

Editorial: Digital assets at a crossroads: risk, governance, and sustainability in the evolving crypto ecosystem

Introduction

The ecosystem of cryptocurrencies and digital assets has evolved into one of the most dynamic and complex domains of the global economy. Over the past decade, growth has been exponential – not only in the number of tokens and blockchain-based projects, but also in the variety of services, infrastructures and opportunities that these technologies have enabled. Digital assets today are not merely speculative instruments; they represent a transformative force that promises to modernize processes across financial markets, supply chains, governance structures and even digital security (Catalini & Gans, 2016; Schär, 2021).

Yet, alongside this unprecedented expansion, a diverse set of risks has emerged. These range from market volatility and systemic fragility to governance failures, environmental concerns and regulatory arbitrage. A central feature of the crypto ecosystem is its heterogeneity: the market is not defined solely by Bitcoin or Ethereum, but by thousands of digital assets with highly differentiated designs, purposes and governance mechanisms (Cong, Li, & Wang, 2022). This multiplicity creates a structure of non-trivial complexity that challenges investors, regulators and academics alike.

Academic research on digital assets has followed this trajectory of growth, expanding rapidly in both depth and scope. Recent studies have explored the economics of tokenization, the stability implications of stablecoins, the governance of decentralized finance (DeFi) and the sustainability challenges associated with proof-of-work consensus (Ante, 2023; Baur & Oll, 2022). In this editorial, rather than providing an exhaustive review, we aim to highlight three critical areas where digital assets are reshaping the financial and business landscape, while simultaneously introducing new forms of risk and governance challenges.

Specifically, we focus on:

- *Tokenization of real-world assets (RWA)*: how tokenization unlocks new forms of liquidity, accessibility and business models, while raising questions of certification, compliance and investor protection.
- *Stablecoins and digital payments*: their role as a backbone of the crypto economy and their potential to reshape the global payments landscape, alongside risks of governance and systemic instability.
- *Sustainability and systemic risks in the crypto ecosystem*: addressing both the environmental implications of consensus mechanisms and the broader set of systemic risks – ranging from liquidity crises to cyber-vulnerabilities – that challenge the long-term viability of the ecosystem.

Throughout the discussion, we will also highlight two emerging initiatives that exemplify how academia and industry can collaborate to address these challenges. First, *Nodiens*, a research-driven platform providing advanced risk indices for the Web3 ecosystem, which offers new tools for monitoring and mitigating manipulation, sentiment dynamics and



systemic vulnerabilities. Second, the *MICA Crypto Alliance*, which seeks to establish certification frameworks for digital assets, thus enhancing trust and compliance across jurisdictions. By weaving these perspectives together, this editorial aims to stimulate discussion on how innovation in digital assets can be reconciled with sustainable growth, effective regulation and robust risk management.

Tokenization of real-world assets (RWA)

The tokenization of real-world assets (RWAs) has emerged as one of the most promising applications of blockchain technology. By enabling the fractionalization of assets such as real estate, commodities and even intellectual property, tokenization increases liquidity, democratizes access to investment opportunities and reduces transaction costs (Zohar, 2015; Chen & Bellavitis, 2020). Beyond these efficiencies, tokenization opens the possibility of innovative business models, where ownership and governance can be dynamically managed through smart contracts.

Yet tokenization also raises important questions regarding certification, investor protection and governance. Unlike purely digital native assets, RWAs are embedded in legal and institutional frameworks that demand enforceable rights, verifiable ownership and compliance with cross-border regulations. Without adequate mechanisms of certification, tokenized assets risk losing credibility, particularly among institutional investors (Aramonte, Huang, & Schrimpf, 2021).

In this respect, initiatives such as the *MICA Crypto Alliance* are particularly relevant. By developing certification standards and compliance protocols, such frameworks can provide the necessary assurance for investors and regulators, ensuring that tokenized assets maintain legitimacy across jurisdictions. Certification, combined with robust disclosure practices, is likely to be a critical enabler for scaling tokenization beyond niche markets. The intersection of innovation and compliance thus becomes a decisive factor for the sustainable expansion of RWAs in global finance.

Stablecoins and digital payments

Stablecoins represent the backbone of today's digital asset economy. Designed to minimize volatility by pegging their value to fiat currencies or commodities, they function as both a medium of exchange and a store of value within the broader crypto ecosystem (Gorton & Zhang, 2021; Bullmann, Klemm, & Pinna, 2019). In DeFi, stablecoins provide the collateral underpinning lending, borrowing and trading activities. In international payments, they offer the promise of low-cost, near-instantaneous cross-border transactions.

Despite their utility, stablecoins present significant risks. The collapse of algorithmic stablecoins such as TerraUSD in 2022 highlighted vulnerabilities in design and governance (Lyons & Viswanath-Natraj, 2023). Moreover, the concentration of issuance among a few private entities raises questions about market power, transparency and systemic risk. Central banks and regulators worldwide are debating whether stablecoins could undermine monetary sovereignty or amplify risks in times of market stress.

Risk monitoring thus becomes essential. Nodians, as a platform for Web3 risk intelligence, exemplifies how quantitative indices can shed light on phenomena such as short-term pump risks, social media manipulation or whale-driven market dynamics. By systematically capturing indicators of attention, sentiment and coordination, such tools can inform traders, exchanges and regulators, offering a more granular perspective on market health. Incorporating these forms of real-time risk analysis into the stablecoin and payment debate is essential for building resilient digital financial infrastructures.

Sustainability and systemic risks in the crypto ecosystem

The sustainability debate in digital assets has often centered on the environmental impact of proof-of-work (PoW) consensus, with Bitcoin frequently criticized for its significant energy consumption (Stoll, Klaaßen, & Gallersdörfer, 2019). The transition of Ethereum to proof-of-stake in 2022 demonstrated that technological innovation can reduce environmental costs while preserving decentralization. Yet sustainability must be conceived more broadly, encompassing not only energy efficiency but also systemic resilience, governance and the ability of digital asset infrastructures to scale securely over time.

In this respect, *Hedera Hashgraph* represents a compelling alternative to traditional blockchain protocols. Hedera's consensus algorithm is based on the "gossip about gossip" protocol (Baird, 2016), in which nodes share information about transactions and their communication history in a highly efficient manner. This approach enables asynchronous Byzantine fault tolerance, ensuring both security and fairness while consuming far fewer computational resources than PoW systems. Empirical studies and industry benchmarks suggest that Hedera achieves high throughput, low latency and minimal energy use per transaction, positioning it as one of the most environmentally sustainable distributed ledger technologies currently in operation (Samuels & Taylor, 2022).

Beyond energy consumption, systemic risks in crypto remain multifaceted. Liquidity crises, as observed during the collapse of FTX in 2022, reveal the interdependence of exchanges, stablecoins and DeFi protocols (Adrian & Griffoli, 2022). Cybersecurity vulnerabilities, inadequate disclosure practices and the absence of robust insurance mechanisms exacerbate these challenges. Importantly, systemic fragility is not confined to the digital domain: spillovers into traditional finance are increasingly plausible as institutional adoption grows.

Addressing these risks requires a dual strategy: the development of *risk intelligence platforms* and the establishment of *certification frameworks*. On the one hand, platforms like *Nodiens* can provide early-warning indicators of manipulation, concentration or unsustainable market dynamics. On the other hand, organizations such as the *MICA Crypto Alliance* can complement these efforts by embedding compliance, governance and sustainability standards into certification schemes. By combining innovative protocols such as Hedera Hashgraph with robust risk intelligence and certification, the digital asset ecosystem can progress toward a future that is both technologically advanced and systemically resilient.

Discussion and future outlook

The trajectory of digital assets presents both an extraordinary opportunity and a formidable set of challenges. On the opportunity side, tokenization promises to unlock vast pools of illiquid assets, democratizing investment and enabling new forms of business innovation. Stablecoins, by offering low-cost and programmable means of settlement, could revolutionize payment systems and challenge the dominance of traditional intermediaries. Sustainability initiatives, including shifts to energy-efficient consensus mechanisms and the development of robust risk analytics, highlight the sector's capacity to adapt in response to criticism and regulatory pressure.

However, the challenges remain equally pressing. The regulatory landscape continues to be fragmented and uncertain, producing opportunities for arbitrage but also impeding institutional adoption (Zetzsche, Buckley, & Arner, 2020). The absence of universally accepted standards for certification or disclosure creates information asymmetries that heighten systemic risk. Moreover, the social dynamics of crypto markets – driven by

attention cycles, influencer concentration and herd behavior – raise fundamental questions about market integrity.

A promising pathway forward lies in the *convergence of technological tools and institutional frameworks*. Initiatives such as *Nodiens* demonstrate that risk analytics can be made more transparent and actionable by drawing upon on-chain and off-chain data to detect manipulation, sentiment shifts or systemic vulnerabilities. At the same time, the *MICA Crypto Alliance* illustrates how certification mechanisms can provide a layer of trust that transcends jurisdictional boundaries, fostering legitimacy and institutional engagement. Together, they embody an emerging paradigm where innovation and governance evolve in tandem, rather than in opposition.

Looking ahead, several avenues warrant deeper scholarly exploration. First, the long-term economic impact of tokenization on capital markets remains underexplored: will fractionalization truly democratize access, or will it exacerbate inequality by enabling speculative micro-trading? Second, stablecoins' intersection with central bank digital currencies poses a critical research agenda: how will private and public digital monies coexist, and what implications will this have for monetary sovereignty? Third, sustainability must be conceptualized holistically: beyond carbon footprints, systemic resilience, cybersecurity and responsible governance must be treated as integral dimensions of sustainable finance.

Finally, the evolution of digital assets should not be examined in isolation from broader societal transformations. Issues of digital identity, privacy and data governance are inseparable from the adoption of blockchain-based solutions. The capacity of digital assets to deliver social as well as financial value will depend on the ecosystem's ability to balance innovation with accountability.

Conclusion

The rapid expansion of digital assets has opened a new frontier in finance and technology. Tokenization, stablecoins and the pursuit of sustainability each illustrate how crypto markets are reshaping the global economy while exposing novel risks. As our analysis suggests, these developments must be understood as interdependent: the success of tokenization depends on robust certification; the resilience of stablecoins depends on credible risk monitoring; and the sustainability of the ecosystem depends on both technological adaptation and systemic oversight.

To navigate this complexity, collaborative approaches are indispensable. Platforms such as *Nodiens* and frameworks such as the *MICA Crypto Alliance* demonstrate how academic research and industry practice can jointly contribute to a more resilient and trustworthy digital asset environment. For scholars, these initiatives open up new lines of inquiry into how risk can be quantified and legitimacy institutionalized in decentralized ecosystems. For policymakers, they provide concrete models for integrating innovation with compliance.

Ultimately, the future of digital assets will be determined not solely by technological breakthroughs or speculative enthusiasm, but by the ecosystem's ability to integrate risk management, certification and sustainability into its core architecture. This integration represents not only a challenge but also a profound opportunity: to shape digital finance in ways that are innovative, inclusive and resilient. By embracing this vision, the crypto ecosystem can transition from its experimental phase into a mature pillar of the global economy.

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Further reading

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