



STABLECOIN REGULATORY DESIGN

A LOGIC MODEL-BASED APPROACH TO DRIVE
PUBLIC-PRIVATE COLLABORATION

Robert Gallic, Joe Kennedy, Andy Anderegg, Sanith Wijesinghe

EXECUTIVE SUMMARY

Stablecoins are a type of cryptocurrency whose value is pegged to a reference asset, most commonly the U.S. dollar. While the current role of stablecoins is limited, they promise to play a central role in the future of finance.

Although Congress has yet to pass legislation specifically dealing with stablecoins, some major bills have already been introduced, and some states, notably New York, have already passed legislation to regulate stablecoins. Furthermore the Financial Stability Oversight Council (FSOC) and President's Working Group (PWG) have already made important contributions to inform how financial regulators should approach stablecoin regulation. Nonetheless, given that a myriad of laws, regulations, policies, and procedures govern how government agencies conduct their business practices, it is often difficult to anticipate the operational impact of changes or additions to them. Federal regulators should continue to discuss how best to coordinate their respective rule-making processes in anticipation of updated obligations from these bills.

In this whitepaper, we introduce a “logic model”-based approach to provide stakeholders greater transparency into the interdependencies, ambiguities, and conflicting authorities that may need to be resolved prior to promulgating new legislation and subsequent regulation. In our view, bodies like the FSOC and PWG approximate the interdepartmental approaches that our logic model is intended to assist with for future stablecoin legislation. We envision a similar structure where individuals represent their departments' oversight authority while deconflicting overlapping authorities. The logic model can serve as a guided approach to developing this more holistic perspective. Ultimately, we seek to minimize the citizen and industry compliance burden with greater stablecoin adoption while also realizing national interest outcomes.

CONTENTS

EXECUTIVE SUMMARY	i
INTRODUCTION	1
A BRIEF OVERVIEW OF STABLECOINS	2
Properly Regulated Stablecoins Can Decrease Payment Friction	2
REVIEW OF THE REGULATORY LANDSCAPE	4
Overlapping Regulation Requires Coordination and Clear Lanes for Both Issuers and Regulators	4
A STRUCTURED APPROACH TO REGULATORY DESIGN	6
Representative Application of the Logic Model to Consumer Protection	8
FFRDC FACILITATED PUBLIC-PRIVATE REGULATORY COLLABORATION	10
CONCLUSION	11
ABOUT THE AUTHORS	12
ENDNOTES	13

INTRODUCTION

The White House Executive Order on “Ensuring Responsible Development of Digital Assets”¹ built on a series of activities by lawmakers, regulatory agencies, and industry stakeholders to better understand the challenges of responsible financial innovation that incentivizes the growth of a digital asset-based economy, while protecting consumers and reducing the risk of illicit financial activity and contagion. Although significant progress has been made in identifying the key issues that need to be addressed, there remains a lack of consensus on how best to address these issues. This lack of consensus and the lack of corresponding regulatory legislation could contribute to increased volatility of digital asset markets in the year ahead and potential harm to society at large.

To date, the collapse of the Terra Luna stablecoin market² and FTX³ have been well contained within the digital asset ecosystem. One could argue that speculative investors should bear the costs of risk taking just like any other market investor. However, as we see greater coupling of digital assets with traditional finance,⁴ risk has a way of propagating in unintended ways and can lead to larger national and global economic contagion events. This would most definitely be exacerbated by a lack of regulatory clarity about the guardrails to operate within. As a case in point, at the height of its success, the collateralized debt obligations (CDO) market cap was only \$200 billion,⁵ a fraction of the size of the broader securities market, yet its collapse led to the global economic meltdown of 2008. A similar risk could manifest itself if digital assets play a major role in supporting financial markets.

Given the current turbulent state of the crypto market, consensus is building on the need for improved risk control measures by industry and government alike. Public policymakers have a unique opportunity to work together to execute a plan to increase overall market safety and stability while controlling for market manipulation by fraudulent actors. Several bills were floated in the 117th Congress, many of which share several common conclusions. Furthermore, the 118th Congress created Congress’ first Digital Assets Subcommittee.⁶ It therefore appears likely that Congress will continue to discuss stablecoin regulation, possibly passing legislation within the next two years.

With this backdrop in mind, we present a novel approach to engage stakeholders in regulatory design using a structured model-based framework that anchors on a stablecoin use case but could also extend to other digital assets. This approach could complement existing rule-making activities as defined in the Administrative Procedure Act or be deployed upstream of an agency’s formal Notice of Proposed Rulemaking or other legislative deliberation process. We begin with an introduction to stablecoins and their history and identify some key open legislative issues. This is followed by a summary of existing legislative efforts and the need for clear regulatory lanes and coordination. The logic model for collaborative engagement is detailed next, together with recommendations on how it might be applied. We conclude with an outline of how Federally Funded Research and Development Centers could be utilized to source elements of the logic model and drive public-private dialogue that can form the basis for sensible regulations.

A BRIEF OVERVIEW OF STABLECOINS

Stablecoins are a unique digital asset designed to maintain their value relative to a real-world fiat currency, asset, or commodity. They were originally created to manage digital asset volatility. They were seen as the decentralized stable complement to Bitcoin and Ethereum. The first stablecoins were pegged mostly to the value of the USD and often collateralized with USD assets. Tether, a USD-pegged and collateralized stablecoin, also known as USDT, was the first major stablecoin to achieve and maintain relative stability at scale. Since that time, hundreds of stablecoin projects have been launched, with the vast majority collapsing quickly due to the failure to maintain their peg.

Despite these failures, several stablecoin projects have maintained relative stability and achieved success at scale, with the total stablecoin market capitalization at around \$140 billion as of February 2023. Over 99 percent of stablecoins are pegged to the USD, with much smaller amounts pegged to the Euro, British pound, Singapore dollar, and gold.⁷ Some financial experts believe that the large percentage of stablecoins linked to the USD is an affirmation of unmet USD demand and forecast that such demand will be an important factor in the USD's continued dominance of international finance.

Stablecoins linked to the USD are currently mostly used in decentralized finance (DeFi) activities to improve liquidity and facilitate the trading, lending, and borrowing of digital assets. The majority of digital trades include at least one stablecoin side, allowing traders to avoid using fiat currencies and interacting with traditional finance intermediaries. Stablecoins, however, have significant potential beyond their current role within DeFi.

Stablecoins can differ in their individual reference values and the method they use to maintain their value. For the purposes of this paper, we are concerned with stablecoins that are issued on a public blockchain, whose value is pegged to a fiat currency, backed by collateralized assets in the same

currency, and maintained by a central issuer. These include USDT, USDC, USDP, and others. Algorithmic stablecoins, like the failed Terra project, or crypto-collateralized/hybrid peg stablecoins, such as Dai and FRAX, fall outside the scope of this paper.

Properly Regulated Stablecoins Can Decrease Payment Frictions

While stablecoins are currently predominately used in DeFi, their design offers significant promise to improve the current U.S. payment system and safeguard the USD's role in international finance. Stablecoins, combined with distributed ledger technology, offer a complete payment and settlement system that operates continuously and without intermediaries. Fees also decrease with scale, allowing businesses to remit large amounts of money nearly instantly across borders with significant cost savings compared to traditional cross border payment systems. With proper regulation, stablecoins could potentially increase the efficiency of money transfers, especially those that cross international borders; allow cheap and instant settlement of goods and services purchases; improve financial inclusion; protect financial wealth; and serve as an alternative or complementary product to Central Bank Digital Currencies.

Proper regulation is critical to unlocking the potential of stablecoins. Regulators must decide what rules should govern the issuers of stablecoins as well as the best governmental level to regulate them (state, federal, or international). Given the U.S. federal structure, the federal/state boundary is especially important.⁸ We summarize below some of the key regulatory issues that would benefit from a coordinated multi-agency approach given this overlap of authorities.

- **Legal Basis and Interoperability**
 - What entities should be allowed to issue stablecoins? Should a stablecoin issuer be a bank or have a parent bank entity?

- Who should lead the design and implementation of standards for interoperability of stablecoins with other stablecoins, the traditional payment system, and across international boundaries?
- **Regulatory Framework including Capital Requirements, Reporting, and Anti-Money Laundering (AML) Obligations**
 - What should be the appropriate level of pre-emption between federal regulations and state regulations for issuers of stablecoins?
 - How should oversight responsibilities between the Securities and Exchange Commission (SEC), Commodity Futures Trading Commission (CFTC), Office of the Comptroller of the Currency (OCC), Federal Deposit Insurance Corporation (FDIC), Financial Crimes Enforcement Network (FinCEN), National Credit Union Administration (NCUA), and the Federal Reserve Banks be coordinated to regulate stablecoins traded on exchanges to minimize reporting burden?
- **Consumer Protection Measures**
 - Should regulators follow a narrow bank model requiring that stablecoins be backed on a 1-1 basis with highly liquid and safe assets, or on an FDIC-type mode in which stablecoins are backed by federal deposit insurance?
- What limits should be specified regarding stablecoin reserve assets: their type, amount, redemption timeline, and associated insurance?
- To what extent should Federal Reserve master accounts and other federal services be provided to stablecoin issuers?
- **Redemption Mechanisms**
 - What rules should govern the redemption of stablecoins into USD as well as the conversion of USD into stablecoins?
- **Monitoring, Tracking, and Privacy**
 - What metrics should be monitored to ensure that individual issuers do not become a threat to financial stability? Similarly, how should the stablecoin market as a whole be monitored to ensure contagion linkages are minimized?
 - Which market regulator is best positioned to monitor these markets? Which public-private partnerships should be explored to ensure high-quality data is available?
 - Should transactions under a certain amount be private? Who would be responsible for reporting on large transaction amounts?

REVIEW OF THE REGULATORY LANDSCAPE

Both the SEC and the CFTC have argued that virtual currencies,⁹ including stablecoins, must comply with existing laws under certain circumstances. The Internal Revenue Service requires taxpayers to declare whether they own virtual currencies and to pay taxes on realized net capital gains. However, no unique federal legislation specifically regulates stablecoins. This is important because stablecoins could eventually play a large enough role in the economy that a failure of one or more could trigger a general panic in financial markets, similar to how the collapse of the CDO market strained the money market funds industry during the Great Financial Crisis of 2007-2009. Several prominent members of Congress introduced legislation on stablecoins during the 117th Congress. Rep. Maxine Waters (D-CA) and Rep. Patrick McHenry (R-NC), who at the time served respectively as the Chair and Ranking Member of the House of Representatives Committee on Financial Services, circulated a discussion draft that was never formally introduced. Former Sen. Pat Toomey (R-PA) also introduced an unnumbered discussion draft. Finally, Sens. Kirsten Gillibrand (D-NY) and Cynthia Loomis (R-WY) introduced S. 4356, which, among many other things, would have set up a regulatory system for issuing stablecoins. These bills shared a number of common provisions, including support for state-licensed issuers; requirements that stablecoins be backed 100 percent with a specific list of low-volatility, liquid assets; and allowances for reduced regulation of entities that limited themselves to the issuance of stablecoins.

Many states have passed legislation to clarify how money transmitter licenses, which are largely regulated at the state level, apply to those who hold and transmit virtual currency on behalf of others. However, New York is the only state that has passed comprehensive legislation to oversee issuers of stablecoins. Issuers

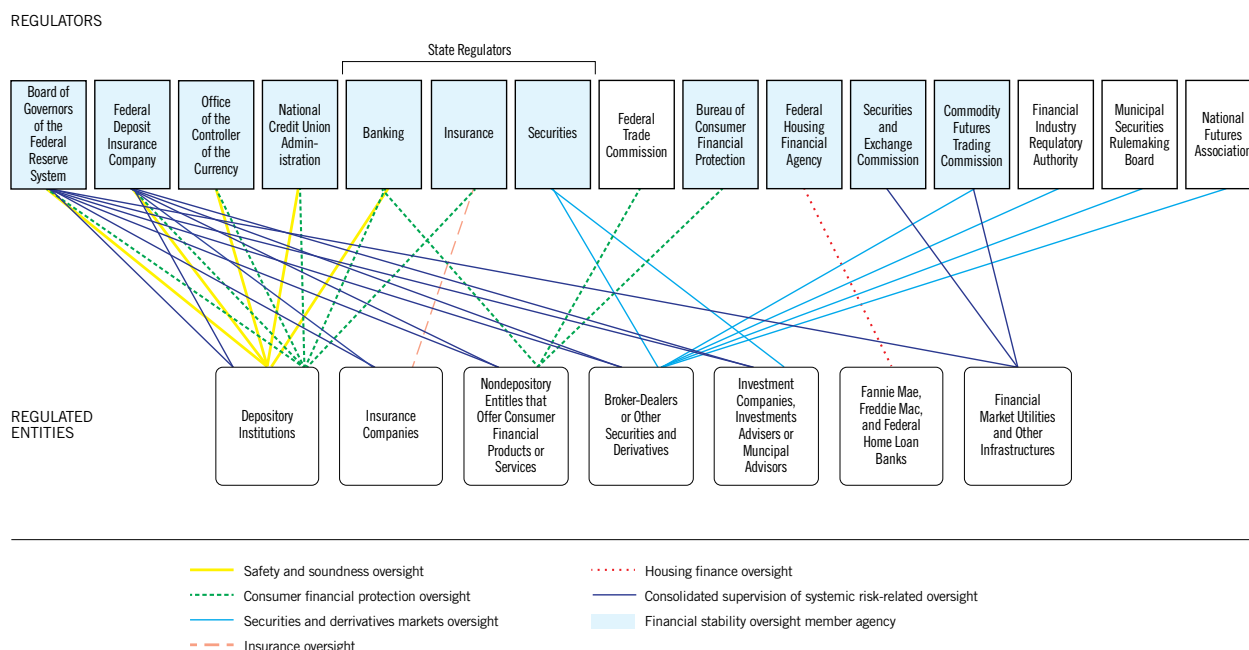
must seek a license from the New York Department of Financial Services (DFS) and comply with strict reserve and reporting requirements. The state requires that stablecoins be fully backed by a reserve of assets, that issuers redeem stablecoins for USD in a timely fashion, and that issuers only issue on approved blockchains. Reserves must be held by a federally chartered depository institution whose regular deposits are backed by federal deposit insurance or an asset custodian approved by the DFS. These requirements are subject to regular public audits. In addition, DFS has specific requirements concerning network security, anti-money laundering, consumer protection, sanctions compliance, and other financial issues.

Overlapping Regulation Requires Coordination and Clear Lanes for Both Issuers and Regulators

Our federal system requires a successful balancing act between the national government and the various states. Too much reliance on state law gives larger states a structural advantage in economic competition. It can also reduce economic growth by reducing the size of relevant markets and burdening businesses with a multiplicity of different rules and licensing requirements. On the other hand, state regulation can allow experimentation with different regulations and provide additional protection to consumers. In cases where Congress is unable to form a consensus on regulation, state laws by default become the only source of effective regulation.

As shown in Figure 1, the complexity of this task is further compounded by the fact that multiple regulators can oversee the financial activities of entities across multiple industry verticals.

Given there are multiple authorities and stakeholders associated with stablecoin regulation, we propose a

FIGURE 1. PAYMENT SYSTEM REGULATORS AND REGULATED ENTITIES.¹⁰

Striking the right balance requires regular communication between legislators, regulators, and private parties about the goals of regulation. In general, Congress should strive to create minimum baseline guidance that provides strong consumer protection, encourages innovation, stabilizes financial markets, and achieves other important goals such as sanctions

compliance and anti-fraud efforts. States should be allowed to set higher standards, provided their actions do not burden activity in other states. In many cases, it may also make sense to turn over some of the regulatory supervision to state agencies. Although federal legislation is still being debated, it is not too early to begin these discussions.¹¹

A STRUCTURED APPROACH TO REGULATORY DESIGN

holistic approach be taken to the task of analyzing regulatory alternatives. The ontology shown in Figure 2 constitutes a “logic model” that can serve as the foundation for such an approach, enabling both structured solicitation of inputs by stakeholders and

transparency into how those inputs are used for overall decision making.

This logic model aims to depict how market and societal factors are interdependent with regulatory

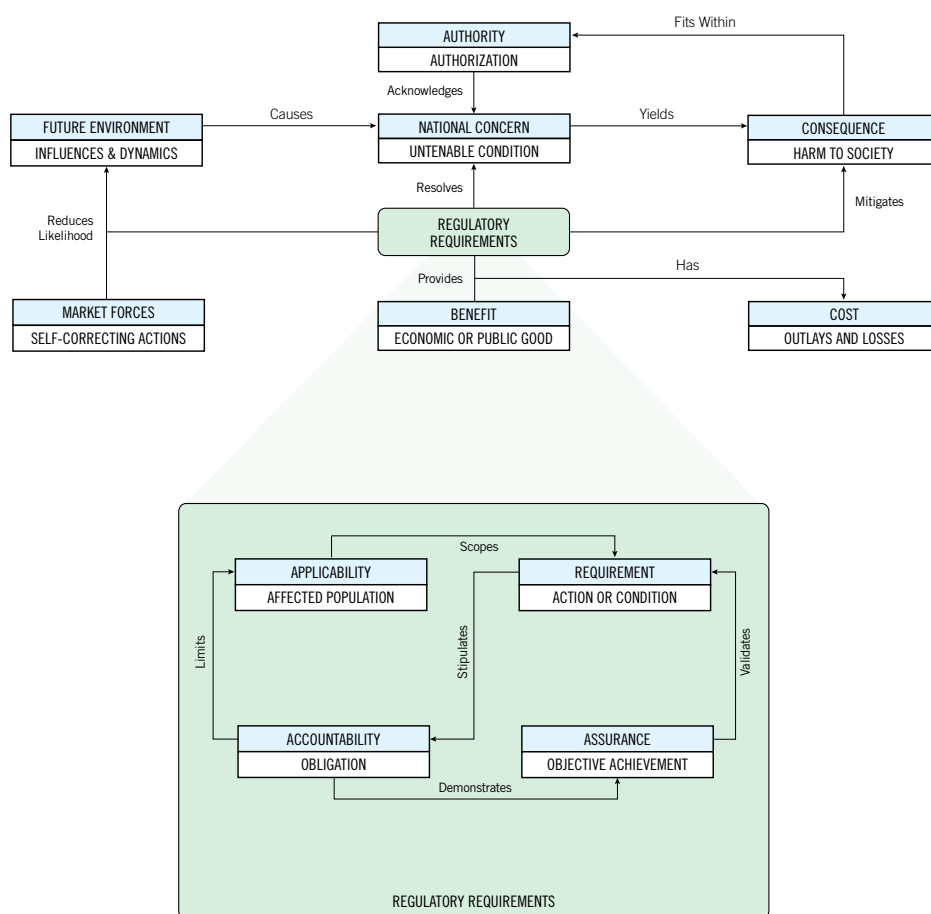


FIGURE 2. REGULATORY REQUIREMENTS IN A DECISION FRAMEWORK ONTOLOGY

goals and the need to consider the impact of feedback loops. One principle for selecting regulatory requirements is to maximize net benefit given the cost of implementation. This principle requires understanding how an agency's regulations stack up against other agencies' regulations to most cost effectively mitigate the consequences or reduce the causes driving the future environment. Conducting joint analysis would allow agencies to find the best solution for the whole of government. Specific to stablecoin regulation, an initial step to creating an instance of this logic model would involve agencies identified in Figure 1 defining their authority through a set of triplets defined by authority statements, national concerns, and consequences. Note that a new regulation is not warranted if the likelihood of a national concern is sufficiently reduced by market forces or existing regulation. Reaching this determination also requires an understanding of existing regulations, including those of other agencies.

To summarize, logic model would consist of the following elements:

- A *national concern* is an untenable condition recognized in law or an agency's *authority* to improve the general well-being of the American people.
- A *benefit* is an economic enhancement or contribution to the public good provided by mitigating a consequence or by adjusting the *future environment*.
- The cost is the economic outlay, inefficiencies, and less tangible losses stemming from satisfying the *regulatory requirements*.
- The future *environment* is a forecasted trend in influences or dynamics that will cause *national concern* to increase in impact to the point of being untenable if not addressed.
- A *requirement* defines compelled actions or conditions to be satisfied by members of the private

sector. It may take different forms like performance, compliance, operational limits, or information disclosure requirements.

- The requirement stipulates the *accountability*, or which party is obligated to meet the requirement. The accountable party must demonstrate they meet the obligation by meeting prerequisites (e.g., license, approvals, permits), operational conditions (e.g., quality program), or post-ops reporting (e.g., inspections, records).
- The obligation may be limited to a subset of the private sector through *applicability* statements. By scoping the requirement to the population with the strongest influence on the national concern, the regulation resolves the most significant contribution and has a lower cost.
- *Accountability and applicability* are key differentiators of regulatory alternatives, as these elements are important to the distribution and magnitude of the cost.
- Regulatory *assurance* is a function of the government's role (e.g., oversight, enforcement, approval), which *validates* that the objectives are achieved through the requirements and accountability demonstration by the private sector.
- This validation is important to the compliance cost and to the effectiveness of the regulation in altering the future environment or resolving the national concern.

This logic model can be used to complement the

CONDUCTING JOINT
ANALYSIS WOULD
ALLOW AGENCIES
TO FIND THE BEST
SOLUTION FOR
THE WHOLE OF
GOVERNMENT.

traditional rulemaking activities governed under the Administrative Procedures Act by:

- Serving as a persistence mechanism for agency decision making and criteria that is in place at the start. Early public consultations can be used to refine and update the model (through deliberate “version control”) to incorporate new information and the current relevance of national concerns.
- Expanding the development of regulatory alternatives to be a joint activity of those agencies with the authority to act and those stakeholders with accountability for the outcomes. The intent is to collect substantive input that would inform the best treatment of the national concern, including market alternatives to regulatory requirements.
- Conducting transparent analysis by sharing the models in hearings, consultations, and writing to supplement the legal language that embodies the rule. Agencies can promote stakeholder input directly on the assessment models through different means:

- Use the ontology to tag each sentence in the legal language with the role it plays in the logic. Present the rule logic as structured English in the write-up to elicit comment directly on the reasoning that would justify each alternative.
- Use the ontology to build the decision models to share with the community for comment. The agency could use discussion forums and electronic means to share the models for comment in parallel with the written notice.
- Use the hearings or advisory committees to jointly develop the models. Use the written notice and comments to work out the legal translation of the models in parallel.

Representative Application of the Logic Model to Consumer Protection

An illustrative example of applying the logic model to examine the key regulatory issue of stablecoin consumer protection is shown in Figure 3.

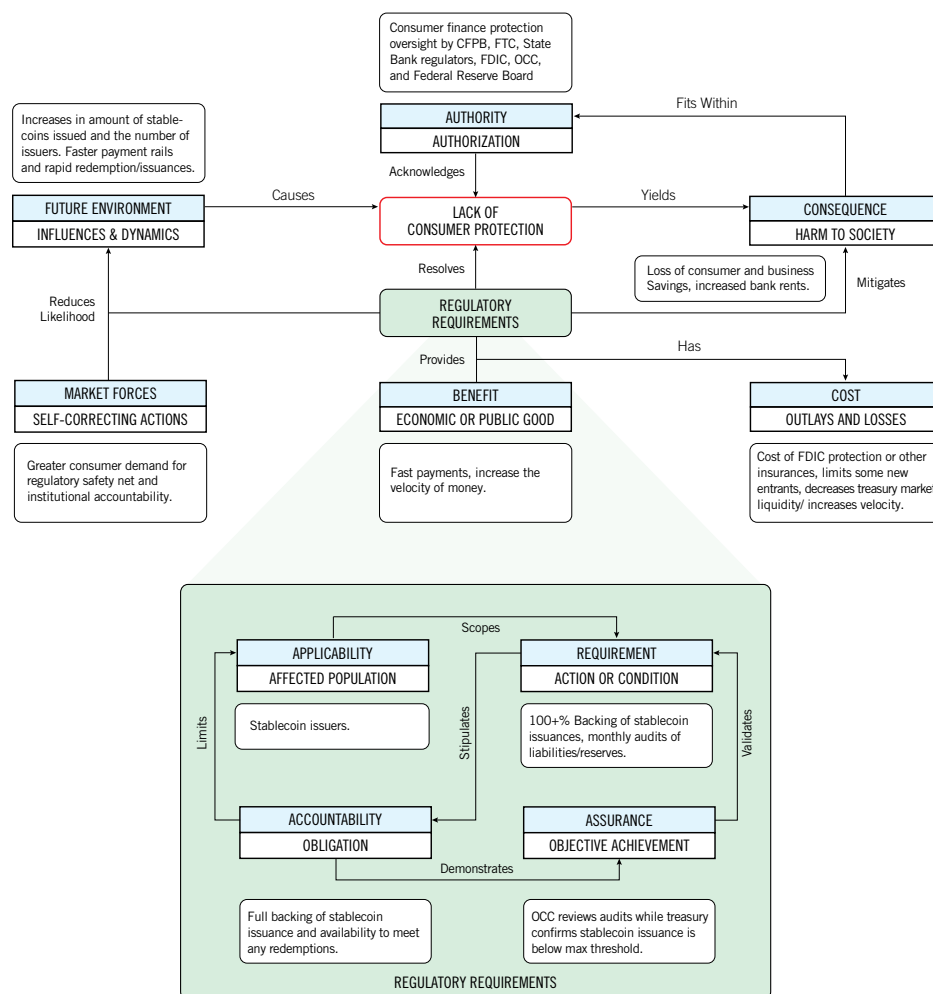


FIGURE 3. AN ILLUSTRATIVE EXAMPLE OF APPLYING THE LOGIC MODEL TO ADDRESS CONSUMER PROTECTION.

As illustrated in this example, a logic model provides a visual approach to initiating and structuring regulatory tradeoffs by making explicit the topics of concern and the associated dependencies between them. To realize the benefits of this approach, the task of sourcing content for the model is best performed as a collaborative exercise with input drawn from multiple regulatory and industry stakeholder groups. While there is existing precedent for such engagement prior

to an official Notice of Proposed Rule Making, such as via a negotiated rulemaking initiative, agencies have been reluctant to invest the additional overhead and time required to coordinate the extended discussions required to reach consensus.¹² As an alternative approach, we propose examining how Federally Funded Research and Development Centers (FFRDCs) could be used to gather diverse public-private viewpoints.

FFRDC FACILITATED PUBLIC-PRIVATE REGULATORY COLLABORATION

FFRDCs are private sector resources operating in the public interest and are required to be free of conflicts of interest.¹³ FFRDCs hold a unique status in promoting collaboration among government, industries, and the nonprofit sector with a mission of advancing the strategic interests of the country and specific agencies. By law, they cannot compete with industry, profit from government decisions, manufacture products, or work for commercial companies. In return, they are encouraged to be long-term partners, using their knowledge and experience to help agencies develop solutions to their most important challenges.

A sizable number of FFRDCs are already in existence; they have well-established relationships with many federal departments and agencies, meaning they can be tasked and produce useful content in relatively short order.¹⁴ For example, the Center for Enterprise Modernization supports Treasury, Commerce, and the financial regulatory agencies, each of which has demonstrated a keen interest in the supervision and, potentially, regulation of blockchain technology and digital assets.

Given this neutral role, FFRDCs are well positioned to bring together a diverse set of stakeholders to advance stablecoin regulation outcomes. In a truly collaborative partnership, the parties pool their efforts and make joint decisions to achieve their shared goals. Moreover, they are jointly accountable for the outcomes of their interaction, including any rewards that may materialize.¹⁵ The premise is that collaboration allows the parties to accomplish more than what each party would be able to accomplish individually.

A collaborative interaction among the stakeholders goes beyond coordination to prioritize communications and decision making based on a wider view of mutual-interest topics. Such engagement enables stakeholders to share ideas, scrutinize each other's inputs, and, in a rulemaking context, contribute to shared ownership of decisions on the rules. To this end, an FFRDC should focus on

creating an environment that allows for:

- **Concrete, attainable goals and objectives:** Regulators make rules in a broader context of other authorities and desired outcomes. Therefore, understanding any significant contextual and priority differences across the relevant parties is key to setting and working toward feasible goals.
- **Members to share a stake in the process and outcomes:** The beneficiaries, regulated parties, their suppliers, and those with secondary outcomes should have a say in the collaboration process and a vested interest in the collaboration outcome.
- **Ability to compromise:** Stakeholders should try to relate to different perspectives and outcomes and be willing to compromise given that there will not be an outcome that will provide maximum benefit to all participants. If they are negotiating and compromising, they are collaborating.
- **Multiple layers of decision making:** As depicted in Figure 3, rulemaking involves a series of interconnected decisions that need to be made on scope, outcomes and options, timing, and what

A SIZABLE NUMBER OF FFRDCS ARE ALREADY IN EXISTENCE; THEY HAVE WELL-ESTABLISHED RELATIONSHIPS WITH MANY FEDERAL DEPARTMENTS AND AGENCIES, MEANING THEY CAN BE TASKED AND PRODUCE USEFUL CONTENT IN RELATIVELY SHORT ORDER.

evidence to consider. Although the final decision belongs to the regulator, stakeholders need to be involved in and consulted with at different timepoints throughout that decision-making process.

- **Flexibility and adaptability:** The rulemaking process should provide flexibility to the stakeholders when needed and appropriate. The more rigid the process, the less opportunities there are for the group of stakeholders to share ownership of the process and accept its outcomes.
- **Speed of industry:** The process should identify areas where industry innovation is creating or expanding national concerns that may require enabling

legislative changes for the authorities and the accountability necessary to address those concerns. These discoveries can inform hearings to ensure agencies are keeping pace with the state of the art.

Participation ultimately depends on whether members' collaboration is in their self-interest: For sustained engagement that spans multiple rules, stakeholders should hold the conviction that collaboration benefits will outweigh costs such as loss of autonomy. Without that conviction, the stakeholders are unlikely to compromise and are more likely to default on agreements or withdraw from the group.

CONCLUSION

Digital assets have grown rapidly since the introduction of Bitcoin in 2009. Despite recent setbacks, they still account for trillions of USD in economic value. More importantly, the widespread use of digital assets could deliver significant economic value by increasing the efficiency of financial transactions and allowing significant innovation in financial markets. As digital assets grow in importance, so does the need for prudential regulation to ensure that they do not become a systemic threat to the economy.

We anticipate stablecoins to be first up in priority for digital asset legislative action. In this whitepaper, we have introduced a logic model-based approach to help regulators better coordinate their rulemaking activities. Given the complexity of the multiagency coordination required to mitigate the potential for unintended consequences, we posit that the use of a logic model can help reduce the likelihood of untenable enforcement costs, overly burdensome reporting requirements, and deliberate regulatory arbitrage.

ABOUT THE AUTHORS

Robert Gallic is an economist and strategist at MITRE with a focus on digital assets and financial markets. He works at the intersection of national security threats and civil sector technical expertise. Rob spent six years in the intelligence community, where he developed strategic national security approaches for the full spectrum of digital assets. He also served as the President's Daily Briefer to CIA Director and Executive Leadership and White House officials. Prior to joining the intelligence community, Rob spent several years working in finance and consulting. He achieved a BA from the University of Notre Dame in Economics and Program of Liberal Studies and a MA from Fordham University in International Political Economics.

Joe Kennedy is a senior principal economist with MITRE, specializing in public policy and the impact of technology. He is especially interested in helping sponsors identify the ways in which future technology can enhance their mission and performance. He has researched and written on a wide number of topics. Past government jobs include General Counsel for the Senate Permanent Subcommittee on Investigations and Chief Economist for the Department of Commerce. Mr. Kennedy has also worked for private groups, including the Manufacturers Alliance and the Information Technology and Innovation Foundation. He has a B.S.F.S. from Georgetown University, a J.D. and M.S. from the University of Minnesota, and a Ph.D. in economics from George Washington University.

Alfred (Andy) Anderegg made his career in architecting and influencing the evolution of the aerospace industry and other national enterprises that span the public and private sectors. As a senior technical advisor, he advises the FAA on a system safety approach for the future of a more automated aviation environment. He works with AIAA space traffic management work group to shape the need for standards in space traffic management. Previously, he served as a portfolio director, guiding concepts, architecture, and system development across all aspects of the National Airspace System. While on detail at the FAA from 2003 through 2006, he led the creation of the Next Generation Air Transportation System (NextGen) Integrated National Plan for Administrator Blakey and Secretary Mineta. Beyond aviation, he has worked on strategy and projects with the DHS for space security, transportation security, biosecurity, and other risk management areas and policy formulation across the federal government.

Dr. Sanith Wijesinghe is a Technical Fellow at the MITRE, supporting the digital assets and web3 work program. He joined MITRE in 2011 and led a research portfolio that made early investments in digital identity and blockchain for applied government use-cases. Dr. Wijesinghe has extensive experience in developing and operating trading systems for the capital markets industry. He holds a master's in aeronautics engineering from Imperial College in London and a master's and Ph.D. in aeronautics and astronautics from the Massachusetts Institute of Technology.

ENDNOTES

- ¹ The White House. (2022, March 9). Executive Order 14067, Ensuring Responsible Development of Digital Assets. [Online]. Available: <https://www.whitehouse.gov/briefing-room/presidential-actions/2022/03/09/executive-order-on-ensuring-responsible-development-of-digital-assets/>.
- ² D. Yaffe-Bellany and E. Griffith, “How a trash talking crypto founder caused a \$40 billion crash,” *New York Times*, May 20, 2022. [Online]. Available: <https://www.nytimes.com/2022/05/18/technology/terra-luna-cryptocurrency-do-kwon.html>.
- ³ D. Yaffe-Bellany, “How Sam Bankman-Fried’s crypto empire collapsed,” *New York Times*, Nov. 1, 2022. [Online]. Available: <https://www.nytimes.com/2022/11/14/technology/ftx-sam-bankman-fried-crypto-bankruptcy.html>.
- ⁴ See, for example, the “Tokenization-as-a-Service” business model for real estate promoted by SolidBlock: “Real estate tokenization.” *SolidBlock*. <https://solidblock.co/real-estate-tokenization/> (accessed March 16, 2023).
- ⁵ G. Morgenson, “How the thundering herd faltered and fell,” *New York Times*, Nov. 8, 2008. [Online]. Available: <https://www.nytimes.com/2008/11/09/business/09magic.html>.
- ⁶ Z. Warmbrodt and E. Mueller, “House Republicans plan crypto panel in first move to oversee troubled industry,” *Politico*, Jan. 12, 2023. [Online]. Available: <https://www.politico.com/news/2023/01/12/mchenry-reveals-house-crypto-panel-names-subcommittee-chairs-00077667>.
- ⁷ “Top reasons why stablecoins are mostly backed by US dollar,” *Times of India*, April 12, 2022. [Online]. Available: <https://timesofindia.indiatimes.com/business/cryptocurrency/blockchain/top-reasons-why-stablecoins-are-mostly-backed-by-us-dollar/articleshow/90796351.cms#:~:text=Ever%20wondered%20why%20most%20of%20the%20stablecoins%20are,the%20most%20dominant%20choice%20over%20other%20fiat%20currencies.>
- ⁸ Tory Newmyer, “How state regulators supplanted the Feds in policing crypto markets,” *Washington Post*, Sept. 20, 2022. [Online]. Available: <https://www.washingtonpost.com/business/2022/09/20/crypto-regulation-alabama-states-feds/>.
- ⁹ See G. Gensler, Chair Gary Gensler’s Letter to Sen. Elizabeth Warren, U.S. Securities and Exchange Commission, Office of the Chair, Aug. 5, 2021. [Online]. Available: https://www.warren.senate.gov/imo/media/doc/gensler_response_to_warren_-_cryptocurrency_exchanges.pdf.
- ¹⁰ “Financial regulation: Complex and fragmented structure could be streamlined to improve effectiveness,” *Government Accountability Office*, March 28, 2016. [Online]. Available: <https://www.gao.gov/products/gao-16-175>.
- ¹¹ In a December 2022 hearing, legislators pressed Rostin Behman, Chairman of CFTC, on how regulations would be coordinated. “Why Congress needs to act: Lessons learned from the FTX collapse,” *U.S. Senate Committee on Agriculture, Nutrition & Forestry*, Dec. 1, 2022. [Online]. Available: <https://www.agriculture.senate.gov/hearings/why-congress-needs-to-act-lessons-learned-from-the-ftx-collapse>.

- ¹² M. P. Carey, “Negotiated rulemaking: In brief,” Congressional Research Service, R46756, April 12, 2021. [Online]. Available: https://www.everycrsreport.com/files/2021-04-12_R46756_f72dec7857316e20d3cd83083de14dc1cde731a2.pdf.
- ¹³ Carnegie Mellon University Software Engineering Institute, “FFRDCs—A primer: Federally funded research and development centers in the 21st century,” Nov. 10, 2017. [Online]. Available: https://resources.sei.cmu.edu/asset_files/Presentation/2017_017_001_507831.pdf.
- ¹⁴ The National Science Foundation maintains a master list of FFRDCs. See “Master government list of federally funded R&D centers.” *National Science Foundation*. <https://www.nsf.gov/statistics/ffrdclist/#agency> (accessed March 16, 2023). The Congressional Research Service reported, in August 2021: “Currently, 12 federal agencies sponsor or co-sponsor a total of 42 FFRDCs. These FFRDCs provide R&D capabilities in support of federal agency missions in a broad range of areas—from energy and cybersecurity to cancer and astronomy. In FY2020, the federal government reported obligations of \$15.4 billion or 10.2% of its total estimated R&D spending to FFRDCs.” M. E. Gallo, “Federally funded research and development centers (FFRDCs): Background and issues for Congress,” Congressional Research Service, R44629, Aug. 2021. [Online]. Available: <https://crsreports.congress.gov/product/pdf/R/R44629>.
- ¹⁵ P. W. Mattessich and B. R. Monsey, “Collaboration: What makes it work. A review of research literature on factors influencing successful collaboration,” Amherst Wilder Foundation, St. Paul, MN, 1992. [Online]. Available: https://www.academia.edu/68136152/Collaboration_What_Makes_It_Work_A_Review_of_Research_Literature_on_Factors_Influencing_Successful_Collaboration.

MITRE

SOLVING PROBLEMS
FOR A SAFER WORLD®