Equilibrium. Quarterly Journal of Economics and Economic Policy
Volume 20 Issue 4 December 2025
p-ISSN 1689-765X, e-ISSN 2353-3293
www.economic-policy.pl

EDITORIAL

Citation: Chatterjee, S., Musa, H., & Kliestik, T. (2025). Blockchain-based financial systems: Trust, transparency, and the future of decentralized finance. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, *20*(4), 1247–1256. https://doi.org/10.24136/eq.4048

Contact to corresponding author: Tomas Kliestik, tomas.kliestik@uniza.sk

Article history: Received: 25.11.2025; Accepted: 20.12.2025; Published online: 30.12.2025

Sheshadri Chatterjee
Indian Institute of Information Technology, India
orcid.org/0000-0003-1075-5549

Hussam Musa
Matej Bel University in Banská Bystrica, Slovakia
orcid.org/0000-0002-4492-8770

Tomas Kliestik
University of Zilina, Slovakia
orcid.org/0000-0002-3815-5409

Blockchain-based financial systems: Trust, transparency, and the future of decentralized finance

Blockchain technology is increasingly recognized as one of the most transformative innovations in contemporary finance (Andronie *et al*., 2024). By embedding verification, trust, and transparency into decentralized digital infrastructures, it challenges conventional assumptions regarding the organization, regulation, and governance of financial systems (Turek *et al*., 2023; Balcerzak & Valaskova, 2024). The conceptual foundations and practical implications of blockchain-based financial systems are examined, with particular emphasis on three interrelated dimensions: the reconfiguration of trust, the emergence of transparency as a systemic attribute, and the evolving architecture of decentralized finance (Lăzăroiu *et al*., 2023; Chen *et al*., 2025; Waliszewski *et al*., 2024; Kliestik *et al*., 2024). The analyses demon-

strate that blockchain represents a paradigm shift in the social and institutional logic of financial intermediation (see Javaid *et al.,* 2022; Marikyan *et al.,* 2022 or Prokopenko *et al.,* 2024). Realizing its transformative potential requires reconciling decentralization with accountability, openness with privacy, and innovation with regulatory stability.

Reconfiguring trust in blockchain-based financial systems

Trust is a fundamental prerequisite for all economic exchange. Traditional financial systems establish trust through centralized institutions such as banks, clearinghouses, and regulatory authorities, which function as guarantors of transaction validity and enforcers of contractual obligations (Javaid *et al.,* 2022). Their legitimacy derives from legal, historical, and reputational foundations, allowing them to mediate risk and uncertainty on behalf of participants. However, this institutional model is also characterized by inefficiency, opacity, and dependency, as individuals and organizations must continually rely on third parties to verify, process, and secure financial operations (Bernardo *et al.,* 2024). Blockchain technology emerged in response to these limitations. Instead of delegating trust to centralized intermediaries, blockchain distributes verification across a network of nodes that collectively validate and record transactions (Hariyani *et al.,* 2025). Consensus mechanisms, such as proof-of-work and proof-of-stake, along with cryptographic proofs, ensure that no single actor can manipulate the ledger unilaterally. The resulting system establishes a form of algorithmic trust, in which reliability is derived from mathematical certainty and distributed consensus rather than institutional authority (De Filipi *et al.*, 2020; Habib *et al.*, 2022).

This reconfiguration of trust represents a structural shift. In blockchain networks, transaction authenticity is guaranteed by collective validation rather than by centralized endorsement. Once confirmed, each transaction is permanently recorded in an immutable ledger, resistant to tampering or revision. Participants can therefore engage in exchanges without preexisting relationships or centralized supervision, reducing transaction costs and expanding access to financial services. This model introduces a high level of transactional autonomy, particularly significant in cross-border contexts where conventional systems are slow, costly, or exclusionary (Theodorakopoulos *et al.,* 2024).

Despite claims of trustlessness, blockchain does not eliminate trust, but redistributes it. Participants must rely on the reliability of the code, the security of cryptographic algorithms, and governance mechanisms that maintain network integrity (De Filipi *et al*., 2020). Trust shifts from human institutions to protocols, reframing the social dimension of trust within a technological context. This transformation raises questions regarding accountability and control: when transactions fail or smart contracts execute incorrectly, responsibility becomes diffuse, embedded in the system's architecture (Teng, 2022).

Decentralized governance structures illustrate these dynamics. Decentralized autonomous organizations (DAOs) encode decision-making processes into blockchain protocols, allowing participants to vote on proposals and allocate resources collectively (Esposito *et al.*, 2025). While these systems aim to replace hierarchical management with transparent, rules-based governance, participation frequently concentrates among a minority of technically proficient or financially dominant actors. Power is not eliminated, but reconfigured along lines of network influence, capital ownership, and technical expertise. Trust in blockchain-based finance thus operates through a hybrid mechanism: decentralized verification coexists with collective governance and social negotiation (Bassan & Rabitti, 2024). Technological systems cannot fully detach from human judgment or institutional support. Instead, they establish new forms of interdependence between technical reliability and social legitimacy, which will determine the long-term stability of blockchain-based financial systems.

Balancing transparency and privacy in decentralized finance

If trust is the foundational principle of blockchain, transparency constitutes its structural core. Blockchain technology enables transaction histories to be publicly verifiable, immutable, and chronologically ordered, contrasting sharply with the opacity of traditional financial systems, where information asymmetries, proprietary data, and discretionary disclosure often impede accountability (Kukman & Gričar, 2025). In blockchain networks, every transaction is permanently recorded on a shared ledger accessible to all participants. Transparency is thus intrinsic to the system, rather than dependent on institutional reporting. Immutable records prevent retroactive data manipulation, providing robust evidence for auditing, compliance, and integrity verification (Karaduman & Gulhas, 2025). Fraud,

misreporting, and double-spending are technically infeasible, reducing reliance on external verification mechanisms.

Transparency also enhances accountability. Transactions and smart contracts are observable by all stakeholders, enabling real-time monitoring of financial activity. This transforms relationships among users, institutions, and regulators, creating a self-auditing environment (Ibrahimy *et al.*, 2024). For instance, decentralized exchanges allow participants to track liquidity flows, fees, and governance actions without intermediary reporting. Consequently, trust shifts from reliance on disclosure to reliance on visibility. However, transparency carries inherent trade-offs. Publicly visible transactions, while pseudonymous, can often be linked to individual identities through network analysis, raising privacy concerns. Privacy-preserving technologies, including zero-knowledge proofs and confidential transactions, attempt to reconcile accountability with data protection, enabling verification without full exposure of sensitive information (Zhang *et al.*, 2024a). Transparency also intersects with governance and power distribution. Although blockchain is designed to be egalitarian, validation and decision-making frequently concentrate among a limited subset of participants, potentially replicating hierarchical structures (Sai *et al.*, 2021). Effective transparency requires mechanisms that ensure equitable participation and prevent domination by technical or financial elites.

Environmental considerations further shape transparency. Proof-of-work consensus mechanisms consume substantial energy, prompting debate over sustainability. Transitions to proof-of-stake and other energy-efficient protocols illustrate blockchain's capacity for self-correction and normative adaptation (Thanasi-Boçe & Hoxha, 2025). Thus, transparency is not merely informational, but normative, exposing systemic inefficiencies and prompting collective corrective action.

In summary, blockchain transforms financial accountability by embedding openness into system architecture. Yet, transparency is neither automatic nor unqualified; it must be managed alongside privacy, governance, and sustainability concerns to ensure that visibility reinforces ethical and operational trust (Radanliev, 2025).

Towards hybrid financial ecosystems

Decentralized finance represents the most advanced frontier of blockchain-based innovation. Decentralized finance platforms replicate tradi-

tional financial services without reliance on centralized intermediaries. These systems utilize smart contracts to execute operations automatically, transparently, and with minimal human oversight (Alamsyah *et al.,* 2024). Decentralized finance may exemplify composability; protocols can interact and combine, forming complex financial instruments without institutional approval. This modularity accelerates innovation and enables a self-organizing financial environment driven by open-source collaboration and market experimentation (Metelski & Sobieraj, 2022). The economic implications of decentralized finance are significant. By removing intermediaries, transaction costs decrease, liquidity improves, and access expands, particularly for populations underserved by traditional banking infrastructure. Decentralized lending and payment systems provide global reach without dependence on formal institutions, challenging the traditional monopoly of banks and regulators (Adamyk *et al.,* 2025). Nonetheless, decentralization introduces systemic risks. Smart contract vulnerabilities, oracle failures, and cyberattacks demonstrate that automation reallocates rather than eliminates risk. Liquidity shocks or price manipulations can propagate rapidly across interconnected protocols, creating cascade effects. While blockchain transparency exposes these crises in real time, visibility alone does not prevent them (Karaduman & Gulhas, 2025).

Governance remains a critical challenge. Community-based governance, often implemented through token-weighted voting, can lead to concentration of influence among major holders, reflecting a form of centralization within ostensibly decentralized systems. Hybrid governance frameworks that combine algorithmic mechanisms with human oversight are required to address these imbalances (Green, 2022). Regulatory adaptation is equally essential. Conventional regulation targets identifiable institutions, whereas decentralized finance operates across code and users without central intermediaries. Function-based regulatory approaches, focusing on economic activities rather than institutional form, are necessary to align oversight with emerging decentralized ecosystems (Rahman *et al.,* 2025).

Hybrid models are emerging as a likely trajectory. Central banks and financial institutions are exploring blockchain-inspired innovations, including central bank digital currencies and tokenized assets, blending decentralized efficiency with regulatory oversight (Zhang *et al.,* 2024b). Technological convergence with artificial intelligence and advanced analytics may further optimize compliance, liquidity management, and autonomous governance, producing resilient, adaptive financial ecosystems (Perifanis &

Kitsios, 2023; Piotrowski & Orzeszko, 2023). Sustainable decentralized finance requires more than technological sophistication; it demands ethical, inclusive, and responsible design. Without normative grounding, decentralization risks reproducing inequalities and systemic vulnerabilities. The challenge lies in constructing trust architectures that balance innovation, transparency, and accountability (Nastoska *et al.*, 2025).

Blockchain-based financial systems are redefining the architecture of global finance. By decentralizing trust, embedding transparency, and automating governance, blockchain introduces a paradigm in which financial reliability arises from collective verification rather than institutional authority. The transition from conventional intermediated finance to decentralized ecosystems presents opportunities for efficiency, inclusion, and resilience, while exposing new vulnerabilities in governance, privacy, and systemic risk (Alamsyah *et al.*, 2024). One critical dimension of this transformation is the potential for enhanced financial inclusion, particularly for populations historically underserved by traditional banking systems. Decentralized platforms can provide access to credit, payments, and investment services without reliance on physical infrastructure or intermediaries, although their effectiveness depends on digital literacy, technological accessibility, and regulatory support. At the same time, blockchain ecosystems introduce novel risk dynamics, including the concentration of decision-making power among a few network participants, technical vulnerabilities in smart contracts, and challenges in ensuring privacy alongside transparency. The future of finance is likely to involve hybrid systems that integrate algorithmic trust with institutional legitimacy, technical transparency with ethical responsibility, and innovation with prudential regulation. Blockchain's transformative potential lies not only in digital efficiency, but in establishing a durable foundation of shared, verifiable, and accountable trust, capable of reshaping financial interactions in both mature and emerging economies.

References

Adamyk, B., Benson, V., Adamyk, O., & Liashenko, O. (2025). Risk management in DeFi: Analyses of the innovative tools and platforms for tracking DeFi transactions. *Journal of Risk and Financial Management, 18*(1), 38. https://doi.org/10.3390/jrfm18010038.

Alamsyah, A., Kusuma, G. N. W., & Ramadhani, D. P. (2024). A review on decentralized finance ecosystems. *Future Internet, 16*(3), 76. https://doi.org/10.3390/fi16030076.

Andronie, M., Blažek, R., Iatagan, M., Skypalova, R., Uță, C., Dijmărescu, A., Kovacova, M., Grecu, G., Pârvu, I., Strakova, J., Guni, C., Zabojnik, S., Chiru, C., Sedláčková, A. N., Novák, A., & Dijmărescu, I. (2024). Generative artificial intelligence algorithms in Internet of Things blockchain-based fintech management. *Oeconomia Copernicana*, *15*(4), 1349–1381. https://doi.org/10.24136/oc.3283.

Balcerzak, A. P., & Valaskova, K. (2024). Artificial intelligence: Financial management under pressure of transformative technology. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, *19*(4), 1127–1137. https://doi.org/10.24136/eq.3394

Bassan, F., & Rabitti, M. (2024). From smart legal contracts to contracts on blockchain: An empirical investigation. *Computer Law & Security Review, 55*, 106035. https://doi.org/10.1016/j.clsr.2024.106035.

Bernardo, B. M. V., Mamede, H. S., Barroso, J. M. P., & dos Santos, V. M. P. (2024). Data governance & quality management—Innovation and breakthroughs across different fields. *Journal of Innovation & Knowledge, 9*(4), 100598. https://doi.org/10.1016/j.jik.2024.100598.

Chen, P., Lei, X., Lin, O., & Yuan, Y. (2025). The impact of blockchain financial technology transformation on supply chain disruption risks. *International Review of Economics & Finance, 102*, 104343. https://doi.org/10.1016/j.iref.2025.104343.

De Filipi, P., Mannan, M., & Reijers, W. (2020). Blockchain as a confidence machine: The problem of trust & challenges of governance. *Technology in Society, 62*, 101284. https://doi.org/10.1016/j.techsoc.2020.101284.

Esposito, M., Tse, T., & Goh, D. (2025). Decentralizing governance: Exploring the dynamics and challenges of digital commons and DAOs. *Frontiers Blockchain, 8*, 1538227. https://doi.org/10.3389/fbloc.2025.1538227.

Green, B. (2022). The flaws of policies requiring human oversight of government algorithms. *Computer Law & Security Review, 45*, 105681. https://doi.org/10.1016/j.clsr.2022.105681.

Habib, G., Sharma, S., Ibrahim, S., Ahmad, I., Qureshi, S., & Ishfaq, M. (2022). Blockchain technology: Benefits, challenges, applications, and integration of blockchain technology with cloud computing. *Future Internet, 14*(11), 341. https://doi.org/10.3390/fi14110341.

Hariyani, D., Hariyani, P., Mishra, S., & Sharma, M. K. (2025). A literature review on transformative impacts of blockchain technology on manufacturing management and industrial engineering practices. *Green Technologies and Sustainability, 3*(3), 100169. https://doi.org/10.1016/j.grets.2025.100169.

Ibrahimy, M. M., Norta, A., & Normak, P. (2024). Blockchain-based governance models supporting corruption-transparency: A systematic literature review. *Blockchain: Research and Applications, 5*(2), 100186. https://doi.org/10.1016/j.bcra.2023.100186.

Javaid, M., Haleem, A., Singh, R. P., Suman, R., & Khan, S. (2022). A review of blockchain technology applications for financial services. *BenchCouncil Transactions on Benchmarks, Standards and Evaluations, 2*(3), 100073. https://doi.org/10.1016/j.tbench.2022.100073.

Karaduman, Ö., & Gülhas, G. (2025). Blockchain-enabled supply chain management: A review of security, traceability, and data integrity amid the evolving systemic demand. *Applied Sciences, 15*(9), 5168. https://doi.org/10.3390/app15095168.

Kliestik, T., Dragomir , R., Băluță, A. V., Grecu, I., Durana , P., Karabolevski , O. L., Kral, P., Balica, R., Suler, P., Bușu, O. V., Bugaj, M., Voinea , D.-V., Vrbka, J., Cocoșatu, M., Grupac, M., Pera, A., & Gajdosikova, D. (2024). Enterprise generative artificial intelligence technologies, Internet of Things and blockchain-based fintech management, and digital twin industrial metaverse in the cognitive algorithmic economy. *Oeconomia Copernicana*, *15*(4), 1183–1221. https://doi.org/10.24136/oc.3109.

Kukman, T., & Gričar, S. (2025). Blockchain for quality: Advancing security, efficiency, and transparency in financial systems. *FinTech, 4*(1), 7. https://doi.org/10.3390/fintech4010007.

Lăzăroiu, G., Bogdan, M., Geamănu, M., Hurloiu, L., Luminița, L., & Ștefănescu, R. (2023). Artificial intelligence algorithms and cloud computing technologies in blockchain-based fintech management. *Oeconomia Copernicana*, *14*(3), 707–730. https://doi.org/10.24136/oc.2023.021.

Marikyan, S., Papagiannidis, S., Rana, O. F., Ranjan, R. (2022). Blockchain: A business model innovation analysis. *Digital Business, 2*(2), 100033. https://doi.org/10.1016/j.digbus.2022.100033.

Metelski, D., & Sobieraj, J. (2022). Decentralized finance (DeFi) projects: A study of key performance indicators in terms of DeFi protocols valuations. *International Journal of Financial Studies, 10*(4), 108. https://doi.org/10.3390/ijfs10040108.

Nastoska, A., Jancheska, B., Rizinski, M., & Trajanov, D. (2025). Evaluating trustworthiness in AI: Risks, metrics, and applications across industries. *Electronics, 14*(13), 2717. https://doi.org/10.3390/electronics14132717.

Perifanis, N.-A., & Kitsios, F. (2023). Investigating the influence of artificial intelligence on business value in the digital era of strategy: A literature review. *Information, 14*(2), 85. https://doi.org/10.3390/info14020085.

Piotrowski, D., & Orzeszko, W. (2023). Artificial intelligence and customers' intention to use robo-advisory in banking services. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, *18*(4), 967–1007. https://doi.org/10.24136/eq.2023.031.

Prokopenko, O., Koldovskiy, A., Khalilova, M., Orazbayeva, A., & Machado, J. (2024). Development of blockchain technology in financial accounting. *Computation, 12*(12), 250. https://doi.org/10.3390/computation12120250.

Radanliev, P. (2025). AI ethics: Integrating transparency, fairness, and privacy in AI development. *Applied Artificial Intelligence, 39*(1), 2463722. https://doi.org/10.1080/08839514.2025.2463722.

Rahman, J., Rahman, H., Islam, N., Tanchangya, T., Ridwan, M., & Ali, M. (2025). Regulatory landscape of blockchain assets: Analyzing the drivers of NFT and cryptocurrency regulation. *BenchCouncil Transactions on Benchmarks, Standards and Evaluations, 5*(1), 100214. https://doi.org/10.1016/j.tbench.2025.100214.

Sai, A. R., Buckley, J., Fotzgerald, B., & Le Gear, A. (2021). Taxonomy of centralization in public blockchain systems: A systematic literature review. *Information Processing & Management, 58*(4), 102584. https://doi.org/10.1016/j.ipm.2021.102584.

Teng, Y. (2022). What does it mean to trust blockchain technology? *Methaphilosophy, 54*(1), 145–160. https://doi.org/10.1111/meta.12596.

Thanasi-Boçe, M., & Hoxha, J. (2025). Blockchain for sustainable development: A Systematic review. *Sustainability*, *17*(11), 4848. https://doi.org/10.3390/su17114848.

Theodorakopoulos, L., Theodoropoulou, A., & Halkiopoulos, C. (2024). Enhancing decentralized decision-making with big data and blockchain technology: A comprehensive review. *Applied Sciences, 14*(16), 7007. https://doi.org/10.3390/app14167007.

Turek, J., Ocicka, B., Rogowski, W., & Jefmański, B. (2023). The role of Industry 4.0 technologies in driving the financial importance of sustainability risk management. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, *18*(4), 1009–1044. https://doi.org/10.24136/eq.2023.032.

Waliszewski, K., Cichowicz , E., Gębski , Łukasz, Kliber, F., Kubiczek, J., Niedziółka, P., Solarz , M., & Warchlewska , A. (2024). Digital loans and buy now pay later from LendTech versus bank loans in the era of 'black swans': Complementarity in the area of consumer financing. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, *19*(1), 241–278. https://doi.org/10.24136/eq.2982.

Zhang, B., Pan, H., Li, K., Xing, Y., Wang, J., Fan, D., & Zhang, W. (2024a). A blockchain and zero knowledge proof based data security transaction method in distributed computing. *Electronics*, *13*(21), 4260. https://doi.org/10.3390/electronics13214260.

Zhang, Y., Gong, B., & Zhu, P. (2024b). Centralized use of decentralized technology: Tokenization of currencies and assets. *Structural Change and Economic Dynamics*, *71*, 15–25. https://doi.org/10.1016/j.strueco.2024.06.006.

Funding information

The paper is an output of the project NFP313011BWN6 „The implementation framework and business model of the Internet of Things, Industry 4.0 and smart transport".

Compliance with ethical standards

This article does not contain any studies with human participants or animals performed by the authors. Extracting and inspecting publicly accessible files (scholarly sources) as evidence, before the research began no institutional ethics approval was required.

Data availability statement

All data generated or analyzed are included in the published article. The raw data supporting the conclusion of this article will be made available by the authors, without undue reservation. The raw anonymized data can be provided by emailing the primary author.

Author contributions

All listed authors have made a substantial, direct and intellectual contribution to the work, and approved it for publication. The authors take full responsibility for the accuracy and the integrity of the source analysis.

Conflict of interest statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.