

# Decentralized Finance (DeFi): Adapting Financial Regulations for Blockchain-Based Systems without Intermediaries

## Introduction

The global financial system is pivotal as Decentralized Finance (DeFi) rises as a potentially transformative force that defies conventional financial structures. Leveraging blockchain technology, DeFi seeks to reinvent financial services independently of intermediaries like banks, brokerages, or exchanges. This blockchain-driven financial landscape provides significant advantages, including enhanced financial inclusion, lower transaction fees, programmable money, and unparalleled transparency. Nonetheless, it also poses intricate regulatory challenges that existing frameworks find difficult to tackle.

This paper examines DeFi's regulatory frontier, analyzing how financial regulations should adapt to blockchain-based systems without traditional intermediaries. DeFi's rapid growth highlights this need. Despite a market correction, the DeFi ecosystem expanded from about \$1 billion in Total Value Locked (TVL) in May 2020 to over \$100 billion in 2024, indicating strong market demand for these innovative services.<sup>1</sup> With increasing institutional interest and advancing technology, DeFi's regulatory challenges require urgent attention and thoughtful solutions.

## The DeFi Paradigm and Its Regulatory Challenges

DeFi is a financial system utilizing decentralized protocols on blockchain networks, mainly relying on smart contracts to automate services and transactions without central intermediaries. DeFi includes decentralized exchanges (DEXs) and platforms like Uniswap and SushiSwap for peer-to-peer trading of digital assets without centralized order books. Lending protocols like Aave and Compound allow users to borrow or lend crypto assets via smart contracts, with algorithmic interest rates based on supply and demand.<sup>2</sup> Stablecoins, cryptocurrencies maintaining stable value, often pegged to fiat (e.g., USDC, DAI), underpin the DeFi ecosystem. Yield farming and liquidity mining incentivize users to provide liquidity for rewards, generating returns on crypto assets. Derivatives and synthetic assets are protocols creating tokenized versions of traditional financial instruments or exposure to real-world assets. Insurance protocols are services offering coverage against smart contract failures or hacks. These applications operate on public blockchains like Ethereum, Solana, and others, creating an open, permissionless financial infrastructure accessible to anyone with an internet connection.

DeFi's regulatory challenges stem from its design. Traditional regulations depend on intermediaries (banks, brokers, exchanges) acting as compliance gatekeepers. As Commodity Futures Trading Commission (CFTC) Enforcement Director Ian McGinley stated, "The types of highly centralized, intermediated entities that regulators typically oversee are absent from the DeFi space," leaving regulators to "ponder whether they will be able to exercise effective oversight of the space at all."<sup>3</sup> Without these identifiable entities, regulatory frameworks centered on intermediary obligations become ineffective.

The UK's Financial Policy Committee noted, "the borderless nature of DeFi platforms complicates the determination of applicable legal jurisdictions and the enforcement of regulations across different

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<sup>1</sup> Merkle Science. (2024). "Understanding Regulatory Frameworks for DeFi in the U.S. and Beyond."

<https://www.merklescience.com/blog/understanding-regulatory-frameworks-for-defi-in-the-u-s-and-beyond>

<sup>2</sup> Lending and Borrowing in DeFi Explained – Aave, Compound <https://finematics.com/lending-and-borrowing-in-defi-explained/>

<sup>3</sup> Elliptic. (2024). "Regulatory Outlook 2024: This will be a defining year for DeFi." <https://www.elliptic.co/blog/regulatory-outlook-2024-this-will-be-a-defining-year-for-defi>

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countries." <sup>4</sup> Regulatory arbitrage remains a persistent concern, as developers may deploy protocols from favorable jurisdictions while serving users globally.

DeFi protocols use self-executing smart contracts that operate autonomously once deployed. This leads to the notion that, as stated by Chainalysis, "somewhere along the way, DeFi operators got the idea that unlawful transactions become lawful when facilitated by smart contracts." <sup>5 6</sup> This misconception has led to enforcement actions but highlights the challenge of determining accountability in automated systems. Most DeFi protocols lack Know Your Customer (KYC) procedures, identifying users only by blockchain addresses. This complicates Anti-Money Laundering (AML) and Countering the Financing of Terrorism (CFT) compliance. Elliptic's research states, "the pseudo-anonymity on DeFi platforms" increases risks related to unregulated crypto activities, making monitoring and identifying suspicious activities harder. <sup>7</sup> Many DeFi protocols use decentralized governance via Decentralized Autonomous Organizations (DAOs), where upgrades and changes are made through token-based voting. This creates ambiguity about liability and regulatory responsibility. The CFTC's 2022 action against Ooki DAO addressed this by classifying voting governance token holders as members of an "Unincorporated Association" and thus liable for compliance violations. <sup>8</sup>

DeFi protocols range across a spectrum of decentralization, not in a binary state. The CFTC's report notes, "there are multiple dimensions of decentralization, including technological design, governance, economics, operation, and distribution of services." <sup>9</sup> The SEC asserts that many DeFi projects are centralized enough to fall under traditional securities regulation. DeFi operates with a composable, layered architecture where protocols rely on each other, creating complex interdependencies. This money lego structure means regulatory actions at one layer can affect others. Intervention against a base layer protocol could disrupt multiple applications built on it, presenting systemic risks that traditional regulatory frameworks cannot address.

### Regulatory Theory and Approaches for DeFi

The U.S. Treasury's recent report highlights that the Bank Secrecy Act is activity-based, indicating that "anyone engaging in financial services still has those obligations, whether the financial activity is centralized or decentralized." <sup>10</sup> This approach asserts that financial activities (lending, trading, etc.) should receive consistent regulatory treatment, via traditional intermediaries or decentralized protocols. The Bank for International Settlements proposed "embedded supervision" for decentralized systems. Developed by economist Raphael Auer, this concept integrates regulatory compliance into blockchain protocols, allowing regulators to "automatically monitor compliance by reading the market's blockchain

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<sup>4</sup> The Tokenizer. (2024). "DeFi and Regulation." <https://thetokenizer.io/2024/11/22/defi-and-regulation/>

<sup>5</sup> Chainalysis. (2024). "DeFi Regulation: Practical Next Steps to Make the Industry Safer." <https://www.chainalysis.com/blog/defi-regulation-practical-next-steps-to-make-the-industry-safer/>

<sup>6</sup> National Law Review. (2023). "CFTC Enforcement Focus on DeFi." <https://natlawreview.com/article/cftc-enforcement-focus-defi>

<sup>7</sup> Elliptic. (2024). "Regulatory Outlook 2024: This will be a defining year for DeFi." <https://www.elliptic.co/blog/regulatory-outlook-2024-this-will-be-a-defining-year-for-defi>

<sup>8</sup> Solidus Labs. (2023). "2023 Crypto Enforcement Trends: SEC & CFTC Set Records as States Take the Lead." <https://www.soliduslabs.com/research/2023-crypto-enforcement-trends>

<sup>9</sup> Merkle Science. (2024). "Understanding Regulatory Frameworks for DeFi in the U.S. and Beyond." <https://www.merklescience.com/blog/understanding-regulatory-frameworks-for-defi-in-the-u-s-and-beyond>

<sup>10</sup> Merkle Science. (2024). "Understanding Regulatory Frameworks for DeFi in the U.S. and Beyond." <https://www.merklescience.com/blog/understanding-regulatory-frameworks-for-defi-in-the-u-s-and-beyond>

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ledger," minimizing the need for separate compliance reporting.<sup>11</sup> This approach uses blockchain transparency for efficient supervision while preserving DeFi's decentralization, but requires technical sophistication from regulators and raises privacy concerns.

The tension between "code as law" (smart contract code defines rules) and "law as code" (embedding legal requirements into code) is a fundamental challenge. Compliance by design integrates regulatory requirements into DeFi protocols, necessitating collaboration between legal experts and developers to translate regulations into technical specifications.

DeFi's global nature requires international coordination. The Financial Action Task Force (FATF) and International Organization of Securities Commissions (IOSCO) are developing aligned DeFi regulations. IOSCO recommends policies for countries to adopt common strategies, while FATF has updated its guidance on DeFi money laundering risks.<sup>12</sup> The challenge is coordinating while respecting various financial regulations. Without this, regulatory arbitrage persists, undermining jurisdictions' effectiveness.

### **Recent Regulatory Developments and Industry Response**

Without regulations, enforcement actions are crucial for defining boundaries in DeFi. The CFTC's 2022 action against Ooki DAO showed that decentralized governance doesn't shield protocols from regulation. In September 2023, the CFTC charged three DeFi protocols (Opyn, ZeroEx, and Deridex) for allegedly offering illegal derivatives trading, not registering as swap execution facilities, and lacking proper KYC procedures.<sup>13</sup> The SEC is extending securities laws to DeFi tokens, asserting that many governance tokens count as investment contracts under the Howey test.<sup>14</sup> These actions show regulators' intent to claim jurisdiction over DeFi without centralized intermediaries. CFTC Enforcement Director Ian McGinley stated, "We will do everything in our power to ensure that digital asset commodity transactions that should be conducted on regulated derivatives exchanges are conducted on those exchanges."<sup>15</sup> Many jurisdictions are creating DeFi regulations. The EU's MiCA focuses on centralized crypto services with provisions for specific DeFi activities. Singapore's Project Guardian tests "the feasibility of applications in asset tokenisation and DeFi while managing risks to financial stability and integrity."<sup>16</sup> Switzerland's Token Act provides a framework for compliant asset tokenization as a model for DeFi regulation.

### **The Innovation Dilemma**

DeFi regulation must balance innovation, consumer protection, and financial stability. Poorly designed regulations risk stifling innovation, potentially killing the golden goose. The Wilson Center highlights that "significant technological advancements, such as the development of digital public goods infrastructure

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<sup>11</sup> Merkle Science. (2024). "Understanding Regulatory Frameworks for DeFi in the U.S. and Beyond."

<https://www.merklescience.com/blog/understanding-regulatory-frameworks-for-defi-in-the-u-s-and-beyond>

<sup>12</sup> Elliptic. (2024). "Regulatory Outlook 2024: This will be a defining year for DeFi." <https://www.elliptic.co/blog/regulatory-outlook-2024-this-will-be-a-defining-year-for-defi>

<sup>13</sup> Davis Wright Tremaine. (2023). "CFTC Division of Enforcement, FY 2023: A Year in Review and Looking Ahead."

<https://www.dwt.com/blogs/financial-services-law-advisor/2023/12/cftc-enforcement-trends-from-fy-2023-report>

<sup>14</sup> Application of Howey to Digital Assets <https://www.sec.gov/about/divisions-offices/division-corporation-finance/framework-investment-contract-analysis-digital-assets>

<sup>15</sup> National Law Review. (2023). "CFTC Enforcement Focus on DeFi." <https://natlawreview.com/article/cftc-enforcement-focus-defi>

<sup>16</sup> Alpha Development. (2023). "Exploring the Regulatory Landscape of Decentralised Finance: Current Status and Future Implications." <https://alphadevelopment.com/insights/exploring-the-regulatory-landscape-of-decentralised-finance-current-status-and-future-implications/>

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like TCP/IP and SMTP for the Internet in the 90s, thrived under a light regulatory touch." <sup>17</sup> Heavy regulation of early DeFi protocols could hinder breakthrough financial technologies.

### A Hybrid Approach

The Blockchain Association states that "DeFi protocols are public goods that should remain accessible to any business building financial services apps and be exempt from regulatory requirements and obligations if they possess certain features." <sup>18</sup> This acknowledges the layered nature of DeFi, in which base protocols operate more like public infrastructure, while the applications built on top may require more direct regulation. An optimal framework includes - tiered, requirements scaled based on activity nature, risk profile, and decentralization level.

### Integrated Regulatory Framework

Based on these insights, an integrated regulatory framework that addresses DeFi's unique characteristics while balancing innovation and protection is proposed here. Different regulatory approaches should apply to different layers of the DeFi ecosystem. In the infrastructure layer, regulate technical standards and security lightly, acknowledging the public good of base protocols. This aligns with Scientific Reports that permissionless systems can be regulated "through the automated validation of proposed updates." <sup>19</sup> In the protocol layer, emphasize transparency, governance, and risk disclosure while maintaining innovation. It can utilize embedded supervision approaches that leverage blockchain transparency. In the application layer, a more comprehensive approach to regulation that addresses consumer protection, market integrity, and specific financial activities. Activity-based regulation is the most appropriate strategy at this layer.

Regulatory requirements should scale with risk factors: 1) Size and Systemic Importance: Larger protocols with significant impact face more oversight. 2) Target Users: Retail-focused applications need stronger consumer protections than those for sophisticated users. 3) Degree of Decentralization: Truly decentralized protocols may need different approaches than those with clear control points.

Regulatory frameworks should utilize blockchain's unique capabilities, such as On-Chain Monitoring, which leverages blockchain's transparency for supervision. Smart contract compliance is achieved by encoding compliance requirements into protocol code. Ensure privacy-preserving compliance by creating techniques that balance transparency with privacy. Chainalysis notes that "leveraging technology, such as blockchain analytics, can help regulators monitor compliance without stifling innovation." <sup>20</sup>

DeFi's global nature requires international coordination, addressing minimum standards for core requirements across jurisdictions, mutual recognition of frameworks for recognizing compliance, and information sharing mechanisms for data exchange among regulators. The multi-stakeholder roundtable at

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<sup>17</sup> Wilson Center. (2024). "DeFi 101: The Good, the Bad, and the Regulatory." <https://www.wilsoncenter.org/article/defi-101-good-bad-and-regulatory>

<sup>18</sup> Blockchain Association. (2023). "Key Elements of an Effective DeFi Framework." <https://crypto4innovation.org/key-elements-of-an-effective-defi-framework/#> Decentralized Finance (DeFi): Adapting Financial Regulations for Blockchain-Based Systems without Intermediaries

<sup>19</sup> Nature Scientific Reports. (2024). "Tradeoffs in automated financial regulation of decentralized finance due to limits on mutable Turing machines." <https://www.nature.com/articles/s41598-024-84612-9>

<sup>20</sup> Rapid Innovation. (2024). "DeFi Regulations 2024: Top Countries, Challenges, and Future Outlook." <https://www.rapidinnovation.io/post/the-global-landscape-of-defi-regulations-what-you-need-to-know-in-2024>

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the Elevandi Insights Forum noted that "greater data sharing between jurisdictions in a transparent and standardised manner" could address regulatory arbitrage concerns.<sup>21</sup>

### **Final Thoughts**

The challenge in DeFi regulation is balancing innovation with necessary protections. The analysis suggests this balance is achievable through careful design that:

1. Preserves Core Benefits: Maintains DeFi's advantages in accessibility, efficiency, and inclusion.
2. Addresses Legitimate Concerns: Mitigates consumer protection risks, financial crime, and stability.
3. Adapts to Evolution: Offers flexibility for technological and market developments.
4. Promotes Collaboration: Encourages dialogue between regulators, developers, and users.

The regulatory frontier of DeFi presents challenges and opportunities—opportunities to rethink financial regulation for the digital age, leverage technology for more efficient oversight, and build financial systems that are simultaneously more innovative, inclusive, and secure than their predecessors.

By approaching DeFi regulation with an open mind, a clear understanding of the technology, and a commitment to balanced outcomes, policymakers can help shape a financial future that harnesses innovation while protecting fundamental public interests. This is the essence of innovative regulation for innovative finance.

By Kiran Malige ©

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<sup>21</sup> Global FinTech Network. (2024). "Regulation in a Decentralised World: Frameworks for DeFi Governance & Oversight." <https://gftn.co/insights/regulation-decentralised-world-defi-governance>