

Sovereign Rails, Dependent Stacks: Payment Infrastructure, Artificial Intelligence and Financial Sovereignty after 2022

Shivam Agrawal

Abstract

Since the 2022 sanctions on Russia, states have hedged against the coercive use of financial networks mainly at the level of reserves and payment rails: gold, alternative messaging and settlement systems, domestic instant-payment schemes and central bank digital currencies. This article asks whether control over payment rails translates into control over the other layers of an increasingly automated financial system, namely the data that make borrowers legible, the models that classify them and the computing capacity on which those models run. It develops the concept of algorithmic sovereignty, defined as a political community's capacity to govern how people and firms under its jurisdiction are classified for payment, credit and compliance purposes, and it specifies the algorithmic dark zone as a family of four ways in which automated systems fail to see borrowers. A structured, focused comparison of the infrastructure offers of the United States, China, the European Union and India, with Brazil as a receiving state, suggests that the layers are separable in ownership and governance but nested in function. India illustrates the pattern most clearly: publicly governed rails coexist with application markets dominated by two foreign-controlled firms, credit bureaus majority-owned by foreign groups and reliance on foreign cloud capacity. The article derives five propositions, with indicators and falsifying observations, for testing beyond the cases that generated them.

Keywords: *algorithmic sovereignty; financial infrastructure; weaponized interdependence; credit scoring; central bank digital currencies; digital public infrastructure; compute; India*

I. Introduction

Between 26 February and 12 March 2022, the governments that control the main hubs of global finance cut seven Russian banks off from SWIFT and barred transactions with Russia's central bank (Council of the European Union, 2022; U.S. Department of the Treasury, 2022; The White House, 2022). Russia's finance minister said that about USD 300 billion of the country's USD 640 billion in gold and foreign exchange reserves had been frozen (Reuters, 2022c). The episode did not invent financial coercion, which has a long history (Mulder, 2022), but it showed at a new scale what Farrell and Newman (2019) call weaponized interdependence: states with jurisdiction over network hubs can deny others access to them.

The response of other states since then has concentrated on reserves and payment rails. Central banks bought more than 1,000 tonnes of gold in each year from 2022 to 2024 (World Gold Council [WGC], 2026). China's Cross-Border Interbank Payment System (CIPS) settled RMB 180.2 trillion in 2025 (Zhou, 2026). Domestic instant-payment systems such as India's Unified Payments Interface (UPI) and Brazil's Pix now process tens of billions of transactions a year, and 146 jurisdictions were exploring a central bank digital currency (CBDC) in May 2026 (Atlantic Council, 2026). Yet the dollar's share of global foreign exchange reserves has fallen only gradually, to 56.70% in the second quarter of 2026 (International Monetary Fund [IMF], 2026). The pattern is one of hedging without exit, and it has been documented at the level of currencies and messaging networks (de Goede & Westmeier, 2022; McDowell, 2023).

Over the same years a second set of dependencies has grown further down what this article calls the financial stack. Credit and compliance decisions increasingly rest on machine-learning models, which draw on data held by bureaus and platforms and run on cloud capacity concentrated in a few firms (Financial Stability Board [FSB], 2024). In the second quarter of 2026, Amazon, Microsoft and Google together earned 63% of global cloud infrastructure revenue (Synergy Research Group, 2026). India, whose public payment rails processed about 241.6 billion transactions in the fiscal year to March 2026 (Press Information Bureau [PIB], 2026a), relies on credit bureaus, most of them majority-owned by foreign groups (Section 6.1), and on two payment applications, controlled by Walmart and Alphabet, that carried about 78% of UPI volume in August 2026 (Entracker, 2026).

This article asks under what conditions control over payment rails translates into control over the data, model and compute layers of automated finance, and how states that lack control at those layers manage the resulting dependence. I argue that the four layers are separable in ownership and governance but nested in

function. A state can therefore win sovereignty over its rails and remain dependent at every layer below them, and hub states can move their coercive power from the layer where it is being contested to layers where it is not.

The article makes three contributions. First, it extends weaponized interdependence, which has largely been theorized one network at a time, to a layered stack in which chokepoints can migrate and in which hedging at one layer leaves exposure at another. Second, it proposes algorithmic sovereignty as control over classification, which distinguishes the concept from digital sovereignty in general, and specifies the algorithmic dark zone as four sub-types and distinguishes it from existing notions of credit invisibility and low-resolution citizenship (Brevoort et al., 2015; Singh & Jackson, 2021). Third, it offers a structured comparison of four infrastructure offers, with Brazil as a receiving state, and derives five propositions with stated indicators and falsifying observations.

Section 2 reviews the literatures on which the argument builds. Section 3 sets out the framework, Section 4 the research design, and Sections 5 to 8 the evidence layer by layer. Section 9 states the propositions and addresses objections, and Section 10 concludes.

II. Literature and Gap

2.1 Infrastructural Power and Weaponized Interdependence

Mann (1984) defined infrastructural power as the capacity of the state to penetrate society and implement decisions through it. International political economy has since turned the concept toward finance. Braun (2020) shows that a state which governs through particular markets comes to depend on them, and Petry (2021) treats the control of exchanges, indices and clearing as a source of structural power. Bernards and Campbell-Verduyn (2019) propose infrastructure as a heuristic for technological change in finance and stress that new devices are layered onto old arrangements. Brandl and Dieterich (2023) argue that global payments remain exclusive because cross-border transfers depend on intermediaries in highly centralized positions, and Westermeier (2020) shows how mandated access to account data turns payments into data infrastructure.

Farrell and Newman (2019) supply the mechanism of coercion. Hubs in global networks give the states with jurisdiction over them a panopticon effect, the ability to observe flows, and a chokepoint effect, the ability to deny access. Dollar clearing and SWIFT messaging are the leading financial examples, and the United States has used them systematically since 2001 (Farrell & Newman, 2023). Neither SWIFT nor the Bank for International Settlements is an American institution; American coercive power over them runs mainly through dollar clearing and the threat of secondary sanctions. SWIFT disconnected sanctioned Iranian banks in 2012 to comply with an EU decision, reconnected most of them in 2016, and suspended several again in 2018 without any EU mandate, after the United States reimposed its sanctions (Al Jazeera, 2018; SWIFT, 2012). De Goede and Westermeier (2022) read such episodes as moments when political choices sedimented in payment infrastructure resurface, and as the start of a fracturing into alternative routes. McDowell (2023) shows that U.S. sanctions push exposed states toward policies that reduce their reliance on the dollar, and Drezner et al. (2021) examine how targets adapt.

This literature treats each network largely on its own terms. It asks who controls a hub and how targets route around it. It has less to say about what happens when a state routes around one hub only to depend on others at a different layer of the same system.

2.2 Currency Hierarchy and Financial Subordination

A second literature explains why hedging rarely becomes exit. Strange (1971) distinguished top, master and negotiated currencies, and Cohen (1998) described a currency pyramid in which money competes across borders through networks of use. The dollar's position rests on mutually reinforcing advantages in trade invoicing and safe assets (Gopinath & Stein, 2021; Norrlof, 2014). Post-Keynesian work on currency hierarchy shows that peripheral currencies carry lower liquidity premiums, which constrains policy regardless of the payment system used (De Paula et al., 2017; Kaltenbrunner & Paineira, 2018). Alami et al. (2023) gather these strands under the heading of international financial subordination. Murau and van 't Klooster (2023) argue that monetary sovereignty must be understood within a global credit-money system that no state fully controls.

New rails do not by themselves move a currency up the hierarchy, which helps explain why the dollar's reserve share has moved slowly despite rapid growth in alternative infrastructure. Digital money may also redraw currency areas along platform lines: Brunnermeier et al. (2019) warn of digital dollarization where economies are closely tied to platforms based abroad. Cohen's (2015) distinction between the autonomy a currency issuer gains and the influence it can exert is useful here, because the infrastructure offers examined below combine a defensive claim to autonomy at home with a bid for influence abroad.

2.3 Fintech, Inclusion and Classification

A third literature examines what happens when the poor are made visible to finance. Gabor and Brooks (2017) identify a fintech, philanthropy and development complex that turns digital footprints into scoreable data. Aitken (2017) shows that inclusion projects constitute the unbanked as an object of knowledge, and Bernards

(2019) shows that alternative credit scoring meets limits set by precarious livelihoods and by the difficulty of extracting profit from them. Mader (2018) finds weak evidence that financial inclusion reduces poverty. Langley and Leyshon (2021) describe how fintech platforms reintermediate retail finance and then consolidate. For India specifically, Jain and Gabor (2020) argue that the state built a digital infrastructure that serves both corporate data extraction and state surveillance while presenting itself in nationalist terms.

The sociology of classification adds a market counterpart to Scott's (1998) account of state legibility. Fourcade and Healy (2013, 2017) show how scoring sorts people into classification situations with unequal life chances. Poon (2009) traces how commercial risk scores reshaped mortgage finance, and Kiviat (2019) shows that predictive pricing provokes political resistance when it clashes with moral categories. Singh and Jackson (2021) describe "low-resolution citizens" of India's Aadhaar system, whose data fit the system's categories poorly and whose rights shrink as a result. Where inclusion turns predatory, legibility brings exposure to extraction (Donovan & Park, 2022; Taylor, 2019). Economics supplies the underlying mechanism: lenders ration credit when they cannot observe borrower risk (Stiglitz & Weiss, 1981), and information sharing among lenders expands lending (Jappelli & Pagano, 2002).

This work is mainly about inclusion and extraction within states. It rarely asks who, across borders, owns the bureaus, models and servers that do the classifying.

2.4 Digital Sovereignty, Stacks and Compute

The final literature concerns sovereignty over digital systems. Pohle and Thiel (2020) and Couture and Toupin (2019) trace how "digital sovereignty" has become a claim that can justify protection and control alike. Bradford (2020, 2023) maps American market-driven, Chinese state-driven and European rights-driven models of regulation, and the European capacity to export rules. Erie and Streinz (2021) describe a parallel Chinese projection of data governance through the Digital Silk Road. Bratton (2015) theorizes sovereignty across a layered computational stack, and DeNardis (2014) shows how control over internet infrastructure has become a primary site of governance. Kwet (2019) and Couldry and Mejias (2019) describe data extraction across the Global South as a new form of colonial relation.

Two recent contributions come closest to the present argument. Fernández Franco et al. (2024) show that Mercado Libre, Latin America's leading platform, depends on U.S. firms for algorithms and computing power while exercising power over local users, and they describe digital dependency as composed of multiple layers of asymmetric relations. Lehdonvirta et al. (2024) map public-cloud computing capacity across countries and distinguish a Compute North, a Compute South and Compute Deserts. Rikap (2024, 2026) shows how a few U.S. firms organize the production of frontier AI and argues that the language of digital public infrastructure has deepened states' dependence on them.

2.5 The Gap

These literatures have documented hub-based coercion, currency hierarchy, the politics of financial inclusion and layered digital dependence, but they have rarely been brought together. The weaponized-interdependence literature studies networks one at a time; the inclusion literature studies classification within states; the digital-dependency literature studies platforms and compute in general. What has received less attention is how control over the apparatus that classifies borrowers is distributed between states, and how that distribution relates to the control over payment rails that has been the main object of hedging since 2022.

III. Framework

3.1 Algorithmic Sovereignty

I define algorithmic sovereignty as a political community's capacity to govern how people and firms under its jurisdiction are classified for payment, credit and compliance purposes: on whose data, by whose models, run on whose computing infrastructure, and subject to whose rules of contestation. The adjective marks the object. Digital sovereignty concerns control over digital infrastructure in general (Pohle & Thiel, 2020). Monetary sovereignty concerns control over the issue and management of money (Murau & van 't Klooster, 2023). Algorithmic sovereignty concerns control over classification, the sorting of people into risk categories that determine access to payment and credit.

In Krasner's (1999) typology, the concept combines domestic sovereignty, the effective authority of public institutions over activity within the territory, with interdependence sovereignty, the capacity to regulate flows across borders. It makes no claim about Westphalian or international legal sovereignty. The term has been used before in a different, user-centred sense, to describe individuals' control over the algorithms that curate their social media feeds (Reviglio & Agosti, 2020). The present usage concerns the state's capacity, although Section 9 returns to the question of who within the state exercises it.

3.2 The Stack

Table 1 sets out four layers of the financial stack, the points at which external dependence arises in each, and indicators that could be used to observe sovereignty at each layer. The indicators are proposed for future measurement; the cases in Sections 5 to 8 are described against them but not scored.

Table 1
Four Layers of the Financial Stack and Indicators of Algorithmic Sovereignty

Layer	Function	Where external dependence arises	Possible indicators of sovereignty
Rails	Moves value and payment instructions	Messaging hubs and dollar clearing; card networks; platforms run by one sponsor; foreign-issued stablecoins	Share of domestic retail payments on domestically governed rails; access to non-dollar settlement; share of reserves held with foreign custodians
Data	Makes people and firms legible to lenders and supervisors	Bureaus owned abroad; data held by foreign platforms; records that are absent or cannot be moved	Domestic or foreign ownership of credit bureaus; enforceable consent and portability rules; share of adults and small firms with usable records
Models	Turns data into scores and compliance decisions	Scores and compliance systems built abroad; external foundation models; limited supervisory access	Domicile of score and model providers; binding rights of explanation and contestation; supervisory power to audit third-party models
Compute	Trains and runs models	Concentrated cloud capacity; export controls on advanced chips	Publicly or domestically controlled compute; domestic cloud regions with frontier processors; exposure to export-control tiers

Note. Compiled by the author. The indicators are proposed for future measurement; the cases are described against them in Sections 5 to 8 but not scored.

The layers stand in two relationships. They are separable in ownership and governance: different firms own them, different regulators supervise them, and control over one confers no legal authority over another. And they are nested in function: models require data and compute, and payment rails increasingly generate the data on which models are trained (Westermeyer, 2020). Separability means that sovereignty won at one layer does not transfer to the next. Nesting means that dependence at a lower layer can constrain what a state does with control at a higher one. Both relationships matter for the argument, and the propositions in Section 9 distinguish them.

3.3 Algorithmic Dark Zones

An algorithmic dark zone is a population of people or firms that automated credit and compliance systems cannot classify accurately, for reasons that lie in the history and governance of data and models rather than in the risk the population presents. The concept is a family with four sub-types, set out in Table 2.

Table 2
Four Sub-types of Algorithmic Dark Zone

Sub-type	Mechanism	Example in this article	Possible indicator	Typical remedy and its risk
Unrecorded	No formal record exists	Adults without accounts or identity records before India's inclusion drives	Share of adults or small firms with no account or bureau record	Identity and account drives; exclusion at the point of authentication
Unportable	Records exist but cannot reach the lender's model	Stylized Tiruppur exporter with tax filings and payment receipts but no bureau file	Approval gap between comparable firms with and without consented data sharing	Consent-based data sharing; extraction and high-cost lending
Low-resolution	Seen only through coarse categories such as jurisdiction, corridor or sector	Correspondent banks exiting whole jurisdictions	Exit rates by jurisdiction after controlling for bank-level risk	Network-level monitoring; new forms of surveillance
Misfit	Scored by a model trained on a different population	Thin-file borrowers scored by bureau-calibrated models	Model accuracy gap by file thickness or by country of training data	Local recalibration and audit rights; dependence on foreign vendors to recalibrate

Note. Compiled by the author. The sub-types can overlap. The low-resolution sub-type adapts Singh and Jackson (2021); the misfit sub-type draws on Blattner and Nelson (2021).

The sub-types differ in cause and remedy. An unrecorded population has no formal record at all. An unportable population has records, in tax filings, bank statements or payment histories, that cannot reach the lender's model. A low-resolution population is visible only through coarse categories such as jurisdiction, corridor or sector, the sense in which Singh and Jackson (2021) speak of low-resolution citizens. A misfit population is scored by a model trained on a different population, so that its records are read through the wrong statistical lens (Blattner & Nelson, 2021).

The concept overlaps with the "credit invisibles" of the U.S. consumer-finance literature (Brevoort et al., 2015) and with low-resolution citizenship. It differs from both in two respects. It is defined relative to automated systems, so that a population can be visible to a human loan officer and dark to a model. And it acquires an international dimension in the misfit and low-resolution sub-types, when the model or the classification scheme is designed, owned or governed outside the jurisdiction of the people being classified.

Aitken (2017) gives reason for caution, since categories such as "the unbanked" are partly produced by the projects that set out to include them; the boundaries of a dark zone are themselves contestable. Nor is leaving a dark zone necessarily a gain: it can mean entering a finely graded classification situation (Fourcade & Healy, 2013) or a market for high-cost credit (Donovan & Park, 2022). Whether a dark zone reflects missing information or real risk is an empirical question. The most direct test compares approval and default rates for comparable firms before and after they gain access to portable data: if newly approved thin-file firms default no more often than firms already scored, the zone was informational.

IV. Research Design

The article uses a structured, focused comparison, which asks the same questions of each case (George & Bennett, 2005), within a theory-building design. The comparison is a plausibility probe in Eckstein's (1975) sense: it establishes whether the framework fits the cases well enough to justify testing, and the propositions in Section 9 are generated inductively from the cases. They cannot be tested on the cases that produced them (Levy, 2008).

The four principal cases are the United States, China, the European Union and India. Each has a documented strategy at two or more layers of the stack, and each offers infrastructure, rules or standards to other states, whether as platforms, regulatory templates or exported designs. China presents itself as part of the Global South; it is treated here as a supplier of infrastructure because that is the role it plays in the platforms examined. India plays a dual role, as a supplier of exported designs and as a Global South state dependent at several layers, and it receives the most detailed treatment. Brazil is added as a receiving state, because it built its own instant-payment system and has since become the object of U.S. trade pressure over it.

For each layer and each case the comparison asks four questions: who owns and governs the layer domestically; how dependent it is on foreign actors; what the case offers or projects to third states; and what rights of explanation or contestation exist for those being classified.

The evidence is documentary: official statistics, legal and regulatory texts, central bank publications, multilateral surveys and peer-reviewed empirical studies, current to 30 September 2026 unless stated. Press reports are cited where they report official data or statements not otherwise published; such cases are indicated. Several figures are self-reported by institutions whose strategies are examined, including the People's Bank of China and India's National Payments Corporation, and are presented as such. IMF reserve data contain a methodology break: from the third quarter of 2025 the IMF reports shares of total reserves with imputation, while earlier published figures are shares of allocated reserves (IMF, 2025). Rupee values are converted at Reserve Bank of India period averages where available and approximately otherwise.

V. Rails

5.1 Hedging without Exit

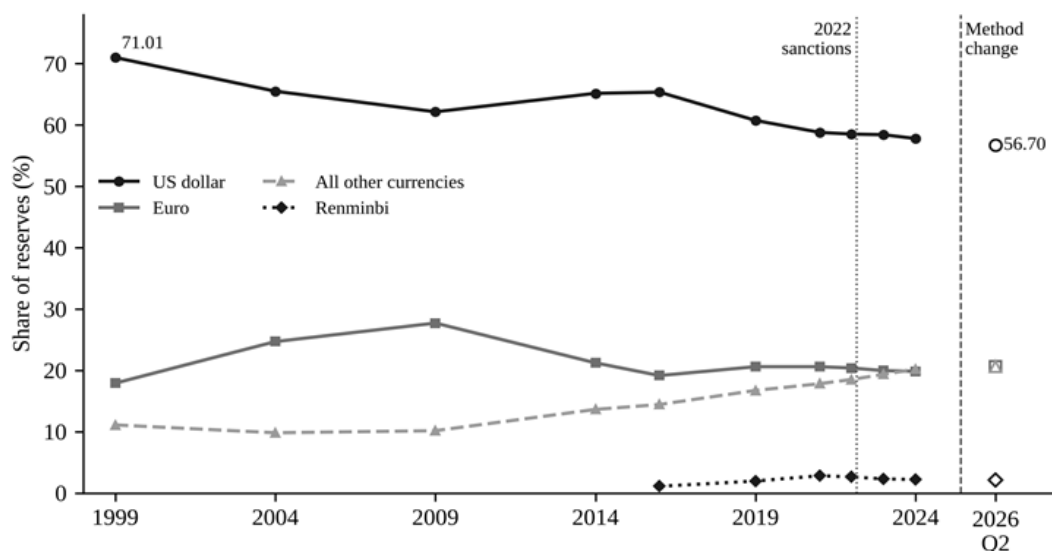
The 2022 measures combined two channels. The SWIFT disconnection was an EU legal act binding a Belgian cooperative, and its first list of seven banks omitted Sberbank, Russia's largest, which was disconnected only on 14 June 2022 (Council of the European Union, 2022; Ukrinform, 2022). The immobilization of central bank reserves ran through U.S. Treasury directives and parallel allied measures. The ruble fell from near 80 to the dollar before the invasion to a record low of 120 on the Moscow Exchange on 9 March, then recovered under capital controls and collapsing imports to about 50 by late June (Reuters, 2022a, 2022b). SWIFT itself kept growing, to an average of 59.8 million messages a day in 2025 across more than 11,500 institutions (SWIFT, 2026a), consistent with Farrell and Newman's (2019) point that the network effects which create hubs make them costly to abandon.

Official-sector behavior since 2022 looks more like insurance than withdrawal. Central bank net purchases of gold reached 1,081.9 tonnes in 2022, 1,050.8 tonnes in 2023 and 1,092.4 tonnes in 2024, before easing to 863.3 tonnes in 2025; the comparable figures were 383.6 tonnes in 2016 and 650.3 tonnes in 2019 (WGC, 2017, 2020, 2024, 2025, 2026). In a 2025 survey of 75 central banks, 32% planned to increase their gold

holdings and the dollar was the only currency for which reported demand fell (Sanghani, 2025). Reserve managers surveyed in 2026 described gold held at home as protection against asset freezes (Invesco, 2026). These are aggregate data; they cannot show which states are hedging or why.

Figure 1 shows how little the currency composition of reserves has changed by comparison. The dollar's share of allocated reserves fell from 71.01% in 1999 to 57.79% in 2024, with no visible acceleration after 2022 (IMF, n.d.), and stood at 56.70% of total reserves in the second quarter of 2026 under the IMF's revised method (IMF, 2025, 2026). About a quarter of the shift away from the dollar since 2000 went to the renminbi and the rest to smaller currencies such as the Australian and Canadian dollars (Arslanalp et al., 2022). In payments, the dollar accounted for 52.09% of global SWIFT payments by value in August 2026, and for 59.87% when payments within the euro area are excluded; the renminbi accounted for 3.26%, fifth among currencies (SWIFT, 2026b).

Figure 1
Currency Composition of Official Foreign Exchange Reserves, 1999 to 2026



Note. Values for 1999 to 2024 are year-end shares of allocated reserves under the IMF's earlier method (U.S. dollar 71.01% in 1999 and 57.79% in 2024). The 2026 Q2 values (open markers) are shares of total reserves with imputation under the method adopted in 2025 (dollar 56.70%, euro 20.60%, renminbi 2.11%) and are not strictly comparable with earlier values. The renminbi was reported separately from 2016; before then it is included in all other currencies. Data from IMF (n.d., 2025, 2026).

Alternative rails have grown from a small base. Russia's own messaging system, founded in 2014, had 177 foreign participants from 24 countries at the end of 2024 (TASS, 2025). CIPS, launched in 2015, had 193 direct and 1,573 indirect participants covering 124 countries and regions at the end of 2025 (Zhou, 2026). It is mainly a clearing and settlement system and often still uses SWIFT messaging. Collective initiatives have remained declaratory: the Kazan Declaration of October 2024 described the BRICS cross-border payments initiative as "voluntary and nonbinding" (TASS, 2024), and the September 2026 New Delhi summit did no more than acknowledge a payments task force (Ambey & Mishra, 2026). Even declaratory moves have drawn U.S. threats of tariffs (Berkowitz, 2024; Khaleej Times, 2025).

5.2 The United States: From Clearing to Tokens

U.S. policy since 2025 has promoted the circulation of the dollar on new rails. Executive Order 14178 of 23 January 2025 prohibits federal agencies from establishing, issuing or promoting a central bank digital currency and makes it policy to promote dollar-backed stablecoins worldwide (Exec. Order No. 14178, 2025). The GENIUS Act of 18 July 2025 requires stablecoin issuers to hold one dollar of high-quality reserves for each dollar issued, subjects them to anti-money-laundering and sanctions obligations, and requires that they be able to freeze tokens (Guiding and Establishing National Innovation for U.S. Stablecoins Act, 2025; Tierno, 2026). The Treasury Secretary said the technology would "buttress the dollar's status as the global reserve currency" (U.S. Department of the Treasury, 2025), a claim consistent with models in which dollar-backed tokens raise global demand for U.S. safe assets (Azzimonti & Quadrini, 2024).

More than 99% of stablecoins by value are denominated in dollars, and the BIS has warned that their spread could undermine monetary sovereignty in emerging economies through currency substitution and capital flight (Bank for International Settlements [BIS], 2025). In August 2026 the IMF's First Deputy Managing Director

cautioned that stablecoins could spread much faster than earlier waves of dollarization (Nicolaou, 2026). What circulates is a private claim pegged to the dollar, which carries run and devaluation risk that the sovereign dollar does not (Eichengreen et al., 2025). Its regulatory design also matters for the argument here. A token that its issuer must be able to freeze carries the chokepoint effect into every wallet that holds it, and the issuer's compliance obligations carry the panopticon effect with it. For households and firms abroad, dollar stablecoins offer a route around correspondent banking that stays within U.S. jurisdiction; for their central banks, they open a new channel of currency substitution.

The United States has also acted against rival public rails. In July 2025 the U.S. Trade Representative opened a Section 301 investigation into Brazil that included electronic payment services, and its June 2026 determination objected that the central bank's "dual role as regulator and owner/operator of Pix creates a conflict of interest" (Office of the United States Trade Representative [USTR], 2026a). A 25% tariff on most Brazilian goods took effect on 22 July 2026 (USTR, 2026b). The case is examined further in Section 5.6.

5.3 China: CIPS, the e-CNY and mBridge

China's rails strategy runs on three tracks. CIPS provides renminbi clearing. The e-CNY, which the Atlantic Council still classes as a pilot, had recorded cumulative transactions of RMB 14.2 trillion and 225 million personal wallets by September 2025 (State Council of the People's Republic of China, 2025), and RMB 16.7 trillion across 3.48 billion transactions by November 2025 (Ding, 2025). Balances held at banks became interest-bearing from January 2026 (Ding, 2025), and an international operations center for cross-border use began operating in Shanghai in September 2025 (Liu, 2025). Turnover should not be confused with depth: in mid-2023 the e-CNY balance was about 0.16% of currency in circulation (People's Bank of China [PBOC], 2023). The PBOC describes its cross-border principles as "no disruption, compliance, interoperability" (PBOC, 2023), and the domestic project fits a longer pattern in which the party-state tolerates financial innovation where it serves development and control (Gruin & Knaack, 2020).

The capacity to settle outside dollar correspondent banking lies mainly in Project mBridge, a multi-CBDC platform built from 2021 by the monetary authorities of Hong Kong, Thailand, the United Arab Emirates and China with the BIS Innovation Hub. A 2022 pilot settled more than USD 22 million (BIS, 2022); the Saudi central bank joined in June 2024 (BIS, 2024a); and the BIS withdrew in October 2024, its General Manager stating that mBridge was "not the 'BRICS bridge'" (The Global Treasurer, 2024). By early 2026 the platform had handled about USD 55.5 billion across more than 4,000 transactions, and the Atlantic Council estimated that about 95% of settlement volume was in e-CNY (Chhangani, 2026). In September 2026 the Financial Times reported that Saudi Arabia was no longer a participating member (The Standard, 2026). A platform designed as a multilateral alternative to dollar correspondent banking now settles mainly in one participant's currency.

5.4 The European Union: A Defensive Digital Euro

The European Central Bank moved its digital euro project to its next phase on 30 October 2025, and the Council and the European Parliament adopted negotiating positions in December 2025 and July 2026 respectively; issuance would be possible in 2029 if legislation is adopted in 2026 (European Central Bank [ECB], 2025; Mondo Visione, 2026; Schneider et al., 2026). Quaglia and Verdun (2025) read the project as an effort to safeguard the euro area's monetary sovereignty and the autonomy of retail payments against private digital currencies issued mostly by non-EU actors and the dominance of non-EU firms in retail payments. The European case shows that even the issuer of the second reserve currency treats control over retail rails as a sovereignty question. Its offer to third states lies less in rails than in rules, examined in Sections 6 and 7.

5.5 India: Public Rails, Private Front Ends

UPI is operated by the National Payments Corporation of India (NPCI), a not-for-profit company promoted by the Reserve Bank of India (RBI) and the Indian Banks' Association. It processed 131.14 billion transactions worth ₹199.96 lakh crore (about USD 2.42 trillion) in 2023-24 and 185.85 billion worth ₹260.56 lakh crore (about USD 3.08 trillion) in 2024-25 (Jacob, 2025), and about 241.6 billion worth some ₹314 lakh crore in 2025-26 (PIB, 2026a). In 2023 India accounted for 129.3 billion of the 266.2 billion real-time payments made worldwide, about 49% (ACI Worldwide, 2024). IMF research attributes part of UPI's spread to interoperability, which lets any application pay any account (Copestake et al., 2025). Since January 2020 merchant fees on UPI and RuPay debit transactions have been set at zero by law, with costs borne by banks and applications and partly offset by a government incentive scheme budgeted at ₹1,500 crore for 2024-25 (Prime Minister's Office, 2025). The rails are public; the front ends are not. In August 2026 PhonePe, controlled by Walmart, and Google Pay, owned by Alphabet, processed 45.64% and 32.26% of UPI volume, a combined share of 77.90% (Entrackr, 2026). NPCI's cap of 30% on any single third-party application, announced in 2020, has been deferred repeatedly, most recently to 31 December 2026 (Pandey, 2025). Langley and Leyshon (2021) predict precisely this consolidation

of platforms on top of open rails, and Braun's (2020) account of infrastructural power suggests why the cap is hard to enforce: a state that governs payments through a few large applications comes to depend on them.

India's retail CBDC has found little room alongside UPI. The RBI's 2022 concept note listed cross-border payments and remittances among its motivations (RBI, 2022). After pilots began in late 2022, the value of e-rupee in circulation rose to ₹1,016.5 crore at the end of March 2025 and then fell to ₹771.7 crore (about USD 90 million) a year later (RBI, 2026), with a little over 8 million users reported in December 2025 (Jain, 2025).

India also exports its rails. UPI was live for payments or remittances in 11 countries as of August 2026 (PIB, 2026a). NPCI's international subsidiary agreed in 2024 to build UPI-modelled domestic systems for Namibia, Peru and Trinidad and Tobago (Business Standard, 2024; Kawale, 2024; Lobo, 2024), and Namibia's instant payment system began a phased rollout in June 2026 (The Brief, 2026). India also participates in Project Nexus, which will link the fast-payment systems of several Asian economies through a not-for-profit company founded by their central banks, with go-live targeted for 2027 (BIS, n.d.-a; Nexus Global Payments, 2026).

5.6 Brazil: A Receiving State Builds Its Own Rails

Brazil illustrates a receiving state's options. Its central bank built and operates Pix, launched in November 2020, and made participation mandatory for institutions with more than 500,000 active accounts (Banco Central do Brasil [BCB], 2020). Pix handled about 80 billion transactions worth more than R\$35 trillion in 2025, and 148.3 million individuals, about 86% of adults, used it in December 2025 (BCB, 2026). Brazil signed a memorandum on cooperation in digital public infrastructure with India in July 2025 (PIB, 2026c), while continuing to run its own system.

The U.S. Section 301 action against Brazil shows that public rails built by a receiving state can themselves become objects of coercion. The determination treated Pix's free use for individuals, its mandatory status and its prominent placement in banking apps as preferences for a national champion that disadvantage U.S. payment providers (USTR, 2026a). The Brazilian government called Pix "a heritage of our people" and announced steps under its reciprocity law (InfoMoney, 2026). The episode is the clearest case in this comparison of a hub state contesting another state's sovereignty at the rails layer by means drawn from a different domain, trade. Brazil has meanwhile moved to bring dollar stablecoins inside its foreign exchange rules: resolutions published in November 2025, in force from February 2026, treat international crypto-asset operations as foreign exchange transactions (Carvalho, 2025), after the central bank's governor estimated that about 90% of crypto flows in Brazil were stablecoins (Reuters, 2025).

VI. Data

6.1 Four Data Regimes

The four principal cases govern credit data in sharply different ways. In the United States the data layer is private and domestic. Three nationwide credit bureaus hold consumer files, and the Consumer Financial Protection Bureau's 2024 rule giving consumers a right to share their financial data was enjoined by a federal court in October 2025 and placed under reconsideration (American Bankers Association Banking Journal, 2025; Consumer Financial Protection Bureau [CFPB], 2024, 2025a). The U.S. offer to other states comes through commercial ownership: TransUnion, for example, held over 92% of TransUnion CIBIL, one of India's four licensed credit bureaus, as of 2017 (TransUnion, 2018).

China has re-centralized credit data under licensed bureaus anchored by the state. The National Internet Finance Association, led by the central bank, holds 36% of Baihang Credit, with eight firms, including Ant Group's Sesame Credit and Tencent, holding 8% each (Caixin Global, 2018). Rules effective from 2022 bar lenders from obtaining credit information from unlicensed platforms, with a transition period that ran to mid-2023 (JunHe, 2021), and the rectification of Ant Group closed with a fine of RMB 7.123 billion in July 2023 (Hong Kong Free Press, 2023). The Personal Information Protection Law of 2021 adds rules on data export (Personal Information Protection Law of the People's Republic of China, 2021).

Retail CBDCs embed comparable choices about who may see payment data. The PBOC describes the e-CNY's privacy model as managed anonymity backed by big-data risk monitoring (PBOC, 2023), the RBI's concept note proposes anonymity for small values and traceability for large ones (RBI, 2022), and the BIS (2021) has argued that privacy from both firms and governments has the attributes of a basic right, which a CBDC can protect by separating payment services from control over the resulting data. A state that joins another state's platform takes on that platform's answers to these questions.

The European Union mandated access to payment accounts in 2015, but its proposed Financial Data Access regulation, published in June 2023, has stalled in negotiation, largely over whether large U.S. technology platforms designated as gatekeepers should be allowed access to EU financial data (Council of the European Union, 2026). The stall is a data-layer instance of the defensive sovereignty seen in the digital euro.

India combines localization with consent. Since 2018 the RBI has required payment system data to be stored only in India (RBI, 2018). Its Account Aggregator framework, dating from 2016, lets licensed

intermediaries move financial data between institutions only with the explicit consent of the person concerned; by mid-2026 more than 493 million consents had been fulfilled (Sahamati, 2026), and lenders disbursed about ₹1.07 lakh crore (about USD 12.7 billion) across 12.2 million loans using such data in 2024-25 (Kawale, 2025). A Unified Lending Interface, piloted from August 2023, draws together identity, land records and consented financial data for lenders (Panda, 2024; RBI, 2023). Data protection rules notified in November 2025 require consent managers to be companies incorporated in India, with most obligations taking effect in May 2027 (Ministry of Electronics and Information Technology [MeitY], 2025).

The ownership of the institutions that hold and score these data is another matter. At least three of India's four licensed credit information companies are majority-owned by foreign groups: TransUnion raised its stake in CIBIL above 92% in 2017 (TransUnion, 2018), Experian held 66.72% of its Indian bureau in 2018 (BIIA, 2018), and Equifax agreed in 2020 to acquire full ownership of its Indian bureau (Equifax, 2020). India localizes the storage of its credit data but not the ownership of its bureaus.

6.2 Dark Zones in the Data

The evidence on trade finance shows how missing data shape exclusion among firms. The Asian Development Bank estimated the global trade finance gap at about USD 2.5 trillion in 2022, about 10% of merchandise trade, and its December 2025 survey found it unchanged (Beck et al., 2023, 2025). Firms whose applications were rejected most often cited insufficient collateral (22%), the absence of a previous relationship with the bank (21%) and insufficient credit history (16%) (Beck et al., 2023). Two of the three leading reasons concern missing records. In the 2025 survey, export credit in India covered 28.5% of an estimated USD 284 billion requirement (Beck et al., 2025). Across developing economies the formal finance gap for micro, small and medium enterprises was estimated at USD 5.2 trillion (International Finance Corporation, 2017), and India's Small Industries Development Bank put the domestic gap at about ₹30 lakh crore (Outlook Business, 2025).

Consider a stylized case, offered as an illustration of the unportable sub-type and not as a documented firm: a knitwear exporter in Tiruppur, Tamil Nadu, with fifteen years of sales, monthly tax filings and steady payment receipts, but no loan from a bank that reports to a bureau. Its records exist; they do not reach the model that scores it. Consent-based data sharing of the Account Aggregator type is designed to close exactly this gap.

The machine-learning evidence, summarized in Table 3, qualifies the promise. Alternative data can make unscored borrowers legible (Berg et al., 2020; Björkegren & Grissen, 2020; Gambacorta et al., 2024), but more flexible models can widen disparities between groups (Bartlett et al., 2022; Fuster et al., 2022), and scores are noisier for underserved groups mainly because their files are thin (Blattner & Nelson, 2021). None of these studies concerns small firms or exporters, half rely on data held by private platforms, and none uses a public consent-based data-sharing system.

Table 3
Selected Evidence on Machine Learning and Alternative Data in Credit

Study	Borrowers	Setting	Data source	Main finding
Berg et al. (2020)	Consumers buying online	Germany	Digital footprint held by an e-commerce firm	Footprint variables match or exceed the information in bureau scores and predict about as well for customers without a score
Björkegren and Grissen (2020)	Consumers	A South American country	Telecom records	Phone-usage models outperform bureau-based models for borrowers with thin files
Gambacorta et al. (2024)	Fintech borrowers	China	Lender's own non-traditional data	Machine learning predicts losses better during a credit-supply shock; the advantage shrinks with longer credit histories
Fuster et al. (2022)	Mortgage borrowers	United States	Administrative mortgage data	More flexible models increase rate disparities; Black and Hispanic borrowers are less likely to benefit
Bartlett et al. (2022)	Mortgage borrowers	United States	Administrative mortgage data	Latinx and African-American borrowers pay higher rates; disparities at fintech lenders are similar to those at other lenders for most loans
Blattner and Nelson (2021)	Consumers	United States	Credit bureau data	Scores are noisier for underserved groups mainly because their files are thin; equal precision would cut approval disparities by about half

Note. Compiled by the author. None of the studies concerns small firms or exporters, three rely on data held by private firms, and none uses a public consent-based data system.

Lighting a dark zone also exposes it to extraction. An RBI working group reported in 2021 that about 600 of some 1,100 lending apps available in India were illegal (Inc42, 2021); the government had blocked 87 illegal lending apps under the information technology law by late 2025 (Kohli, 2025); and the RBI has since tightened its rules on digital lending (RBI, 2025b). In Kenya, the central bank brought digital lenders under licensing in 2022 and had licensed 281 by September 2026 (Citizen Digital, 2026), while the number of borrowers negatively listed with credit bureaus fell from about 2.2 million in 2019 to about 0.9 million in 2023 (FSD Kenya, 2024). Experimental evidence is mixed: digital loans in Kenya improved households' resilience to shocks (Suri et al., 2021), while in Malawi most borrowers repaid late and paid high fees (Brailovskaya et al., 2024). Bernards (2022) shows that Kenya's fintech boom reproduced colonial patterns of uneven development. Whether inclusion helps depends on the regulation of lenders as much as on the availability of data.

6.3 Legibility and Its Costs in India

India's identity layer illustrates the unrecorded sub-type and the costs of remedying it. Account ownership rose from 35% of adults in 2011 to 89% in 2024, with no gap between men and women (Klapper et al., 2025), although counts of accounts are weak evidence of improved welfare (Mader, 2018). In a large evaluation in Jharkhand, Muralidharan et al. (2025) found that biometric authentication for food rations did not reduce leakage, and that the reforms they studied together caused an estimated 1.5 to 2 million eligible people to lose benefits at some point. Masiero and Arvidsson (2021) document exclusion and distortion when Aadhaar was integrated into food distribution, and Khera (2019) and Masiero (2023) describe the surveillance risks of the system. The Supreme Court recognized privacy as a fundamental right in 2017 (*Justice K. S. Puttaswamy (Retd.) v. Union of India*, 2017).

VII. Models

7.1 An Evidence Gap

The model layer is where the paper's distinctive claim is hardest to evidence. I found no credible public survey measuring how many lenders or banks in emerging economies use credit-scoring or anti-money-laundering models supplied by foreign vendors. What exist are proxies. The first is bureau ownership: the scores that gate most retail credit in India are produced by foreign-controlled bureaus (Section 6.1), and FICO has marketed scores designed for India since 2017 (The Asian Banker, 2017). The second is reliance on foundation models: in a 2026 survey of financial firms and regulators, 63% of industry respondents built internal workflows on external foundation models, and 76% used OpenAI's (Cambridge Centre for Alternative Finance [CCAF], 2026). Open-weight models could reduce such dependence, although openness alone does little to reduce concentration across data, compute and development frameworks (Widder et al., 2024).

7.2 Four Model Regimes

The four cases now differ more at the model layer than at any other. The United States has made model governance less binding. In April 2026 the Federal Reserve, the Office of the Comptroller of the Currency and the Federal Deposit Insurance Corporation replaced their 2011 model-risk guidance with SR 26-2, which places generative and agentic AI outside its scope and states that non-compliance will not result in supervisory criticism (Board of Governors of the Federal Reserve System, 2026). The CFPB withdrew its 2022 circular on adverse-action notices for complex algorithms in May 2025 (CFPB, 2025b).

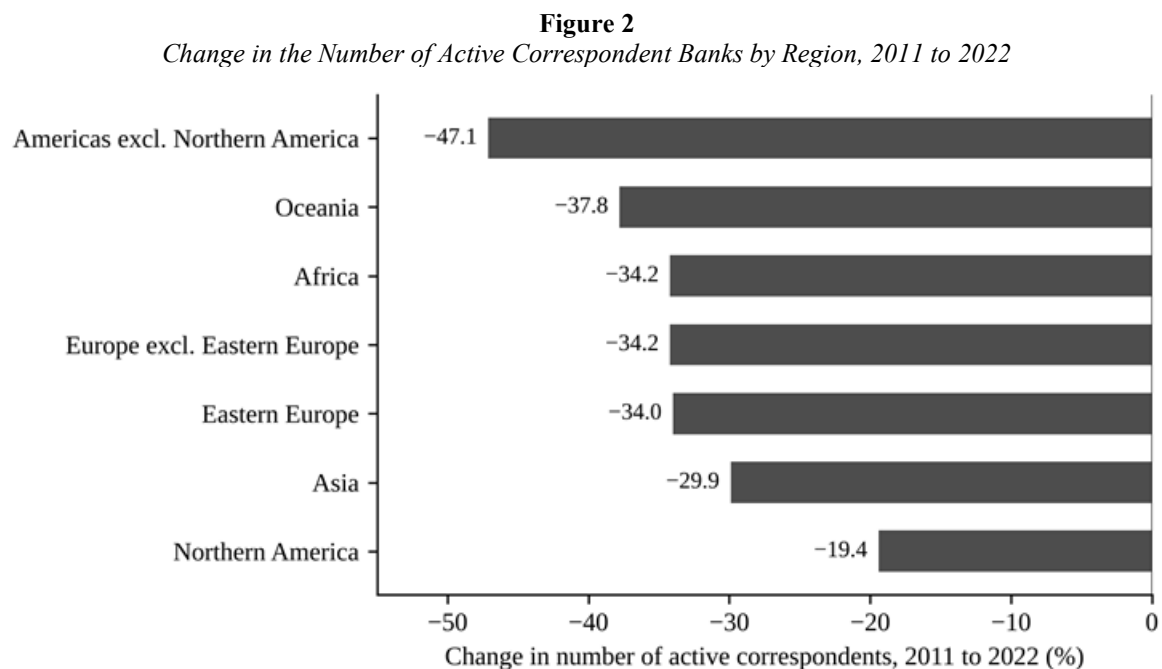
The European Union has the densest accountability regime. In *SCHUFA* the Court of Justice held that a credit bureau's automated score is itself a decision under Article 22 of the General Data Protection Regulation when a lender draws strongly on it (Case C-634/21, 2023), and in *Dun & Bradstreet Austria* it required controllers to explain the procedure and principles actually applied (Case C-203/22, 2025). From 20 November 2026 the revised Consumer Credit Directive bars the use of special-category data and social networks in creditworthiness assessment and gives consumers a right to human intervention, explanation and review of automated assessments (Directive (EU) 2023/2225, 2023). The AI Act classifies credit scoring as high-risk (Regulation (EU) 2024/1689, 2024, Annex III, point 5(b)), but a 2026 amendment delayed those obligations to 2 December 2027 (Regulation (EU) 2026/1744, 2026). Through these rules the EU offers third states a template for contestation; whether it travels through a Brussels effect (Bradford, 2020) is an open question for the model layer.

China governs algorithms through ex ante filing with the Cyberspace Administration (Cyberspace Administration of China et al., 2021), and its data protection law gives individuals a right to an explanation and to refuse decisions made solely by automated means that significantly affect their rights (Personal Information Protection Law of the People's Republic of China, 2021, Art. 24). Credit scoring itself is controlled mainly through the bureau licensing described in Section 6.1.

India regulates the lending process without regulating models. The RBI's 2025 digital lending directions require consent, data localization and grievance procedures but contain no provisions specific to algorithms (RBI, 2025b). Its FREE-AI committee report of August 2025 recommended a financial-sector data infrastructure, board-approved AI policies at regulated entities, audits and indigenous AI models for the financial sector (RBI, 2025a). The report is advisory, and I found no binding instrument implementing it as of September 2026.

7.3 Compliance Models and De-risking

Correspondent banking offers the clearest evidence of the low-resolution sub-type. The number of correspondent banking relationships fell by about 30% worldwide between 2011 and 2022, even as payment volumes rose by 61% (Davies, 2023). Figure 2 shows the decline in active correspondents by region (Committee on Payments and Market Infrastructures [CPMI], 2023). Jurisdictions with long-standing deficiencies in anti-money-laundering regimes lost about 25 percentage points more correspondents than average (Rice et al., 2020), and large banks cited money-laundering risk, sanctions, risk appetite and profitability as reasons for withdrawal (World Bank Group, 2015). Whole jurisdictions are classified, in effect, by their corridor risk.



Note. Data from CPMI (2023), Table 2, based on SWIFT MT103 and MT202 messages excluding MT202COV. Active correspondents differ from correspondent relationships, which fell by about 30% worldwide over the same period (Davies, 2023). SWIFT data do not represent complete market statistics. I found no study attributing de-risking to artificial intelligence and make no such claim. Automation could cut either way. Rules-based transaction monitoring generates high rates of false positives (Oztas et al., 2024), and in the BIS's Project Aurora, network-level machine learning on synthetic data potentially detected up to three times more money laundering and reduced false positives by up to 80% (BIS, n.d.-b). If correspondent banks that adopt network-level monitoring exit high-risk corridors more slowly than banks using rules-based systems, automation would be raising the resolution at which jurisdictions are seen. Supervisors have meanwhile identified concentration among AI providers and correlated model behavior as systemic vulnerabilities (BIS, 2024b; Danielsson et al., 2022; FSB, 2024).

VIII. Compute

Computing capacity is concentrated and largely outside the regulatory reach of most states. Amazon, Microsoft and Google held 28%, 20% and 15% of global cloud infrastructure revenue in the second quarter of 2026 (Synergy Research Group, 2026), and 70% of the European market in 2024, against about 15% for European providers (Synergy Research Group, 2025). The comparison with India's payment applications is instructive. Their two-firm share, about 78% of a national market, is higher than the two-firm share of global cloud, 48%; but Indian regulators can at least cap application shares, whereas the supply of frontier compute is governed in Washington.

U.S. export controls on advanced chips tightened from October 2022 to December 2024 (U.S. Department of Commerce, 2024). The Framework for Artificial Intelligence Diffusion of January 2025 sorted countries into tiers and placed India in the second, with a reported cap of about 49,901 H100-equivalent processors through 2027

(Harithas, 2025; U.S. Department of Commerce, 2025a). It was rescinded on 13 May 2025, before its compliance date (U.S. Department of Commerce, 2025b), and in January 2026 licensing for H200-class chips to China moved from a presumption of denial to case-by-case review (U.S. Department of Commerce, 2026). In July 2025 an executive order created a program to export full-stack American AI packages, from chips and data centers to models, with federal financing (Exec. Order No. 14320, 2025). As with stablecoins, policy has moved from restricting access to promoting the adoption of American infrastructure abroad.

China is building a substitute stack. Huawei has published an annual roadmap of domestic AI accelerators through 2028 (Huawei, 2025), and Alibaba Cloud operates 18 of its 31 regions outside mainland China (Alibaba Cloud, 2026). The European Union adopted its Chips Act in 2023, had selected 19 publicly funded AI Factories by August 2026 and announced an initiative to mobilize EUR 200 billion for AI investment (European Commission, 2025, 2026; Regulation (EU) 2023/1781, 2023). India's AI mission, approved in March 2024 with more than ₹10,300 crore over five years, offered more than 38,000 graphics processors to users at a subsidized rate by February 2026 (PIB, 2024, 2026b).

In a census of public cloud regions in October 2023, Lehdonvirta et al. (2024) placed India in the Compute North, among countries hosting the processors used to train frontier models, and Brazil in the Compute South. The classification measures where capacity is located, not who owns it, and the regions counted belong to U.S. and Chinese providers. India thus hosts frontier compute without controlling most of it, the same configuration found at its data and application layers.

IX. Discussion: Propositions and Objections

9.1 The Comparison

Table 4 summarizes the four cases across the layers. No case controls all four layers: the United States is home to the leading cloud and chip-design firms but has weakened its own model and data governance; China controls its data and model layers tightly and remains exposed on advanced chips; the EU writes the most demanding rules for models but depends on U.S. firms for most of its cloud; and India governs its rails and data flows publicly while relying on foreign-owned bureaus, foreign-controlled applications and foreign cloud. The offers to third states also take different forms at different layers: the United States exports tokens and full-stack AI, China exports platforms and cloud regions, the EU exports rules, and India exports designs.

Table 4
Four Infrastructure Offers Compared across the Layers, as of September 2026

Layer	United States	China	European Union	India
Rails	Dollar clearing; 52.09% of global SWIFT payments (August 2026); federal CBDC work barred; dollar stablecoins promoted under the GENIUS Act	CIPS (RMB 180.2 trillion settled in 2025); e-CNY pilot (RMB 16.7 trillion cumulative to November 2025); mBridge (about 95% of volume in e-CNY)	Euro payment systems; digital euro in legislative negotiation, issuance possible in 2029	UPI (about 241.6 billion transactions in 2025-26), run by NPCI; two private applications hold about 78% of volume
Data	Private bureaus; 2024 data-availability rule enjoined and under reconsideration	State-anchored licensed bureaus; platforms barred from feeding credit data directly to lenders	Account access under PSD2; financial data access regulation stalled over gatekeeper access	Payment data localized (2018); consent-based Account Aggregators; data protection rules (2025); at least three of four bureaus majority foreign-owned
Models	Model-risk guidance non-binding (SR 26-2, 2026); algorithmic adverse-action circular withdrawn (2025)	Ex ante algorithm filing; statutory right to explanation and to refuse solely automated decisions	GDPR Art. 22 as read in SCHUFA (2023); credit-directive rights from November 2026; AI Act duties from December 2027	No algorithm-specific binding rules; FREE-AI (2025) advisory; recommends indigenous models
Compute	Home of firms with 63% of global cloud revenue; export controls on advanced chips	Domestic accelerator roadmap; case-by-case licensing for H200-class imports since January 2026	19 AI Factories; InvestAI; U.S. firms hold 70% of the European cloud market	Public pool of over 38,000 GPUs (2026); Compute North in 2023, mainly through foreign providers' regions
Offer to third states	Dollar stablecoins; full-stack AI exports; trade pressure on rival public rails (Brazil)	mBridge; e-CNY international operations center; CIPS in 124 countries and regions; cloud regions abroad	Rules: data protection, credit-scoring rights and AI regulation	DPI cooperation memoranda (24 countries); UPI live in 11 countries; UPI-modelled systems; Nexus

Main risk for partner states	Digital dollarization; freeze capability carried by tokens; peg risk	Settlement concentrated in one currency; sponsor's privacy and data rules	Compliance costs without infrastructure	Concentrated private front ends; exclusion at identification; foreign bureaus and compute
------------------------------	--	---	---	---

Note. Compiled by the author from sources cited in Sections 5 to 8. Figures carry different reference dates, as stated in each cell. The regulatory characterizations draw on Bradford (2020, 2023) for the first three cases.

9.2 Five Propositions

Table 5 states five propositions generated from the comparison, with indicators and the observations that would falsify each. They are offered for testing on cases other than those that produced them.

Table 5
Propositions, Observable Implications and Falsifying Evidence

Proposition	Observable implication	Indicators and data	Would be falsified if
P1. Exposure to sanctioning jurisdictions increases states' infrastructural hedges faster than it reduces the dominant currency's share of their invoicing and reserves.	Among exposed states, hedging rises after 2022 while dollar shares change little	Domestic gold holdings; CIPS and SPFS participation; CBDC platform membership; national invoicing and reserve composition; geopolitical distance and past sanctions	Hedging is unrelated to exposure, or currency shares fall as fast as hedging rises
P2. Alternatives whose governance, operator or settlement currency is controlled by one state attract narrower membership and higher exit than multilaterally governed links.	Single-sponsor platforms gain fewer members and lose more	Sponsorship coded ex ante from governance rules; membership and exits over time for CIPS, SPFS, mBridge, Nexus and stablecoin corridors	Single-sponsor platforms grow as broadly as multilateral links with no higher exit
P3. Portable data on firm cash flows expands credit to thin-file firms; whether it flows through public consented systems or private platforms determines who holds classifying power.	Approval rises for thin-file firms after data become portable; classifying power differs by channel	Approval and default rates before and after access to consented data; market shares of lenders and data intermediaries	Approval does not rise, or defaults among newly approved firms exceed those of comparable scored firms
P4. Lowering informational barriers raises take-up of high-cost credit and financial distress where the regulation of lenders lags the availability of data.	Distress rises with digital lending in weakly regulated settings and not in regulated ones	Negative bureau listings; complaints; app blocking and licensing data (India, Kenya)	Distress does not rise with digital lending where regulation lags
P5. Across states, control at the rails layer is weakly correlated with domestic control of bureaus, models and compute.	States with public instant-payment systems are no more likely to own their bureaus or compute	Ownership of instant-payment operators and credit bureaus; domicile of model vendors; location and ownership of cloud regions	A strong positive correlation across a cross-national sample

Note. Compiled by the author. The propositions were generated inductively from the cases in this article and should be tested on other cases.

The first proposition distinguishes infrastructural from currency de-dollarization. It is close to McDowell's (2023) finding that sanctions provoke anti-dollar policies, and adds the prediction that the two forms diverge: states most exposed to sanctioning jurisdictions should expand hedges such as domestic gold holdings and non-SWIFT participation without a matching fall in the dollar's share of their invoicing and reserves, for the structural reasons that currency hierarchy identifies (De Paula et al., 2017).

The second proposition concerns sponsorship. It must be tested with sponsorship coded ex ante, from governance rules, the location of the operator and the settlement currency fixed by design, to avoid inferring sponsorship from the outcome. mBridge generated the proposition and cannot test it; CIPS, the Russian messaging system, Nexus and dollar stablecoins can.

The third and fourth propositions split the data layer's promise from its risks. Portability, not modeling technique, appears to be the main constraint on lending to thin-file firms, but portable data can flow through public consented rails, as with Account Aggregators and Open Finance Brasil, which had 208.79 million active consents in July 2026 (Let's Money, 2026), or through private platforms. The channel determines who holds classifying power more than whether inclusion occurs. The fourth proposition predicts that inclusion raises financial distress

where the regulation of lenders lags the availability of data, as the Indian and Kenyan experience with digital lending apps suggests.

The fifth proposition is the framework's central claim restated for cross-national testing. If control at the rails layer were strongly correlated with domestic control of bureaus, models and compute, the separability argument would fail.

9.3 Objections

Four objections deserve a response. First, algorithmic sovereignty might be state capacity under another name. It differs in specifying an object, the classification of borrowers, and in its cross-border dimension: a capable state can still have its residents classified by institutions it does not own. Second, the model layer may not be a real site of dependence, since lenders can build models in-house and open-weight models are spreading. The evidence on this point is thin, as Section 7.1 acknowledges, and the proposition about the model layer should be treated as the least secure part of the argument.

Third, inclusion may not be desirable. The framework is neutral on this point: sovereignty over classification includes the power to protect borrowers from predatory lenders as well as the power to expose them to scoring, and the Kenyan licensing regime shows a state using it for the former. Fourth, states are not unitary actors. In India the repeated deferral of the cap on payment applications plausibly reflects the bargaining power of incumbent platforms and the regulator's dependence on them (Braun, 2020; Jain & Gabor, 2020). Who within a state exercises algorithmic sovereignty, whether regulators, banks, platforms or the engineers who design public systems, is a question the framework raises without answering.

Two implications for policy follow most directly. States that build public rails need instruments at the application layer, including enforceable interoperability and limits on market share, if public rails are to remain publicly governed in practice. And supervisors need the legal power to examine how credit and compliance models supplied by foreign vendors perform on domestic borrowers, a power that the EU's case law has begun to establish and that India's FREE-AI report recommends without yet making binding.

X. Conclusion

This article has argued that the hedging of financial networks since 2022 has concentrated on reserves and payment rails, while dependence at the data, model and compute layers of automated finance has received less attention and in several cases has grown. The layers are separable in ownership and governance, so that sovereignty won at one does not transfer to the next, and nested in function, so that dependence at a lower layer constrains what a state can do with control at a higher one. The U.S. action against Pix and the migration of U.S. policy from export restriction to the promotion of American stablecoins and AI stacks suggest that hub states can shift coercive power to layers where it is not being contested.

The contribution is threefold: an extension of weaponized interdependence to a layered stack, a concept of algorithmic sovereignty defined by control over classification, and a specification of the algorithmic dark zone that distinguishes unrecorded, unportable, low-resolution and misfit populations. The evidence is documentary and the comparison establishes plausibility only. The model layer is the least documented, because no public data measure how far lenders in emerging economies rely on foreign scoring and compliance systems. Whether the layered view holds beyond the cases examined here is an empirical question, and Table 5 specifies the evidence that would answer it.

Declarations

Funding: The author received no specific funding for this work.

Competing interests: The author declares no competing interests.

Data availability: All data are drawn from publicly available sources listed in the references. The data underlying Figures 1 and 2 come from the cited IMF and CPMI sources, and the script that generates the figures is available from the author on request.

Use of generative AI: The author used AI-based tools to assist with literature search, verification of statistics and citations, and language editing. The author reviewed all content and takes full responsibility for the analysis, interpretation and conclusions.

References

- [1]. ACI Worldwide. (2024, April 29). *Global real-time payments growth "sustainable" as new use cases push transactions to record highs: ACI Worldwide report* [Press release]. Business Wire. <https://www.businesswire.com/news/home/20240429624485/en>
- [2]. Aitken, R. (2017). 'All data is credit data': Constituting the unbanked. *Competition & Change*, 21(4), 274–300. <https://doi.org/10.1177/1024529417712830>
- [3]. Alami, I., Alves, C., Bonizzi, B., Kaltenbrunner, A., Koddenbrock, K., Kvangraven, I., & Powell, J. (2023). International financial subordination: A critical research agenda. *Review of International Political Economy*, 30(4), 1360–1386. <https://doi.org/10.1080/09692290.2022.2098359>
- [4]. Alibaba Cloud. (2026). *Global locations*. Retrieved October 10, 2026, from <https://www.alibabacloud.com/global-locations>

- [5]. Al Jazeera. (2018, November 5). *What SWIFT is and why it matters in the US-Iran spat*. <https://www.aljazeera.com/economy/2018/11/5/what-swift-is-and-why-it-matters-in-the-us-iran-spat>
- [6]. Ambey, K., & Mishra, A. R. (2026, September 13). *India's BRICS payment pitch falls short of leaders' declaration*. Business Standard. https://www.business-standard.com/world-news/india-s-payment-pitch-finds-no-mention-in-brics-declaration-126091300507_1.html
- [7]. American Bankers Association Banking Journal. (2025, November). *Kentucky federal court enjoins CFPB from enforcing current 1033 final rule*. <https://bankingjournal.aba.com/2025/11/kentucky-federal-court-enjoins-cfpb-from-enforcing-current-1033-final-rule/>
- [8]. Arslanalp, S., Eichengreen, B., & Simpson-Bell, C. (2022). The stealth erosion of dollar dominance and the rise of nontraditional reserve currencies. *Journal of International Economics*, 138, Article 103656. <https://doi.org/10.1016/j.jinteco.2022.103656>
- [9]. Atlantic Council. (2026). *Central bank digital currency tracker* [Data set]. Retrieved October 10, 2026, from <https://www.atlanticcouncil.org/cbdctracker/>
- [10]. Azzimonti, M., & Quadrini, V. (2024). Digital assets and the exorbitant dollar privilege. *AEA Papers and Proceedings*, 114, 153–156. <https://doi.org/10.1257/pandp.20241069>
- [11]. Banco Central do Brasil. (2020). *Resolution BCB No. 1 of August 12, 2020* [Pix regulation]. https://www.bcb.gov.br/content/estabilidadefinanceira/pix/Pix_Regulation/Resolution_BCB_1.pdf
- [12]. Banco Central do Brasil. (2026, August 24). *Apresentação do Presidente Gabriel Galipolo, Febraban Tech 2026* [Presentation slides]. https://www.bcb.gov.br/conteudo/home-ptbr/TextosApresentacoes/Apresentacao_GabrielGalipolo_FebrabanTech_24.8.2026.pdf
- [13]. Bank for International Settlements. (n.d.-a). *Nexus*. Retrieved October 10, 2026, from <https://www.bis.org/project/nexus>
- [14]. Bank for International Settlements. (n.d.-b). *Project Aurora*. Retrieved October 10, 2026, from <https://www.bis.org/about/bisih/topics/fimis/aurora.htm>
- [15]. Bank for International Settlements. (2021). CBDCs: An opportunity for the monetary system. In *Annual economic report 2021* (Chapter III). <https://www.bis.org/publ/arpdf/ar2021e3.htm>
- [16]. Bank for International Settlements. (2022). *Project mBridge: Connecting economies through CBDC*. <https://www.bis.org/publ/othp59.htm>
- [17]. Bank for International Settlements. (2024a, June 5). *Project mBridge reaches minimum viable product stage and invites further international participation* [Press release]. <https://www.bis.org/press/p240605.htm>
- [18]. Bank for International Settlements. (2024b). Artificial intelligence and the economy: Implications for central banks. In *Annual economic report 2024* (Chapter III). <https://www.bis.org/publ/arpdf/ar2024e3.htm>
- [19]. Bank for International Settlements. (2025). The next-generation monetary and financial system. In *Annual economic report 2025* (Chapter III). <https://www.bis.org/publ/arpdf/ar2025e3.htm>
- [20]. Bartlett, R., Morse, A., Stanton, R., & Wallace, N. (2022). Consumer-lending discrimination in the FinTech era. *Journal of Financial Economics*, 143(1), 30–56. <https://doi.org/10.1016/j.jfineco.2021.05.047>
- [21]. Beck, S., Pandey, A., DiCaprio, A., & Malaket, A. (2025). *ADB global trade finance gap survey* (ADB Briefs No. 378). Asian Development Bank. <https://doi.org/10.22617/BRF250557-2>
- [22]. Beck, S., Tayag, M. C., Kim, K., Latoja, M. C., Pandey, A., & Malaket, A. (2023). *2023 trade finance gaps, growth, and jobs survey* (ADB Briefs No. 256). Asian Development Bank. <https://doi.org/10.22617/BRF230334-2>
- [23]. Berg, T., Burg, V., Gombović, A., & Puri, M. (2020). On the rise of FinTechs: Credit scoring using digital footprints. *The Review of Financial Studies*, 33(7), 2845–2897. <https://doi.org/10.1093/rfs/hhz099>
- [24]. Berkowitz, B. (2024, November 30). *Trump threatens 100% tariffs on BRICS if they move away from the dollar*. Axios. <https://www.axios.com/2024/11/30/trump-tariffs-brics-dollar>
- [25]. Bernards, N. (2019). The poverty of fintech? Psychometrics, credit infrastructures, and the limits of financialization. *Review of International Political Economy*, 26(5), 815–838. <https://doi.org/10.1080/09692290.2019.1597753>
- [26]. Bernards, N. (2022). Colonial financial infrastructures and Kenya's uneven fintech boom. *Antipode*, 54(3), 708–728. <https://doi.org/10.1111/anti.12810>
- [27]. Bernards, N., & Campbell-Verduyn, M. (2019). Understanding technological change in global finance through infrastructures. *Review of International Political Economy*, 26(5), 773–789. <https://doi.org/10.1080/09692290.2019.1625420>
- [28]. BIIA. (2018, October 6). *PNB to exit India credit bureau of Experian*. <https://www.biaa.com/pnb-to-exit-india-credit-bureau-of-experian-2/>
- [29]. Björkegren, D., & Grissen, D. (2020). Behavior revealed in mobile phone usage predicts credit repayment. *The World Bank Economic Review*, 34(3), 618–634. <https://doi.org/10.1093/wber/lhz006>
- [30]. Blattner, L., & Nelson, S. (2021). *How costly is noise? Data and disparities in consumer credit* (arXiv:2105.07554). arXiv. <https://arxiv.org/abs/2105.07554>
- [31]. Board of Governors of the Federal Reserve System. (2026, April 17). *SR 26-2: Revised guidance on model risk management*. <https://www.federalreserve.gov/supervisionreg/srletters/SR2602.htm>
- [32]. Bradford, A. (2020). *The Brussels effect: How the European Union rules the world*. Oxford University Press. <https://doi.org/10.1093/oso/9780190088583.001.0001>
- [33]. Bradford, A. (2023). *Digital empires: The global battle to regulate technology*. Oxford University Press.
- [34]. Brailovskaya, V., Dupas, P., & Robinson, J. (2024). Is digital credit filling a hole or digging a hole? Evidence from Malawi. *The Economic Journal*, 134(658), 457–484. <https://doi.org/10.1093/ej/uead083>
- [35]. Brandl, B., & Dieterich, L. (2023). The exclusive nature of global payments infrastructures: The significance of major banks and the role of tech-driven companies. *Review of International Political Economy*, 30(2), 535–557. <https://doi.org/10.1080/09692290.2021.2016470>
- [36]. Bratton, B. H. (2015). *The stack: On software and sovereignty*. MIT Press. <https://doi.org/10.7551/mitpress/9780262029575.001.0001>
- [37]. Braun, B. (2020). Central banking and the infrastructural power of finance: The case of ECB support for repo and securitization markets. *Socio-Economic Review*, 18(2), 395–418. <https://doi.org/10.1093/ser/mwy008>
- [38]. Brevoort, K. P., Grimm, P., & Kambara, M. (2015). *Data point: Credit invisibles* (CFPB Office of Research Reports Series No. 15-1). Consumer Financial Protection Bureau. <https://www.consumerfinance.gov/data-research/research-reports/data-point-credit-invisibles/>
- [39]. Brunnermeier, M. K., James, H., & Landau, J.-P. (2019). *The digitalization of money* (NBER Working Paper No. 26300). National Bureau of Economic Research. <https://doi.org/10.3386/w26300>
- [40]. Business Standard. (2024, May 2). *NPCI inks pact with Bank of Namibia for developing UPI-like payment system*. https://www.business-standard.com/companies/news/npci-inks-pact-with-bank-of-namibia-for-developing-upi-like-payment-system-124050200443_1.html

- [41]. Caixin Global. (2018, May 28). *Launch of unified platform boots private firms from personal credit business*. <https://www.caixinglobal.com/2018-05-28/launch-of-unified-platform-boots-private-firms-from-personal-credit-business-101258187.html>
- [42]. Cambridge Centre for Alternative Finance. (2026). *2026 global AI in financial services report*. University of Cambridge Judge Business School. <https://jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/2026-global-ai-in-financial-services-report>
- [43]. Carvalho, J. (2025, November 10). *BC publica regras para o mercado de criptoativos e mantém permissão para auto custódia*. Capital Aberto. <https://capitalaberto.com.br/regulacao/2025/11/bc-publica-regras-para-criptoativos-e-mantem-a-auto-custodia>
- [44]. Case C-203/22, *CK v Dun & Bradstreet Austria GmbH*, ECLI:EU:C:2025:117 (Court of Justice of the European Union February 27, 2025).
- [45]. Case C-634/21, *OQ v Land Hessen (SCHUFA Holding)*, ECLI:EU:C:2023:957 (Court of Justice of the European Union December 7, 2023). <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:62021CJ0634>
- [46]. Chhangani, A. (2026, January 15). *What to watch as China prepares its digital yuan for prime time*. Atlantic Council. <https://www.atlanticcouncil.org/blogs/econographics/what-to-watch-as-china-prepares-its-digital-yuan-for-prime-time/>
- [47]. Citizen Digital. (2026, September 30). *CBK approves 29 more digital lenders*. <https://citizen.digital/article/cbk-approves-29-more-digital-lenders-n391183>
- [48]. Cohen, B. J. (1998). *The geography of money*. Cornell University Press.
- [49]. Cohen, B. J. (2015). *Currency power: Understanding monetary rivalry*. Princeton University Press.
- [50]. Committee on Payments and Market Infrastructures. (2023). *CPMI correspondent banking chartpack* [End-2022 data]. Bank for International Settlements. https://www.bis.org/cpmi/paysysinfo/corr_bank_data/chartpack_2305.pdf
- [51]. Consumer Financial Protection Bureau. (2024). Required rulemaking on personal financial data rights. *Federal Register*, 89, 90838. <https://www.govinfo.gov/content/pkg/FR-2024-11-18/html/2024-25079.htm>
- [52]. Consumer Financial Protection Bureau. (2025a, August 22). Personal financial data rights reconsideration [Advance notice of proposed rulemaking]. *Federal Register*. <https://www.federalregister.gov/documents/2025/08/22/2025-16139/personal-financial-data-rights-reconsideration>
- [53]. Consumer Financial Protection Bureau. (2025b, May 12). Interpretive rules, policy statements, and advisory opinions; withdrawal. *Federal Register*, 90, 20084. <https://www.federalregister.gov/documents/2025/05/12/2025-08286/interpretive-rules-policy-statements-and-advisory-opinions-withdrawal>
- [54]. Copestake, A., Kirti, D., & Martinez Peria, M. S. (2025). *Growing retail digital payments: The value of interoperability* (IMF Fintech Note No. 2025/004). International Monetary Fund. <https://doi.org/10.5089/9798229014250.063>
- [55]. Couldry, N., & Mejias, U. A. (2019). *The costs of connection: How data is colonizing human life and appropriating it for capitalism*. Stanford University Press.
- [56]. Council of the European Union. (2022). Council Regulation (EU) 2022/345 of 1 March 2022 amending Regulation (EU) No 833/2014 concerning restrictive measures in view of Russia's actions destabilising the situation in Ukraine. *Official Journal of the European Union*, L 63, 1–4. <https://eur-lex.europa.eu/eli/reg/2022/345/oj>
- [57]. Council of the European Union. (2026, April 6). [Presidency working document on the proposal for a regulation on a framework for financial data access] (WK 5041/2026). <https://data.consilium.europa.eu/doc/document/WK-5041-2026-INIT/en/pdf>
- [58]. Couture, S., & Toupin, S. (2019). What does the notion of "sovereignty" mean when referring to the digital? *New Media & Society*, 21(10), 2305–2322. <https://doi.org/10.1177/1461444819865984>
- [59]. Cyberspace Administration of China, Ministry of Industry and Information Technology, Ministry of Public Security, & State Administration for Market Regulation. (2021). *Provisions on the administration of algorithmic recommendation in internet information services* (China Law Translate, Trans.). <https://www.chinalawtranslate.com/en/algorithms/>
- [60]. Danielsson, J., Macrae, R., & Uthemann, A. (2022). Artificial intelligence and systemic risk. *Journal of Banking & Finance*, 140, Article 106290. <https://doi.org/10.1016/j.jbankfin.2021.106290>
- [61]. Davies, M. (2023, June 15). Correspondent banking in the South Pacific. *Reserve Bank of Australia Bulletin*. <https://www.rba.gov.au/publications/bulletin/2023/jun/correspondent-banking-in-the-south-pacific.html>
- [62]. de Goede, M., & Westermeier, C. (2022). Infrastructural geopolitics. *International Studies Quarterly*, 66(3), Article sqac033. <https://doi.org/10.1093/isq/sqac033>
- [63]. DeNardis, L. (2014). *The global war for internet governance*. Yale University Press.
- [64]. De Paula, L. F., Fritz, B., & Prates, D. M. (2017). Keynes at the periphery: Currency hierarchy and challenges for economic policy in emerging economies. *Journal of Post Keynesian Economics*, 40(2), 183–202. <https://doi.org/10.1080/01603477.2016.1252267>
- [65]. Ding, F. (2025, December 29). *China to allow interest on digital yuan in major overhaul*. Caixin Global. <https://www.caixinglobal.com/2025-12-29/china-to-allow-interest-on-digital-yuan-in-major-overhaul-102398302.html>
- [66]. Directive (EU) 2023/2225 of the European Parliament and of the Council of 18 October 2023 on credit agreements for consumers and repealing Directive 2008/48/EC. (2023). *Official Journal of the European Union*. <https://eur-lex.europa.eu/eli/dir/2023/2225/oj/eng>
- [67]. Donovan, K. P., & Park, E. (2022). Algorithmic intimacy: The data economy of predatory inclusion in Kenya. *Social Anthropology/Antropologie Sociale*, 30(2), 120–139. <https://doi.org/10.3167/saas.2022.300208>
- [68]. Drezner, D. W., Farrell, H., & Newman, A. L. (Eds.). (2021). *The uses and abuses of weaponized interdependence*. Brookings Institution Press.
- [69]. Eckstein, H. (1975). Case study and theory in political science. In F. I. Greenstein & N. W. Polsby (Eds.), *Handbook of political science: Vol. 7. Strategies of inquiry* (pp. 79–137). Addison-Wesley.
- [70]. Eichengreen, B., Nguyen, M. T., & Viswanath-Natraj, G. (2025). Stablecoin devaluation risk. *The European Journal of Finance*, 31(11), 1469–1496. <https://doi.org/10.1080/1351847X.2025.2505757>
- [71]. Entrackr. (2026, September 16). *PhonePe crosses 11 bn monthly UPI transactions in August, G Pay nears 8 bn*. <https://entrackr.com/news/phonepe-crosses-11-bn-monthly-upi-transactions-in-august-g-pay-nears-8-bn-12537408>
- [72]. Equifax. (2020, January 17). *Equifax signs share purchase agreement for its Indian subsidiary leading to 100% ownership* [Press release]. <https://investor.equifax.com/news-events/press-releases/detail/83/equifax-signs-share-purchase-agreement-for-its-indian>
- [73]. Erie, M. S., & Streinz, T. (2021). The Beijing effect: China's "Digital Silk Road" as transnational data governance. *New York University Journal of International Law and Politics*, 54(1), 1–92.
- [74]. European Central Bank. (2025, October 30). *Progress on the digital euro*. https://www.ecb.europa.eu/euro/digital_euro/progress/html/index.en.html
- [75]. European Commission. (2025, February 11). *EU launches InvestAI initiative to mobilise €200 billion of investment in artificial intelligence* [Press release IP/25/467]. https://ec.europa.eu/commission/presscorner/detail/en/ip_25_467

- [76]. European Commission. (2026). *AI factories*. Shaping Europe's Digital Future. Retrieved October 10, 2026, from <https://digital-strategy.ec.europa.eu/en/policies/ai-factories>
- [77]. Exec. Order No. 14178, 90 Fed. Reg. 8647 (2025). <https://www.federalregister.gov/documents/2025/01/31/2025-02123/strengthening-american-leadership-in-digital-financial-technology>
- [78]. Exec. Order No. 14320, 90 Fed. Reg. 35393 (2025). <https://www.federalregister.gov/documents/2025/07/28/2025-14218/promoting-the-export-of-the-american-ai-technology-stack>
- [79]. Farrell, H., & Newman, A. (2023). *Underground empire: How America weaponized the world economy*. Henry Holt and Company.
- [80]. Farrell, H., & Newman, A. L. (2019). Weaponized interdependence: How global economic networks shape state coercion. *International Security*, 44(1), 42–79. https://doi.org/10.1162/isec_a_00351
- [81]. Fernández Franco, S., Graña, J. M., & Rikap, C. (2024). Dependency in the digital age? The experience of Mercado Libre in Latin America. *Development and Change*, 55(3), 429–464. <https://doi.org/10.1111/dech.12839>
- [82]. Financial Stability Board. (2024, November 14). *The financial stability implications of artificial intelligence*. <https://www.fsb.org/2024/11/the-financial-stability-implications-of-artificial-intelligence/>
- [83]. Fourcade, M., & Healy, K. (2013). Classification situations: Life-chances in the neoliberal era. *Accounting, Organizations and Society*, 38(8), 559–572. <https://doi.org/10.1016/j.aos.2013.11.002>
- [84]. Fourcade, M., & Healy, K. (2017). Seeing like a market. *Socio-Economic Review*, 15(1), 9–29. <https://doi.org/10.1093/ser/mww033>
- [85]. FSD Kenya. (2024, August 5). *Launch of the findings on Kenya's credit market landscape study* [Press release]. <https://www.fsdkenya.org/wp-content/uploads/2024/08/Press-release-Launch-of-the-findings-on-Kenyas-credit-market-landscape-study-.pdf>
- [86]. Fuster, A., Goldsmith-Pinkham, P., Ramadorai, T., & Walther, A. (2022). Predictably unequal? The effects of machine learning on credit markets. *The Journal of Finance*, 77(1), 5–47. <https://doi.org/10.1111/jofi.13090>
- [87]. Gabor, D., & Brooks, S. (2017). The digital revolution in financial inclusion: International development in the fintech era. *New Political Economy*, 22(4), 423–436. <https://doi.org/10.1080/13563467.2017.1259298>
- [88]. Gambacorta, L., Huang, Y., Qiu, H., & Wang, J. (2024). How do machine learning and non-traditional data affect credit scoring? New evidence from a Chinese fintech firm. *Journal of Financial Stability*, 73, Article 101284. <https://doi.org/10.1016/j.jfs.2024.101284>
- [89]. George, A. L., & Bennett, A. (2005). *Case studies and theory development in the social sciences*. MIT Press.
- [90]. Gopinath, G., & Stein, J. C. (2021). Banking, trade, and the making of a dominant currency. *The Quarterly Journal of Economics*, 136(2), 783–830. <https://doi.org/10.1093/qje/qjaa036>
- [91]. Gruin, J., & Knaack, P. (2020). Not just another shadow bank: Chinese authoritarian capitalism and the 'developmental' promise of digital financial innovation. *New Political Economy*, 25(3), 370–387. <https://doi.org/10.1080/13563467.2018.1562437>
- [92]. Guiding and Establishing National Innovation for U.S. Stablecoins Act, Pub. L. No. 119-27, 139 Stat. 419 (2025). <https://www.govinfo.gov/app/details/PLAW-119publ27>
- [93]. Harithas, B. (2025, February 18). *The AI diffusion framework: Securing U.S. AI leadership while preempting strategic drift*. Center for Strategic and International Studies. <https://www.csis.org/analysis/ai-diffusion-framework-securing-us-ai-leadership-while-preempting-strategic-drift>
- [94]. Hong Kong Free Press. (2023, July 8). *China's Ant Group fined almost US\$1 billion as tech firms hit with hefty fines, crackdown draws to close*. <https://hongkongfp.com/2023/07/08/chinas-ant-group-fined-almost-us1-billion-as-tech-firms-hit-with-hefty-fines-crackdown-draws-to-close/>
- [95]. Huawei. (2025, September 18). *Groundbreaking SuperPoD interconnect: Leading a new paradigm for AI infrastructure*. <https://www.huawei.com/en/news/2025/9/he-xu-keynote-speech>
- [96]. Inc42. (2021, November 22). *RBI spots 600 illegal lending apps out of 1,100 available*. <https://inc42.com/buzz/rbi-spots-600-illegal-lending-apps-out-of-1100-available>
- [97]. InfoMoney. (2026, July). [Brazilian government note on the U.S. Section 301 action, shared by President Lula on 15 July 2026]. <https://www.infomoney.com.br/?p=3413084>
- [98]. International Finance Corporation. (2017). *MSME finance gap: Assessment of the shortfalls and opportunities in financing micro, small and medium enterprises in emerging markets*. <http://hdl.handle.net/10986/28881>
- [99]. International Monetary Fund. (n.d.). *Currency composition of official foreign exchange reserves (COFER)* [Data set]. Retrieved October 10, 2026, from <https://data.imf.org/en/datasets/IMF.STA:COFER>
- [100]. International Monetary Fund. (2025, December 19). *IMF data brief: Currency composition of official foreign exchange reserves*. <https://data.imf.org/en/news/imf-data-brief-december-19>
- [101]. International Monetary Fund. (2026, September 30). *IMF data brief: Currency composition of official foreign exchange reserves*. <https://data.imf.org/en/news/imf%20data%20brief%20september%2030>
- [102]. Invesco. (2026, February 26). *A weaker dollar fuels gold demand as sovereign investors embrace broader AI opportunity* [Press release]. <https://www.invesco.com/content/dam/invesco/uk/en/pdf/press/2026/weaker-dollar-fuels-gold-demand-26-feb-26.pdf>
- [103]. Jacob, S. (2025, April 1). *UPI clocks new record in value and volume in March after dip in Feb*. Business Standard. https://www.business-standard.com/finance/news/upi-value-hits-record-rs-24-77-trillion-in-march-marks-new-high-in-fy25-125040100744_1.html
- [104]. Jain, A. (2025, December 5). *Retail CBDC transactions hit 120 mn, value crosses ₹28,000 crore: RBI DG*. Business Standard. https://www.business-standard.com/finance/news/retail-cbdc-transactions-hit-120-mn-value-crosses-28-000-crore-rbi-dg-125120501178_1.html
- [105]. Jain, S., & Gabor, D. (2020). The rise of digital financialisation: The case of India. *New Political Economy*, 25(5), 813–828. <https://doi.org/10.1080/13563467.2019.1708879>
- [106]. Jappelli, T., & Pagano, M. (2002). Information sharing, lending and defaults: Cross-country evidence. *Journal of Banking & Finance*, 26(10), 2017–2045. [https://doi.org/10.1016/S0378-4266\(01\)00185-6](https://doi.org/10.1016/S0378-4266(01)00185-6)
- [107]. JunHe. (2021). [Legal update on the People's Bank of China Measures for the Administration of Credit Reporting Business]. <https://www.junhe.com/legal-updates/1892?locale=zh>
- [108]. *Justice K. S. Puttaswamy (Retd.) v. Union of India*, (2017) 10 SCC 1 (Supreme Court of India).
- [109]. Kaltenbrunner, A., & Paineira, J. P. (2018). Subordinated financial integration and financialisation in emerging capitalist economies: The Brazilian experience. *New Political Economy*, 23(3), 290–313. <https://doi.org/10.1080/13563467.2017.1349089>
- [110]. Kawale, A. (2024, June 5). *Peru to adopt UPI technology, first South American country to do so*. Business Standard. https://www.business-standard.com/finance/news/npci-central-reserve-bank-of-peru-ink-agreement-to-develop-upi-like-system-124060500690_1.html

- [111]. Kawale, A. (2025, October 6). *NBFCs, capital markets lead consents in account aggregator system*. Business Standard. https://www.business-standard.com/finance/news/nbfc-lead-account-aggregator-consents-in-fy25-with-60-share-125100600872_1.html
- [112]. Khaleej Times. (2025, July 7). *Trump vows extra 10% tariffs on countries aligning with 'anti-American' policies of BRICS*. <https://www.khaleejtimes.com/world/trump-tariffs-brics-rio-summit>
- [113]. Khera, R. (Ed.). (2019). *Dissent on Aadhaar: Big data meets big brother*. Orient BlackSwan.
- [114]. Kiviat, B. (2019). The moral limits of predictive practices: The case of credit-based insurance scores. *American Sociological Review*, 84(6), 1134–1158. <https://doi.org/10.1177/0003122419884917>
- [115]. Klapper, L., Singer, D., Starita, L., & Norris, A. (2025). *The Global Findex Database 2025: Connectivity and financial inclusion in the digital economy*. World Bank. <https://doi.org/10.1596/978-1-4648-2204-9>
- [116]. Kohli, C. (2025, December 2). *MeitY blocked 87 illegal lending apps under IT Act, reveals a Lok Sabha reply*. MediaNama. <https://www.medianama.com/2025/12/223-meity-87-illegal-lending-apps-it-act/>
- [117]. Krasner, S. D. (1999). *Sovereignty: Organized hypocrisy*. Princeton University Press.
- [118]. Kwet, M. (2019). Digital colonialism: US empire and the new imperialism in the Global South. *Race & Class*, 60(4), 3–26. <https://doi.org/10.1177/0306396818823172>
- [119]. Langley, P., & Leyshon, A. (2021). The platform political economy of FinTech: Reintermediation, consolidation and capitalisation. *New Political Economy*, 26(3), 376–388. <https://doi.org/10.1080/13563467.2020.1766432>
- [120]. Lehdonvirta, V., Wü, B., & Hawkins, Z. (2024). Compute North vs. Compute South: The uneven possibilities of compute-based AI governance around the globe. *Proceedings of the AAAI/ACM Conference on AI, Ethics, and Society*, 7(1), 828–838. <https://doi.org/10.1609/aies.v7i1.31683>
- [121]. Let's Money. (2026, August 27). *Open Finance entra em nova fase com desafio de governança*. <https://www.letsmoney.com.br/noticias/open-finance-208-milhoes-consentimentos-governanca/>
- [122]. Levy, J. S. (2008). Case studies: Types, designs, and logics of inference. *Conflict Management and Peace Science*, 25(1), 1–18. <https://doi.org/10.1080/07388940701860318>
- [123]. Liu, R. (2025, September 29). *China launches digital yuan international hub to spur cross-border use*. Caixin Global. <https://www.caixinglobal.com/2025-09-29/china-launches-digital-yuan-international-hub-to-spur-cross-border-use-102367502.html>
- [124]. Lobo, S. (2024, October 3). *National Payments Corporation of India to develop UPI-like payments system for Trinidad and Tobago*. MediaNama. <https://www.medianama.com/2024/10/223-npci-to-develop-upi-payments-system-for-trinidad-and-tobago/>
- [125]. Mader, P. (2018). Contesting financial inclusion. *Development and Change*, 49(2), 461–483. <https://doi.org/10.1111/dech.12368>
- [126]. Mann, M. (1984). The autonomous power of the state: Its origins, mechanisms and results. *European Journal of Sociology*, 25(2), 185–213. <https://doi.org/10.1017/S0003975600004239>
- [127]. Masiero, S. (2023). Digital identity as platform-mediated surveillance. *Big Data & Society*, 10(1), Article 20539517221135176. <https://doi.org/10.1177/20539517221135176>
- [128]. Masiero, S., & Arvidsson, V. (2021). Degenerative outcomes of digital identity platforms for development. *Information Systems Journal*, 31(6), 903–928. <https://doi.org/10.1111/isj.12351>
- [129]. McDowell, D. (2023). *Bucking the buck: US financial sanctions and the international backlash against the dollar*. Oxford University Press.
- [130]. Ministry of Electronics and Information Technology. (2025, November 13). *Digital Personal Data Protection Rules, 2025 (G.S.R. 846(E))*. Government of India. <https://www.meity.gov.in/static/uploads/2025/11/53450e6e5dc0bfa85ebd78686cadad39.pdf>
- [131]. Mondo Visione. (2026, July 9). *Digital euro: MEPs ready to start negotiations*. <https://mondovisione.com/news/digital-euro-meps-ready-to-start-negotiations-202679/>
- [132]. Mulder, N. (2022). *The economic weapon: The rise of sanctions as a tool of modern war*. Yale University Press.
- [133]. Muralidharan, K., Niehaus, P., & Sukhtankar, S. (2025). Identity verification standards in welfare programs: Experimental evidence from India. *The Review of Economics and Statistics*, 107(2), 372–392. https://doi.org/10.1162/rest_a_01296
- [134]. Murau, S., & van 't Klooster, J. (2023). Rethinking monetary sovereignty: The global credit money system and the state. *Perspectives on Politics*, 21(4), 1319–1336. <https://doi.org/10.1017/S153759272200127X>
- [135]. Nexus Global Payments. (2026, February 9). *Nexus Global Payments appoints technical operator* [Press release]. Business Wire. <https://www.businesswire.com/news/home/20260209818123/en/Nexus-Global-Payments-Appoints-Technical-Operator>
- [136]. Nicolaou, K. (2026, August 23). *Stablecoins could speed up dollarisation, IMF official warns*. Cyprus Mail. <https://cyprus-mail.com/2026/08/23/stablecoins-could-speed-up-dollarisation-imf-official-warns>
- [137]. Norrlof, C. (2014). Dollar hegemony: A power analysis. *Review of International Political Economy*, 21(5), 1042–1070. <https://doi.org/10.1080/09692290.2014.895773>
- [138]. Office of the United States Trade Representative. (2026a, June 4). Notice of determination and request for comments concerning action pursuant to Section 301: Brazil's acts, policies, and practices. *Federal Register* (Doc. 2026-11158). <https://www.federalregister.gov/documents/2026/06/04/2026-11158/notice-of-determination-and-request-for-comments-concerning-action-pursuant-to-section-301-brazils>
- [139]. Office of the United States Trade Representative. (2026b, July 15). *USTR Section 301 action on Brazil's unreasonable acts, policies, and practices* [Press release]. <https://ustr.gov/about/policy-offices/press-office/press-releases/2026/july/ustr-section-301-action-brazils-unreasonable-acts-policies-and-practices>
- [140]. Outlook Business. (2025, May 14). *Can digital push drive MSME boom while credit gap persists?* <https://www.outlookbusiness.com/industry/sidbi-msme-credit-gap-digital-lending>
- [141]. Oztas, B., Cetinkaya, D., Adedoyin, F., Budka, M., Aksu, G., & Dogan, H. (2024). Transaction monitoring in anti-money laundering: A qualitative analysis and points of view from industry. *Future Generation Computer Systems*, 159, 161–171. <https://doi.org/10.1016/j.future.2024.05.027>
- [142]. Panda, S. (2024, August 26). *RBI to launch Unified Lending Interface to transform lending space: Das*. Business Standard. https://www.business-standard.com/finance/news/rbi-to-launch-unified-lending-interface-to-transform-lending-space-das-124082600197_1.html
- [143]. Pandey, K. (2025, January 2). *NPCI extends UPI market share cap deadline to 2026, giving Google and PhonePe a two-year relief*. MediaNama. <https://www.medianama.com/2025/01/223-npci-extends-upi-market-share-cap-deadline-to-2026-google-phonepe-relief/>
- [144]. People's Bank of China. (2023, November). *Introduction to e-CNY* [Conference presentation]. International Monetary Fund. <https://imf.org/-/media/Files/Conferences/2023/11/sti-25th/e-cny-intro-imf.ashx>

- [145]. Personal Information Protection Law of the People's Republic of China. (2021). (DigiChina, Trans.). Stanford University. <https://digichina.stanford.edu/work/translation-personal-information-protection-law-of-the-peoples-republic-of-china-effective-nov-1-2021/>
- [146]. Petry, J. (2021). From national marketplaces to global providers of financial infrastructures: Exchanges, infrastructures and structural power in global finance. *New Political Economy*, 26(4), 574–597. <https://doi.org/10.1080/13563467.2020.1782368>
- [147]. Pohle, J., & Thiel, T. (2020). Digital sovereignty. *Internet Policy Review*, 9(4). <https://doi.org/10.14763/2020.4.1532>
- [148]. Poon, M. (2009). From New Deal institutions to capital markets: Commercial consumer risk scores and the making of subprime mortgage finance. *Accounting, Organizations and Society*, 34(5), 654–674. <https://doi.org/10.1016/j.aos.2009.02.003>
- [149]. Press Information Bureau. (2024, March 7). *Cabinet approves over Rs 10,300 crore for IndiaAI Mission, will empower AI startups and expand compute infrastructure access*. Government of India. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2012375>
- [150]. Press Information Bureau. (2026a, August 24). *UPI: Transforming India's payment landscape* [Backgrounder]. Government of India. <https://static.pib.gov.in/WriteReadData/specificdocs/documents/2026/aug/doc2026824968201.pdf>
- [151]. Press Information Bureau. (2026b, February 17). *India's AI moment: 20,000 additional GPUs power India's next phase of AI leadership* [Backgrounder]. Government of India. <https://static.pib.gov.in/WriteReadData/specificdocs/documents/2026/feb/doc2026217795001.pdf>
- [152]. Press Information Bureau. (2026c, July 29). *India strengthens global digital cooperation through digital public infrastructure partnerships with 24 countries*. Government of India. <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2291054>
- [153]. Prime Minister's Office. (2025, March 19). *Cabinet approves incentive scheme for promotion of low-value BHIM-UPI transactions (P2M)*. Government of India. https://pmindia.gov.in/en/news_updates/cabinet-approves-incentive-scheme-for-promotion-of-low-value-bhim-upi-transactions-p2m
- [154]. Quaglia, L., & Verdun, A. (2025). The geoeconomics of central banks digital currencies (CBDCs): The case of the European Central Bank (ECB). *New Political Economy*, 30(5), 639–651. <https://doi.org/10.1080/13563467.2025.2504390>
- [155]. Regulation (EU) 2023/1781 of the European Parliament and of the Council of 13 September 2023 establishing a framework of measures for strengthening Europe's semiconductor ecosystem (Chips Act). (2023). *Official Journal of the European Union*. <https://eur-lex.europa.eu/eli/reg/2023/1781/oj>
- [156]. Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence (Artificial Intelligence Act). (2024). *Official Journal of the European Union*, L series. <https://eur-lex.europa.eu/eli/reg/2024/1689/oj>
- [157]. Regulation (EU) 2026/1744 of 8 July 2026 amending Regulation (EU) 2024/1689 (Digital Omnibus on AI). (2026). *Official Journal of the European Union*. <https://eur-lex.europa.eu/eli/reg/2026/1744/oj>
- [158]. Reserve Bank of India. (2018, April 6). *Storage of payment system data* (RBI/2017-18/153). <https://www.rbi.org.in/Scripts/NotificationUser.aspx?Id=11244>
- [159]. Reserve Bank of India. (2022, October 7). *Concept note on central bank digital currency*. <https://rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=1218>
- [160]. Reserve Bank of India. (2023, August 14). *Reserve Bank of India to launch the pilot project for public tech platform for frictionless credit* [Press release]. https://www.rbi.org.in/scripts/BS_PressReleaseDisplay.aspx?prid=56200
- [161]. Reserve Bank of India. (2025a, August 13). *FREE-AI committee report: Framework for responsible and ethical enablement of artificial intelligence*. <https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=1306>
- [162]. Reserve Bank of India. (2025b, May 8). *Reserve Bank of India (Digital Lending) Directions, 2025* (RBI/2025-26/36). <https://www.rbi.org.in/scripts/NotificationUser.aspx?Id=12848>
- [163]. Reserve Bank of India. (2026, July 31). *Table 152: eRupee in circulation: e₹-Retail and e₹-Wholesale* [Data set]. In *Handbook of statistics on Indian economy*. <https://rbi.org.in/scripts/PublicationsView.aspx?id=23977>
- [164]. Reuters. (2022a, March 9). *Russian rouble weaker as inflation data eyed*. Malay Mail. <https://www.malaymail.com/news/money/2022/03/09/russian-rouble-weaker-as-inflation-data-eyed/2046442>
- [165]. Reuters. (2022b, June 29). *Rouble nears 50 against US dollar; first time since May 2015*. Business Today. <https://www.businesstoday.in/latest/world/story/rouble-nears-50-against-us-dollar-first-time-since-may-2015-339692-2022-06-29>
- [166]. Reuters. (2022c, March 13). *Sanctions have frozen around \$300 billion of Russian reserves, finance minister says*. The Tribune. <https://www.tribuneindia.com/news/world/sanctions-have-frozen-around-300-billion-of-russian-reserves-finance-minister-says-377494>
- [167]. Reuters. (2025, February 6). *Brazil's Galipolo sees surge in crypto use, says 90% of flow tied to stablecoins*. Yahoo Finance. <https://finance.yahoo.com/news/brazils-galipolo-sees-surge-crypto-191900953.html>
- [168]. Reviglio, U., & Agosti, C. (2020). Thinking outside the black-box: The case for "algorithmic sovereignty" in social media. *Social Media + Society*, 6(2). <https://doi.org/10.1177/2056305120915613>
- [169]. Rice, T., von Peter, G., & Boar, C. (2020, March). On the global retreat of correspondent banks. *BIS Quarterly Review*. https://www.bis.org/publ/qtrpdf/r_qt2003g.htm
- [170]. Rikap, C. (2024). Varieties of corporate innovation systems and their interplay with global and national systems: Amazon, Facebook, Google and Microsoft's strategies to produce and appropriate artificial intelligence. *Review of International Political Economy*, 31(6), 1735–1763. <https://doi.org/10.1080/09692290.2024.2365757>
- [171]. Rikap, C. (2026). 'Digital public infrastructure': Cultural hegemony and states' technological dependence. *Big Data & Society*, 13(3), Article 20539517261473384. <https://doi.org/10.1177/20539517261473384>
- [172]. Sahamati. (2026, July 21). *Varta: The Sahamati newsletter (June edition)*. <https://sahamati.org.in/varta-the-sahamati-newsletter-june-2026/>
- [173]. Sanghani, N. (2025, June 24). *Central banks turn to gold over the dollar*. OMFIF. <https://www.omfif.org/2025/06/central-banks-turn-to-gold-over-the-dollar/>
- [174]. Schneider, E., Glos, A., Gonzalez, J., & Peterson, M. (2026, July 15). *Europe's digital euro heads to last stage of negotiations: What Council and Parliament agree on, and where they still clash*. Freshfields Bruckhaus Deringer. <https://www.freshfields.com/en/our-thinking/blogs/technology-quotient/europes-digital-euro-heads-to-last-stage-of-negotiations-what-council-and-parl-102nbx6>
- [175]. Scott, J. C. (1998). *Seeing like a state: How certain schemes to improve the human condition have failed*. Yale University Press.
- [176]. Singh, R., & Jackson, S. J. (2021). Seeing like an infrastructure: Low-resolution citizens and the Aadhaar identification project. *Proceedings of the ACM on Human-Computer Interaction*, 5(CSCW2), Article 315. <https://doi.org/10.1145/3476056>
- [177]. State Council of the People's Republic of China. (2025, October 29). *China's digital RMB transactions top 14.2 trillion yuan*. https://english.www.gov.cn/archive/statistics/202510/29/content_WS6901a9c9c6d00ca5f9a0726a.html
- [178]. Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *The American Economic Review*, 71(3), 393–410.

- [179]. Strange, S. (1971). The politics of international currencies. *World Politics*, 23(2), 215–231. <https://doi.org/10.2307/2009676>
- [180]. Suri, T., Bharadwaj, P., & Jack, W. (2021). Fintech and household resilience to shocks: Evidence from digital loans in Kenya. *Journal of Development Economics*, 153, Article 102697. <https://doi.org/10.1016/j.jdevco.2021.102697>
- [181]. SWIFT. (2012, March 15). *SWIFT instructed to disconnect sanctioned Iranian banks following EU Council decision* [Press release]. <https://www.swift.com/insights/press-releases/swift-instructed-to-disconnect-sanctioned-iranian-banks-following-eu-council-decision>
- [182]. SWIFT. (2026a). *Annual review 2025*. https://www.swift.com/sites/default/files/files/2025-swift-annual-review_v08-1.pdf
- [183]. SWIFT. (2026b, September 17). *Global currency tracker* (September 2026 edition). <https://www.swift.com/swift-resource/252606/download>
- [184]. Synergy Research Group. (2025, July 24). *European cloud providers' local market share now holds steady at 15%*. <https://www.srgresearch.com/articles/european-cloud-providers-local-market-share-now-holds-steady-at-15>
- [185]. Synergy Research Group. (2026, July 30). *Q2 cloud market passes \$143 billion; highest growth rate in eight years*. <https://www.srgresearch.com/articles/q2-cloud-market-passes-143-billion-highest-growth-rate-in-eight-years>
- [186]. TASS. (2024, October 23). *BRICS states to study possibility of establishing BRICS Clear infrastructure: Declaration*. <https://tass.com/world/1860743>
- [187]. TASS. (2025, April 2). *Participants from 24 countries connected to Bank of Russia's financial messaging system*. <https://tass.com/economy/1937683>
- [188]. Taylor, K.-Y. (2019). *Race for profit: How banks and the real estate industry undermined Black homeownership*. University of North Carolina Press.
- [189]. The Asian Banker. (2017, October 26). *New FICO credit scores provide lenders opportunity to expand access to credit in India for nearly 350 million* [Press release]. <https://www.theasianbanker.com/press-releases/new-fico-credit-scores-provide-lenders-opportunity-to-expand-access-to-credit-in-india-for-nearly-350-million>
- [190]. The Brief. (2026, July). *Namibia becomes fourth African country to launch instant payments system*. <https://thebrief.com.ua/2026/07/namibia-becomes-fourth-african-country-to-launch-instant-payments-system/>
- [191]. The Global Treasurer. (2024, November 1). *Bank for International Settlements leaves Chinese CBDC project*. <https://www.theglobaltreasurer.com/2024/11/01/bank-for-international-settlements-leaves-chinese-cbdc-project/>
- [192]. The Standard. (2026, September 20). *Saudi Arabia withdraws from China-led mBridge digital currency project, FT reports*. <https://www.thestandard.com.hk/finance/article/343296/Saudi-Arabia-withdraws-from-China-led-mBridge-digital-currency-project-FT-reports>
- [193]. The White House. (2022, February 26). *Joint statement on further restrictive economic measures*. <https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2022/02/26/joint-statement-on-further-restrictive-economic-measures/>
- [194]. Tierno, P. (2026). *Stablecoin legislation: An overview of the GENIUS Act of 2025 (P.L. 119-27)* (CRS Insight No. IN12553). Congressional Research Service. <https://www.congress.gov/crs-product/IN12553>
- [195]. TransUnion. (2018). *Annual report on Form 10-K for the fiscal year ended December 31, 2017*. U.S. Securities and Exchange Commission. <https://www.sec.gov/Archives/edgar/data/1552033/000155203318000018/transunion-20171231x10k.htm>
- [196]. Ukrinform. (2022, June 14). *EU removes three more Russian banks from SWIFT*. <https://ukrinform.net/rubric-economy/3506578-eu-removes-three-more-russian-banks-from-swift.html>
- [197]. U.S. Department of Commerce. (2024, December 5). *Foreign-produced direct product rule additions, and refinements to controls for advanced computing and semiconductor manufacturing items*. *Federal Register* (Doc. 2024-28270). <https://www.federalregister.gov/documents/2024/12/05/2024-28270/foreign-produced-direct-product-rule-additions-and-refinements-to-controls-for-advanced-computing>
- [198]. U.S. Department of Commerce. (2025a, January 15). *Framework for artificial intelligence diffusion*. *Federal Register*, 90, 4544–4584. <https://www.federalregister.gov/documents/2025/01/15/2025-00636/framework-for-artificial-intelligence-diffusion>
- [199]. U.S. Department of Commerce. (2025b, May 13). *Department of Commerce announces rescission of Biden-era artificial intelligence diffusion rule, strengthens chip-related export controls* [Press release]. <https://www.bis.gov/press-release/departement-commerce-announces-rescission-biden-era-artificial-intelligence-diffusion-rule-strengthens>
- [200]. U.S. Department of Commerce. (2026, January 15). *Revision to license review policy for advanced computing commodities*. *Federal Register*, 91, 1684–1689. <https://www.federalregister.gov/documents/2026/01/15/2026-00789/revision-to-license-review-policy-for-advanced-computing-commodities>
- [201]. U.S. Department of the Treasury. (2022, February 28). *Treasury prohibits transactions with Central Bank of Russia and imposes sanctions on key sources of Russia's wealth* [Press release JY0612]. <https://home.treasury.gov/news/press-releases/jy0612>
- [202]. U.S. Department of the Treasury. (2025, July 18). *Statement from U.S. Secretary of the Treasury Scott Bessent on enactment of the GENIUS Act* [Press release SB0197]. <https://home.treasury.gov/news/press-releases/sb0197>
- [203]. Westermeier, C. (2020). Money is data – the platformization of financial transactions. *Information, Communication & Society*, 23(14), 2047–2063. <https://doi.org/10.1080/1369118X.2020.1770833>
- [204]. Widder, D. G., Whittaker, M., & West, S. M. (2024). Why 'open' AI systems are actually closed, and why this matters. *Nature*, 635(8040), 827–833. <https://doi.org/10.1038/s41586-024-08141-1>
- [205]. World Bank Group. (2015). *Withdrawal from correspondent banking: Where, why, and what to do about it*. World Bank. <http://hdl.handle.net/10986/23335>
- [206]. World Gold Council. (2017). *Gold demand trends: Full year 2016*. <https://www.gold.org/goldhub/research/gold-demand-trends/gold-demand-trends-full-year-2016>
- [207]. World Gold Council. (2020). *Gold demand trends: Full year 2019*. <https://www.gold.org/goldhub/research/gold-demand-trends/gold-demand-trends-full-year-2019>
- [208]. World Gold Council. (2024, January 31). *Gold demand trends: Full year 2023, central banks*. <https://www.gold.org/goldhub/research/gold-demand-trends/gold-demand-trends-full-year-2023/central-banks>
- [209]. World Gold Council. (2025). *Gold demand trends: Full year 2024*. <https://www.gold.org/goldhub/research/gold-demand-trends/gold-demand-trends-full-year-2024>
- [210]. World Gold Council. (2026, January 29). *Gold demand trends: Q4 and full year 2025*. <https://www.gold.org/goldhub/research/gold-demand-trends/gold-demand-trends-full-year-2025>
- [211]. Zhou, L. (2026, March 3). *MNCs drive expansion of China's CIPS*. China Daily. <https://enapp.chinadaily.com.cn/a/202603/03/AP69a642c1a310d93d63cc560d.html>