

UC Irvine

Syntheses

Title

Virtually Irreplaceable: Cash as Public Infrastructure

Permalink

<https://escholarship.org/uc/item/3fk2v13j>

Author

Dalinghaus, Ursula

Publication Date

2019-07-31

Copyright Information

This work is made available under the terms of a Creative Commons Attribution-NonCommercial License, available at <https://creativecommons.org/licenses/by-nc/4.0/>

Peer reviewed



Cash
Matters[®]

Virtually Irreplaceable

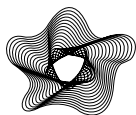
Cash as Public Infrastructure



White Paper Cash Matters

An ICA movement

Written and provided by the



IMTFI

INSTITUTE FOR MONEY, TECHNOLOGY
& FINANCIAL INCLUSION

Ursula Dalinghaus, Ph.D.

Institute for Money, Technology
& Financial Inclusion

Visiting Professor of Anthropology
at Ripon College, Wisconsin.

dalinghausu@ripon.edu



Cash
Matters®



Table of Contents

About the Institute for Money, Technology & Financial Inclusion (IMTFI)	6	4.0 Design and Denomination: the Role of Cash in Social Practices	36
Acknowledgments	7	4.1 Denomination as a specific manifestation of physical cash	38
Executive Summary	8	-----	-----
Key Assessments	10	5.0 Case Studies	39
Virtually Irreplaceable: Cash as Public Infrastructure	12	5.1 Puerto Rico – Cash as failsafe	39
1.0 Cash as a Public Good	13	-----	-----
1.1 Cash is the only form of public money available to all	13	5.2 United Kingdom – Cashless payments brings new work	40
-----	-----	-----	-----
1.2 Cash is a public good in a wider sense	15	5.3 India – Demonetization and its lessons	42
-----	-----	-----	-----
1.3 Cash plays a part in nation building	16	5.4 Sweden – Why cash matters in the cashless utopia	45
-----	-----	-----	-----
2.0 Central Banks and the Role of Cash as a Public Infrastructure	20	5.5 China – Social credit scores and implications for data surveillance	47
2.1 Ensuring stable payments and good governance, safeguarding privacy and access	20	-----	-----
-----	-----	5.6 Australia, the United Kingdom, and South Africa – Digital control and “quarantining” of money for vulnerable populations	50
2.2 Freedom of choice matters	22	-----	-----
-----	-----	5.7 Pushing back against cashlessness	52
2.3 Spotlight on central bank digital currency	27	-----	-----
-----	-----	5.8 Public concerns of a cashless society	54
3.0 The Endurance of Cash Usage in the Payments Landscape	32	-----	-----
-----	-----	6.0 Conclusion	55
		6.1 Cash is and must remain an indispensable part of any payment landscape	55
		-----	-----
		6.2 Policy considerations	57
		-----	-----
		7.0 Appendix	58
		-----	-----

About the Institute for Money, Technology & Financial Inclusion (IMTFI)

From cash to livestock to mobile phones – monetary technologies are part of the fabric of our everyday cultural, social, and spiritual lives. IMTFI is dedicated to understanding how people engage with money in all of its forms and examining how policies can best support people's everyday behaviors, activities, and rituals with money. We seek to share our learnings broadly and build a set of global partners dedicated to making monetary technologies meet people's true needs across the world.

Established in 2008 with funding from the Gates Foundation, IMTFI is a research institute based out of the University of California, Irvine. Its core activity has been supporting original research in the developing world on the impact of mobile and digital financial services. For that purpose, it has built an extensive transnational network of embedded scholars and researchers who focus on developing grounded, nuanced perspectives on people's everyday financial practices and the impact of new technologies.

To date, IMTFI has supported 147 projects in 47 countries involving 186 different researchers. Those researchers have produced 11 books and 100+ articles in scholarly and other venues, and have been mentioned in the media 170+ times, in venues ranging from Bloomberg Businessweek and the Guardian to Forbes, India. With newly established collaborations with research entities in Pakistan, Mexico, and Senegal, IMTFI looks forward to continuing to foster conversations around financial inclusion.

Learn more at www.imtfi.uci.edu



IMTFI
INSTITUTE FOR MONEY, TECHNOLOGY
& FINANCIAL INCLUSION

Institute for Money, Technology & Financial Inclusion
University of California, Irvine
School of Social Sciences
3151 Social Sciences Plaza Irvine, CA 92697-5100
(949) 824-2284
imtfi@uci.edu

Acknowledgments

Ursula Dalinghaus is currently an affiliated scholar at the IMTFI – Institute for Money, Technology and Financial Inclusion (University of California, Irvine) and a Visiting Professor of Anthropology at Ripon College. She can be contacted at dalinghausu@ripon.edu.

The author is responsible for the content and any errors herein. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of any funding agency, funding source or the University of California, Irvine.

The author would like to thank Bill Maurer and Andrea Nitsche for their guidance, crucial input and substantial contributions at all stages of the conceptualization, writing, and revision process.

Thanks also to Sean Mallin, Jenny Fan, and Susanne Maise who contributed invaluable writing and editorial assistance as well as content suggestions that greatly improved the arguments and evidence in this paper. For provocations and critical input at various stages in the process, the author would also like to thank Hugo Cuevas-Mohr, Vivian Dzokoto, Dominique Eguren, Vagias Karavas, Taylor C. Nelms, Gustav Peebles, Alexis Riggs and Erin B. Taylor.

Executive Summary

The demise of cash has been predicted for at least 60 years. This despite the fact that the majority of payments worldwide are made in cash; cash payments are vital to everyday economic transactions around the globe.

Cash's built-in anonymizing features are still unrivaled when it comes to questions of privacy, which is increasingly important to consumers in an age when companies can track every purchase and some state actors have begun to use digital platforms to monitor their citizens. Cash's low-tech usability and capacity to function off the grid make it a safe back-up plan and a critical redundancy when digital payments are unexpectedly offline. And cash's status as legal tender ensures it is universally accepted, equally accessible, and free to use for consumers, making it an important public good and public infrastructure.

This white paper for Cash Matters, a movement funded by the International Currency Association (ICA), makes a case for how and why cash should be understood as a "public good." Drawing from the accumulated expertise on cash and digital monetary technologies of the Institute for Money, Technology & Financial Inclusion (IMTFI), and the latest research across policy, industry, and academic sources, this paper highlights particular qualities of cash – design features that no other method of payment offers – that have so far been overlooked in discussions about a future payments landscape.

Cash is accessible to all, ensures economic stability, and safeguards citizens' rights and privacy. In light of the infrastructural, technological, and legal underpinnings of cash, this paper conceptualizes cash as a distributed public infrastructure – not a good in itself, but a system of relationships, technologies, and qualities that make the cash form unique. The paper argues that cash payments are an indispensable complement to mobile, electronic, and digital payments, and that much would be lost and nothing gained if society were to go cashless.

Part 1 argues that a defining feature of cash is that it is a public good. Cash has positive externalities and network effects. It is also public money – the only form of money not controlled by a private entity (private meaning serving commercial interests). It is deployed not to make a profit on its transfer but to support and sustain transfers free of charge. There may still be costs associated with cash, but cash itself is a means of value transfer that settles at par, no more and no less. Cash is non-excludable because its function as a means of payment, of transfer of value, works without compensation. And cash is non-rivalrous because its use by one person does not preclude its use by another: everyone can use cash at the same time (just not the same banknotes). Cash differs from other payment media because of its link to national domestic economies as well as the cultural, symbolic, and political meanings imprinted on the cash form.

Part 2 argues that more than a public good, cash is a public infrastructure. The ability of governments to produce it and for it to circulate freely sustains economic relationships. Cash serves as a store of value, and it contributes to financial stability. Cash is a guardrail against negative interest rates and serves as a brake on fees for other forms of payment. State-issued physical cash is a distributed public infrastructure that allows citizens and users to create a space outside the state. At the same time, cash acts as a claim upon central banks and, ultimately, states to ensure good governance of monetary and payment systems. Part 2 also spotlights recent scholarship, research, and expert opinion on the benefits and disadvantages of a central bank digital currency (CBDC). These discussions shed further light on the specific properties, capacities, and importance of physical fiat money in current financial systems.

Part 3 illustrates the role of cash in contemporary payments. Payments are not an all-or-nothing affair, where a new payment system displaces and replaces an old one. Instead, payments are a variegated landscape. People use multiple forms of payment, and they do so for different purposes. Cash plays an essential and enduring role in these different repertoires of payment.

Part 4 shows how the materiality of cash is vital to social practices. The role cash plays in social relationships often hinges on the physical design features of cash, such as denomination, which make cash a particularly useful tool for budgeting, accounting, gifting, and saving, among other practices.

Part 5 explores case studies from around the world where battles to replace as well as maintain cash are highlighting the importance of cash as a public infrastructure for people's lives and livelihoods.

Part 6 concludes by making a positive case for cash. Because of its physical and distributed form across societies, cash remains vital in a digital world – a critical public good and public infrastructure in local, national, and global monetary systems.



Key Assessments

"It is an intriguing fact that the availability of government currency provides protection against government intrusion itself."

Pierre Lemieux
Canadian economist

Cash is the only form of payment that is independent from its issuer.

Cash guarantees individual and personal freedom, as it is the only form of payment that is not tied to its issuer. Once cash is in circulation, the intrinsic power associated with any form of money has been completely transferred from the issuer to the consumer or citizen. Cash is a means of personal empowerment, which cannot be duplicated by any other form of payment.

Cash can be held by its users separate from the prying eyes of banks, platform companies, or governments. Cash serves in part as a kind of "people's account," as its privacy and its very materiality permit people to budget and account by separating cash from other money, secreting it away, or deploying it in specific circumstances without concerns about surveillance.

Cash acts a guardrail and anchoring point in the financial system

Analyses of cash in relation to the potential characteristics of a central bank digital currency (CBDC) affirm the threshold properties of physical cash: that cash indeed acts as a barrier or interest rate floor to the use of the zero lower bound as a monetary policy tool. Cash offers an exit from the formal financial system, whether in good times or bad, and especially during a financial, environmental, or political crisis. Cash acts as a guarantee that citizens can exercise their right to determine how they store wealth and how they make decisions about spending and consumption in the economy.



Cash is public money

“Payment” is a lucrative market; many parties are trying to capture a piece of it. Cash is the only form of payment that can be used free of charge once it is in circulation. Paying cash does not incur any costs for consumers. It is the only form of money not controlled by a private commercial entity. It is deployed not to make a profit on its transfer but to support and sustain transfers free of charge. This is not to say that there are no costs associated with cash, but that cash itself, as a means of value transfer, settles at par.

No third parties profit from cash itself as a means of value transfer; though there are third parties responsible for its handling, storage, and transport, there are none responsible for its ability to transfer value. Cash does not require intermediaries to work, neither in technological nor in any other form. This immediacy of cash eliminates third-party business models and thus makes it a target for attacks by the very same third parties trying to profit from the payment market.

Cash is a public infrastructure

Cash is the only tangible means of payment that allows citizens to instantly settle a transaction in central bank money at face value. In contrast, all digital payment forms require a third party or intermediary for the payment to settle. Cash’s status as legal tender ensures it is universally accepted, equally accessible, and free to use for consumers, making it an important public good and public infrastructure. Cash remains vital in a digital world because of its physical and distributed form across societies as a deliberative tool for political and economic activity. This contrasts with digital accounts from which, theoretically, people could be shut out with the flip of a switch. Physical currency therefore has a crucial and ongoing role to play in the fast-changing payments landscape, now and in the future.

Virtually Irreplaceable: Cash as Public Infrastructure

Introduction

The demise of cash has been predicted for at least 60 years. It always seems right around the corner, whether through the Diners Club card in the 1960s, the Visa network in the 1980s, or M-Pesa, mobile wallets, and cryptoassets since the 2000s. Nevertheless, cash payments are still common – and vital – to everyday economic transactions around the world.

In the Global North, cash is the payment of choice for consumers who value cash for the freedom they associate with it.

For many people in poverty, people living in the immediate aftermath of a natural disaster, or people juggling jobs and unpredictable income streams, cash is a lifeline and often the only means of payment. In many parts of the Global South, cash is the only form of payment used for everyday purchases, for saving and budgeting, and for domestic and international remittances. Consequently, cash in circulation has been growing globally.

US currency, which is effectively the world's reserve currency, has been growing at an average of 5 percent for the past 20-plus years, with the number of notes in circulation doubling to 40 billion between 1996 and 2016.

By mid-2018, it reached a global circulation of \$1.6 trillion.¹ In the euro area, the value of euro banknotes and coins in circulation following the currency's introduction in 2002 was 234 billion euros, and has grown to 1,260 billion euros by the end of May 2019.²

Despite this critical role of cash in everyday finance, commercial players in the non-cash market continue to attack cash while promoting the benefits of a cashless lifestyle.³ For example, quick-service restaurants and some retailers have gone cashless, cutting off those without access to a bank card or mobile wallet. Some merchants receive incentives to refuse to accept cash, though proponents of these initiatives overstate concerns that cash supports criminal activities and understate how card networks will benefit from increased fee revenues.⁴ And a variety of actors – including commercial banks, financial tech startups, cryptoasset promoters, financial inclusion experts, and even nation-states (as in the recent case of India) – imagine a future where cash will be entirely replaced by digital currency. Some believe this will happen gradually and will be driven by markets and consumers, while others hope to actively cultivate a shift to digital currency through commercial initiatives and public policies.

And still, across the globe, cash continues to be relevant for monetary stability, financial access, and infrastructural resilience. It is a fundamental entry point into the wider economy and a critical tool for both economic and social well-being.

1.0 Cash as a Public Good

1.1 Cash is the only form of public money available to all

What is a public good? Economists define public goods as “non-excludable” and “non-rivalrous.”⁵ Excludable goods are those for which their owners or producers demand a payment for their use.

Rivalrous goods are goods that cannot be enjoyed or consumed by more than one user at the same time. The consumption of a rivalrous good by one individual prevents or precludes that by another.

Many goods are owned by someone for their sole enjoyment, and therefore are excludable and rivalrous. Many others are non-excludable – access is granted to all, regardless of willingness to pay. A lot of goods are non-rivalrous – that is, they are open to the public, and one individual’s consumption does not impact another’s.

Classification of Goods

	Excludable	Non-excludable
Rivalrous	Private goods (food, clothes, automobile)	Common-pool goods (underground water)
Non-rivalrous	Club goods (cable TV, electric power)	Public goods (national defense, lighthouse)

Source: Filiz Kartal, “Public Goods”, in Political and Civic Leadership: A Reference Handbook. Richard A. Couto (ed). Thousand Oaks, CA: SAGE Publications, Inc., 2010, p. 153-161, p. 155.

<http://sk.sagepub.com/reference/civicleadership/n19.xml>

Cash fits the definition of a non-excludable, non-rivalrous good – though not in the sense of individual banknotes (since the possession of an individual banknote precludes the possession by another). But as a system of legal tender, cash money is a public good in this technical sense.

Cash is non-excludable because its function as a means of payment, of transfer of value, works without compensation. In contrast, when paying with a credit card via an app like PayPal or a smartphone app, the card networks, banks, and payment providers are all charging a fee. And cash is non-rivalrous because its use by one does not preclude its use by another: everyone can use cash at the same time.

In our current monetary system, legal tender in the form of cash is a public good that guarantees ease of use, accessibility, privacy, and many other unique qualities. Cash is an integral part of a stable and well-functioning money and payment system.

- Legal tender laws designate state-issued cash as a means of paying all debts, public or private.
- Citizens and non-citizens alike are expected to pay debts and accept payments in service of that debt. No one can be excluded from access to the officially designated medium of payment for servicing debt obligations.
- Cash settles at par, ensuring no one is shut out from economic activity because of fees to pay.

"A monetary system is non-excludable – single individuals can hardly be prevented from using banknotes and coins. It is also non-rival because an individual's participation in the system does not impede another's use. In fact, it likely raises the value of the currency through network effects – a currency that is widely used is more valuable than one that is not, because it enables more trades." ⁶

Gabriele Camera

Economist

1.2 Cash is a public good in a wider sense

There are also public goods in a wider sense – and cash is one of them. These are goods that might not fit the economists' definition but generate network effects and positive spillovers. They must be, by definition, freely available to all; usually they are public goods by political decision rather than by virtue of their specific qualities. Examples include education, knowledge, and public infrastructure.

Central bank research on the development of digital fiat affirms the extent to which cash is a public good in the modern world. Analysts highlight the "unit of account" function of money as the broader term for defining how money is a public good, making room for alternative (digital) forms:

"An argument for issuing a new form of e-money is the provision of public goods. Indeed, the provision of outside money, as opposed to inside money, is a public good insofar as outside money provides a non-excludable and non-rivalrous service (per the standard definition of public good taken from Stiglitz 1988). This service is the ability to conduct safe and efficient payment transactions. Central banks already offer different forms of outside money such as cash and reserves."

*"The cash 'system' fits the typical public good description because the central bank allows anyone to acquire this means of payment, and the positive network externalities from its usage benefit every individual making use of the system."*⁷

Mohammad Davoodalhosseini & Francisco Rivadeneyra

Bank of Canada

*A unit of account is a public good. Just like general knowledge or technical standards that help coordination of agents, an established unit of account is non-rival and non-excludable. Note that a standard established by a common unit of account does not need a publicly supplied physical or electronic form of money to be adopted. However, just like weights and measures, it is helpful for adoption when the government establishes and enforces a common standard. New forms of electronic money, public or private, can, without any cost, be denominated in the established national currency."*⁸

1.3 Cash plays a part in nation building

By materializing the unit of account as distinct national currencies, states have depended upon physical cash for nation-building efforts. Physical cash embodies national boundaries, but can also cross them in ways that digital money cannot.

Historically, physical cash has contributed to positive network effects in the economy and society at large. State provision of public goods is tied to the rise of nation-states, citizenship, and claims to political equality.⁹

Citizenship *"changed the character of states because, unlike a subject, a citizen has been defined as a rights-bearing individual vis-à-vis the state."*¹⁰

While electoral rights contributed to greater political equality, states began to address inequalities produced by markets by investing in urban infrastructure and the provision of goods for which there is a shared societal interest: roads, water, sanitation, and quarantine.¹¹

Modern states have established cash as a public good in order to create national economies, making this a political as well as an economic decision. Unifying commerce under a single national currency creates network effects and removes one domain of uncertainty so that businesses can make reliable business plans and run operations.

Historically, public institutions have played a crucial role in ensuring the public-good aspect of monetary systems, and of cash specifically.¹² Public institutions set the conditions, through law, regulation, and sanction, that maintain public goods. Cash is no exception. In order for people to trust that physical cash will have value in the future, society-wide confidence in the stability of the monetary instrument is essential. Public institutions, such as independent central banks, monetary authorities, and treasuries, can take a long-term approach to a currency instrument's value.

By definition, the cost for providing public goods is removed from profit-oriented market mechanisms, with states and public authorities stepping in to ensure maintenance, control, regulatory oversight, and good governance of critical infrastructures that serve society as a whole.

The development of domestic territorial currencies in the form of uniform physical cash denominations was a direct response to an array of private monies circulating with different values, fees, and terms for acceptance and settlement.¹³

By establishing a uniform public money, states and monetary authorities contributed to greater inclusion of people in the domestic economy and a reduction in exploitative fees and volatility in value when accessing different forms of payment (costs that fell heavily on the poor in society). This money also acted as a reliable payment infrastructure that helped to stabilize business cycles.¹⁴

The political economist Eric Helleiner argues that cash should be thought of as a ubiquitous, public mass medium: like it or not, it promotes the nation-state's images of itself and solidifies the very idea of the nation.¹⁵ Cash, as a substantial part of a stable monetary system, has social aspects that surpass its economic definitions and role in economic transactions.¹⁶ But it is important to note here how cash differs from other payment forms because of its link to national domestic economies as well as the cultural, symbolic, and political meanings imprinted on the cash form.

Role of cash – social aspects

Cash is valued for its universal use and low-tech availability in everyday life.

Cash as a public good ensures competition with other electronic payment methods, which are more commercial in nature.

Cash acts as a symbol of national sovereignty, history, and culture

Cash is used for educational purposes.

Cash is the first stage in financial and, consequently, social inclusion.

Source: Paul Van der Knaap, Taco de Vries, and Ewout Boesenach, G4S World Cash Report 2018, p. 9.

Full report: <https://www.g4scashreport.com/>

Physical cash in the form of national currencies has gone hand in hand with other public goods:

- Cash is a form of power sharing between state, polity, market, and individual.
- Cash creates an economy for everyone, both within and outside the borders of its issuance. Both citizens and non-citizens can use physical cash.
- Cash can cross borders, acting as a communicative medium (national calling card) as well as a store of value that connects individuals, families, and transnational networks, e.g. through remittances, tourism or in contexts of environmental or political instability.
- Cash serves as a market indicator – cash demand, usage, and circulation produce important data and are the basis for statistics on consumer confidence and economic activity, and act as a warning sign regarding emergent phenomena not captured in other market indices.
- Cash materializes national and political ideals inside the nation-state or currency union.

In response to two separate opinions on proposed cash limitations in Portugal and Bulgaria, the European Central Bank offered a conclusion in line with the analysis presented here:

"The ability to pay in cash remains particularly important for certain groups in society that, for various legitimate reasons, prefer to use cash rather than other payment instruments. Cash is generally also appreciated as a payment instrument because it is, as legal tender, widely accepted, fast and facilitates control over the payer's spending. Moreover, it is still the only means of payment that allows citizens to instantly settle a transaction in central bank money at face value, without the legal possibility to impose a fee for the use of this means of payment. Additionally, cash payments facilitate the inclusion of the entire population in the economy by allowing it to settle any kind of financial transaction in this way."¹⁷

In the past couple of years, due to the rise of digital payments often associated with a loss of privacy and an increase of risk, the question of a central bank issued digital currency (CBDC) has gained momentum. This has prompted analysts to recognize that the physical attributes of cash contribute to its capacity to serve as a public good:

“An outstanding question is whether the use of a CBDC could also be a public good like the use of money. This is a question for economic research to answer because the nature of physical cash usage as a public good may be tied, in part, to its form.”¹⁸

James Chapman & Carolyn A. Wilkins

Bank of Canada

“An important role in the near term for monetary theorists is to understand what characteristics of physical cash make it essential to the economy and whether a CBDC with those characteristics would also be essential. For example, certain design features could make CBDC more excludable than cash (e.g., if the central bank were to restrict access or prevented certain types of transactions).”¹⁹

As central banks experiment with new digital technologies, the means by which the cash infrastructure currently acts as a public good provides further evidence and support for maintaining cash as a critical, resilient public infrastructure.

“Is there a public interest reason for a central bank to issue a CBDC? The first place to start in answering this question is to consider whether the use of money is a public good. We argue that it is:

- The use of money as a means of payment is non-rivalrous. Although the object of money most certainly is rivalrous, the acceptance of money in return for goods by one person does not prohibit or affect the acceptance and use of money by another.
- The use of cash is non-excludable in its current form. Anyone can use cash. It is akin to a token that does not depend on a network (or other infrastructure) to ensure that settlement of a transaction is successful or that a user has a store of value. Other methods of payment can exclude consumers, which is part of where the potential for market power comes from.

A subtler public benefit from the provision of central bank money is that its availability as a ready asset helps underpin trust in the financial system. This is because it provides an outside option to all people who conduct financial transactions – from buying groceries to buying derivatives.”

Source: James Chapman and Carolyn A. Wilkins, Crypto ‘Money’: Perspective of a Couple of Canadian Central Bankers. Bank of Canada Staff Discussion Paper No. 2019-1, p. 18-19.

<https://www.bankofcanada.ca/wp-content/uploads/2019/02/sdp2019-1.pdf>

2.0 Central Banks and the Role of Cash as a Public Infrastructure

2.1 Ensuring stable payments and good governance, safeguarding privacy and access

Central banks differ from commercial banks in facilitating money creation and a stable payments infrastructure, as well as acting as lender of last resort. Deposits held at commercial banks can be withdrawn on demand and are the banks' liabilities to depositors. While physical cash makes up only a tiny fraction of money in circulation, it is nonetheless important to monetary policy by guaranteeing "an effective lower bound for the risk-free nominal interest rate" – that is, cash is the only fallback against negative interest rates or the removal of the zero lower bound.²⁰ Cash therefore acts as a check on the limitless or inflationary expansion of money. Cash also limits the fees that banks can charge depositors for saving their money in the bank and can guard against the confiscation of those savings by banks.



In addition, cash contributes to the stability of the national payment system and monetary stability in the two-tier banking system: "cash being the only instrument that allows banks in this system to convert their liabilities vis-à-vis non-banks into central bank money."²¹ For consumers, the existence of cash and the ability to convert account-based money into cash at commercial banks leads to the belief that "a bank is where the money is."²²

Camera's experimental research provides evidence for the importance of physical tokens in facilitating the long-term trust necessary for stable monetary systems that can serve as a public good.

*"There is something important about cash, cash allows you to establish property rights independently over a third party. You have it in your pocket."*²³

Gabriele Camera

Economist

Most importantly, as noted above, only physical cash guarantees independence from the issuer. All digital forms have the capacity to restrict freedom, whether in terms of restricting access to funds and choice over how to spend these or in terms of surveillance and tracking. Cash offers an exit from the formal financial system, whether in good times or bad, and especially during a financial, environmental, or political crisis. Digital options, regardless of design, would not allow for a similar exit from the digital financial system, even if consumers might move their deposits to other private or alternative accounts or cryptocurrencies. Depending on the design of the CBDC, people could move money from commercial to central bank accounts (in times of crisis), putting greater pressure on the central bank and weakening the banking system as a whole.²⁴ As Jens Weidmann, President of the Deutsche Bundesbank, Chair of the Bank for International Settlements and Member of the European Central Bank Governing Council, recently warned:

"However, the biggest threat in terms of financial stability is the possibility of a digital bank run. Of course, the analogue world has seen the odd bank run – an image of long queues forming in front of branches of the UK

bank Northern Rock in 2007 springs to mind. But a digital bank run would be different. In a classic bank run, customers have to find another way of storing the money that they withdraw, and this entails either risk or costs. In a digital bank run, all it takes is a few mouse clicks to transfer savings out of the private financial system and into a central bank account. Customers are less likely to think twice about doing that. It is fairly safe to say that, had such an option been available back then, it would not have been just Northern Rock's customers but also those of other UK banks that would have wanted to place their savings out of harm's way at the central bank just in case, and precisely this action would have completely destabilised the entire banking system."²⁵

In other words, cash remains important to crisis management because the demand for physical cash limits the potential reach and detrimental effects of a global bank run in ways that digital money does not. But cash is also a public infrastructure, providing checks and balances between central banks, commercial banks, and consumers, and serving as a crucial aspect of the money system more generally. While cash and digital forms of money seem interchangeable, the ability to access cash and keep it outside the money system as a store of value, in good times and bad, shows how physical cash plays an important role in anchoring the exponentially larger system of accounts-based "virtual" value. That is, though physical cash is a small fraction of global money, it has power in differentiating public from private money because bank deposits can be converted on demand into physical cash. As discussions of the potential impact of CBDCs on financial stability make clear, cash is important to maintaining stability in the financial system.²⁶ Cash can act as a guardrail against governments using people's private money for macroeconomic policy as well as against private banks bailing in depositors' savings to cover debts.

Cash therefore entails both market and political claims. National central banks are responsible for monopoly note issuance of standardized currency, and, as the issuers

and guarantors of state/territorial currencies, are accountable to the public. Moreover, they have played a key role in mandating that "transactions involving cash and checks would be settled at par – meaning that there's no transaction cost to paying that way." Bill Maurer, author of "How Would You Like to Pay?" and Dean of the School of Social Sciences at UC Irvine, observed "Cash is profoundly democratic. It can be given by anyone, accepted by anyone, settled and cleared instantaneously."²⁷ Finally, central banks "design the money they issue and regulate private forms of money" as well as "ensure that money meets certain social criteria" in public policy and in relation to users.²⁸ The concepts of legal tender and par settlement sustain the belief that fiat money will hold value in the present and into the future. This public trust in physical currency is in large part due to the good governance practices of many central banks, lending credibility to cash.

The shift from cash to digital forms of money and payment therefore provokes renewed consideration of old political questions:

- How should money be organized and what forms should it take?
- How does the relationship of cash to digital forms of payment reframe debates about public access to payments and inclusion?
- Who owns and operates the payment infrastructure when state-issued currency is displaced by digital payment methods?
- What is the future relationship between private entities (commercial banks as well as fintech and other payment service providers) vis-à-vis state and public institutions? Here, a key question is how central banks, in particular, retain control over the currency cycle and, as a consequence, the economic and financial stability of the monetary system.

2.2 Freedom of choice matters

The discussion of cash as a public good is framed primarily around assumptions of individual choice regarding payment cost and efficiency as key drivers motivating the turn to digital options at the expense of cash. However, if policies and incentives make it impossible to use or access cash, then the concept of “choice” falls short. Focusing on individual choice also sidelines the fact that cash is a payment infrastructure, not just a medium of exchange, and needs an infrastructure in order to be available and accepted.

Consider the case of Sweden, where the Riksbank has largely delegated the responsibility for its cash infrastructure to commercial banks. As a result, the accessibility, availability, and acceptance of cash have dramatically decreased – not because consumers made a choice but because commercial interests dictated their choices. ATMs can be several hundred kilometers apart, and commercial banks in Sweden so far have the right to refuse to handle cash, as do retailers. All this despite studies in 2019 showing that 72 percent of the Swedish population do not want to go cashless (up 4 percent from the same study 2018).²⁹ At the time of writing, Sweden is contemplating legislation making it mandatory for commercial banks to accept and handle cash.

If cash were to be entirely replaced by digital payments with no central bank alternative, this would mean that all electronic and digital payment methods would be under private control.³⁰

Notably, commercial banks would still depend upon the central bank for risk-free settlement and clearing in central bank money, but without cash, the public would no longer have access to central bank money, while paying more to access the payments system.³¹ Cecilia Skingsley, deputy governor of the Riksbank, notes the example of the popular mobile payments system Swish, which is widely credited for helping to make Sweden cashless, but could not run “without the 24/7 support of the central bank run settlement and clearing facilities, or RIX.”³² Despite the support by the Riksbank, Swish can crash, leaving thousands of consumers without the possibility to pay, as happened in May 2019 during a popular football event.³³

Although central banks have not typically thought of physical cash as part of monetary policy proper (instead emphasizing formal monetary policy, such as interest rates and quantitative easing), they are beginning to focus more on cash, especially in their research on digital fiat accounts and/or currency as well as distributed ledger technology.³⁴ With these new technologies, physical cash has become the benchmark for all other forms of currency and payment.

Physical banknotes, Member of the Executive Board of the European Central Bank Yves Mersch has argued, “do not exist for their own sake” – that is, cash depends on constitutional and social values distinct from its profitability in the marketplace. However, cash, “as a medium of transaction... opens the way for the exercise of many fundamental rights – it costs money to live and money has to be earned.”³⁵ In this broader sense, cash might be conceptualized as a public infrastructure precisely through the multiplicity of uses and practices through which citizens and consumers access and preserve fundamental rights, goods, and resources.

Money design and central bank accountability to the public

“On the supply side, central banks play a pivotal role and ensure that money delivers on its three functions. For central banks, this role means two things. First, because they are accountable to the public, central banks must design the money they issue – and regulate private forms of money – in a way that satisfies the user needs stated earlier. Second, because they are public policy institutions, they must ensure that money also meets important social criteria:

- As a unit of account, money is an important public good that requires price stability in all economic circumstances. The design of money can favor or interfere with this goal. For instance, because cash pays no interest, central banks find it difficult to offer deeply negative interest rates following sharp recessions (more on this later).
- As a means of payment, money must be universally available and verifiable as well as efficient, while ensuring appropriate consumer protection and minimal cost to taxpayers.
- As a store of value, money must be as secure as possible, but it must also allow for efficient allocation of resources.

In addition, central banks will prefer forms of money that support, or at least do not undermine, three other public policy goals: financial integrity, financial stability, and monetary policy effectiveness. In turn, each of these further supports the three functions of money.”

Source: Tommaso Mancini-Griffoli, Maria Soledad Martinez Peria, Itai Agur, Anil Ari, John Kiff, Adina Popescu, and Celine Rochon, “Casting Light on Central Bank Digital Currency.” IMF Staff Discussion Note. November 2018. International Monetary Fund, SDN 18/08, p. 10-11.

<https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2018/11/13/Casting-Light-on-Central-Bank-Digital-Currencies-46233>

When people hold cash as national currency, they can assert claims upon states through participation in the market economy and through forms of national citizenship. And when modern states define the unit of account in the form of a physical unified national currency, physical cash constitutes a promise made by the state to all its money holders to secure current as well as future value.³⁶ In turn, money holders bind their future fates and economic fortunes to the stability and welfare of the corresponding national economies.³⁷ At a practical level, changes to cash require long rollout periods, public information campaigns, and public acceptance of new currency or currency redesign. We know from experience that digital formats change rapidly and digital data storage degrades; there is no digital form that has existed for more than seventy years, but we have book manuscripts from thousands of years ago.³⁸

Elisa Oreglia and Janaki Srinivasan's research among traders, fishers, farmers, and merchants in India and Myanmar underscores how demonetization and the undermining of cash infrastructures have consequences for trust in central banks and financial institutions as well as for long-term financial stability:

"Our research participants continue to favor old financial tools such as gold for savings and cash for transactions. Both have been in use for generations, and they symbolize a specific attitude towards time and trust towards the state and formal financial institutions. For example, the Indian demonetization in November 2016 explicitly pitched a cashless economy as its goal. While digital payments went up immediately afterwards, they fell once the new banknotes became available. Several of the advantages of using cash – its familiar form, near universal acceptance, easy retrievability, materiality, and room for negotiating through change – also resurfaced in the debates around demonetization. The sudden way the demonetization was carried out has also taken a toll on the relatively strong faith that Indians had in their banking system and the Reserve Bank of India, which regulates the sector. Drawing a

*comparison with the relatively frequent and occasionally much more dramatic demonetizations in Myanmar, we see that such changes have entrenched a deeply seated distrust of official financial tools and a strong tendency to differentiate savings, including some outside the reach of the state, and to put wealth into illiquid assets perceived as safer, such as land and gold. In both countries, therefore, demonetizations confirmed to certain segments of the population that the state was and is not a reliable financial counterpart. Such actions reverberate through time, and rhetoric alone is not sufficient to persuade the same people that the state is now concerned about their financial inclusion."*³⁹

Demonetization in India illustrates both the power but also limits of the state in canceling specific cash forms. In another vein, the euro "experiment" highlights the importance of cash for concretizing membership in a political union, especially in the sense that shared cash across member states allows for another layer of guarantee. A radical altering of the arrangement would require public deliberation and consultation, also in the political domain. In this sense, cash itself can be seen as a mediating, deliberative socio-political tool that is quite different from the euro as a digital accounting number alone.

Although cash is issued by states, it has the capacity to be autonomous from states in how people use it, store it, trade it, and give it meaning.

*"It is an intriguing fact that the availability of government currency provides protection against government intrusion itself."*⁴⁰

Pierre Lemieux
Canadian economist



However, it is important to qualify the term “government currency” since it applies only to physical cash (and not to CBDC). State-issued physical cash is a distributed public infrastructure that allows citizens and users to create a space outside the state while at the same time acting as a claim upon central banks and, ultimately, states to ensure good governance of monetary and payment systems.

While these qualities of cash have raised concerns regarding financial crime and illicit behavior, these concerns have been proven to be unfounded. As demonstrated in “*Keeping Cash – Assessing the Arguments about Cash and Crime*”, cash is no more susceptible to financial crime than any other financial tool.⁴¹ Multiple payment tools are used in evading law enforcement and to move value across jurisdictions, and digital tools are subject to abuse as much if not more than physical cash, while often entailing less transparency and exposing consumers to new risks. The EU came to the same conclusion after looking at evidence demonstrating there was no connection between cash and terrorism or cash and crime. It determined not to proceed with setting uniform cash payment limitations across its territory.⁴²

“All things considered, the European Commission came to the conclusion that ceilings on cash payments will not, as a rule, deter criminals from committing a criminal act, especially in the case of offences in connection with tax evasion or terrorist financing... The introduction of a ceiling for cash payments represents an encroachment

on consumers’ freedom to choose the method of payment and risks a possible loss of confidence in the currency on the part of the general public.”⁴³

In everyday finance, the independence of physical cash from the issuer and the capacity to keep it outside relations of control in the formal financial system, as well as in the household, is important for understanding the distributed qualities of cash. Many of the poor and marginalized could have bank accounts but choose not to because of the costs associated with maintaining an account and the unpredictability of fees.⁴⁴ Cash is also a form of power and autonomy, given that cash is universally accepted and can be used at discretion. People who receive government benefits via payment cards or other cashless means often have their purchasing decisions constrained. Not so with cash.

As a unit of account and a memory device, cash plays a crucial role as a physical accounting unit. The table on page 26 shows how just because cash is difficult to track does not mean it is absent from accounting. Instead, cash offers an alternative means of accounting in relation to digital ledgers and, crucially, a confidential or private means of accounting – unavailable to the eyes of the state or corporate actors who would seek to extract data from people’s everyday efforts to manage their money and finances.

Cash/Digital comparison*

TOKEN	ACCOUNT
<p>Physical cash Banknotes and coins denominated in a currency issued by a central bank, a series of denominations that make up a currency</p> <p>Issue – centralized; use – decentralized</p>	<p>Digital “cash,” plastic money, e-money Electronic version of central bank money deposited with commercial banks</p> <p>Issue – centralized; use – requires intermediaries</p>
<p>“Sovereign money – a claim on the central bank; outside money” (Camera)</p> <p>Public money</p>	<p>“Commercial bank money – a claim on public debt; inside money” (Camera)</p> <p>Private money</p>
<p>Distributed physical objects across time and space</p>	<p>Distributed immaterial objects or data across time and space</p>
<p>Leaves material traces, but these traces are independent of individual users</p>	<p>Leaves permanent traces that link user and transaction in time and space</p>
<p>Physical objects, which are money Money objects that can be used as money (official currency) or as something else (social earmarking: assigning particular meanings and uses to interchangeable banknotes or coins)</p>	<p>Immaterial objects that are not money, but facilitate value transfer</p>
<p>Can be exchanged directly, without intermediaries or supporting infrastructure</p>	<p>Must pass through a third-party intermediary, whether person(s) or infrastructures</p>
<p>Memory device – “requires separate act of account keeping” (Guseva and Rona-Tas)</p> <p>Traces are ephemeral – not easily linked back to users, transactors, savers</p>	<p>Memory device – “With plastic money, this remembering is digital and inseparable from money itself” (Guseva and Rona-Tas)</p> <p>Leaves a data trail that includes a host of details, from amounts, time and place of transactions, but also “preferences and routines of transactors themselves” (Dodd, cited in Guseva and Rona-Tas)</p>
<p>Physical cash can be folded, stacked, kept in physically distinct envelopes, jars, or hiding places, passed from hand to hand indistinctly with value hidden or ostentatiously with the value displayed prominently (cf. Guseva and Rona-Tas)</p>	<p>“Digital money is digitized information... It can be manipulated, moved, recategorized, analyzed and subjected to any mathematical function imaginable” (Guseva and Rona-Tas)</p>
<p>Spending cash is tangible – can help people keep track of spending, sets a physical limit and boundary</p>	<p>Spending with plastic or credit card money is less tangible, can be more easily disconnected from the funds actually available</p>

*Not included here are alternative/cryptoassets

Author’s synthesis with and inspired by sources: Camera; Dodd; Guseva and Rona-Tas; Maurer; Mai. (Sources in endnote) 45

2.3 Spotlight on central bank digital currency

Bitcoin and other cryptoassets try to reproduce in digital form certain features of physical cash, such as its direct exchangeability, privacy, and finality – but without a central authority issuing the money. For proponents, a decentralized ledger verified across multiple computers is understood to be a more democratic public form than central banks. However, as accounts-based digital systems, cryptoassets still require intermediaries, unlike physical cash. And although cryptoassets may be decentralized, they require both public and private infrastructures to operate, including substantial computing power, electricity, and other capital. There is also minimal regulatory oversight of cryptoassets and few consumer protections against hacking or financial loss.

As Gillian Tett notes, the use of blockchain bots on supposedly decentralized trading exchanges “shows the difficulty of ever trying to build a truly democratic marketplace – with bitcoin or anything else – in a world of accelerating (and unequal) computing power.”⁴⁶

Many analysts argue that bitcoin and other cryptoassets remain primarily speculative and that their value is too volatile for use as a ubiquitous medium of payment.

Central bank digital currency (CBDC) refers to digital forms of money issued by a central bank, though the phrase “digital currency” can be somewhat misleading, and is often used as an umbrella term for the various digital money and payment options that central banks around the world are researching and analyzing.⁴⁷ Currently, most central banks do not have plans to substitute physical cash for digital currency, cash being the only tangible access point between the central bank and the public (in all other respects, central banks deal directly with commercial banks and other financial institutions at a wholesale level).⁴⁸

Still, given that physical currency in the form of banknotes and coins makes up such a small percentage of the monetary base (about 10 percent) in the fractional reserve system, and given the declining rate of cash usage in the Northwestern world, many central banks and financial institutions are exploring the possibilities of digital fiat.⁴⁹ But as a number of analysts point out, this research remains highly conceptual, theoretical, and speculative, and there is little real-world empirical experience with the implications of a shift to digital money for central banks, commercial banks, and for domestic as well as global financial stability.⁵⁰

Even with the right design and characteristics of digital fiat and the right mix of regulatory oversight and legal backing, physical cash may not be completely replaceable. While much of the public discussion focuses on the potential benefits of a complete shift to digital in the future, analyses looking at the uncertainties of an all-digital system are shining a light on the unique features of physical cash.

Some central bank researchers have talked about the “unit of account” function of money as a public good and the use of public money (regardless of the object or form) as a public good – by which they mean public money’s “capacity” to be used in universally accessible non-excludable ways – as well as the entire “cash infrastructure” as a public good.⁵¹ Within these discussions, the benefits of the cash form are highlighted, though it is also suggested that what matters most is the publicly defined unit (or universal standard) of account, which could take either (or both) physical or digital forms. A small minority point to the important distinction of a money token as having a physical form (cash) with a digital token essentially referring to a “data object” or an accounts-based entry/ledger function.⁵²

“Money first appeared as an accounting unit for the purpose of record keeping. Goods were valued and priced in these units, and only later did some of those goods become used as mediums of exchange.”⁵³

Aleksi Grym

Bank of Finland

“One could therefore argue that money is always scriptural, and that money is inherently a unit of account. Currency, in the form of coins, banknotes or other physical objects, can be seen as a physical manifestation of the unit of account. Physical currency would then be just another way to keep accounts, a more tangible form of bookkeeping. Out of the three basic functions for money, therefore, it is the unit of account that is arguably the most fundamental.”⁵⁴

By highlighting the primacy of money as a unit of account, Aleksi Grym underscores how physical cash uniquely combines accounting and payment functions, noting: *“the handling of physical objects to keep accounts is simple and intuitive and therefore still widely used today.”⁵⁵*

A number of design considerations inform discussions about whether central banks should issue a CBDC. Should it be token/value-based or should it be account-based? Would it be available to ordinary citizens/consumers (“retail”; a digital token or account held directly by citizens with the central bank)? Or would it be implemented at the wholesale level only (in the form of reserves held by commercial banks with the central bank, used for interbank transfers, for example)? For members of the public, would the experience of a CBDC be much different from current electronic payment forms? Would a CBDC feel different from faster payments or an account with a commercial bank?⁵⁶

The impact of retail CBDC on overall financial stability and the division of labor in the current monetary system are open questions. If account-based, and depending on central bank e-money bearing interest, would this create competition with or negatively impact deposits with commercial banks?⁵⁷ Would central banks be in a position to offer more competitive options than commercial banks? Would consumers prefer to hold their accounts with the central bank rather than commercial banks, and how would this impact the cost of loans and access to credit?



In particular, if the general public had access to a retail CBDC, would they transfer their money from commercial banks to the central bank in times of financial crisis? Would restrictions need to be set on CBDC accounts in terms of value or set limits for transferring funds in or out, and would restrictions or limitations in fact undermine trust in a digital fiat money?

Would the central bank need to institute and control its own payment system, or would it use existing payment systems? This could offer another public payment infrastructure that could act as a failsafe in times that private infrastructures are down or disabled, providing redundancy. But it would also be potentially expensive to maintain, and the use of tax revenues to stay competitive with private options could undermine central bank independence and create political and social tensions.⁵⁸

There are also questions regarding interoperability within and between payment systems, domestically and internationally (cross-border payments). In contrast to cash, which anyone can access without the need for an account or identity documents, digital fiat may be less inclusive, depending on the design and legal specifications.⁵⁹ Digital currency, whether token – or account-based, requires some form of intermediary for every transaction, and anonymity and privacy cannot be guaranteed. Depending on the specifications, universal access may not be possible, or it could be potentially compromised in a way that it cannot with physical cash.

In addition, analyses of cash in relation to the potential characteristics of CBDCs affirm the threshold properties of physical cash: that cash is a barrier or a floor to the removal of the zero lower bound as a monetary policy tool.⁶⁰ Cash acts as a guarantee that citizens can exercise their right to determine how they store wealth and how they make decisions about spending and consumption in their economy.

Table 2: Possible characteristics – advantages and disadvantages

	ADVANTAGES	DISADVANTAGES
Extent of anonymity (Partial is also possible)	Full Anonymity	
	Maintains privacy, similar to cash. Enables issuance without keeping detailed information at the central bank.	Presents technological and legal challenges, since it is not consistent with the effort to reduce illegal money and money laundering.
	No Anonymity	
	Helps in reducing the shadow economy. Enables the collection of statistical information for decisions made by the central bank and various government agencies.	Negative impact on privacy. Requires the keeping of detailed information by the central bank or an agency on its behalf.
Does it bear interest?	Not interest bearing	
	Similar to cash. Used as a means of payment and maintains the ability to be used as a unit of account.	Will make it hard to set a negative interest rate on deposits since it would be easier to move to it than to cash. Its risk is lower than the risk of an interest-free deposit at commercial banks, so it creates some competition with them.
	Interest bearing	
	Can be an additional tool for monetary policy makers, particularly in setting a negative interest rate (on condition that there is no cash alongside it in the economy).	Creates more significant competition for the banks in the area of deposits, so it may have a negative impact on the stability of the financial system. The central bank becomes an intermediary. It should be examined whether it would also offer credit. If yes, it would need to build complex mechanisms to assess and monitor risk. Loses the basic quality of cash – fixed (nominal) value. As long as cash exists, a negative interest rate for the digital currency cannot be set.
Method of issuance	Balance-based	
	Enables full identification of holders and transactions.	Requires that the central bank keep detailed information. This can be done through agents or intermediaries. It will be necessary to examine who the agents would be – the public sector or the private sector, the banks, or other entities.
	Value Based	
	Enables a greater extent of anonymity to be set.	Does not enable the payment of interest, and cannot be used as a monetary tool. May be less secure in maintaining value.
Technology	Distributed DLT system (closed network with a role for the central bank)	
	A more resilient system against attack. Makes it easier to coordinate between various entities.	The technology is still not sufficiently mature and stable. The technology may change in the future, which would require significant adaptation of the systems.
	Central Ledger	
	Known technology. May have a current advantage in making transactions and transfers.	The technology may become outdated. Makes it difficult to coordinate between various entities. Easy to attack the system since just one failure point is sufficient.

Note: In outlining the potential advantages and disadvantages of CBDC design, the authors of the Bank of Israel Report start with the premise that cash will continue to exist alongside a CBDC – p. 17. According to the report, in Israel cash in circulation and usage continues to experience an upward trend and remains central to consumers’ transactional practices and preferences – p. 18-21. The authors also assume that the use of negative interest rates would be considered an advantageous monetary policy tool, in contrast to the arguments advanced in this paper.

Advantages and disadvantages of CBDC, depending upon design.

Source: Characteristics of CBDC, Bank of Israel, Report of the Team to Examine the Issue of Central Bank Digital Currencies, November 2018, p. 32.

<https://www.boi.org.il/en/NewsAndPublications/PressReleases/Documents/Digital%20currency.pdf>

There are fundamental political questions that central banks would need to address in designing digital currencies, such as who would be eligible to have an account with a given national central bank or hold a sovereign digital token? Agustin Carstens, General Manager of the Bank for International Settlements (BIS), commented at a Brookings Institution event, “For example, today, I have in my wallet some U.S. dollar bills and I’m Mexican and the U.S. government doesn’t mind that I have U.S. dollar bills. I don’t know if the U.S. government will be happy about me having an account with the Fed. So, you know, there are issues that you have to think about.”⁶¹

In recent discussions of central bank research into digital currencies and distributed ledger technology, some central bankers and research experts within central banks have argued that maintaining the cash infrastructure is critical for making public money and payment systems resilient in the digital age.

“The mandate of most central banks is to create resilient payment systems. And resilience means different types of technology being deployed as fail-safes if and when the other thing fails. Don’t make your secondary system look like your primary system. Disaster recovery [requires resilience], finally, what if the power goes down? Paper – perhaps this march towards cashlessness needs to be rethought through. It’s actually pretty scary to go fully digital. It’s not a good thing for resiliency, because all you’d need is for the lines to go down, the power to go down and suddenly no one can pay each other and that’s not a good thing. So having some form of cash, keeping it warm. Even if you have cash in the country, if no one is using it and no one holds it, again that’s not resilient because sure the mechanism exists but no one has it in their pocket. So you need to kind of feed all of these things to sustain a really resilient system where people can pay each other all the time.”

Antony Lewis,
Director of Digital Assets at R3⁶²

“If we are not credible as central banks, we are done. We are out of the business. It all depends on which model is trustworthy, where you have the bulk of the population trusting that model vs. another model.”

Patrick Njoroge

Governor, Central Bank of Kenya

“So I don’t see it more as a technology issue, it’s really about how much trust we have in a particular model that comes forward. There are three directions of trust 1) technology, 2) concerning money, don’t want there to be fraud in it, 3) extreme situations. In extreme situations, power goes down and you still need to transact. What may have been a brilliant solution in a particular state of nature, where there is electricity and all these other backups, the trust element has to be not just by 99 percent of the population, it has to be virtually 100 percent of the population. And that’s why in my view this sort of old fashioned currency has sticking power – because of the trust element, particularly in the extreme cases.”

Patrick Njoroge,
Governor, Central Bank of Kenya⁶³

These examples show that the key to maintaining cash as a public good is fostering cash usage throughout society as a complementary and unique payment form – that is, to treat cash as a public infrastructure.

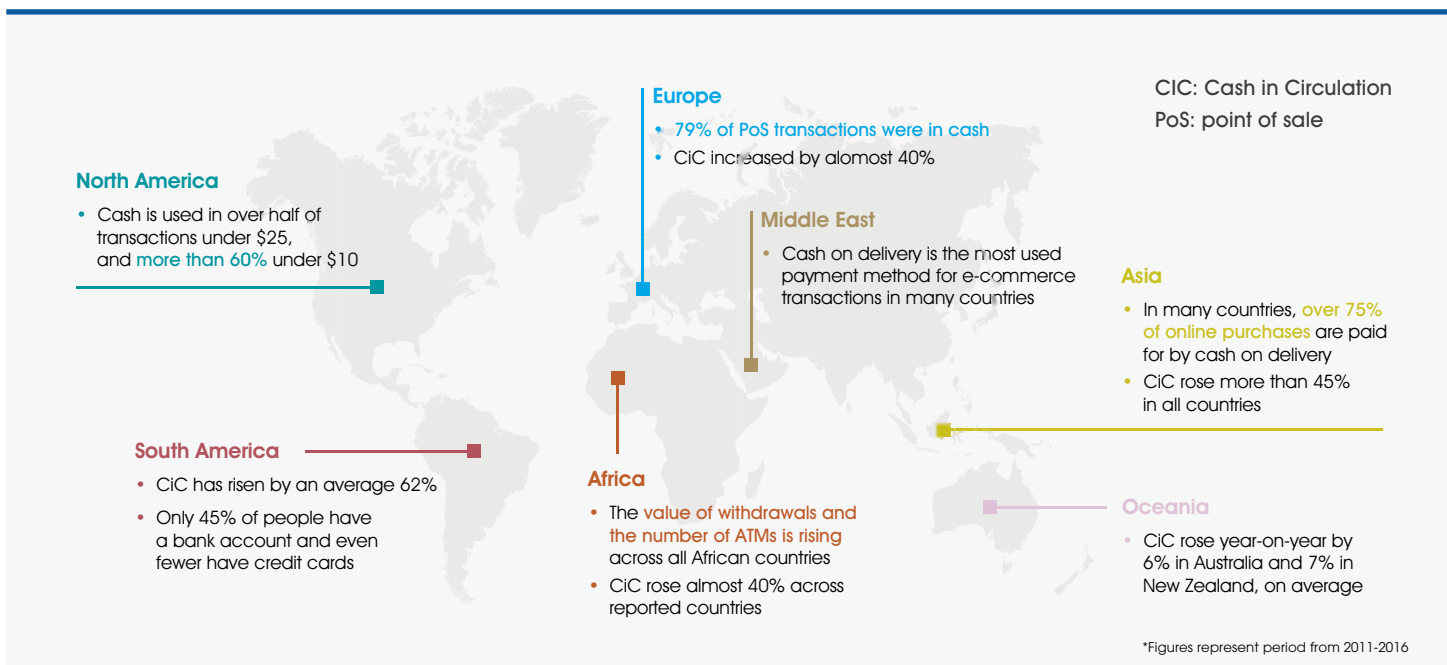
3.0 The Endurance of Cash Usage in the Payments Landscape

Contemporary debates about cash and cashlessness assume an all-or-nothing approach. When we look at payment in the real world, however, we almost always see people making diverse payment choices, using specific forms of money for specific kinds of transactions, and people use one form to complement other forms.

Despite the prominence of evolutionary assumptions that cash will be entirely replaced by digital currencies, the empirical evidence tells a different story. Money forms have tended to coexist rather than replace one another.⁶⁴ Cash will surely continue to coexist with other payment forms. However, if the use of cash declines in relation to multiple competing options, cash can only successfully coexist if access to cash and the stability of the cash infrastructure are supported and maintained as a public good.

Research on cash payments is growing, particularly since the recent EU consultation on cash payment limitations and thresholds, but also due to the growth of cash in circulation. Central banks, the payments industry, and researchers from a variety of fields are analyzing the composition of cash and electronic payment transactions. As new reports and studies show, cash makes up a large share of payments at the point of sale in developed as well as emerging markets. According to the G4S World Cash Report for 2018, “Cash remains the most widely used payment instrument in the world and on all continents.”⁶⁵ In 18 of 24 countries where payment diary surveys⁶⁶ have been conducted by central banks, cash makes up 50 percent of all transactions, and “demand for cash is increasing globally, based on the rising value of ATM withdrawals and currency in circulation, both in absolute value and relative to GDP.”⁶⁷

Figure 1: Cash is the most widely used payment instrument in the world on all continents, and the most efficient.



Source: “Cash Usage Worldwide 2018.” G4S World Cash Report for 2018.

<https://www.g4s.com/media-centre/news/2018/04/17/global-cash-report>

As the G4S study affirms, “Both cash and non-cash payment instruments fulfill unique needs, and as long as these needs do not change, both types of payment instruments are required to meet the full spectrum of users’ needs.”⁶⁸

The interplay between cash and other payment instruments takes on further nuance in consumer and household payment studies. Though diverse in scope and methods and therefore not always easily compared, some general findings of these studies include:

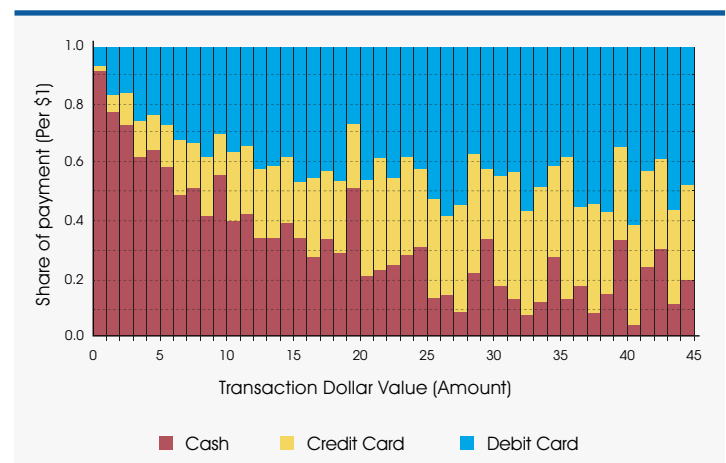
- Cash as a medium of exchange is essential around the world for making payments, with a special focus on small-value payments.
- Cash as a store of value is essential for savings practices, financial budgeting, and diversifying risk.⁶⁹ Many currencies, in particular the US dollar and the euro, are used as a store of value outside the territories of their issue and jurisdiction.
- Cash in the form of high-denomination banknotes is used in daily financial life for consumer transactions, gift exchanges, and savings. In Europe, this is especially true for certain countries (in Germany, Austria, and Switzerland, cash usage, including transactional use of high-denomination notes, is greater than in the Netherlands, France, or Sweden).⁷⁰

One of the most important studies on cash payments in Europe to date, “The Use of Cash by Households in the Euro Area,” shows both the predominance as well as diversity of cash payments in 17 countries in the euro area.⁷¹ The study tracked point of sale transactions and ATM withdrawals and combined survey and payment diary research. Payment diary participants (residents of euro area countries who were 18 years or older) were asked to keep a diary of all of their payments for one day.

According to the study, cash made up 79 percent of payments at the point of sale and 54 percent in terms of the value of transactions. At national levels, cash usage varied a lot, which underscores that there is no one-size-fits-all approach to cash; a policy moving away from cash in the euro area would have an uneven and detrimental effect on the day-to-day financial lives of European consumers.

In the United States, Oz Shy has used payment diary data to analyze how ATM denominations impact the choice to pay with cash or card at the point of sale.⁷² Using statistical analysis of ATM cash withdrawals, Shy established that the denominations available from the ATM have an impact on consumer payment choice. Specifically, the availability of the US \$20 bill – often the only denomination consumers can access when making ATM withdrawals – influenced the payment threshold values at which people would select cash or card. “100 was the most frequently withdrawn amount, followed by 40, 20, 60, and 200 in this order. All these amounts are multiples of \$20.”⁷³

Figure 2: Share of use of cash, credit, and debit cards by each payment; dollar amount up to \$45.



Note: Unequal spacing between each \$1 reflect relative number of payments at this amount.

Source: Oz Shy, “How the ATM Affects the Way We Pay.” Federal Reserve Bank of Atlanta. Working Paper 2019-02, p. 18.

<https://www.frbatlanta.org/-/media/documents/research/publications/wp/2019/02-how-the-atm-affects-the-way-we-pay-2019-02-25.pdf>

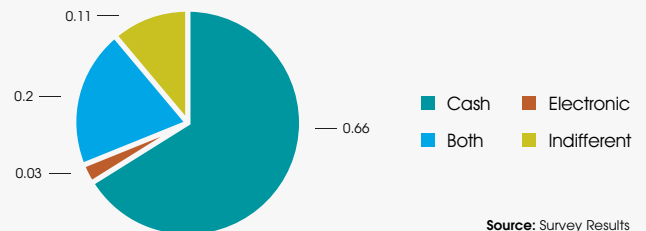
Shy determined that *“the ATM currency denomination affects payment choice of all consumers even in days when consumers do not withdraw cash from an ATM.”*⁷⁴

*“We can think of the \$20 ATM currency denomination as influencing payment choice of consumers who rarely withdraw cash from an ATM in the same way (if not more) than consumers who frequently withdraw cash from ATMs.”*⁷⁵ A primary reason for this, according to Shy, is that the threshold for switching from cash to card correlates with the relative amount of change a customer would be handed back.⁷⁶

In a very different context, experiences of currency instability intensify preferences for physical cash over electronic methods. Sakarombe and Marabada’s research with a representative sample of 200 respondents in Harare, Zimbabwe, found that, despite experiences of liquidity crises and hyperinflation, people still trusted cash more than e-money.⁷⁷ In particular, many perceived the promotion of e-money by the Reserve Bank of Zimbabwe as *“mere manipulation of the public to deposit money in banks in order for the government to make use of the money.”*⁷⁸ In a context where state and private financial institutions have proven to be untrustworthy, people prefer to keep their money outside the banking system in cash, at *“home where they can see it every day and make use of it whenever they wish to.”*⁷⁹

Figure 3: Preferences on the medium of exchange

The preferences concerning the form in which money should exist was questioned. It was found that most people prefer cash to other forms of money. The reasons were associated with the market conditions existing in Zimbabwe. 66% prefer using hard cash, 20% preferred both, 11% were indifferent between the two and only 3% supported plastic money. In such a situation where the monetary authorities are encouraging a cashless society, only 3% would be pro the policy.



Source: Survey Results

Source: Survey Results

Reasons for preferences: cash to plastic

Reason	Frequency
Easy to manage	72 (55%)
Cash is not subject to bank charges and transaction charges (PoS charges)	130 (98%)
Holding cash gives satisfaction	123 (93%)
Not all transactions allow plastic/electronic money	132 (100%)
Electronic money is subject to network facilities which may drop	92 (70%)
Inflation may erode the value of money whilst in banks	125 (95%)

Zimbabwe: Preferences for Cash. Source: Upenyu Sakarombe and Namatirai Dziva Marabada, “Electronic Money or Cash? In Face of Liquidity Crisis in Zimbabwe.” International Journal of Academic Research in Business and Social Sciences. 2017, Vol. 7, No. 11, p. 69.

http://hrmars.com/hrmars_papers/Electronic_Money_or_Cash_In_Face_of_Liquidity_Crisis_in_Zimbabwe.pdf

In Northwestern markets, it is primarily low-value payments in cash that are viewed as barriers to digital payment adoption. However, if one is using cash to limit spending, then it makes sense that low-value payments are often made in cash. That is, overspending with digital payment methods may occur if people lose track of multiple small amounts; cash could be a means of preventing that. Cash payment studies don't make this connection since they don't ask why people are using cash for small-value purchases. This could be the basis for further research. Important, too, is the relationship of cash to debit cards. Some studies group credit and debit together under cards, but debit is closer to cash, while credit implies debt. These perceptions are not captured in the idea that payment tools are interchangeable.

Low-value payments are important for other reasons, such as making visible how new payment forms seek to channel payment "choice" in ways that are prompted by payment providers, especially in the promotion of contactless payments. Brett Scott observes that small transactions are not only "a vast untapped data frontier" but also a new source of data that folds people into digital networks at the expense of cash:

"You can do very fine-tuned profiling of people if you watch their interactions so the big breakthrough of digital payment companies is contactless payment systems where you can basically do very fast, very small transactions, so the contactless payments stuff is the big frontier for the small-scale data because you can approve contactless transactions without having to contact the bank first. This is why the big tech companies are making plays into this space. I guarantee you that FB will start creating their own digital payments infrastructures using messenger and WhatsApp and existing infrastructures to harvest their own payments data. If you want to see what a person acts upon in society, actually put your money where your mouth is concept, what they actually do, watch their payments data."⁸⁰

Indeed, Facebook is looking at a Facebook currency, a cryptoasset or "global coin", which, according to media reports is to be called "Libra", available to all its users in 2020. According to Facebook, Libra is to be a "global currency and financial infrastructure".⁸¹ It is backed by

so called "founding members" from a variety of industries, among them Mastercard, PayPal, PayU (Naspers' fintech arm), Stripe, Visa, Lyft, MercadoPago, Spotify AB, Uber Technologies, Inc., Vodafone Group, Anchorage, Xapo Holdings Limited, Andreessen Horowitz, Thrive Capital, Union Square Ventures, plus "nonprofit and multilateral organizations, and academic institutions" such as Mercy Corps or Women's World Banking.

The questions that a parallel currency poses, available on a global scale to one third of the human population, are huge. What impact would Libra have on existing monetary and financial systems? Trust is one of the most important characteristics for a functioning currency and financial and economic system.

Who would safeguard protection of data and privacy, especially looking at a company that has been known for its untrustworthiness in the past years with regard to the rights of its users, to privacy and the protection of data?

How will Facebook guarantee security, both with regard to hacks and to money laundering? What do we make of a cryptocurrency that is run by a consortium consisting mostly of private market participants, interested by definition mostly in maximizing their profits? And how is individual independence and freedom maintained in a set-up where Facebook is the sole issuer of a "global currency"?

4.0 Design and Denomination: the Role of Cash in Social Practices

A design-oriented approach to cash – that is, attention to cash as a physical form of money in the broadest sense, inclusive of currency design as well as cash usage – can offer insight into the unique qualities of cash as distinct from as well as complementary to digital payment tools.

Research at the intersections of mobile money, digital finance, and traditional monetary forms has explored the benefits and challenges entailed in new payment technologies. In particular, with the introduction of mobile money, industry providers competing for market share and scalability for new financial tools turned to use cases and design questions to better understand user experiences and reasons for, as well as barriers to, uptake of new digital products. Qualitative research on situated user experiences of these new technologies led IMTFI researchers to pay greater attention to the distinct features of cash, especially in cases where users continued to prefer cash over digital payment tools.⁸²

Reflections on the nature and capacities of the cash form are often spurred by cross-cultural encounters with different national currencies or the use of multiple currencies within a country. Financial breakdown due to global events or poor monetary governance at the national level of official currencies are also key moments when people reflect on the nature of money, such as re-denomination in Ghana and Zambia, dollarization in Ecuador, or, as mentioned earlier and in one of the case studies, demonetization in India.⁸³ Cash infrastructures and the distributed nature of cash as a collective social form are uniquely palpable in new monetary arrangements of state-issued currency, as in the case of currency unions (such as the euro) or monetary reforms (demonetization or re-denomination). Because these new arrangements entail technological and/or

political changes to the unit of account that everyone uses, people become cognizant of the infrastructural arrangements of cash that are typically in the background.

Physical money tokens are an ancient technology that has coexisted with the emergence of new payment technologies over time.⁸⁴ Use of physical tokens is deeply embedded in financial behaviors and the performance of specific cultural practices where visibility of the money form is central for symbolic and practical purposes.⁸⁵ Cash in the form of state-issued currency is encoded with a variety of properties that ensure its quality, security, machine-readability, and durability in the cash life cycle. Security features, jurisdictional and legal inscriptions and signatures, raised print for the visually impaired, and other quality features are embedded within the cash object, which can be made out of a variety of materials, such as cotton, polymer, copper, and other alloys. Serial numbers ensure that every banknote is unique and at the same time uniform within a series.

A wide range of interdisciplinary studies, as well as policy research, have demonstrated that for many people, physical cash denominations are an essential budgeting tool as well as a means of teaching children critical skills in numeracy, mathematical reasoning, and financial literacy.



With the rise of cashless and contactless payments, studies show that consumers often overspend and that school children increasingly have little to no experience in handling physical cash. As Jennie Golding recently argued, the absence of interacting with physical cash means that many financial concepts are difficult for students to understand, demonstrating once again the often taken-for-granted influence of cash in shaping the financial and economic world around us.⁸⁶ Golding found that children also struggled to grasp a variety of concepts, from taxes, budgets, and loans to the use of spreadsheets and calculated expenditures.

*"So what did we evidence that so challenged me? First, I observed Year 3 (seven to eight-year-old) children using plastic coins to model transactions that included 'finding total cost,' 'giving change,' and working out different ways to 'pay for things.' The resources were well-designed and the teaching sound. It worked well for some children. However, about half the class had significant difficulty – apparently because they had little familiarity with the use of coins, or conception of the 'equivalence' of different combinations, or of the notion of 'change.'"*⁸⁷

In the United States, National Public Radio's Paul Solomon interviewed children in New York about their experiences of cashless culture.⁸⁸ While the children still encountered cash and showed a keen awareness of calculating prices based on cash denomination values, some described a very different experience when it came to spending money in apps or games.

One girl described using game money this way: *"I feel like it's just like, click, click. It's just not real money."* Often, minors click to purchase without realizing they have signed up for a subscription that is then regularly charged to their account.⁸⁹

According to Solomon, *"Facebook came under scrutiny earlier this year when documents revealed it made more than \$34 million from in-app purchases made by minors."*⁹⁰

Designers of digital payment applications also highlight how the qualities of cash that are incorporated into people's social practices and repertoires of cash usage should be translated into a digital interface. For example, Woldmariam et al. describe the importance of physical cash in rural Ethiopia for expressing hierarchy, obligation, or generosity through the display, concealment, or refusal of cash in the act of giving or transacting and in how cash is handled, folded, bundled, embraced, or pushed away.⁹¹ The materiality of money is important for practices where physical cash is used as a signal to reject a gift or payment, in practices of labeling, and when cash bundles are physically separated based on source and purpose.⁹²

Culturally and historically, then, cash denominations express different cultures of payments and notions of value (both social and economic), and they are given meaning through a variety of usages and contexts. As Woldmariam et al. note: *"From the viewpoint of an individual's practices, physical money is not homogeneous like digital money, but heterogeneous. It gets its meaning from its context and has different uses based on its different contexts. Its use, allocation, and treatment are all highly related to an individual's social, cultural, and religious practices."*⁹³

In many contexts, people have come to trust in value that has a physical form. In Ghana, for example, mobile money was slow to take off because its immateriality was viewed with suspicion. Dzokoto and Aggrey write: *"Traditional Ghanaian culture puts value on the form in which some payments are made. Apology pacifications may require a sheep, for example, and wedding bride prices come in the form of cash AND a variety of other goods."*⁹⁴ Cash is seen as reliable: *"If one rolled up one's cash and kept it in a bra, tied it in the corner of a cloth, or kept it in a repurposed plastic or tin container, one knew where it was at all times, and could access it easily. Intangible e-value was just too... intangible."*⁹⁵

4.1 Denomination as a specific manifestation of physical cash

Denomination is a *"hinge between money as a material form and money as a system of value or representation."*

⁹⁶ Cash has particular shapes, colors, sizes, numeric face value – all elements of cash design. Money is, in this sense, always a relative value, and denomination is a particular design feature associated with physical cash. The existence of physical cash denominations acts as a boundary or threshold in the formation of prices and other practices of commensuration and scale making. Physical denominations are designed to facilitate translations between price, payment, and making change.⁹⁷

The social and economic life of particular cash denominations also points to the unique *"design"* qualities of physical cash, and these can figure prominently but also differently in people's financial practices. Sometimes, it is only the right combination of notes or coins to pay the purchase total that may matter. At other times and in other contexts, particular denomination notes are needed, such as in gift giving or celebrations.

Certain denominations may have special significance in national debates, such as the US \$20 bill in the grassroots movement to put a woman on US currency by 2020, where issues of gender equality in pay as well as historical recognition of racial and social inequality have been at stake. Harriet Tubman, American abolitionist and former slave who helped countless slaves to freedom on the Underground Railroad, was the woman elected to be on the new US \$20 note, replacing US president Andrew Jackson, a slave owner and architect of the 1830 Indian Removal Act. In response to the US Treasurer's May 2019 announcement that the new Tubman design would be delayed until 2028, new grassroots efforts to stamp existing 20's are growing.⁹⁸ New York designer Dano Wall created a 3-D stamp of Tubman that can be superimposed over Jackson.⁹⁹ This power of the \$20 bill in the United States becomes all the more salient when considered against the backdrop of Oz Shy's study, mentioned earlier, on the impact of ATM denominations on cash payment thresholds.¹⁰⁰

The value of a particular note can also be practically significant, such as when the new Europa series 50-euro note represents the preferred value for marking life events or as a denomination of choice when traveling. For international communities, the US \$100 bill is recognized the world over; whether it is physically present or not, it can animate people globally to think about the relationship between money, value, and power (for example, see the BBC episode *"What would you do with \$100?"*).¹⁰¹

What is denomination?

Denomination refers to specific and physically distinct units of value within a currency system (money of account), represented by banknotes and coins that together make up the universe of value arrangements in a given state-issued money. Denomination can also refer to the difference between state-issued currencies, which index territorial boundaries of issuance and use. Cash in the form of currency denominations held within as well as outside the territory of the issuing state is subject to seigniorage, a source of profit for the issuing central bank that can then be transferred back to the state. In this sense, fees associated with state-issued currency are conceived of as contributing to the larger public good, especially in times of high interest rates. Both the US dollar and the euro are used as the official currencies of nation-states outside the territorial and jurisdictional spaces of issue (e.g., dollarization in Ecuador, El Salvador, Panama; euroization in Serbia, Montenegro, Kosovo, Albania).

Denomination might be a notation in a physical or electronic ledger, but when applied to physical cash, it always refers to a particular currency or money of account. Whether we are talking about digital accounting or material cash, money is always "denominated" in terms of a particular currency – in other words, particularized in a unit of account tied to territories and nation-states.

5.0 Case Studies

5.1 Puerto Rico – Cash as failsafe

In the immediate aftermath of Hurricane Maria, Puerto Rico became a “100 percent cash economy.”¹⁰² Extended power outages across the island made it impossible for people to use card or ATM networks. Only those who already had cash on hand could continue to make payments in the emergency. The Federal Reserve Bank of Atlanta ensured that sufficient cash was flown in following the storm. In an interview for National Public Radio, Amy Goodman, head of the Atlanta Fed’s cash operations, described the role of the Fed in ensuring that sufficient high-quality currency is available domestically and abroad, especially in moments of crisis:

*“Cash becomes king during any type of contingency situation, because it can be used even when power outages occur or electronic systems fail. It’s ubiquitous, it’s readily accepted, anonymous, works well in emergencies, and it could be used by all ages. Because of this, demand for cash soars in the lead-up to a crisis and in its aftermath. For example, with hurricanes Harvey and Irma, peak Federal Reserve Bank payment volume was nearly five times greater than normal, as compared to the prior 30-day average leading up to those events. When the crises abated, the money flowed back to the Federal Reserve Banks, creating extremely heavy receipts to be taken back in and processed. So these events definitely have a dramatic impact on cash.”*¹⁰³

Goodman talked about the effectiveness and dedication of staff members who worked long hours and dealt with numerous logistical challenges in response to the series of storms that hit Texas, Florida, and Puerto Rico. Because a large share of US currency in circulation is held outside the country (more than two-thirds of cash in circulation globally, according to Goodman), without the crisis preparedness of the Fed, there would be insufficient cash within the US with which to make transactions when disasters strike.¹⁰⁴

The Bank of Mexico is also exemplary in disaster management. When the banking infrastructure collapsed, as in the fall of 2017 after two separate earthquakes devastated different regions of Mexico, including Oaxaca, Chiapas, and Mexico City, the bank was prepared. It supplied banknotes in different denominations as well as cash modules installed within 24 hours where customers could withdraw cash free of charge.¹⁰⁵

These examples show how cash is itself a vital infrastructure for bridging the gap when critical electronic and IT infrastructures fail. Cash is indispensable for making essential payments and for accessing necessary goods and services when disaster strikes.

5.2 United Kingdom – Cashless payments bring new work

A mixed-methods study on the introduction of cashless payment to London buses in 2014 offers an important vantage point on some of the qualities of cash, especially since many cities have been switching to cashless payments for public transport.¹⁰⁶ Researchers Gary Pritchard, John Vines, and Patrick Oliver followed the process prior to, during, and following the introduction of the new system by Transport for London (TfL), which entailed the elimination of cash in favor of contactless payment via a pre-loaded card (Oyster). Interviews and field research with bus drivers on their routes, as well as interactions with passengers and analyses of online forums with public comments at the time of the introduction, enabled a variety of perspectives on the issue.

The study found that much of the work of communicating the impending change fell on the bus drivers; advertisements and announcements were not always taken in by passengers, and drivers worried that non-English-speaking tourists would not be prepared for the switch. Drivers perceived the coming changes as beneficial because they would make the payment process more efficient during boarding and exiting of the bus, would eliminate the need for drivers to act

as cashiers, and would reduce the time and labor of interacting with passengers. At the same time, the change brought new concerns about situations where passengers would board the bus with an empty or absent Oyster card. Vulnerable populations, such as the elderly and children, or unwitting tourists shifted the labor of bus drivers from taking payments to making complex decisions about when (and for whom) to make exceptions for people who could not pay with their card.

“Giving leeway” was far from straightforward and often involved allowing passengers to ride for free rather than denying transit, as regulations required. Some of the flexibility of cash was lost because the new policy stated that all passengers must possess a physical Oyster card, meaning that a passenger could no longer pay for another person’s ride using their card, as had always been possible with cash.¹⁰⁷ Passengers felt that their ability to choose was restricted and that the state’s ability to track their daily travel routines or sell their data increased the potential for unwanted surveillance. Online comments indicated that cash allowed people to budget and keep track of their available finances for transportation, and a paper ticket acted as *“a receipt and record of expenditure,”* whereas with the card the danger of



overspending one's balance was greater and could mean finding oneself without the necessary funds to complete a trip, especially without access to top-up options after-hours or in certain parts of London.¹⁰⁸

The authors of the study point to the infrastructures necessary to making "efficient payments" work:

*"The narrative surrounding the everyday nature of cashless payments ignores the great amount of work and hidden labour involved in its maintenance and use. While it is not unusual for the hidden labour of employees as a result of new technologies to be highlighted... in this case it was the passengers who had to place considerably more effort into the production of this system. There is now a greater need than ever to ensure their Oyster is with them at all times and has sufficient credit to complete journeys."*¹⁰⁹

With the switch to contactless payments, Oyster card usage has declined, and "money trapped on dormant Oyster cards amounts to £321m, a princely sum that has effectively been loaned, interest-free from the public to TfL. This 'mountain of cash' exists as credit on cards that haven't been used for at least a year – either lost, damaged, abandoned, or stashed away."¹¹⁰

Bernardo Batiz-Lazo & Prachandra Shakya

In an intriguing postscript to this story, Bernardo Batiz-Lazo and Prachandra Shakya describe how further shifts in how people pay for London transit has led to an enormous sum of unused money sitting dormant on Oyster cards.¹¹¹

These unclaimed funds represent an unprecedented potential windfall for the TfL if consumers fail to claim them. Indeed, the unspent remainders of digital balances raise the question of who "owns" these funds and whether the work of tracking down the owners of these remainders will be undertaken at all. According to London assembly member Caroline Pidgeon, "The total amount left on dormant Oyster cards is soaring, almost certainly in part due to the increasing number of people who have switched to contactless payment. TfL never stops bombarding us with advertisements and information campaigns, but highlighting this cash mountain is one issue that they remain incredibly quiet about. It is time TfL devoted far more time and energy telling the public how they can get their own money back."¹¹²

As Batiz-Lazo and Shakya point out, "TfL has no financial incentive to persuade the public to withdraw their balances."¹¹³ One option would be to impose a deadline after which consumers would no longer be able to access remaining funds. But given the tiny balances on individual cards, it is an open question whether it is worth people's time. This example shows that the shift to cashless systems does not necessarily mean that payments become more efficient in the long run and that competition between cashless payment options may be greater than between cash and digital. Moreover, these options may offer less stability in terms of recourse or access to one's money in the event of rapid changes.

5.3 India

– Demonetization and its lessons

By many accounts, Indian Prime Minister Narendra Modi's demonetization of the two largest banknotes, 86 percent of the value of notes in circulation, failed to deliver on its promise to catch money launderers and tax evaders while rooting so-called black money out of the system. Official estimates indicate that 99 percent of the notes were returned to the banking system. As some analysts have pointed out, the idea that black money would be held as savings in banknotes was flawed. Chandrasekhar and Ghosh write:

*"The attempt to flush out black money was based on the mistaken notion that such black money constitutes a stock of currency wealth rather than a continuous flow of illicit or quasi-legal transactions, and that those holding such currency stocks would not dare to return them to banks for fear of being caught."*¹¹⁴

C. P. Chandrasekhar & Jayati Ghosh

*"In the event, such optimism proved to be completely misplaced, as the RBI (after spending an inordinate amount of time – nine months – 'counting the received notes') admitted that 99 per cent of the notes had come back into the banking system; much of the remaining 1 per cent was currency held in Nepal and with co-operative banks that had yet to be counted. Meanwhile, the new notes proved just as susceptible to counterfeiting, as they had no additional security features, and there appeared to be no obvious impact on the incidence of corruption – most of which probably did not involve cash transactions in any case."*¹¹⁵



The primary effects of demonetization were negative, especially on the lives of the poor, with rural and low-caste women disproportionately affected. Many of these women, because of India's patriarchal structures, do not have a bank account, and deal only in cash. Because physical cash can be hidden and stored away and leaves no visible traces when it is spent, it allows for privacy within the household that joint or even separate bank accounts do not. Demonetization forced these women to reveal to their husbands the savings they had stashed away for household needs, such as food, children's education, ritual and gift obligations, or in case of emergencies. This created tensions within households and between husbands and wives. As a consequence, women suffered doubly: They lost their savings and often were beaten or kicked out of the house by their husbands.¹¹⁶ In addition, numerous deaths have been associated with the currency exchange due to the physical duress of waiting in line, refusal of medical assistance, and loss of savings, among other reasons,¹¹⁷ though the government has not released an official report of the total number of deaths.¹¹⁸ For a majority of the poor and illiterate in rural areas of India, cash has returned as the preferred method of payment, and the reliability and accessibility of a cashless digital payment system is a long way off.¹¹⁹

Chandrasekhar and Ghosh call attention to the enforced nature of this push toward cashlessness, arguing that a shift to digital should be a choice for consumers rather than imposed by the state.¹²⁰ This move was made despite the lack of existing infrastructure that would have been necessary for people to shift to digital options, and this infrastructure will not be in place any time soon. Moreover, insufficient cash in circulation has led to a liquidity crunch and severely impacted the livelihoods of the poorest in society, not to mention nationwide economic activity.¹²¹ Recent reports show a 0.5 percent decline in GDP growth, attributed in large part to the effects of demonetization.¹²²

Policies that impose digital payments are problematic for a number of reasons, according to Chandrasekhar and Ghosh. First, enforcing this mode of payment acts as a kind of regressive tax on the poor, with added fees and costs for underlying technology eating up even more of people's already limited funds.¹²³

A number of policy measures further restricted the use of cash to the benefit of digital providers. As already noted, the Reserve Bank of India did not ensure that sufficient currency notes were supplied to the public. Limits on cash withdrawals were imposed on bank and ATM withdrawals, and cash transactions over Rs200,000 were not allowed. In contrast, there were incentives to use digital providers, at least initially, by eliminating certain fees, offering tax and financial benefits for cashless transactions, and rolling out greater access to PoS terminals.¹²⁴ But in the long term, many of the fees and costs of cashless payments are likely to fall on consumers.

Given that rural populations and the urban poor tend to make many small transactions because of lack of funds

or storage options, the fees place an even greater burden on those who can least afford it.¹²⁵ Although more people have been included in the formal financial system via bank accounts, many of the accounts are dormant.¹²⁶ There are also insufficient bank branches relative to the population in many parts of India. Banking correspondents meet much of the existing gap in banking services, but are also subject to the increased costs of digital payments, which require technical equipment and non-existing or unreliable broadband connectivity. Many of the solutions for building out the payments infrastructure have failed to take off, and a host of problems in regard to weakness in cybersecurity, identity protection, and legal recourse in the event of fraud or failure have yet to be sufficiently addressed for any of the existing digital and mobile providers. Few legal restrictions are in place that would prevent government or financial institutions from using surveillance, and failures in the biometric ID system have been responsible for starvation in two regions where people were unable to authenticate their identity in order to receive food rations or other welfare benefits.¹²⁷

Demonetization disproportionately penalized the poor who, unable to change their old notes at the bank, paid higher and often predatory fees to informal lenders in order to keep at least some of the value of their notes on hand.¹²⁸ It also transformed existing social and economic practices. Dana Kornberg describes how cash exchanges structure the lives and working relationships of informal garbage collectors in Delhi.¹²⁹ Cash transactions operate as a kind of informal contract between sellers and buyers of recyclables, including scrap metal, paper, plastic, and other items discarded by middle-class residents. Cash is central to these transactions because patrons do not pay in full but will extend cash advances to collectors to cover daily needs. Scrap collectors also rely on informal channels of credit facilitated by cash. While these relationships are hierarchical and can be exploitative in nature, they are also essential to informal workers' ability to provide for their families, fulfill ritual obligations, send remittances, and improve circumstances in their home villages. *"This infuses the cash with extra meaning and also requires durable relationships and negotiations to function. Physical currency's flexibility makes it amenable to negotiation in both timing and amount – a feature that requires more personalized relationships."*

This crucial and also resilient cash nexus was broken as a result of demonetization:

*"It was very difficult for people like Pintu and even the scrap buyers to get the new 500 and 2,000 rupee bills issued to replace the eliminated notes. The chain had been damaged: With cash in short supply everywhere, scrap buyers couldn't pay the collectors, who in turn had more trouble supporting their families. Seeing how people were struggling, a buyer rhetorically asked: 'Why didn't the government do more to make sure that poor people would have money?'"*¹³⁰

In other cases, the cash nexus was strengthened. Nordman and Guérin argue, based on their field research in southern India, that the ties that cash helped to create in the informal economy for traders, laborers, and the poor also presented myriad ways to recycle cash holdings, and for some allowed for the extension of business relations and addition of new clientele.¹³¹

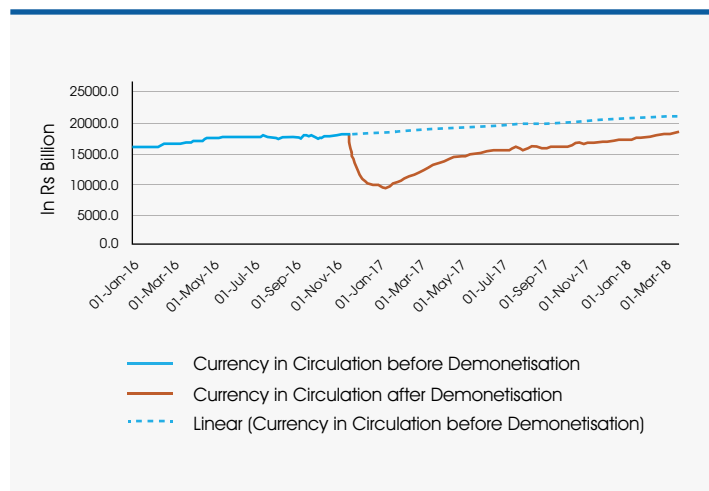
Rather than formalizing the informal, demonetization strengthened the informal. Cash practices before, during, and following demonetization made it possible for many to weather the storm through the varied and layered informal relationships of exchange, savings, and circulation of value.¹³²

The Reserve Bank of India recently announced that a new Rs100 note will be issued, certain to reprise some of the currency chaos of demonetization.¹³³ ATMs across India will need to be refitted with new trays to accommodate old and new 100 notes. According to industry

specialists, recalibration for the new notes issued during demonetization is not even complete and the logistical challenges remain immense. *"Adjusting all the 200,000-odd ATMs in India to the new notes will take around a year and cost over Rs100 crore (\$14.5 million), according to industry experts."*¹³⁴

*"The government and the RBI need to realise that cash rules and so people need ATMs and bank branches," said an executive with a private sector bank, requesting anonymity. "And they can't wish cash away only because they want to. Therefore, these things need to be better planned to avoid an adverse impact on the industry."*¹³⁵

Figure 4: Currency in circulation (pre- and post-demonitization)



"Currency in circulation was Rs 17977 billion on 4 Nov 16 and then declined to touch Rs 8980.2 billion by 6 Jan 17. It has been rising ever since and crossed the pre-demonetisation levels recently and touched Rs 18135.52 on 9-March-18."

Source: Mostly Economics Blog, March 21, 2018.

<https://mostlyeconomics.wordpress.com/2018/03/21/currency-in-circulation-pre-and-post-demonetisation-trends/>

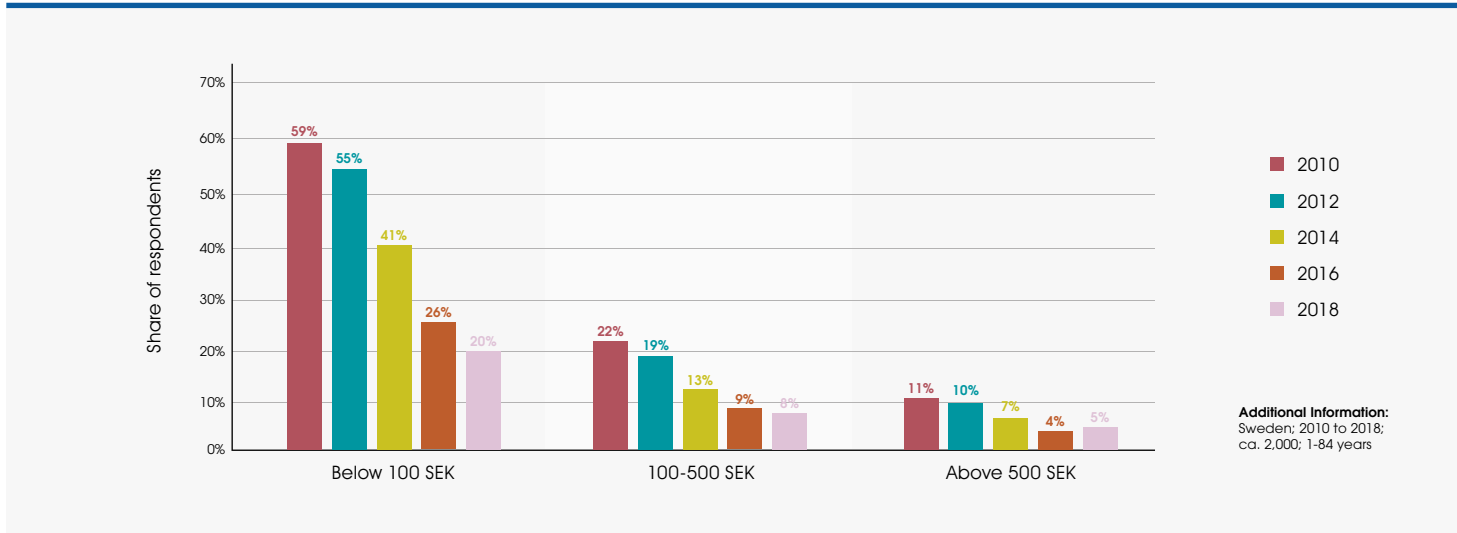
5.4 Sweden – Why cash matters in the cashless utopia

Sweden is touted as the poster child of the coming cashless society. By some estimates, only 2 percent of payments (total transactions by value) are made in cash with 20 percent of retail transactions made in cash.¹³⁶ Wider trends show that globally Sweden stands out as a country with “a consistent five year annual decline in the value of currency in circulation” and the lowest ratio of currency in circulation to GDP (1.2%).¹³⁷ This trend towards cashlessness over the past 20 years is the result of technological innovations and public-private cooperation in building out the digital payment infrastructure. In particular, mobile direct payment applications – Swish for individual peer-to-peer payments and iZettle for business-to-business and commercial transactions – allow for instant settlement (from the user perspective) and are available nationwide.¹³⁸

Cashlessness works here because of the built-out digital infrastructure and high levels of trust in the payments system (and many would say, the state).

According to the G4S World Cash Report, driving factors include low-population density; a lack of large banks and thus greater cooperation in facilitating a unified ATM landscape, mobile payments, and clearing network; receptiveness on the part of the public to new technologies; trust in Swedish financial and state institutions, which historically have guaranteed long-term stability; and greater trust in the state regarding issues of privacy and transparency.¹³⁹

Figure 5: Cash usage in Sweden from 2010 to 2018, by payment size



Source: The Riksbank. Cash usage in Sweden from 2010 to 2018, by payment size. In Statista – The Statistics Portal. Retrieved June 11, 2019.

<https://www.statista.com/statistics/674315/cash-usage-in-sweden-by-payment-size/>

However, the shift toward cashless payments, though embraced by many in Sweden, has not been a choice made by consumers but rather a choice made by the commercial banks in Sweden, which have dismantled hundreds of ATMs throughout the country and have been refusing to handle cash.¹⁴⁰ This, in a very short time, made cash a non-viable option.

While there is a high-level of inclusion in Sweden in terms of bank accounts and Internet access, the shift to cashlessness has led to new exclusions: rural areas often do not have sufficient Internet coverage to participate in non-cash payments, elderly citizens may prefer to use cash but no longer have the option, and disabled citizens, refugees and asylum seekers, non-citizens, and even tourists can find themselves shut out or subject to restricted use of the cashless payment system.

the Krona as legal tender is also changing, leading the Swedish Central Bank to explore proposals to create a digital form of fiat money, though no concrete decisions have been made about what form this would take.

At the same time, with potential cyberattacks and other forms of digital hacking a growing concern in Sweden and worldwide, regulators now believe it is essential to keep cash as a failsafe in times of environmental disaster, network failures, and new forms of digital political disruption. A recent survival manual, *"If Crisis or War Comes,"* issued to the Swedish population by the government, instructs citizens to keep cash in small denominations in their survival kit in the event that electronic grids and IT systems are disrupted.¹⁴² Sweden is now also contemplating legislation obliging commercial banks to accept and handle cash.¹⁴³

All of this occurs while an increasing majority of Swedish citizens (72 percent in a 2019 poll) say they do not want to go cashless.¹⁴¹

The sharp decline in cash usage in Sweden now poses new problems because a certain amount of cash in circulation is necessary for upholding the cash infrastructure. Once below this level, a vicious circle ensues where few or no cash withdrawals lead to fewer ATMs, which lead to even lower cash withdrawals, making the cost of maintaining a viable amount of cash in circulation prohibitive. As the cost of cash rises and fewer financial institutions distribute and accept it, the role of

5.5 China – Social credit scores and implications for data surveillance

Mobile wallets are the predominant form of making payments in China, with Alipay and WeChat Pay the most prominent providers.

At the end of 2018, WeChat Pay had over 900 million active users every month; the closest competitor, Alibaba, had 500 million active users.¹⁴⁴

These are not simply payment applications on a smartphone but platform economies through which consumers can access a range of applications and manage the entirety of their financial as well as social lives. Within the application, consumers can make retail and online payments, send money to family, friends, and coworkers, pay taxes and rent, and also use social media, online gaming and dating sites, and more. For some users, there is little need to ever leave the ecosystem.

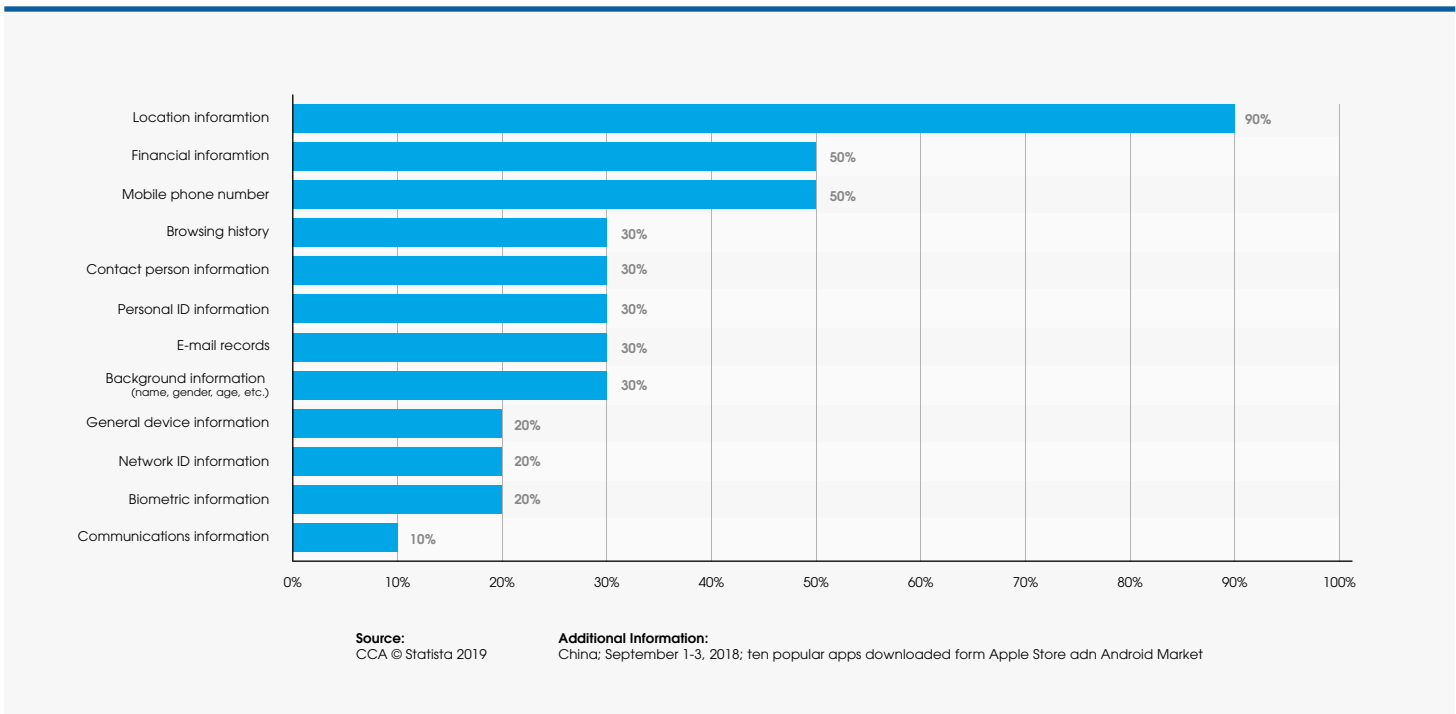
China's Social Credit System is an official government program (first proposed in 2014, and still in development) that aims to create an extensive scoring system that assesses the trustworthiness and behavior of all Chinese citizens by 2020.¹⁴⁵ However, the system is currently fragmented and distributed across national, provincial, municipal, and ministerial levels.¹⁴⁶ The nationwide official government system is distinct from private or corporate social credit systems, despite much Western media press that treats these as the same.¹⁴⁷ Mac Sithigh and Siems explain that *"three different models operate: China-wide blacklists, compliance scores by pilot cities, and social credit scores by financial institutions."*¹⁴⁸

There are therefore a variety of measures and standards at work, and some models have been more successful than others. Unlike the United States, China does not have an established third-party credit scoring system. The system in China does not currently generate a single numerical score, but is rather a series of disaggregated reports depending on the context and locality.¹⁴⁹

While government blacklists refer to individuals who have broken the law and have failed to pay court fees and fines, for example, payment applications – notably Zhima (Sesame Credit) – also collect data on social media use and other in-application payment and social behaviors, using gamification and other incentives to reward certain behaviors while tracking other practices (such as time spent on video games) to generate a fluctuating score using company-specific algorithms. While governmental and corporate systems are not yet linked and operate differently, there is some overlap and information sharing in computing scores in the financial application and in assessing trustworthiness and payment practices in determining overall creditability.

*"What's troubling is when those private systems link up to the government rankings" — which is already happening with some pilots, Ohlberg says. "You'll have sort of memorandum of understanding like arrangements between the city and, say, Alibaba and Tencent about data exchanges and including that in assessments of citizens," Ohlberg adds. "That's a lot of data being collected with little protection, and no algorithmic transparency about how it's analysed to spit out a score or ranking, though Sesame does share some details about what types of data are used."*¹⁵⁰

Figure 6: Share of online payment apps collecting or using personal data in China as of September 2018, by type of data



Source: CCA. Share of online payment apps collecting or using personal data in China as of September 2018, by type of data. In Statista – The Statistics Portal. Retrieved June 11, 2019.

<https://www.statista.com/statistics/949042/china-share-of-online-payment-apps-collecting-personal-data-by-type/>

High, positive scores within the application can confer benefits, such as reduced hotel or bike rental fees, waived deposits, and other discounts, whereas low scores can entail higher fees for the same services, or can mean being shut out from accessing certain goods and services altogether, as happens with blacklisting. One of the stated aims of the social credit score is to provide alternative means for assessing creditworthiness and providing access to loans for people who are unbanked or lack other formal qualifying criteria to access credit, with the

aim of improving participation in the domestic economy. "Trustworthiness scores" could substitute as a form of proof of "creditworthiness."¹⁵¹ However, failure to repay debts or critique of government censorship can result in increased surveillance and exclusion from accessing financial, medical, and social necessities. While most analysts note that the system is far from complete or coherent, they worry that future versions of the system will become monopolized by state control and increase state power through technological means.

The Chinese Social Credit System is for Western observers a prime example of the potential for market and state surveillance, and privacy-invading dimensions of the extension of the digital net.¹⁵² However, Engelmann et al. note that privacy has a different meaning in China than in the West:

"The division between a private and a public persona is often conceived as trying to be secretive as privacy is commonly conceived as hiding something shameful." ¹⁵³

So far, the Social Credit System is not perceived by many Chinese as a threat to privacy, as would be the case for Western observers. However, just as many in the West, especially in the younger generations of consumers, quickly sign away rights to privacy when accepting disclosure agreements without reading them for the convenience of digital payments, so, too, do few young Chinese users of Alipay's Social Credit System express "concerns about or awareness of dataveillance" or "continuous surveillance using meta-data." ¹⁵⁴

"The success of Alipay is advantaged by its capacity to appeal to the population's socio-economic need for a secured and trustworthy payment platform while it manipulates the pre-existing socio-cultural and political conditions of privacy in China. It adapts, appropriates, and transforms technological trends to entice user-subjects by appealing to their self-interest. Alipay de-politicizes the system's political elements through gamified features (e.g. Ant Forest) and a loyalty-rewards program that includes rules, rewards, and penalties." ¹⁵⁵

What's more, Kristin Shi-Kupfer and Mareike Ohlberg warn that China's Social Credit System has implications for the data privacy and protection of the EU and European actors:

"...It is certain that the Social Credit System will pose challenges for the EU and European actors. European citizens' privacy, safety and rights need protection from Chinese government encroachment. This includes protection from European commercial actors that may cooperate with China's authorities.

On present knowledge, EU citizens who live in China long-term will be integrated into the Social Credit System, individually and, where applicable, as the legal representative of a company. Data about them will be systematically collected and aggregated in a central repository. Chinese companies operating in Europe could collect and use data on EU citizens – and others – within EU territory, inside the permissible legal framework. There is the further risk that Chinese companies (such as Baidu, Alibaba, or Tencent) and internationally listed companies operating in China could be pressured to collect and hand over data to the Chinese government beyond what is permitted by the European legal framework.

...data on violations of China's political regulations by foreign companies and NGOs operating in China (and potentially their parent organizations abroad) could be stored under social credit records and later used to pressure foreign entities into complying with Chinese censorship." ¹⁵⁶

The authors outline key considerations for future EU policy responses to the Social Credit System, including potential challenges in enforcing data transfer agreements, enforced compliance with the system as a function of operating in China, as well as the dangers of possible adoption of certain elements of the system in the EU and globally.¹⁵⁷

5.6 Australia, the United Kingdom, and South Africa – Digital control and “quarantining” of money for vulnerable populations

Outside the context of China’s developing social credit system, precedents already exist for understanding how digital cashless technologies have the potential to limit, control, and remotely intermediate how and whether people can access their money. Brett Scott writes, “*digital payment facilitates a vast new frontier of financial surveillance and control, while also exposing users to new risks not present in the cash infrastructure.*”¹⁵⁸ Physical, universally accepted cash, in contrast, gives people power and autonomy in spending and budgetary decisions.

Historically, the poor and colonial subjects have been the targets of historical efforts to restrict monetary value to other monetary instruments, in place of freely circulating cash. Distribution of public aid and welfare assistance have often taken the form of earmarked funds in contrast to universally fungible cash, with the idea that states and charitable entities know better than the poor and the needy how and on what kinds of consumer goods money should be spent. Viviana Zelizer has described how in the 1900s, “*paradoxically, just as the American state was struggling to enforce a single, generalized, freely circulating legal tender, public and private charities alike invented multiple alternative monies for the poor by producing either materially distinct currencies, such as grocery orders or food stamps, or by closely restricting the use of ordinary money.*”¹⁵⁹ Cash, especially in the context of stable reserve currencies, frees people to make their own decisions about provisioning and consumption needs.

Such schemes are not only things of the past. More recent cashless technologies are being used to channel and control where and how people can use their money, as in the case of Australia’s cashless welfare card trial,¹⁶⁰ in which 80 percent of the social benefits were loaded on the card, limiting recipients’ ability to decide what bills they could pay when, and where they could shop. Cheaper and even second-hand alternatives available to them with cash were suddenly out of reach.¹⁶¹ Moreover, recipients felt discriminated against and were worse off financially. It not only hurts recipients, but small business too. One family-owned business in South Australia reported \$100,000 in outstanding payments as a result of the card scheme.¹⁶² New versions of this controversial program are being rolled out in Queensland and other parts of Australia. The cashless debit card issued by Indue restricts spending at stores and other retail establishments where alcohol is sold and also prohibits spending on gambling and drugs with the aim of improving social welfare in the community. The problem for many is that it places all welfare recipients in the same basket and puts personal finance decisions in the hands of the corporate entity managing the card.¹⁶³

Kate Coddington compares the impact of cashless technology on restricting funds, mobility, and participation in economic life in the Australian BasicCard program for Aboriginal communities and the Azure Card for asylum seekers in the United Kingdom.¹⁶⁴



In humanitarian contexts, recipients can make cash withdrawals from the card. However, cashless technologies used to distribute aid to people with precarious citizenship claims not only segregate and quarantine funds and restrict goods that can be purchased only at participating providers but also restrict mobility and subject recipients to remote surveillance. For example, for refused asylum seekers in the United Kingdom, travel beyond the location of temporary residence is restricted: *"If cards are used outside the asylum seeker's home area, the UKBA considers this proof that asylum seekers are not destitute as they can afford travel, and will discontinue payments. As one asylum seeker noted, travel restrictions and the lack of funds for transportation mean that the Azure card, it's like an open prison. ... It is unclear how the card data is being used, but the purchasing patterns of asylum seekers as well as their regular use is clearly being monitored."*¹⁶⁵

In both Australia and the United Kingdom, cashless debit cards for welfare distribution are attractive precisely because of the data that can be collected on what users purchase, and the dates, times, and locations where purchases are made, to enhance surveillance and monitoring of the program.¹⁶⁶ Coddington describes cashless technologies as a "bordering technology" that gradually erodes recipients' quality of life and ability to make decisions about how to provision and spend money while also subjecting people to "new forms of surveillance."¹⁶⁷ *"Without cash, the state chips away at people's ability to feed their families, move freely, or participate fully in the increasingly market-driven nature of wider social networks."*¹⁶⁸

Coddington continues: *"Refused asylum seekers and Aboriginal residents on income quarantines perceive cashless technologies as a trap, and their opinions are justified by the ever-present barriers to citizenship that these technologies reinscribe with the performances of daily life: every grocery run, every school excursion denied, every social visit postponed – it is through the graduate erosion of community life that cashless technologies enact their slow violence and perform their border work. The border is securitized over the long-term through the gradual increase in precarity,*

*the hyper-securitization of endless surveillance, and the accelerating restrictions placed on daily life without access to cash."*¹⁶⁹

While these examples may seem to describe exceptional cases, other examples show how digital and electronic channels can impact autonomy over one's finances or facilitate remote intermediation in ways that point to the importance of physical cash for re-establishing autonomy and evading surveillance. Deborah James has described how in South Africa debt collectors in the post-apartheid credit regime could collect on debts directly from debtors' bank accounts. Black middle-class consumers who purchased furniture or appliances on installment credit found themselves unable to pay for housing or food because debt collectors had already accessed their accounts to withdraw the repayment. Wages paid in cash were often the only means by which people could regain control of their money and plan debt repayment on their own terms while still having money to live.¹⁷⁰

While digital payments market their approach under the headline of "freedom, autonomy, and convenience," examples mentioned in this paper suggest some of the possibilities for control and remote intermediation in an all-digital payments system – far beyond the examples of consumer marketing and upselling that dominate many discussions of how payments data are used both with and without people's knowledge and control.

5.7 Pushing back against cashlessness

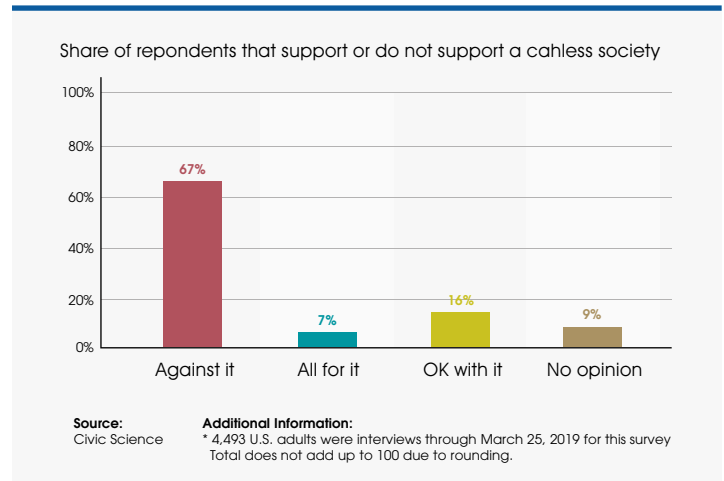
The global push toward greater financial inclusion within the formal banking system, which its proponents usually connect to, fails to give sufficient space to the ways increasing digitalization is exposing people not only to the benefits of being banked but also to the disadvantages. To the high costs of maintaining and accessing bank accounts in the United States and elsewhere, of Internet access and connectivity, and of keeping up with the changing technology to access formal accounts through mobile, computer, and electronic devices that often come with additional recurring fees attached. And yet, all over the world, including developed markets, many people navigate irregular jobs, limited work contracts, and volatile and seasonal incomes.

Increasingly, people who were once banked are moving to being under- and unbanked, sometimes by choice, but often out of necessity.

For these members of society, the ability to pay for things in cash, to conduct business in cash, and to make do in cash is essential to their participation in the economic, cultural, and social lives of their communities.

At the same time, there is an increasing “*gentrification of payments*,” where people are being out-priced and excluded due to newly trending cashless-only retail establishments and an increasing number of establishments, such as parking garages, airlines, and sports stadiums, that no longer accept cash payments.¹⁷¹ At policy levels as well as through grassroots movements, popular, and political mobilization, people are beginning to push back against the drive toward cashlessness.

Figure 7: Americans don’t buy into a cashless world



Sarah Feldman, Americans Don’t Buy Into a Cashless world, April 9, 2019. Source: Civic Science.

<https://www.statista.com/chart/17667/support-of-cashless-payments-united-states/>

Across the United States, cities are beginning to enforce old laws on the books against refusing cash (Massachusetts) or draft and introduce legislative mandates for retail establishments to accept cash. One example is Philadelphia, Pennsylvania, where councilman William Greenlee sponsored a bill for an ordinance (which passed) that bans cashless stores. The ordinance goes into effect July 1, 2019. These moves are prompting more public discussion and debate around the implications and drawbacks of cashless futures. It is also raising awareness that legal tender laws, such as those in the United States, do not necessarily guarantee that cash has to be accepted when making purchases (though it is mandated once a debt has been incurred). It seems somewhat paradoxical to councilman Greenlee and others that the physical manifestation of the monetary unit of the United States would be declined as a payment method when the virtual value that passes through the card or mobile networks is acceptable.

For Greenlee, the ability to pay in cash is a matter of fairness. In a radio panel discussion, Greenlee came back to the point, *"You should be able to purchase a cup of coffee with United States Currency."*¹⁷²

Greenlee explains that it is important to act before more retail establishments follow the trend. Cashlessness implies that some people are not welcome in an establishment and creates difference and exclusion. *"People have been paying with US currency since Ben Franklin walked the streets of Philadelphia."* On the same panel, economist Jay Zagorsky described an instance when he was out of town driving to the airport and stopped to pump gas. His credit card malfunctioned, leading the issuer to cancel his card on the spot under suspicion of fraudulent use. However, this left Zagorsky with no means to pay by card. If he had not had \$40 in cash on him, he would have had to push his car to the airport. It is not just the un- and underbanked who can unexpectedly find themselves shut out of the system. Legal scholar Mehrsa Baradaran supports Greenlee's move, affirming that it is important for policymakers to act on issues such as these, especially when the least powerful in society often do not find a voice in legislative action. Baradaran has researched un- and underbanked communities in the United States, as well as how community banks do not always solve problems of financial exclusion. Many people choose to not have bank accounts because they are living on the edge. Maintaining a bank account and access to a debit or credit card is expensive – and often out of reach. Protecting access to and acceptance of cash is therefore vital.

Elisabeth Rhyne of the Center for Financial Inclusion ACCION has recently written about a cashless backlash in Uruguay, where new banking laws require all businesses to accept electronic payments and wages to be paid electronically. Two different political campaigns have gotten behind popular petitions to walk back mandatory financial inclusion.

Rhyne writes: *"In addition to the unpreparedness of the society, opponents of this financial inclusion measure cite high banking fees, unfair contract clauses, and invasion of privacy as concerns. An underlying mistrust of banks is behind many of the specific concerns, heightened by fear of banks and government teaming up against citizens, on the pretext of security. But the biggest complaint is the mandatory aspect of the law. One of the leaders of the protest, quoted in the newspaper El País, stated, 'We say yes to the financial system, we say yes to the cards, we say yes to the banks... We say no to the obligation.'"*¹⁷³

The pro-cash movement Cash Matters breaks down the Adelante lafigliola campaign, "a new campaign that defines itself as social-christian party, lists four reasons to end the mandatory banking law," as follows:

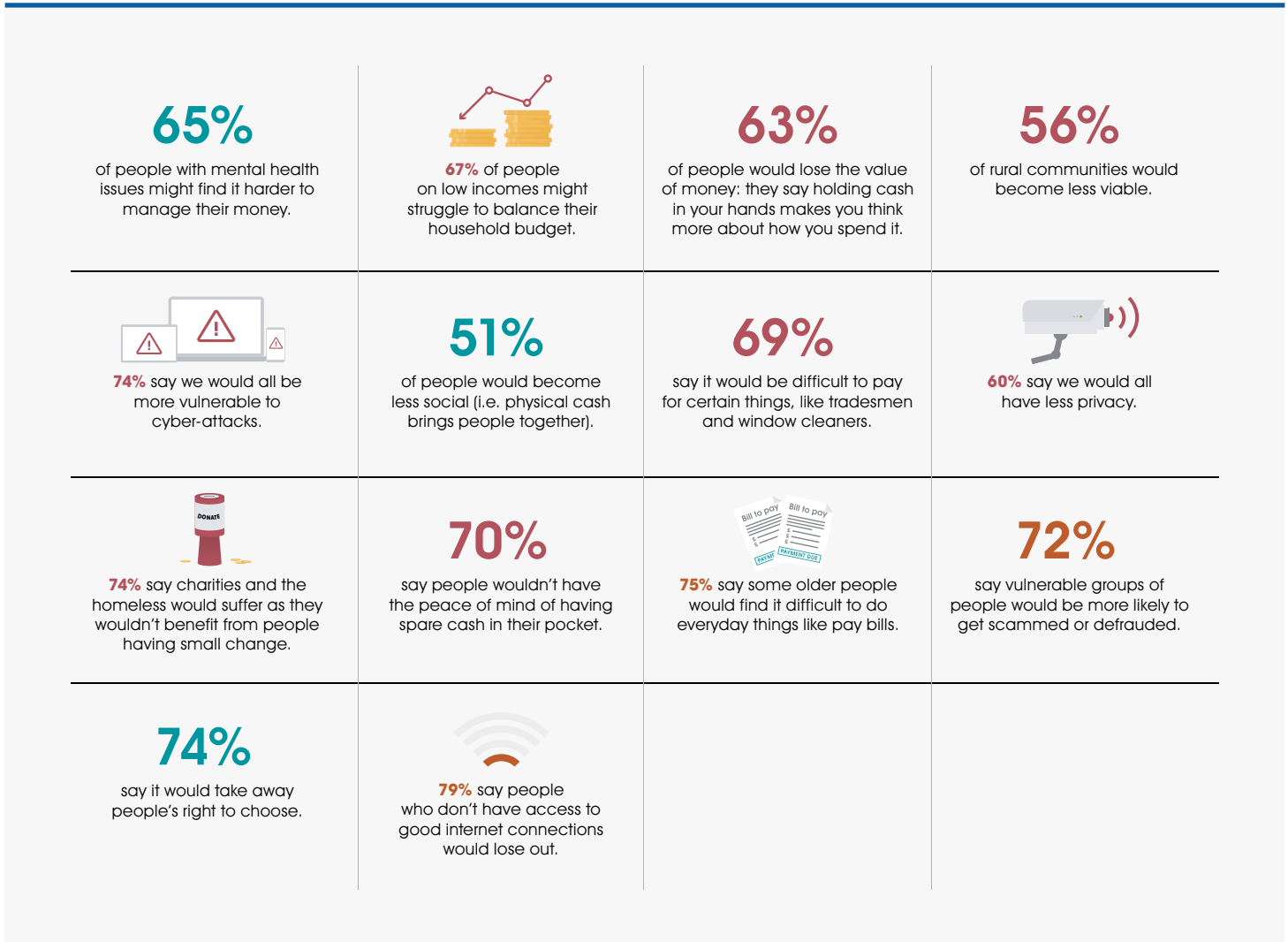
- 1 It makes it impossible for someone to exist unbanked, leading to economic enslavement.
- 2 Having no option but to conduct transactions via banking systems violates the public's right to privacy.
- 3 Banks should not profit off every single transaction.
- 4 It would mostly be in the interest of point-of-sale terminal businesses.

It notes that "whatever the critics' methods, the imposed cashless policy is being met with resistance on all fronts."¹⁷⁴

Rhyne suggests that the pushback on the financial inclusion mandate in Uruguay is far from an isolated instance and that globally there is an increasing perception that *"banks do not have customer best interests at heart, that they charge confusing and unfair fees, that the good old ways don't need changing, and that electronic money creates a major threat to privacy. Governments and financial service providers everywhere would do well to recognize such emotion-laden concerns and work to build customer trust and confidence before moving too fast to transform the way money works."*¹⁷⁵

5.8 “Public concerns of a cashless society” *

Figure 8: What implications do the UK population believe cashless society would have?



* Source: "Access to Cash survey of 2,000 nationally representative UK consumers conducted in November 2018". Final Report, Access to Cash Review, March 2019, p. 46.

<https://www.accesstocash.org.uk/media/1087/final-report-final-web.pdf>

6.0 Conclusion

6.1 Cash is and must remain an indispensable part of any payment landscape

This paper argues that for a number of substantial reasons, cash is and must remain a critical public good and public infrastructure in local, national, and global monetary systems. This argument for cash is not against the rise of digital and mobile payments but sees cash as complementary to them. Corresponding legislation ensuring the access, acceptance, and availability of cash, such as has been passed in several US states in the past couple of months, should be considered when private players gain too much influence in any given national currency system.

The arguments cited and substantiated in this paper that make cash an indispensable part of any payment landscape now and in future are:

- Cash is independent of its issuer and is in itself a form of transfer of power from issuer to user. Therefore, it confers personal and individual freedom to its users and empowers them.
- Cash is public money, not private money. Once in circulation, cash is free to use and no fees are involved. No commercial market participants benefit from citizens paying with cash.
- Cash acts as a guarantee that citizens can exercise their right to determine how they store wealth and how they make decisions about spending and consumption in the economy. It is an effective guardrail against the monetary policy tool of negative interest rates.
- Cash is a public infrastructure. Its status as legal tender ensures it is universally accepted, equally accessible, and free to use for consumers, making it an important public good and public infrastructure. Cash remains vital in a digital world because of its physical and distributed form across societies as a deliberative tool for political and economic activity.

In local, everyday practices, the physicality and divisibility of cash denominations are an important part of its indispensability in everyday life. Children learn about economic and financial relationships when they handle, count, store, and pay with physical units of cash. These include: the relationship between money, price, cost of living, and units of value; the potential of cash saved in a jar and the finitude of banknotes spent; and the long and difficult but also formative histories and politics of making national or territorial communities embedded in the iconography, texture, and qualities of banknotes. People of all ages and abilities appreciate and often depend on the physical budgeting properties of cash. Cash has many lives and, despite its universal form, becomes integrated in incredibly diverse ways in people's narrower financial and social lives.

On a broader level, cash is part of a complex, distributed, and vital public infrastructure. Physical currency is an object lesson and a material artifact containing ideas about value, technological change, and regulatory histories. Cash, according to Lemieux, is the only form of payment that is truly independent from its issuer and thus guarantees individual freedom.¹⁷⁶ All digital payment forms require a third party or intermediary for the payment to settle. In a context where the merits of cash are being weighed against the many benefits of digital payment options, physical currency has a crucial and ongoing role to play in the fast-changing payments landscape.

Cash remains vital in a digital world because of its physical and distributed form across societies, which stands in contrast to digital accounts from which, theoretically, people could be shut out with the flip of a switch. Cash has been and still is the benchmark for every other mode of payment. Without seeking to valorize one currency over another or dismiss the often troubled and unequal relationships of power through which currencies have come into being, this paper shows how cash upholds and makes possible a variety of distinctions that are important to the regulation and governance of electronic money.¹⁷⁷

Cash is also the benchmark in terms of pricing payments. As long as public money – that is, cash – is around, private money will have to be competitive in terms of fees and pricing for payment services, simply because people have the option to switch to cash if they perceive other forms of payment – cards, digital, and mobile – as too expensive. This is one of the main reasons the “war on cash” is being fought so relentlessly.

Cash is a means to build identity, politically and nationally. The motifs on banknotes and coins depict a people’s magic moments and reflect its identity. People therefore value cash tokens beyond their monetary worth. Take the case of the euro: this physical cash acts as a socio-political glue for the European community.¹⁷⁸ Altering the infrastructure of physical cash in one member polity necessarily impacts the cash and payments infrastructure of all members, as well as many issues beyond finance. In a speech in 2017 introducing the 50-euro banknote, ECB president Mario Draghi emphasized the importance of physical euros distributed across the European payments landscape and polity: *“Holding a euro banknote and knowing that it can be used in 19 countries is a reminder of the deep integration Europe has attained.”*

“Indeed, when asked about the most important elements of European identity, the single currency is the one most frequently quoted by euro area citizens after democracy and freedom... support for the single currency now stands at 70%, equaling the highs recorded in the pre-crisis period.”¹⁷⁹

Mario Draghi

President of the European Central Bank



In many countries that have experienced financial crises and instability, foreign currencies are trusted more than national money, highlighting the important link between monetary authorities, credibility, and physical cash. In Zimbabwe, cash as well as physical US dollars are a “*hedge against any uncertainty that may arise in the unforeseen future.*”¹⁸⁰ For many in Ecuador, the dollar is a “*trustworthy currency because it is ‘hard’ and ‘strong’; its value does not fluctuate, but persists over time.*”¹⁸¹

Physical cash acts as a deliberative tool that no single entity controls – monetary authorities, states, and citizens possess a certain degree of power sharing through the materiality of cash that is different from currency in digital form only. So long as cash is distributed across territorial expanses within or outside its state of issue, held within households, businesses, and central bank vaults, and used across every domain of economic and social life, it affords a different kind of distributed agency in relation to digital accounts and computing databases. This does not make it less fragile or subject to abuse than digital, insofar as people, states, central banks, and markets give cash value. However, because cash guarantees independence from digital systems, cash acts as a barrier against “*surveillance capitalism.*”¹⁸² Cash is therefore all the more socially, economically, and politically necessary for ensuring democracy, personal freedom, and freedom of choice, especially as digital forms of money expand.

6.2 Policy considerations

In looking at the role of cash as a public good across the globe and how to best maintain cash as a “*public infrastructure*,” politicians should consider issuing legislation ensuring the access to, as well as acceptance and availability of cash. Deliberations should take into account:

- Arguments that cash will be used so long as people continue to use cash sound convincing. Freedom of choice is an important civil right. However, if policies and incentives make it impossible to use or access cash, the concept of “*choice*” falls short.
- Analytical frameworks that assume in advance the evolutionary outcome that cash is being or will be replaced limit the kinds of empirical research on actual practices of cash usage. There is no one-size-fits-all approach to how cash fits within different payment cultures. Research should extend beyond point of sale transactions and ATM withdrawals to better understand the diverse and legitimate strategies and use cases for cash, beyond the cash and crime nexus.
- Efficiency and costs of cashless are relative; replacing cash with cashless might make payments more efficient in some aspects, but it does so by shifting and re-arranging labor of payments elsewhere. Digital and cash both have material infrastructures upon which they depend, and require resources – social, environmental, security-related, etc. A better approach to the future of payments is to design in terms of complementarity.
- Historical perspectives on the development of territorial currencies and cash design offer new lessons for the present digital age. Because of the diverse ways in which cash denominations have been designed, used, exchanged, held, and distributed across societies over time, people have turned to cash as a deliberative tool in shaping economic, political, and social life. These histories show the crucial and complementary role that cash will continue to play in the payments landscape as a public infrastructure that can help address questions of privacy, accountability, and agency in conjunction with digital.
- The future is not static. Climate change, finite natural resources, political instability, and as-yet-to-be-anticipated challenges on the horizon can change the way people pay in the future. The cash form will be crucial to that future, especially if the underlying infrastructures for digital fail, become too costly, or are abused by financial institutions or political regimes. Cash is essential for securing a resilient payments infrastructure.
- The future of payments, and of cash in particular, should be part of an ongoing societal dialogue. Policy efforts should focus not on eliminating or curtailing cash but on making the payments infrastructure more inclusive and equitable as a whole.
- Cash, both as a physical form of payment and a practice of use with positive network effects, is an irreplaceable and resilient public infrastructure.

7.0 Appendix

- 1 Eric Rosenbaum, "The Cashless Society Myth: PayPal, Square, and bitcoin have not Stopped Cash from being a Growth Business," CNBC, August 6, 2018. <https://www.cnbc.com/2018/08/06/spike-the-dollars-obit-cash-is-still-a-growth-business.html>
- 2 European Central Bank statistics http://sdw.ecb.europa.eu/quickview.do?SERIES_KEY=195.BKN.M.U2.NC10.B.ALLD.AS.S.E and http://sdw.ecb.europa.eu/quickview.do?SERIES_KEY=195.BKN.M.U2.NC10.C.ALLD.AS.S.E
- 3 Grace Noto, "Visa is Betting on Businesses, Not Consumers, to Win the War on Cash." Bank Innovation, July 17, 2017. <https://bankinnovation.net/2017/07/visa-is-betting-on-businesses-not-consumers-to-win-the-war-on-cash/>; Visa, "Are Cashless Payments good for Business? Infographic. USA Visa.Com. <https://usa.visa.com/dam/VCOM/global/about-visa/documents/cashless-infographic.pdf>
- 4 Tim Fraser and Jenny Surane, "Plastic-versus-Cash battle heats up after Visa, Mastercard deals." The Globe and Mail/Bloomberg News, Updated July 18, 2017. <https://www.theglobeandmail.com/report-on-business/small-business/sb-money/plastic-versus-cash-battle-heats-up-after-visa-mastercard-deals/article35706978/>
- 5 Filiz Kartal, "Public Goods." Political and Civic Leadership: A Reference Handbook. Richard A. Couto, ed. Thousand Oaks, CA: SAGE Publications, Inc., 2010, p. 153–161. <http://sk.sagepub.com/reference/civicleadership/n19.xml>
- 6 Gabriele Camera, A Perspective on Electronic Alternatives to Traditional Currencies. Sveriges Riksbank Economic Review 2017:1, p. 130. https://www.riksbank.se/globalassets/media/rapporter/pov/artiklar/svenska/2017/170120/rap_pov_artikel_6_170120_sve.pdf
- 7 M. Davoodalhosseini and F. Rivadeneyra. "A Policy Framework for E-Money: A Report on Bank of Canada Research." Bank of Canada Staff Discussion Paper No. 2018-05, p. 2. <https://www.bankofcanada.ca/wp-content/uploads/2018/04/SDP-2018-5.pdf>
- 8 Davoodalhosseini and F. Rivadeneyra, Ibid., p. 18.
- 9 Kartal, Ibid, p. 154.
- 10 Kartal, Ibid, p. 154.
- 11 Kartal, Ibid, p. 154.
- 12 Gabriele Camera, "A Perspective on Electronic Alternatives to Traditional Currencies," Ibid. p. 130. https://www.riksbank.se/globalassets/media/rapporter/pov/artiklar/svenska/2017/170120/rap_pov_artikel_6_170120_sve.pdf; see also Christine Desan, "The Constitutional Approach to Money: Monetary Design and the Production of the Modern World." Money Talks: Explaining How Money Really Works. Nina Bandelj, Frederick F. Wherry, and Viviana A. Zelizer, eds. Princeton: Princeton University Press, 2017, p. 109–130. <https://press.princeton.edu/titles/11026.html>
- 13 See Eric Helleiner, The Making of National Money: Territorial Currencies in Historical Perspective. Ithaca: Cornell University Press, 2003, p. 61–79.
- 14 Helleiner, Ibid.
- 15 Helleiner, Ibid., see especially p. 100–120.
- 16 In section 4, we will consider how cash figures in everyday social practices, in mathematics and financial education, and in important rituals.
- 17 ECB Opinion. Portugal, May 22, 2017. https://www.ecb.europa.eu/ecb/legal/pdf/en_con_2017_18_pt_f_signed.pdf; ECB Opinion. Bulgaria, July 11, 2017. https://www.ecb.europa.eu/ecb/legal/pdf/en_con_2017_27_sign.pdf
- 18 James Chapman and Carolyn A. Wilkins, "Crypto 'Money': Perspective of a Couple of Canadian Central Bankers." Bank of Canada Staff Discussion Paper No. 2019-1, p. 19. <https://www.bankofcanada.ca/wp-content/uploads/2019/02/sdp2019-1.pdf>
- 19 Chapman and Wilkins, Ibid., p. 18.
- 20 Franz Seitz and Malte Krueger, "The Blessing of Cash." International Cash Conference 2017 – War on Cash: Is there a Future for Cash? April 25–27, 2017, Island of Mainau, Germany, Deutsche Bundesbank, Frankfurt a. M., p. 4. <http://hdl.handle.net/10419/162911>
- 21 Seitz and Krueger, Ibid., p. 11.
- 22 Seitz and Krueger, Ibid., p. 15.
- 23 Seminar, Swedish House of Finance, "E-krona, Money and Trust among Strangers," April 27, 2018. <https://www.youtube.com/watch?v=f4U676prxCo>
- 24 On the relationship between CBDC design and bank run risks, see, for example, Chapman and Wilkins, Ibid., p. 20–22.
- 25 Jens Weidmann, Opening remarks, Fourth cash symposium of the Deutsche Bundesbank, Frankfurt am Main, February 14, 2018. <https://www.bis.org/review/r180226a.htm>
- 26 Insights come from debates about the impact of digital fiat on the current monetary system. See for example James Chapman and Carolyn A. Wilkins, Ibid., p. 20.
- 27 "This trend toward thinner wallets makes it easy to forget what a miracle cash is. 'Cash is profoundly democratic,' said Bill Maurer, the dean of the School of Social Sciences at UC–Irvine and the author of How Would You Like to Pay? 'It can be given by anyone, accepted by anyone, settled and cleared instantaneously.' One of the central bank's great achievements, he observed, was making sure that transactions involving cash and checks would be settled at par – meaning that there's no transaction cost to paying that way. (As late as the 1930s, banks were still charging "interchange" fees on checks.) With plastic and online payments, that's rarely the case." Henry Grabar, "No Shirt, No Swipe, No Service: Cash is a miracle. So why are more businesses refusing it?" Slate. July 24, 2018. <https://slate.com/business/2018/07/cashless-stores-and-restaurants-are-on-the-rise-to-the-delight-of-credit-card-companies.html>
- 28 Tommaso Mancini-Griffoli, Maria Soledad Martinez Peria, Itai Agur, Anil Ari, John Kiff, Adina Popescu, and Celine Rochon, "Casting Light on Central Bank Digital Currency." IMF Staff Discussion Note. International Monetary Fund, SDN 18/08 (November 2018), p. 10–11. <https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2018/11/13/Casting-Light-on-Central-Bank-Digital-Currencies-46233>
- 29 Bankomat – Sifundersökning 2019. <https://bankomat.se/wp-content/uploads/2019/03/Sifunders%C3%B6kning-Bankomat-2019.pdf>
- 30 Cecilia Skingsley, Seminar, Swedish House of Finance, "E-krona, Money and Trust among Strangers." April 27, 2018. <https://www.youtube.com/watch?v=f4U676prxCo>
- 31 Skingsley, Ibid.
- 32 Skingsley, Ibid. Skingsley notes this during the Q&A at the end of the video.
- 33 Ebba Thornéus, "Swish nere - miljontals kunder påverkades." Aftonbladet, May 25, 2019. <https://www.aftonbladet.se/nyheter/a/Xg4mgW/swish-nere--miljontals-kunder-paverkades>; "Swish crashes during popular football event in Skövde, Sweden." Cash Matters Blog. June 12, 2019. <https://www.cashmatters.org/blog/swish-crashes-during-popular-football-event-in-skovde-sweden/>
- 34 Ursula Dalinghaus, "When Cash is the Tie that Binds – Denominating Affective Monetary Attachments in Germany and the Euro Zone." Unpublished Manuscript, n.d. Histories of currency unions and demonetizations highlight the role of cash in monetary policy proper. On the long-term impact of demonetizations in India and Myanmar, see Elisa Oreglia & Janaki Srinivasan, "Human and Nonhuman Intermediation in Rural Agricultural Markets." Journal of Cultural Economy, 2019, p. 12–13. <https://doi.org/10.1080/17530350.2018.1544918>. On the afterlives of the 1990 German currency union, see "Die Geschichte lebt in Echos weiter." Interview with Anett Selle. Welt am Sonntag Nr 16:42 April 22, 2018. <https://www.welt.de/wirtschaft/plus175813699/Anthropologin-Ursula-Dalinghaus-Waehrungsunion-1990-ist-ein-Trauma-fuer-den-Osten.html>

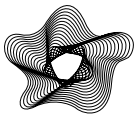
- 35 Yves Mersch, "The Role of euro banknotes as legal tender." Speech at the 4th Bargeldsymposium of the Deutsche Bundesbank, Frankfurt am Main, February 14, 2018. ECB. <https://www.ecb.europa.eu/press/key/date/2018/html/ecb.sp180214.en.html>
- 36 Bill Maurer, "The Gift of Money: Dematerialization, Demonetization, and Money's Pedigree." *La Découverte Revue du Mauss*. 2019 2(52): 161-175, p. 173. <https://www.cairn.info/revue-du-mauss-2018-2-page-161.htm?contenu=article>
- 37 Gustav Peebles, "Inverting the Panopticon: Money and the Nationalization of the Future." *Public Culture* 2008 (20): 2, p. 233-265. <https://read.dukeupress.edu/public-culture/article-abstract/20/2/233/31941/inverting-the-panopticon-money-and-the?redirectedFrom=fulltext>
- 38 Paul Dourish, *The Stuff of Bits: An Essay on the Materialities of Information*. Cambridge: MIT Press, 2017, p. 62. <https://mitpress.mit.edu/books/stuff-bits>
- 39 Oreglia and Srinivasan, *Ibid.*, p. 12-13. Citations removed from quotation.
- 40 Pierre Lemieux, "In Defense of Cash." *The Library of Economics and Liberty*, October 3, 2016. <http://www.econlib.org/library/Columns/y2016/Lemieuxcash.html>
- 41 Ursula Dalinghaus, "Keeping Cash: Assessing the Arguments about Cash and Crime." *Cash Matters/ICA White Paper*. September 1, 2017. <https://www.cashmatters.org/blog/cash-matters-white-paper-keeping-cash-assessing-the-arguments-about-cash-and-crime/>
- 42 European Commission, "Security Union: Commission publishes report on restrictions on payments in cash." June 13, 2018. https://ec.europa.eu/info/news/economy-finance/security-union-commission-publishes-report-restriction-payments-cash-2018-jun-13_en
- 43 See summary box on p. 46, "Cash Demand in the Shadow Economy." *Deutsche Bundesbank Monthly Report*. March 2019. <https://www.bundesbank.de/resource/blob/793190/466691bce4f27f6407b35f8429441ae/ml/2019-03-bargeld-data.pdf>
- 44 Lisa Servon, *The Unbanking of America: How the New Middle Class Survives*. Boston: Mariner Books, 2017. <https://www.lisaservon.com/books>
- 45 Gabriele Camera, "A Perspective on Electronic Alternatives to Traditional Currencies," *Ibid.* p. 131; Nigel Dodd, *The Social Life of Money*, 2014, p. 296, cited in Guseva and Rona-Tas, p. 204; Alya Guseva and Akos Rona-Tas, "Money Talks, Plastic Money Tattles: The New Sociability of Money." *Money Talks: Explaining How Money Really Works*. Nina Bandelj, Frederick F. Wherry, and Viviana A. Zelizer, eds. Princeton: Princeton University Press, 2017, p. 201-214; Bill Maurer, "Blockchains are a Diamond's Best Friend: Zelizer for the Bitcoin Moment." *Money Talks: Explaining How Money Really Works*. Nina Bandelj, Frederick F. Wherry, and Viviana A. Zelizer, eds. Princeton: Princeton University Press. 2017, p. 215-229; Bill Maurer, "Distributed accounts: money as token and money as record." *Distributed Agency: The Sharing of Intention, Cause, and Accountability*. N. J. Enfield and Paul Kockelman, eds. New York: Oxford University Press, 2017, p. 109-116. <https://escholarship.org/uc/item/01n7f253>; Heike Mai, "Why would we use crypto euros? Central Bank-Issued Digital Cash—A User Perspective." *EU Monitor*. Deutsche Bank Research. February 15, 2018. https://www.dbresearch.com/PROD/RPS_EN-PROD/PROD000000000462095/Why_would_we_use_crypto_euros%3F_Central_bank-issued.pdf
- 46 Gillian Tett, "A Fraud or the Future? Bots and the Bitcoin Debate." *Opinion FT Magazine*. May 1, 2019. <https://www.ft.com/content/d379f2f8-6b9d-11e9-80c7-60ee53e6681d>
- 47 For an overview of these discussions and research initiatives see Bank of Israel, "Report of the Team to Examine the Issue of Central Bank Digital Currencies." November 2018. <https://www.boi.org.il/en/NewsAndPublications/PressReleases/Documents/Digital%20currency.pdf>; Christian Barontini and Henry Holden, "Proceeding with caution - a survey on central bank digital currency." *BIS Papers* No 101. January 8, 2019. <https://www.bis.org/publ/bppdf/bispap101.pdf>; Tommaso Mancini-Griffoli, et al., "Casting Light on Central Bank Digital Currency," *Ibid.* <https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2018/11/13/Casting-Light-on-Central-Bank-Digital-Currencies-46233>
- 48 See Christian Barontini and Henry Holden, "Proceeding with caution - a survey on central bank digital currency." *BIS Papers* No 101. January 8, 2019. <https://www.bis.org/publ/bppdf/bispap101.pdf>; Bank of Israel, "Report of the Team to Examine the Issue of Central Bank Digital Currencies." November 2018. <https://www.boi.org.il/en/NewsAndPublications/PressReleases/Documents/Digital%20currency.pdf>; p. 19; Sayuri Shirai, *Money and Central Bank Digital Currency*, Asian Development Bank Institute (ADB) Working Paper No. 922, February 2019. <https://www.adb.org/sites/default/files/publication/485856/adb-wp922.pdf>
- 49 Most global money (90 percent, according to some estimates) is held in digital or electronic form, and much of global money is created by the private banking system. See for example Jeff Desjardins, "All of the World's Money and Markets in One Visualization, October 26, 2017. <http://money.visualcapitalist.com/worlds-money-markets-one-visualization-2017/>
- 50 "Since no advanced economy has issued CBDC for public use, there is no cumulative experience in the advanced world. The discussion of CBDC is therefore mostly theoretical, and is accompanied by tremendous uncertainty regarding the implications of the possible specifications." Bank of Israel, *Ibid.*, p. 15. <https://www.boi.org.il/en/NewsAndPublications/PressReleases/Documents/Digital%20currency.pdf>; see also Jens Weidmann, "Opening Remarks," Fourth cash symposium of the Deutsche Bundesbank, Frankfurt am Main, February 14, 2018. <https://www.bis.org/review/r180226a.htm>
- 51 On the unit of account and the cash system as a public good, see M. Davoodalhosseini and F. Rivadeneira, *Ibid.*, p. 18-19. <https://www.bankofcanada.ca/wp-content/uploads/2018/04/SDP-2018-5.pdf>; see also Tommaso Mancini-Griffoli, et al., "Casting Light on Central Bank Digital Currency," *Ibid.* p. 10. <https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2018/11/13/Casting-Light-on-Central-Bank-Digital-Currencies-46233>
- On the use of money as a public good, see James Chapman and Carolyn A. Wilkins, *Ibid.*, p. 18. <https://www.bankofcanada.ca/wp-content/uploads/2019/02/sdp2019-1.pdf>
- 52 Aleksí Grym, "The Great Illusion of Digital Currencies." *BoF Economics Review* (1) 2018. https://helda.helsinki.fi/bof/bitstream/handle/123456789/15564/BoFER_1_2018.pdf; for the term "data object," see Brett Scott, "State of Power 2019. Gentrification of Payments: Spreading the Digital Financial Net." *TNI Longreads*. <http://longreads.tni.org/state-of-power-2019/digital-payment-gentrification/>
- 53 Aleksí Grym, *Ibid.*, p. 5.
- 54 Grym, *Ibid.*, p. 5.
- 55 Grym, *Ibid.*, p. 5.
- 56 For discussions of the potential user experience of a central bank digital currency (CBDC), see especially Tanai Khaonarong and David Humphrey, "Cash Use Across Countries and the Demand for Central Bank Digital Currency." *IMF Working Paper* 19/46 March 1, 2019. <https://www.imf.org/en/Publications/WP/Issues/2019/03/01/Cash-Use-Across-Countries-and-the-Demand-for-Central-Bank-Digital-Currency-46617>; Heike Mai, "Why would we use crypto euros? Central Bank-Issued Digital Cash—A User Perspective." *EU Monitor*. Deutsche Bank Research. February 15, 2018. https://www.dbresearch.com/PROD/RPS_EN-PROD/PROD000000000462095/Why_would_we_use_crypto_euros%3F_Central_bank-issued.pdf
- 57 "However, the fact that a CBDC would compete with bank deposits and provide safe haven is a doubled-edged sword. Currently, there is a tension between the use of physical cash and other interest-bearing liquid financial assets as a store of value, in large part because of the storage costs of bank notes. This tension helps determine the demand for bank deposits relative to cash. The introduction of a CBDC could fundamentally change the demand for bank deposits, both in normal times and during a financial crisis. This change would depend on the design of a CBDC and the sensitivity of demand deposits to the interest rate." James Chapman and Carolyn A. Wilkins, *Ibid.*, p. 21. <https://www.bankofcanada.ca/wp-content/uploads/2019/02/sdp2019-1.pdf>

- 58 See Tanai Khiaonrong and David Humphrey, *Ibid.*, p. 29-30. <https://www.imf.org/en/Publications/WP/Issues/2019/03/01/Cash-Use-Across-Countries-and-the-Demand-for-Central-Bank-Digital-Currency-46617>
- 59 See especially Bank of Israel, *Ibid.*, and Heike Mai, *Ibid.*
- 60 According to a number of analysts, the creation of a central bank digital currency (CBDC) does not guarantee the effectiveness of negative interest rates as a monetary policy tool, even if cash were to be replaced, which many see as unlikely and problematic. See, for example, number 27, p. 15, and number 56, p. 27, in Tommaso Mancini-Griffoli, et al., "Casting Light on Central Bank Digital Currency," *Ibid.* <https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2018/11/13/Casting-Light-on-Central-Bank-Digital-Currencies-46233>; see Noriyuki Yanagawa and Hiromi Yamaoka, "Digital Innovation, Data Revolution and Central Bank Digital Currency," Bank of Japan Working Paper No 19-E-2, February 2019; p. 15–16. http://www.boj.or.jp/en/research/wps_rev/wps_2019/data/wp19e02.pdf. Larry White notes that "a tax on holding money of all kinds may not prompt the public to spend more on final goods, but rather prompt them to attempt to preserve their wealth by shifting it out of negative-yielding deposit and currency balances and into nonfinancial assets like gold and other commodities. In the process, the banking system will shrink in real terms, which will constrain rather than stimulate real investment." Larry White, "The Zero Lower Bound is No Reason to Punish Currency Users." *Alt-M.* March 28, 2019. <https://www.alt-m.org/2019/03/28/the-zero-lower-bound-is-no-reason-to-punish-currency-users/>
- 61 Agustín Carstens, "Digital Currencies: Implications for Central Banks." The Brookings Institution. Washington, D. C. April 17, 2018. <https://www.brookings.edu/events/digital-currencies-implications-for-central-banks/>
- 62 Deconomy 2018 Panel Discussion, "Central Bank Digital Currency and its Future." July 10, 2018 (Distributed Economy). Remarks starting around minute mark 26:00. <https://www.youtube.com/watch?v=Vg-Agxi5Ys8> See also: <https://www.linkedin.com/in/lewisantony/?originalSubdomain=sq>
- 63 IMF Spring 2019 Meetings, Washington DC. Panel, "Money and Payments in the Digital Age." April 10, 2019. Remarks at minute mark 40:00–42:33. <https://www.youtube.com/watch?v=eRkOsbEyNpA&app=desktop>
- 64 Bill Maurer, "Money Talks." *Aeon.* December 14, 2015. <https://aeon.co/essays/how-money-evolved-from-shells-and-coins-to-apps-and-bitcoin>; Stephen Rea and Taylor Nelms interview: "An Anthropological Conversation about Mobile Money and Financial Technologies." *The Human Show*, Episode 12, May 15, 2018. <https://simplecast.com/s/12097be2f?m=0n0s>
- 65 Paul Van der Knaap, Taco de Vries, and Ewout Boesenach, *G4S World Cash Report 2018*, p. 14–15. <https://www.g4s.com/media-centre/news/2018/04/17/global-cash-report>
- 66 See box 1, p. 16, Tanai Khiaonrong and David Humphrey, *Ibid.* <https://www.imf.org/en/Publications/WP/Issues/2019/03/01/Cash-Use-Across-Countries-and-the-Demand-for-Central-Bank-Digital-Currency-46617>
- 67 Van der Knaap et al., *Ibid.*
- 68 Van der Knaap, *Ibid.*, p. 21.
- 69 See, for example, IMTFI Fellow Janet Arnado's work on women's savings practices in the Philippines, featured in DG McCullough, "Saving for a rainy day: in alternative ways: part 1," *The Guardian Visa Partner Zone*, December 21, 2015. <https://www.imtfi.uci.edu/featuredarticles/0.pdf>. For an example of savings tips in cash as a budgeting method, see Bill Maurer and Melissa Wrapp, Slide Presentation: "The Lessons Fintech Apps Teach...Or don't." Research Event: The Future of Trust: How Technology will Make it or Break it for your Credit Union. May 29, 2019. Filene Center of Excellence for Emerging Technology. https://filene.org/assets/images/layout/Future-of-Trust2_Maurer-and-Wrapp.pdf
- 70 See, for example, the 2017 Swiss National Bank Survey on Payment Methods. https://www.snb.ch/en/i/about/cash/id/paytrans_survey_2
- 71 Henk Esselink and Lola Hernández (2017). "The Use of Cash by Households in the Euro Area." ECB Occasional Paper Series no 201/Nov 2017. https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op201_en.pdf
- 72 Oz Shy, "How the ATM Affects the Way We Pay." Federal Reserve Bank of Atlanta. Working Paper 2019-02 February 2019. <https://www.frbatlanta.org/-/media/documents/research/publications/wp/2019/02-how-the-atm-affects-the-way-we-pay-2019-02-25.pdf>
- 73 Shy, *Ibid.*, p. 7.
- 74 Shy, *Ibid.*, p. 12.
- 75 Shy, *Ibid.*, p. 12.
- 76 Shy, *Ibid.*
- 77 Upenyu Sakarombe and Namatirai Dziva Marabada, "Electronic Money or Cash? In Face of Liquidity Crisis in Zimbabwe," *International Journal of Academic Research in Business and Social Sciences.* 2017, Vol. 7, No. 11: 63-73. http://hrmars.com/hrmars_papers/Electronic_Money_or_Cash_In_Face_of_Liquidity_Crisis_in_Zimbabwe.pdf
- 78 Sakarombe and Marabada, *Ibid.*, p. 71.
- 79 Sakarombe and Marabada, *Ibid.*, p. 71.
- 80 Brett Scott, *Euromoney* podcast: "Going Cashless." Treasury and Turbulence Citi. March 28, 2019. <https://www.euromoney.com/podcasts/treasury-and-turbulence>
- 81 All quotes from the Libra white paper: <https://libra.org/en-US/white-paper/>
- 82 For an overview of these research insights, see Bill Maurer, Smoki Musaraj, and Ivan V. Small, eds. *Money at the Margins: Global Perspectives on Technology, Financial Inclusion, and Design.* New York: Berghahn Books, 2018. <http://www.berghahnbooks.com/title/MaurerMoney>; see also interview with the editors here: <https://www.socsci.uci.edu/newsevents/news/2019/06-13-money-at-the-margins.php>; and Stephen C. Rea and Taylor C. Nelms, "Mobile Money: The First Decade." IMTFI Working Paper 2017-1. https://www.imtfi.uci.edu/files/docs/2017/Rea_Nelms_Mobile%20Money%20the%20First%20Decade%202017_3.pdf
- 83 For Ghana, see Vivian Dzikoto and John Kojo Aggrey, "[Dis]Trust in Mobile Money in Ghana: Yesterday, Today, and Tomorrow." IMTFI Blog, November 22, 2017. <http://blog.imtfi.uci.edu/2017/11/distrust-in-mobile-money-in-ghana.html>; for Zambia see Vivian Dzikoto and Mwiya Imasiku, "Cashless or Cashlite? Mobile Money Use and Currency Redenomination in Zambia." IMTFI Final Report, 2016. <https://www.imtfi.uci.edu/research/2013/Zambia%20Report%20Dzikoto%20and%20Imasiku%20final.pdf>; see also "Cashlite or Cashless? It depends on the financial Ecosystem." IMTFI Blog. <http://blog.imtfi.uci.edu/2016/07/cashlite-or-cashless-it-depends-on.html>; for Ecuador, see: Taylor C. Nelms, "Dollarization, Denomination, and Difference: Rounding Up in Quito, Ecuador." Unpublished manuscript, n.d.
- 84 See Chapurukha Kusimba, "When— and why — did people first start using money?" *The Conversation*, June 19, 2017. <https://theconversation.com/when-and-why-did-people-first-start-using-money-78887>; Bill Maurer, "Teaching about Money's Origins—and its possible cryptographic futures—with Proto-cuneiform." *Crewsproject* Blog, February 11, 2019. <https://crewsproject.wordpress.com/2019/02/11/teaching-about-moneys-origins-and-its-possible-cryptographic-futures-with-proto-cuneiform/>; Rachel O'Dwyer, "Cache Society: Transactional Records, Electronic Money, and Cultural Resistance." *Journal of Cultural Economy*, 2018. <https://doi.org/10.1080/17530350.2018.1545243>
- 85 Bill Maurer, "On the Media: Money then and Now." IMTFI Blog, October 23, 2018. <http://blog.imtfi.uci.edu/2018/10/on-media-money-then-and-now.html>; Vivian Dzikoto and John Kojo Aggrey, "[Dis]Trust in Mobile Money in Ghana: Yesterday, Today, and Tomorrow." IMTFI Blog. November 22, 2017. <http://blog.imtfi.uci.edu/2017/11/distrust-in-mobile-money-in-ghana.html>
- 86 Jennie Golding "Cash may be going out of fashion, but children still need to understand how money works." *IOE London* Blog, May 1, 2019. <https://ioelondonblog.wordpress.com/2019/05/01/cash-may-be-going-out-of-fashion-but-children-still-need-to-understand-how-money-works/>

- 87 Golding, *Ibid.*
- 88 Paul Solomon, NPR: "How Kids are adapting to a cashless culture." PBS News Hour. May 7, 2019. <https://www.pbs.org/newshour/show/how-kids-are-adapting-to-a-cashless-culture>
- 89 Paul Solomon, NPR: "How Kids are adapting to a cashless culture." *Ibid.*
- 90 Solomon, *Ibid.*; see also Cecilia Kang, "Consumer Groups accuse Facebook of Duping Children," *The New York Times*, Feb. 21, 2019. <https://www.nytimes.com/2019/02/21/technology/facebook-children-privacy.html>
- 91 Mesfin F. Woldmariam, Gheorghita Ghinea, Solomon Atnafu, and Tor-Morten Groenli, "Monetary Practices of Traditional Rural Communities in Ethiopia: Implications for New Financial Technology Design." *Human-Computer Interaction* 2016 31 (6): 473–517. <https://www.tandfonline.com/doi/abs/10.1080/07370024.2016.1139461>
- 92 Woldmariam et al., *Ibid.*; p. 501.
- 93 Woldmariam et al., *Ibid.*; p. 481.
- 94 Vivian Dzikoto and John Kojo Aggrey, "(Dis)Trust in Mobile Money in Ghana: Yesterday, Today, and Tomorrow." IMTFI Blog, November 22, 2017. <http://blog.imtfi.uci.edu/2017/11/distrust-in-mobile-money-in-ghana.html>
- 95 Dzikoto and Aggrey, *Ibid.*
- 96 Nelms, "Dollarization, Denomination, and Difference: Rounding Up in Quito, Ecuador." *Ibid.*; Taylor C. Nelms and Ursula Dalinghaus, "Social life of Denomination." Unpublished Manuscript, n.d.
- 97 Nelms, *Ibid.*
- 98 Aysha Khan, "Andrew Jackson Rebellion: Church stamps Harriet Tubman's image on \$20 bills." UPI, June 4, 2019. https://www.upi.com/Top_News/US/2019/06/04/Andrew-Jackson-rebellion-Church-stamps-Harriet-Tubmans-image-on-20-bills/5081559661475/
- 99 DeNen L. Brown, "Harriet Tubman is already appearing on \$20 bills whether Trump officials like it or not." *The Washington Post*, May 23, 2019. https://www.washingtonpost.com/history/2019/05/24/harriet-tubman-is-already-appearing-bills-whether-trump-officials-like-it-or-not/?hpid=hp_hp-top-table-main-trump-bills%3Aharriet-tubman%3Ahomepage%2Ft&hpid=hp_hp-top-table-main-trump-bills%3Aharriet-tubman%3Ahomepage%2Ft
- 100 Oz Shy, "How the ATM Affects the Way We Pay." *Ibid.*
- 101 BBC Series Money and Power, "What would you do with \$100?" December 23, 2018. <https://www.bbc.co.uk/programmes/w3csxgp5>
- 102 Amy Goodman, "Paper Delivery: A Conversation about the Atlanta Fed's Cash Operations." Federal Reserve Bank of Atlanta, February 22, 2018. <https://www.frbatlanta.org/podcasts/transcripts/economy-matters/180222-atlanta-feds-cash-operations.aspx>
- 103 Goodman, *Ibid.*
- 104 Morten Wendelbo, "3 Reasons why the US is vulnerable to big disasters." *The Conversation*, July 2, 2018. <https://theconversation.com/3-reasons-why-the-us-is-vulnerable-to-big-disasters-97592>
- 105 G+D Currency Technology, "Predict the Unpredictable." <https://www.gi-de.com/en/de/currency-technology/trends/digitalization-across-the-cash-cycle/predict-the-unpredictable/>
- 106 Gary Pritchard, John Vines, and Patrick Oliver, "Your Money's no Good Here: The Elimination of Cash Payment on London Buses." *CHI* 2015, April 18–23, 2015: 907-916. <https://dl.acm.org/citation.cfm?doid=2702123.2702137>
- 107 Pritchard et al., *Ibid.*, p. 915.
- 108 Pritchard et al, *Ibid.*, see p. 911 and 915.
- 109 Pritchard et al., *Ibid.*, p. 914.
- 110 Bernardo Batiz-Lazo and Prachandra Shakya, "Unused £321m trapped on dormant Oyster cards – and time may be running out to get it back." *The Conversation*, July 17, 2018. <https://theconversation.com/unused-321m-trapped-on-dormant-oyster-cards-and-time-may-be-running-out-to-get-it-back-99558>
- 111 Batiz-Lazo and Shakya, *Ibid.*
- 112 Sky News. "Commuters warned of £321m dormant Oyster card 'cash mountain.'" *Sky News UK*, June 30, 2018. <https://news.sky.com/story/dormant-oyster-card-cash-mountain-totals-321m-11421714>
- 113 Batiz-Lazo and Shakya, *Ibid.*
- 114 C. P. Chandrasekhar and Jayati Ghosh, "The Financialization of Finance? Demonetization and the Dubious Push to Cashlessness in India." *Development and Change*, 2017 49 (2): 420-431, p. 425. <https://doi.org/10.1111/dech.12369>
- 115 Chandrasekhar and Ghosh, *ibid.*, p. 425.
- 116 Vidhi Doshi, "Women bear the brunt as finances and families are undone by India's Cash Crisis." *The Guardian*, December 22, 2016. <https://www.theguardian.com/global-development/2016/dec/22/india-cash-crisis-women-bear-brunt-finances-families-undone>; Ursula Dalinghaus, Nima Lamu Yolmo, and Janaki Srinivasan, "Special Perspectives Series on Demonetization in India – Insights, Challenges, and Ways Forward." February 22, 2017. http://blog.imtfi.uci.edu/2017/02/special-perspectives-series-on_22.html; Jilinskaya-Pandey, Mariya and Nicolas de Zamaroczy, "From that day onwards, I decided that I would never again be in such a helpless state: how North Indian women safeguard their money in times of uncertainty." *Conversation: International Feminist Journal Of Politics* 2019 (21);2, 334–342. <https://www.tandfonline.com/doi/full/10.1080/14616742.2019.1583071>
- 117 Nishant Saxena. "Demonetisation death toll: 90 people and counting as note ban takes tragic turn." *Catch News*, Dec. 9, 2016. <http://www.catchnews.com/national-news/deaths-due-to-demonetisation-since-8-nov-here-s-a-list-of-the-casualties-of-pm-modi-s-note-ban-1480484645.html>
- 118 PTI, "No official report on deaths due to demonetisation: Government." *The New Indian Express*. March 17, 2017. <http://www.newindianexpress.com/nation/2017/mar/17/no-official-report-on-deaths-due-to-demonetisation-government-1582474.html>
- 119 Nina Robinson/BBC World News, "India's Cashless Economy." April 23, 2017 <http://www.bbc.co.uk/programmes/p0504qs3>
- 120 Chandrasekhar and Ghosh, *Ibid.*
- 121 Chandrasekhar and Ghosh, *Ibid.*, p. 424.
- 122 "The Economic Survey 2016/17 says note ban reduced GDP growth by up to 0.5 per cent in fiscal year 2017." *Indian Express*, January 1, 2017, cited in "A Timeline of India's Cash Ban: A man-made currency crisis one year later." *Cash Matters Blog*, December 11, 2017. <https://www.cashmatters.org/blog/cost-indias-man-made-currency-crisis/>; Chandrasekhar and Ghosh write: "While it did not meet its stated goals, the move did result in major disruption of the economy, loss of jobs and incomes, and considerable material distress (Ghosh et al., 2017; Reddy, 2017). Since more than 95 per cent of transactions were estimated to occur in cash before this move, the result was the expropriation of purchasing power for a considerable period of time, which froze a number of markets, diminished demand, disrupted economic activity and led to loss of livelihood and employment. Even the government's own Economic Survey (Ministry of Finance, 2017) recognized that the shortage of cash constrained economic activity for some time and noted evidence of distress, for example in increased demand for work in the rural employment scheme. While official 'quick estimates' of GDP do not adequately capture informal activities that account for at least 85 per cent of the work force, even they suggested a significant deceleration in economic activity, from annual growth of 7.5 per cent in July–September 2016 to 5.7 per cent in April–June 2017 (CSO, 2017). The impact on employment and livelihoods will only be known with the release of large employment survey data, expected in late 2018; however, quick surveys done by private agencies have found significant job losses (Vyas, 2017)." C. P. Chandrasekhar and Jayati Ghosh, *Ibid.*, p. 425.

- 123 Chandrasekhar and Ghosh, *Ibid.*, p. 423.
- 124 Chandrasekhar and Ghosh, *Ibid.*, p. 426.
- 125 Chandrasekhar and Ghosh, *Ibid.*, p. 432. "Even when these charges appear to be relatively low, they can add up with multiple transactions. Since the poor are more likely to make many small purchases, and typically cannot afford to buy or store purchases made in bulk, they suffer more from these charges and end up paying a non-negligible amount simply for transacting, implying a transfer from their incomes to the profits of the banks and fintech companies."
- 126 Chandrasekhar and Ghosh, *Ibid.*, p. 429.
- 127 Chandrasekhar and Ghosh, *Ibid.*, p. 432–433. See also "India's cash crisis 2 years later." *Cashmatters.org*, November 13, 2018. <https://www.cashmatters.org/blog/indias-cash-crisis-2-years-later/>
- 128 Dana Kornberg, "Why a 'cashless' society would hurt the poor: A lesson from India." *The Conversation*, June 26, 2017. <https://theconversation.com/why-a-cashless-society-would-hurt-the-poor-a-lesson-from-india-79735>
- 129 Kornberg, *Ibid.*
- 130 Kornberg, *Ibid.*
- 131 Christophe J. Nordman and Isabelle Guérin. "The Shock of Indian Demonetisation: A Failed Attempt to Formalise the Economy." *The Conversation*, April 3, 2018. <https://theconversation.com/the-shock-of-indian-demonetisation-a-failed-attempt-to-formalise-the-economy-93328>
- 132 Summarizing Christophe J. Nordman and Isabelle Guérin's argument, *Ibid.*
- 133 Reserve Bank of India Press Release, "RBI to Issue New Design ₹ 100 Denomination." July 19, 2018. https://rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=44533
- 134 Nupur Anand, "Indian ATMs could run dry – yes, again." *Quartz India*, July 23, 2018. <https://qz.com/india/1333660/new-rs100-notes-could-leave-indias-atms-cashless-again/>
- 135 Anand, *Ibid.*
- 136 Ryan Browne, "People in Sweden barely use Cash – and that's sounding alarm bells for the country's central bank." *CNBC*, May 2, 2018. <https://www.cnbc.com/2018/05/03/sweden-cashless-future-sounds-alarm-bells-for-the-central-bank.html>; See also Sveriges Riksbank, "Payment Patterns in Sweden 2018." <https://www.riksbank.se/globalassets/media/statistik/betalningsstatistik/2018/payments-patterns-in-sweden-2018.pdf>
- 137 "Tryggad tillgång till kontanter," report by the Riksbank Committee, March 2018, p. 21. <https://www.regeringen.se/rattsliga-dokument/statens-offentliga-utredningar/2018/06/sou-201842/>
- 138 For a step-by-step view of how Swish works, as well as a comparison of Swish and iZettle, see Etienne Brunet, "Swish, the secret Swedish FinTech payment company created by Nordic banks and used by 50% of Swedes is challenging unicorns." *Medium.com.*, January 8, 2017. <https://medium.com/@etiennibr/swish-the-secret-swedish-fintech-payment-company-created-by-nordic-banks-and-used-by-50-of-swedes-cfc06f59d6f>
- 139 Van der Knaap et al., *Ibid.*, p. 78–79.
- 140 *The Irish Times*, "Sweden's push to get rid of cash has some saying, 'not so fast!'" November 21, 2018. <https://www.irishtimes.com/business/financial-services/sweden-s-push-to-get-rid-of-cash-has-some-saying-not-so-fast-1.3705912>
- 141 Survey conducted by Sifundersökningen. 'Sju av tio vill ha kvar kontanter!' Commissioned by Bankomat AB; up 4 percent from the same study 2018. <https://bankomat.se/wp-content/uploads/2019/03/Sifunders%C3%B6kning-Bankomat-2019.pdf>
- 142 If Crisis or War Comes: <https://www.msb.se/Upload/Forebyggande/Krisberedskap/Krisberedskapsveckan/Fakta%20om%20broschyren%20Om%20krisen%20eller%20Kriget%20kommer/If%20crises%20or%20war%20comes.pdf>; see also "What's Inside Sweden's 'Prepare for War' Manual?" *The Week*, May 22, 2018. <https://www.theweek.co.uk/93765/what-s-inside-sweden-s-prepare-for-war-survival-manual>
- 143 "Tryggad tillgång till kontanter," report by the Riksbank Committee, March 2018. <https://www.regeringen.se/rattsliga-dokument/statens-offentliga-utredningar/2018/06/sou-201842/>
- 144 "Allied Wallet adds WeChat Pay with 900 Million Active Users." *Mobile Paymentstoday*, October 12, 2018. <https://www.mobilepaymentstoday.com/news/allied-wallet-adds-wechat-pay-with-900-million-active-users/>
- 145 Not only individual citizens, but also all legal entities (companies and public institutions are included), each with a corresponding 18-digit ID or Unified Social Code. Severin Engelmann, Mo Chen, Felix Fischer, Ching-Yu Kao, and Jens Grossklags. "Clear Sanctions, Vague Rewards: How China's Social Credit System Currently Defines 'Good' and 'Bad' Behavior." In FAT* '19: Conference on Fairness, Accountability, and Transparency (FAT* '19), January 29–31, 2019, p. 29. <https://www.cybertrust.in.tum.de/fileadmin/w00bzf/www/papers/2019-FAT-Engelmann-Chen.pdf>
- 146 Engelmann et al., *Ibid.*, p. 30.
- 147 Nicole Kobie, "The Complicated Truth about China's Social Credit System." *WIRED*, January 21, 2019. <https://www.wired.co.uk/article/china-social-credit-system-explained>
- 148 Mac Síthigh, Daithí and Mathias Siems, "The Chinese Social Credit System: A Model For Other Countries?" *EUI Working Paper LAW 2019/01*, p. 12. http://cadmus.eui.eu/bitstream/handle/1814/60424/LAW%20_%202019%20_%2001.%20.pdf?sequence=1&isAllowed=y
- 149 See Rogier Creemers, "China's Social Credit System: An Evolving Practice of Control." *Working Paper 9 May 2018*. <https://ssrn.com/abstract=3175792>
- 150 Kobie, *Ibid.*
- 151 Kobie, *Ibid.*
- 152 Brett Scott, "Gentrification of Payments," *Ibid.*
- 153 Engelmann et al., *Ibid.*, p. 30.
- 154 Jose van Dijck, cited in Gladys Pak Lei Chong, "Cashless China: Securitization of everyday life through Alipay's social credit system—Sesame Credit." *Chinese Journal of Communication*, March 12, 2019. p. 4; see also p. 9. <https://doi.org/10.1080/17544750.2019.1583261>
- 155 Chong, *Ibid.*, p. 13–14.
- 156 Kristin Shi-Kupfer and Mareike Ohlberg, "China's Digital Rise: Challenges for Europe." *Merics No 7*, April 2019, p. 41. https://www.merics.org/sites/default/files/2019-04/MPOC_No.7_ChinasDigitalRise_web_3.pdf
- 157 Shi-Kupfer and Ohlberg, *Ibid.*, p. 41.
- 158 Brett Scott, "Gentrification of Payments," *Ibid.*
- 159 Viviana Zelizer, *The Social Meaning of Money: Pin Money, Paychecks, Poor Relief, and other Currencies*. New York: Basic Books, 1994, p. 124. <https://press.princeton.edu/titles/11007.html>
- 160 Melissa Davey, "Shop owner says cashless welfare card has left him \$100,000 short." *The Guardian*, May 4, 2017. <https://www.theguardian.com/australia-news/2017/may/05/shop-owner-says-cashless-welfare-card-has-left-him-100000-short>; Melissa Davey, "'Ration days again': cashless welfare card ignites shame." *The Guardian*, Jan. 8, 2017. <https://www.theguardian.com/australia-news/2017/jan/09/ration-days-again-cashless-welfare-card-ignites-shame>

- 161 "Stick Together, No Dignity in Cashless Welfare." 3CR Community Radio, May/June 2017. <https://player.fm/series/stick-together/no-dignity-in-cashless-welfare>
- 162 Davey, "Shop owner says cashless card has left him \$1000,000 short," Ibid.
- 163 Rosemarie Lentini, "Cashless Debit Card: What you need to know as Welfare trials roll out in Queensland." Nine.com.au, January 28, 2018. <https://finance.nine.com.au/personal-finance/welfare-cashless-card-rolls-out-in-queensland-explained/82199bc3-9f43-45d9-83b1-09eeefa29f36>
- 164 Kate Coddington, "The Slow Violence Of Life Without Cash: Borders, State Restrictions, And Exclusion In The U.K. And Australia." Geographical Review 2018, p. 1–17. <https://onlinelibrary.wiley.com/doi/abs/10.1111/gere.12332>
- 165 Carnet and others 2014, 42; cited in Coddington, Ibid., p. 9.
- 166 Coddington, Ibid., p. 9.
- 167 Coddington, Ibid., p. 8.
- 168 Coddington, Ibid., p. 11.
- 169 Coddington, Ibid., p. 14. In contrast, UNHCR USA recognizes the importance of cash-based assistance as synonymous with the "power of choice." Over a two-year period UNHCR assisted "10.5 million people in 94 countries, and now provides more cash than in-kind aid. With access to grants in cash, internally displaced and stateless people are able to meet their needs with dignity, while benefiting from the protections and resilience that cash in hand makes possible. For example, recipients at Tabareybarey refugee camp can withdraw cash from mobile phones to spend in the camp as well as in the local community. Roger Heyn, UNHCR associate programme officer for cash assistance in Niger, West Africa, explains that cash assistance "is more cost effective, it gives refugees dignity of choice, and it has a very positive impact on the local economy. So it benefits the refugees and the host economy at the same time." UNHCR USA, Cash assistance gives refugees the power of choice." August 28, 2018. <https://www.unhcr.org/news/stories/2018/8/5b6c40f04/cash-assistance-gives-refugees-power-choice.html>
- 170 Deborah James, "Obligations, Repayments and Regulations: The Debt Conundrum in the Global South." The Conversation, Nov. 4, 2015. <https://theconversation.com/obligations-repayments-and-regulations-the-debt-conundrum-in-the-global-south-50162>
- 171 Brett Scott refers to a "gentrification of payments." Brett Scott, "State of Power 2019. Gentrification of Payments: Spreading the Digital Financial Net." TNI Longreads. <http://longreads.tni.org/state-of-power-2019/digital-payment-gentrification/>; For an overview of cashless initiatives in the US, see Kate Fitzgerald, "The 10 places where the U.S. wants to mandate cash." PaymentsSource. March 29 2019. <https://www.paymentsource.com/list/the-10-places-where-the-us-wants-to-mandate-cash?tag=00000157-686c-dfbc-a35f-fcec2cd80000>
- 172 Knowledge @ Wharton, "Show Me the Money: Does Going Cashless hurt Financial Inclusion?" Podcast, May 12, 2019. <https://knowledge.wharton.upenn.edu/article/cashless-stores-philadelphia/>
- 173 Elisabeth Rhyne, "Financial Inclusion Backlash in Uruguay." CFI Blog, April 24, 2019. <https://www.centerforfinancialinclusion.org/financial-inclusion-backlash-in-uruguay>
- 174 "Pro-cash petitions protesting Uruguay's cashless law." Cash Matters Blog, May 28, 2019. <https://www.cashmatters.org/blog/2-pro-cash-petitions-protesting-uruguays-cashless-law-ley-de-inclusion-financiera/>
- 175 Rhyne, Ibid.
- 176 Pierre Lemieux, "In Defense of Cash," The Library of Economics and Liberty, October 3, 2016. <http://www.econlib.org/library/Columns/y2016/Lemieuxcash.html>
- 177 Ursula Dalinghaus, Keeping Cash, p. 43. <https://www.cashmatters.org/blog/cash-matters-white-paper-keeping-cash-assessing-the-arguments-about-cash-and-crime/>
- 178 Ursula Dalinghaus, "When Cash is the Tie that Binds – Denominating Affective Monetary Attachments in Germany and the Euro Zone." Unpublished Manuscript, n.d.
- 179 Mario Draghi, "Issuance of the new 50 euro note." April 4, 2017. <https://www.ecb.europa.eu/press/key/date/2017/html/sp170404.en.html>
- 180 Sakarombe and Marabada, "Electronic Money or Cash? In Face of Liquidity Crisis in Zimbabwe," Ibid., p. 71.
- 181 Taylor Nelms, "Ecuador Bans Bitcoin! A Monetary Mix-Up." The King's Review, October 20, 2015. <http://kingsreview.co.uk/articles/ecuador-bans-bitcoin-a-monetary-mix-up/>
- 182 Brett Scott, "Gentrification of Payments," Ibid.



IMTFI

INSTITUTE FOR MONEY, TECHNOLOGY
& FINANCIAL INCLUSION

University of California, Irvine

School of Social Sciences

3151 Social Sciences Plaza

Irvine, CA 92697-5100

tel: (949) 824-2284 fax: (949) 824-2285

email: imtfi@uci.edu website: imtfi.uci.edu





Cash
Matters[®]