions create trust in the product as well as the brand.” Participants in interviews spoke of the frustration of not knowing the status of a remittance payment, and referred to the experience of customer-centric digital services such as DoorDash as examples where they feel informed throughout the process.



“If it’s an app like DoorDash, it’ll tell you they’ve picked up your food, they’re heading to your door, they dropped it off. And then there’s a picture. I really like being able to track everything and like having proof... being able to track everything in real time.”

- Research Participant

Communicating transaction status and shortening transaction times could help users by removing uncertainty. In our interviews, “short” was deemed to be “within a couple of hours” (rather than the more common few days).⁶³

Design Implications: People Who Send Remittances

The following design implications are meant to guide anyone seeking to create payment systems to better serve users' needs. Because decisions are being made at the time of publication about possible US retail CBDC design options, the insights in this section are generally framed for CBDC technologists and policymakers, but the ideas outlined below are not limited to the CBDC use case.

Designing new payment systems for people making remittance payments from the US means improving usability, faster transaction times, and low-cost or no fees. Without these attributes, users are likely to rely on existing services because they may be unwilling to tolerate the uncertainty of trying a new service when the benefits are not clear. Digital remittance services such as Wise, WorldRemit and Remitly provide an improved digital experience compared to Western Union and Moneygram, but because many recipients of these payments require cash, digital-only providers are not set up with physical locations and cash inventories ready to serve these markets. It is estimated that at least 80% of the total remittance volume worldwide is handled via cash payments.⁶⁴

For the large number of people who are cash-reliant, digital currencies (including, but not limited to, CBDCs) will not improve users' experience of sending remittances unless there is a suitable on-ramp from cash to digital currency, and an off-ramp in the recipient's country back into cash. For the estimated 10-12 million undocumented immigrants in the US who are unlikely to have a bank account, a digital currency that requires links to a bank account for Know Your Customer (KYC) purposes is unlikely to be used. We did not interview this cohort and further research should be conducted to explore if digital currencies could improve the remittance experiences for people without documentation, or whether it would even be used at all by this group.⁶⁵

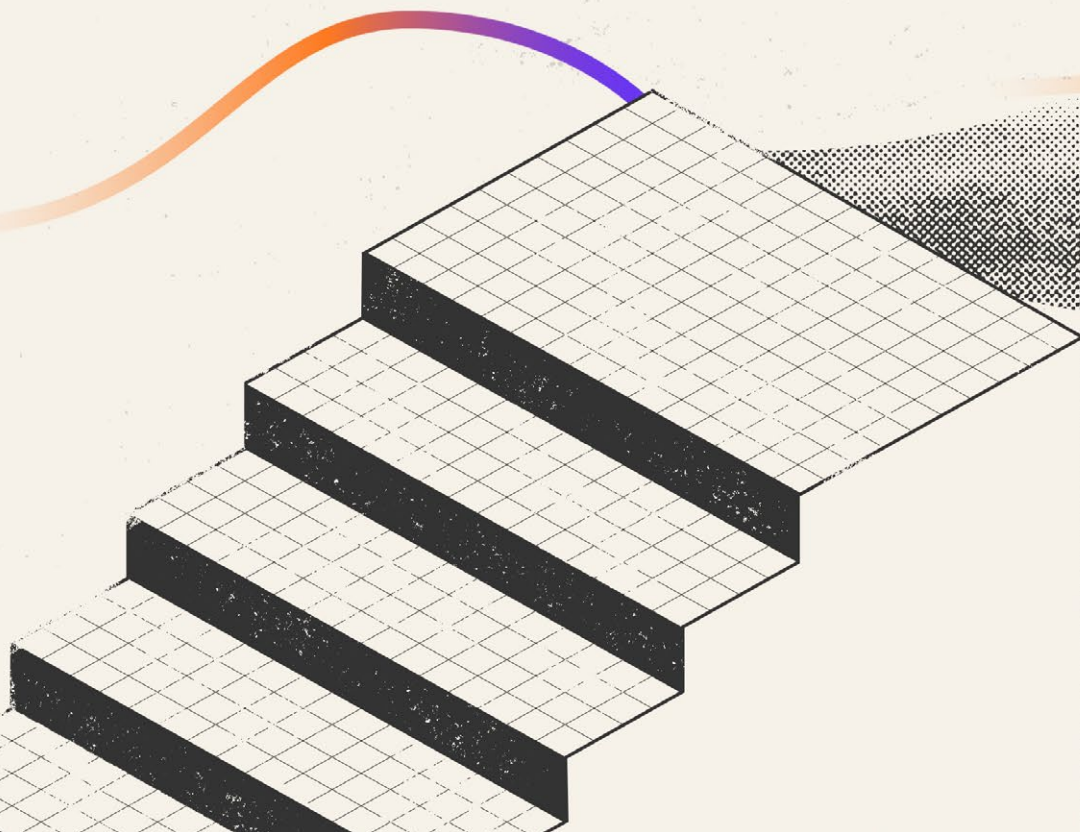



4.0

Small and Medium Sized Enterprises (SMEs)

Untested Assumption

"Currently, accepting customer payments incurs fees; SMEs will likely be early adopters of a US retail CBDC because it will reduce the costs of doing business."⁶⁶



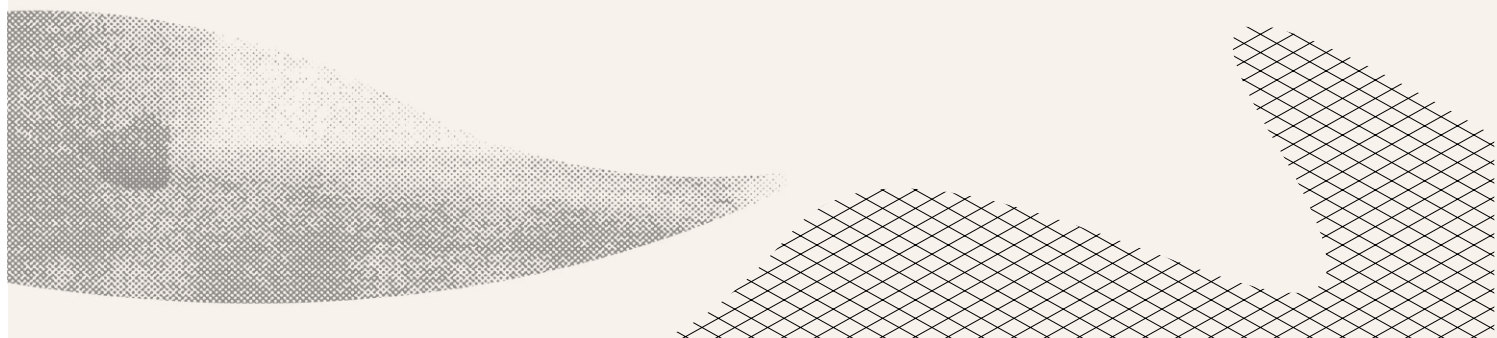
Small and Medium Sized Enterprises (SMEs)

SMEs desire instant payment confirmation.

What we learned:

- **SMEs tolerate payment fees as the cost of doing business, and see it as a service they expect to pay for.**
- **Delays in clearing payments are not a deal-breaker for SMEs, but the confirmation that a transaction has been initiated should be instant.**
- **SMEs are likely to access a CBDC via their existing bank.**

For this research sprint we asked: “What are the needs and pains for SMEs when handling customer transactions? What opportunities exist to improve this, and how might a CBDC address these?” We interviewed 14 small-to-medium-sized enterprises (including an accountant, cleaner, gym manager, jewelry maker, therapist, drone rental seller, wind turbine seller, construction company, tutor, high-end clothing retailer, pharmacy supplier, CBD product manufacturer, and B2B money lender) who regularly accept customer payments via multiple methods.



4.1 SMEs tolerate payment fees as the cost of doing business, and see it as a service they expect to pay for.

Current merchant processing (assessment and interchange) fees, including credit cards and third-party payment services, can range anywhere from 1.3% to 3.5%.⁶⁷ Through interviews we found that SMEs tend to see those fees as an inevitable part of doing business, and will usually accept most forms of payment if it means closing a sale. Fees appear not to be a significant consideration. Existing data supports this; it is now the case that 99% of card-accepting merchants in the United States accept American Express despite this payment method having one of the highest processing fees.⁶⁸



"I definitely am not complaining about the fees. I think they're very fair, but they do add up."

- Research Participant



"If I could get [payment fees] down to 1.5-2%, that would be a big saving."

- Research Participant

We found in interviews that SMEs will "meet their customers where they are," adjusting their business processes to accommodate a customer's preferred payment method.



"We started out accepting credit card, cash, and then check. We didn't advertise it, but if somebody wanted to pay by check then it was fine. And then to accommodate, people were inquiring whether we accept Venmo, PayPal and Zelle. And I was like yeah, if that's easier for you. So I set those up, and for certain [gym] members, that's how they pay. So it's according to the needs of our members. I wanted to accommodate them."

- Research Participant



“Originally I said we accepted Venmo and then a couple of customers said ‘I don't have Venmo, but I do have Cash App’. And I said ‘Okay, I can accept via Cash App.’”

- Research Participant

Accepting a diverse range of payment methods is a competitive opportunity for SMEs, and a way for them to provide a positive customer experience. While we observed this dynamic with merchants that would qualify as small-to-medium enterprises, this pattern may not repeat with large enterprises who are managing large payment and accounting operations. The savings on operational efficiency could outweigh some lost sales from economically disadvantaged populations.

There is an upward trend in people signing up for merchant accounts with digital third-party payment services.⁶⁹ It can be expected that merchant adoption of new digital payment methods will continue as long as customers wish to pay using these methods, especially given the decline in cash use over the last few years (in 2020, 19% of all transactions were made in cash, down from 26% in 2019).⁷⁰

4.2 Delays in clearing payments are not a deal-breaker for SMEs, but the confirmation that a transaction has been initiated should be instant.

We heard in interviews that when receiving a payment via a bank wire, third-party payment service, or by check, SMEs can feel frustration and uncertainty while waiting to see if the customer payment has been approved. SMEs would prefer a reliable and instant confirmation that a payment has been approved, and reassurance that the money will be delivered to their account.

However, there is a difference between payment approval and receiving the funds. SMEs need confirmation that the payment has been approved to be confident the sale has closed, but there is less urgency for the money to be immediately reflected in their account. It should be noted that there are likely SMEs of specific business models without the same flexibility to wait long periods of time for the funds to clear, and we did not focus our research on that specific cohort.



“I’m not a fan of [accepting] bank wires or checks because you have to wait to see if it's going to go through. [If a check] is going to bounce, it takes a week to know. And then with wires, even though they have to have the money in the account to be able to submit the wire, it still takes 3-7 days for us to receive it. I have frustrations with anything that takes longer than 24 hours. I'd rather just know it's all set.”

- Research Participant



“It’s a major frustration. Somebody will pay via Zelle or Cash App; they have their phone out, we have our phone out to receive the payment, they're sending it, we're checking to make sure we receive it so we can do the handoff of the shoes and it'll show sent on their end, but we haven't [received notification] on our phone.”

- Research Participant



“My [payment] preference is credit cards or debit cards, just because the ability to know whether or not it's been 100% processed is instantaneous.”

- Research Participant

Though accepting a credit or debit card payment is “instant,” processing times with credit card transactions usually take between 24 to 48 hours for the merchant to receive the funds, and in some cases can take 7-10 days.⁷¹ This supports the assumption that SMEs will tolerate longer clearing times for payments, as long as they know the funds are on their way. When the wait is eliminated, uncertainty is removed.

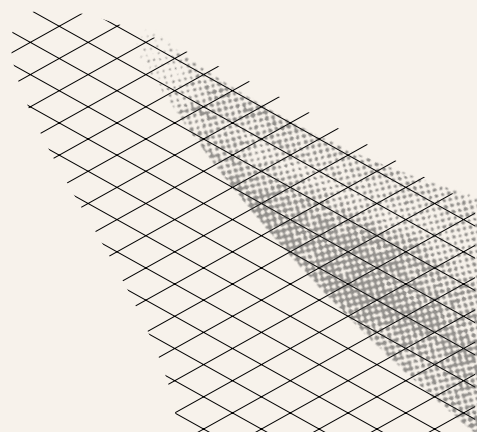
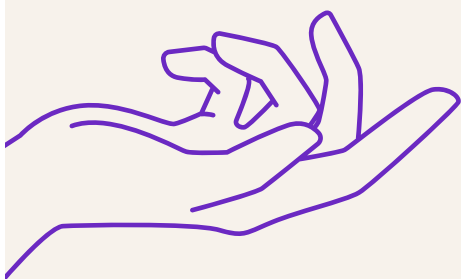
4.3 SMEs are likely to access a CBDC via their existing bank.

Most SMEs that we interviewed expressed a generally positive attitude toward the bank they use for their business. When asked whether they would consider switching to a new one, they were not opposed to the idea but only if an alternative would benefit them substantially more. Banking fees that they

deemed “not ideal” were not enough of a motivator to make the switch nor to rate their bank poorly.

Moreover, they voiced a strong sense of trust with their current banking choice. We asked SMEs in interviews to rate how they feel about their banks, using the Edelman Trust Barometer framework, whereby dimensions of trust in an institution is determined by perceptions of how ethical and competent it is.⁷² Every person we interviewed saw their bank as competent, even if they did not rate them as very ethical.

We learned in interviews that SMEs trust banks due to several factors, including reputation and overall satisfaction. When choosing a financial institution, proximity and familiarity count. Existing research found that when individuals want to open an account for personal financial needs, they generally go to the branch that is closest to them, or select the bank with which they already have an account.⁷³ This is consistent with our interviews. Once SME owners establish a relationship with a bank, they tend to stay with the same institution for long periods of time, if not the same amount of time that they have been in business. Existing research also confirms this.⁷⁴



Design Implications: Small and Medium Sized Enterprises (SMEs)

The following design implications are meant to guide anyone seeking to create payment systems to better serve users' needs. Because decisions are being made at the time of publication about possible US retail CBDC design options, the insights in this section are generally framed for CBDC technologists and policymakers, but the ideas outlined below are not limited to the CBDC use case.

While SMEs expect fees as a cost of doing business, if a CBDC did not impose transaction fees, it would likely attract the interest of SMEs. However, for a CBDC to be viable with SMEs, their customers must also be willing to pay with a CBDC. Our research indicates that customers motivate SMEs on the type of payment methods they accept. SMEs need "instant" payment confirmation of a payment being made, but it may not be necessary for funds to clear instantly. We advise that future research be conducted with a wider pool of merchants to test this preliminary result, particularly with large companies. As SMEs tend to have good relationships with their banks, being able to use new payment systems via their preferred existing financial institution will be welcomed by this cohort.

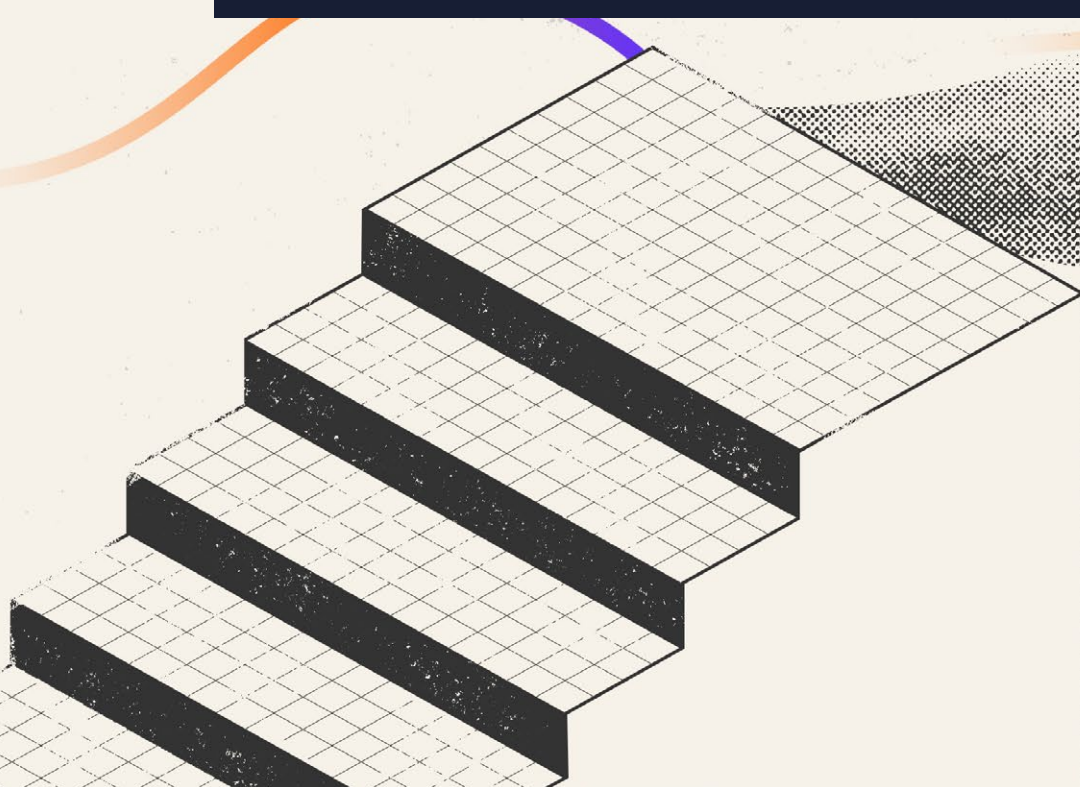



5.0

Privacy Considerations

Untested Assumption

"If the government were to launch a CBDC, people would gravitate towards a privacy-centric system, because money is a private matter and people would be concerned about the government being able to view their transactions."



Privacy Considerations

Financial privacy is important and issues of security are Americans' number one concern.

What we learned:

- **People are more concerned about financial privacy from people in their social circle than they are about privacy from the government.**
- **People assume that the government already has access to some of their financial information. While people react differently to that assumption, they accept it as a fact of life.**
- **Concerns around the government having access to a person's financial information include data security, authoritarian use of data, censorship, and lack of control.**

5.1 People are more concerned about financial privacy from people in their social circle than they are about privacy from the government.

Attitudes and behaviors relating to privacy are complex, shaped by external conditions as much as a person's own lived experience. While a person might strongly favor the concept of personal privacy, secondary research tells us that behaviors do not often reflect these attitudes.⁷⁵ For example, people care about their personal data, but regularly give up their data in exchange for convenience, ease of use, and social status.





“This might sound really bad, but I don't care about [my data being used] because to me we're going to use these apps anyway. People say ‘make sure you read the terms and conditions’, even though it's a thousand pages. And I'm like, I mean, are you going to choose not to have an iPhone?”

- Research Participant

We asked people in interviews and in our survey about their priorities and concerns relating to financial privacy. Privacy of finances from the government was not the most important consideration shared by participants in our research. Most people we interviewed felt greater concern for the privacy of their financial transactions from others they knew (in their social circle, extended family, and people in their workplace or neighborhoods) than they felt concern for privacy from companies or the government.

We found that if a person's financial transactions are not private from people they know, there is the risk of embarrassment, judgment, ostracization, and lack of control of their own identity as perceived by others.

Everyone has “something to hide,” not because what they're doing may be wrong or illegal, but because there may be real social or cultural ramifications for not having privacy.



“As far as my family and friends goes, [my finances] are just really none of their business. And then for different organizations it should be on a need to know basis.”

- Research Participant



“I would still want the amount [I send] to be private [from people I know], especially for birthdays. I don't want there to be a comparison; why I gave more to someone else. If they can all see that information, then I feel like it's either expected of me or they're going to wonder ‘oh, why did I get less than this person?’”

- Research Participant

In interviews with people in rural settings where communities are likely to be more tight-knit, the desire for financial privacy is amplified. Living near so few people means that anything shared is often shared with everyone.



“Being in a rural area our school district serves 65% of families below the poverty level, and when they see or hear about people making a ton of money they have a Facebook group and it’s ridiculous some of the things people say. So we’ve learned it’s better not to bring up how well off we are because of the judgment we get. When people ask, we say ‘we’re okay’ ‘we get by.’”

- Research Participant



“I value my personal privacy pretty highly, you can see that because I don’t want to bank locally.”

- Research Participant



“I definitely don’t think personal privacy is much of a thing in a small town, because if you tell one person the other 200 are going to know by the end of the day.”

- Research Participant



“[My finances] are my business, and no one else’s unless I want to share it with them. One thing I like about banking with USAA is nobody knows what I do with my money, or how I use it. My statements come electronically. It’s not sitting in a mailbox waiting, or put in someone else’s mailbox which can happen. It has happened.”

- Research Participant

The potential risk of having data exposed to the government or other authorized parties feels less tangible than the risk of financial information about them being exposed to people they know. For people making remittance payments, for example, they expect that details of their transactions to be visible to the government, with many interviewees acknowledging that this lack of privacy was related to the prevention of money laundering and terrorism funding.

In addition, to test user preferences related to privacy, we asked people to make trade-offs between different attributes of making a mobile payment. When choosing what people value most between a payment which is either “instant,” “free” or “private” from the government, most users (65%) gravitate towards “instant” and “free,” while only 13% gravitate towards “private,” and the remaining 22% felt all three options were equally important.

“Who” vs “what” financial data

In 2015, Pew Research Center ran a survey of Americans to understand ideas around privacy. Survey results show that 93% of adults say that being in control of who can get information about them is important; whereas 90% say that controlling what information is collected about them is important.⁷⁶

In our own survey, we asked people to state what types of financial information they would be comfortable sharing with different people in their network and different organizations.

Our data shows that people feel the most comfortable with family members, friends, and third-party payment services (Paypal, Venmo, Cash App, or Zelle) knowing *that* a transaction had occurred, followed by *who* they transacted with (or where they shopped), followed by the *amount* they spent. “An acquaintance” ranked the lowest in all categories, and “None of these” (the most private option) was generally the most popular response).

5.2 People assume that the government already has access to their financial information. While people react differently to that assumption, they accept it as a fact of life.

In a report by Pew Research, roughly half of Americans (49%) say it is acceptable for the government to collect data about all Americans in order to assess potential terrorist threats, while 31% feel it is unacceptable to collect data about all Americans for that purpose.⁷⁷

In our survey we applied the lens of financial transactions to a similar question, and came up with similar results; just under half (45.2%) say the government should be able to prevent money laundering or payments to terrorist organizations compared to 37.4% who say that everyone’s financial transactions should be private from the government, with 17.4% undecided.

Q: State which of the below statements you most agree with.

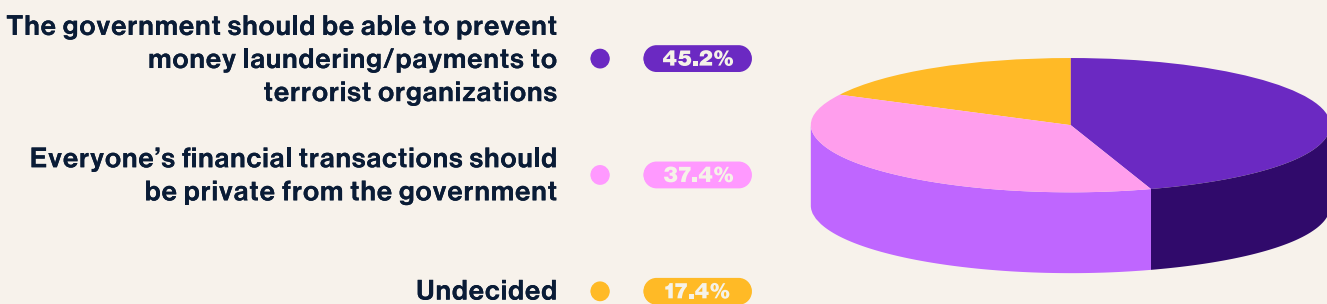


Figure 17.

In interviews we learned that financial privacy from the government is considered “nice to have,” but people assume the government can access a certain amount of this information anyway.



“I believe [the government] already knows [a lot] about us. I do not do anything illegal. The government can subpoena banks and have some account information disclosed, because they want to make sure you don't sponsor terrorism. They have a lot of influence on banks and financial institutions by virtue of the Patriot Act. So I'm okay with [the government] seeing those small personal transactions.”

- Research Participant

For SMEs, there were no objections based on actual experience (only imagined hypothetical risks, for example concerns about security of their data) that would stop them from using a government payment method, especially if this reduced their business costs.



“I wouldn't mind [government access to our transaction data], as long as I was getting some kind of benefit from it, [for example] free transactions... I just don't understand why they would do that... I would be fine with it, you know, as long as I know what they're doing.”

- Research Participant

Pew found that 72% of Americans believe that all or most of what they do online and on their cell phone is being tracked by companies, and 42% think the same of the government.⁷⁸ However, there is the added complexity of lack of visibility; 78% of Americans stated they had very little to no understanding about what the government does with data collected, and 84% said they have very little or no control over the data that the government collects about them.

Pew also notes that Black Americans are more likely than white Americans to say they believe the government is tracking all or most of what they do online or on their cell phone (60% vs. 43%). Similar gaps are present in views about offline activities: 47% of Black adults think all or most of their offline activities are tracked by the government, compared with just 19% of white adults. In addition, Black and Hispanic adults are more likely than white adults to say they are concerned to some degree about what law enforcement officials, employers, and family and friends know about them. This concern is rooted in experience. According to existing data, Black Americans are more likely to experience social media and email breaches than whites or Hispanics, and to have had a line of credit opened in their name without them knowing.⁷⁹

In our interviews, we found no significant differences in attitudes towards financial-transaction privacy from participants in traditionally underrepresented groups; however, some do consider what identity-related information they share about themselves, for example deciding whether to disclose their sexual orientation (in in-person transactions). Further investigation and a larger study into the relationship between identity and privacy is recommended for a more robust understanding.



5.3 Concerns around the government having access to a person's financial information include data security, authoritarian use of data, censorship, and lack of control.

The technologists we interviewed prior to embarking on this research assumed that privacy of financial transactions from the government would be a major point of concern for Americans. Our research shows this to be only somewhat true.

In our survey, we found that 33.9% took a neutral position on whether the government has their best interests at heart, with 29.1% agreeing or strongly agreeing with the statement, and 34.9% disagreeing or strongly disagreeing (2.1% not applicable). Responses to the statement “the government respects my privacy” were very similar. However the responses to the statement “the personal information I provide to the government will be kept confidential” were skewed more positively with 42.6% agreeing or strongly agreeing, 29.4% neutral, and 26.7% disagreeing or strongly disagreeing (1.3% not applicable).

Though responses skew slightly more to the positive, in interviews we learned there were some concerns about the government being technically capable of keeping their data confidential. We asked how people felt about the idea of digital cash being issued and managed by the government through the central bank. People's concerns about the government being able to see financial transactions fell into three main categories:

- **Despotism:** Governments seeing what money they have and what payments they make, and then using that information in nefarious ways (the social credit system recently rolled out in China was cited by users as an example).
- **Censorship:** Imposing new limitations or regulations on what they can or cannot purchase if an item is deemed unfavorable by the government.

- **Lack of control:** Losing access or ownership of their account because the government is able to freeze or close their account against their wishes or without their authorization.



“The relationship banks have to the government, that's where people should be more concerned. The second that banks and the government have our facial recognition, [they could] prevent us from voting, instead of using [the data] for good. It's a big spiral.”

- Research Participant



“Well, that's the first step of [the government] controlling it and taxing it. That's how it starts. Just look at some of the stuff going on with banks now. I can't withdraw \$1,000 without them reporting something on it. I would prefer [the government] to stay out of it.”

- Research Participant



“I would feel like the government can then look at anything I do. Kind of like China, where I'm rated on a social score. [What I purchase] might not be in line with what the government thinks I should be spending my money on.”

- Research Participant

Additional questions and concerns raised about a government-issued CBDC fell into the following categories:

- **Being insecure:** Will it be secure if it is centrally managed by the government?
- **Being hacked:** What happens if there is a breach of the data from a cyberattack?
- **Being stolen:** Will it be guaranteed if money is stolen from me?

Interviews elicited that expectations of competency from the government to manage a digital currency are low, based on experience with other government services such as digital services (Filing for Unemployment and

Healthcare.gov) and brick-and-mortar government offices (for example the Department of Motor Vehicles.) If a CBDC were to be government issued and controlled, it is likely that some people would have reduced confidence that this system would be secure.



"I'm sure the positive side is that it is backed by the federal government itself, rather than an organization like PayPal or service where you're not going to be too concerned about the federal government's saying, oh, we ran out of money and we're shutting down. But at the same time, the concern is that for example, the DMV is run by the government and we see how efficient that is at times."

- Research Participant



"We're in the digital age where hackers are going to find a way, there's a lot of things that can go wrong with that. I definitely don't think it's a good idea to replace physical currency entirely. One of the reasons that we do in fact bank with a local bank is that if something is to happen, we can go get our money out of the bank because it's local and they're here. But in the event that - I hate to be like a conspiracy theorist or anything - China attacks, or the internet is shut down, what are they going to do then? It would just absolutely devastate the United States."

- Research Participant



"We hear about data breaches everyday. I want to trust them, but I know it's not perfect."

- Research Participant



"The government has horrible computer systems. If [a hacker] locks them out of their computer system and holds it ransom, the entire system would go black in one fell swoop."

- Research Participant

Design Implications: Privacy Considerations

The following design implications are meant to guide anyone seeking to create payment systems to better serve users' needs. Because decisions are being made at the time of publication about possible US retail CBDC design options, the insights in this section are generally framed for CBDC technologists and policymakers, but the ideas outlined below are not limited to the CBDC use case.

In the Eurosystem report on the public consultation on a digital euro, privacy was the number one consideration for respondents when asked “How would you rank, in order of importance, the features that a digital euro should offer?” “I want my payments to remain a private matter” was the top consideration named by 8,221 EU citizens.⁸⁰

We asked 1,319 US individuals the same question, with the same answer options. Privacy of payments, however, emerged as the 3rd most important feature, with “secure,” and “easy to use,” ranking as more important than privacy. Qualitative interviews support this finding; privacy is not the number-one priority for Americans when considering features of a digital dollar.

For Americans, the top four preferred features of digital cash are: (1) security, (2) ease of use, (3) privacy, and (4) cost. In contrast, for Europeans, the top four preferred features of a digital euro are: (1) privacy, (2) security (3) geographic access, and (4) offline access.

In our US survey, 16% of respondents ranked privacy as their #1 preferred feature for digital cash.⁸¹

To explain the variation in responses between the EU and US audiences, it is important to understand the different contexts in which these populations exist.⁸² Strong legislative protection such as the Right to Be Forgotten and General Data Protection Regulation has created a higher awareness and preference for privacy amongst Europeans.⁸³ In contrast, the US’s relative dominance in consumer technologies is associated with surveillance capitalism.⁸⁴ In America, weak user-data protection at the federal level as well as the normalization of mass surveillance via far-reaching legislation like the Patriot Act, has likely led Americans to relatively deprioritize privacy in favor of other issues. This doesn’t mean that privacy is not a concern, but that it is not the *primary* concern.

When we proposed two hypothetical and divergent models for a potential CBDC design (one intermediated and one disintermediated) in our survey, we found that most people (56%) would prefer to use CBDC in a non-private way with a third-party, than have their own (private) CBDC that they were ultimately responsible for securing.⁸⁵ This aligns with the findings that privacy is not the number one concern for most, and that security, rather, is predominant.

Q: These are two ways digital cash could work. State which you prefer.



Figure 18.

Examining the demographic differences of the people in our survey who chose different options, those who preferred an anonymous version of digital cash: (1) were much more likely to have used cryptocurrency in the last 12 months, (2) tended to be male, (3) reported relatively high technical competency, and (4) already engaged in anonymity-protecting behaviors online. However,

surprisingly, those selecting a non-anonymous version of digital cash also tended to be the most privacy-conscious, while those endorsing an anonymous version were relatively privacy-neutral.⁸⁶ This could well indicate that privacy doesn't trump convenience or security of funds. It is still easier to use a bank for your digital cash, even if you're privacy conscious.

Based on our research, it is our recommendation that any new payment systems should have users' transactions and payment history made private from other users by default, and only allow authorized parties to see that information (with the exception of counterparties they interact with for making or receiving payments).

For US CBDC design, technologists should consider how to make a system that is not only secure, but has relevant protections in place to prevent actions by the government being taken which will erode trust. Policymakers must consider creating guardrails that prevent the government from abusing access to transaction data.

People value control and agency, ensuring that if transactions are visible to government agencies, then no actions are taken on that information without user consent (e.g. taking funds, auto deducting taxes etc.), and that it is understood why the government can see the information.

The background features a light beige grid pattern. In the top right, there is a curved orange line and a purple line. In the bottom right, there is a dark grey area with a grid pattern, overlaid with several colorful geometric shapes (orange and purple lines) that resemble a stylized staircase or a series of steps.

Recommendations for US Retail CBDC Design

How Might a CBDC Improve the US Payments System for Users?

These recommendations are based on our research and we encourage further exploration of these early findings.

Access

- Introducing a CBDC that does not aim for broad use by a diverse population, from the start, runs the risk of creating a financially exclusive, two-tiered system. When a new system becomes adopted by the many, whether they do or don't need it, it avoids stigmatizing certain groups who can only use the new option and are currently excluded from the existing system.
- It is important that people can choose how to access a CBDC: (1) directly, (2) via a preferred third-party, or (3) through a traditional retail bank. Based on our research, a CBDC provided only through traditional banks will not be appealing or accessible enough for broad adoption, especially among unbanked Americans.
- In order to facilitate financial inclusion and prevent financial exclusion, using a CBDC should not require someone to have a credit history or banking record.
- For greater applicability to those who are cash-reliant, or without traditional banking services, a clear process for transitioning between using physical cash to using a CBDC should be made available.

- To meet the needs of the 15% of Americans without a smartphone (and 36.3% of unbanked Americans who do not have a smartphone), alternative access points should be explored (for example prepaid cards).⁸⁷ Though our research didn't directly evaluate this accessibility concern, it is well documented and should be prioritized for any user-related assessment of CBDC accessibility and equitable design.
- It is critical for technologists and policymakers to consider how a CBDC might fit into a user's broader financial ecologies. A CBDC should be researched and developed for its potential capacity to fill important gaps in our current payment stack. Determining what those gaps are and how a CBDC should be designed to be top of wallet for those users and use cases are questions that this report touches on but that deserve significant further research before conclusive recommendations can be made.

Attributes

- A major complaint we heard in interviews with users was the facelessness of third-party payment services. There is either no option to speak to a real person when things go wrong, or it is very difficult to do so. Good customer support would be a significant improvement on the status quo for users.
- Respondents shared frustrations regarding various limitations and imbalances within third-party payment services. For instance Zelle users cannot connect multiple bank accounts and PayPal merchant users experience a persistent lack of agency based on PayPal's return policies. To improve on this experience for users would mean having relatively few restrictions. To support a feeling of personal control for users, there should always be clarity and predictability regarding any limits placed on spending amounts, on how many transactions a person can make, or on what a person can purchase.
- A US retail CBDC, which is convenient, easy to use, fast, and free will likely meet the payment needs of many of the US

population; however, as many financial services provide some if not all of these attributes, something more may be necessary to attract user interest.

Privacy and Security

- A CBDC should feel and be secure; people must feel safe in the knowledge that their money and financial data is protected from theft or hacks.
- People expect digital financial services to protect their money. Though anonymity is a nice-to-have, a self-custodied version of a CBDC may not be an attractive proposition. People are likely to prefer instead custodying their funds with a third-party if it means knowing their funds are safe should they lose access to their credentials.
- CBDC design should treat the amount someone has or pays as the most-sensitive type of financial data about a person, followed by who they are transacting with. The fact a transaction has occurred is the least sensitive information, out of these three, based on our research.
- If transactions are visible to government agencies, guardrails must be in place to prevent actions which will erode trust. For example, auto-deducting funds from people's accounts, the profiling of citizens based on their spending behaviors, or creating new restrictions on what people are allowed to purchase. It should be made clear what information the government can see and why they need to see it.
- A CBDC should have the transactions and payment history of users made private from other users by default, and only allow authorized parties to see that information (with the exception of counterparties they interact with for making or receiving payments).



Recommendations for Further Research

Recommendations for Further Research

Global Research in Low- and Middle-Income Countries

- What digital-currency technical and policy design choices are necessary for mitigating the risks of systemic harm to the poor?
- What is the potential for digital currencies to expand access to financially excluded low- and middle-income populations?
- How do various digital currencies, including hypothetical CBDCs, compare to extant approaches?

Designing Technology in the Public Interest

- How is the public interest served by existing frameworks of financial inclusion related to financial technologies?
- Can digital currencies not only expand financial inclusion, but do so in ways that promote financial and infrastructural justice?
- Can digital currencies serve these goals in ways that existing and proposed private sector technologies cannot?
- What are the most important public-interest values (for example: reliability, speed, low cost, privacy, transparency, accessibility, governance structure) that need to be considered and what are the key trade-offs among them?
- In order to serve the public interest, what are the most pressing unmet user needs and promising points of entry into the existing payment infrastructure for digital currencies?

Digital Wallet and Key Management Design

- What key-management options and wallet designs might work best for users?

- How do the needs for these differ among different segments of the population?

Cash

- Physical cash and Americans' behavioral and attitudinal patterns surrounding it are surprisingly understudied; what can we learn by deeper investigations into how and why people use physical cash?
- How might the various social, financial, values-based, and other systemic implications physical cash has for people's lives be useful for digital-currency design considerations?

Digital Currency Adoption

- What might catalyze a migration to digital currencies among mainstream users?
- What policies, technologies, or products could provide an effective way for mainstream Americans to move toward using digital currency as their primary way of sending, receiving, or holding money?

Central Bank Digital Currency

- What are the various roles for intermediaries in a CBDC, and what might users expect from, or rely on these intermediaries for, in each case, and why?
- How might the adoption of a potential CBDC be impacted by identity, such as race, ethnicity, age, sex, or gender?
- What can we learn, even at this early stage of CBDC R&D, from paper prototypes and in-person experiments? Some aspects of a CBDC could not be tested using the methods selected for this study. We recommend developing paper prototypes that mimic the end-user experience of using various CBDC design concepts, and having people interact with these in real-world scenarios. It would be useful, for example, to test tolerance

for various access/delivery options, transaction times, fee structures, incentive programs, as well as privacy and security design options.

- How have stablecoins and cryptocurrencies affected unbanked people in the US, and what lessons might CBDC learn from their relative success or failure?
- A CBDC which allows for programmability (dynamic services built on top of the underlying system), may result in uses that strain its capacity, for example “micropayments” or “streamed payments” (sending fractions of a cent every second). Which use cases of programmability, if any, are highly desirable for end users and why?
- Are there alternatives to a US retail CBDC, either technology or policy based, that would be more likely than a CBDC to improve upon Americans’ experience within our current financial system and that might better solve users’ leading pain points?

Limitations of Our Research and Areas for Further Investigation

We took a broad approach for this first study so we could directly address a variety of core assumptions about users underpinning policy conversations and technical explorations around digital currencies in the US (including but not limited to CBDCs). However, there are numerous specific populations and economic actors whom we did not engage during this study. Our hope is that this report is the first of many to explore digital currencies’ potential impact among a variety of populations in the US economy.



Additional Populations

We recommend in-depth studies of the following as they relate to digital-currency design considerations:

- The relationship between race, ethnicity, and financial services
- People who receive financial aid from the government (e.g. through welfare payments, stimulus checks, or tuition assistance) and/or who are homeless
- People over the age of 55 (due to recruitment selection methods, we did not speak with many Americans over age 55)
- Undocumented migrant workers (there are more than 10 million in the US);⁸⁸ given that undocumented people are often cash-dependent and may be unbanked, research should be conducted into their experiences and needs, including in relation to making remittance payments
- People who are unemployed, including those who are not of legal age to work or who are retired
- High-net-worth individuals
- People and organizations who use US dollars outside of the United States



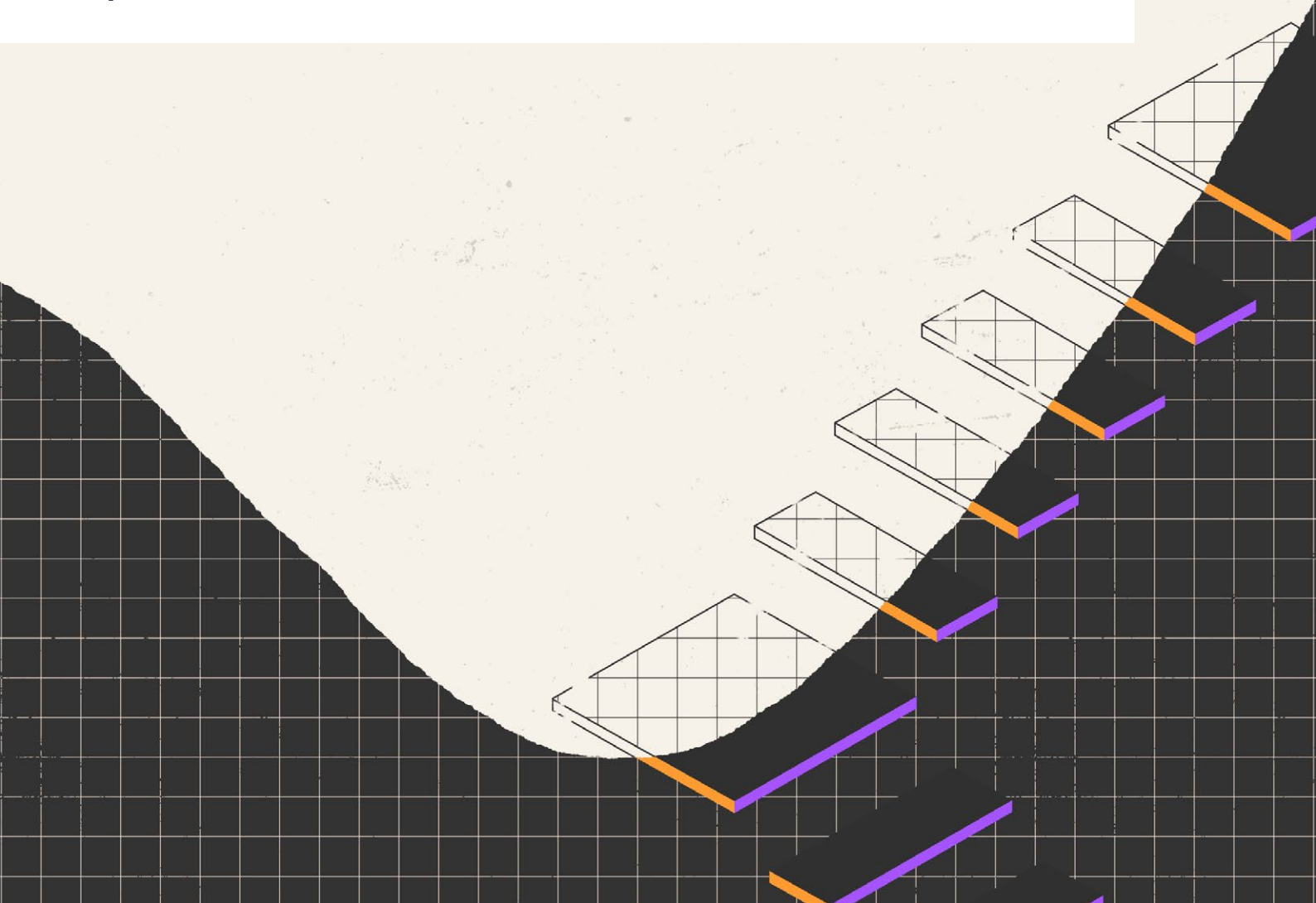
Additional Actors Related to CBDC

Our research focused on assumptions related to potential end users of a US retail CBDC. There are many other actors, besides end users, that would operate within a CBDC ecosystem, therefore additional exploration is necessary to generate a comprehensive understanding of the potential implications of a US CBDC. Additional actors we recommend for study include:

- Policymakers and regulators
- High-volume cash businesses such as restaurants, bars, or retail stores (we only interviewed a small number of small and medium-sized enterprises in this study)
- Large retail corporations who benefit from economies of scale when negotiating payment fees with payment providers
- Neobanks, third-party payment providers, point-of-sale systems providers, and other fintech companies
- Governmental departments that are likely to interact with a CBDC, such as the IRS and the Department of Justice
- Commercial banks and credit unions, investment banks, savings and loans associations, brokerage firms, insurance firms, and mortgage providers
- Other financial intermediaries, such as the United States Postal Service, check-cashing services, and remittance providers



| Appendices



Appendix A: Why User Research

The Power of Talking to People

This report surfaces insights from user research, the discipline of understanding a target group of people’s needs, pains, goals and motivations, in order to inform the design and build of technology, products, and services.⁸⁹ User researchers use various research methods to expose issues and design opportunities, both qualitative and quantitative.⁹⁰

It’s called “user research,” but the word “user” often abstracts the underlying human experiences which we study to gather these transformative insights. In this report, though we use the terms “people” and “user” interchangeably, we are always referring to real, living, breathing people who are the experts of their own lived experiences, and who can teach us to view the world from new vantage points. Rigorously surfacing, investigating, and synthesizing these human stories, perspectives, and behaviors is what allows user researchers to surface unexpected patterns and insights at scale.

User research, which can be either discovery (also called exploratory or generative user research) and/or evaluative (also called UX or optimization research), is used widely in the private sector for developing new products or features, and for optimizing existing user experiences. Digital transformation efforts in the public sector also regularly rely on user research (most often quantitative survey-based research) to ensure that vital services can be accessed by, and meet the needs of, the citizens or organizations they serve.⁹¹ In addition, in academia, deep research into people and populations is the cornerstone of many social scientists’ work, whose research informs the systems, strategies, and policies under which society operates. An empathetic mindset, a desire to understand why we behave the way we do, and a passion for solving complex problems are often drivers for those entering the user research field.

A common objection to user research, often voiced by technologists, is that “people don’t know how to solve their problems.” There is truth to this; people are not rational actors, nor are they working in your lab, company, government, or organization to build a solution to meet their own needs. Yet this sentiment highlights a misconception of the purpose of user research: it’s not to ask people what they want or need, but to better understand their underlying experiences.

People are uniquely expert in their own problems and pains. Through carefully structured research conversations we can validate and challenge the assumptions and biases which technologists, policymakers, and user researchers bring to the subject matter, revealing new paths of inquiry and new solutions that may have not been in our original line of sight. We do not know what we do not know. By speaking directly with people, guided by a tested research methodology, asking carefully crafted questions to avoid influencing the individual, and being prepared to follow where the rabbit hole takes us, we help the user get to the truth of their own experience.

Money is a sensitive subject; there is stigma around talking about one's own finances, and this is why research into the topic especially requires a qualitative approach in addition to gathering quantitative survey data. By building rapport in a one-on-one interview, user researchers create safety for openness and honesty, and this leads to deeper, more meaningful insights, which then translate to design recommendations grounded in reality. The researchers on this study noted multiple occasions where participants realized that they had never been asked questions about their attitude to money and the financial products and services they use. An example of this is a quote from one person we interviewed: "I'm surprised [the interview] got that deep, I definitely thought it was going to stick mostly to [my business operations] And now I've realized how much my personal political beliefs are centered around money and government regulation."

User research is a reality check, a risk-mitigator, a cost-saver, and a compass to point development of new services in better (and sometimes different) directions. In the design of digital currencies, and especially in the exploration of new national payments-system rails (such as a potential US retail CBDC), considering end-users' perspectives from the start is vital. These are infrastructure technologies that could either transform or undermine millions of Americans' financial situation (the outcome is yet to be determined).

If you are a technologist, policymaker, or researcher designing new money systems for people, it is imperative that those people are consulted before major decisions are made. Investing in user research at every stage of digital currency R&D mitigates the risk of creating new inequities and increases the likelihood that we will effectively solve the most painful problems people have with our current financial system, provide new value, and improve Americans' day-to-day lives.

Appendix B: Research Methodology

Objectives

We executed this research to explore values, beliefs, and attitudes relevant to the design of digital currencies among people residing in the United States.

In addition, we focused on a few common assumptions among technologists and policymakers related to likely early end-users of a US retail CBDC. One objective was to explore user considerations relevant to the development of a US CBDC and a second was to validate common assumptions regarding likely use cases. Planned in the context of rapidly-rising public and private sector interest in a US CBDC, this work recognizes the necessity of timely user research to inform public and private sector efforts.⁹² It prioritizes the recognition and reporting of early signals over the comprehensive judgement of all relevant insights. Consistent with this high-level objective and mindful of pragmatic budgetary and temporal constraints, the second research goal was articulated as: to confirm testable hypotheses with which subsequent research could validate or invalidate like CBDC use cases.

Questions and Subject Selection

A primary consideration of research design was to assure that efforts undertaken thematically targeted and considered questions relevant to experts and institutions already intimately involved in digital currency design and deployment. To this end, in May and June of 2021 we held a series of consultative meetings with digital currency technical experts and researchers at the MIT Media Lab's Digital Currency Initiative, along with staff from major central banks and the World Economic Forum. These consisted of one-on-one and small group interviews to establish primary topics and initial questions, followed by formal rounds of consolidation, cross-pollination, and refinement for each institution consulted.⁹³

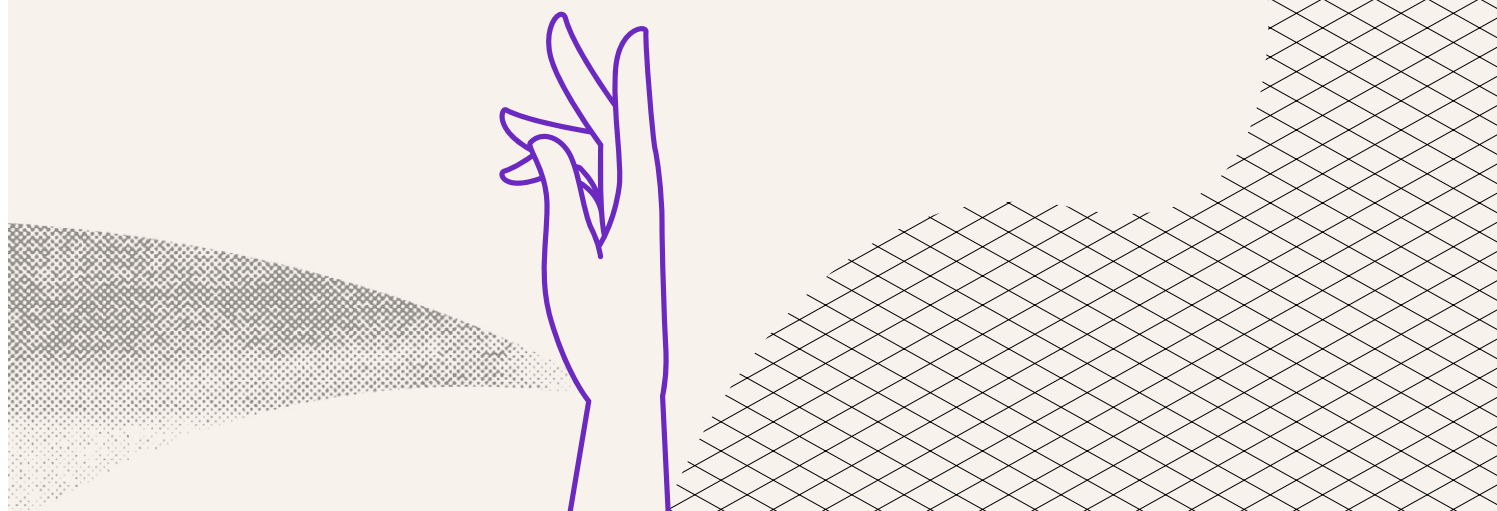
The key themes arrived upon by these stakeholder representatives were *current experiences and pains for users in the existing financial system, perceptions of financial transaction privacy, and anticipated CBDC early users and use cases*. Three audiences were identified as especially relevant

to expected early use cases of CBDC: people who are unbanked, small and medium-sized enterprises (SMEs), and people who send remittances. We worked with stakeholder groups to unearth assumptions and identify questions relevant to each of these topics. Once developed in consultation with stakeholders, our researchers further refined them to assure feasibility, counter known bias, and reduce ambiguity. The questions and contentions are listed in Tables D and E, below.

Theme	General Considerations	Specific Question(s)
Current Experiences and Pains in the Existing Financial System	What are the attitudes, needs, pains and blockers that exist in the current financial system?	<ul style="list-style-type: none"> • How might digital currencies address the unmet needs of Americans? • What are the possible blockers to adoption? • How influential are these at restricting people from trying digital currencies (including, but limited to, a US retail CBDC)?
Perceptions of Financial Transaction Privacy	<p>What is privacy in the context of CBDCs?</p> <p>In what situations is the privacy of financial transactions perceived to be important, as relevant to CBDCs?</p>	<ul style="list-style-type: none"> • What do subjects mean by privacy in the context of money/financial transactions? • How do subject perceptions of privacy differ across demographics? • What benefits outweigh subjects' need for privacy? • Are actors likely to use a US retail CBDC if its use requires a perceived loss of, or a perceived gain in, privacy?

Table D. Stakeholder Questions Regarding Perceptions of Financial Transaction Privacy

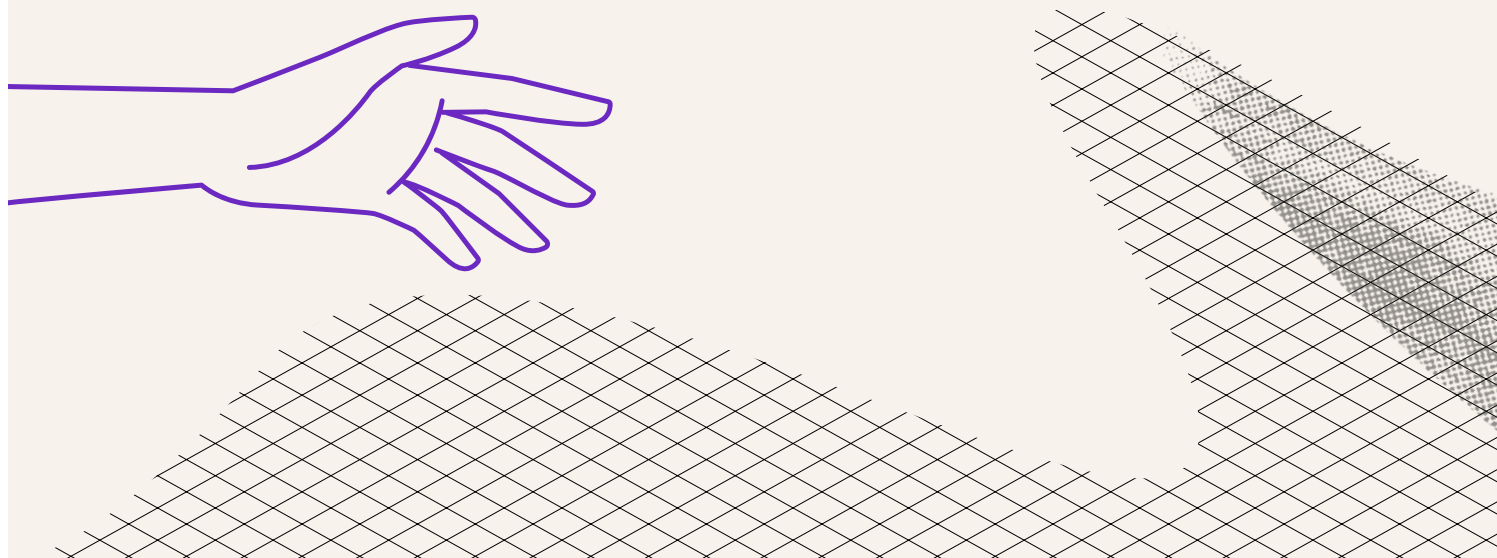
Table D, above, depicts the themes, general considerations, and specific questions that industry, technical, and policy stakeholders identified. Table E, below, shows the key digital currency use cases considered, formally defines implicated subject subpopulations, and relates assumptions stakeholders identified to the hypotheses our researchers developed for initial validation.



Use Case	Subpopulation	Specific Question(s)	Hypothesis
Consumer Payments	US-based small and medium sized (SME) business-to-consumer (B2C) merchants	Subjects will adopt digital currencies (including, but limited to, a US retail CBDC) to reduce costs.	Cost savings will motivate subjects to adopt novel means of accepting payment.
Payments Among Unbanked Americans	US residents who both (i) pay to use financial intermediaries and (ii) do not use traditional banking services	Subjects will adopt digital currencies (including, but limited to, a US retail CBDC) to save money and access features previously unavailable to them.	Money savings will motivate subjects to adopt unfamiliar financial products/enact new financial behaviors.
Remittance Payments	US residents, including noncitizen members of diasporic communities and US citizens with familial ties abroad, who make regular noncommercial transfers to people in their home country or homeland.	Subjects will adopt digital currencies (including, but limited to, a US retail CBDC) to reduce remittance costs.	Subjects are concerned about remittance costs and motivated to save money on remittances.

Table E. Anticipated Use Cases

Over the course of research undertaken, initial findings from qualitative interviews with these populations were provided to industry, policy, and technical stakeholders in three one-hour sessions. These sessions not only offered stakeholders early indications from research phases, but also invited them to voice further considerations for which subpopulation-level data collection could usefully contribute to extant policy and technical development. Table F, below, lists considerations so identified, the subject subpopulations among whom we gathered data to inform these considerations, and the screening criteria by which subjects were selected to participate.



Consideration	Stakeholder Reasoning (Why is this important?)	Implicated Subject Subpopulation
Rural-Urban Digital Divide	Many digital currency designs (including, but limited to, a US retail CBDC) require user internet connectivity. Despite recent gains in broadband internet access, adoption rates of internet-connecting devices (e.g. tablets, smartphones, and laptops) remain lower among rural Americans than among suburban and urban Americans. ⁹⁴ Proactive design and policy efforts could prevent digital currencies (including, but limited to, a US retail CBDC) from exacerbating the rural-urban digital divide.	US residents who self classify as the following: <ul style="list-style-type: none"> • Live in a rural setting • Have poor public transport access in their area • Have lived in a rural setting for 3+ years • Whose nearest town is 10+ miles away • Who experience lack of cell phone connectivity (>10% on an average day)
Underrepresented Americans	The design and development of twentieth century information technologies has been criticized for disfavoring underrepresented groups, including women, people of color, and sexual minorities. ⁹⁵ Early policy and design efforts could benefit from proactively seeking input from underrepresented groups.	US residents who self classify as either (or a combination of): <ul style="list-style-type: none"> • Black, African American, Asian, Hispanic or Latino/a/x • Sexual orientation other than heterosexual • Neurodivergent • Transgender • Immigrant to the US <p>Note: For our interviews, we did not screen for US residents who self-classify as people with mental and/or physical disabilities or impairments. We recommend extensive research be performed with this cohort in future studies.</p>
Users of Digital Payment Platforms	The preponderant majority of Americans use digital payments technology for some transactions. ⁹⁶ Digital currency design and policy (including, but limited to, a US retail CBDC) has the potential to either support or undermine the features and functionalities driving this widespread usage.	US residents who self classify as the following: <ul style="list-style-type: none"> • Use at least four of the following: Credit cards, PayPal, Venmo, Cash App, Zelle, Apple Pay, Google Pay. • Use these services for a range of purposes

Table F. Additional Stakeholder Considerations and Implicated Subpopulations

Methods Determination

Our researchers determined that complementary but distinctive data types would be most likely to offer both the depth of consideration and breadth of population coverage necessary for an initial exploration of this array of questions and hypotheses to obtain meaningful results. Therefore, a mixed methods approach was selected.⁹⁷ One advantage of such an approach is that it facilitates the deployment of both exploratory and confirmatory questions, enabling researchers to map as yet underexplored topic areas (such as openness to CBDC usage, or digital cash, as we referred to it with users) and to validate assumptions based on secondary research or stakeholder expertise. Inferences from these two strands of research form the empirical basis for meta-inferences that synthesize the two, enabling us to offer

conclusions with greater confidence than would be possible on the basis of either quantitative or qualitative research alone.⁹⁸

Participant Sourcing

We collected data for the survey over the course of June, July, and August, 2021. Interviewees representing specific populations (e.g. unbanked US residents) were sourced by User Interviews and Respondent, both respected research participant recruitment firms. Survey participants were sourced by Cint, a global leader in respondent recruitment. Survey and interview participants were sourced consistent with the confound and sample bias prevention policies of each.⁹⁹ We requested that Cint source survey participants representative of the US population in terms of age, race, household income, and gender. We evaluated the potential qualitative research subjects provided by User Interviews through pre-screening to ensure they were a suitable fit for the subject matter to be tested.

It is possible that, due to the subject selection methods used, our participants are likely skewed to be more technically-capable people with reliable internet connections, as they were able to take part in video calls or online surveys, and chose to opt-in for such studies; subjects were not picked at random from the entire US population.

Qualitative Interviews

Following initial engagement with industry, policy, and technical stakeholders, our researchers created an initial draft of interview and survey questions, which were iterated over the following weeks among separate staff researchers. Further stakeholder engagement narrowed and clarified the areas of inquiry most relevant to near-term digital currency development (including, but limited to, a US retail CBDC).

Our researchers gathered qualitative data through 91 one-on-one interviews that took place over this period. Interviews were 45-60 minutes each, semi-structured, and followed a discussion guide. Each interview was remotely administered online, with user-permissioned audio and video recorded. Researchers subsequently transcribed and coded these recordings, spot-checking and cross-checking for consistency. Discussion guides were developed iteratively over the twelve weeks of qualitative research, enabling

each week's interview results to inform and strengthen subsequent weeks' interviews. Researchers employed qualitative user research best practices to avoid biasing respondents, and to ensure quality of insights.¹⁰⁰

Quantitative Survey

Pretesting

To evaluate our survey instrument, we conducted a series of pretest questions across a small (n=150) sample, which included both multiple-choice and free text items. Once completed, researchers tabulated multiple choice data, examining item responses for red flags such as miss rates in excess of 85%, inconsistencies across related questions, and overly consistent responses. Open text responses were also evaluated for anomalies that could indicate systematic wording comprehension challenges.

Administration

Informed by this testing, our researchers finalized a 60-item, 25-minute survey instrument, which they provided to Cint for administration to a sample of US residents statistically representative of the US population along gender, racial, and income lines with a two-tailed sampling error tolerance of 5% or less. Cint administered this survey over the period of June-August, 2021 to over 1400 respondents, 1,319 of whom completed or nearly completed the survey.¹⁰¹ These respondents were largely representative of the US population along the lines specified. However, Cint informed us that due to the impacts of the ongoing Covid-19 pandemic, it was unable to produce a fully representative sample of respondents. Differences between the US population and our sample population are highlighted in Appendix C.

Coding and Analysis

Qualitative Research

While most survey items were readily quantified, the survey included four open-ended text prompts. Our researchers manually cleaned and qualitatively coded respondent answers to these open-ended questions, converting them from qualitative to quantitative data, using the constant comparative method.¹⁰² Our researchers similarly cleaned closed ended survey results. This included removal of personally identifiable information, of respondents that evinced

likely non-human (bot) activity, of straightline responses, and of respondents who gave unintelligible or nonsense responses.

Several survey items required responses to visual cues. These were left optional to accommodate respondents with visual impairments. However, all respondents who self-identified as having visual impairments did complete these optional questions. Item non-responses were evaluated, and variation between response rates to these questions among respondents who self-identified as disabled and among respondents who identified as non-disabled was found to be negligible.

Quantitative Research

To enable the quantitative analysis of survey results, researchers similarly cleaned the quantitative data, creating several novel variables and otherwise manipulating extant variables. To enable the creation of composite variables, select items were reverse coded to standardize the interpretation of coded responses across multiple items related to the same construct. As necessary, flag variables were created to delineate groups of respondents indicating low, medium, and high, with the meaning of each approximately determined by the mean plus or minus a single standard deviation. Five and nine point Likert scales were similarly simplified into variable triads.

On the basis of these manipulations, a composite variable was created to represent the aggregation of sixteen manifest variables which our researchers believe correspond to respondent attitudes regarding privacy. For nominal variables, dummy variables were created corresponding to each of the response categories.¹⁰³ Factor analysis was used to generate factor scores for each respondent.¹⁰⁴ The mean and variances of these scores were specified as zero and one, respectively, and a density plot thereof rendered.¹⁰⁵ This density plot indicated a bimodal distribution, and a new variable was created and coded to reflect this. A composite variable was similarly developed and coded to represent respondent attitudes towards digital cash under two hypothetical scenarios:

Scenario 1: Payments using digital cash are anonymous. They cannot be tied back to your identity, but you do not have access to any automatic record of your payments.

Scenario 2: Payments can be made using digital cash, and they are not anonymous (for example, an authorized bank or technology provider has a record of your payments). This means you can also access an automatic record of your payments.

These composite representations of attitudes towards privacy from government oversight and privacy from private sector oversight were then compared across demographic categories and analyzed to detect statistical patterns indicating potential relevance.

100+ variables in combination with a dozen or more grouping (demographic) variables yielded well over a thousand possible two-way comparisons. Given this large number of potential comparisons and questions to explore, a basic selection process was needed to focus only on questions and comparisons that were significant in the statistical and, perhaps, the practical sense. Two-way comparisons were tested for statistical significance, then examined to understand practical implications and weighed against potential confounds. For the specific quantitative manipulations deployed, see Appendix D. Survey Two-Way Comparisons.

Funding Disclaimer

The research questions, methodology, and design of our study were determined by the Maiden Labs research team, led by Georgia Rakusen. As described under *Questions and Subject Selection* (page 91), our initial list of questions was prioritized through a series of 60-90 minute semi-structured interviews with MIT DCI developers and research scientists, as well as with staff of major central banks and the World Economic Forum. The research was made possible through funding from the MIT DCI, including through contributions to the MIT DCI from Citi Ventures, Google, and PayPal. During May and June of 2021 Maiden Labs shared sample research questions with MIT DCI staff and its funders. In addition, three one-hour sessions were held to share emerging insights regarding: (1) small and medium sized enterprises, (2) unbanked people, and (3) people who send remittances. These sessions were attended by staff of the MIT DCI and its funders, as well as a representative of the World Economic Forum.

Appendix C: Survey Respondent Distribution

Variable	Distribution (Navy = our sample distribution, Blue = actual 2019 US distribution, Red = difference)										
Age¹⁰⁶	<17	18-24	25-34	35-44	45-54	55-64	65-74	75+			
	4.3%	14.9%	22.2%	22.9%	14.8%	18.7%	2.2%	0%			
	22.6%	9.3%	13.9%	12.7%	12.4%	12.9%	9.6%	6.9%			
	(18.3%)	5.6%	8.3%	10.2%	2.4%	5.8%	(7.4%)	(6.9%)			
Gender	Female	Male	Non-Binary¹⁰⁷	Unstated							
	66.2%	31.9%	0.5%	1.4%							
	50.8%	49.2%	N/A	N/A							
	15.4%	(17.3%)	N/A	N/A							
Household Income¹⁰⁸	<25K	25K-49.9K	50K-74.9K	75K-99.9K	100K-124.9K	125k-149.9K	150K-174.9K	175K-199.9K	200K+		
	29.2%	25.6%	16.8%	10.5%	7.1%	4.1%	2.4%	1.4%	2.8%		
	17%	20.1%	16.5%	12.3%	9.4%	6.1%	5%	3.3%	10.3%		
	12.2%	5.5%	0.3%	(1.8%)	(2.3%)	(2%)	(2.6%)	(1.9%)	(7.5%)		
Race or Ethnicity	White	Black	Asian	Hispanic/Latino/a/x	N. Hawaiian	N. America	Multiple	Other	Unstated		
	36.9%	26.9%	10.7%	16.6%	0.6%	2.6%	3.8%	1.5%	0.4%		
	72%	12.8%	5.7%	18.4%	0.2%	0.9%	3.4%	4.9%	N/A		
	(35.1%)	14.1%	5%	(1.8%)	(0.4%)	1.7%	0.4%	3.4%	N/A		
Disability Status	Not Disabled	Disabled	Unstated								
	80.1%	17.9%	2%								
	74%	26%	N/A								
	6.1%	(8.1%)	N/A								
Education¹⁰⁹	None	K-8	Some HS	HS Degree	Some College	T/T/V cert	Assoc.	Bach.	Master	Prof.	Doc
	0.9%	0.5%	7.4%	24.6%	19.1%	4.1%	9.9%	20.1%	10.1%	1.5%	1.8%
	0%	3%	6%	28%	17%	4%	6%	22%	9%	1%	2%
	0.9%	(2.5%)	1.4%	(3.4%)	2.1%	0.1%	3.9%	(1.9%)	1.1%	0.5%	(0.2%)
Employment	Employed¹¹⁰	Self-employed¹¹¹	Unemployed, looking¹¹²	Unemployed, not looking¹¹³	Homemaker¹¹⁴	Student	Military	Retired	Unable to work		
	46.7%	9.7%	10.5%	8.0%	7.6%	8.4%	0.5%	6.1%	8.4%		
	58.5%	6.35%	5.2%	0.2%	N/A	N/A	N/A	N/A	N/A		
	(11.8%)	3.35%	5.3%	7.8%	N/A	N/A	N/A	N/A	N/A		

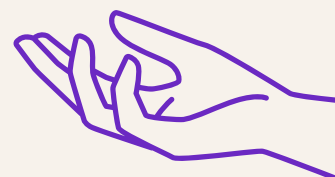
Table G. Survey Respondent Distribution

Appendix D: Survey Two-Way Comparisons

For two-way comparisons of categorical variables (e.g., *Age by Privacy*), χ^2 tests were conducted. For comparisons involving continuous variables (e.g., *Tech_Comp by Privacy*), the omnibus F test from a one-way analysis of variance (ANOVA) was used. In both cases, comparisons which yielded a p value less than .05 were considered for further examination. Given the sample size ($n = 1,319$), these tests were likely overpowered for most comparisons, rendering the choice of acceptable Type I error rate ($\alpha = .05$) overly inclusive.

Several key research questions involved a comparison of the distribution of demographic variables across two groups (e.g. respondents who selected Somewhat/Very Likely for a particular item versus respondents who selected Somewhat/Very Unlikely). In these cases, the proportion (%) of respondents falling into each category of the demographic variable was calculated and then an effect size for the difference between each pair of proportions (P_1 and P_2) across the two groups was determined. Cohen's h was used as the effect size, with the value of h interpreted as a small effect near 0.2, a medium effect near 0.5, and a large effect near 0.8.¹⁵ Only comparisons that included at least one difference in proportions with an effect size of at least $h = 0.35$ were considered.

Some of the demographic variables with large numbers of response categories (e.g., *Race/Ethnicity*), had too few respondents in many of the categories to draw meaningful inferences. The present survey analysis, then, largely focuses on those categories which contained the bulk of the respondents (e.g., White, Black, Asian, Pacific Islander, Hispanic or Latino/a/x for the *Race/Ethnicity* variable). To simplify interpretation where possible (e.g. *Household Income*), some grouping variables were combined.¹⁶



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