

Discussion Paper

The Future of Cash

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DP 20-03

September 2021

<https://doi.org/10.21799/frbp.dp.2021.03>

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Abstract

In many advanced economies around the world, the share of transactions conducted using cash payments has been falling over the past several years. This change has likely been because of a combination of shifting consumer tastes, improvements in payment technology (specifically credit and debit cards), and the rapid growth of online transactions. As the decline in the cash share has led to some businesses choosing not to accept cash payments, many policymakers have discussed interventions to ensure access to the modern economy for consumers who prefer to pay in cash. Despite the reduced use of cash as a means of payment, currency in circulation has continued to increase in many countries, including the United States. This increase suggests that cash is still providing utility as a store of value. This paper surveys literature and data on the use of cash as a means of payment and discusses how and why the cash share is falling in the United States and around the world. Furthermore, it also discusses the opportunities and challenges of a transition away from cash for consumers, businesses, and society.

Keywords: cashless society, cash payments, electronic payments

JEL Classification Codes: E42; G20; G21

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I want to thank Bob Hunt, Julia Cheney, Kyle Mangum, Jason Keegan, and Adam Steinberg for their extremely helpful comments on the paper, as well as Brian Prescott and Shaun O'Brien for their assistance working with the Diary of Consumer Payment Choice Data.

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I. Introduction

In March 2019, the City of Philadelphia passed an ordinance requiring almost all retail stores to accept cash payments (Lieber, 2019). Similar regulations have since been enacted in cities and states across the country, with more likely to follow. Over the last few years, there have been discussions in legislatures and newspapers worldwide on the subject of whether to require retail stores to accept cash payments, and the continued impact of COVID-19 has given policymakers and academics an extra variable to think about when discussing the causes and impacts of changing payment behaviors.¹ Therefore, it is worth understanding how quickly payment shares are changing and the distributional effects of these shifts.

According to the Federal Reserve Diary of Consumer Payment Choice (Diary), in the period of 2016–2019 alone, the share of payments made in cash in the United States fell from 31 percent to 26 percent (Greene and Schuh, 2017, and Greene and Stavins, 2020).² Presumably, this decline is not a direct result of cash of becoming more burdensome for consumers or businesses at the margin (although it is likely that when cash usage falls sufficiently, the fixed cost of maintaining cash could become more burdensome). In fact, cash has become easier to count and handle because of automation and other technological improvements. Yet, while the experience of a cash user at the margin hasn't changed, the relative benefit of using cash has fallen because of improved outside options. Spending using credit and debit cards has surged in popularity. In the United States, banks are aggressively marketing payment cards to consumers, using tactics such as credit card rewards programs and low interest rates. Additionally, using cards to make payments has become more convenient over time as payment card systems have improved and contactless payment options have become more widespread.

Many policymakers have expressed concern about the distributional and equity impacts of the shift from cash, despite the fact the United States is a highly banked country. Over 93 percent of Americans have access to either a general purpose credit or charge card or a debit card, and close to 97 percent of Americans have some sort of relationship with at least one financial institution (according to the 2016 Federal Reserve Survey of Consumer Finance).³ Nevertheless, a 2019 FDIC survey notes that about 5 percent of U.S. households do not have a checking or savings account at a bank, representing about 7 million households — a sizable total of individuals who rely on access to cash payments.⁴

Policymakers, researchers, and advocates have long sought to better understand and mitigate the roadblocks preventing access for some to the banking system. The optimal policy response likely

¹ See Engert, Fung, and Sengendorf, 2019; Alderman, 2018; or Access to Cash Review, 2019, for instance.

² In 2020, this share fell to 19 percent (Coyle, Kim, and O'Brien, 2021), likely because of the impacts of the COVID-19 pandemic on consumer behavior. When this paper was written, it is unclear how much of this impact is transitory; this paper will continue to use statistics as of 2019, except when discussing the impacts of COVID-19 on cash, in particular.

³ See Board of Governors of the Federal Reserve System, 2016.

⁴ See Federal Deposit Insurance Corporation, 2020.

depends on what these roadblocks are; if participation in the modern economy relies on access to the banking system, it is vital to take steps to ensure that this access is available to all.⁵

Additionally, while the data show how cash is being displaced as a payment method, it remains remarkably consistent in its function as a store of value. The Diary shows that while only about one-fifth of Americans store cash outside of what they carry with them daily, those who do store an average value of \$1,100 in cash holdings. Moreover, the total cash in circulation has grown substantially in the United States in recent years, more than doubling in nominal terms between 2007 and 2018, causing an increase in the cash-to-GDP ratio of almost 50 percent in that period (Armelius, Claussen, and Reslow, 2020).⁶ As long as there is interest in keeping savings in cash, it will continue to have an important role in the economy.

In this paper, I describe in detail why and how the cash payment share is falling using research from various countries. I then discuss who benefits and who is harmed by an economy that reduces or eliminates cash. Finally, I discuss whether cash has a future as a means of payment and how policymakers can prepare for a world in which it does not.

II. How Cash Payments Are Changing

The Diary provides helpful background on the role of cash in today's world. To produce these data, approximately 3,000 individuals are asked to fill out a survey documenting their spending for three consecutive days.⁷ The results from the Diary are useful for understanding how people tend to acquire, hold, and use cash as well as other means of payment. The Diary demonstrates that cash, credit, and debit card purchases make up most transactions, roughly in equal amounts. However, consumers do not treat these as perfect substitutes. For example, even when all options are available, consumers tend to use credit cards, debit cards, and cash for different types of purchases. This disparity is found both within and across consumers. For a given consumer, cash purchases tend to be used for lower-value purchases compared with card payments. Although the median debit card purchase is \$25 and the median credit card purchase is \$28, the median cash purchase is only \$10. Thus, while cash is used for 26 percent of all transactions, it only represents 6 percent of the value of total purchases. Additionally, the Diary shows that different consumers have different preferences, which can correspond to certain demographics. For example, younger and older consumers use cash more, compared with middle-aged consumers.

⁵ The issue of economic access for unbanked Americans has broader importance. For instance, in May 2020, as economic impact payments in response to the COVID-19 pandemic were being rolled out, Cheung (2020) noted that those without bank accounts would have to wait longer than those with them to receive the payments.

⁶ See also Ashworth and Goodhart (2020).

⁷ The full questionnaire can be found on the Federal Reserve Bank of Atlanta website. Additional information can also be found in Kim, Kumar, and O'Brien (2020).

While the Diary is a useful starting point, it is worth corroborating its results with other sources. Wang and Wolman (2018) use data from an unidentified national retail chain to see how much the cash share is declining in an individual business. These data are a useful supplement to the Diary for multiple reasons. First, because the retailer provides data from all its retail locations for multiple months, the sample size is much larger than the data from the 3,000-person-per-year Diary. Additionally, since the data come from one large company, it is unlikely that any changes in the cash share would be caused by changes in the types of goods and services purchased by consumers over time. In fact, the authors find that between February 2011 and February 2015, the cash share fell by approximately 8.6 percentage points. About 30 percent of this change can be attributed to shifts in typical transaction sizes (as noted previously, cash is used more for smaller purchases) and changing demographics (age, education, and race, in particular); the remaining difference is assigned to what the authors refer to as changing technology and changing preferences (notably, consumer payment preferences).

The paper may understate the cash share decline, potentially by a significant amount, given it focuses only on the time series of in-store retail sales, while simultaneously more retail purchases have shifted online. The Visa Payment Panel described in Akana (2019) demonstrates how rapidly consumers have adopted online transactions in recent years. In 2007, only 32 percent of panel participants reported an online purchase; from 2015–2018, the average was 80 percent. Moreover, the percentage of spending that took place online increased from 7 percent in 2007 to over 25 percent by 2017. Since very few online purchases use cash as the method of payment, a shift of purchasing from face-to-face to online necessarily means that the overall cash share will decline. This evidence is corroborated by the Federal Reserve System (2019) Payments Study, which shows that the growth of ecommerce payments using cards was 20.5 percent per year from 2015 to 2018, well above the 5.8 percent growth rate of in-person card payments. (The study does not cover cash payments, but given other evidence presented here, it is likely that online card payment growth is outpacing cash growth as well.)

The previous paragraphs only discuss cash in terms of its use as a way of purchasing goods and services (*medium of exchange*). However, cash also serves as a way to keep one's savings (*store of value*), and this role does not seem to be declining at the same pace. The 2019 Diary shows that individuals tend to carry about \$60 in cash on average, similar to earlier survey years, even as currency in circulation has increased significantly in recent years.

These secular trends have existed for some time, but in 2020, much of the cash landscape was additionally affected by the COVID-19 pandemic. From mid-March to May 2020, a supplemental survey produced by the Federal Reserve System's Cash Product Office (CPO)⁸ showed that 63 percent of consumers reported not making any in-person payments at all. This result is likely because of fears of becoming infected with the virus, business shutdowns, and stay-at-home orders enacted by jurisdictions across the country. Moreover, 22 percent of consumers reported switching from in-person to online (or phone) payments. Among the remaining transactions, there is mixed evidence whether consumer fears

⁸ See Kim, Kumar, and O'Brien, 2020a.

of the cleanliness of cash further eroded the cash share even for face-to-face transactions.⁹ In the CPO survey, 28 percent of respondents reported “avoiding using cash”; however, among those who did make in-store purchases, the percentage of respondents who used cash was very similar to the numbers reported in the 2019 Diary. Finally, while it seems like the amount of cash spent fell, the survey shows massive increases in the amount of cash held by participants. Compared with the 2019 survey, the average cash held by a person increased from \$69 to \$81, and the amount of cash “stored elsewhere” increased from \$257 to \$483. As a result, the total growth of cash in circulation more than tripled compared with previous years.¹⁰

The Diary (released in May 2021 based on October 2020 data) confirms that the shift from cash was sizable, at least in the medium term (Coyle et al., 2021). In that survey, 72 percent of consumers reported making an in-person payment, significantly down from the 91 percent reported in the previous year, and the cash share of payments decreased from 26 percent to 19 percent. For in-person payments, the cash share fell from 35 percent to 28 percent, likely a reflection of average transaction sizes increasing.¹¹ However, consistent with the CPO survey, the data show that consumers increased the cash held in their wallets even as they used less of it for payments.

III. Falling Cash Share Worldwide

Consumers, policymakers, and advocates in other countries are having many of the same conversations as here in the United States. The most extreme case is Sweden, where cash has been entirely displaced by other payment methods. Economists have speculated why Sweden’s experience has been so extreme compared with other countries. Although in the United States, and in most places, cash as a percentage of GDP has held steady or increased over time, Sweden is an outlier. In 2018, the cash-to-GDP percentage for Sweden was 1.3 percent, far lower than the Euro Area (10.9 percent) or the United States (8.2 percent), and the lowest of all countries or regions reported by the Bank for International Settlements.¹² Many Swedish banks no longer allow deposits or withdrawals in cash, and payments traditionally made in cash, such as charity and church tithing, have migrated to cards (Alderman, 2015). Armelius (2020) demonstrates that Sweden is a clear outlier in this statistic (although Norway is relatively close behind) and identifies a number of factors that have led to cash’s decline in Sweden, including a small informal sector (as cash payments are common in black and gray market transactions), an “aggressive notes and coins changeover” (forcing Swedes to trade in their notes and coins for new

⁹ Karen Heller’s August 11, 2020, *Washington Post* article describes how some consumers have turned to intense disinfecting techniques to clean their bills, despite epidemiologist assurances that cash is “not much more bad than anything else.”

¹⁰ A follow-up survey in August 2020 showed these trends continued through the summer (Foster and Greene, 2021).

¹¹ Consumers reported far fewer payments of under \$25 in this survey compared with previous years.

¹² See Bank for International Settlements, 2018. The comparison between payment share and banknotes as a percentage of GDP is admittedly imperfect; it does not account for cash’s place as a store of value (see the discussion of cash holdings during the pandemic above and the discussion of Japan below). However, the cross-country comparison shows how deemphasized cash has become in Sweden compared with other places in the world.

ones in a short amount of time), an impressive mobile banking apparatus, and high levels of trust in the banking sector.

Canada is not facing as extreme a decline in the cash share as Sweden; currency in circulation has not declined there.¹³ Still, there is a 20-year pattern of declining cash payments in Canada, leading economists at the Bank of Canada to consider the impact a potentially cashless future would have on society (Engert et al., 2019). Not only is there a discussion of the effect of cash becoming less common but also the effect of its disappearance.

In Japan, cash in circulation has increased despite advances in other means of payments (Fukiji and Nakashima, 2019). The authors of the paper suggest that increased *cash hoarding* (also known as *mattress deposits*) led to this increase. Their numbers suggest that cash hoarding can account for up to 42 percent of the total cash in circulation. Meanwhile, substitution from cash only affected the cash share by about 0.4 percent. The authors believe that this increased demand for cash is caused by pervasive low interest rates, which reduce the incentive to keep money in banks. Therefore, it's feasible, given the persistently low interest rates prevalent worldwide,¹⁴ that demand for cash could remain even as cash payments are substituted for other payment methods.

IV. Pros and Cons of the Falling Cash Share

For Consumers

Most of the literature and interest on the issue of falling cash share focuses on the perspective of consumers in lieu of businesses, since affected consumers are more likely to be part of vulnerable populations. While publicly available data are thin, the relative costs of accepting cash for merchants, at the margin, don't appear to have changed much. Rather, based on the surveys and diaries described previously, it appears that consumer preferences (in response to prices consumers incur) are driving current changes in the composition of payments more so than businesses on the other side of the transaction.

In the simplest terms, a falling cash share is explained, in part, by a story of improving technology. Given the conveniences of card payments (e.g., not having to carry cash or stop at an ATM; and for credit cards specifically, not having to come up with all the money on the spot, protection in cases of disputed payments; and often, increasingly advantageous cash back and other rewards programs), cash is no longer king.

However, while consumers often "choose" cards over cash, not all consumers are winners in a world where cash is no longer available. In Sweden, there are concerns that some individuals, especially those

¹³ See Engert et al. (2019) for a discussion of some differences between the path of the cash share in the two countries.

¹⁴ See Kiley (2019).

who are elderly, poor, and/or immigrant, do not have access to broad portions of the economy because they don't have payment cards (Alderman, 2018). This same concern is frequently raised by policymakers in U.S. jurisdictions, such as the City of Philadelphia, who advocate mandating that merchants continue to accept cash.¹⁵

For a quantitative perspective on this issue, we turn to Alvarez and Argente (2019). The authors conducted multiple field studies in Mexico and took advantage of idiosyncratic changes in government policy to better understand, among other things, how much utility consumers derive from the ability to pay for Uber rides with cash. Their calculations determined that, among consumers who pay for Uber rides with cash, a ban on cash payments was associated with a loss of about 50 percent of pre-ban Uber expenditure — quite a significant amount.

It is likely that the effect of a policy or technology change that made cash access harder would have a different effect in the United States than in Mexico, which is, relatively speaking, far more dependent on cash.¹⁶ However, in the United States, cash is still an important means of payment for many individuals, and disruption to accessing it, for instance because of local ATM or branch closures, or because of local businesses refusing to accept cash altogether, can add stress and disutility to consumers' lives.¹⁷

Engert et al. (2018) also discuss concerns that privacy advocates have about an economy without a cash payment option. One difference between cash and card payments is that cash payments are generally anonymous. There is no easy way to track who is making purchases in cash. However, if a consumer buys a good at a retail store with a credit card, that purchase is linked in some database to that consumer in perpetuity, at least theoretically. For some policymakers, the ability to track payments is beneficial. Black and gray market economies are more easily rooted out when payments can be tracked.

On the other hand, privacy tends to be prioritized by democratic societies, and even though the Privacy Act and the Gramm–Leach–Bliley Act limit the abilities of the government and businesses, respectively, to access transaction-level data, there are still consumers who take comfort in the availability of a more anonymous payment option like cash.¹⁸

¹⁵ Philadelphia mandated that most retail stores accept cash in 2019 (Lieber, 2019).

¹⁶ One consulting company estimates that 88 percent of Mexican consumers use cash as their primary form of payment (Villamil, 2019).

¹⁷ Tranfaglia (2018) describes how bank branch networks are declining across the country and provides evidence that, at least in the suburbs of Chicago and Philadelphia, these closures are clustered spatially.

¹⁸ One of the appeals of digital currencies that rely on a distributed ledger (e.g., bitcoin) is that transactions in such media could be more anonymous. However, when it comes to privacy in the context of specific digital currencies, the devil is in the details.

For Businesses

Businesses that accept both cash and card payments often prefer cash payments over credit card or debit card payments. Some of the most thorough analysis on the issue comes from Arango and Taylor, 2008. This study relies on a survey of 50 Canadian merchants. The cost breakdown used in the analysis includes direct costs, such as payments to credit card companies, as well as indirect costs from activities such as checking out purchases (which can take more or less time, depending on the payment method), and counting and transporting cash. The authors show that cash is the cheapest payment method for merchants when the transaction size is small, and a debit card is the cheapest payment method when the transaction size is large. While these findings are specific to Canada's economy, the cost of acceptance for credit cards at the margin tends to be higher than that of cash in the United States as well. To the author's knowledge, no equivalent study had been done in the United States at the time. Recently, however, Felt et al. (2020) estimate these costs using publicly available data on labor costs and merchant discount rates for credit and debit cards. The authors find that the costs of cash as a share of the value of a transaction are three times less than that of debit cards and six to 10 times less than that of credit cards, depending on the type of credit card used.

While the previous papers consider marginal costs, there are also fixed costs that can only be removed by stopping acceptance of a given payment type. For example, if a diner accepts both cash and credit card purchases, it may prefer that a consumer pay in cash. However, if most consumers pay using a credit card, it is possible the business will reduce costs by removing its cash register. (There may be a reduction in associated costs as well — surveillance, insurance, and cleanliness are often cited as examples.)

Furthermore, businesses could “steer” consumers toward their preferred payment type by offering discounts to consumers who use their preferred method, but this may not be effective. While some consumers may use cash instead of a credit card because of the discount, consumers who would have paid cash anyway now pay less. Research such as Briglevics and Shy (2014) suggests that this type of steering is generally not profitable to most businesses, although it is occasionally used.¹⁹

Many economic papers on payment methods assume cash is accepted by all sellers of goods and services,²⁰ but some businesses in the United States are starting to reject cash, leading to policy changes described in the introduction of this paper. We can look again to Sweden for a real-world example of a cashless business. Industry giant Ikea recently stopped accepting cash at its Swedish locations, citing the fact that store employees were spending up to 15 percent of their time handling cash before the policy change. Despite fears that this policy would exclude some potential customers, only 0.12 percent of patrons in the time since the policy was enacted haven't had a cash alternative at the time of purchase,

¹⁹ In some cases, depending on the jurisdiction and relevant contractual agreements, these surcharges may not even be allowed.

²⁰ See Huynh, Nicholls, and Shcherbakov (2019) for a recent example.

and in most of these cases, the purchase in question was at the store cafeteria. According to the company, customers are given the food free of charge in these cases (Alderman, 2018).

V. Is the Era of Cash Almost Over?

This paper has focused on the falling cash share as the result of individual decisions made by consumers and businesses. It is also worth considering how this decline could lead to a self-perpetuating cycle, which could cause the virtual elimination of cash to come sooner than current trends would suggest.

One alluring feature of cash is that it will generally be accepted everywhere, which is not necessarily the case with card payment options. In technical terms, this is called a *coordinating equilibrium*, as cash is valuable because it is widely accepted as a form of payment (i.e., because cash is often needed, ATMs line our business districts and allow quick withdrawals of cash). If businesses stop accepting cash in larger numbers, it will feel less like a convenience and more like a burden that takes up wallet space. ATMs are already feeling the effects of the falling cash share,²¹ and operators would likely reduce the stock of ATMs, or raise prices, if ATM activity falls consistently. For now, this is mainly a demand-side issue, as ATM closures are driven primarily by lower consumer interest in accessing them. Nevertheless, if demand were to fall sufficiently and consistently, a feedback loop could develop in which the decreased desire to pay with cash causes more businesses to stop accepting cash, which could in turn lead to consumers having less need to access it. If this were to happen, options for accessing cash could become less convenient, leading even fewer consumers to carry cash, and thus leading more businesses to stop accepting cash. Policies such as those passed in Philadelphia and elsewhere requiring cash acceptance are a possible method of short-circuiting this feedback loop, but is that helpful? It depends on whether the decline in cash use at these kinds of businesses is largely the result of consumer preferences (demand) or other factors (supply).

It is possible that even if the cash payment share continues to fall, cash will remain prevalent because of individuals hoarding currency. However, it remains to be seen whether cash holdings will start to decline as they have in Sweden, or whether Sweden is a unique case. On one hand, it is possible other countries or jurisdictions will mirror Sweden or perhaps progress to even greater extremes. On the other hand, it is possible, through a combination of continued consumer demand for cash and policy interventions, that cash will continue to play an important role in payment systems in the United States and around the world for the foreseeable future.

VI. Preparing for a Cashless Future

The future of cash, and preparation for its potential demise, has been a topic in many highly banked countries. Methods of payments have evolved throughout history, and it is worth remembering that the Federal Reserve Notes used daily by many Americans were once an innovation that replaced older technologies as well.

²¹ The United States saw a decline of 1,000 ATMs between 2018 and 2019, a decline of 0.2 percent (Daly, 2020).

Chodorow-Reich et al. (2020) note that one application of their research on demonetization in India is to demonstrate how the sudden lack of availability of cash was extremely disruptive to the economy, which shows how a society dominated by electronic payments could be susceptible to serious disruption in the case of an electronic outage. While the probability of a data breach making a payment system inoperable is low, given the precautions in place, the possibility exists (Cheney et al., 2012). Discussions among payment system operators about how to reduce the risk of disruption and mitigate its impacts continue.

At the same time, the shift from cash and toward electronic payments has its share of benefits as well. For example, the production of cash is costly for taxpayers, and cash must be regularly replaced due to wear and tear. It is possible to lose, steal, or counterfeit bills, which can be quite an expensive experience for a consumer whose cash is stolen or a business that is paid using counterfeit currency.²² And compared with the ease of swiping a debit card, or in today's world waving a phone or watch over a card reader, it is relatively inconvenient for consumers to have to visit ATMs or bank branches for more cash. It is easy to see that consumers and businesses do see the benefits of electronic payments.

Some economists believe that central bankers should be encouraging a shift away from cash. For instance, economist Kenneth Rogoff titled his 2017 book, *The Curse of Cash: How Large-Denomination Bills Aid Crime and Tax Evasion and Constrain Monetary Policy* (Rogoff, 2017). Rogoff argues that without cash, central banks would have the ability to implement deeply negative interest rates, as individuals and businesses would no longer be able to avoid paying by shifting their holdings into (zero-interest) cash. More directly, cash costs governments money from lost revenue when cash transactions go unreported. A study by Chakravorti and Mazzotta (2013) conservatively estimates the foregone tax revenue to be \$100 billion each year.

Central banks around the world, including in the United States, are preparing for a digital future. In May 2021, Federal Reserve Chair Jerome Powell addressed the topic of a Central Bank Digital Currency (CBDC), announcing that the Federal Reserve would ask for public comment about the potential creation of a digital dollar, specifically “on issues related to payments, financial inclusion, data privacy, and information security.”²³

Whether there is a future for cash is hard to predict, but what is clear is its decline as a medium of exchange will continue. The question for policymakers is how intense and quick that shift will continue to be going forward, and how to ensure that all economic actors can take advantage of the economic

²² Of course, card payments are susceptible to fraud as well. The Federal Reserve in 2018 found that the fraud rate on noncash payments was \$0.46 per \$10,000 in 2015, which is up from \$0.38 in 2012. Because of the increase in total volume of noncash payments in that time period, this reflected a 37 percent increase in the value of fraudulent payments. Unfortunately, it is harder to track the fraud rates of cash payments, making a direct comparison challenging.

²³ See Powell (2021). It is important to note that Chair Powell specifically rejected the idea of having a CBDC replace cash entirely: “We think it is important that any potential CBDC could serve as a complement to, and not a replacement of, cash and current private-sector digital forms of the dollar, such as deposits at commercial banks.”

benefits of electronic payments? Also, how will this be done while mitigating the potential negative impacts to certain groups and ensuring that unbanked and underbanked Americans are not left behind as noncash payment options continue to gain market share?

VII. Conclusion

Much as the barter economy gave way to gold and silver coins, and the gold standard gave way to fiat currency, digital payments are representative of the creative destruction (or perhaps destructive creation) that has changed how people pay for goods and services over time. Yet while cash as a medium of exchange has declined, currency in circulation as a share of GDP has remained steady or even increased, suggesting continued demand for cash as a store of value. In the coming years, it will be worth noting whether the cash payment share decline slows, continues, or accelerates, and how cities, states, and countries continue to allow the cashless economy to grow while ensuring that access to the economy remains universal.

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