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BLOCKCHAIN IN THE AGENT ECONOMY: IDENTITY, AUTHORIZATION, AND MACHINE-TO-MACHINE SETTLEMENT

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ABSTRACT

Autonomous AI agents increasingly conduct economic transactions on behalf of individuals and organizations. This paper examines which payment architecture is most suitable for such transactions. Using a conceptual research design grounded in transaction cost economics, it separates agent based payments into three functions: identity, authorization, and settlement. It then compares delegated fiat, managed on chain, and native on chain architectures. The analysis shows that identity and authorization do not inherently require blockchain technology. Its distinctive contribution lies in enabling settlement through a shared ledger that is not controlled by a single institution. This feature is most valuable when multiple parties lack mutual trust and access to a common intermediary, when value can remain on chain, and when limited recourse is acceptable.A full cost comparison also challenges simple claims that blockchain settlement is inexpensive. Although public network fees may be low, total costs can be dominated by access, compliance, currency conversion, custody, liquidity and expected fraud losses. Evidence available through July 2026 remains promising but limited. Amazon Bedrock AgentCore Payments is still in preview, while x402 activity remains concentrated among a small number of facilitators and stablecoins. The most plausible institutional outcome is therefore the coexistence of conventional payment systems, managed blockchain services, native on chain settlement, and central bank digital currencies. The paper contributes a decision framework and research agenda rather than an empirical estimate of adoption.

Keywords: *agent economy, blockchain, transaction-cost economics, machine-to-machine settlement, stablecoins, central bank digital currency (CBDC), AI agents*

1. INTRODUCTION

Autonomous AI agents are software systems that plan and act in digital environments to achieve goals defined by human or organizational principals. They increasingly call external tools, purchase data or computational resources, and initiate economic transactions. Although these actions may be automated, their legal and economic consequences remain attributable to principals and service providers rather than to software as an independent legal entity. Rothschild et al. (2025) argue that the broader economic significance of this development may lie not only in productivity gains but also in reducing communication frictions among economic actors.

This development raises an institutional question that is often framed primarily as a technical one. AI agents can already make payments by using a principal's credentials within intermediated payment systems. The central issue is therefore not whether agents can pay, but which payment architecture is most appropriate for transactions that may be continuous, low value, executed at machine speed, and conducted between parties without a shared provider or prior relationship.

This paper does not argue that blockchain is necessary for agent mediated payments. Cards, bank transfers, stored value accounts, and instant payment systems will remain efficient for many transactions. The narrower claim is that permissionless blockchain provides a distinct institutional option: settlement through a shared ledger that is not controlled by a single bank, platform, or state issuer. Bitcoin demonstrated the feasibility of maintaining such a ledger over time (Nakamoto, 2008), while smart contract networks and stablecoins have expanded the scope for programmable payments. The economic value of this feature depends on the characteristics of the transaction rather than on the technology itself.

The analysis draws on transaction cost economics and institutional approaches to blockchain. Catalini and Gans (2020) conceptualize blockchain as a mechanism for reducing verification and networking costs, while Davidson, De Filippi, and Potts (2018) examine it as a form of governance technology. Nguyen Thanh, Son, and Vo (2024) consider blockchain as an institutional infrastructure for autonomous AI, and more recent studies address the emerging agent economy and its associated risks (Rothschild et al., 2025; Marino & Juels, 2025; Romandini et al., 2025).

The paper contributes a functional distinction among identity, authorization, and settlement and uses it to compare three payment architectures. Its central theoretical implication is that blockchain relevance is neither universal nor binary. Rather, it depends on the governance requirements, trust structure, and full transaction costs associated with a particular exchange.

The study combines conceptual analysis with a time specific assessment of early implementations. The evidence covers authorization protocols, the x402 payment stack, Amazon Bedrock AgentCore payments, public fee schedules, and independent security and transaction analyses. These examples demonstrate technical and institutional feasibility but should not be interpreted as evidence of representative adoption. The following section explains the research design and source selection process.

2. ANALYTICAL APPROACH AND SCOPE

Following Jaakkola's (2020) guidance that conceptual research should clearly define its theoretical foundation and analytical design, this study applies transaction cost economics to payments initiated by AI agents and synthesizes relevant institutional and technical evidence. Transaction cost economics provides the main explanatory framework by enabling payment architectures to be compared according to the costs of coordinating, verifying, executing, and governing exchange. The unit of analysis is a payment initiated or executed by an AI agent on behalf of a principal. Identity, authorization, and settlement are examined separately to prevent the characteristics of one function from being incorrectly attributed to another.

The analysis proceeds in four stages. First, it identifies the institution responsible for each payment function. Second, it classifies the payment architecture as delegated, managed on chain, or native on chain. Third, it compares total transaction costs across access, processing, liquidity, custody, compliance, and recourse rather than focusing solely on ledger fees. Fourth, it examines public implementations and fee schedules to assess whether the predicted tradeoffs are observable in practice. The resulting framework is conditional and does not seek to establish a universal ranking of payment architectures.

Cases were selected purposively to ensure analytical coverage and source verifiability. Visa, Mastercard, ACP, and AP2 represent delegated authorization models, while Amazon Bedrock AgentCore payments and x402 illustrate managed stablecoin settlement. Public blockchain documentation is used to identify the fee structures and control characteristics of native on chain systems. FedNow, FedACH, and TIPS demonstrate that conventional payment infrastructure can also provide rapid and low cost settlement.

The evidence therefore covers all three payment architectures and includes both private and public sector sources. The evidence cutoff date was July 25, 2026. Because the study does not use an original dataset, the cases establish technical feasibility and boundary conditions rather than representativeness, causal effects, adoption rates, or market share.

3. WHY INTERMEDIARIES EXIST, AND WHAT AGENTS CHANGE

Payment intermediaries exist because market exchange is costly. Coase (1937) identified the costs of discovering prices and negotiating and concluding contracts, while Williamson (1985) linked governance choice to transaction characteristics such as frequency, uncertainty, and asset specificity. In payment systems, intermediaries authenticate account holders, authorize instructions, verify funds, route messages, manage liquidity, allocate fraud losses, and provide recourse. Catalini and Gans (2020) describe part of this burden as verification cost, namely the cost of confirming the facts on which exchange depends.

In conventional commerce, a bundled merchant fee is often modest relative to the transaction value and covers more than settlement alone. Stripe, for example, publicly lists a United States domestic card processing fee of 2.9 percent plus USD 0.30. This is a merchant facing processing price rather than the marginal cost of the underlying settlement infrastructure (Stripe, 2026). Public infrastructure fees are much lower. In 2026, the Federal Reserve lists USD 0.045 for a FedNow customer credit transfer and USD 0.0035 for a standard FedACH origination item, while the Eurosystem lists EUR 0.002 for a TIPS instant payment, excluding participant systems and customer services (Federal Reserve Financial Services, 2026a, 2026b; European Central Bank, 2026b). These services are not directly available to retail users or AI agents. Access is limited to eligible institutions and qualifying payment service providers, so agents generally reach them through banks or other intermediaries (Federal Reserve Financial Services, 2026c; European Central Bank, 2024). Conventional settlement infrastructure can therefore be rapid and inexpensive even when access and retail services remain costly.

Agent activity changes the relevant transaction structure. Payments may occur repeatedly for individual API calls, be too small to absorb fixed merchant fees, and involve providers that do not share an account system. Conventional systems can address these conditions through batching, netting, prepaid balances, subscriptions, and instant payment rails. Such arrangements may be efficient when a platform can hold balances and allocate risk. The more difficult case arises when no platform connects all participants, cross border onboarding is costly, or parties do not wish to rely on a single operator as the universal gatekeeper.

4. THREE FUNCTIONS, AND WHERE BLOCKCHAIN CONTRIBUTES

The concept of agent payment combines at least three distinct functions: identity, authorization, and settlement. Identity establishes which technical or legal principal is acting. Authorization defines what that principal permits the agent to do. Settlement changes the monetary positions of the parties. Cryptography can support all three functions, but it is not synonymous with blockchain. A blockchain is one institutional arrangement for maintaining a shared state through distributed validation and consensus. The relevant question is therefore not whether cryptography is involved, but whether a particular function benefits from this form of shared ledger.

Identity does not generally require blockchain infrastructure. An agent can hold a cryptographic key pair and prove control of it without using a shared ledger, just as users and servers already authenticate themselves online. The W3C decentralized identifier standard likewise supports ledger based, web based, peer based, and key based methods (World Wide Web Consortium, 2022). More importantly, a cryptographic key or identifier authenticates a technical controller but does not independently establish legal identity, accountability, or the individual or organization that bears liability. These relationships usually depend on contracts, registries, and governance arrangements outside the ledger.

Authorization can also be implemented without blockchain. Visa Intelligent Commerce, Mastercard Agent Pay, the Agentic Commerce Protocol, and Google's Agent Payments Protocol describe mechanisms such as scoped mandates, evidence of buyer intent, and revocable permissions operating through conventional payment systems (Visa, 2025; Mastercard, 2025; Stripe & OpenAI, 2025; Google, 2025). Because these initiatives were announced or introduced during 2025, they should be regarded as emerging infrastructure rather than mature empirical benchmarks. Nevertheless, they demonstrate that enabling an agent to spend within the limits established by a principal is fundamentally an authorization problem and does not logically require on chain settlement.

Settlement is the function for which a permissionless ledger offers the most distinctive institutional arrangement. However, transfer, clearing, and settlement must be distinguished. Transfer refers to the payment instruction, clearing determines the resulting obligations, and settlement discharges those obligations. Banks and central bank payment systems perform all three functions without blockchain. A permissionless blockchain differs by maintaining the settlement state according to protocol rules rather than on the books of a single institution.

Control of a private key may allow an agent to sign transactions from an address, but it does not imply that the agent legally owns assets in its own name or possesses independent legal personality. Stablecoins also introduce an additional governance layer. USDC, for example, represents a liability of its issuer, while Circle retains the authority to block addresses and freeze or restrict redemption under specified conditions (Circle, 2026). Consequently, the underlying ledger may be permissionless even when the asset, wallet, sequencer, facilitator, or fiat gateway remains subject to centralized control.

Blockchain's specific contribution is therefore operator independent recordkeeping at the settlement layer. It does not inherently provide legal identity, authorization, monetary denomination, regulatory compliance, or recourse. This settlement property may nevertheless be valuable when participants can change wallets, facilitators, or service providers while continuing to transact through a common ledger. It should not, however, be interpreted as eliminating all intermediaries or all institutional points of control.

5. WHEN ON-CHAIN SETTLEMENT IS ADVANTAGEOUS

An AI agent can access a payment rail through three stylized architectures. Under delegated settlement, the agent acts within a principal's mandate while an intermediary debits a card, bank account, or stored value balance. Under managed on chain settlement, a wallet provider, custodian, or payment facilitator controls transaction execution and settles a stablecoin on a blockchain. Under native on chain settlement, software controls the signing key subject to policies established by the principal and submits transactions without relying on a custodial facilitator. These categories represent governance arrangements rather than sequential stages of technological development, and practical systems may combine elements of more than one architecture.

Two variables organize the central comparison: the number of transacting parties and

the availability of a common trusted intermediary. These variables are not sufficient by themselves. Architecture choice also depends on transaction frequency and value, jurisdiction, onboarding requirements, liquidity and foreign exchange needs, confidentiality, liability allocation, and the importance of ex post recourse. When relatively few parties transact through a trusted operator, delegated payment will often minimize total cost. As the number and heterogeneity of participants increase, and as reliance on a common operator becomes difficult or undesirable, managed or native on chain settlement becomes a plausible alternative rather than an automatic default.

The comparison must therefore consider the cost of the complete transaction rather than settlement fees alone. In this study, total transaction cost includes access and onboarding, identity and authorization, payment processing, clearing and settlement, liquidity, foreign exchange and fiat conversion, custody and key security, compliance and reporting, and expected losses arising from fraud, error, disputes, and limited recourse. A low network fee addresses only one part of this cost structure. Conversely, card and managed payment prices may bundle several services that a native wallet must obtain separately. Protocol openness also does not eliminate the need for regulated onboarding through an exchange, stablecoin issuer, wallet provider, or merchant.

Table 1. Conceptual transaction-cost decision framework for agent-payment architectures

Dimension	Delegated payment	Managed on-chain	Native on-chain
Access	Principal and merchant use a bank, card, or platform relationship	Provider supplies wallet, policy, and settlement access	Principal provisions a software-controlled key or smart account; RPC or paymaster services may remain
Authorization	Mandate enforced by issuer, network, merchant, or platform	Mandate enforced by agent platform and wallet/facilitator	Mandate enforced in software, smart account, or contract policy
Settlement control	Bank, network, or platform ledger and governance	Public ledger underneath; provider controls custody, transaction submission, or access policy	Public ledger; no custodial facilitator is required, although RPC, paymaster, or sequencer services may remain
Recourse	Potential disputes, reversals, and allocated liability	Service-level limits or remedies; ledger transfer usually final	Limited ledger-level recourse; principal bears key and policy risk
Best fit	Known parties, common intermediary, fiat endpoints, high value of recourse	Cross-platform programmatic payment needing enterprise controls	Many parties without common operator; value stays on-chain; recourse less valuable
Main hidden cost	Onboarding, merchant pricing, cross-border reach, platform lock-in	Custody, screening, conversion, provider concentration, issuer control	Key security, infrastructure dependencies, compliance, liquidity, privacy, error and fraud losses

Note: The columns are ideal types. Actual systems may combine elements of more than one architecture

Source: Authors' own elaboration

Table 2 does not compare interchangeable end-to-end agent-payment products. It decomposes public prices at different layers of the payment stack. Stripe lists 1.5 percent for stablecoin checkout and explicitly includes fiat conversion, wallet and anti-money-laundering screening, fraud prevention, and gas sponsorship (Stripe, 2026). An agent cannot connect directly to FedNow, FedACH, or TIPS and must use an eligible institution or payment service provider. Conversely, protocol access on Base, Solana, or Ethereum does not supply compliance, stablecoin issuance, custody, conversion, or recourse. In a managed on-chain system, wallet and facilitator costs sit above gas, just as bank or payment-service-provider costs sit above central-bank settlement. At the protocol layer, Base

charges an L2 execution fee plus an L1 security fee; Solana charges 5,000 lamports, equal to 0.000005 SOL, per signature plus an optional priority fee; and Ethereum fees vary with gas used and network demand (Base, 2026; Solana Foundation, 2026; CoinCodex, 2026; Ethereum Foundation, 2026). These figures are dated parameters or public list prices, not evidence that every user can achieve them end to end.

Table 2. Illustrative public prices and access conditions at different payment-stack layers, July 2026

Example	Published price or parameter	What the figure covers	Direct access / eligibility
Stripe domestic card (US)	2.9% + USD 0.30 per successful domestic-card transaction	Merchant-facing processing product; includes more than the underlying settlement rail.	Merchants and platforms through Stripe's API; an agent acts through an authorized customer or merchant integration.
Stripe stablecoin checkout	1.5% of the USD transaction amount	Includes fiat conversion, wallet/AML screening, fraud prevention, and gas sponsorship.	Eligible merchants through Stripe; a managed service, not native protocol access.
FedNow / FedACH	FedNow: USD 0.045 per credit transfer, offset for the first 2,500 monthly transfers in 2026. FedACH: USD 0.0035 per standard origination item.	Central infrastructure or operator-to-participant prices; exclude participant systems, customer service, and integration.	Eligible institutions, or service providers acting for them; no direct agent or retail access.
TIPS	EUR 0.002 per instant transaction, shared between sending and receiving participants	Central-bank infrastructure price; monthly account-holder charges also apply.	Eligible credit institutions and qualifying PSPs; agents and merchants use a bank or PSP interface.
Base	Minimum L2 base fee: 0.005 gwei. Base illustrates about USD 0.002 for 200,000 gas at ETH = USD 2,000, plus the L1 security fee.	Network execution and data/security components only; actual price varies with gas, demand, and ETH.	Protocol-level access with a wallet or key and fee funding or sponsorship; asset, wallet, and sequencer controls may remain.
Solana / Ethereum	Solana: 5,000 lamports = 0.000005 SOL per signature, about USD 0.00037 using the July 25, 2026 daily opening price of SOL = USD 73.96, plus an optional priority fee. Ethereum: gas used × (base + priority fee).	Protocol fees only; USD cost varies with SOL/ETH and demand; excludes wallet, stablecoin, conversion, compliance, and recourse.	Protocol-level access with a key and fee funding or sponsorship; service and asset controls may remain.

Note: The rows are not interchangeable end-to-end alternatives. They decompose prices at different layers of the payment stack. Central-bank fees exclude the bank or PSP interface through which an agent would gain access; blockchain protocol fees exclude wallet, stablecoin, facilitator, compliance, conversion, and recourse costs. The Solana dollar value is an illustrative calculation using CoinCodex's July 25, 2026 daily opening price and will change with SOL/USD.

Source: Authors' compilation based on Stripe (2026), Federal Reserve Financial Services (2026a, 2026b), European Central Bank (2026b), Base (2026), Solana Foundation (2026), Ethereum Foundation (2026), and CoinCodex (2026).

Recourse is the institutional counterpart of settlement finality. Delegated payment systems can offer dispute procedures, transaction reversals, and a contractual counterparty responsible for specified losses. Native on chain transfers, by contrast, are generally irreversible at the ledger level. A mistaken, deceived, or compromised agent may therefore expose its principal to losses without access to a chargeback mechanism. Managed services can introduce spending limits, transaction screening, custody controls, and contractual remedies, but these protections arise from service governance rather than from the blockchain itself. Marino and Juels (2025) similarly identify mistaken transfers, theft by malicious or mis-

aligned agents, and the irreversibility of resulting losses as important sources of harm.

On chain settlement is therefore most attractive under a specific set of conditions. It becomes more plausible when many parties lack both mutual trust and a common intermediary, when transactions are sufficiently frequent or low in value that individual onboarding and billing are costly, when value can remain on chain so that conversion costs do not dominate, when transparency and settlement finality are acceptable, and when the principal can absorb or mitigate the consequences of limited recourse.

Managed on chain settlement is likely to be more suitable for early enterprise adoption because it preserves policy controls, compliance mechanisms, and contractual accountability. Native on chain settlement provides the clearest test of blockchain's institutional value, but it also creates the greatest exposure to key management, security, operational, and liability risks.

6. EVIDENCE, LIMITATIONS, AND EARLY IMPLEMENTATIONS

The preceding sections develop a conceptual framework. Evidence available through July 2026 can demonstrate feasibility and illustrate institutional design, but it cannot establish causal cost savings or representative adoption. Vendor documentation is used to describe product architecture and public pricing, while independent research is used, where available, to assess transaction activity and security. Because the field is evolving rapidly, all implementation claims should be interpreted as a dated snapshot.

Amazon Bedrock AgentCore payments provides an instructive example of managed on chain settlement. However, it was announced in May 2026 as a preview rather than as a production system operating at established scale (Amazon Web Services, 2026). The preview supports x402 and allows users to connect Coinbase or Stripe Privy wallet infrastructure, authorize wallet access, and impose session spending limits. AWS itself acknowledges that agent payment infrastructure at scale does not yet exist. The example therefore demonstrates technical integration and governance design rather than market validation or a reliable cost benchmark.

The x402 stack also illustrates the relocation rather than elimination of intermediation (Reppel et al., 2025). A resource server issues an HTTP 402 payment request, the client submits payment authorization, and a facilitator verifies and settles the transaction according to the selected scheme. The protocol can support multiple networks and facilitators, making the access layer more contestable than a closed proprietary ledger. In practice, however, Ling et al. (2026) report that three facilitators processed approximately 71 percent of observed activity by mid May 2026. Neutral settlement at one layer can therefore coexist with concentration at another.

Claims about scale require similar caution. Ling et al. (2026) report approximately 130 million cumulative x402 transactions through May 2026. Base accounted for about 54 percent of activity, Solana for 35 percent, and Polygon for 10 percent, while USDC represented 98.8 percent of dollar denominated volume on EVM networks. Monthly transaction counts peaked in late 2025 before declining. These figures demonstrate real protocol use, but they do not reveal how much activity reflects autonomous economic demand rather than testing, incentives, bots, or other automated traffic.

At the broader stablecoin level, McKinsey and Artemis estimate approximately USD 390 billion in annualized payment activity based on December 2025 data, equivalent to about 0.02 percent of global payments (McKinsey & Company, 2026). This estimate depends partly on transaction tagging and category assumptions and is not specific to AI agents. The available evidence therefore does not support a precise estimate of the share of genuine agent initiated payments.

The infrastructure is also not secure by default. Ling et al. (2026) identify cross resource substitution, duplicate settlement races, allowance overdraft, and denial of settlement vulnerabilities across protocol, software, and deployment layers. More broadly, agents that control keys or delegated authority remain exposed to prompt injection, misdirected transfers, excessive permissions, and privacy leakage through transaction graphs (Marino & Juels, 2025; Romandini et al., 2025). Concentration among facilitators and stablecoin issuers creates further operational and governance risks even when the underlying ledger remains open.

Bitcoin based machine payments are technically feasible, although the evidence is more limited in this context. Lightning Labs' L402 combines HTTP access credentials with Bitcoin Lightning payments and is designed for APIs and digital services that software agents can purchase (Lightning Labs, 2026). Routing fees vary according to channel structure and liquidity conditions, and no comparable independent dataset establishes agent specific adoption. L402 is therefore treated as evidence of technical possibility rather than as a basis for comparative adoption claims.

Taken together, the evidence supports the feasibility of agent initiated payments and demonstrates early institutional experimentation across several architectures. It does not yet establish comparative welfare effects, causal cost advantages, representative adoption, or the emergence of a dominant payment architecture.

7. GOVERNANCE, REGULATION, AND THE CONTROL OF MONEY

Governance in agent payment systems is distributed across multiple layers. The ledger determines transaction ordering and technical finality. A stablecoin issuer governs issuance, redemption, and address restrictions. A sequencer or validator set influences transaction availability and ordering. Wallet providers and facilitators control access, policy enforcement, and transaction execution, while banks and exchanges govern entry into and exit from fiat currency. Describing a payment as on chain therefore does not identify who can exclude a participant, freeze an asset, allocate a loss, or satisfy a legal claim. These functions must be mapped separately for each payment architecture.

A digital euro would represent a different institutional arrangement, but its current design requires careful distinction. The European Central Bank states that the digital euro would operate through a centralized settlement platform rather than distributed ledger technology. It would not constitute programmable money, although conditional payments could be supported through payment service providers. The ECB aims to be prepared for a possible first issuance during 2029, subject to the adoption of the necessary legislation (European Central Bank, 2026a). Coexistence should therefore not be understood as the emergence of a single programmable settlement ledger. A more plausible outcome is a set of parallel and potentially interoperable payment rails comprising commercial bank money, central bank digital money, issuer backed stablecoins, and permissionless crypto assets, each governed by different control, access, and liability arrangements.

Regulation directly affects the transaction costs of agent payments. Know your customer and anti money laundering obligations, sanctions screening, data protection, consumer protection, licensing, tax reporting, and operational resilience requirements determine which institutions may provide wallets, payment access, and settlement services. Liability is particularly important because an AI agent normally acts as a tool of a human or organizational principal. Contracts and legal rules must therefore specify who bears losses when an agent exceeds its mandate, is manipulated, or pays a merchant that fails to deliver.

Consumer payments that require reversibility and dispute resolution may consequently need different governance arrangements from wholesale machine to machine settlement.

This paper does not attempt to resolve these legal issues. Instead, it treats them as institutional cost variables that must be incorporated into any empirical comparison of agent payment architectures.

8. CONCLUSION

This paper advances a deliberately bounded theoretical claim. Blockchain is not necessary for agent identity or authorization, nor is it inherently a superior payment technology. Its distinctive contribution lies in providing a shared settlement record that does not depend on the ledger of a single institution. This property becomes economically relevant when many heterogeneous parties lack a common trusted intermediary, value can remain on chain, and reductions in onboarding or networking costs exceed the additional costs of conversion, compliance, security, and limited recourse. Where these conditions are absent, delegated bank or card payments, or another governed payment rail, may minimize total transaction costs.

The paper's main contribution is the functional decomposition of agent payments into identity, authorization, and settlement, combined with the comparison of delegated, managed on chain, and native on chain architectures. This framework transforms the broad question of whether the agent economy requires blockchain into a sequence of analytically testable choices. These include identifying the function being performed, determining who governs each layer, distinguishing bundled from externalized costs, assessing whether participants share a trusted intermediary, establishing whether value must cross the fiat boundary, and specifying who bears losses arising from error, fraud, or manipulation.

Evidence available through July 2026 demonstrates the feasibility of managed on chain infrastructure, but it also reveals facilitator concentration, security vulnerabilities, issuer control, and insufficient data to distinguish genuine autonomous demand from testing, bots, incentives, and speculative activity. The current evidence therefore does not support claims of superior welfare, broad adoption, or the emergence of a dominant architecture.

Future research should measure complete transaction costs for comparable agent payment tasks across delegated, managed on chain, and native on chain systems. It should distinguish agent initiated commerce from automated testing and speculative traffic, examine how batching and prepaid balances affect micropayment economics, compare fraud, error, and dispute rates, and assess concentration among wallets, facilitators, sequencers, and stablecoin issuers. Legal and organizational research should also examine how mandates, accountability, and liability are allocated when agents transact across jurisdictions.

A further theoretical boundary case concerns advanced AI systems, including possible artificial general intelligence, that operate with substantially greater autonomy and cannot rely on a principal's continuously available account. Such systems could create stronger demand for native and programmable settlement, while intensifying unresolved questions concerning control, ownership, accountability, and liability. This remains a hypothesis for future research and should not be interpreted as evidence that uncontrollable artificial general intelligence exists or that blockchain would necessarily be required.

The most plausible near term outcome is therefore institutional coexistence. Delegated payment systems, managed blockchain services, native on chain settlement, and central bank digital currencies are likely to serve different transaction types. Architecture will be selected according to the governance and cost characteristics of each transaction rather than through a single technological verdict.

REFERENCES

Amazon Web Services. (2026, May 7). Agents that transact: Introducing Amazon Bedrock AgentCore payments, built with Coinbase and Stripe. *AWS Machine Learning Blog*. Retrieved July 25, 2026, from https://aws.amazon.com/blogs/machine-learning/agents-that-transact-introducing-amazon-bedrock-agentcore-payments-built-with-coinbase-and-stripe/

Base. (2026). Network fees. Base Documentation. Retrieved July 25, 2026, from https://docs.base.org/base-chain/network-information/network-fees

Catalini, C., & Gans, J. S. (2020). Some simple economics of the blockchain. *Communications of the ACM*, 63(7), 80–90. https://doi.org/10.1145/3359552

Circle Internet Group. (2026). USDC terms. Retrieved July 25, 2026, from https://www.circle.com/legal/usdc-terms

CoinCodex. (2026). Solana (SOL) historical data. Retrieved July 28, 2026, from https://coincodex.com/crypto/solana/historical-data/

Coase, R. H. (1937). The nature of the firm. Economica, 4(16), 386–405. https://doi.org/10.1111/j.1468-0335.1937.tb00002.x

Davidson, S., De Filippi, P., & Potts, J. (2018). Blockchains and the economic institutions of capitalism. *Journal of Institutional Economics,* 14(4), 639–658. https://doi.org/10.1017/S1744137417000200

Ethereum Foundation. (2026). Ethereum gas and fees: Technical overview. Retrieved July 25, 2026, from https://ethereum.org/developers/docs/gas/

European Central Bank. (2024). Policy on access by non-bank payment service providers to central bank-operated payment systems and to central bank accounts. https://www.ecb.europa.eu/paym/target/target-professional-use-documents-links/tips/shared/pdf/Eurosys_pol_on_access_to_central_bank_operated_payment_systems_by_NBPSPs.pdf

European Central Bank. (2026a). FAQs on the digital euro. Retrieved July 25, 2026, from https://www.ecb.europa.eu/euro/digital_euro/faqs/html/ecb.faq_digital_euro.en.html

European Central Bank. (2026b). What is TIPS? Retrieved July 25, 2026, from https://www.ecb.europa.eu/paym/target/tips/html/index.en.html

Federal Reserve Financial Services. (2026a). FedACH Services 2026 fee schedule. Retrieved July 25, 2026, from https://www.frbservices.org/resources/fees/ach-2026

Federal Reserve Financial Services. (2026b). FedNow Service 2026 fee schedule. Retrieved July 25, 2026, from https://www.frbservices.org/resources/fees/fednow-2026

Federal Reserve Financial Services. (2026c). Payment processors and third-party service providers. Retrieved July 25, 2026, from https://www.frbservices.org/resources/service-setup/payment-processors-third-party-service-providers

Google. (2025). Agent Payments Protocol (AP2) [GitHub repository]. Retrieved July 25, 2026, from https://github.com/google-agentic-commerce/AP2

Jaakkola, E. (2020). Designing conceptual articles: Four approaches. *AMS Review*, 10, 18–26. https://doi.org/10.1007/s13162-020-00161-0

Lightning Labs. (2026). L402: Lightning HTTP 402 protocol. Retrieved July 25, 2026, from https://docs.lightning.engineering/the-lightning-network/l402

Ling, S., Huang, Y., Du, Y., Chen, Y., Zhou, Y., Wu, L., & Wang, C. (2026). Free-riding the agentic web: A systematic security analysis of x402 payments. arXiv:2605.30998v2. https://doi.org/10.48550/arXiv.2605.30998

Marino, B., & Juels, A. (2025). Giving AI agents access to cryptocurrency and smart contracts creates new vectors of AI harm. arXiv:2507.08249. https://arxiv.org/abs/2507.08249

Mastercard. (2025, April 29). Mastercard unveils Agent Pay, pioneering agentic payments technology to power commerce in the age of AI [Press release]. Retrieved July 25, 2026, from https://www.mastercard.com/us/en/news-and-trends/press/2025/april/mastercard-unveils-agent-pay-pioneering-agentic-payments-technology-to-power-commerce-in-the-age-of-ai.html

McKinsey & Company. (2026, February 18). Stablecoins in payments: What the raw transaction numbers miss. Retrieved July 25, 2026, from https://www.mckinsey.com/industries/financial-services/our-insights/stablecoins-in-payments-what-the-raw-transaction-numbers-miss

Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system. https://bitcoin.org/bitcoin.pdf

Nguyen Thanh, B., Son, H. X., & Vo, D. T. H. (2024). Blockchain: The economic and financial institution for autonomous AI? *Journal of Risk and Financial Management*, 17(2), 54. https://doi.org/10.3390/jrfm17020054

Reppel, E., Caspers, R., Leffew, K., Organ, D., Kim, D., & Dalal, N. (2025). x402: An open standard for internet-native payments [Whitepaper]. Coinbase Developer Platform. https://www.x402.org/x402-whitepaper.pdf

Romandini, N., Mazzocca, C., Otsuki, K., & Montanari, R. (2025). SoK: Security and privacy of AI agents for blockchain. In 2025 7th International Conference on Blockchain Computing and Applications (BCCA) (pp. 708–720). IEEE. https://doi.org/10.1109/BCCA66705.2025.11229689

Rothschild, D. M., Mobius, M., Hofman, J. M., Dillon, E. W., Goldstein, D. G., Immorlica, N., Jaffe, S., Lucier, B., Slivkins, A., & Vogel, M. (2025). The agentic economy. arXiv:2505.15799. https://arxiv.org/abs/2505.15799

Solana Foundation. (2026). Fees. Solana Documentation. Retrieved July 25, 2026, from https://solana.com/docs/core/fees

Stripe, & OpenAI. (2025). Agentic Commerce Protocol (ACP). Retrieved July 25, 2026, from https://www.agenticcommerce.dev/

Stripe. (2026). Local payment methods pricing [United States]. Retrieved July 25, 2026, from https://stripe.com/pricing/local-payment-methods

Visa. (2025, April 30). The future is here: Visa announces new era of commerce featuring AI [Press release]. Retrieved July 25, 2026, from https://usa.visa.com/about-visa/newsroom/press-releases.releaseId.21361.html

Williamson, O. E. (1985). The economic institutions of capitalism: Firms, markets, relational contracting. Free Press. https://www.simonandschuster.com/books/The-Economic-Intstitutions-of-Capitalism/Oliver-E-Williamson/9780684863740

World Wide Web Consortium. (2022). Decentralized identifiers (DIDs) v1.0. W3C Recommendation. https://www.w3.org/TR/did-core/