Efficiency without Compulsion: Economic Trade-offs in the Transition to a Cashless Society

Wenxi Xu *

Shanghai MacDuffie Bilingual High School, Shanghai 201403, China

* Corresponding Author Email: el39823@126.com

Abstract. The fast pace of the diffusion of digital payments has brought down transaction costs, widened the reach of markets practically and made exchange faster and easier. But the benefits for welfare in a cashless economy cannot be reduced to an average transaction efficiency. This paper creates a conceptual framework for assessing the cash to digital payment transition, combining transaction cost economics, behavioural economics, financial-inclusion issues, platform competition, privacy and payment-system resilience. The main difference is between "digitalisation" and "cashlessness" by force. While digital payments can improve welfare by reducing exchange frictions and enabling specialisation, cash can also provide welfare-enhancing behavioural frictions, which cash elimination can remove, as well as reducing consumer exclusion for those facing digital barriers, exacerbating reliance on data-rich intermediaries and decreasing redundancy in crises or infrastructure failures. This theoretical framework is related to recent developments in the payment system by drawing on recent institutional evidence from the World Bank, OECD, Federal Reserve Financial Services, and the European Central Bank. The paper proposes that a policy of payment pluralism is needed: digital-first innovation with ongoing availability of cash and robust offline solutions. When the distribution of consumers' capabilities and systemic tail risks are not trivial, preserving choice does not have to be merely a social concession, it can be an efficiency-enhancing institutional design.

Keywords: Cashless society, digital payments, transaction costs, behavioural economics, financial inclusion, privacy, payment resilience.

1. Introduction

Much of the cash's demise is portrayed as a simple story of technological advancement. Cards, mobile wallets, instant transfers, QR code payment and automatic subscription enable transactions in shorter time and over wider distances than cash. These innovations reduce the direct costs of exchange and in many cases make it easier to participate in formal markets. A cashless economy thus looks like a logical conclusion of the payment innovation from an efficiency point of view.

That conclusion is incomplete as a payment system is not just a way to settle transactions. It also helps in influencing consumer behavior, determining eligibility for exchange and allocating information and market power as well as creating redundancy in the case of a failure in the digital infrastructure. So the pertinent policy question is not whether digital payment is useful. Whether taking away a universally recognised offline payment option is worth the gains of digitalisation.

This paper poses the following questions: When is the shift towards digital payments pro-social and when can forced cashlessness generate welfare counter-effects? The claim is that the question of digitalisation and of abolition of cash should be separated. While digital payments can lower transaction costs and expand the effective market, a full abandonment of cash can lead to a greater loss of self-control mechanisms, a greater distributional exclusion, a greater reliance on concentrated payment platform, a loss of transactional privacy and a lesser resilience of the payment system to outages and crises.

The paper provides an integrated conceptual framework which connects these effects, rather than considering each as a stand-alone policy issue. It brings together the classic economic theory, behavioural research and latest institutional evidence. The resulting policy principle is: payment pluralism – wherever it makes sense to do so, encourage the use of digital payment, but retain meaningful access to cash and other offline fallbacks. In this framework, the choice of payments is

endowed with option value. Payment methods that do not play a role in the majority of daily transactions can still generate welfare by safeguarding consumers who are heterogeneous, and to operate the system in adverse states of the world.

2. Analytical Framework: Transaction Costs, Market Extent, and Option Value

Costs of transacting are the first and the best economic argument for digital payments. Coase [1] highlighted that exchange is not without cost – economic actors have to invest costs in finding exchange partners, negotiating, documenting and monitoring and executing transactions. There are also settlement costs associated with physical cash. It needs to be removed, moved, counted, secured, topped up and handled as 'change'. There is a risk of theft for merchants, and cash-handling costs, plus the need for consumers to get and carry the proper denominations.

Digital payment eliminates or greatly diminishes these frictions. Without co-presence the transactions can be done remotely, bookkeeping expenses can be reduced by automatic records, and delays caused by the transfer mechanism can be reduced by instant or near-instant transfers. As well these go along with Smith's [2] observation that the extent of the market is the limit of the division of labor. Easier payment in terms of distance and scale can give specialised producers and service providers access to a broader set of consumers; consumers can have a larger set of suppliers. Thus, reducing payment friction can help to provide the convenience, but also to enable productivity-enhancing specialisation.

The welfare analysis, however, is different when the counterfactual under consideration is not 'cash versus digital payment' but 'payment choice versus compulsory digital payment'. Some forms of friction have protective functions, and some forms of redundancy have option value. While it can take longer to complete than a card tap, the simplicity, salience, and privacy may be important to specific consumers or at specific times in the world for a cash transaction. Thus, it is not possible to draw conclusions about the social value of cash solely from its average transaction share.

This distinction is also important when it comes to the difference between private efficiency and system-level welfare. A trader can reduce the cost of running the business by not accepting cash; and a payment service provider can maximize transaction volumes because the payment experience is almost invisible. However, a system of all privately optimised decisions can result in external costs if it leaves out the vulnerable users, if it allows market power to be established, or if the continuity of payments relies on a small number of digital infrastructures. It's not about smoothness in normal situations; it's about welfare that is resilient to heterogeneous users and changing situations.

Table 1. Welfare trade-offs in the transition to digital payment

Dimension	Potential gain from digital payment	Risk of compulsory cashlessness	Policy implication
Transaction costs	Faster settlement, lower handling costs, wider market reach	Over-optimisation of convenience can remove useful safeguards	Promote digital adoption without eliminating alternatives
Consumer behaviour	Automation and records can improve budgeting and convenience	Lower payment salience can weaken spending restraint for some users	Use transparency, reminders, spending controls, and easy cancellation
Inclusion	Digital accounts can extend formal financial access	People with connectivity, identification, literacy, disability, or affordability barriers may be excluded	Maintain accessible payment channels and targeted inclusion support
Privacy and competition	Data can improve fraud detection and service quality	Universal traceability and platform gatekeeping can increase dependency and market power	Strengthen data governance, interoperability, and contestability
Resilience	Digital systems are scalable and efficient in normal conditions	Power, network, cyber, or service outages can interrupt all-digital payment	Preserve cash and/or robust offline fallback capability

3. Payment Friction and Consumer Behaviour

Typically, traditional models regard the payment instrument as a secondary factor and the price of the good and the consumer's budget constraint as primary factors. Behavioural research indicates that the nature of payment and the timing can also influence the experience of spending, however. Prelec and Loewenstein [3] report that what economists refer to as the 'pain of paying' is the psychological pain of relinquishing money. The closer the payment is to consumption, the more salient the cost of the purchase. There is always a natural coupling with cash because the consumer sees and at the same time physically hands over a scarce asset when he or she makes a purchase.

This salience can be undermined by digital payment. Contactless cards, stored credentials, one-click checkout, buy-now-pay-later arrangements and automatically renewing subscriptions, are just some of the ways that consumption can be separated from the visible moment of payment. Raghubir and Srivastava [4] demonstrate that the payment form and payment coupling can affect the spending behaviour. This is not a call to action that digital payment means irrational spending. The use of digital records, alerts, and budgeting tools can enhance financial management. Instead, a payment setting that eliminates any last-minute inhibitions could result in a behavioural barrier being taken away for consumers who profit from salience and deliberate friction.

This is important for the business goal of many digital interfaces – to decrease the number of dropouts and increase conversions. The fewer clicks and fewer interruptions the better, from the seller's point of view. For the consumer, the same design can be used to minimize recurring charges, impulse purchases or small-value transactions. The welfare effect will thus vary depending on whose transaction cost is being reduced and if the removed friction previously acted as a self-control mechanism.

The right policy answer is not to re-invent the cumbersomeness of cash within digital systems. It is to maintain consumer choice in design. These include clear pre-purchase price display, real-time notifications, spending dashboards, recurring charges that are initially off by default where applicable, easy subscription cancellation, and friction for any unusually large or high-risk purchase, which can help keep the advantages of the digital settlement and re-create valuable moments of reflection. In this context, the goal is calibrated friction, not frictionless payments for their own sake.

4. Financial Inclusion and Distributional Effects

Assuming a fully cashless society must be taken with a grain of salt, as this is a digital readiness that is not spread equally. Digital exclusion cannot only be solved by smartphone ownership. It can relate to income, age, disability, geography, documentation, connectivity, digital literacy, language, trust, or the ability to recover from account or device issues. Even if a user has a smartphone, she can be struggling with access to data, storage space, authentication or fraud prevention. Another might have a bank account, but rely on family members to make digital transactions.

The Global Findex 2025 has recorded significant advances in financial and digital inclusion, as well as significant gaps in the adoption of digital and financial services. The ownership of an account and digital payments are explicitly linked to mobile connectivity and financial resilience [5]. Based on this evidence, a balanced interpretation may be drawn: digital finance can be a powerful technology for inclusion, but this does not mean that the use of digital finance in certain countries suggests that everyone is ready for digital-only exchange.

There is no denying that cash is still special, as it has low participation requirements. No account or charged device, no password, no data plan, no ID check at point of payment, no need to trust a software interface. These could be important economically for consumers on the fringes of the formal financial system. OECD [6] also signals that a transition to cashless or cash-lite societies can result in risks for consumers who, for various reasons, are unable or unwilling to do so, and maps out policy interventions to maintain cash access and acceptance.

It is therefore a question of distribution that is central. There can be a significant increase in the burden to a minority while experiencing an average increase in convenience. For a young professional, cashlessness might be primarily a feature of speed; for an older consumer, it might be a feature of dependency; for a low-income consumer, it might be a feature of fees and/or minimum-balance requirements; and for a person wanting to escape from a dominant household member, cashlessness can be a feature of autonomy. Such a median-user welfare analysis will underestimate the asymmetric costs.

Therefore, inclusion should be assessed in terms of payment effectiveness, not just being a cardholder. Consumers are not meaningfully included if the account has been opened but does not allow the consumer to access funds, securely authenticate with the financial service, understand the interface, recover from errors, and complete essential transactions at reasonable cost. One means of avoiding a digital capability gap becoming an exclusion from ordinary economic life is to keep cash as a public fallback.

5. Privacy, Data, and Market Power

Digital payments create data, in addition to settlement. Transaction records can be used to help detect fraud, resolve disputes, make credit assessments and design services. Meanwhile, the conditions of routine economic activity are that payments are now fully digital and therefore traceable. Payment data can indicate where, when, what, and who the consumer was within a household and also give insight into the frequency of people consuming the same products. The point is that record creation is not inherently problematic — it's that the removal of cash means that the consumer's typical way of transacting without leaving behind a detailed digital record is gone.

The competitive ramifications are likewise significant. Payment systems are characterized by network effects: the value of the network can increase with additional users, merchants, and institutions. Katz and Shapiro [7] demonstrate the possible impact of compatibility and competition in the presence of network externalities. In today's digital payment world, these can all add to the data benefits, user base and control over the key user interface to result in good platform positions. Data asymmetries, market power, and gatekeeping of critical infrastructure are competition risks that should be addressed in the mobile payment market [8].

So for those consumers who typically pay using digital payments, a cash option can have a structural role. It provides an exterior possibility that is not reliant on the private platform, a specific

gadget ecosystem, or a unique information structure. The outside option (cash) is imperfect, and therefore, cash does not replace all the uses of digital, but this very fact can help prevent the participation in ordinary commerce becoming contingent on the user's joining a particular technological network.

Therefore, policy should not solely focus on the choice of the consumer's brand but also on payment competition as an infrastructure matter. Technical issues like interoperability, transparency of access conditions, proportionality of data portability, adoption of open technical standards where possible and competition examination of gatekeeping roles can decrease reliance on individual providers. Similarly, privacy protections should make a differentiation between data that is essential to the lawful settlement and security and data that is not essential to the settlement and is also being gathered. The overall goal is to achieve the informational advantages of digital payment without hidden costs of universal surveillance or platform dependency in the form of efficiency.

6. Resilience and the Option Value of Redundancy

The strongest argument is resilience, where the efficiency in normal times is different from the efficiency in crisis. Digital payment infrastructure requires electricity, telecommunications, software, authentication systems, cloud/data-centre capacity and operational financial intermediaries. These systems can have a high reliability but failures may be correlated. Many of the payment channels can be disrupted concurrently during a power outage, telecommunications outage, cyber incident, software error, or large service outage.

That is what makes cash valuable: it has different operating requirements. A transaction can be completed once cash is in the hands of users and the merchants without a network connection or real-time authorisation. This contingency role is highlighted in the following recent evidence. Clarifying that cash has tangible attributes and is widely accepted offline, the ECB analysis of several crisis episodes suggests that these attributes can also play a role in the preparedness phase during a crisis situation [9]. The point here is not that cash will supplant electronic infrastructure in a modern economy but that a diversity of payment technologies decreases the chances of common-mode failure.

Consumer behaviour also indicates that cash remains a preferred choice of backup and not just a legacy choice. According to Federal Reserve Financial Services [10], 76% of the U.S. consumers surveyed in 2025 carried money with them, four out of five also used cash in the past 30 days, and 90% planned to keep using cash. The same survey characterizes cash as one of the most common types of payment, and as a major store of value. While these statistics are U.S.-based, they do support the overall argument that the amount of cash people demand is greater than the amount of cash they use in practice.

Economically, this is the option value of redundancy. The backup system might look underutilized during normal times since its main value comes during adverse times. Therefore, rating it just based on average transaction volume is like rating insurance based on the number of claims. There is a lot of redundancy — it is expensive and should not be maintained indefinitely. However, removing a technologically independent fallback can result in big losses on low-probability/high-impact events. It is therefore important to optimise in the design of the payment system resilience-adjusted efficiency and not just efficiency in normal times.

7. Counterarguments and Policy Implications

The arguments for cash should not glaze over the facts. Physical currency is very expensive. It must be printed, transported, protected, counted and replaced. It can be used to enable tax evasion, corruption, robbery and illegal trading activities. Merchants can decrease the opportunity for theft and improve service by not accepting cash and governments can also better deliver benefits and emergency transfers digitally. Formal digital payments can help increase financial inclusion by

providing access to accounts, transfers, savings facilities and credit histories to users who are not currently included [11].

These arguments are all pro-digitalisation but do not imply the welfare-maximising nature of compulsory cashlessness. The issue to be addressed in the policy, then, is one of institutional design rather than technological preference. A mixed system can realize most of the benefits of reduced transaction cost from digital payment, and retain cash for consumers and contingencies where the attributes of cash are especially valuable. The standard should not be whether cash works in every transaction, but whether it continues to be available in such a way that it generates social benefits that are greater than the costs to sustain a viable cash infrastructure.

The analysis leads to four policy implications. First, jurisdictions that are quickly transitioning to digital payments should track — and not just cash transactions — but effective access and acceptance of cash. The "option" may end up being lost in practice if the physical infrastructure of cash is too depleted. Secondly, digital payment design needs to involve consumer-protection measures that reintroduce salience and control in frictionless interfaces, where there are behavioural risk issues. Third, regulators should make interoperability, data governance and contestability key elements of payment-system policy, given that convenience in the technology can lead to dependence in the market. Fourth, resilience planning must be based on multiple means of operation, such as cash and, if technically possible, some means of digital payment that can be used offline, or if infrastructure is limited.

These measures can be summarised as a digital-first (but not digital-only) approach. This is not intended to freeze the payment system in its current technological state. It is to make sure that innovation is not reducing the options available, but increasing them. In a heterogeneous society, a payment architecture that provides multiple payment methods (some of which may be quite efficient) can be more effective than a single method that is super-efficient, as it can better address variations in capability, preference, risk exposure and crisis conditions.

8. Conclusion

The economic rationale for digital payment is strong, but less broad than that for a cash-free society. Digital payments can reduce transaction costs, facilitate specialisation, allow for distant transactions, and increase access to formal financial services. The results warrant further innovation and adoption. By themselves, they do not warrant taking cash off the list of available public options.

Cashlessness is compulsory and creates a change in the calculation of welfare because it removes a subset of functions of welfare that cannot be done via only the speed of transactions. Cash can help to make spending salient, maintain and ensure consumer participation when digital options are not available, offer some transactional privacy, offer an alternative to the platform, and offer technologically independent redundancy in case of outages and crises. The importance of these functions is greatest just at those times when conventional measures of payment efficiency seem the least necessary.

Hence the correct goal is not efficiency with compulsion but efficiency without compulsion. Payment pluralism is not a transitory institutional structure on the path towards full digitalization, but rather an institutional arrangement that can be better than a single payment method in an environment with non-trivial systemic risk and diverse consumer needs. The future can be significantly more cash-free, but cash and resilient offline alternatives must be preserved. Digital payment must not be a substitute for meaningful choice, but rather should make avoidable inconvenience a thing of the past.

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