

Should We Fear a Cashless Society?

I. The Irreversibility Asymmetry

Consider what it would take to rebuild a cash network after the last ATM has gone dark. Not slow the transition — reverse it. You would need governments to subsidise infrastructure the market has already written off, in constituencies with little political weight, across timelines that outlast administrations. No plausible political coalition sustains that effort. Which means that once the transition has happened, it has happened. The question was never whether to go cashless. It was whether anyone was paying attention to the conditions under which it occurred.

Arrow, Fisher, and Henry formalised this asymmetry in 1974: when a decision is partially irreversible and new information arrives over time, there is positive option value in delay. Dixit and Pindyck identify the conditions under which that option premium is highest: irreversibility, uncertainty about future states, and a genuine ability to wait.¹ Cash transitions meet all three. The people most harmed rarely show up in aggregate data until the harm has already compounded; digital penetration, once it crosses a threshold, moves fast enough to close the correction window before anyone has measured what they lost. The populations with the most at stake have the least leverage over the decisions that drive the transition.

Cash network viability depends on fixed costs that only make commercial sense above a usage threshold. Once digital penetration pushes cash use below that line, no private operator rebuilds the network. Norway and Sweden maintained cash access after their markets failed — but only through permanent public subsidy, only after recording significant exclusion, and only because both countries have unusually functional regulatory institutions.² The correction arrived after the harm, and it depends on future governments holding the same view as current ones. That is not a robust foundation. The ECB is implementing a digital euro. The Riksbank is deciding right now whether to mandate cash acceptance or let the market finish what it started. These are not hypothetical choices.

II. The Efficiency Case and Why It Isn't Enough

In Sub-Saharan Africa, mobile money drove adult account ownership from 23 to 55 percent between 2011 and 2021.³ Pomeranz's study of Chilean firms found digital payment trails raised VAT compliance substantially — not through audits, but because records made evasion visible to the firms themselves.⁴ The same household that loses wages to a poorly managed cashless transition also loses money to the cash-based middleman the digital trail would have exposed. The sequencing question is about which harm comes first — and who bears the cost of getting the order wrong. The financial inclusion literature is better on direction than on timing, and I am not sure that gap has been adequately noticed.

The zero lower bound is the efficiency case at its strongest. Kenneth Rogoff's argument in *The Curse of Cash* is that eliminating high-denomination notes — and ultimately cash itself — would open a qualitatively different monetary policy space: real rates of negative three percent or below, not the modest negative territory achievable while cash hoarding remains an option.⁵ Swanson and Williams showed that policy effectiveness deteriorates the longer ZLB binding persists; Reifschneider and Williams formalised the framework within which those losses compound.⁶ In a sustained deflationary episode — Japan in the 1990s, the eurozone after 2012 — that additional space would be the deciding variable. The ZLB case is real. Rogoff's argument has not been

substantially revised since 2016, and the post-pandemic inflation cycle — which required the sharpest rate rises in a generation rather than deeper negative rates — is an awkward decade for it. It is also the argument that sounds most technically respectable while doing the most political work, which is a combination worth being suspicious of.

When both thresholds are breached and conventional tools are exhausted, the welfare calculus shifts — but only if the trigger is pre-specified and observable, not self-assessed by the institution that gains discretion from classifying itself as constrained. ZLB conditions are defined partly by the same models used to justify policy, so triggers must draw on external data: unemployment figures, output gap estimates from independent agencies, deflator readings — not the institution's own assessment. You cannot protect a trigger from capture by using a trigger to define what counts as capture.

III. What Happens When It Goes Wrong

The cleanest failure case is also the most extreme.

In November 2016, 86 percent of India's currency by value was withdrawn from circulation overnight. Chodorow-Reich, Gopinath, Mishra, and Narayanan found that employment and output growth fell roughly two percentage points in the districts most exposed.⁷ Two percentage points sounds like an economic variable. In a district where cash is the medium of daily commerce — the morning tea, the daily wage, the credit informal lenders extend because they know their borrowers — withdrawing it overnight without adequate digital infrastructure does concentrated, immediate harm to people with no alternative. Those were people's wages.

Demonetisation was a government decision, imposed in days. A market-driven transition is slower and less legible, but the endpoint is the same: cash becomes functionally unavailable before the institutions capable of managing that fact exist. China scaled to a billion users in under a decade and generated large inclusion gains alongside exclusion severe enough that the People's Bank of China mandated cash acceptance in December 2020.⁸ The PBOC intervention is better read as evidence of what embarrasses governments than of what they intend: the correction only happened once the exclusion was visible enough to create political cost.

Before M-Pesa, cash in rural Kenya was itself the exclusion mechanism — a day's travel, a theft risk, an unreliable arrival. Jack and Suri found M-Pesa lifted 194,000 households out of extreme poverty, concentrated among female-headed households.⁹ The argument for protective conditions is an argument for people cash already serves — not for people it has already abandoned.

IV. Who Designs the Architecture Decides Who Gets Watched

Surveillance risk in digital payment systems follows from design decisions, not from going digital itself. Brunnermeier, James, and Landau establish that privacy architecture is a parameter, not a given.¹⁰ Chaum's blind signature protocol and BIS Project Tourbillon demonstrate that cryptographic anonymity for retail CBDC is technically achievable.¹¹ The question is not whether privacy-preserving design is possible. It is whether the political conditions under which it gets built are normal or exceptional.

Culpepper's work on low-salience institutional decisions shows what happens next: on technical questions that don't generate public attention, organised interests shape outcomes without electoral constraint.¹² In CBDC design, those interests include financial intelligence units, law enforcement,

and the payment platform operators who have commercial reasons to want transaction data — none of whom are accountable to the people whose privacy the architecture will determine for the next several decades. During the GDPR process, even with Snowden generating unusual public attention to exactly this question, security services shaped the Article 23 national security exemptions in ways that the people lobbying for them have since described as going further than they expected to get away with — which tells you something about what happens when public attention moves on.¹³ Without something comparably disruptive to concentrate public attention on CBDC design, the outcome is worse. Probably much worse.

A government that wants to see transaction data will not announce the intention. It will define thresholds, insert exemptions — each step defensible, the cumulative result a payment system that records everything. On current trajectory, the digital euro will tell the ECB more about European spending behaviour than the ECB's own economists currently think they want to know.

V. Four Conditions, None of Which Is Currently Met

Privacy erodes because architecture decisions made at deployment get locked in — which means anonymity for low-value retail transactions has to be built into the protocol through Chaum-type cryptographic design, not promised by legislation a future parliament can repeal. I am not sure where exactly the line falls between privacy that is robust and privacy that is merely defended in court, but I am fairly confident the ECB's current approach is on the wrong side of it. The ECB's current digital euro design documentation specifies 'privacy by regulation' rather than privacy by cryptographic architecture, which means it fails this condition on its face. Exclusion continues because cash protection statutes without enforcement produce paperwork rather than access — enforceable acceptance requirements with real penalties; Norway's mandatory acceptance model is the precedent.¹⁴ Governments report access rates that justify decisions already made, which is why coverage verification must be done by an independent auditor before physical alternatives are removed, above 99 percent adult coverage. The threshold is not arbitrary: at an Atkinson inequality parameter of one, the welfare weight on the excluded fraction exceeds the average, making 99 percent a conservative bound.¹⁵

Both the China and Norway corrections arrived after the harm — which is why offline payment capacity and geographic redundancy have to be built in from the outset. Retrofitting means the exclusion has already happened.

Each of these conditions can be hollowed out, which makes enforcement the central question. The Congressional Research Service's analysis of the Unfunded Mandates Reform Act found it reduced unfunded mandates primarily by raising the political cost of non-compliance, even though points of order were sustained only three times in its first decade.¹⁶ The federal-state context doesn't map cleanly onto cash protection; what matters is that visible non-compliance changed behaviour upstream.

VI. The Asymmetry of Regret

Cash protection is not symmetric precaution — precaution also argues against the status quo, given that cash sustains corruption and keeps rural borrowers out of formal credit markets. The argument is about a specific structural asymmetry: the populations who bear the highest cost of a failed transition are also the ones least able to register it in the processes that would need to respond. A market-driven threshold effect, where cash viability collapses non-linearly once penetration

crosses a certain point, combines with this structural exclusion from political voice to produce an error that self-conceals: the people harmed are not represented in the data that would trigger correction, and not represented in the institutions that control the data. Norway's 2017 cash review caught the exclusion because Norway had an independent oversight body tracking unbanked populations — the signal existed before the harm compounded. In India in 2016, the districts most harmed by demonetisation were precisely the districts least represented in the data policymakers were reading. The difference is whether the excluded are inside the measurement system. Ordinary mismanagement leaves traces. This kind doesn't.

Who decides when the four conditions are met? With what accountability to the people who bear the cost if the decision is wrong? The two-regime framework and pre-specified observable triggers exist to make those questions answerable — to prevent self-classification by actors with incentives to override the triggers. These institutions have to be built before the transition, when cash still functions and the political urgency for protection is lowest, and when the organised interests that would prefer no such institutions exist are most able to prevent their formation quietly. I don't have a fully satisfying answer to how you build those institutions against the interests that would prefer they not exist. The essay identifies the problem more cleanly than it solves it.

Designing enforcement mechanisms that remain credible across administrations, against organised interests with structural incentives to erode them, tends to fail. Not dramatically — no one announces the retreat. They get hollowed out. The legal commitment stays on paper; the interest groups that benefit from the weaker version outlast the coalitions that built the stronger one. Most statutory protections die this way — though most protect things that can be rebuilt. Cash networks cannot. What distinguishes the cash case is that once the network threshold has been crossed, the excluded population has already lost its main source of economic leverage. By then, the choice has already been made for them.

The worst outcome is not that cashlessness happens too slowly. It is that it happens before the institutions capable of managing it exist, and that by the time exclusion is visible, the option to reverse it has closed.

Notes

1. Arrow, K. J. and Fisher, A. C. 'Environmental Preservation, Uncertainty, and Irreversibility.' *Quarterly Journal of Economics*, 88(2), 1974, pp. 312-319. Henry, C. 'Investment Decisions Under Uncertainty: The Irreversibility Effect.' *American Economic Review*, 64(6), 1974, pp. 1006-1012. Dixit, A. K. and Pindyck, R. S. *Investment Under Uncertainty*. Princeton University Press, 1994, ch. 4.
2. Ceeney, N. *Access to Cash Review: Final Report*. March 2019, pp. 7-8. Norges Bank. *Retail Payment Services 2023*. Norges Bank, 2024. Sveriges Riksbank. *E-Krona Pilot Phase 3 Interim Report*. 2023. Swedish Government Commission, SOU 2023:16.
3. Demirguc-Kunt, A. et al. *The Global Findex Database 2021*. World Bank, 2022, pp. 3-7, 44-49.
4. Pomeranz, D. 'No Taxation without Information: Deterrence and Self-Enforcement in the Value Added Tax.' *American Economic Review*, 105(8), 2015, pp. 2539-2569.
5. Rogoff, K. *The Curse of Cash*. Princeton University Press, 2016, ch. 2-3. Agarwal, R. and Kimball, M. 'Breaking Through the Zero Lower Bound.' IMF Working Paper WP/15/224, 2015. Agarwal, R. and Kimball, M. 'Enabling Deep Negative Rates to Fight Recessions: A Guide.' IMF Working Paper WP/19/84, 2019.
6. Swanson, E. T. and Williams, J. C. 'Measuring the Effect of the Zero Lower Bound on Medium- and Longer-Term Interest Rates.' *American Economic Review*, 104(10), 2014, pp. 3154-3185. Reifschneider, D. and

- Williams, J. C. 'Three Lessons for Monetary Policy in a Low Inflation Era.' *Journal of Money, Credit, and Banking*, 32(4), 2000, pp. 936-966.
7. Chodorow-Reich, G., Gopinath, G., Mishra, P., and Narayanan, A. 'Cash and the Economy: Evidence from India's Demonetization.' *Quarterly Journal of Economics*, 135(1), 2020, pp. 57-103.
 8. People's Bank of China. 'Notice on Further Improving Cash Acceptance and Use by Market Entities.' Notice No. 19, December 2020. Chorzempa, M. *The Cashless Revolution: China's Reinvention of Money and the End of America's Domination of Finance and Technology*. PublicAffairs, 2022, pp. 178-184.
 9. Suri, T. and Jack, W. 'The Long-Run Poverty and Gender Impacts of Mobile Money.' *Science*, 354(6317), 2016, pp. 1288-1292.
 10. Brunnermeier, M. K., James, H., and Landau, J.-P. 'The Digitalization of Money.' NBER Working Paper 26300, 2019.
 11. Chaum, D. 'Blind Signatures for Untraceable Payments.' *Advances in Cryptology: Proceedings of Crypto 82*. Springer, 1983. Bank for International Settlements. *Project Tourbillon: A Proof of Concept for Privacy-Preserving CBDC*. BIS, November 2023. European Central Bank. 'Privacy and the Digital Euro.' ECB Occasional Paper No. 309, 2023 (specifying regulatory rather than cryptographic privacy architecture).
 12. Culpepper, P. D. *Quiet Politics and Business Power: Corporate Control in Europe and Japan*. Cambridge University Press, 2011. Culpepper, P. D. 'Quiet Politics in Tumultuous Times.' *Politics and Society*, 49(1), 2021, pp. 133-143.
 13. De Hert, P. and Papakonstantinou, V. 'The New General Data Protection Regulation: Still a Sound System for the Protection of Individuals?' *Computer Law and Security Review*, 32(2), 2016, pp. 179-194. Rossi, B. 'How the Snowden Revelations Saved the EU General Data Protection Regulation.' *The International Spectator*, 53(4), 2018, pp. 95-111.
 14. Norges Bank. *Retail Payment Services 2023*. Norges Bank, 2024.
 15. Atkinson, A. B. 'On the Measurement of Inequality.' *Journal of Economic Theory*, 2(3), 1970, pp. 244-263.
 16. US Congressional Research Service. 'Unfunded Mandates Reform Act: History, Impact, and Issues.' R40957, updated 2024, pp. 14-15.

Bibliography

- Agarwal, R. and Kimball, M. 'Breaking Through the Zero Lower Bound.' IMF Working Paper WP/15/224, 2015.
- Agarwal, R. and Kimball, M. 'Enabling Deep Negative Rates to Fight Recessions: A Guide.' IMF Working Paper WP/19/84, 2019.
- Arrow, K. J. and Fisher, A. C. 'Environmental Preservation, Uncertainty, and Irreversibility.' *Quarterly Journal of Economics*, 88(2), 1974, pp. 312-319.
- Atkinson, A. B. 'On the Measurement of Inequality.' *Journal of Economic Theory*, 2(3), 1970, pp. 244-263.
- Bank for International Settlements. *Project Tourbillon: A Proof of Concept for Privacy-Preserving CBDC*. BIS Innovation Hub, November 2023.
- Brunnermeier, M. K., James, H., and Landau, J.-P. 'The Digitalization of Money.' NBER Working Paper 26300, 2019.
- Ceeney, N. *Access to Cash Review: Final Report*. March 2019.
- Chaum, D. 'Blind Signatures for Untraceable Payments.' *Advances in Cryptology: Proceedings of Crypto 82*. Springer, 1983, pp. 199-203.
- Chodorow-Reich, G., Gopinath, G., Mishra, P., and Narayanan, A. 'Cash and the Economy: Evidence from India's Demonetization.' *Quarterly Journal of Economics*, 135(1), 2020, pp. 57-103.

- Culpepper, P. D. *Quiet Politics and Business Power: Corporate Control in Europe and Japan*. Cambridge University Press, 2011.
- Culpepper, P. D. 'Quiet Politics in Tumultuous Times: Business Power, Populism, and Democracy.' *Politics and Society*, 49(1), 2021, pp. 133–143.
- De Hert, P. and Papakonstantinou, V. 'The New General Data Protection Regulation: Still a Sound System for the Protection of Individuals?' *Computer Law and Security Review*, 32(2), 2016, pp. 179–194.
- Demirguc-Kunt, A., Klapper, L., Singer, D., Ansar, S., and Hess, J. *The Global Findex Database 2021: Financial Inclusion, Digital Payments, and Resilience in the Age of COVID-19*. World Bank, 2022.
- European Central Bank. 'Privacy and the Digital Euro.' ECB Occasional Paper No. 309, 2023.
- Dixit, A. K. and Pindyck, R. S. *Investment Under Uncertainty*. Princeton University Press, 1994.
- Henry, C. 'Investment Decisions Under Uncertainty: The Irreversibility Effect.' *American Economic Review*, 64(6), 1974, pp. 1006–1012.
- Norges Bank. *Retail Payment Services 2023*. Norges Bank, 2024.
- Chorzempa, M. *The Cashless Revolution: China's Reinvention of Money and the End of America's Domination of Finance and Technology*. PublicAffairs, 2022.
- People's Bank of China. 'Notice on Further Improving Cash Acceptance and Use by Market Entities.' Notice No. 19, December 2020.
- Pomeranz, D. 'No Taxation without Information: Deterrence and Self-Enforcement in the Value Added Tax.' *American Economic Review*, 105(8), 2015, pp. 2539–2569.
- Reifschneider, D. and Williams, J. C. 'Three Lessons for Monetary Policy in a Low Inflation Era.' *Journal of Money, Credit, and Banking*, 32(4), 2000, pp. 936–966.
- Rogoff, K. *The Curse of Cash*. Princeton University Press, 2016.
- Rossi, B. 'How the Snowden Revelations Saved the EU General Data Protection Regulation.' *The International Spectator*, 53(4), 2018, pp. 95–111.
- Suri, T. and Jack, W. 'The Long-Run Poverty and Gender Impacts of Mobile Money.' *Science*, 354(6317), 2016, pp. 1288–1292.
- Sveriges Riksbank. *E-Krona Pilot Phase 3 Interim Report*. 2023.
- Swanson, E. T. and Williams, J. C. 'Measuring the Effect of the Zero Lower Bound on Medium- and Longer-Term Interest Rates.' *American Economic Review*, 104(10), 2014, pp. 3154–3185.
- US Congressional Research Service. 'Unfunded Mandates Reform Act: History, Impact, and Issues.' R40957, updated 2024.