Democracy and Financial Intermediation: The Political Economy of Cryptocurrencies

Ghita Chraibi (usx8ns@virginia.edu) and David Leblang (leblang@virginia.edu)

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Abstract

Cryptocurrency allows citizens to exit the formal financial system without leaving the state or the market. The exit choice runs along two dimensions: which currency instrument to hold (stablecoins or non-stablecoins) and which channel to use for exchange (intermediated or disintermediated venues). We argue that democratic institutions shape both dimensions. Where electoral accountability is strong, citizens remain in regulated, intermediated channels; where it is weak, they shift toward dollar-pegged stablecoins routed through opaque venues, thereby reducing both surveillance and currency debasement. We build a model of democratic accountability and the cost(s) of financial legibility and derive hypotheses linking state power to exchange in cryptocurrency markets. We leverage unique transaction-level data from 110 emerging and developing economies, along with panel data and event study models, to test these hypotheses. Our findings show that behavior in cryptocurrency markets is directly tied to expectations regarding state power.

Introduction

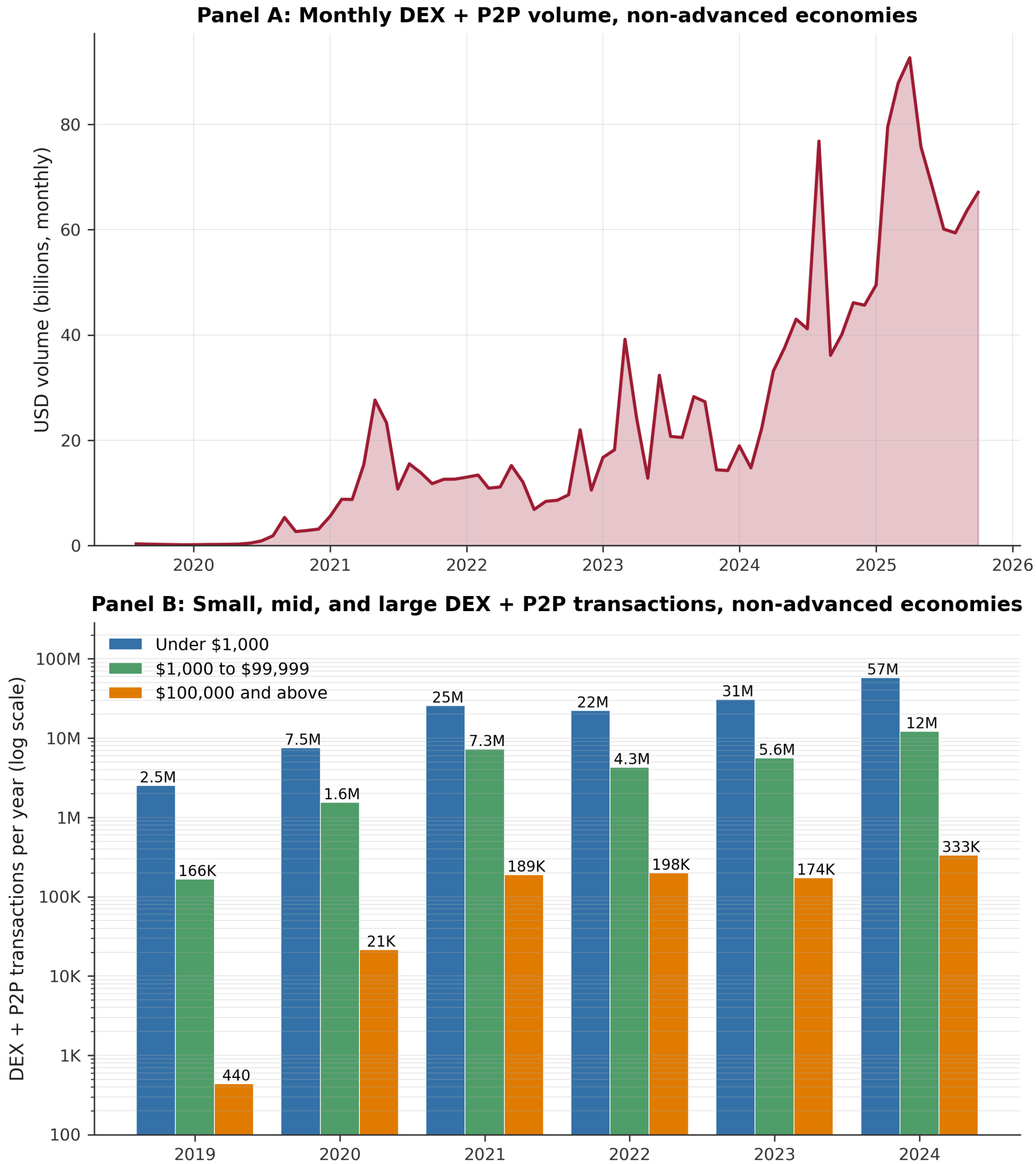
States have long possessed the power to freeze citizens' bank accounts, but modern financial infrastructure has made that power faster, more precise, and easier to deploy against political opponents. In November 2020, Nigeria's central bank abruptly froze the accounts of activists protesting police brutality (Amnesty International 2021). After Turkey's 2016 coup attempt, the presidency issued emergency decrees that froze the assets of tens of thousands of citizens. In the run-up to India's 2024 election, the Income Tax Department froze the accounts of the country's largest opposition party (Reuters 2024). A decade ago, citizens facing such actions had essentially one escape route: dollarization—converting domestic savings into foreign currency and holding it in cash or abroad. That choice forced a brutal trade-off. Remaining inside the formal financial system preserved stability and functionality but left citizens exposed to a state that had already shown it would weaponize the banking system against them. Exiting the system provided insulation from political interference but removed the ability to conduct arm's-length transactions, store wealth securely, or settle large payments at scale.

Cryptocurrency removes this trade-off. Disintermediated markets operating outside the regulated financial system offer citizens both an alternative architecture for transferring value and an alternative set of currencies to hold, without the functional sacrifices imposed by informal dollarization. The pattern is clear: in countries from Nigeria to Russia to Hong Kong, citizens route transactions through decentralized exchanges (software that matches buyers and sellers without an intermediary holding the assets) and peer-to-peer platforms (which connect users directly), accepting higher costs, lower liquidity, and no consumer protection—and ultimately paying more, not less, for the option.[1]

These are not isolated examples. Disintermediated cryptocurrency markets—decentralized exchanges (DEX) and peer-to-peer (P2P) platforms—have grown sharply over the past six years in both advanced and emerging economies. Annual retail DEX and P2P transactions in non-advanced economies rose from roughly 2.5 million in 2019 to 57 million in 2024, with mid-sized and large transactions growing on a comparable scale; advanced economies show a similar trajectory (Figure 1 and Figure 2; Aramonte, Huang, and Schrimpf 2021; Chainalysis 2022).

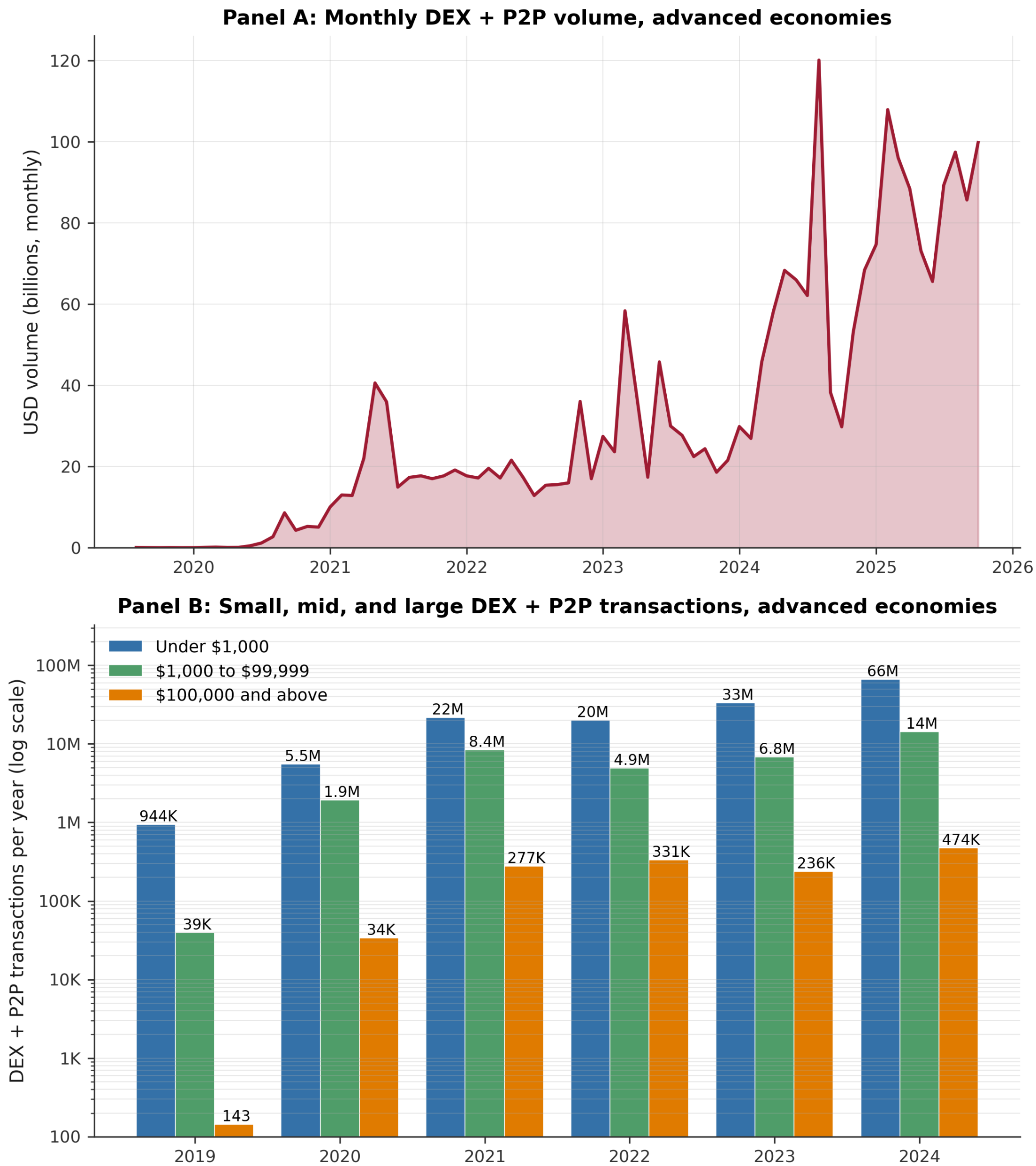
The scale of these markets and their rapid growth are striking; they signal a shift in how citizens and states interact in monetary affairs. This is a dramatic and important shift. Traditionally, states make two distinct promises to their citizens about money: first, that currency issued today will retain its value; and second, that individuals can store wealth and transact without the financial system turning against them. Scholars have examined this first promise extensively, analyzing the institutional commitments—independent central banks, fixed exchange rates, currency boards, and inflation targeting—that make it credible (Kydland and Prescott 1977; Barro and Gordon 1983; Broz 2002; Keefer and Stasavage 2003; Leblang 2003; Bodea and Hicks 2015). The second promise has received far less attention because, until recently, citizens had few options other than dollarization to bypass state-controlled financial systems. Disintermediated cryptocurrency markets remove that constraint: citizens can now use monetary instruments without routing them through intermediaries that the state is able to monitor, regulate, and compel.

[1] We define the cost premium of disintermediated channels as the average premium paid by users who retain functional access to the formal financial system. This premium is not universal. In countries where central bank exchange-rate management produces large spreads between official and parallel rates, peer-to-peer platforms can often clear transactions closer to the parallel-market rate and may therefore be cheaper for citizens operating in the unofficial currency. Our argument rests on the claim that the political cost of legibility—not raw transaction costs—drives citizens' choice of financial architecture.



Source: Chainalysis. Top panel is USD volume. Bottom panel is annual transaction counts on a log scale.

Figure 1: Disintermediated cryptocurrency exchange in non-advanced economies, 2019–2024. Panel A: monthly USD volume routed through decentralized exchanges and peer-to-peer platforms. Panel B: annual transaction counts on the same venues, broken into three transaction-size bands (small under $1,000; mid $1,000 to $99,999; large $100,000 and above). Both panels are restricted to the 110-country non-advanced sample used in the empirical analysis.



Source: Chainalysis. Top panel is USD volume. Bottom panel is annual transaction counts on a log scale.

Figure 2: Disintermediated cryptocurrency exchange in advanced economies, 2019–2024. Panel structure and definitions identical to Figure 1. Advanced-economy retail and institutional activity track the non-advanced trajectory: small-transaction counts rise from roughly 944 thousand in 2019 to 66 million in 2024, and large-transaction counts from a few hundred to nearly half a million.

We argue that democratic institutions limit the state's ability to leverage private financial information. When electoral accountability constrains the state's capacity to act on the information it collects, the political cost of being observed is low, and citizens are willing to use intermediated channels to capture the economic benefits those channels provide

(Tsebelis 2002; North and Weingast 1989; Hollyer, Rosendorff, and Vreeland 2011). In the absence of political constraints, however, the state's observational capacity becomes an instrument of surveillance, asset seizure, and political repression, prompting citizens to incur costs to evade it (Guriev and Treisman 2019; Escriba-Folch 2013). The choice between intermediated and disintermediated exchange is fundamentally a decision about how much citizens can afford to trust the institutions that govern financial exchange.

Our argument distinguishes two dimensions of cryptocurrency choice. On the instrument dimension, citizens facing monetary stress demand dollar-denominated assets as a hedge against inflation and currency depreciation. On the channel dimension, citizens facing political oppression demand opaque exchange venues as a hedge against surveillance and asset seizure[2]. Democratic accountability shapes both demands. Where political institutions are strong, citizens tend to trust both the domestic currency and formal financial institutions. Where institutions are weak, they shift toward a parallel monetary system, holding dollar-denominated stablecoins and routing them through opaque channels. These patterns are not just theoretical; they are directly observable in the data. Figure 3 shows the composition of small-transaction USD volume across the four cells defined by crossing instrument (stable vs. non-stable) with channel (intermediated vs. disintermediated) over our 2019–2024 window; Figure 4 shows the same decomposition for large-transaction volume.

[2] Not all this demand is political: migrants and their families use dollar-pegged stablecoins for low-cost remittances, avoiding the steep commissions of conventional money-transfer operators, and citizens under capital controls may use them to obtain dollars. These are real and growing cases; our claim is not that political exit is the only driver of cryptocurrency adoption, but that it is a distinct and identifiable dimension operating on top of them. In the empirical analysis below, we include remittances as part of the battery of control variables included as robustness checks.

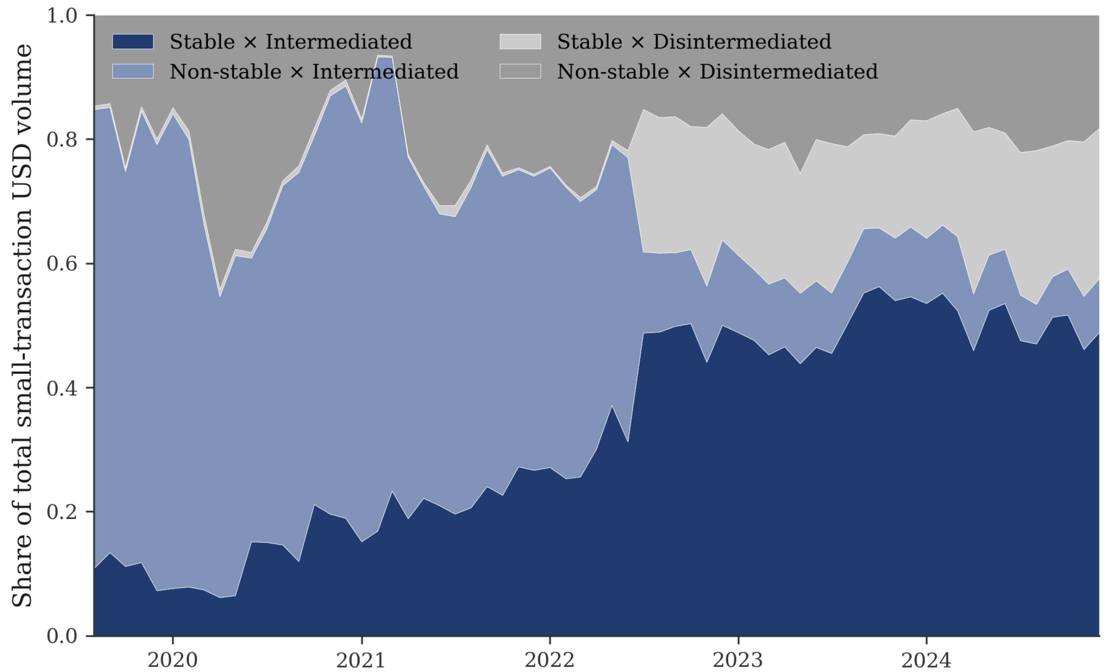


Figure 3: Four-cell composition of cryptocurrency activity, global sample (188 countries), small (retail) transactions, August 2019 through December 2024. Stacked shares of total small-transaction USD volume sum to one in each month. The four cells are defined by the crossing of stable versus non-stable instrument and intermediated versus disintermediated channel.

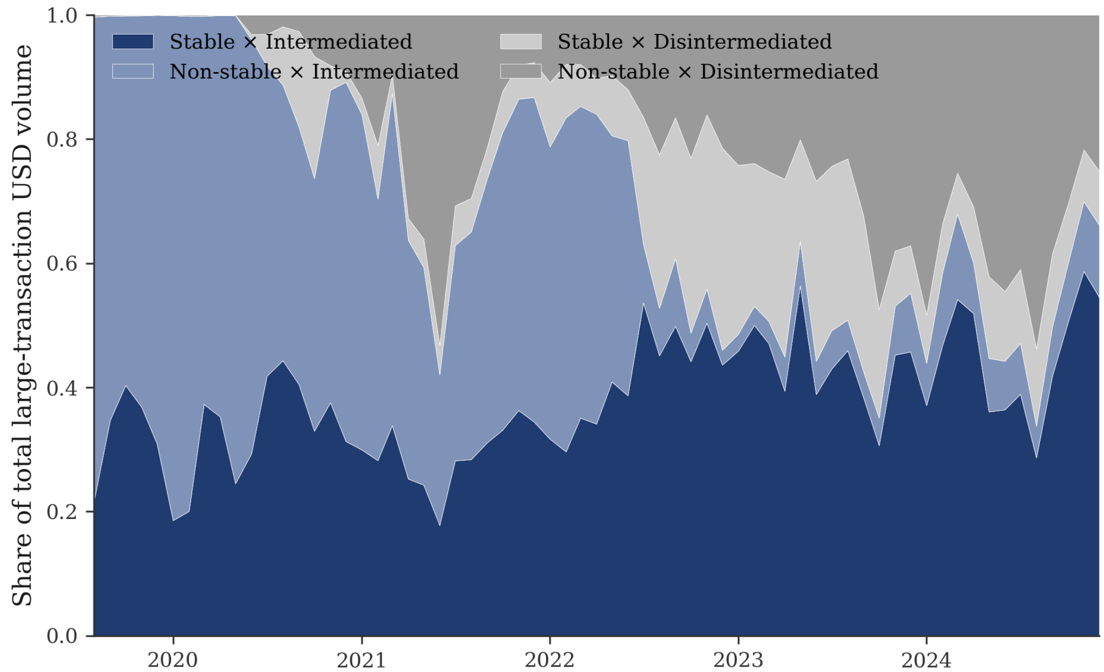


Figure 4: Four-cell composition of cryptocurrency activity, global sample (188 countries), large (institutional) transactions, August 2019 through December 2024. Stacked shares of total large-transaction USD volume sum to one in each month. Cell definitions are identical to Figure 3.

We argue that democratic accountability constrains the executive's use of state power against citizens. More concretely, our theoretical focus is on the credibility of the constraint on arbitrary state action against private wealth—the security of property and contract against the state itself. This claim builds on a rich political economy tradition which places executive constraint within the domain of democratic accountability (North and Weingast 1989; Scott 1998; Acemoglu and Robinson 2006; Hollyer, Rosendorff, and Vreeland 2011). From these foundations, we derive two testable implications. First, democratic accountability reduces the share of cryptocurrency activity routed through disintermediated channels, both in equilibrium and in response to discrete domestic political shocks. Second, the same legibility infrastructure that states use to monitor their own citizens also enables external governments to project power across borders. Sanctions work by compelling correspondent banks to exit target jurisdictions, thereby shutting down regulated cross-border payments (Farrell and Newman 2019; Morse 2022). As sanctions intensify, correspondent banks withdraw from target jurisdictions, cryptocurrency exchanges restrict or exit service, and fiat on-ramps close, raising the effective cost and reducing the operational feasibility of even disintermediated channels until supply-side constraints begin to dominate citizen demand for opacity.

We test these hypotheses using cryptocurrency transaction data from 110 emerging and developing economies between January 2019 and December 2024. For each country-month, we measure the share of activity routed through intermediated channels—

centralized exchanges that custody assets, verify identities, and report to regulators—versus disintermediated channels that collect no identity data and transmit no records to state authorities. We first examine these patterns in a cross-country panel and then analyze market responses to specific political and regulatory events that call the state's commitment to financial neutrality into question. We then assess the impact of external pressure through international sanctions targeting a country's banking system. In both domestic and international settings, we find that restrictions increase the shift from intermediated to disintermediated markets.

Our arguments and evidence proceed as follows. Section I traces the historical consolidation of financial intermediation as state infrastructure and its byproduct of legibility. Section II develops the political economy of legibility and the resulting choice between intermediated and disintermediated cryptocurrency channels. Section III presents a model in which democratic accountability shapes both the baseline political cost of legibility and citizens' adaptive capacity under external pressure. Sections IV, V, and VI derive hypotheses, describe data, and present results. Section VII offers case evidence on regulatory crackdowns through which states extend legibility infrastructure, and Section VIII concludes.

I. Money, Trust, and the Architecture of Visibility

Monetary exchange requires trust in the medium of payment, the counterparty, and the transaction record. Commodity money reduces the need for trust but is impractical for routine transactions. As economies grew more complex, citizens turned to paper claims that could be transferred without physically exchanging the underlying metal. The earliest financial intermediaries—goldsmiths and bullion-vault custodians—emerged to issue such claims against metal held on deposit (Eichengreen 2019). Intermediation lowers the cost of solving the trust problem at scale. Verifying identities, validating media of exchange, and maintaining records are costly when performed independently by each party; an intermediary concentrates these functions within a single institution (Diamond 1984; Catalini and Gans 2020).

Intermediation, however, created fragility. London's goldsmiths discovered they could lend out a portion of their reserves, since depositors rarely demanded redemption simultaneously. The resulting fractional-reserve banking system functions only as long as depositors trust the intermediary. When that trust erodes, depositors rush to withdraw, and the bank fails before it can liquidate the assets backing their deposits. In response to recurrent bank runs, authorities added further layers of intermediation: clearinghouses to manage counterparty risk, lender-of-last-resort facilities to supply emergency liquidity (Bagehot 1873; Gorton 1985; Goodhart 1988), and central banks to supervise the system and backstop systemic failures.

Each stage in the evolution of financial institutions produces the same byproduct: legible records. The goldsmiths' ledgers, the clearinghouses' books, and the central banks' supervisory data document who holds wealth and where that wealth is held; information the state can use to assess taxes and monitor economic activity (Scott 1998; Carruthers 1996).[3] Financial intermediation thus produces legibility: the state's capacity to observe, identify, and link financial activity to specific legal persons. Legibility is an intrinsic feature of financial infrastructure, not a deliberate design choice. The same arrangements that create trust in money also create the state's capacity to monitor it.

Most accounts of state power over the economy emphasize the state's interest in extracting seigniorage (Fischer 1982), securing macroeconomic autonomy through control of the money supply (Andrews 1994; Goodman and Pauly 1993), and using the payments system to monitor economic behavior (Cohen 1998; Helleiner 2003; Strange 1996). All of these functions depend on financial legibility: states cannot tax, enforce regulatory compliance, or sanction political opponents without the capacity to observe how and where citizens use their money. The state's legibility architecture emerged largely through deliberate state-building. War-making and fiscal capacity required states to observe and tax economic activity at scale (Tilly 1990). Because direct monitoring of millions of citizens would be prohibitively costly, states learned over centuries to deputize a small number of intermediaries to monitor on their behalf (Levi 1988). The resulting infrastructure is expensive to construct but highly productive once established, giving rulers with long time horizons strong incentives to extend it (Olson 2000).

States act on this incentive through delegation. Rather than monitoring transactions directly, they license, regulate, and direct private intermediaries to monitor on their behalf. Ayres and Braithwaite's (1992) concept of "enforced self-regulation," together with the regulatory architecture that crystallized over the twentieth century, institutionalizes this delegation (Helleiner 1994). Domestically, the Bank Secrecy Act, Know-Your-Customer mandates, and the Foreign Account Tax Compliance Act conscript banks as compliance agents that report to the state.[4] Internationally, SWIFT (1973) standardized interbank messaging in a form legible to states, while the Financial Action Task Force (1989) extended Anti-Money Laundering and Countering the Financing of Terrorism requirements

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[3] In 1640, Charles I seized £200,000 in bullion deposited at the Royal Mint, demonstrating that institutions consolidating private wealth were targets for sovereign extraction (Quinn 1997; Carruthers 1996). The goldsmiths' private ledgers were only marginally safer than the Mint.

[4] The Foreign Account Tax Compliance Act (FATCA, 2010) extended American reporting requirements extraterritorially, requiring foreign financial institutions to report accounts held by U.S. citizens to the IRS (Grinberg 2012; Eccleston 2013). Each of these statutes is an instruction to private intermediaries about what to collect, retain, and transmit.

globally through graylisting and blacklisting (Büthe and Mattli 2011; Sharman 2011; Simmons 2001; Morse 2022; McDowell 2023).[5]

By the early twenty-first century, virtually every non-trivial transaction in the formal financial system passed through a regulated intermediary that, by law, had to identify the parties, record the transaction, and make the record available to the state (Sharman 2011; Eichengreen 2019; Morse 2022). Money had become comprehensively legible—not because states observed every transaction directly, but because the intermediaries through which money moved were created, certified, and regulated as agents of state observation. This architecture enables taxation, financial repression, sanctions enforcement, and political surveillance in equal measure: the same intermediation that supports tax administration in Denmark also facilitates financial repression in Egypt and the identification of dissidents in China.

II. The Political Economy of Financial Legibility

The political cost of financial transparency—the burden citizens bear when their financial activity is visible to the state—depends on the strength of institutional limits on government power. In countries with strong democratic institutions, government actions involving private wealth typically require judicial review, legislative oversight, or both.[6] Where institutions are weak, governments can act on financial information with few obstacles. All governments already possess broad access to financial data; what varies is whether institutional limits raise the cost of using it.

When political constraints fail or are suspended, financial activity shifts from intermediated to disintermediated markets. After Nigerian #EndSARS organizers had their bank accounts frozen in 2020, activity moved to peer-to-peer Bitcoin platforms (Amnesty International 2021). After Hong Kong's 2020 National Security Law expanded state powers to seize the assets of pro-democracy activists, residents quickly adopted non-custodial wallets and decentralized exchanges. Russian dissidents—and, after February 2022, ordinary Russians facing both Western sanctions and domestic asset freezes—shifted from regulated exchanges to peer-to-peer markets and decentralized protocols. This pattern is not unique to autocracies: Canada froze the trucker convoy's accounts in February 2022 but reversed course within weeks amid judicial review and parliamentary

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[5] FATF mutual evaluations are peer-review assessments of national AML/CFT regimes conducted on roughly seven-year cycles. Countries with significant deficiencies face graylisting or blacklisting, which is consequential: correspondent banks reduce relationships with listed jurisdictions, and capital flows decline (Sharman 2011; Morse 2022).

[6] Tsebelis (1995, 2002) formalizes this logic: policy change requires agreement among multiple actors with veto power, and the number and configuration of those actors determine the scope for executive discretion.

scrutiny. Institutions do not by themselves guarantee restraint—democracies do freeze accounts—but what distinguishes accountable systems is the credibility and reversibility of the constraint; a check that low-accountability settings lack.

What varies across regimes is the institutional cost of financial coercion and, with it, the risk that citizens bear. A state that can monitor financial activity and has no credible constraints generates sovereign risk. In this situation, citizens discount the security of intermediated finance because of the risk that the state will use information against them.[7] The strength of democratic accountability determines the size of that discount and whether financial transparency functions primarily as a public good or as a surveillance tool aimed at political opponents.[8]

This logic extends Hirschman's (1970) exit–voice framework to monetary politics. When voice exists, citizens have little incentive to bear the costs of exit, and intermediated exchange dominates (Chraibi 2025, *forthcoming)*. When voice is unavailable, citizens who would otherwise prefer intermediated exchange accept the costs of disintermediation because the political cost of visibility exceeds the economic cost of opacity.[9] The exit that cryptocurrency enables differs from earlier forms of dollarization in three respects. It is selective: citizens can withdraw from one dimension of state authority (financial visibility) without leaving the currency or the political jurisdiction. It is graduated: some transactions

[7] The canonical formulation is North and Weingast's (1989) account of the Glorious Revolution: the English Crown's inability to credibly commit not to expropriate wealth was the fundamental obstacle to capital market development. The institutional innovations of 1688 (parliamentary sovereignty, independent courts, secure property rights) solved the commitment problem by constraining the sovereign's future action. Acemoglu and Robinson (2006) generalize this insight: a state that cannot bind itself to restraint must cede structural power if its commitments are to be credible.

[8] Hollyer, Rosendorff, and Vreeland (2011) show that democratic transparency is two-sided: citizens monitor what the state does with the information it collects, and that monitoring constrains predatory use. Guriev and Treisman (2019, 2022) document the opposite: financial surveillance, observable to the state, is a useful instrument for identifying dissenters and punishing opponents without the visible coercion that traditional repression requires, thereby making it especially attractive to "informational autocrats."

[9] This assumption does not require citizens to possess a high degree of financial market knowledge. Those facing acute political risk operate in dense networks through which channel-choice information spreads rapidly. After the 2020 #EndSARS account freezes, Nigerian organizers publicly shared instructions on how to receive Bitcoin via peer-to-peer platforms. After February 2022, Russian opposition figures and independent media outlets did the same with non-custodial wallets. The signal itself requires no formal regulatory understanding—only the knowledge that some platforms request a passport photograph during account creation, while others do not.

can remain in state-visible channels while others move to state-invisible ones. And it is reversible: improvements in democratic accountability can draw citizens back into intermediated channels.

The risks of monetary debasement and financial surveillance tend to cluster in the same countries because both stem from institutional weakness. Democratic institutions enforce commitment devices that make monetary stability credible and impose constraints that make restraint in surveillance credible.[10] A citizen who fears inflation can hedge through intermediated channels by, for example, buying dollars on a regulated exchange. A citizen who fears surveillance cannot do the same because the exchange that sells dollars creates a record of the transaction. Cryptocurrency-based disintermediation addresses both risks at once.

Before 2008, intermediation was a technological necessity rather than a choice: every solution to digital double-spending required a trusted central authority to maintain a definitive ledger.[11] That ledger-keeper constituted the system's chokepoint—the obvious target for any state seeking to shut the system down or compel disclosure. Nakamoto (2008) solved the double-spending problem without a central ledger-keeper by enabling a distributed network to reach consensus on transaction order through a cryptographic puzzle ("proof of work") that no single entity controls.[12]

The digital-currency ecosystem that emerged, however, diverged sharply from Nakamoto's design. Centralized exchanges such as Mt. Gox, Coinbase, and Binance, along with a broader set of regulated platforms, quickly reintroduced identity-verifying intermediation atop Bitcoin and subsequent public blockchains. Within a decade, states extended the same chokepoint strategy to these venues through IRS reporting rules, the EU's Fifth Anti-Money Laundering Directive, and the FATF Travel Rule.

The resulting ecosystem is now bifurcated. On one side are regulated, KYC-compliant exchanges that remain legible to the state. On the other hand are decentralized exchanges, peer-to-peer platforms, and non-custodial wallets—technologically diverse

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[10] The literature linking central bank independence and monetary credibility makes this institutional dependence explicit (Cukierman, Webb, and Neyapti (1992); Maxfield (1997); Broz (2002); Bodea and Hicks (2015)).

[11] Double-spending is the problem that distinguishes digital from physical money. A physical banknote can be handed to one party at a time; a digital token, being a string of bits, can be copied and "spent" twice unless something prevents it. Prior digital-cash proposals (Chaum 1983; DigiCash; e-gold) solved this by having a central ledger-keeper record which tokens had already been spent and refuse to honor duplicates.

[12] The technical details of the blockchain protocol (proof-of-work consensus, cryptographic hash functions, block structure) are described in Appendix A. The main text develops only the features necessary for the hypotheses and empirical tests that follow.

venues that do not transmit user identity to state authorities (Bailey, Rettler, and Warmke 2024). Citizens build these disintermediated channels on parallel infrastructure not because they are criminals seeking anonymity, but because the formal infrastructure has been captured by states they cannot trust (Foley, Karlsen, and Putnins 2019).

The essential political feature of disintermediated markets is not anonymity but illegibility. At the level of the ledger, the Bitcoin blockchain is in fact the opposite of anonymous: every transaction is permanently and publicly recorded for anyone to inspect.[13] The ledger tracks wallet addresses rather than legal identities; any link between an address and an individual must be established outside the protocol. A citizen who acquires cryptocurrency through a centralized exchange has already created that link in the exchange's KYC records, so any authority able to compel the exchange can reconstruct her entire transaction history. A citizen who acquires cryptocurrency through a peer-to-peer exchange without KYC requirements has not created that link at the point of acquisition.

Citizens who hold dollar-pegged stablecoins rely on centralized issuers to maintain the peg. Our argument focuses on the channel layer: the decision of how visible to be when transacting. We treat the peg's stability as a maintained belief and assume that routing transactions through disintermediated venues does not alter citizens' assessment of whether the peg will hold.[14]

Citizens, therefore, confront a recurring architectural choice between a legible channel that exposes them to whatever use the state makes of financial information and an illegible one that shields them from it. The political cost of this choice turns on their expectation that the state will refrain from predation.

In the emerging and autocratic states we study, channel-level illegibility remains binding. Most of these governments lack independent chain-analysis tools and cannot routinely compel U.S.-domiciled issuers such as Circle or Tether. The predator that matters is the citizen's own government, not the issuer's home jurisdiction. Because U.S. authorities do not routinely act on requests from these states, the binding constraint on state power operates at the point of transaction. In the next section, we develop a model that yields two predictions: one about the equilibrium level of disintermediation and one about how citizens respond when external pressure raises the political cost of visibility.

[13] Forensic firms such as Chainalysis, Elliptic, and CipherTrace (contracted by the U.S. Treasury, DEA, FBI, and numerous foreign governments) have built substantial businesses on the underlying transparency of the blockchain. Their core technique is clustering: wallet addresses are grouped by transaction patterns, and each cluster is identified through external information.

[14] The interaction between trading-side permissionlessness and issuing-side centralization lies outside the scope of this paper.

III. A model of Citizen Choice

In this section, we introduce a simple model of the citizen's choice between intermediated and disintermediated channels, summarize its main results, and translate them into intuitive terms. The full derivations, sufficient conditions, and extensions appear in Appendix B.

The model's economic logic is straightforward. A citizen weighs two political pressures against a fixed economic cost. The first is the probability that her own state will use financial records against her once it observes her activity. Democratic accountability lowers this probability by placing institutional checks between the record and any predatory use. The second is the cost of substituting away from regulated venues when external pressure increases the stakes of legibility. Here, too, democratic accountability reduces costs because democratic institutions provide an open internet and civil society networks that enable substitution across financial channels.

Three results follow. First, the two pressures operate in opposite directions on the equilibrium share of disintermediated activity. Democracies route a smaller share through illegible channels because the political cost of observation is low and the regulated channel remains convenient. Autocracies route a larger share because the political cost of visibility is high enough to outweigh the economic cost of substitution. Second, external sanctions shift the equilibrium non-monotonically. Moderate sanctions raise the political cost of legibility and push activity into disintermediated channels through citizen demand. Comprehensive sanctions, however, damage the disintermediated infrastructure itself (correspondent banks withdraw, exchanges exit, and fiat on-ramps close) so that supply-side damage eventually dominates. The result is an inverted-U relationship between sanctions intensity and disintermediation. Third, democratic accountability amplifies the demand response along the ascending portion of that inverted-U, where citizens still control the choice. Citizens with greater capacity to substitute respond more strongly to marginal increases in sanctions pressure. This amplification disappears in the descending portion, where the corresponding withdrawal and exchange exits are driven by supply-side constraints rather than by the target country's domestic institutions.

The remainder of this section develops the formal setup. Section IV then translates the results into testable hypotheses.

III.1 The Citizen's Choice

A citizen chooses how to route her cryptocurrency transactions: through an intermediated channel that collects identifying information or through a disintermediated channel that does not. The political cost of legibility has two sources. The first is domestic: the probability that her own state will act predatorily upon observing her activity. The second is external: the probability that an international sanctioning authority will act against her through the same legible channel. Both risks operate through the same mechanism. A regulated intermediary makes the citizen identifiable to any actor capable of compelling its compliance, and the institutions that constrain the state moderate that resulting risk.

Formally, the citizen chooses the disintermediated share of cryptocurrency holdings $(1 - \alpha) \in [0,1]$ to maximize expected utility. The intermediated channel provides a non-price benefit $B > 0$ (consumer protection, deposit insurance, legal recourse). The disintermediated channel imposes a convex economic cost, $c_D^0/[2\psi(\delta)] \cdot (1-\alpha)^2$, where $c_D^0 > 0$ scales the cost level and $\psi(\delta) > 0$ captures the citizen's institutional capacity to substitute, entering the denominator so that greater institutional capacity lowers the effective cost of substitution. Higher democratic accountability raises this capacity, since $\psi'(\delta) > 0$. The political cost of legibility combines the domestic source $\pi(\delta) \in [0,1]$, with $\pi'(\delta) < 0$, and an external source proportional to sanctions intensity S:

$$\Phi(\delta, r, S) = \pi(\delta) \cdot L(r) + \eta \cdot S,$$

where $L(r) > 0$ is the loss conditional on state predation. The citizen's optimal mix is the point at which the political benefit of becoming less observable offsets the economic cost of routing around the intermediary:

$$1 - \alpha^*(\delta, r, S) = \frac{\psi(\delta) \cdot [\Phi(\delta, r, S) - B]}{c_D^0}.$$

Disintermediation rises with the political cost of legibility Φ and with substitution capacity ψ; it falls with the convex cost c_D^0 and with the value of intermediation B.

Two parameters carry the democracy effect through different channels. $\pi(\delta)$ is the baseline-cost channel: democratic accountability lowers the probability that the domestic state acts predatorily, raising the relative value of legible channels and lowering the citizen's equilibrium disintermediated share. $\psi(\delta)$ is the adaptive-capacity channel: democratic accountability supplies the infrastructure (i.e., a free press, civil-society networks, a less-censored internet, and a weaker capacity to suppress disintermediated activity through prosecution, account freezes, or platform blocks) that lowers the cost of substituting towards these channels. The first sets the equilibrium level of disintermediation, and the second sets the extent to which citizens move when external pressure raises the cost of remaining legible. Both parameters place the same constraint on executive action but pull in opposite directions on the disintermediated share — democracy lowers its baseline through $\pi(\delta)$ and sharpens its response to external shocks through $\psi(\delta)$.

III.2 Implications

Under normal conditions, the baseline-cost channel dominates the equilibrium share of disintermediated activity. Setting $S = 0$ reduces the political cost to its domestic term $\pi(\delta)L(r)$; differentiating the interior optimum with respect to democracy gives

$$\left.\frac{\partial(1-\alpha^*)}{\partial\delta}\right|_{S=0} = \frac{\psi'(\delta)\,[\pi(\delta)L(r)-B] + \psi(\delta)\,\pi'(\delta)\,L(r)}{c_D^0}.$$

The two terms pull in opposite directions — the capacity term ($\psi' > 0$) is positive, the baseline-cost term ($\pi' < 0$) is negative — with the baseline-cost term dominating in the empirically relevant region (Appendix B.4 provides sufficient conditions). The equilibrium disintermediation share is therefore lower in democracies: democratic citizens accept intermediated channels because the economic benefits outweigh the small political cost, whereas citizens in autocracies bear the costs of disintermediation because the political cost of legibility is potentially very large.

For external shocks, the framework predicts a more complex pattern. Sanctions[15] raise the political cost of legibility through the same mechanism as domestic predation. However, external sanctions simultaneously degrade the disintermediated infrastructure itself:[16] correspondent banking withdrawal, exchange exit, and fiat on-ramp closure reduce the supply of channels that enable citizens to exit the financial system. We capture this supply effect through a quadratic cost-shifter, $c_D^0(S) = c_D^{0,0} + \kappa S^2$, in which $\kappa > 0$ governs the convexity of infrastructure damage at high intensity. The disintermediated share at sanctions intensity S is

$$1-\alpha^*(S) = \frac{\psi(\delta)\cdot[\pi(\delta)L(r)+\eta S - B]}{c_D^{0,0}+\kappa S^2}.$$

[15] International financial sanctions are restrictions one state (or coalition) imposes on another's access to the global financial system — typically asset freezes on government and individual holdings, correspondent banking restrictions that force third-country banks to refuse transactions with the target, removal from SWIFT and other payment-messaging infrastructure, and secondary sanctions that penalize banks in non-sanctioning jurisdictions for dealing with sanctioned entities. Coalitions often impose them in response to military aggression (Russia after February 2022), nuclear proliferation (Iran, North Korea), human rights violations (Myanmar, Belarus), and a range of other foreign-policy disputes.

[16] The supply-degradation channel can be implemented using a variety of instruments. Faced with sanctions exposure, banks withdraw correspondent relationships from targeted jurisdictions to avoid compliance liability; this is the "de-risking" dynamic in sanctions and FATF listings (Farrell and Newman 2019; Morse 2022; Sharman 2011). The same logic extends to the crypto exit channel: comprehensively sanctioned jurisdictions lose access to centralized exchanges and fiat on-ramps that convert local currency into cryptocurrency; for example, when major exchanges and card networks restricted Russian users after February 2022, and when access for Iranian users was entirely cut off. The quadratic form of the supply-cost shifter approximates this process, detailed in the Appendix.

The denominator grows faster than the numerator at high S, generating an inverted-U whose peak satisfies

$$S^* = \frac{\eta \cdot c_D^0(S^*)}{2\kappa \cdot [\Phi - B]}.$$

An interior peak exists when κ is sufficiently large relative to η — equivalently, when supply-side correspondent-banking infrastructure damage rises faster than demand-side citizen substitution.

On the ascending portion of the inverted-U, where demand effects dominate, and the infrastructure supporting disintermediation remains, the marginal effect of sanctions on the disintermediated share is approximately

$$\left.\frac{\partial(1-\alpha^*)}{\partial S}\right|_{\text{demand region}} \approx \frac{\psi(\delta)\cdot\eta}{c_D^0}.$$

Differentiating again with respect to democracy yields:

$$\left.\frac{\partial^2(1-\alpha^*)}{\partial S\ \partial\delta}\right|_{\text{demand region}} = \frac{\psi'(\delta)\cdot\eta}{c_D^0} > 0.$$

Democratic accountability amplifies the citizen's response to a marginal increase in sanctions, even as democratic accountability — through its effect on $\pi(\delta)$ in the baseline — reduces the equilibrium level of disintermediation. The amplification operates entirely through adaptive capacity $\psi(\delta)$; on the descending portion of the inverted-U it vanishes, because correspondent banks do not condition their exit on the target country's domestic political institutions. A framework operating on the political-cost level alone — lowering $\pi(\delta)$ but holding $\psi(\delta)$ fixed — would predict the opposite, that democracies respond less because they start from a lower baseline.

IV. Hypotheses

This section develops two hypotheses along with their observable implications. The first hypothesis is that democratic accountability reduces financial disintermediation, both in equilibrium and in response to acute domestic political shocks. The second is that international sanctions generate a non-monotonic effect on disintermediation—an inverted-U—and that democratic accountability amplifies citizens' demand-side response along the ascending portion of that curve. We first derive three implications of the first hypothesis, then turn to the implications of the second, focusing on heterogeneity across transaction sizes and the role of democratic accountability in shaping the demand response to sanctions.

The equilibrium claim of hypothesis 1 is that citizens in countries with higher democratic accountability conduct a larger share of cryptocurrency transactions through intermediated channels, all else equal. The shock-response claim is that when a country experiences a discrete political event that raises the threat of state predation, citizens shift their share of assets toward less-observable routing channels in the months after the event. Three implications follow.

Implication 1a (legibility gradient). The democracy effect runs along the channels citizens choose for political reasons. Channels that identify users to state authorities should have a positive effect, because citizens in democracies accept legibility and concentrate their activity there, as it is cheaper. Non-identity-transmitting channels should show the largest negative effect because that is where activity concentrates in autocratic states. The model treats demand for the deepest-privacy and illicit-flagged venues (e.g., gambling) as exogenous to political accountability (Appendix B.7), so it predicts no relationship with democracy in these venues. That null also serves as a falsification check: a democracy effect in venues used for non-political reasons would undercut the political-exit rationale derived above.

Implication 1b (parallel prediction for stablecoins versus non-stablecoins). We predict an equivalent instrument-share pattern alongside the channel-share pattern of 1a: citizens facing weaker democratic accountability hold a larger share of their cryptocurrency in dollar-pegged stablecoins than in non-stablecoin assets. This implication is motivated by the discussion in section II: democratic institutions embed commitment devices that enhance the credibility of monetary policy, just as they constrain politically motivated financial surveillance (Cukierman, Webb, and Neyapti 1992; Bodea and Hicks 2015).

Implication 1c (concentration in small retail transactions). The democracy effect is concentrated in small transactions because individual citizens lack access to institutional substitutes (e.g., offshore banking, OTC desks, corporate treasury management) that firms and multinationals use to hedge against domestic predation risk. For individuals, cryptocurrency-based disintermediation is the available substitute, so the political-cost mechanism is strongest where individuals transact.

Hypothesis 2: International financial sanctions have a non-linear effect on disintermediation, mediated by democratic accountability. Moderate sanctions raise the political cost of legibility while disintermediated infrastructure remains operational, increasing the disintermediated share through citizen demand (Result 2 of Appendix B). Comprehensive sanctions degrade the infrastructure on which disintermediated channels themselves depend—correspondent banking, exchange access, fiat on-ramps—reducing disintermediation through supply. The net pattern is an inverted-U in sanctions intensity.

Implication 2a (steeper inverted-U for small transactions). Small transactions rely on local crypto infrastructure that comprehensive sanctions degrade through correspondent banking withdrawal and exchange exits. Large transactions, as discussed above, access a global infrastructure less sensitive to local disruption. The downturn at high sanctions intensity is therefore sharper for small transactions.

Implication 2b (democracy amplifies the demand-side response). On the ascending portion of the inverted-U, democratic accountability raises the citizens' response to a marginal increase in sanctions through the adaptive-capacity term (Result 3 of Appendix B). The interaction between democracy and sanctions in the demand region is the most distinctive feature of the two-channel formulation. Democracy enters the disintermediation outcome through two parameters that pull in opposite directions: it lowers $\pi(\delta)$, the baseline political cost, reducing the equilibrium disintermediated share and it raises $\psi(\delta)$, the adaptive capacity, amplifying the marginal response to external shocks.

V. Data and Empirical Strategy

V.1 Data

We construct a country-month panel of 110 non-advanced economies from August 2019 through December 2024.[17] Cryptocurrency data comes from Chainalysis, which provides transaction-level data that we aggregate to monthly volumes by country, month, and legibility tier.[18] We sort exchange channels into five tiers, ordered by the strength of the identity link they provide to state authorities. Tier 0 covers intermediated activity at licensed centralized exchanges, hosted wallets, and merchant services providers, which collect comprehensive KYC information at account opening and report transactions to the state. Tiers 1 and 2 cover venues with partial identity verification: lending protocols (Tier 1),

[17] We classify countries as non-advanced using the IMF *World Economic Outlook* Advanced Economy / Emerging Market and Developing Economy (AE/EMDE) typology in its 2024 vintage. The Chainalysis database contains 187 countries with attributable transaction volume in the August 2019-December 2024 window, of which 146 are non-advanced under the IMF classification. We retain countries with at least 53 months (roughly 80 percent) of non-missing tier-share data over the 65-month window, which excludes 36 sparsely covered country panels, yielding a working sample of 110 countries and 6,911 country-months. Once we add covariates, our estimating sample drops to 83.

[18] Chainalysis identifies wallets, clusters them into entities using transaction-pattern heuristics, and attributes activity to countries using IP information at fiat on-ramp interactions and KYC data shared by cooperating exchanges. The data, therefore, identify country-level activity with measurement error that increases for users routing transactions through privacy-preserving tools and through jurisdictions with weak KYC enforcement. The measurement error runs counter to our hypotheses: countries where citizens conceal their activity from intermediaries are countries where Chainalysis attribution is least reliable, biasing the disintermediated share downward in the countries where the political-cost mechanism predicts it should be highest. The bias works against finding the patterns we report.

smart-contract platforms, and no-KYC exchanges (Tier 2). [19] Tier 3 covers decentralized exchanges, peer-to-peer marketplaces, and cryptocurrency ATMs, none of which transmit counterparty identity to the state. Tier 4 contains mixing services, protocol-level privacy tools, and residual activity from the darknet, sanctioned entities, and illicitly flagged activity.

Tier 3 and Tier 4 both sit on the unobservable side of legibility, where the state cannot, without external information, link a transaction to an identified citizen. They differ in why citizens transact there. Tier 3 activity is consistent with the political-cost mechanism: citizens choosing channels that do not identify them to the state. Tier 4 activity is dominated by non-political demand (e.g., gambling and criminal mixing) that do not, ex ante, respond systematically to domestic institutional conditions. Together, they form the deep-disintermediation region.

Our primary variable of interest is democratic accountability measured by V-Dem's Clean Elections Index (v2xel_frefair). Macroeconomic controls—the real interest rate and exchange-rate depreciation—are drawn from the IMF's International Financial Statistics. We include a measure of capital controls using the IMF's Financial Account Restrictiveness Index (Fernández et al. 2016). International sanctions intensity is measured by the Global Sanctions Database (GSDB v4) as the log of 1 plus the number of countries imposing financial sanctions on the target. Regulatory variables—banking restrictions, payment bans, and FATF grey-listing—are coded from primary regulatory documents.

Every specification includes a block of crypto-market and global-financial controls that capture the common conditions driving activity across all countries: the price deviation of USDC (a US-dollar pegged stablecoin) from its dollar peg, the lagged Ethereum network gas price, the broad dollar index, and an indicator of centralized-exchange distress episodes. We also include an indicator for China's crypto ban, capturing the People's Bank of China's blanket prohibition on cryptocurrency trading and mining from September 2021 through the end of the sample.

V.2 Dependent Variables

The theoretical model treats α as the country-aggregate share of cryptocurrency activity routed through intermediated channels; empirically, we work with the disintermediated share $(1 - \alpha)$. Our primary outcome is the deep-disintermediation region defined above—

[19] Although no-KYC exchanges do not require identity documents at signup, they remain centralized operators that accumulate identifying metadata (email addresses, IPs, device fingerprints, internal address-to-account links) accessible to the state through legal or coercive means. This distinguishes them structurally from Tier 3 venues, which lack a custodial operator to compel disclosure of information.

the combined Tier 3 and Tier 4 share—which we construct in three variants: the small-transaction share, the all-transaction share, and the large-transaction share.

For the gradient analysis of Implication 1a, we construct the tier-share variables tier0_share through tier4_share, along with small-transaction variants. For the instrument channel, we use the share of USDC in aggregate holdings, computed as USDC volume / (USDC volume + Bitcoin volume) to capture the dollar-substitution margin that operates alongside the channel dimension.

In the within-country event studies (Section VI.2), we use the volume-weighted channel illegibility index for small stablecoin transactions, denoted L^stable. It is the volume-weighted average of the legibility weights τ_k across Chainalysis service categories, with weights ranging from 0 (centralized exchange) to 1 (darknet markets and sanctioned entities).[20] We construct an analogous index for small non-stablecoin transactions, denoted L^nonstable. We also compute a layered-evasion gap L^stable − L^nonstable, which captures the difference between the two indices: a positive value means that citizens route their stablecoin volume through less-observable channels than their non-stablecoin volume. Layered evasions occur when residents pursue two evasion strategies (a dollar-pegged instrument and an illegible routing channel) simultaneously.

V.3 Estimation

The variation that identifies Hypothesis 1 is across countries. Democratic accountability is a slow-moving institutional feature that barely changes within a country, even over a six-year period. The conventional approach—country fixed effects, which absorb unobserved country-specific heterogeneity—would discard almost all the variation that identifies the independent variable. We therefore estimate the panel data models using correlated random effects (CRE), implemented via the Mundlak transformation, in which the country-level mean of each time-varying regressor is included as an additional control (Mundlak

[20] The legibility weight τ_k is assigned to each Chainalysis service category k based on the strength of the identity link the venue transmits to the state authority. The mapping is as follows. Tier 0 (τ = 0.0): centralized exchange, hosted wallet, merchant services. Tier 1 (τ = 0.2): lending, lending contract. Tier 2 (τ = 0.4–0.5): smart contract, token smart contract, ICO, NFT platform collection (each 0.4); no-KYC exchange (0.5). Tier 3 (τ = 0.6–0.7): decentralized exchange, decentralized exchange contract, bridge (each 0.6); peer-to-peer exchange, ATM (each 0.7). Tier 4 (τ = 0.9–1.0): mixing, protocol privacy (each 0.9); darknet market, sanctioned entity, sanctioned jurisdiction, sanctions, illicit actor/organization, fraud shop, scam, child abuse material (each 1.0). The mining pool, infrastructure-as-a-service, unclassifiable “other” volume, and the gambling service category are excluded from gradient construction. The gambling exclusion follows from per-category diagnostics reported in Section VI.1.

1978; Wooldridge 2010, ch. 10). CRE retains the between-country variation that captures the signal while removing the confounding that fixed effects are meant to remove.[21]

Year fixed effects capture global cryptocurrency-market shocks. We report robust standard errors clustered at the country level.

VI. Results

VI.1 Hypothesis 1: Democratic Accountability and Equilibrium Channel Choice

Table 1 tests Hypothesis 1 across three related outcomes: aggregate legibility, deep disintermediation, and deep disintermediation in small transactions (full specifications for all models are in the appendix). The Clean Elections Index coefficient is negative and statistically significant in each column. Moving from full autocracy to full democracy is associated with roughly a 10-percentage-point reduction in the equilibrium disintermediated share in the small-transaction subsample, where we argue the political-cost mechanism is concentrated. The coefficient for all transactions is smaller in absolute magnitude but has the same sign.

Table 1. Democratic accountability is associated with lower equilibrium disintermediation.

Variable	Legibility Score	Deep Disint (All)	Deep Disint (Small)
Clean Elections Index	−0.0493*	−0.0630*	−0.1007**
	(0.0263)	(0.0366)	(0.0398)
N	4,242	4,242	4,242

*CRE estimator with year fixed effects; country-clustered standard errors in parentheses. Coefficients on the Clean Elections Index only; control coefficients are suppressed for readability and reported in full in Appendix E.1. Controls: lagged real interest rate, capital-account restrictiveness (FARI), exchange-rate depreciation, FATF grey-list, USDC price deviation, China crypto-ban indicator, lagged Ethereum gas price, centralized-exchange distress indicator, and the broad dollar index, plus Mundlak between-country means. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*

[21] Two properties make the estimator appropriate here. First, adding the country average of each time-varying regressor captures between-country confounding as unit fixed effects; under the Mundlak assumption, it is consistent and, when between-unit variation carries the identifying signal, weakly more efficient than within fixed-effects estimation. Second, it nests a direct test of the random-effects assumption: the joint significance of the Mundlak means.

While Table 1 reports the average effect of democracy across all legibility tiers, Implication 1a suggests that the democracy coefficient should reverse sign as we move from fully legible to fully illegible venues. The pattern in Figure 5 aligns with this implication. Tier 0—exchange in fully intermediated markets—carries a positive, statistically significant coefficient: citizens in democracies accept legibility and concentrate exchange in licensed venues. Tier 3 shows the opposite, as citizens in lower-accountability countries move out of identity-transmitting exchanges. The middle tiers—venues with only partial identity verification—cluster around zero. This is a threshold response: were citizens responding to legibility by degree, the coefficient would steadily grow more negative tier by tier. Instead, it stays near zero until identity transmission stops altogether, then turns sharply negative at Tier 3. Citizens are not fine-tuning to how observable a venue is; they exit once a venue stops reporting their identity to the state. Tier 4 is null, consistent with the model's treatment of Tier 4 demand as exogenous to political-cost selection.[22] This null also serves as a falsification check against the most common alternative reading of disintermediation—that it is driven mainly by illicit activity. Were that so, the democracy effect would concentrate in Tier 4, the illicit-flagged venues; instead, it appears at Tier 3, legal but non-identifying venues such as decentralized and peer-to-peer exchanges and vanishes at Tier 4.

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[22] The Tier 4 category contains mixing, protocol-privacy, and illicit-flagged services (darknet market, sanctioned entity, sanctioned jurisdiction, illicit-actor-organization, fraud shop, scam, and child-abuse material). The pooling assumption is that demand for these services is driven primarily by non-political motives. Citizens with strong political-cost concerns might, in principle, use mixing services, thereby contaminating the null prediction at Tier 4. We disaggregate Tier 4 into two subcomponents from the raw Chainalysis service-category labels: a privacy-tool subcomponent (mixing plus protocol-privacy), which is the component a politically motivated user would plausibly select, and an illicit residual (darknet market, sanctioned entity, sanctioned jurisdiction, illicit-actor-organization, fraud shop, and scam). Both subcomponents produce null Clean Elections Index coefficients: the privacy subcomponent at $b = -0.006$ ($SE = 0.005$, $p = 0.18$) and the illicit residual at $b = +0.006$ ($SE = 0.021$, $p = 0.79$). The pooled Tier 4 null reported in Figure 5 thus reflects null effects for each subcomponent rather than an average of oppositely signed components. The "gambling" service category was removed from the Tier 4 construction because per-category diagnostics on the non-AE sample show that gambling concentrates in offshore financial centers, FX-controlled jurisdictions, and weak-state autocracies rather than in regulated gambling hubs; co-moves negatively with centralized-exchange volume (Pearson −0.27) rather than with the privacy or illicit categories; and captures 41 percent of its USD volume in transactions above $100,000, all of which are inconsistent with the retail political-cost mechanism Tier 4 is designed to identify. Gambling is excluded from this measure by the same logic that excludes mining-pool, infrastructure-as-a-service, and "other" volume.

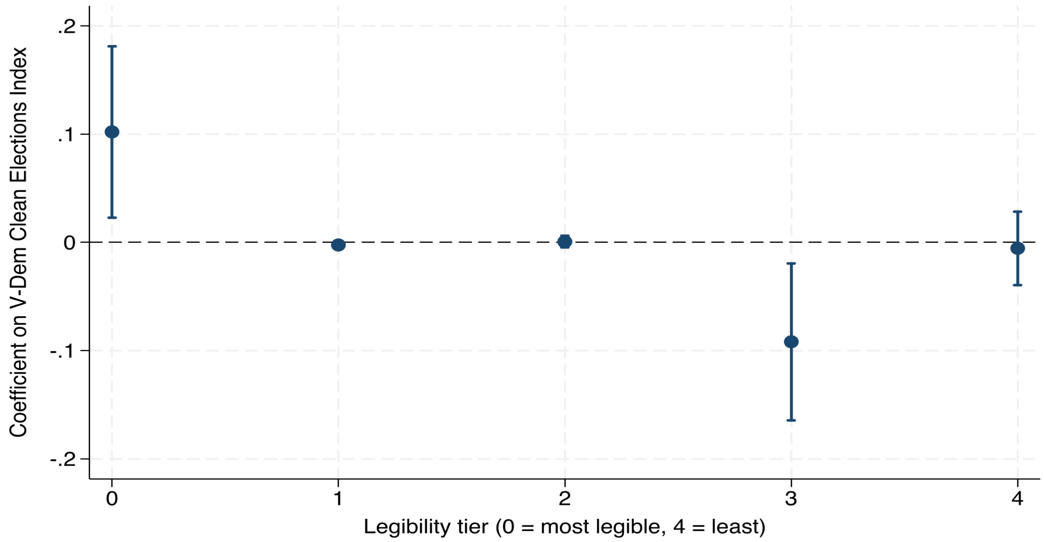

Figure 5: Democracy effect across legibility tiers, small-transaction outcomes. CRE estimator with year fixed effects. Coefficient on Clean Elections Index from separate regressions on each tier. Vertical bars are 95% confidence intervals.

Table 1 reports how citizens route transactions. But citizens must also decide which currency instrument to hold. The relevant instrument is the stablecoin, a cryptocurrency token pegged to the US dollar that preserves value when the domestic currency is unstable and formal dollar accounts are hard to obtain.[23] Implication 1b of Hypothesis 1 states that democracy also operates along the instrument margin. Where accountability is weaker and monetary commitments less credible, citizens shift a larger share of their holdings into stablecoins. Table 2 supports this prediction. The Clean Elections Index is negative on both the USDC share (Column 1) and the deep-disintermediation share (Column 2); citizens in more democratic countries allocate a smaller share of their cryptocurrency portfolios to dollar-pegged stablecoins, consistent with lower demand for dollar hedging under reduced monetary stress. The exchange-channel result, meanwhile, reflects the political-exit mechanism discussed above. Democratic accountability thus constrains two distinct forms of state extraction simultaneously: monetary debasement and political predation.

[23] Intermediated stablecoin activity is not merely a faster domestic payments rail. In our sample it functions chiefly as synthetic dollar access where formal dollar accounts are restricted or unavailable—economically distinct from a domestic fast-payments system, and the reason it responds to monetary stress on the instrument margin documented here. Yield is a separate demand driver for some stablecoins and lies outside our scope; our argument concerns legibility and dollar access, not return, and our instrument measure does not depend on yield-bearing arrangements.

Table 2. Democracy operates on both instrument and channel margins.

Variable	USDC Share	Deep Disint (Small)	Stable Legibility	Nonstable Legibility
Clean Elections Index	−0.0528*	−0.1007**	−0.0217	−0.0542*
	(0.0317)	(0.0398)	(0.0167)	(0.0298)
N	4,242	4,242	4,221	4,242

*Same specification and controls as Table 1 (Clean Elections Index shown; full models in Appendix E.2). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*

The third implication of H1 is that the democracy effect will be concentrated in small retail transactions, because individuals lack the institutional substitutes, such as offshore banking, OTC desks, and corporate treasuries that firms and multinationals use to hedge against government predation. Table 3 confirms this hypothesis: the effect is largest in the small-transaction column and smaller in the all- and large-transaction columns.

Table 3. Democracy effect concentrates in small transactions.

Variable	Small	All	Large
Clean Elections Index	−0.1007**	−0.0630*	−0.0551
	(0.0398)	(0.0366)	(0.0421)
N	4,242	4,242	4,209

Same specifications and controls as Table 1 (full models in Appendix E.1).

The Clean Elections Index serves as a composite proxy for electoral integrity—the degree to which incumbents face binding accountability. The framework links this proxy to two channels simultaneously. The first is the baseline-cost channel $\pi(\delta)$: more accountable executives are less able to act on what they observe. The second is the adaptive-capacity channel $\psi(\delta)$: electoral accountability tends to coincide with a free press, civil-society networks, and an open internet, all of which lower the cost of substitution. Because a single index cannot isolate these two channels, we introduce auxiliary controls, reported in Appendix D. Adding measures of citizen capacity and remittance-corridor conditions—internet penetration, fixed broadband subscriptions, mobile cellular subscriptions, electricity access, log GDP per capita, and remittance intensity—absorbs much of the $\psi(\delta)$ infrastructure and leaves the democracy coefficient essentially unchanged across specifications. The remaining effect is therefore identified primarily through the baseline-cost channel $\pi(\delta)$. The small-transaction result is also robust to replacing the Clean Elections Index with the V-Dem polyarchy index (Appendix D.6), and to replacing it with direct measures of property-rights and rule-of-law security—V-Dem rule of law, the Heritage property-rights and judicial-effectiveness indices, and the World Bank rule-of-law estimate (Appendix D.7).[24]

A separate concern is that our data capture channel is limited to existing crypto users and does not capture prior decisions to adopt cryptocurrency at all. If adoption itself is correlated with the political-cost concerns that shape channel choice, the estimated cross-country gradient could partly reflect differences in the composition of the adopter pool rather than the channel-choice mechanism itself. Our argument addresses this in two ways.

Theoretically, Appendix B.10 embeds the channel-choice model within a two-stage framework in which citizens first decide whether to adopt and then select their channel mix. Under monotone selection, the observed cross-sectional gap is a lower bound (in absolute value) on the true population-level political-cost effect. The intuition is that democracies selectively attract the most politically concerned adopters, and these citizens choose the highest levels of disintermediation conditional on entry; as a result, the cross-country comparison understates rather than overstates the structural effect of democracy.

Empirically, Appendix D.1 adds a direct adoption-intensity proxy—the lagged log of the country's total crypto USD volume—alongside the capacity controls. The democracy coefficient changes only modestly, from −0.1007 to −0.0975. Conditioning on country-level adoption intensity does not absorb the effect, consistent with our claim that the operative margin is channel choice within the adopter pool and not differential entry into cryptocurrency use.

VI.2 Hypothesis 1: Within-Country Responses to Acute Political Shocks

Beyond cross-sectional patterns, Hypothesis 1 predicts within-country responses to discrete institutional shocks. We test this prediction in two ways. First, we examine three sharply timed events: Hong Kong's National Security Law (June 30, 2020), Russia's exclusion from SWIFT (February 26, 2022), and two regulatory changes in Nigeria. Under Hypothesis 1, each should produce marked increases in channel illegibility (L^stable) within months. Second, we extend beyond these cases to the full set of political transitions identified in the V-Dem Episodes of Regime Transformation (ERT) dataset. The ERT

[24] These alternative measures are correctly signed, and the property-rights index is significant on the disintermediation outcomes; consistent with the framing of democratic accountability as a proxy for the security of property and contract, the electoral-accountability measure remains the strongest single predictor when it and a property-rights measure are entered jointly (Appendix D.7). We interpret this as evidence that electoral accountability is the most informative available proxy for the underlying constraint on arbitrary state action, not as evidence against a property-rights interpretation.

algorithmically flags sustained movements toward autocratization, democratization, or regime breakdown and records the year each episode begins. Because V-Dem codes episodes annually while our panel is monthly, we hand-code the precise treatment month for each onset using primary sources (see Appendix C for the dating procedure and cohort list).

These episodes begin in different months across countries, producing staggered adoption. In this setting, conventional two-way fixed-effects estimators are biased when treatment effects are heterogeneous. We therefore estimate the effect of these shocks on channel illegibility (transactions under $1,000) using the Callaway–Sant'Anna estimator for staggered, heterogeneous-cohort difference-in-differences (Callaway and Sant'Anna 2021), implemented with doubly robust augmented inverse-probability weighting.

These short event windows identify changes in channel mix among the existing population of crypto users; they do not, and cannot, measure the movement of a portfolio into cryptocurrency. A National Security Law announced in June 2020, for example, affects how Hong Kong residents already active in crypto markets choose to hold and trade their balances—whether through regulated centralized exchanges or peer-to-peer venues. On a months-long horizon, such shocks do not induce non-users to enter the market in sufficient numbers to materially alter observed channel shares. Longer-run effects on adoption are plausible and worth examining in future work, but the identification windows used here are short enough to abstract from them. This within-population design complements the cross-sectional attenuation extension of the model; we present that extension in Appendix B.10. By holding the adopter pool fixed, the event studies isolate the channel-choice mechanism.

Table 4 reports the post-period average treatment effects for Hong Kong, Russia, and the two Nigerian events, while Figure 6 displays the corresponding dynamic event-study profiles for Hong Kong and Russia.

Table 4. Single-case event studies for flagship acute political shocks.

Case	Event	Date	Window	L^{stable}	$L^{\text{small\_agg}}$
Hong Kong	National Security Law	2020-06	0–48	+0.099***	+0.130***
Russia	SWIFT exclusion	2022-02	0–34	+0.072***	+0.057***
Nigeria	#EndSARS account freezes	2020-11	0–24	not significant	+0.034**
Nigeria	#EndSARS, full window (with confounds)	2020-11	0–49	+0.024***	+0.043**
Nigeria	Central Bank crypto-banking ban	2021-02	0–47	not significant	not significant

Single-treated-unit Callaway–Sant'Anna doubly-robust difference-in-differences with country-clustered standard errors and a never-treated donor pool. The Nigeria-EndSARS specification is reported in two post-treatment windows, discussed below. p < 0.10, ** p < 0.05, *** p < 0.01.*

Hong Kong and Russia

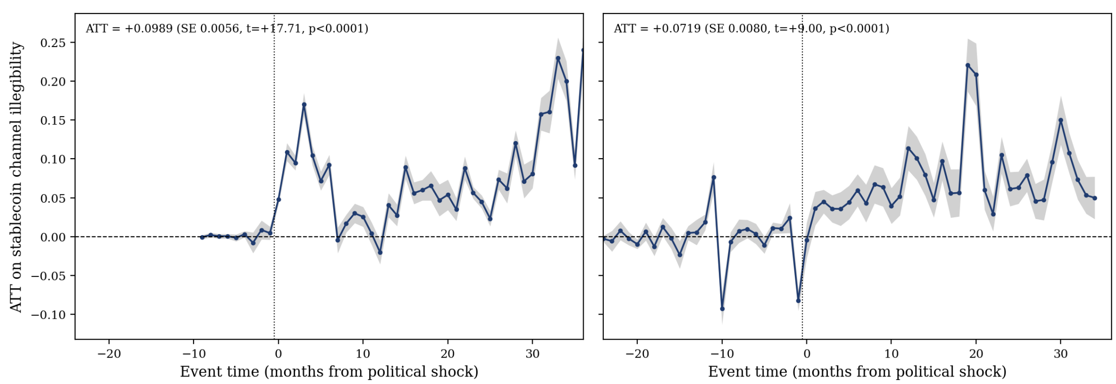

Figure 6: Dynamic event-study profiles for Hong Kong (NSL, 2020-06) and Russia (SWIFT, 2022-02). Shaded bands are 95% pointwise confidence intervals from country-clustered standard errors. The vertical dashed line marks the treatment month.

The trajectories for Hong Kong and Russia are similar: pre-event coefficients are indistinguishable from zero, while post-event coefficients spike within the first month and accumulate to large positive values within two years. In raw terms, Hong Kong's small-transaction stablecoin volume in 2019 ran 99.8% through centralized exchanges, the most state-observable channel. By 2023, that share had fallen to roughly 71% as users migrated to peer-to-peer venues and on-chain stablecoin wallets. Russia's response to the February 2022 SWIFT exclusion is similar one year later.

Nigeria

Nigeria offers relatively clean identification through two financial-system shocks occurring in the same country, only four months apart, but of theoretically opposite types. The first was the November 2020 EndSARS aftermath, in which the Central Bank of Nigeria obtained court orders freezing protest organizers' accounts, and the State Security Service intensified enforcement against named dissidents. The second was the February 2021 CBN circular directing banks to close cryptocurrency-exchange accounts. The EndSARS episode constitutes a political shock that signals heightened predatory risk without directly restricting regulated channels. The CBN circular, by contrast, is a regulatory restriction on intermediated access that supplies no additional political information. Hypothesis 1, therefore, predicts a routing response to the first event and a null response to the second.

Interpreting the Nigeria EndSARS event study, therefore, requires separating two distinct periods. The clean identification window (event-time 0–24, November 2020–October 2022) precedes a series of unrelated monetary and political shocks—the 2022–23 naira redesign and demonetization crisis, the February 2023 political transition, and the June 2023 FX-market liberalization. Within this window, the EndSARS aftermath produces a clear positive shift in the aggregate small-transaction illegibility index, but no effect on the stablecoin-specific channel. Extending the window beyond event-time 24 picks up additional increases in stablecoin routing that align with the post-2023 monetary shocks rather than the 2020 political signal. The Nigerian data thus reveal two separate processes: a political-cost response to EndSARS that operates on broad small-transaction routing, and a later, independent shift in stablecoin usage driven by monetary disruption. Our argument concerns only the first. Figure 7 displays both patterns, with the two windows shaded for clarity.

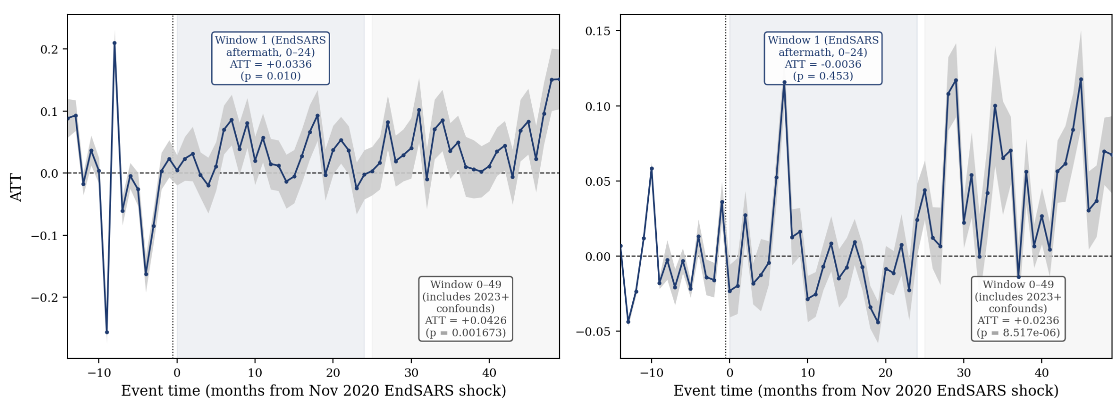

Figure 7: Dynamic event-study profiles for the Nigeria-EndSARS specification (trigger month = November 2020) on two outcomes. Left: aggregate small-transaction illegibility index (L_{agg}^{small}). Right: stablecoin channel illegibility (L^{stable}). Light-blue shading marks the EndSARS-aftermath window (event time 0–24, Nov 2020 – Oct 2022); light-orange shading marks the post-2023 confounded window (event time 25–49). Solid lines are point estimates; shaded bands are 95% pointwise confidence intervals from country-clustered standard errors. The aggregate-index response appears within the EndSARS window; the stablecoin-channel response is concentrated in the post-2023 window and is not attributable to the EndSARS shock.

Episode heterogeneity

Hong Kong, Russia, and Nigeria demonstrate that the mechanism is identifiable when shocks are clear and sharply timed. To assess whether the pattern holds more generally, we pool all ERT-identified episodes into three cohorts: autocratization, democratization, and regime breakdown (full lists in Appendix C.1). The framework predicts that citizens facing autocratization or regime breakdown will shift toward less observable venues as the political cost of legibility rises. Democratization serves as a placebo: citizens moving from autocracy to democracy experience a declining political cost and have no theoretical reason to increase disintermediation. A null result in this cohort helps confirm that the autocratization findings reflect a political-cost response rather than a generic reaction to political news or an estimation artifact.

The theory yields an additional testable implication. The autocratization response should be concentrated in episodes that are still ongoing during our sample window—when citizens are actively updating their beliefs about state behavior—and should weaken or disappear in episodes that have already concluded. Because global routing illegibility is trending upward over the period, a pooled estimate that averages ongoing and completed episodes can mask the underlying increase in treated countries. We therefore expect a negative pooled coefficient that strengthens substantially once we separate ongoing from completed episodes.

Table 5 reports the pooled post-period treatment effects for all three cohorts on the channel and instrument margins.

Table 5. Pooled cohort effects of political shocks on routing illegibility and instrument share.

	Routing-channel margin			Instrument margin
Cohort	L^{stable}	$L^{\text{small\_agg}}$	Layered-evasion gap	Stablecoin share
Autocratization (n = 14)	negative**	negative, n.s.	negative, n.s.	not significant
Democratization (n = 9, placebo)	not significant	not significant	not significant	not significant
Documented regime transitions (n = 14)	negative, n.s.	negative*	positive*	not significant

*Callaway–Sant'Anna doubly-robust difference-in-differences with country-clustered standard errors and monthly trigger timing. Cohort and event-date lists in Appendix C. * p < 0.10, ** p < 0.05, *** p < 0.01.*

As predicted, the democratization placebo is null across all outcomes. The autocratization cohort shows a negative and statistically significant pooled effect on L^stable. The regime-transitions cohort produces a positive and marginally significant estimate on the layered-evasion gap (L^stable − L^nonstable), indicating that citizens route stablecoin volume through less-observable channels than their non-stablecoin volume. In contrast, the instrument margin—the share of holdings in stablecoins—is null across all three cohorts in these short event windows, even though the cross-section shows a clear pattern (Table 2).

To test the heterogeneity prediction, we split the autocratization episodes according to V-Dem's ERT classifications: ongoing (still unfolding), severe-completed, or averted. This divides the 14-country cohort into six ongoing, six severe-completed, and two averted cases (lists in Appendix C.1).

Table 6. Autocratization-cohort heterogeneity by V-Dem episode outcome.

Subset	n	Effect on L^{stable}
Pooled (all autocratization onsets)	14	negative**
Ongoing (outcome = ongoing)	6	negative***
Breakdown (outcome = ongoing or severe)	12	negative**
Severe (outcome = severe only)	6	negative, n.s.

*Single-cohort Callaway–Sant'Anna doubly-robust difference-in-differences for each subset. The ongoing-subset effect is more than three times as large as the severe-subset effect; the pooled effect is the cohort-weighted echo of the two subgroups. * p < 0.10, ** p < 0.05, *** p < 0.01.*

The pattern matches our prediction: the ongoing subset's effect on L^stable is statistically significant; the severe subset is similarly signed with confidence intervals that span zero. Treated-country illegibility increases over the window in raw terms, but the global control trend rises faster, yielding a negative coefficient relative to the never-treated comparison. This indicates that the mechanism is most visible where citizens have room to move, and the institutional environment is visibly changing. The pooled estimate survives a random-permutation placebo (Appendix C.5); dynamic event-study profiles for the ongoing and severe subsets are in Appendix C.

The within-country evidence corroborates the cross-sectional findings using a different research design. Citizens adjust their routing behavior in real time when domestic institutional conditions visibly change; the response is concentrated in ongoing episodes rather than completed ones, and it operates through stablecoin routing rather than shifts in instrument shares. The democratization and regulatory-action placebos are null, as predicted. Together, these patterns support Hypothesis 1's claim that democratic accountability shapes channel choice both in equilibrium and during periods of institutional change.

VI.3 Hypothesis 2: Sanctions and Disintermediation

Sanctions affect disintermediation through two opposing channels. On the demand side, they function much like domestic predation: by raising the political cost of using observable financial routes, they push citizens toward less visible alternatives. On the supply side, they erode the infrastructure on which those alternatives depend—correspondent banking relationships, exchange access, and fiat on-ramps—thereby narrowing the pathways out of the formal system.

As sanctions tighten, disintermediation therefore rises at first, driven by citizen demand for workarounds. Once supply-side damage grows severe enough to outweigh this behavioral response, however, the relationship reverses, and disintermediation begins to decline. The net result is an inverted-U relationship between sanctions intensity and disintermediation. Democratic accountability steepens the rising portion of this curve because citizens in more accountable systems enjoy greater latitude to substitute into alternative channels and therefore respond more strongly to pressure from sanctions.

Table 7 reports the inverted-U specification: a positive linear and a negative quadratic coefficient on sanctions intensity.

Table 7. Sanctions intensity has a non-linear effect on disintermediation.

Variable	Inverted-U
Lagged GSDB intensity	+0.0306***
	(0.0082)
Lagged GSDB intensity squared	−0.0071***
	(0.0017)
Clean Elections Index	−0.0778*
	(0.0342)
N	4,242

*Inverted-U specification on deep disintermediation (all transactions). Same controls as Table 1 (full model in Appendix E.3). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*

The estimated peak occurs at a log sanction intensity of roughly 2.14, corresponding to about seven or eight sanctioning countries. This threshold cleanly divides the distribution. Most sanctioned country-months—65 percent—involve only one to three senders and therefore sit on the rising portion of the curve. A smaller group of targets, however, faces comprehensive multilateral regimes.[25] These include Russia (more than forty senders,

[25] The sender count comes from the Global Sanctions Database, which records multilateral sanctions (UN, EU) as a separate sender–target dyad for each member state. At the high end, the count therefore reflects coalition and bloc membership rather than independent national decisions, reaching roughly 190 for targets under UN financial sanctions. The inverted-U is estimated on log-intensity, which compresses this upper tail; the peak at seven to eight senders falls in the small-coalition range, where the count is unaffected by bloc aggregation.

rising to forty-six after the 2022 invasion), Iran (three through 2021, then over thirty after 2022), Belarus (one in 2019, climbing above forty by 2023), and Myanmar (four before the 2021 coup, then thirty-two afterward). Together, these heavily sanctioned cases account for about one-fifth of the sample and lie on the descending portion of the curve, where supply-side damage dominates. Because few observations fall in the intermediate range, the peak is best interpreted as the transition from small coalition to broad multilateral sanctions rather than as a level at which many countries cluster. Figure 8 plots the curve with a 95% confidence-interval band.

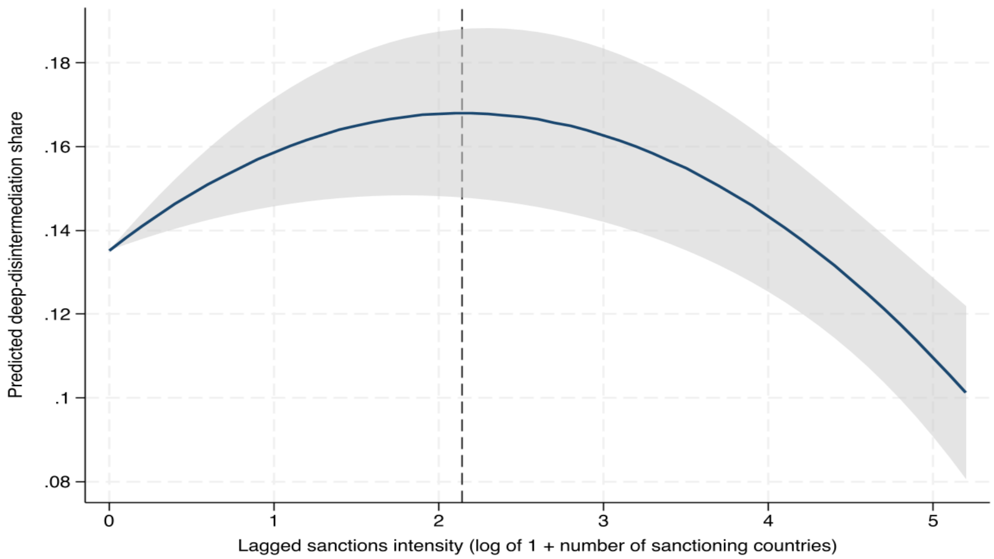

Figure 8: Sanctions and disintermediation: the inverted-U. Predicted contribution to deep disintermediation from Table 7 Column 2, with 95% confidence interval band computed by the delta method. Vertical dashed line marks the estimated peak at log-intensity 2.14 (~7 to 8 sanctioning countries).

The inverted-U relationship presented so far assumes a uniform response across political regimes; our model, however, generates a sharper prediction. When sanctions raise the cost of using legible financial channels, citizens in settings with greater adaptive capacity—such as a more open internet or a state less able to suppress exit—can substitute into disintermediated alternatives more readily. Therefore, the same increase in sanctions intensity elicits a larger behavioral response in these environments. Democracies should amplify, rather than dampen, the demand-side effect (Implication 2b).

Table 8 tests this prediction by interacting the Clean Elections Index with lagged sanctions intensity. The estimated interaction coefficient is positive (+0.036), with a two-sided p-value of 0.13. Because the model predicts a positive cross-partial in the demand region in advance (Result 3 of Appendix B), a one-sided test is the appropriate benchmark, yielding p = 0.065. The interaction points in the expected direction under the directional test. On its own, however, it does not decisively rule out a flat marginal-effect profile. Stronger empirical support for Implication 2b comes from the level pattern across regime types, which we examine next.

Table 8. Democracy and the demand-side response to sanctions.

Variable	Inverted-U	Dem × Sanctions
Lagged GSDB intensity	+0.0306***	+0.0114
	(0.0082)	(0.0160)
Lagged GSDB intensity squared	−0.0071***	−0.0037
	(0.0017)	(0.0029)
Clean Elections Index	−0.0778*	−0.0944**
	(0.0342)	(0.0398)
Lagged GSDB × Democracy	—	+0.0356
		(0.0236)
Lagged GSDB squared × Democracy	—	−0.0065
		(0.0051)
N	4,242	4,242

Same specifications and controls as Table 7 (full models in Appendix E.3).

Figure 9 shows how the marginal effect of an increase in sanctions varies across levels of democracy, evaluated at a moderate sanctions' intensity. Two features of this profile speak to Implication 2b. First, the marginal effect is statistically distinguishable from zero in moderately democratic countries and above, but indistinguishable from zero in more autocratic countries. It rises from roughly +0.006 in the most autocratic settings to about +0.033 in the most democratic ones. The estimates are significant in the upper half of the democracy distribution and null in the lower half. This matches the model's prediction: citizens with greater adaptive capacity respond to additional sanctions pressure, while those without it do not. Second, the slope of the profile across levels of democracy (the cross-partial) points in the expected direction but is estimated imprecisely. We therefore interpret the demand-side amplification in terms of the marginal effect rather than its slope.

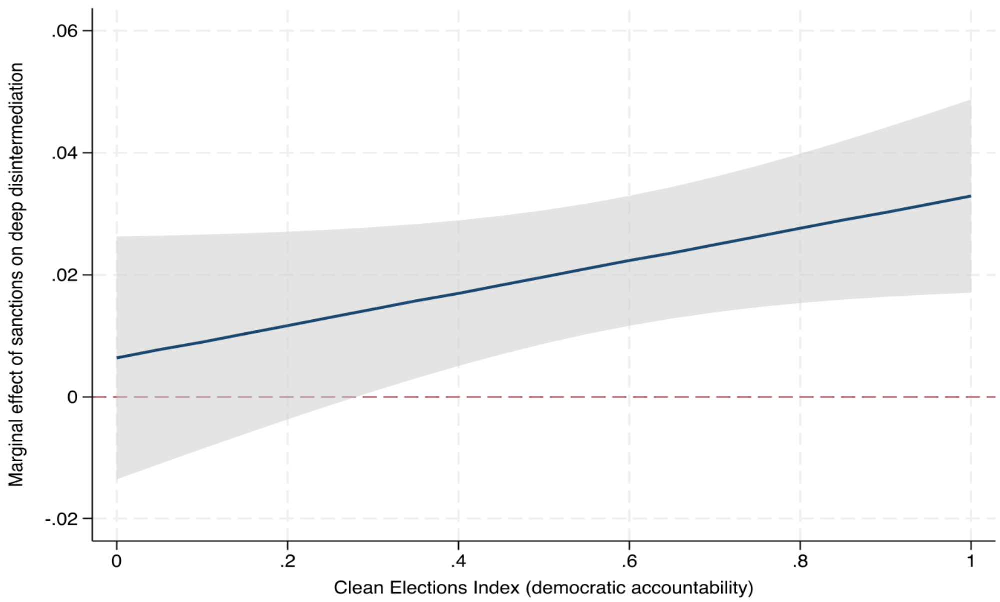

Figure 9: Marginal effect of sanctions on deep disintermediation, by democracy. Marginal effects implied by the Table 8 interaction specification, evaluated at the 25th percentile of nonzero sanctions intensity and traced across the Clean Elections Index. The shaded band is the 90% confidence interval.

A potential identification concern is reverse causality: sanctions may be imposed partly in response to crypto-mediated evasion, which could, in turn, generate a positive correlation between sanctions intensity and disintermediation. This account struggles to explain the graded pattern we observe. If sanctions were triggered solely by evasion, there would be no clear reason for the marginal effect of additional sanctions to strengthen as democratic accountability increases. The fact that citizens in more democratic countries respond more strongly points instead to a demand-side mechanism driven by citizen behavior rather than by the factors that lead governments to impose sanctions.

The second potential concern is whether the inverted-U reflects financial exclusion in particular or a broader decline in the target country's external relations. Appendix D.3 reports two robustness checks. Restricting sanctions intensity to Western senders alone (the United States, EU member states, the United Kingdom, Canada, Australia, and Japan) preserves the inverted-U at a similar magnitude. A placebo constructed from non-financial sanctions, by contrast, yields null coefficients on both terms, consistent with a financial-exclusion mechanism.

These results identify the relationship between sanctions and cryptocurrency usage across countries. We can also look within cases to look at the effect over time. The challenge we confront is that a standard off to on event study requires countries that *enter* sanctions during the panel, but almost none do. Most of the countries targeted by sanctions were already sanctioned when our data began in 2019. We therefore date the event not at first imposition but at *escalation*: the month a country's sanction regime jumps to comprehensive, SWIFT-level intensity. Because these escalations sit above the inverted-U's estimated peak, the episodes we examine focus on the descending side where supply-side destruction of financial infrastructure competes with residual demand. Seven non-advanced economies experience an escalation between 2019 and 2024; we code each escalation month using primary policy and news sources. Details are included in Appendix C-7,

Table 9 reports the single-treated-country estimates on both the stablecoin-channel illegibility index L^stable and the deep-disintermediation share. The cases are not homogeneous; they array along a spectrum. At one end, Russia's disintermediation rises sharply after the February 2022 SWIFT exclusion—a 14.5-percentage-point increase in the deep-disintermediation share. At the other end, Myanmar collapsed by 37 points after the post-coup sanctions.

This ordering reflects the depth of each country's cryptocurrency market before sanctions began. Sanctioned countries with deep markets—Russia, Belarus, Venezuela—uniformly saw disintermediation rise, as demand for private transactions found usable infrastructure. Among countries with thin markets, the supply channel mostly came to dominate, and disintermediation fell—most starkly in Myanmar, whose post-coup collapse destroyed available channels. Afghanistan is an exception: a thin market yet rising on both exchange channels; we conjecture this is because the 2021 Taliban takeover drove a demand surge large enough to outstrip that country's limited infrastructure. The deep-market uniformity is the clean half of the pattern; the supply-driven decline is clearest where the surrounding state is itself failing.

Table 9. Single-case sanctions event studies (CS-DiD ATT vs. never-sanctioned donor pool).

Country	Escalation	Trigger	L^{stable}	Deep disint.
Deep pre-shock infrastructure				
Russia	2022m2	SWIFT exclusion (Feb. 26 announcement)	+0.071***	+0.145***
Belarus	2022m3	EU SWIFT exclusion (Reg. 2022/355)	+0.051***	+0.131***
Venezuela	2024m4	renewed oil/financial sanctions	+0.029***	+0.052***
Thin pre-shock infrastructure				
Myanmar	2021m2	post-coup sanctions	−0.099***	−0.366***
Afghanistan	2021m8	Taliban takeover; reserves frozen	+0.021***	+0.088***
Ethiopia	2021m9	Tigray-conflict sanctions	+0.021***	−0.148***
Mali	2022m1	ECOWAS regional sanctions	+0.000	−0.020

Each cell is a separate single-treated-country Callaway–Sant'Anna doubly-robust estimate against the never-sanctioned donor pool. "Deep" and "thin" classify each country by its mean total cryptocurrency volume over the 12 months before escalation (deep: above $100 million; the gap between the deep and thin groups is more than an order of magnitude). Escalation months and sources are in Appendix C.7. Single-treated-unit *standard errors rest on one treated cluster and should be read for sign and ordering rather than individual significance. * p < 0.10, ** p < 0.05, *** p < 0.01.*

VI.4 Combined Model

We conduct two final checks to ensure that the effects of democracy and sanctions are distinct rather than driven by an omitted confounder. The first jointly estimates the H1 baseline and the H2 inverted-U specification. If democracy and sanctions were simply capturing the same underlying process through different regressors, including both sets of terms would cause one to absorb the other. In practice, however, the democracy coefficient remains negative and statistically significant even when estimated alongside the sanctions inverted-U terms (Table 10). This pattern indicates that democracy and sanctions operate as two separate effects: the democracy coefficient captures the equilibrium level of disintermediation, while the sanctions terms trace the inverted-U relationship around that level.

Table 10. Combined model.

Variable	H1 Baseline	+ Sanctions
Clean Elections Index	−0.0630*	−0.0778*
	(0.0366)	(0.0342)
Lagged GSDB intensity	—	+0.0306***
		(0.0082)
Lagged GSDB intensity squared	—	−0.0071***
		(0.0017)
N	4,242	4,242

*Same specification and controls as Table 1 (Clean Elections Index and sanctions terms shown; full models in Appendix E.1 for the H1 baseline and Appendix E.3 for sanctions). * p < 0.10, ** p < 0.05, *** p < 0.01.*

The second check verifies that the democracy effect is not driven by how we construct the dependent variable: it emerges across both channels identified by the formal model. Table 11 reports a negative and statistically significant Clean Elections Index coefficient for both the instrument channel, measured by the USDC share, and the exchange channel, measured by deep disintermediation in small transactions. Consistent with the model's predictions, these two channels move together.

Table 11. The democracy effect on both margins.

Variable	USDC Share	Deep Disint (Small)
Clean Elections Index	−0.0528*	−0.1007**
	(0.0317)	(0.0398)
N	4,242	4,242

*Same specification and controls as Table 1 (full models in Appendix E.2). * p < 0.10, ** p < 0.05, *** p < 0.01.*

The quantitative results document the citizen side of the relationship: where accountability is weak, citizens shift a larger share of activity into channels the state cannot observe. The same institutional weakness should also shape state behavior. Governments facing few constraints both provoke greater exit and enjoy greater latitude to expand their legibility infrastructure when an opportunity arises. The next section examines this state-side response, showing how low-accountability governments exploit episodes of monetary stress to redirect cryptocurrency activity into channels they can monitor.

VII. Case Evidence on the Regulatory Crackdown Mechanism

If low-accountability states extend surveillance under fiscal stress, cryptocurrency banking bans should be more common in autocracies. They are. Among non-advanced economies, autocracies—defined as countries with a mean Clean Elections Index below 0.5—are roughly twice as likely to have imposed a crypto banking ban as democracies: 12.2 percent versus 5.6 percent (Table 12). We interpret this as a regularity of autocratic governance.

Table 12. Cryptocurrency banking bans are more common in autocracies.

Country group	Ever imposed a banking ban	Countries
Democracies (CEI mean ≥ 0.5)	5.6%	54
Autocracies (CEI mean < 0.5)	12.2%	74

Non-advanced economies, country level. Autocracy = country-mean Clean Elections Index below 0.5. Descriptive shares of countries that have ever imposed a crypto banking ban; no significance test.

This cross-country pattern is consistent with autocracies' greater willingness to extend financial surveillance, but it remains descriptive and cannot speak to timing or mechanism. The three cases that follow—Nigeria in 2021, Türkiye in 2021, and Argentina in 2022—provide the missing evidence on mechanisms. Each combines acute monetary stress with a state response that extends financial surveillance through new regulation of cryptocurrency intermediaries, followed by a measurable shift in citizens' channel choice in the months that follow. These cases demonstrate that the regulatory-crackdown mechanism corresponds to identifiable state behavior.

Nigeria 2021

The macroeconomic backdrop in Nigeria was a managed exchange-rate regime under acute strain. The Central Bank of Nigeria's official naira–U.S. dollar rate, held near ₦380 through most of 2020, came under pressure in late 2020 as oil receipts collapsed and dollar liquidity at the I&E window dried up; the parallel-market rate widened to roughly ₦480–₦500 by January 2021. Against this background, the CBN issued Letter Ref. BSD/DIR/PUB/LAB/014/001 on 5 February 2021 to all Deposit Money Banks, Non-Bank Financial Institutions, and Other Financial Institutions. The letter reminded institutions that "dealing in cryptocurrencies or facilitating payments for cryptocurrency exchanges is prohibited" and directed them to "identify persons and/or entities transacting in or operating cryptocurrency exchanges within their systems" and to "ensure that such accounts are closed immediately" (Central Bank of Nigeria 2021). Enforcement followed quickly: within weeks, several exchanges, including Binance, Bundle, and Quidax, reported the losing correspondent banking relationships with Nigerian institutions.

The citizen response was rapid and channel-substituting rather than activity-reducing. Chainalysis's 2021 *Geography of Cryptocurrency* report ranked Nigeria among the top countries globally on its adoption index and documented heavy use of peer-to-peer marketplaces, with volumes on platforms such as Paxful and LocalBitcoins continuing to rise through Q2 2021 even as on-ramp access through licensed banks collapsed (Chainalysis 2021). The institutional context was one in which the CBN, under Governor Godwin Emefiele during the Buhari administration, was frequently deployed as an instrument of administrative policy. In October–November 2020, the CBN obtained a court order freezing the accounts of #EndSARS protest organizers (Amnesty International 2021), consistent with a broader pattern of executive-driven use of regulatory authority (Page 2018). These two events, the November 2020 account-freeze episode and the February 2021 crypto-banking ban, form the within-Nigeria comparison analyzed above: the political-cost shock produced a measurable routing response, while the regulatory ban produced none, the divergence the framework predicts.

Türkiye 2021

The Turkish lira entered 2021 already weakened, having fallen from roughly TL6.0/USD in early 2020 to around TL7.40 by year-end. The proximate trigger for the events that followed, however, was political. On 20 March 2021, President Erdoğan dismissed Central Bank Governor Naci Ağbal by decree two days after he raised the policy rate by 200 basis points, triggering an immediate depreciation of roughly 15 percent (Reuters 2021; CNN Business 2021). Twenty-six days later, the Central Bank of the Republic of Türkiye published a regulation (Resmî Gazete No. 31456, 16 April 2021, effective 30 April) prohibiting the use of crypto-assets for payments and barring payment and electronic-money institutions from facilitating such transactions (Central Bank of the Republic of Türkiye 2021). Citizens responded before the regulation took effect: Chainalysis recorded rising Turkish trading volumes through March and April, and the 22 April collapse of the domestic exchange Thodex—whose founder fled with client assets estimated in the billions—accelerated migration toward foreign exchanges and stablecoin self-custody (Chainalysis 2021; Reuters 2021). Ağbal's removal was the third governor dismissal in roughly twenty months under a 2018 decree that gave the president direct authority to appoint and dismiss governors. Each removal was followed by depreciation and a tightening of administrative controls.

Argentina 2022

Argentine inflation accelerated from roughly 50 percent year-on-year at the beginning of 2022 to 71 percent by July and approached 95 percent by December. Over the same period, the official peso/USD rate moved from ARS103 in January to ARS177 by year-end, while the parallel "dólar blue" widened from ARS208 to nearly ARS350, all within a tightening cepo cambiario that limited retail dollar purchases to USD 200 per month (Reuters 2022). On 2 May 2022, two large private banks (Banco Galicia and Brubank) announced retail crypto-trading services. Three business days later, on 5 May 2022, the Banco Central de la República Argentina issued Comunicación "A" 7506, prohibiting financial entities from engaging in or facilitating operations involving digital assets, including cryptoassets and those whose yields are linked to their price movements (Banco Central de la República Argentina 2022). Comunicación "A" 7507, restricting collective investment vehicles, followed shortly afterward.

The citizen response was an increasing shift toward disintermediated channels. Chainalysis ranked Argentina among the top fifteen countries on its 2022 adoption index, with a disproportionate share of activity in dollar-pegged stablecoins (USDT and USDC) used as informal savings instruments, and with P2P platform volumes—particularly Binance P2P and the domestic wallet Lemon—rising sharply through Q3 2022 (Chainalysis 2022). The institutional context was one of an unusually weak BCRA. Although de jure independent, its leadership served at the pleasure of the executive and operated under pressure to monetize fiscal deficits, a dynamic that intensified after Economy Minister Martín Guzmán resigned in July 2022 and Sergio Massa assumed an enlarged economic portfolio in August with direct authority over exchange-control policy (Gerchunoff and Llach 2018; Edwards 2010). The speed of the regulatory response—three business days after private banks launched retail crypto trading—is consistent with the mechanism we emphasize: a monetary authority moving quickly to close a substitution channel once it is opened.

The three cases illustrate a common mechanism. Monetary stress raises the salience of cryptocurrency markets as instruments of capital flight and store-of-value protection. States facing few institutional constraints respond by extending financial surveillance to these channels through banking bans, payment restrictions, or licensing requirements that route activity through state-legible venues. The citizen response depends on the form of the intervention: regulatory measures that close intermediated channels push activity into disintermediated ones through reduced availability, while political-cost shocks that signal predatory state intent pull citizens toward them through choice.

VIII. Conclusion

We begin with a puzzle. From Nigeria to Hong Kong to Russia, citizens route cryptocurrency through venues with wider spreads, lower liquidity, and no consumer protection—willingly paying more for the alternative. Standard models cannot explain this pattern. They treat disintermediation as efficiency arbitrage in which yield differentials drive substitution toward cheaper options (Diamond 1984). Cryptocurrency disintermediation runs in the opposite direction: citizens who use decentralized exchanges accept higher costs rather than seek cheaper alternatives. The puzzle resolves once we recognize that intermediation generates a politically valuable byproduct—legibility—whose political cost varies with institutional constraints on state power.

Democratic accountability constrains the executive use of that legibility in two ways. It lowers the equilibrium political cost of being observed, reducing disintermediation under normal conditions (Hypothesis 1). And it amplifies citizens' demand-side response to international financial sanctions, because the adaptive capacity that accountable institutions supply gives citizens greater room to respond more strongly as sanctions tighten (Implication 2b).

We extend the monetary-politics literature on credible commitment (Cukierman, Webb, and Neyapti 1992; Maxfield 1997; Broz 2002; Bodea and Hicks 2015), which has focused on the conditions under which states commit not to inflate. We identify a parallel commitment problem: the conditions under which states commit not to weaponize the financial system against its users. The cryptocurrency market makes both commitment failures observable at once. Citizens substitute toward dollar-denominated instruments when the value commitment is not credible, and toward illegible channels when the access commitment is not credible. These two responses are empirically separable: they operate on different dimensions of the same transaction, respond to different institutional variables, and concentrate in different market segments. This separability distinguishes the cryptocurrency setting from earlier episodes of capital flight, dollarization, or informal finance.

Our argument also bears on policy debates about cryptocurrency regulation. The standard framing treats cryptocurrency primarily as a tax evasion, money laundering, and consumer protection problem to be addressed through KYC requirements, exchange licensing, and reporting mandates. That framing is incomplete. In democratic settings, regulatory integration is defensible: the political cost of legibility is low, and the gains in consumer protection and tax administration plausibly outweigh the costs to financial privacy. In low-accountability environments, however, the same architecture functions as an instrument of political control. Citizens who route activity through disintermediated channels are exiting a system that has demonstrably been turned against them. The degree of democratic accountability, therefore, determines whether regulatory integration ultimately serves the citizens it ostensibly protects.

States and markets are central to political economy. Citizens vote with their wallets—selectively, partially, and reversibly—on whether the institutions that govern their money can be trusted not to turn it against them. Where that trust is absent, they are building the exit in plain sight.

Appendix A: Blockchain Technology Primer

This appendix provides technical background: what a blockchain is, how proof-of-work and proof-of-stake consensus work, what custody means in this setting, why the Tier 0 through Tier 3 classification of the legibility weights (set out in the main text) tracks an underlying technical distinction rather than a regulatory label, and what separates the two instrument types, stablecoins and non-stablecoins.

A.1 The double-spending problem

A physical banknote can be handed to only one person at a time. A digital token, by contrast, is a string of bits that can be copied. Without a mechanism to prevent copying, the recipient of a digital payment cannot know whether the sender has already spent the same funds elsewhere. From the 1980s through 2008, every working digital payment system solved this problem the same way: a single trusted institution maintained an authoritative ledger and refused to honor any transfer whose source had already been spent (Chaum 1983). That institution was always something a state could compel. Digital money was therefore inherently legible to state authority—not as a policy choice, but as a technical requirement of the only working solution to double-spending.

A.2 Hashes, blocks, and the chain

Nakamoto (2008) showed that this requirement could be removed. The key technical building block is the cryptographic hash function—a procedure that takes any input and produces a short, fixed-length fingerprint with two essential properties: identical inputs always produce the same fingerprint, and it is computationally infeasible to find two different inputs that produce the same fingerprint.

A “block” consists of a batch of recent transactions together with the fingerprint of the immediately preceding block. The fingerprint of the new block, therefore, depends on the fingerprint of every previous block, all the way back to the first (“genesis”) block. This sequence is the chain.

This structure produces what is loosely called "immutability." Altering any historical transaction changes that block's contents, which changes its fingerprint, which breaks the fingerprint reference in every subsequent block. The only way to alter a past entry is to recompute every subsequent block faster than the honest network extends the chain—an operation that is infeasible for any single actor on a sufficiently large network.

A.3 Consensus without an authority

The remaining technical problem is how the network agrees on which set of new transactions to record next, without any central authority. Two consensus protocols are used in practice: proof-of-work (Bitcoin since 2009) and proof-of-stake (Ethereum since September 2022).

Under proof-of-work, computers on the network compete to find a numerical value that, when combined with a candidate block, produces a fingerprint below a target threshold. The first machine to succeed broadcasts the block; the rest of the network verifies it, and the chain extends by one. Under proof-of-stake, validators are selected to propose the next block in proportion to the number of native tokens they commit as collateral; misbehavior results in the loss of that collateral through slashing.

Both protocols share a key political property: the network reaches consensus through a rule no participant controls. There is no headquarters to subpoena, no CEO to compel, and no addressable entity to whom a freeze order can be served. Court orders to freeze cryptocurrency balances are therefore served on intermediaries that sit atop the protocol, not on the protocol itself.

A.4 Wallets: custodial versus non-custodial

A wallet is not a balance of tokens. It is a pair of cryptographic keys—one public, one private—that controls a single address on the blockchain. The address is derived from the public key; the private key authorizes transfers out of the address. Whoever holds the private key controls the funds, and the disintermediation variable in this paper measures who that is.

In a *custodial* wallet, an intermediary (typically a centralized exchange) holds the private key on the user's behalf. The user logs in with a username and password; the exchange signs transactions when instructed. A state that can compel the exchange can freeze the address, disclose its contents, or seize its balance, regardless of the customer's cooperation.

In a *non-custodial* wallet, the user holds the private key directly—typically as a string of words or in a hardware device that signs transactions offline. A state that wants to interfere with these funds has no intermediary to compel. It can prosecute the user for refusing to disclose the key (depending on the jurisdiction), but it cannot reach the address through the architecture itself.

Tier 0 services are those in which an intermediary holds the keys (centralized exchanges, hosted wallets, merchant services). Tier 3 services—decentralized exchanges, peer-to-peer platforms, and cryptocurrency ATMs—assume the user has already moved funds into a non-custodial wallet that the venue does not control. Figure 10 illustrates the two pathways.

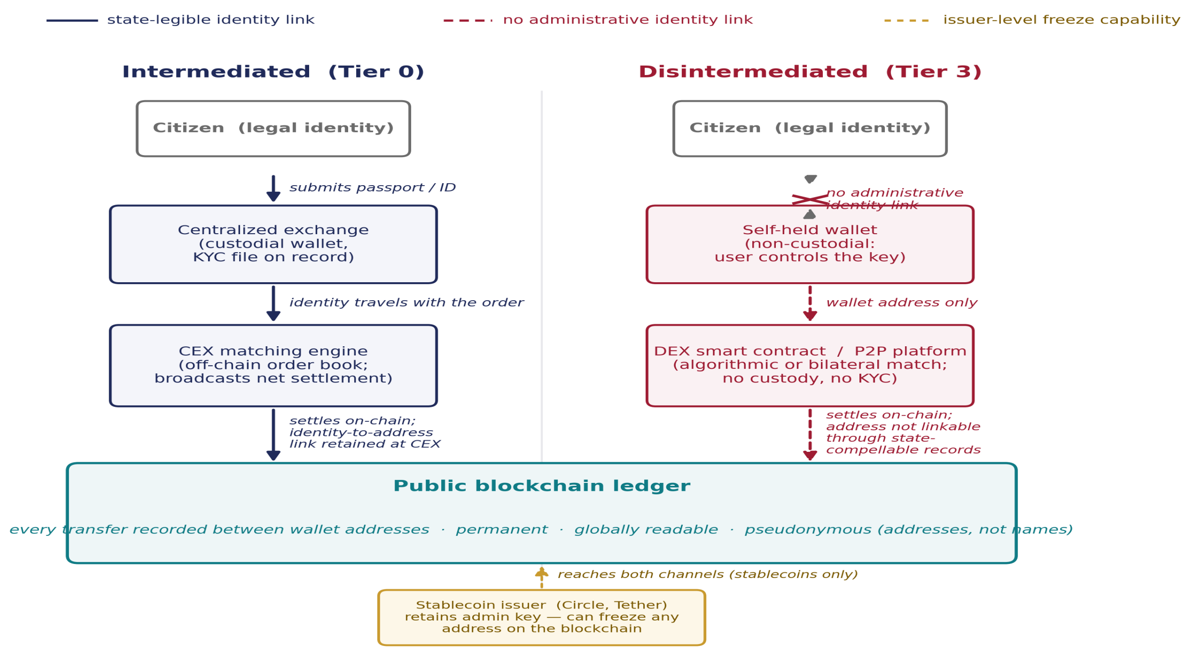

Figure 10: Two parallel pathways for the same cryptocurrency purchase. Left: the citizen submits identity documents to a centralized exchange, which custodies the wallet, matches orders against its internal book, and settles the net position on the public blockchain. The identity-to-address link is retained on the exchange's servers and is compellable by any authority with jurisdiction over the exchange. Right: the citizen acquires funds through a peer-to-peer or decentralized exchange venue that performs no KYC, and deposits them into a wallet whose private key she holds herself. The on-chain entry exists, but no administrative record links it to her legal identity. The blockchain layer is shared across both pathways. The dashed gold arrow indicates the issuer-layer freeze capability, which applies to stablecoin balances regardless of channel.

A.5 What the ledger records, and what it does not

Every transfer on the Bitcoin and Ethereum chains is recorded: sending address, receiving address, amount, timestamp, and transaction fee. The full record is publicly downloadable; any laptop with sufficient storage can replay the entire history from January 2009. There is no equivalent in traditional finance, where transaction history is held privately by the customer's bank.

What the ledger does not record is the legal person associated with each address. The on-chain entry is a string such as `1A1zP1eP5QGefi2DMPTfTL5SLmv7Divf`, not "Jane Doe." The link between an address and a name is established outside the protocol—through the KYC file at a regulated exchange, an IP address logged when a transaction is broadcast, or a counterparty whose identity is already known. This is why cryptocurrency is described as pseudonymous rather than anonymous.

The chain-analysis industry exists precisely because the on-chain record is so transparent. The data are already public; the firms' work is to assemble external information that connects public addresses to the legal persons who control them.

No cryptocurrency channel is anonymous at the ledger level. What varies across channels is whether a state can compel disclosure of the identity link through a regulated intermediary. Where the user has acquired and moved funds entirely through Tier 0 venues, the link sits on a server at the exchange and can be subpoenaed. Where funds have been acquired through a Tier 3 venue and never touched a regulated exchange, no such administrative record exists.

A.6 Mapping technology to legibility tiers

Three venue types—CEX, DEX, and P2P—account for nearly all the activity examined in this paper.

A *centralized exchange* (CEX) operates like a bank for cryptocurrency: it accepts customer fiat deposits, custodies customer crypto holdings in exchange-controlled wallets, maintains an off-chain order book that matches orders internally, and broadcasts only net settlement to the blockchain. KYC is a regulatory requirement in essentially every advanced economy and in most emerging markets where exchanges operate under license. From the state's perspective, a CEX is functionally equivalent to a bank: it knows who its customers are, what they hold, what they have transacted, and is required to report on demand. Centralized exchanges, hosted wallets, and merchant-service providers constitute Tier 0.

A *decentralized exchange* (DEX) is a smart contract—software running on a blockchain—that swaps one token for another against a pool of tokens supplied by other users. The contract has no operator and no balance sheet; it executes deterministically against transactions sent to it from non-custodial wallets. There is no account, no login, and no identity collection. A *peer-to-peer* (P2P) platform matches buyers and sellers for direct bilateral settlement; payment occurs outside the platform (bank transfer, mobile money, or cash), and the platform's role is matchmaking and, in some cases, escrow. KYC is minimal, often limited to a phone number, and frequently absent. DEX contracts, their cross-chain bridges, and P2P platforms together constitute Tier 3.

One vulnerability does not respect the channel distinction. The major dollar-pegged stablecoins—USDC and USDT—are issued by private companies that retain administrative keys allowing them to freeze any address holding their token on-chain, regardless of whether the address belongs to a CEX customer or a self-custody holder. Circle exercised this capability after the August 2022 Treasury designation of Tornado Cash, freezing every

USDC address associated with the sanctioned smart contract within hours. This issuer-layer vulnerability operates orthogonally to the intermediated/disintermediated distinction; it is why the disintermediated-stablecoin cell in the four-cell decomposition in the main text is empirically thin.

Returning to Figure 10: the same purchase executed through either pathway produces an entry on the same blockchain. What differs is whether an administrative record links that entry to the citizen. The tier classification—Tier 0 for CEX-mediated activity and Tier 3 for DEX/P2P activity—tracks this single distinction.

Appendix B: The Formal Model

Section III of the paper presents the citizen's problem, the interior optimum, the inverted-U emergence condition, and the amplification result. Here we derive them in full: the first-order condition, the dominance condition under which Hypothesis 1 holds, the derivation of the inverted-U and its peak, the full demand-region and descending-portion derivations of the amplification result, and the multi-tier and transaction-size extensions that generate Implications 1a, 1c, and 2a. With each derivation, we include sufficient conditions.

B.1 Setup

Consider a representative citizen in country i at time t executing a cryptocurrency transaction of value V. The citizen allocates a share $\alpha \in [0, 1]$ of the transaction to intermediated channels and the residual share $(1 - \alpha)$ to disintermediated channels.

The intermediated channel provides a non-price benefit $B > 0$—consumer protection, deposit insurance, legal recourse, ease of use—that is available only through regulated venues. The disintermediated channel provides no such benefit and transmits no identity record to the state authority.

We normalize the marginal economic cost of the intermediated channel to zero. The disintermediated channel imposes an economic cost that we model as a convex function of the disintermediated share:

$$C_D(1-\alpha) = \frac{c_D^0}{2\psi(\delta)}(1-\alpha)^2$$

The convexity is essential to the model's empirical content. A linear specification yields only corner solutions ($\alpha^* \in \{0, 1\}$), which would predict that every country either fully intermediates or fully disintermediates. The convex specification admits two interpretations. At the individual level, the quadratic captures the empirical observation that deeper disintermediation requires progressively more sophisticated tooling and exposure to more illiquid markets. At the country-aggregate level, the quadratic captures the envelope across heterogeneous individual cost functions: the population-level cost of moving a marginal additional share to disintermediated channels.

The parameter $c_D^0 > 0$ captures the level of the disintermediated cost. The parameter $\psi(\delta) > 0$ is the adaptive-capacity term: in countries with greater democratic accountability, the effective cost of disintermediation is lower because citizens face fewer technical, informational, and institutional barriers to exit. We assume $\psi'(\delta) > 0$ and $\psi(\delta) > 0$ on $\delta \in [0,1]$.

B.2 The Political Cost of Legibility

The political cost of routing a transaction through the intermediated channel depends on two sources of risk:

$$\Phi(\delta, r, S) = \pi(\delta) \cdot L(r) + \eta \cdot S$$

The first term captures domestic risk. $\pi(\delta) \in [0,1]$ is the probability that the domestic state takes predatory action against the citizen conditional on observing her financial activity. $L(r) > 0$ is the loss she suffers if predatory action occurs, where r indexes financial repression intensity. We assume $\pi'(\delta) < 0$ and $L'(r) > 0$.

The second term captures external risk. $S \geq 0$ indexes the intensity of international financial sanctions against country i, and $\eta > 0$ scales the citizen's expected loss from a sanctioning government acting against her through the intermediated system. The scale parameter η plausibly varies with the depth of the target country's integration into the global financial system; we treat it as a country-specific constant in the static model and revisit it in the empirical specifications, where country fixed effects absorb the cross-sectional variation.

B.3 The Citizen's Problem and the Interior Optimum

The citizen chooses α to maximize expected utility:

$$\max_{\alpha \in [0,1]} U(\alpha) = V - \frac{c_D^0}{2\psi(\delta)}(1-\alpha)^2 - \alpha \cdot \Phi(\delta, r, S) + \alpha \cdot B$$

The first-order condition is:

$$\frac{\partial U}{\partial \alpha} = \frac{c_D^0}{\psi(\delta)}(1-\alpha) - \Phi + B = 0$$

Solving for the interior optimum:

$$1 - \alpha^* = \frac{\psi(\delta) \cdot (\Phi - B)}{c_D^0}$$

The interior solution applies when $B < \Phi < B + c^0$_D/$\psi(\delta)$.

B.4 Result 1: The Baseline Democracy Effect (Hypothesis 1)

Setting $S = 0$ and differentiating with respect to δ:

$$\left.\frac{\partial(1-\alpha^*)}{\partial\delta}\right|_{S=0} = \frac{\psi'(\delta)\cdot[\pi(\delta)L(r)-B]}{c_D^0} + \frac{\psi(\delta)\cdot\pi'(\delta)\cdot L(r)}{c_D^0}$$

The capacity term is positive (democratic citizens find disintermediation cheaper, raising the share they substitute into it); the baseline-cost term is negative (democratic citizens face lower political cost of legibility, reducing the share they substitute). The net effect is negative under a sufficient-condition assumption rather than as a theorem:

Assumption 1 (baseline-cost dominance). At the empirical means of the sample, the baseline-cost gradient dominates the capacity gradient:

$$\psi(\delta)\cdot|\pi'(\delta)|\cdot L(r) > \psi'(\delta)\cdot[\pi(\delta)L(r)-B]$$

Two considerations make the assumption plausible. First, the interior-solution requirement $B < \Phi$ implies that $\pi L > B$, but the gap ($\pi L - B$) is bounded above by the maximum disintermediated share, which is far below one for almost all countries in our panel, so the baseline-cost term multiplies a moderate quantity. Second, the baseline-cost effect operates on the *level* of the political cost while the capacity effect operates on its *gradient*. The capacity-controls test in Section VI confirms that the assumption is matched in the data: the democracy coefficient survives the inclusion of a battery of control variables.

A numerical illustration may help. Suppose $\pi(\delta) = 0.5 - 0.3\delta$ (the predation probability falls from 0.5 in a full autocracy to 0.2 in a full democracy), $\psi(\delta) = 1 + 0.5\delta$, $L(r) = 1$, $B = 0.1$, and $c_D^0 = 1$. Then $\psi'(\delta) = 0.5$, $\pi'(\delta) = -0.3$, and at $\delta = 0.5$ the dominance condition becomes $1.25\cdot 0.3 = 0.375 > 0.5\cdot(0.35-0.1) = 0.125$, comfortably satisfied. The dominance condition fails only in parameter regions where the baseline political cost is implausibly low (πL close to B, generating a degenerate interior solution) or where the capacity gradient is implausibly steep ($\psi'(\delta)$ much larger than $|\pi'(\delta)|$, which is empirically not observed).

B.5 Result 2: The Sanctions Inverted-U (Hypothesis 2)

Sanctions affect the citizens' problem through demand ($\eta\cdot S$ in Φ) and supply (c^0_D(S) = c^0_D$_0$ + κS^2) channels. The quadratic supply-side specification requires some justification. Correspondent banks facing a sanctioned target country make a sequential withdrawal decision: at low sanctions intensity, the compliance burden is manageable, and relationships are retained. At moderate sanctions intensity, banks engage in selective de-risking, dropping some relationships while retaining others. At high sanctions intensity, banks exit the target jurisdiction entirely to avoid compounding regulatory liability. The transition from selective de-risking to wholesale exit provides the empirical justification for the quadratic term: the marginal cost of an additional sanctioned country grows faster than linearly because each marginal sanction pushes additional banks past the wholesale-exit threshold. The quadratic functional form is the simplest specification consistent with this sequential structure; we treat it as an approximation rather than a deep claim about the underlying micro-structure.

The disintermediated share is:

$$1 - \alpha^*(S) = \frac{\psi(\delta) \cdot [\pi(\delta)L(r) + \eta S - B]}{c_{D,0}^0 + \kappa S^2}$$

Differentiating with respect to S:

$$\frac{d(1-\alpha^*)}{dS} = \frac{\psi(\delta) \cdot \eta}{c_D^0(S)} - \frac{\psi(\delta) \cdot [\Phi - B] \cdot 2\kappa S}{[c_D^0(S)]^2}$$

The inverted-U emerges when the supply channel overtakes the demand channel at some interior S* > 0:

$$S^* = \frac{\eta \cdot c_D^0(S^*)}{2\kappa \cdot [\Phi - B]}$$

This produces an interior solution when κ is sufficiently large relative to η. Section VI confirms the inversion at a log sanction intensity of 2.14 (approximately 7-8 sanctioning countries).

B.6 Result 3: Democracy Amplification on the Ascending Portion (Implication 2b)

On the ascending portion of the inverted-U, the demand channel dominates, so the second (supply-side) term of the B.5 derivative is negligible, and the marginal effect reduces to its first term, $\partial(1-\alpha^*)/\,\partial S \approx \psi(\delta)\,\eta/c_D^0$. Differentiating this with respect to δ—common factor η/c_D^0—gives the amplification result:

$$\left.\frac{\partial^2(1-\alpha^*)}{\partial S\ \partial \delta}\right|_{\text{demand region}} = \frac{\eta}{c_D^0}\,\psi'(\delta) > 0$$

Democratic accountability amplifies the demand-side response to sanctions through the capacity channel $\psi(\delta)$. On the descending portion, infrastructure destruction is the binding constraint, and the cross-partial vanishes. Democracy operates with opposite signs on the baseline and the adaptive-capacity channels; the positive cross-partial in the demand region is the empirical fingerprint of the second channel.

B.7 Multi-Tier Extension (Implication 1a)

Cryptocurrency channels are indexed by tier k ∈ {0, 1, 2, 3, 4}. Tiers 0 through 3 differ in economic cost, with c^k_D strictly increasing in k. Tier 4 demand is exogenous to the political cost, with a fixed share ν flowing to Tier 4 regardless of the institutional environment.

Citizens with intermediation benefit B_i (distributed with density $f(B)$ and cumulative $F(B)$) select the tier k satisfying:

$$\frac{c_D^k}{\psi(\delta)} \leq \Phi - B_i < \frac{c_D^{k+1}}{\psi(\delta)}$$

The country-level share at tier $k \in \{0, 1, 2, 3\}$ is:

$$\text{share}_k = (1-\nu) \cdot \left[F\left(\Phi - \frac{c_D^{k-1}}{\psi(\delta)}\right) - F\left(\Phi - \frac{c_D^k}{\psi(\delta)}\right)\right]$$

Differentiating with respect to δ yields:

- $\partial\text{share}_0/\partial\delta > 0$ (democracy raises Tier 0 share)
- $\partial\text{share}_3/\partial\delta < 0$ (democracy lowers Tier 3 share)
- $\partial\text{share}_4/\partial\delta = 0$ (Tier 4 demand independent of Φ)

The political-exit effect concentrates near Tier 3: the marginal citizen who would otherwise route through disintermediated channels sits at the Tier 2/Tier 3 boundary. The empirical density of citizens at this threshold is therefore high, generating the negative coefficient at Tier 3. The sign reversal between Tier 0 (positive) and Tier 3 (negative) is the pattern predicted in Implication 1a.

B.8 Transaction-Size Heterogeneity (Implications 1c and 2a)

The disintermediation cost varies by transaction size:

$$c_D^0(V) = \bar{c}_D^0 \cdot g(V), \quad g'(V) < 0$$

Large institutional transactors face lower effective c^0_D because they have non-cryptocurrency substitutes. The marginal effect of δ at transaction size V scales inversely with c^0_D(V), generating the small-large asymmetry in the H1 coefficient that Section VI confirms. Similarly, the peak of the inverted-U is shifted higher for small transactions, and the descending portion is steeper—Implication 2a.

B.9 Summary of Theoretical Predictions

Result	Comparative static	Generates
1	$\partial(1-\alpha^*)/\partial\delta < 0$ under normal conditions	H1
1 (multi-tier)	Sign pattern across tiers 0–4	Implication 1a
1 (size)		$\partial(1-\alpha^*)/\partial\delta$
2	$d(1-\alpha^*)/dS$ traces inverted-U	H2
2 (size)	Inverted-U steeper for small V	Implication 2a
3	$\partial^2(1-\alpha^*)/(\partial S\partial\delta) > 0$ in demand region	Implication 2b

B.10 Two-Stage Selection: Crypto Adoption and Channel Choice

The model estimated in the paper is silent on one that we cannot measure: the citizen's prior choice of whether to use cryptocurrency at all. The shares we observe are computed within the population of crypto users in each country; we do not observe citizens who hold only fiat currency. If crypto adoption itself is correlated with the political-cost concerns that drive channel choice, the observed channel share across democracies could, in principle, reflect compositional differences in the adopter pool rather than the model's mechanism. This appendix extends the framework to a two-stage decision—adopt in Stage 1, choose the channel mix in Stage 2—and derives a comparative static that relates the observed cross-country channel-share gap to the true population-level political-cost gradient. The result is that, under monotone selection, the observed gap is a lower bound (in absolute value) on the true population effect.

B.10.1 Setup

Citizens are indexed by $i \in [0,1]$ and differ in an idiosyncratic political-cost sensitivity $\theta_i \in \Theta \subseteq \mathbb{R}_+$ drawn from a continuous CDF F with full support. The parameter θ_i scales the citizen's perceived political cost of legibility: a citizen with high θ_i assigns more weight to the expected loss from being observed by the state, holding δ, r, and S fixed. The aggregate cost-of-legibility function is now $\theta_i \cdot \Phi(\delta, r, S)$ rather than Φ alone; the citizen's other parameters $(B, c_D^0, \psi(\delta), \pi(\delta), L(r), \eta)$ are as in the baseline model.

Each citizen faces an exogenous, idiosyncratic entry cost $K_i \in \mathbb{R}_+$, the fixed cost of acquiring a wallet, learning the platform, and locating a usable on-ramp—drawn from a distribution G independent of θ_i. The outside option is fiat: a citizen who does not enter crypto is forced to use a fully legible channel and incurs $\theta_i \cdot \Phi$ on her entire monetary balance. A citizen who enters crypto pays K_i once and gains access to the channel-choice problem of Section B.3.

B.10.2 Stage 2: Channel Choice Given Entry

Conditional on entry, citizen i chooses the intermediated share $\alpha_i \in [0,1]$ to maximize

$$U(\alpha; \theta_i, \delta, r, S) = \alpha B - \alpha \theta_i \Phi(\delta, r, S) - \frac{c_D^0}{2\psi(\delta)}(1-\alpha)^2.$$

The interior first-order condition gives

$$1 - \alpha_i^*(\delta, r, S) = \frac{\psi(\delta) \cdot [\theta_i \Phi(\delta, r, S) - B]}{c_D^0},$$

defined on the interval $\theta_i \in [\theta_{\min}, \theta_{\max}]$ where $\theta_{\min} = B/\Phi$ and $\theta_{\max} = (B + c_D^0/\psi)/\Phi$. Citizens with $\theta_i < \theta_{\min}$ choose the corner $\alpha = 1$ (fully intermediated); those with $\theta_i > \theta_{\max}$ choose the corner $\alpha = 0$ (fully disintermediated). The disintermediated share is strictly increasing in θ_i throughout the interior region.

The maximized Stage-2 utility, net of fiat:

$$V^*(\theta_i; \delta, r, S) = \frac{\psi(\delta)}{2c_D^0} \cdot [\max(0,\ \theta_i \Phi(\delta, r, S) - B)]^2.$$

This option value is zero for citizens whose political-cost concern is too low to justify any disintermediation ($\theta_i \leq \theta_{\min}$), and is strictly positive and increasing in θ_i above the threshold. This is the value of having the disintermediated channel available; a citizen with no concern about state observation derives utility from switching from fiat to crypto.

B.10.3 Stage 1: The Entry Decision

A citizen enters crypto if and only if the Stage-2 option value exceeds her idiosyncratic entry cost:

$$V^*(\theta_i; \delta, r, S) \geq K_i.$$

For citizens with $\theta_i \leq \theta_{\min}$, the option value is zero and entry never clears any positive K_i; these citizens remain in fiat. For citizens with $\theta_i > \theta_{\min}$, entry occurs with probability $G(V^*(\theta_i))$, which is strictly increasing in θ_i. Equivalently, fix $K = \bar{K}$ and define the entry threshold

$$\theta^*(\delta, r, S; \bar{K}) = \frac{B + \sqrt{2\bar{K}c_D^0/\psi(\delta)}}{\Phi(\delta, r, S)},$$

so that all citizens with $\theta_i \geq \theta^*$ enter for that fixed cost. The entry rule is monotone in θ.

The comparative static of θ^* with respect to democracy has two components:

$$\frac{\partial \theta^*}{\partial \delta} = \underbrace{\frac{-\sqrt{2\bar{K}c_D^0} \cdot \psi'(\delta)/[2\psi(\delta)^{3/2}]}{\Phi}}_{<0 \text{ (capacity)}} + \underbrace{-\frac{(B + \sqrt{2\bar{K}c_D^0/\psi(\delta)}) \cdot \pi'(\delta)L(r)}{\Phi^2}}_{>0 \text{ (baseline cost)}}.$$

The capacity term is negative ($\psi' > 0$ lowers the threshold), and the baseline-cost term is positive ($\pi' < 0$ raises it). Under the standard-conditions assumption of Section B.4—that the baseline-cost channel dominates the capacity channel in the empirically relevant region—the second term dominates, and $\partial\theta^*/\partial\delta > 0$: democracies have higher entry thresholds and therefore narrower, more selected adopter pools.

B.10.4 The Observed Channel-Share Gap

Let $\bar{\alpha}^*(\delta, r, S)$ denote the population-mean disintermediated share among adopters in a country with democracy δ:

$$\bar{\alpha}^*(\delta) = \mathbb{E}_F[\,(1 - \alpha_i^*(\delta)) \mid \theta_i \geq \theta^*(\delta)\,].$$

The empirical cross-country comparison is the difference

$$\Delta_{\text{obs}} \equiv \bar{\alpha}^*(\delta_{\text{dem}}) - \bar{\alpha}^*(\delta_{\text{aut}}).$$

This is the gap our Section VI estimates identify, evaluated at the difference between a democratic and an autocratic country. The counterfactual population-level gap, evaluated at a representative $\theta = \bar{\theta}$ and abstracting from selection, is

$$\Delta_{\text{pop}} \equiv (1 - \alpha^*(\bar{\theta}, \delta_{\text{dem}})) - (1 - \alpha^*(\bar{\theta}, \delta_{\text{aut}})),$$

which is the comparative static the model is fundamentally about.

Proposition B.1 (Attenuation under monotone selection). Under the standard-conditions assumption of Section B.4 and monotone selection ($\partial\theta^*/\partial\delta > 0$), the observed cross-country gap in disintermediated share is a lower bound (in absolute value) on the true population-level gap: $|\Delta_{\text{obs}}| \leq |\Delta_{\text{pop}}|$, with strict inequality whenever the adopter pools differ in mean θ.

Proof sketch. Decompose Δ_{obs} into a democracy-effect component and a selection component by adding and subtracting $\mathbb{E}_F[(1 - \alpha^*(\delta_{\text{aut}})) \mid \theta \geq \theta^*(\delta_{\text{dem}})]$:

$$\Delta_{\text{obs}} = \underbrace{\mathbb{E}_F[(1 - \alpha^*(\delta_{\text{dem}})) - (1 - \alpha^*(\delta_{\text{aut}})) \mid \theta \geq \theta^*(\delta_{\text{dem}})]}_{\text{(A) democracy effect, common selection}}$$
$$+ \underbrace{\mathbb{E}_F[(1 - \alpha^*(\delta_{\text{aut}})) \mid \theta \geq \theta^*(\delta_{\text{dem}})] - \mathbb{E}_F[(1 - \alpha^*(\delta_{\text{aut}})) \mid \theta \geq \theta^*(\delta_{\text{aut}})]}_{\text{(B) selection effect, common } \delta}.$$

Component (A) is negative under the standard-conditions assumption, and approximates Δ_{pop} when the conditioning subset is large. Component (B) is strictly positive: in the autocratic regime, $(1 - \alpha^*)$ is increasing in θ throughout the interior region, so restricting to the higher-threshold democratic subset $\{\theta \geq \theta^*(\delta_{\text{dem}})\}$ raises the conditional mean of $(1 - \alpha^*)$. The positive selection component, therefore, partially offsets the negative democracy effect, so $|\Delta_{\text{obs}}| = |(A)| - (B) < |(A)| \approx |\Delta_{\text{pop}}|$.

The intuition is straightforward: democracies have, by definition, the most politically concerned citizens in their adopter pool (because the lower baseline political cost of legibility makes crypto unattractive to citizens with mild concern), and these citizens choose the most disintermediated option conditional on entry. Autocracies have a broader, less selective pool that includes citizens with lower political-cost concerns, and these marginal entrants pull the mean toward less disintermediation. The two effects work against each other; the observed gap underestimates the magnitude of the structural democracy effect.

B.10.5 Empirical Implications

Three implications follow for interpreting the Section VI results. First, the cross-country H1 coefficient on the Clean Elections Index should be read as a lower bound on the structural political-cost effect. The point estimates reported in Tables 1–3 is therefore conservative in the direction the selection concern would predict.

Second, robustness specifications that condition on observable correlates of crypto adoption—internet penetration, broadband subscriptions, mobile subscriptions, electricity access, and log GDP per capita—should leave the democracy coefficient largely unchanged. These variables primarily capture the part of the adoption margin that operates through citizen capacity rather than through unobserved political-cost concerns.

Appendix D.1 confirms this pattern. Third, the within-country event studies in Section VI.2 are not subject to the same attenuation. Because the adopter pool is held fixed across the treatment date, the discontinuous channel shifts they document—Hong Kong +9.9 percentage points and Russia +7.2 percentage points—identify the channel-choice mechanism directly, without the selection offset that would otherwise attenuate the cross-sectional estimates.

Appendix C: Within-Country Identification Strategies

Here we document the within-country identification design used in Section VI.2: cohort construction, hand-coded triggering months, the estimator, the full results grid, the placebo, and the single-case detail.

C.1 Cohort construction

We use V-Dem Episodes of Regime Transformation (ERT) dataset (Edgell et al. 2020; Maerz et al. 2024) and the V-Dem regime-class indicator (`v2x_regime`) to identify three families of discrete political shocks in the 2020–2024 window:

- **Autocratization onsets (aut)**: the first year of a V-Dem-coded autocratization episode falling in 2020–2024. Fourteen non-advanced countries qualify: Armenia, Belarus, Côte d'Ivoire, Haiti, Mexico (2020); Afghanistan, Kuwait, Myanmar, Romania, Senegal, Ukraine (2021); Moldova, Madagascar (2023); Argentina (2024). Three additional 2019 onsets (Guinea, Guyana, Kyrgyzstan) fall before the observation window and are excluded.
- **Democratization onsets (dem, placebo)**: the first year of a V-Dem-coded democratization episode. After dropping three onsets that V-Dem flags as democratic openings but which independent reporting describes as procedurally compromised (Sri Lanka 2020, Benin 2022, Tunisia 2023), nine countries remain: Montenegro and Malawi (2020); Bolivia and Honduras (2021); Brazil and Poland (2023); Botswana, Guatemala, and Mauritius (2024).
- **Documented regime transitions (regdown)**: the first year in which V-Dem's four-class regime classifier drops by at least one category, restricted to the 14 of 32 candidate cases that correspond to substantively documented political shocks (coups, court purges, invasions, constitutional reforms): Côte d'Ivoire (2020), Myanmar, El Salvador, Mali (2021), Chad, Haiti, Tunisia, Afghanistan, Guinea, Burkina Faso, Ukraine (2022), Gabon (2023), Georgia, Mexico (2024). The remaining eighteen knife-edge V-Dem reclassifications, which lack an identifiable triggering event, are excluded from the treated set in our principal specifications.

C.2 Hand-coded triggering months

V-Dem codes episode start years annually. The panel and the political-cost mechanism both run at a monthly frequency, so we hand-code the triggering month of each event from primary news and policy sources. Belarus 2020 is anchored to the August 2020 stolen presidential election and the immediate post-election crackdown. Myanmar 2021 is anchored to the February 1, 2021 Tatmadaw coup. Hong Kong's NSL is anchored to the June 30, 2020 promulgation. Russia's SWIFT exclusion is anchored to the February 26, 2022 announcement.

C.3 Estimator

We use Stata 19's implementation of the Callaway–Sant'Anna (2021) heterogeneous-cohort staggered difference-in-differences estimator with doubly robust augmented inverse probability weighted aggregation. Standard errors are clustered at the country level. Pre-treatment covariate adjustment for V-Dem polyarchy and log GDP per capita yields results almost identical to the covariate-free specification across all reported cells, so we report the covariate-free specifications in the main text.

C.4 Full results

Table C.1 reports the post-period mean treatment effects for every (cohort × outcome) cell from the principal specifications. Estimates are derived from the doubly-robust Callaway–Sant'Anna implementation on the non-advanced-economy monthly panel with country-clustered standard errors.

Table C.1. Full pooled-cohort estimation grid, non-advanced sample.

Outcome	Autocratization (n = 14)	Democratization (n = 9, placebo)	Documented regime transitions (n = 14)
L^{stable}	negative**	n.s.	negative, n.s.
$L^{\text{small\_agg}}$	negative, n.s.	n.s.	negative*
Layered-evasion gap	negative, n.s.	n.s.	positive*
$L^{\text{nonstable}}$	negative, n.s.	n.s.	negative, n.s.
L^{score} (all transactions)	negative, n.s.	n.s.	negative, n.s.
$L^{\text{score\_lg}}$ (large transactions)	negative, n.s.	n.s.	negative, n.s.
Stablecoin share	n.s.	n.s.	n.s.
Aggregate disintermediated share	negative, n.s.	n.s.	negative, n.s.

Each cell reports the post-period mean treatment effect from a separate doubly-robust Callaway–Sant'Anna estimation on the non-advanced-economy panel. Significance is assessed at conventional levels using country-clustered standard errors.

Figure 11 plots the dynamic event-study profiles for the ongoing and severe subsets of the autocratization cohort referenced in §VI.2.

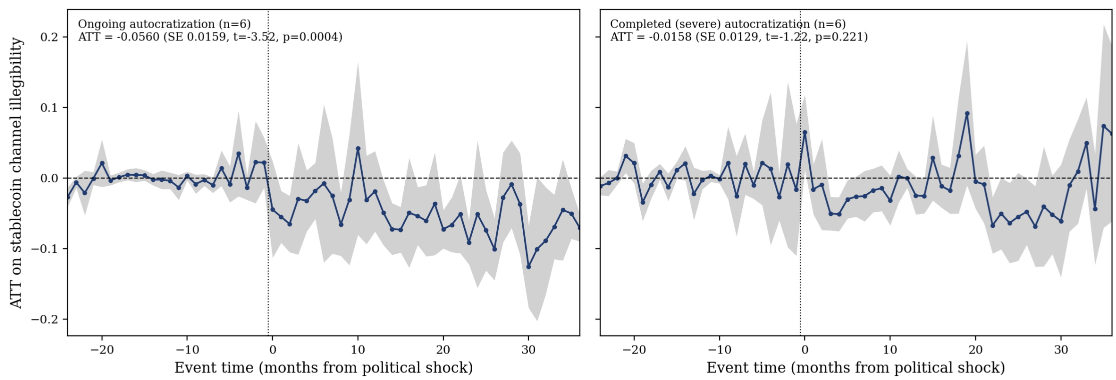

Figure 11: Dynamic event-study profiles for the ongoing (left, n=6) and severe (right, n=6) subsets of the autocratization cohort. The ongoing subset shows a clean post-onset accumulation of negative coefficients with tight confidence bands; the severe subset's mean trajectory points in the same direction but its confidence bands span zero throughout.

C.5 Random-permutation placebo

For the pooled autocratization cohort × L^stable cell, we ran a random-permutation test. Holding the fourteen treated countries fixed, we randomly permuted onset-month assignment across them and re-estimated the pooled effect 100 times. Two of those 100 permutations produced a test statistic as large as the realized value. The empirical p-value matches the analytic test based on country-clustered standard errors. The pooled effect, thus, is not an artifact of estimator-noise structure.

C.6 Single-case results detail

Table C.2 reports the single-treated-country event-study estimates from Section VI.2 for the three flagship cases. Each row is a separate Callaway–Sant'Anna estimation, with one treated country compared against a never-treated donor pool of approximately 70 non-advanced economies that have no autocratization, democratization, or documented regime transition onset in 2020–2024.

Table C.2. Single-case event-study estimates, non-advanced sample.

Case	Event	Date	L^{stable}	$L^{\text{small\_agg}}$
Hong Kong	National Security Law	2020-06	+0.099***	+0.130***
Russia	SWIFT exclusion	2022-02	+0.072***	+0.057***
Nigeria	CBN crypto-banking ban	2021-02	not significant	not significant

Each row is a separate single-treated-unit Callaway–Sant'Anna doubly-robust estimation. The parameter estimates for Hong Kong and Russia are substantively large: Hong Kong's stablecoin volume shifted from 99.8% centralized-exchange routing in 2019 to approximately 71% by 2023. Country-clustered standard errors.

C.7 Dating the sanctions-escalation events

This subsection documents the calendar month assigned to each of the seven sanctions episodes analyzed in Section VI.3 (Table 9). The coding rule is escalation, not first imposition: for each country, we record the month in which its financial-sanctions regime escalated to a comprehensive, SWIFT-level intensity—exclusion of the country's major banks from the SWIFT messaging network, or, in the state-collapse case of Afghanistan, a sweeping freeze of central-bank reserves—rather than the month a narrower sanctions program first took effect. Because the panel runs at monthly resolution (2019m8–2024m12), each event is assigned to the month containing its triggering legal or administrative measure.

- **Myanmar — 2021m2.** Executive Order 14014 (Feb. 10, 2021) and same-day OFAC SDN designations following the February 1 coup; the Burma Sanctions Regulations (86 FR 29209) followed in June, but the operative escalation is the February EO.
- **Afghanistan — 2021m8.** Freeze of approximately $9.5 billion in Da Afghanistan Bank reserves after the Taliban seized Kabul (Aug. 15; freeze reported Aug. 17–18, 2021), cutting the new authorities off from external assets.
- **Ethiopia — 2021m9.** Executive Order 14046 (Sept. 17, 2021), declaring a national emergency over the Tigray conflict. This is the weakest "SWIFT-level" case of the seven—E.O. 14046 created a sanctions *authority* rather than an immediate sovereign cutoff—but the September dating of the triggering measure is firm.
- **Mali — 2022m1.** ECOWAS 4th Extraordinary Summit (Jan. 9, 2022): suspension of commercial and financial transactions plus a freeze of Malian state assets in the regional central bank (BCEAO).
- **Belarus — 2022m3.** EU exclusion of three Belarusian banks from SWIFT under Council Regulation (EU) 2022/355 (Mar. 2, 2022), with disconnection on Mar. 20. (The earlier candidate month of February is not supported; the SWIFT measure is a March action.)

- **Russia — 2022m2.** G7/EU Joint Statement committing to remove selected Russian banks from SWIFT (Feb. 26, 2022). We date Russia by this announcement, consistent with the flagship single-case study in Section VI.2; the binding EU regulation (2022/345) and operative disconnection came in March. Coding Russia by the operative cutoff instead would place it in 2022m3, alongside Belarus, and does not materially change the results.
- **Venezuela — 2024m4.** OFAC non-renewal of General License 44, replaced by the narrower wind-down license GL 44A (Apr. 17, 2024), reimposing the comprehensive oil and financial sanctions architecture.

Appendix D: Robustness Checks

This appendix reports the robustness checks summarized at the end of Section VI.1. The democracy coefficient on the deep-disintermediation share survives the addition of citizen-capacity controls and remittance-corridor controls, distinguishing the political-exit interpretation from the two principal alternatives in the literature.

D.1 Citizen-capacity and adoption-margin controls

Table D.1 reports the Hypothesis 1 specification with two layers of controls added: citizen-capacity controls (internet penetration, fixed broadband, mobile cellular, electricity access, log GDP per capita), and a direct adoption-intensity proxy (the lagged log of total monthly crypto USD volume in the country). The two layers address distinct concerns. The capacity battery distinguishes the baseline-cost channel $\pi(\delta)$ from the adaptive-capacity channel $\psi(\delta)$ in the model: if the democracy coefficient were operating through an infrastructure that lowers the cost of substituting toward illegible channels, conditioning on the capacity battery would absorb it.

The adoption-intensity proxy addresses the selection concern formalized in Appendix B.10: if the cross-country gradient were driven by differential entry into crypto rather than by differential channel choice conditional on entry, then conditioning on country-level crypto volume would attenuate it. The democracy coefficient is essentially unchanged across all four columns: baseline (−0.1007), with internet penetration added (−0.0920), with the full capacity battery added (−0.0927), and with the adoption-intensity proxy added (−0.0975). The democracy effect therefore operates through the baseline-cost channel $\pi(\delta)$ rather than through the capacity channel $\psi(\delta)$, and it operates within the adopter pool rather than through the composition of adopters.

The latter is the empirical complement to the theoretical attenuation result of Appendix B.10. The model predicts that the observed cross-country gap is a lower bound on the structural political-cost gradient, and conditioning on a direct measure of adoption intensity leaves that observed gap essentially intact.

Table D.1. H1 democracy effect survives capacity and adoption-margin controls.

Variable	Baseline	+ Internet	+ Full Capacity	+ Adoption proxy
Clean Elections Index	−0.1007**	−0.0920**	−0.0927**	−0.0975**
	(0.0398)	(0.0398)	(0.0387)	(0.0420)
Internet users (%)	—	included	included	—
Fixed broadband (per 100)	—	—	included	—
Mobile cellular (per 100)	—	—	included	—
Electricity access (%)	—	—	included	—
Log GDP per capita	—	—	included	—
Log crypto volume (lag)	—	—	—	included
N	4,242	3,765	3,478	4,242

*Same specifications and controls as Table 1. The "Adoption proxy" column includes the lagged log of the country's total monthly crypto USD volume (the sum of intermediated and disintermediated volumes), with its Mundlak between-country mean. The proxy captures cross-country variation in the level of crypto activity that would be associated with the prior choice to use crypto rather than fiat. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*

D.2 Remittance-corridor controls

Table D.2 reports the analogous specification with remittance-corridor controls. The democracy coefficient is essentially unchanged when remittance intensity is added (−0.1013**), and the coefficient remains significant in both the low-remittance subsample (−0.1047*) and the high-remittance subsample (−0.1162*). The political-exit interpretation survives this test; the remittance-demand alternative does not account for the cross-country gradient.

Table D.2. H1 democracy effect survives remittance controls.

Variable	Baseline	+ Remit Control	Low Remit	High Remit
Clean Elections Index	−0.1007**	−0.1013**	−0.1047*	−0.1162*
	(0.0398)	(0.0395)	(0.0548)	(0.0650)
Remittance intensity	—	included	—	—
N	4,242	4,242	1,789	2,453

Same specifications and controls as Table 1.

D.3 Sanctions identification robustness

Table D.3 reports two robustness specifications for the Hypothesis 2 inverted-U: restricting the GSDB sanctioning-country count to Western senders only (US, EU member states, UK, Canada, Australia, Japan) and using non-financial sanctions (trade, travel, diplomatic) as a placebo. The inverted-U survives the Western-sender restriction with a magnitude comparable to that of the full-count specification; the placebo produces null coefficients on both the linear and quadratic terms, indicating that the pattern is specific to financial sanctions and not driven by general state-relations stress.

Table D.3. H2 inverted-U: identification robustness.

Variable	Restricted senders	Non-financial (placebo)
Lagged GSDB intensity	+0.0405***	+0.0208
	(0.0134)	(0.0177)
Lagged GSDB intensity squared	−0.0107***	−0.0072
	(0.0037)	(0.0054)
N	4,242	4,242

Same specifications and controls as Table 7.

D.4 Sanctions across transaction-size subsamples

Table D.4 estimates the inverted-U separately on small, all-transaction, and large-transaction subsamples. The pattern holds in every subsample. The descending portion is no steeper for small transactions than for large: the small-transaction quadratic (−0.0075) is, if anything, slightly smaller in magnitude than the large-transaction quadratic (−0.0095). The model's Implication 2a, which predicted a steeper descending portion for small transactions, is not supported. The supply-side correspondent-banking exit channel operates on transactions of all sizes rather than concentrating on retail volume.

Table D.4. H2 inverted-U across transaction-size subsamples.

Variable	Small	All	Large
Lagged GSDB intensity	+0.0358***	+0.0306***	+0.0403***
	(0.0092)	(0.0082)	(0.0095)
Lagged GSDB intensity squared	−0.0075***	−0.0071***	−0.0095***
	(0.0018)	(0.0017)	(0.0019)
N	4,242	4,242	4,209

Same specifications and controls as Table 7.

D.5 Legibility-gradient coefficients

Table D.5 reports the exact tier-by-tier coefficients plotted in the legibility-gradient figure of Section VI.1. The sign reversal between Tier 0 (positive) and Tier 3 (negative), with null middle tiers and a null Tier 4, is the gradient pattern that identifies the political-exit mechanism.

Table D.5. Democracy effect across legibility tiers (small-transaction shares); exact estimates for the legibility-gradient figure of Section VI.1.

Tier	Coefficient (SE)
Tier 0	+0.102** (0.040)
Tier 1	−0.002* (0.001)
Tier 2	+0.001 (0.003)
Tier 3	−0.092** (0.037)
Tier 4	−0.006 (0.017)
N	4,242

CRE estimator with year fixed effects. Coefficient on Clean Elections Index from a separate regression on each tier share. Country-clustered standard errors in parentheses. Same controls as Table 1. p < 0.10, ** p < 0.05, *** p < 0.01.*

D.6 Alternative democracy measure (V-Dem polyarchy)

Table D.6 re-estimates the Table 1 specifications with the V-Dem electoral-democracy (polyarchy) index in place of the Clean Elections Index. Polyarchy is the only alternative democracy index available in the panel; Polity and Freedom House are not merged. The headline small-transaction effect is robust — slightly larger than under the Clean Elections Index — while the all-transaction and aggregate-legibility coefficients are similarly signed but not statistically significant.

Table D.6. Table 1 democracy effect under V-Dem polyarchy.

Outcome	Polyarchy coefficient
Legibility Score	−0.044 (0.038)
Deep Disint (All)	−0.047 (0.051)
Deep Disint (Small)	−0.130** (0.058)
N	4,242

*CRE estimator with year fixed effects; country-clustered standard errors in parentheses. V-Dem polyarchy (v2x_polyarchy) replaces the Clean Elections Index; same lean controls and Mundlak means as Table 1. * p < 0.10, ** p < 0.05, *** p < 0.01.*

D.7 Property-rights and rule-of-law measures

Table D.7 re-estimates the Table 1 specifications using direct measures of the security of property and contract in place of the Clean Elections Index, to assess whether the result reflects electoral accountability specifically or the broader constraint on arbitrary state action that the index proxies. We use five measures, each oriented so that higher values denote a more secure environment (so the expected coefficient is negative, as for the Clean Elections Index): the V-Dem rule-of-law index, a V-Dem clean-government measure (one minus the political-corruption index), the Heritage property-rights and judicial-effectiveness indices, and the World Bank rule-of-law estimate. The alternative measures are correctly signed throughout, and the Heritage property-rights index is statistically significant on both disintermediation outcomes. When the Clean Elections Index and a property-rights measure are entered jointly (standardized, so coefficients are per standard deviation), the Clean Elections Index remains the stronger predictor in every pairing. We read this as evidence that electoral accountability is the most informative available proxy for the underlying security of property and contract, not as evidence against the property-rights interpretation.**Table D.7.** Table 1 democracy effect under property-rights and rule-of-law measures.

Measure	Legibility Score	Deep Disint (All)	Deep Disint (Small)	N
Clean Elections Index (reference)	−0.0493*	−0.0630*	−0.1007**	4,242
V-Dem Rule of Law	−0.0414	−0.0415	−0.0574	4,242
V-Dem clean government (1 − corruption)	−0.0051	+0.0110	−0.0067	4,242
Heritage Property Rights	−0.0393	−0.0796**	−0.0673*	4,322
Heritage Judicial Effectiveness	−0.0089	−0.0136	−0.0333*	4,322
World Bank Rule of Law	−0.0003	−0.0026	−0.0090	3,796

*Each row substitutes one measure for the Clean Elections Index in the canonical lean CRE specification (same controls and Mundlak means as Table 1); coefficients on the focal measure are shown. All measures are oriented so that higher values denote greater security of property and contract. Sample sizes differ across measures because of coverage. * p < 0.10, ** p < 0.05, *** p < 0.01.*

Appendix E: Full Estimation Tables

The body tables report only the coefficients of interest. This appendix reports the full control vector for each estimated model. Every specification is the canonical lean CRE estimator with year fixed effects and Mundlak between-country means; the year fixed effects and Mundlak means are estimated but suppressed from the tables below for readability. Country-clustered standard errors are in parentheses throughout, and the lagged dependent variable differs by column (the lag of each column's outcome).

E.1 H1 cross-section (Tables 1 and 3)

Table E.1. Full models for the Hypothesis 1 cross-section.

Variable	Legibility	All-tx	Small-tx	Large-tx
Clean Elections Index	−0.0493*	−0.0630*	−0.1007**	−0.0551
	(0.0263)	(0.0366)	(0.0398)	(0.0421)
Lagged dependent variable	0.6032***	0.6025***	0.6511***	0.5509***
	(0.0292)	(0.0252)	(0.0291)	(0.0257)

Variable	Legibility	All-tx	Small-tx	Large-tx
Capital-account restrictiveness (FARI)	−0.0494	−0.0689	−0.1078	−0.0056
	(0.0694)	(0.1107)	(0.1049)	(0.1201)
Real interest rate (lagged)	−0.0001***	−0.0001***	−0.0001***	−0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Exchange-rate depreciation (lagged)	−0.0381	−0.0417	−0.0966**	0.0016
	(0.0354)	(0.0448)	(0.0405)	(0.0445)
FATF grey-list	0.0001	0.0011	0.0108	0.0062
	(0.0057)	(0.0088)	(0.0089)	(0.0098)
USDC price deviation	−0.0133***	−0.0171***	−0.0354***	−0.0220***
	(0.0023)	(0.0032)	(0.0054)	(0.0025)
China crypto-ban indicator	−0.0106	−0.0300**	−0.0262**	−0.0262**
	(0.0074)	(0.0117)	(0.0103)	(0.0106)
Log Ethereum gas price	−0.0033	−0.0032	0.0068*	−0.0238***
	(0.0022)	(0.0036)	(0.0036)	(0.0034)
Centralized-exchange distress	0.0096***	0.0139***	0.0105*	0.0165***
	(0.0035)	(0.0052)	(0.0055)	(0.0054)
Broad dollar index (DXY)	−0.0013**	−0.0015**	−0.0003	−0.0033***
	(0.0005)	(0.0007)	(0.0008)	(0.0006)
Constant	4.5044***	7.2300***	7.2778***	8.7779***
	(1.4206)	(2.1799)	(2.4195)	(2.6553)
N	4,242	4,242	4,242	4,209
Countries	83	83	83	83

Outcomes: aggregate legibility score (col. 1), deep disintermediation in all transactions (col. 2), small transactions (col. 3), and large transactions (col. 4). Year fixed effects and Mundlak between-country means included but suppressed. * p < 0.10, ** p < 0.05, *** p < 0.01. 110 countries is the raw working sample and 83 is the estimation sample accounting for missing variables.

E.2 Instrument and channel margins (Tables 2 and 11)

Table E.2. Full models for the instrument and channel margins.

Variable	USDC share	Deep disint (small)	Stable legibility	Nonstable legibility
Clean Elections Index	−0.0528*	−0.1007**	−0.0217	−0.0542*
	(0.0317)	(0.0398)	(0.0167)	(0.0298)
Lagged dependent variable	0.5636***	0.6511***	0.5744***	0.6273***
	(0.0220)	(0.0291)	(0.0384)	(0.0253)

Variable	USDC share	Deep disint (small)	Stable legibility	Nonstable legibility
Capital-account restrictiveness (FARI)	−0.0840	−0.1078	−0.0283	−0.0531
	(0.1142)	(0.1049)	(0.0444)	(0.0845)
Real interest rate (lagged)	−0.0001**	−0.0001***	−0.0000*	−0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Exchange-rate depreciation (lagged)	−0.0383	−0.0966**	−0.0014	−0.0550
	(0.0375)	(0.0405)	(0.0179)	(0.0406)
FATF grey-list	0.0114	0.0108	−0.0001	0.0021
	(0.0077)	(0.0089)	(0.0041)	(0.0066)
USDC price deviation	−0.0098***	−0.0354***	−0.0048***	−0.0159***
	(0.0022)	(0.0054)	(0.0012)	(0.0026)
China crypto-ban indicator	0.0523***	−0.0262**	−0.0103**	−0.0167*
	(0.0164)	(0.0103)	(0.0048)	(0.0087)
Log Ethereum gas price	−0.0217***	0.0068*	−0.0036**	−0.0025
	(0.0026)	(0.0036)	(0.0016)	(0.0025)
Centralized-exchange distress	0.0309***	0.0105*	0.0027	0.0121***
	(0.0050)	(0.0055)	(0.0026)	(0.0039)
Broad dollar index (DXY)	0.0009	−0.0003	−0.0005	−0.0014**
	(0.0007)	(0.0008)	(0.0004)	(0.0005)
Constant	12.3954***	7.2778***	3.1085***	6.3824***
	(2.3648)	(2.4195)	(0.9617)	(1.7866)
N	4,242	4,242	4,221	4,242
Countries	83	83	83	83

*Outcomes: USDC share of stablecoin holdings (col. 1), deep disintermediation in small transactions (col. 2), stable-instrument legibility (col. 3), and nonstable-instrument legibility (col. 4). Year fixed effects and Mundlak between-country means included but suppressed. * p < 0.10, ** p < 0.05, *** p < 0.01.*

E.3 Sanctions inverted-U and democracy interaction (Tables 7, 8, and 10)

Table E.3. Full models for the sanctions inverted-U and the democracy interaction.

Variable	Inverted-U (all-tx)	+ Democracy interaction
Clean Elections Index	−0.0778**	−0.0944**
	(0.0342)	(0.0398)
Lagged GSDB intensity	0.0306***	0.0114
	(0.0082)	(0.0160)
Lagged GSDB intensity squared	−0.0071***	−0.0037

Variable	Inverted-U (all-tx)	+ Democracy interaction
	(0.0017)	(0.0029)
CEI × GSDB intensity	—	0.0356
		(0.0236)
CEI × GSDB intensity squared	—	−0.0065
		(0.0051)
Lagged dependent variable	0.5985***	0.5971***
	(0.0249)	(0.0250)
Capital-account restrictiveness (FARI)	−0.0734	−0.0725
	(0.1121)	(0.1132)
Real interest rate (lagged)	−0.0001***	−0.0001***
	(0.0000)	(0.0000)
Exchange-rate depreciation (lagged)	−0.0397	−0.0402
	(0.0447)	(0.0447)
FATF grey-list	0.0024	0.0023
	(0.0083)	(0.0084)
USDC price deviation	−0.0170***	−0.0171***
	(0.0032)	(0.0031)
China crypto-ban indicator	−0.0300**	−0.0299**
	(0.0117)	(0.0117)
Log Ethereum gas price	−0.0033	−0.0033
	(0.0036)	(0.0036)
Centralized-exchange distress	0.0141***	0.0141***
	(0.0052)	(0.0052)
Broad dollar index (DXY)	−0.0015**	−0.0015**
	(0.0007)	(0.0007)
Constant	7.2391***	6.9790***
	(2.1192)	(2.2713)
N	4,242	4,242
Countries	83	83

*Outcome: deep disintermediation in all transactions. Column 1 is the inverted-U specification (Table 7, and the right column of the Table 10 combined model); column 2 adds the Clean Elections Index interactions with the linear and quadratic sanctions terms (Table 8). The Table 10 H1 baseline column is the all-transaction model in Table E.1. Year fixed effects, and Mundlak means are included but suppressed. * p < 0.10, ** p < 0.05, *** p < 0.01.*

AI Use Statement

We used Claude (Opus 4.7) to aid in constructing the dependent variable. Data obtained from Chainalysis comprised 21 CSV files, each 3.8 GB. Claude assisted in extracting the desired series, aggregating them, and creating the series we use for the dependent variables. We also used Claude to check our work on the formal model. Finally, we provided Claude with a "clean" dataset to act as a replication agent.

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