DeFining Regulation

THE FUTURE OF REGULATION FOR DECENTRALIZED FINANCE

Lauren Latta
[redacted] | STONIER ABA GRADUATE SCHOOL OF BANKING CAPSTONE

TABLE OF CONTENTS

EXECUTIVE SUMMARY **2**

From Blockchains to Banking 2
Stablecoins 4
Analysis 5
Key Results and Recommendations 5

STATEMENT OF PROBLEM/HYPOTHESIS **8**

Current Regulatory Action for Crypto-assets 8
Regulatory Perspective 11
OCC National Trust Charter 13
Federal Reserve Bank Consideration of a Central Bank Digital Currency (CBDC) 13
Enforcement of Unlawful Crypto-asset Activities 14
International Regulatory Activities 14
Application of Analysis 16

RESEARCH METHODOLOGY **18**

Sources of Information 18
Methods and Techniques Used 18
Research Limitations 19

FINDINGS AND CONCLUSIONS **21**

LUNA / TerraUSD (UST) 21
Tether (USDT) 27
Gemini Dollar (GUSD) 31
USD Coin (USDC) 34
Summary of Key Risks Themes 40
Conclusion 53

RECOMMENDATIONS **55**

Proposed Supervisory Program 55
Proposed Insurance System 57
Positive or Negative Consequences 58
Achieving the Mission 59

BIBLIOGRAPHY **61**

EXECUTIVE SUMMARY

This paper explores the connections between the evolving decentralized finance, specifically stablecoins, and the world of traditional banking. As the lines separating these two arenas continue to blend, the question becomes whether the existing laws, regulations, and banking principles that have supported traditional, centralized finance are sufficient to support the emerging risk coming from crypto-assets. Moreover, if the regulation of stablecoins were incorporated into the banking sector, are the risks sufficiently controlled and what further action steps may need to be taken? One key consideration in this area is also whether these asset-types should be considered for Federal insurance coverage, similar to the Federal Deposit Insurance Corporation (FDIC) deposit insurance.

To date, there has been relatively limited supervisory guidance issued from the three primary banking regulators, the FDIC, the Office of the Comptroller of the Currency (OCC), and the Federal Reserve Bank (FRB). However, this is an area of significant importance and has gained international regulatory attention, as well as Presidential Executive Orders gearing to address the issue of regulating crypto-assets. Representatives from each of the Federal Banking Agencies have made statements indicating the systemic connections between the crypto-asset space and the existing banking system, and the need for further regulation and oversight to control the risks to insured depository institutions and the financial system more broadly. While minimal changes to banking regulations related to crypto-assets have yet to occur, some of the agencies have shifted to try to incorporate stablecoins into the banking space. This is seen in the case of the National Trust Charter process by the OCC, which has chartered several stablecoin issuers. However, further regulatory efforts are needed to control the risks presented by crypto-assets for both consumers and the financial markets. The research presented shows the significant growth in crypto-asset activity, principally through stablecoins, and expanded number of diverse, young, and underbanked consumers that invest in these assets.

From Blockchains to Banking

The use of blockchain technology was first implemented in 2008 with the development of Bitcoin.[1] While this paper will not be revisiting the history of blockchain technology and digital assets, the general risks in our current environment will be presented. Bitcoin, and many other crypto-assets such as Ether, are not backed by any assets. Rather, they, derive their value from their scarcity or utility, which has resulted in dramatic price fluctuations depending on market sentiment. The desire to have a digital asset that could be converted to another coin without first converting to a FIAT (or government-issued) currency resulted in the rise of stablecoins, which are backed by a pool of assets or utilize other pegging methods to maintain a stable value. Since the start of Bitcoin, crypto has innovated to incorporate smart contracts by Ethereum, changes to protocols to reduce the needed computing power and processing time,

[1] (Gupta, "A Brief History of Blockchain")

and other innovations to make the coins more accessible through wallets and now financial institutions. The crypto-asset market cap totals an estimated $1 trillion as of October 28, 2022, consisting of approximately 20.2 thousand crypto-assets coin types (roughly 11 thousand that are active). [2,3] Financial institutions are exploring more ways to incorporate crypto-asset-related activities into their business model, most typically involving facilitating the purchase or sale of digital assets, accepting digital assets as collateral on loans, crypto-asset custody, payment services, and now even offering crypto-trading services.[4]

The Community State Banking Supervisors (CSBS) presented a National Survey of Community Banks at their Community Banking Research Conference on September 28, 2022, which indicated an increase in community bank interest to engage in crypto-asset activity.[5] The survey was responded to between April and July 2022, and included mostly state-chartered banks with less than $10 billion in total assets. Survey respondents indicated, while less than 1.5 percent were currently offering crypto-asset services, approximately 11.2 percent plan to offer such services in the next 12 months.[6] One such example is Vast Bank, a community bank located in Tulsa, Oklahoma, which was the first nationally chartered, FDIC-insured bank to offer customers the ability to buy, sell, and hold digital assets as well as provide custody services.[7] The bank began engaging in this activity in January 2021, following OCC approval.[8]

While the prolonged low interest rate environment and movement away from centralized finance fueled much of the growth in crypto-assets since 2016, recent events have highlighted the significant risks of this asset class as well as the weaknesses in risk management practices considered fundamental to traditional finance. Over the past 6 months, the market has observed the collapse of LUNA and stablecoin TerraUSD in May 2022, and shortly thereafter the insolvency of crypto lender Celsius Network, hedge fund Three Arrows Capital, and crypto-asset exchange Voyager Digital, LLC. [9] As recent as November 2022, the widely known and advertised crypto-asset exchange, FTX, became insolvent and filed for bankruptcy. All these failures have brought the issue of crypto-asset activity at banks to the forefront of discussion for banking regulators.

[2] (Horwarth, "How Many Cryptocurrencies are There In 2023?")
[3] (CoinMarketCap, "Today's Cryptocurrency Prices by Market Cap")
[4] (Rooney, "Mastercard Will Help Banks Offer Cryptocurrency Trading")
[5] (Conference of State Bank Supervisors, "2022 National Survey of Community Banks")
[6] (Conference of State Bank Supervisors, "2022 National Survey of Community Banks")
[7] (Scrivner, ABA Banking Journal Podcast on "How a Community Bank Launched a Retail Crypto Platform")
[8] (Vast Bank NA, Press Release "Vast Bank Partners with Coinbase to Complete Successful Bitcoin Transaction")
[9] (Duggan, Article "Celsius Crypto Meltdown: A Crypto Lender in Crisis")

Stablecoins

One of the evolutions of distributed ledger technology and blockchain is the emergence of stablecoins around 2014. Stablecoins are crypto-assets whose values are tied to FIAT currencies or other assets.[10, 11] A Bank for International Settlements whitepaper titled "Stablecoins: risks, potential, and regulation," provides the following definitions of major stablecoin categories: "Stablecoins aim to preserve a stable value through at least two distinct mechanisms. Most commonly, stablecoin issuers purport to back stablecoins with fiat currency, assets or other cryptocurrencies; these are called asset-linked stablecoins. By contrast, algorithm-based stablecoins seek to use algorithms to increase or decrease the supply of stablecoins in response to changes in demand."[12] To address the prior price volatility issues associated with Bitcoin and other crypto-assets, stablecoins were introduced to serve as a more stable store of value, means of payment, and unit of account.[13] Stablecoins aimed to bridge distributed ledger technology with more traditional, centralized monetary currencies. Stablecoins share the most similarities with characteristics of the centralized banking system. As such, stablecoins will be the focus of this paper.

Major stablecoin projects include Tether, USD Coin, Binance USD, Dai, Pax Dollar, True USD, USDD, and the failed TerraUSD, etc.[14] Several of these stablecoins are reviewed in the case studies for this analysis.

Table One: Top 10 Stablecoins by Market Cap, As of January 13, 2023

,

Name	Price	1h %	24h %	7d %	Market Cap	Volume(24h)	Circulating Supply
Tether USDT	$1.00	0.00%	0.01%	0.05%	$66,283,479,275	$34,862,000,627 34,857,334,253 USDT	66,272,586,193 USDT
USD Coin USDC	$1.00	0.00%	0.00%	0.00%	$44,108,835,590	$3,394,164,409 3,393,654,710 USDC	44,104,706,301 USDC
Binance USD BUSD	$0.9998	0.00%	0.01%	0.01%	$16,308,517,017	$9,112,417,026 9,109,581,230 BUSD	16,310,972,436 BUSD
Dai DAI	$1.00	0.01%	0.01%	0.05%	$5,806,788,998	$181,144,527 181,079,085 DAI	5,804,175,688 DAI
Pax Dollar USDP	$1.00	0.13%	0.09%	0.68%	$879,673,655	$2,190,304 2,178,741 USDP	878,084,065 USDP
TrueUSD TUSD	$0.9999	0.04%	0.02%	0.06%	$846,126,455	$36,973,113 36,960,296 TUSD	846,179,638 TUSD
USDD USDD	$0.9817	0.01%	0.20%	0.28%	$712,048,639	$9,501,830 9,686,151 USDD	725,332,036 USDD
Gemini Dollar GUSD	$1.01	0.12%	0.35%	1.47%	$612,424,817	$940,039 931,793 GUSD	607,049,883 GUSD
Fei USD FEI	$0.992	1.02%	0.75%	2.07%	$421,582,049	$1,228,919 1,257,199 FEI	424,996,178 FEI
Neutrino USD USDN	$0.3683	0.07%	4.80%	19.72%	$250,538,812	$683,829 1,865,367 USDN	680,266,294 USDN

[10] (Arner, Auer, & Frost; Working Paper on "Stablecoins: risks, potential and regulation", 2-6)
[11] (Hertig, Article on "What Is a Stablecoin?")
[12] (Arner, Auer, & Frost; Working Paper on "Stablecoins: risks, potential and regulation")
[13] (Arner, Auer, & Frost; Working Paper on "Stablecoins: risks, potential and regulation")
[14] (CoinMarketCap, "Today's Cryptocurrency Prices by Market Cap")

Analysis

Information obtained for this case study review consists of publicly available, third-party publications, as well as laws, regulations, or guidance issued by federal agencies and banking regulators. The analysis supporting the risk conclusions and final recommendations are based on a combination of primary data obtained from the author's professional experience, combined with information from third-party publications.

This analysis consists of four cases. In three of the cases, stablecoin issuers either failed or experienced a material adverse event: (1) the crash of TerraUSD / LUNA in May 2022, (2) adverse events affecting Tether USDT from 2017 until 2022, and (3) adverse events in 2022 impacting Gemini GUSD. These cases reflect a variety of issues that have negatively affected stablecoins. The fourth case study, USD Coin, is a stablecoin which has faired favorably for the past few years and demonstrates some sound practices which could be considered in developing a regulatory framework for stablecoins.

Key Results and Recommendations

The Key Risks

Based on a review of the three main case studies as well as additional third-party research performed on stablecoins, some key risks were identified. These key risks include, but are not limited to, the following: an inability to scale algorithmic stablecoins, credit and liquidity risks, pricing volatility, risk associated with unsustainable growth, run risk, contagion risk, compliance and legal risks, operational risks associated with undeveloped governance practices and risk management, and third-party risk/counterparty risk.

Are the risks addressed under the existing regulatory framework?

This paper then explored whether existing banking laws, regulations, and frameworks generally address some of the key risk concerns. Ultimately, most, if not all, of the risks were addressed in some way within existing banking laws, regulations, and the current risk framework. Therefore, many of the issues presented in the cases could have been prevented or minimized under the existing banking regulation framework and would be a natural fit for oversight provided by the primary federal banking regulators. Some areas, while the risk principles are consistent, may need to be expanded to address the operational differences between centralized banks and stablecoin issuers. For example, algorithmic stablecoin pegging mechanisms and stablecoin asset reserve requirements need further regulation to be developed. Whereas, regulations addressing liquidity risk, prudent growth, third-party risks, effective governance, and sound risk management may need adjustments, but would not require a wholesale change, as the principles remain consistent. Further, some of the risks related to investor disclosures and fraud are currently being regulated through the Security and

Exchange Commission (SEC) in their application of stablecoin issuances as "securities," and through the Department of Justice. Also, false claims regarding deposit insurance coverage are similarly being overseen by the FDIC.

This paper proposes a regulatory structure, similar to the FDIC, to serve as the singular chartering authority, supervisory authority, and insurer. This federal regulator would include representation from all major banking and securities regulatory agencies, and would be responsible for the implementation of a safe and sound risk management framework for stablecoin issuers. Many of the banking principles currently in existence could be leveraged to develop a structure for stablecoins. This federal chartering and insurance authority would fully supervise stablecoin issuers as well as ensure development of appropriate resolution plans and receivership strategies. Many of the key elements of this regulatory framework are similar to the FDIC's role for financial institutions. However, one of the key differences with the proposed framework is that supervision of Digital Assets would fall under one regulator that also serves as the insurer. By maintaining a separate agency and insurance fund, risks in the crypto-asset industry can be partitioned from those of traditional banking. This paper presents some of the overlaps between traditional banking and decentralized finance; consequently, many of the principles backing existing banking laws, rules, and regulations could be implemented when regulating stablecoin issuers.

Should stablecoins receive deposit insurance coverage?

The final question, and arguably the most important one, arising from this research is the potential application of deposit insurance. Some of the risks highlighted in this paper, such as the contagion risk, the run-risk, and even the significant price volatility, is tied to the lack of appropriate mechanisms to maintain confidence for consumers in the crypto-asset markets. The best way to mitigate some of the aforementioned risks, which are largely uncontrolled, is to offer federal insurance coverage for stablecoins which are backed by stable, FIAT assets.

This paper outlines how insurance coverage may operate differently than the deposit insurance coverage provided for banks. For example, the proposed process would likely be tied to a separate insurance fund that is appropriated through a series of risk premiums assessed on an issuer-by-issuer basis. Potential ratings factors to set the assessment rate may vary from the traditional CAMELS rating system applied to banks, and will likely result in a high required reserve level to compensate for some of the higher risks present today.

The stablecoin markets make up over 80 percent of crypto trading and lending, and maintain many similarities to centralized currencies. Therefore, if crypto-assets were to receive additional regulatory oversight, stablecoins should be the first type of asset addressed. This would bring a significant degree of stability to the crypto-market as a whole. The stablecoin markets are immaturely developed to date, and the lack of regulation and federal oversight has resulted in negative impacts that are not seen the in traditional banking sector today. These cases demonstrate the significant adverse effect a failure of a stablecoin issuer can have on consumers and the financial markets more broadly. For federal agencies, such as the FDIC, FRB,

and OCC, to satisfy their mission to maintain stability and public confidence in the nation's financial system, the agency should consider how the application of sound banking principles and deposit insurance to stablecoin issuers may be the next evolution in banking. This would prevent the uncontrolled risk from flowing into the banking sector. Additionally, this would provide better protection to consumers, draw more consumers into the banking system, and also better protect minority and low-moderate socioeconomic consumers who are more likely to hold stablecoins.

STATEMENT OF PROBLEM/HYPOTHESIS

This analysis explores the key risks of stablecoins to financial markets, and existing U.S. banking laws and regulations that may be applicable to regulate this asset type. Finally, this analysis asks the elephant-in-the-room questions: Should stablecoins be federally insured? If so, is the current banking regulatory framework robust enough to control the risks to the financial sector?

This paper will also explore the relevant regulations and regulatory guidance that could shape the way crypto-asset-activity is regulated by the three primary federal banking regulators, the FRB, the OCC, and the FDIC. Ultimately, this analysis aims to address whether the current banking regulatory framework is sufficient to address the key risks to the banking industry from stablecoins. This assessment will factor in current regulations and frameworks that exist today, and opine on whether these laws and regulations adequately capture the risks present in this newly emerging asset class. Furthermore, any significant gaps in the regulatory framework will be addressed, with proposed solutions.

Current Regulatory Action for Crypto-assets

Actions taken by federal banking regulators specific to crypto-activity have a relatively short history and are in their early stages of development. However, this area has been identified as a key risk to the banking sector by leaders in all the federal banking agencies.

Since 2020, the OCC has issued several press releases, bulletins, and interpretive letters addressing crypto activities permissible for national banks.[15] This includes OCC Bulletin 2020-59, which provided advance notice of proposed rulemaking on the OCC's digital activities rules and other banking issues related to digital technology.[16] The OCC has issued interpretive letters addressing the authority of national banks to provide cryptocurrency custody services for customers (July 2020), to hold stablecoin reserves (September 2020), and to engage in payment activities using stablecoins (January 2021).[17,18,19] Of note, in November 2021, the OCC issued interpretive letter #1179, which clarified the authority of a bank to engage in certain cryptocurrency activities, and authorized the OCC to charter a National Trust Bank. This interpretive letter greatly expanded the activities which financial institutions could engage in crypto-related-activities, as long as they were authorized through a separate Trust Bank (refer to comments below on the National Trust Charter).

In November 2021, the President's Working Group on Financial Markets, in partnership with the FDIC and OCC, released an Interagency Report on Stablecoins. The Report identifies that "if

[15] (OCC, OCC Website on Digital Assets)
[16] (OCC, OCC Bulletin 2020-59 on Digital Activities: Advance Notice of Proposed Rulemaking)
[17] (OCC, "Interpretive Letter #1170")
[18] (OCC, "Interpretive Letter #1172")
[19] (OCC, "Interpretive Letter #1174")

well-designed and appropriately regulated, stablecoins could support faster, more efficient and more inclusive payment options. However, the report also identified a variety of risks presented by stablecoins including risks to market integrity and investor protection (such as fraud and misconduct), illicit finance concerns and risk to financial integrity (e.g. Money Laundering and Terrorist Financing risks), and payment systems risk resulting from runs or operational disruptions."[20]

The FRB, OCC, and FDIC issued a joint statement in November 2021 summarizing the agency initiatives to evaluate the permissibility, safety and soundness risks, consumer protection implications, and compliance with existing laws and regulation for crypto-asset-related activities, which banks may engage.[21] The agencies will also evaluate capital and liquidity standards for banks engaged in crypto-asset-activity.

The President's Working Group on Financial Markets (PWGFM), the FDIC, and the OCC released a report titled "Report on Stablecoins" on November 1, 2021.[22] The Interagency report noted numerous risks associated with stablecoins and provided a list of recommendations. Secretary of the Treasury Janet L. Yellen noted, "Current oversight is inconsistent and fragmented, with some stablecoins effectively falling outside of the regulatory perimeter."[23] Of significant importance, the Report on Stablecoins recommended that Congress act promptly to enact legislation to "ensure payment stablecoins and payment stablecoin arrangements are subject to a federal prudential framework." Key recommendations included (paraphrased):

- Require stablecoin issuers be insured depository institutions to address risks to stablecoin users and guard against runs.
- Custodial wallet providers should be subject to federal oversight. Also, provide authority to a federal supervisor of a stablecoin issuer to require any entity critical to the functioning of a stablecoin arrangement meet appropriate risk management standards.
- Require stablecoin issuers and custodial wallet providers comply with restrictions on affiliations with commercial entities, to address concerns with systemic risk and a concentration of economic power.

On March 9, 2022, President Joseph Biden issued Executive Order 14067, "Ensuring Responsible Development of Digital Assets", which calls for the development of a coordinated interagency action plan for mitigating the digital-asset-related illicit finance and national security risks. [24] As a result of this Executive Order, the Treasury called on the Financial Stability Oversight Council (FSOC) to report on the specific financial stability risks and regulatory gaps posed by digital assets. The U.S. Department of the Treasury (DOT, or "Treasury Department") provided reports

[20] (PWGFM, FDIC, & OCC; "Report on Stablecoin")
[21] (OCC, FRB, & FDIC; "Joint Statement on Crypto-Asset Policy Sprint Initiative and Next Steps")
[22] (PWGFM, FDIC, & OCC; "Report on Stablecoin")
[23] (DOT, Press Release "PWGFM Releases Report and Recommendations on Stablecoins")
[24] (DOT, "Action Plan to Address Illicit Financing Risks of Digital Assets")

addressing the illicit finance and national security risks.[25] The FSOC report noted three gaps in the area of regulation for crypto-assets in the US (paraphrased): (1) spot markets are not regulated to ensure orderly and transparent trading, and prevent conflicts of interest and market manipulation; (2) inconsistent regulatory framework, where firms can engage in regulatory arbitrage; and, (3) certain crypto-trading platforms offer retail customers the ability to directly access markets, which exposes retail investors to practices commonly performed by an intermediary (such as automated liquidation). [26]

The FDIC has issued two independent statements involving crypto-assets to date. In Financial Institution Letter (FIL) 16-2022, "Notification of Engaging in Crypto-Related Activities" issued on April 7, 2022, the agency established procedures for banks to report whether they are engaged or considering engaging in crypto-related activities.[27] This process allows the FDIC to discuss the pertinent risks with each bank on a case-by-case basis. The FIL generally states some of the risks associated with crypto-asset activity including safety & soundness risks, financial stability risks, and consumer protection risk.[28] The FRB published a similar notification requirement on August 16, 2022, titled SR-22-6/CA 22-6, "Engagement in Crypto-asset-Related Activities by Federal Reserve-Supervised Banking Organizations". [29]

To address misrepresentations about FDIC Insurance made by some crypto companies[30], the FDIC published a second statement, an Advisory titled "Advisory to FDIC-Insured Institutions Regarding Deposit Insurance and Dealing with Crypto Companies," on July 29, 2022.[31] This Advisory reminds insured banks that they need to be aware of how FDIC insurance operates and need to assess, manage, and control risks arising from third-party relationships, including crypto companies. The FDIC noted concerns about risk of consumer confusion or harm from crypto-assets offered in connection with an insured depository institution. The advisory states that banks should evaluate their third-party risk management policies and procedures, including compliance risks related to Part 328 Subpart B (False Advertising, Misrepresentation of Insured Status, and Misuse of the FDIC's Name or Logo).

On January 3, 2023, the FRB, FDIC, and OCC issued a statement highlighting the key risks for banking organizations titled "Joint Statement on Crypto-Asset Risks to Banking Organizations."[32] The Joint statement describes each agencies case-by-case approach taken to reviewing crypto-asset activity, and identified some general risks observed to date, which include (paraphrased below):

- Risk of fraud or scams

[25] (DOT, "Action Plan to Address Illicit Financing Risks of Digital Assets")
[26] (FSOC, "Report on Digital Asset Financial Stability Risks and Regulation 2022", 112-119)
[27] (FDIC, FIL-16-2022 "Notification of Engaging in Crypto-Related Activities")
[28] (FDIC, FIL-16-2022 "Notification of Engaging in Crypto-Related Activities")
[29] (FRB, SR 22-6 "Engagement in Crypto-Asset-Related Activities by FRB-Supervised Banking Organizations")
[30] (FDIC, Press Release "FDIC Issues Cease and Desist Letters to Five Companies...")
[31] (FDIC, FIL-35-2022 "Advisory to FDIC-Insured Institutions Regarding Deposit Ins. and Dealings with Crypto...")
[32] (FDIC, FIL-01-2023 "Joint Statement on Crypto-Asset Risks to Banking Organizations")

- Legal uncertainties related to custody practices, redemptions, and ownership rights
- Inaccurate or misleading representations regarding deposit insurance, and other practices that may be unfair, deceptive, or abusive to consumers
- Significant volatility in crypto-asset markets
- Susceptibility of stablecoins to run risk
- Contagion risk due to interconnectedness between crypto-asset sector participants
- A lack of mature and robust risk management and governance practices
- Heightened risks associated with open, public, and/or decentralized networks, such as a lack of governance; absence of contracts or standards on roles, responsibilities, and liabilities; and, vulnerabilities to cyber-attacks, outages, lost assets, and illicit finance.[33]

The Joint statement noted that it is "important that risks related to the crypto-asset sector that cannot be mitigated or controlled do not migrate to the banking system."[34] The statement encouraged a "careful and cautious" approach to reviewing crypto-asset-related activities at each banking organization.[35] Furthermore, each agency has developed processes to review crypto-asset-related activities to ensure they can be performed in a safe & sound manner, are legally permissible, and comply with laws and regulations. Notably, the Joint Statement indicates two areas where crypto-asset activity will likely be inconsistent with safe and sound banking practices. This includes issuing or holding as principal crypto-assets that are issued, stored, or transferred on an open, public, and/or decentralized network or similar system.[36] Secondly, engaging in a business model that is concentrated in crypto-asset-related activities or has concentrated exposure to the crypto-asset sector.[37]

Regulatory Perspective

In remarks by Acting Comptroller of the Currency Michael J. Hsu at DC Fintech Week on October 11, 2022, he identified the "three lenses" which regulators should use to identify risks:

- **Skeuomorphism** – Acting Comptroller Hsu defined this term as "using the familiar [traditional finance, or TradFi] to introduce something novel" which "can downplay or mask the risks involved and establish false expectations."[38]
- **Integration** – Acting Comptroller Hsu stated, "Integrating an immature crypto industry with a mature TradFi system without guardrails and gates would be imprudent." He added "even integration within the crypto industry itself warrants attention from financial stability regulators" as the industry should seek to "limit the scope of activities commingled within a single crypto firm."[39]

[33] (FDIC, FIL-01-2023 "Joint Statement on Crypto-Asset Risks to Banking Organizations", 1)
[34] (FDIC, FIL-01-2023 "Joint Statement on Crypto-Asset Risks to Banking Organizations", 1)
[35] (FDIC, FIL-01-2023 "Joint Statement on Crypto-Asset Risks to Banking Organizations", 2)
[36] (FDIC, FIL-01-2023 "Joint Statement on Crypto-Asset Risks to Banking Organizations", 2)
[37] (FDIC, FIL-01-2023 "Joint Statement on Crypto-Asset Risks to Banking Organizations", 2)
[38] (Hsu & OCC, Remarks at DC Fintech Week 2022 on "Skeumorphism, Commingling, and Data Gaps in Crypto", 2-5)
[39] (Hsu & OCC, Remarks at DC Fintech Week 2022 on "Skeumorphism, Commingling, and Data Gaps in Crypto", 6-8)

- **Data** – Acting Comptroller Hsu noted "regulators have relied on supervisory processes to monitor banks' exposures to crypto and to gain insights into their activities." However, he stated, "recurring gathering of quantitative data focused on the nexus between banks and crypto could help ensure that regulators have an accurate and complete view of the risk." He further added that the Office of Financial Research could perform this research domestically, and given the borderless nature of crypto, international coordination is warranted.[40]

Acting Comptroller Hsu has noted the active and contested discussions by federal regulators on whether to pull crypto-asset activity into the U.S. banking regulatory perimeter. This would expand regulatory oversight of digital assets; however, Acting Comptroller Hsu noted this also would introduce the risk of potentially allowing a crypto to choose "from a menu of regulators and regulatory perimeters."[41] To offset this risk, he emphasized the importance of interagency and international collaboration to ensure "regulatory standards remain high and the playing field level."[42]

> "How do we, in the bank regulatory community, ensure safety and soundness, while encouraging responsible innovation, in the face of a high risk and rapidly changing technology? I believe we can do so by taking a careful and cautious approach and by developing guardrails and gates."
>
> -Acting Comptroller Hsu[43]

FDIC Acting Chairman Martin H. Gruenberg spoke on crypto-assets at the Brookings Institute on October 20, 2022.[44] His remarks emphasized the importance of the agencies developing a better understanding of activities planned or already active, and providing case-specific supervisory feedback. He also stated that the FDIC would take a cautious and deliberate approach to bank participation in crypto-asset activity due to (1) risk to safety and soundness, consumer protection, and financial stability; (2) lack of history and familiarity with these assets; and, (3) the dynamic nature of these assets.[45] Acting Chairman Gruenberg also addressed how the "distributed ledger technology upon which they [stablecoins] are built may prove to have meaningful applications and public utility within the payment systems."[46] He added the caveat that decentralized forms of monetary exchange have historically led to numerous bank runs and cycles of bank failures.[47]

---

[40] (Hsu & OCC, Remarks at DC Fintech Week 2022 on "Skeumorphism, Commingling, and Data Gaps in Crypto", 8-9)
[41] (Hsu & OCC; Remarks to the Harvard Law School and Program ... "Don't Chase", 4)
[42] (Hsu & OCC; Remarks to the Harvard Law School and Program ... "Don't Chase", 4)
[43] (Hsu & OCC; Remarks to the Harvard Law School and Program ... "Don't Chase", 6)
[44] (Gruenberg & FDIC; Remarks at the Brookings Institution on "The Prudential Regulation of Crypto-Assets")
[45] (Gruenberg & FDIC; Remarks at the Brookings Institution on "The Prudential Regulation of Crypto-Assets")
[46] (Gruenberg & FDIC; Remarks at the Brookings Institution on "The Prudential Regulation of Crypto-Assets")
[47] (Gruenberg & FDIC; Remarks at the Brookings Institution on "The Prudential Regulation of Crypto-Assets")

In July 2022, FRB Vice Chair Lael Brainard spoke on this topic at the Bank of England Conference. She stated that bank regulatory involvement "provides an interface where regulators have strong sightlines and can help ensure strong protections….But bringing risks from crypto into the heart of the financial system without the appropriate guardrails could increase the potential for spillovers and has uncertain implications for the stability of the system."[48]

OCC National Trust Charter

The OCC has provided a route for some crypto companies to obtain a National Trust Bank charter. On January 11, 2021, the OCC issued an Interpretive Letter titled "OCC Chief Counsels Interpretation on National Trust Banks."[49] This Letter details the OCC's authority to charter national banks as founded in the National Bank Act, 12 U.S.C. § 21-27, whose activities are "limited to those of a trust company and activities related to the same."[50] These national banks are subject to specific standards, including adopting appropriate policies and procedures, conducting appropriate reviews, maintaining appropriate records, and arranging suitable audits.[51] According to news releases listed on the OCC's website, four crypto-companies have received approval by the OCC under this authority. These companies include Anchorage Trust Company (conditionally approved on January 13, 2021),[52] Protego Trust Bank (conditionally approved on February 5, 2021) [53], Paxos National Trust (conditionally approved on April 23, 2021), [54] and SoFi Bank (conditionally approved on January 18, 2022) [55].

Federal Reserve Bank Consideration of a Central Bank Digital Currency (CBDC)

The Board of Governors of the Federal Reserve System released a research paper in January 2022 titled "Money and Payments: The U.S. Dollar in the Age of Digital Transformation."[56] This paper considers the state of the current U.S. payment system and emergence of stablecoins. This analysis notes that the CBDC would act as a digital liability between consumers and the Federal Reserve, versus going through a commercial bank. The Federal Reserve's analysis suggests that a U.S. CBDC, if created, would best serve the needs of the U.S. by being privacy-protected, intermediated, widely transferable, and identity-verified. The research paper notes this is not without some additional risks, such as the unknown impact to the financial sector market structure, the cost and availability of credit, safety and stability of the financial system, and the efficacy of monetary policy. Further, it disclosed that the FRB is presently researching and experimenting with digital currencies, including a CBDC. This research provides insights

[48] (Brainard & FRB; Remarks at Bank of England Conference "Crypto-Assets and Decentralized Finance ...")
[49] (OCC, Interpretive Letter #1176 "Chief Counsel's Interpretation of National Trust Banks")
[50] (OCC, Interpretive Letter #1176 "Chief Counsel's Interpretation of National Trust Banks", 2)
[51] (OCC, Interpretive Letter #1176 "Chief Counsel's Interpretation of National Trust Banks")
[52] (OCC, News Release 2021-6 "OCC Conditionally Approves Conversion of Anchorage Digital Bank")
[53] (OCC, News Release 2021-19 "OCC Conditionally Approves Conversion of Protego Trust Bank")
[54] (OCC, News Release 2021-49 "OCC Conditionally Approves Chartering of Paxos")
[55] (OCC, News Release 2022-4 "OCC Conditionally Approves SoFi Bank, NA")
[56] (FRB, Report on "Money and Payments: The U.S. Dollar in the Age of Digital Transformation")

into how the technology and payment systems backing stablecoins could be leveraged into a CBDC issued by the U.S. While not the focus of this paper on stablecoin regulation, this would compete with many of the stablecoin products in existence and could be a potential solution to produce a more secure and stable digital currency.

Enforcement of Unlawful Crypto-asset Activities

To date, the SEC and Commodity Futures Trading Commission (CFTC) have been the primary agencies taking regulatory action against bad actors in the crypto market. SEC Chairman Gary Gensler has advocated for regulation of crypto-assets, particularly stablecoins, by applying the definition of "securities" within the SEC's jurisdiction over digital asset types. [57] Chairman Gensler has argued that further regulation must be developed to provide for investor protections, market integrity, barring front running customers, and anti-manipulation and fraud. The SEC announced in May 2022 that they would be doubling the size of their Crypto Assets and Cyber Unit to 50 personnel.[58] From July 2013, the date of the SEC's first action, through December 2021, the SEC has brought forward 97 crypto asset-related litigation and administrative proceedings with $2.4 billion in total monetary penalties. [59] Through October 22, 2022, SEC actions total 17. [60] An analysis performed by Cornerstone Research partners identified that in the 20 actions issued in 2021, 65 percent alleged fraud and 80 percent alleged an unregistered securities offering violation.

The CFTC has also indicated their intent to increase enforcement of crypto-related cases. In May 2022 at a crypto industry conference, CFTC Chairman Rostin Behnam stated, "that the CFTC has filed more than 50 enforcement actions related to digital asset activity since 2015, and more than half of those cases involved allegations of fraud." [61] Chairman Behnam further indicated that the agency would prioritize its existing authority to deter and combat fraud in the crypto markets, while adding that lawmakers grant his agency authority to regulate crypto-assets to protect investors.

International Regulatory Activities

The risks of crypto-assets and discussions on regulation are not unique to banking activities in the U.S. Numerous countries are working to develop prudent standards for how crypto-asset-activities interface with the TradFi system.[62] Some examples of policies which integrate crypto-assets into traditional finance include:

[57] (Schonberger, "SEC Chair Gensler warns on investing in crypto after meltdown")
[58] (SEC, Press Release 2022-78 "SEC Nearly Doubles Size of Enforcement's Crypto Assets and Cyber Unit")
[59] (Mola & Cornerstone Research; "SEC Cryptocurrency Enforcement 2021 Update")
[60] (SEC, SEC Website "Crypto Assets and Cyber Enforcement Actions")
[61] (Sun, "CFTC Signals Intent to Increase Enforcement of Crypto-Related Cases")
[62] (Comply Advantage, "Cryptocurrency Regulations Around The World")

- Many countries have developed ways to tax cryptocurrency transactions (this is now something the US will be implementing based on the 2022 Infrastructure Bill). [63] To specify a few countries, Canada began taxing cryptocurrencies in 2013, Singapore assesses sales tax on crypto-transactions starting in 2017, and digital asset sales were subject to Capital Gains tax in Australia starting in 2017.[64]
- Australia announced a new licensing framework for cryptocurrency exchanges in December 2021, which would bring crypto-assets into a regulated environment. [65,66]
- The Japanese Financial Services Agency announced legislation would be proposed in 2022 to regulate stablecoin issuers. [67]
- The South Korean government introduced legislation in March 2021 requiring cryptocurrency investors to use the same name on their wallets as their bank accounts. In addition, cryptocurrency exchanges are required to verify customer identifies. [68, 69]
- Switzerland has established legislation defining the legalities of exchanging cryptocurrency and running exchanges in September 2020. [70, 71]
- The United Kingdom (UK) plans to legislate to address misleading crypto-asset promotions. [72, 73]
- China has banned any form of crypto-asset activity starting in September 2021.[74] At the end of January 2023, the Hong Kong Monetary Authority indicated it may require to keep their principal business and corporate entity in Hong Kong, should they wish to obtain a required stablecoin license.[75]
- The European Union issued their Fifth Anti-Money Laundering (AML) Directive in January 2020 requiring exchanges to perform customer due diligence/know your customer and satisfy standard AML reporting requirements.[76] Additional countries have also implemented AML requirements for crypto-asset-activity, including the UK, Malta, Estonia, Mexico, etc.

Global committees have also developed suggested regulatory frameworks. The BASEL Committee and Bank for International Settlements (BIS), Basel, Switzerland, have proposed establishing capital limits and liquidity/funding limitations on bank's crypto-asset exposures.[77] These proposals may limit bank capital exposure to as little as 1 percent of Regulatory Tier 1

[63] (Thomson Reuters & Ledgible; "Refresher: Infrastructure and Investment Job Act's Crypto Reporting...")
[64] (Comply Advantage, "Cryptocurrency Regulations Around The World")
[65] (Comply Advantage, "Cryptocurrency Regulations Around The World")
[66] (Jose & Byron; "Australia proposes new laws to regulate crypto, BNPL")
[67] (Comply Advantage, "Cryptocurrency Regulations Around The World")
[68] (Comply Advantage, "Cryptocurrency Regulations Around The World")
[69] (Stangarone, "South Korea Tightens Regulations on Cryptocurrencies")
[70] (Comply Advantage, "Cryptocurrency Regulations Around The World")
[71] (Comply Advantage, "Cryptocurrency Regulations Around The World")
[72] (Comply Advantage, "Cryptocurrency Regulations Around The World")
[73] (HM Treasury, "Government to strengthen rules on misleading cryptocurrency adverts")
[74] (Hu, John, Shen, & Wilson; "China's top regulators ban crypto trading and mining, sending bitcoin tumbling")
[75] (Au, "How Hong Kong Is Gearing Up to Regulate Stablecoins")
[76] (Comply Advantage, "5th Anti-Money Laundering Directive (5AMLD): What You Need To Know")
[77] (BIS, "Second consultation on the prudential treatment of cryptoasset exposures")

Capital.[78] The BIS Report also noted requirements to hold higher levels of liquid assets, depending on the digital asset type and collateralization. For example, the BIS suggested that certain fully collateralized stablecoins may exhibit similar liquidity characteristics to equity securities, therefore requiring a similar Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) as banks holding certain securities.[79]

Moreover, the Financial Action Task Force (FATF), a global money laundering and terrorist financing watchdog, has issued several rules requiring heighted reporting and suspicious activity monitoring for crypto-asset-related firms. Most notably, FATF INR 15, issued in June 2019, requires countries to ensure that service providers assess and mitigate their money laundering and terrorist financing risks and implement a full range of Anti-Money Laundering/Countering the Financing of Terrorism (AML/CFT) compliance measures.[80] The U.S. has adopted many of the recommendations from FATF through policies created by the US Treasury's Financial Crimes Enforcement Network (FinCEN).

As crypto-assets by their very nature are borderless and affect global markets, it is important to consider the policies being initiated and considered by other countries. However, this paper will focus on pertinent risks and regulatory gaps specific to the U.S. banking system.

Application of Analysis

This research paper aims to discover whether stablecoin activity is a prudent activity to incorporate under federal regulation and/or consider for deposit insurance coverage, based on a case study analysis, which will identify some of the key risks in recent stablecoin issue failures or adverse events. Moreover, this analysis will opine on whether the current banking laws and regulations in place are sufficient to regulate stablecoin activity.

This analysis is primarily intended for consideration by U.S. federal banking regulators. In today's environment, there appears to be more questions than answers when it comes to the topic of bank involvement in crypto-asset-related activity. The topics analyzed in this paper could be applied to most research currently being conducted by banking regulators, or more broadly any individual or organization examining the potential root-cause of some of the recent crypto- failures/downturns. The cases discussed in this paper will largely be non-bank organizations that function with minimal, if any, regulatory oversight. Therefore, some of the key risks discussed could be applicable to any organization that is currently involved with, or considering whether to get involved with, a company engaging in crypto-asset-related activity. More specifically to US banking regulators, the topics discussed in this paper could be applied in answering some of the current questions being posed by regulators: Is stablecoin activity legally permissible for US banks? What are the key risks for different stablecoin activities? Is there

[78] (BIS, "Second consultation on the prudential treatment of cryptoasset exposures", 6)
[79] (BIS, "Second consultation on the prudential treatment of cryptoasset exposures", 32-33)
[80] (FATF, "Public Statement on Virtual Assets and Related Providers")

systemic risk to the financial system stability from stablecoins? Are there any gaps in regulation or regulatory oversight?

RESEARCH METHODOLOGY

This paper will be supported through the analysis of three public case studies of stablecoin companies that either failed or experienced material adverse events, and one that has experienced relatively less adverse events as an example of some best practices. This paper aims to opine on some of the root causes of adverse events, and whether regulatory oversight could have prevented such occurrences. The research in this paper will address the current banking regulatory environment and whether current laws and regulations are sufficient to control the key risks presented from stablecoin activities.

Sources of Information

Information on the case studies will be obtained primarily through publicly available, published sources. Case study information used will mostly consist of secondary data obtained from published sources. This may include news reports, publicly available enforcement actions or legal action, etc. The analysis will also include a review of relevant laws and regulations, which will be obtained through the primary websites for the FDIC, OCC, and FRB.

Some primary data will be obtained using personal and professional experience supervising financial institutions. The author will leverage approximately 10 years of experience in banking regulation. This background will be particularly useful when identifying the key risks in the case studies, and understanding the implementation and any limitations of current banking regulations. This experience will include consideration of banking regulations, understanding of examination processes, and knowledge of safety & soundness risks. Additionally, some informational interviews were conducted with personnel within the FDIC, and were used to set the scope of the paper; however, they did not provide significant input beyond what is publicly available and asked for their interviews not to be described in this paper.

Methods and Techniques Used

Data was collected and recorded primarily by reviewing third-party news and reports, as well as assessing publicly-available regulatory information. Information on market capitalization and other crypto-related metrics were obtained from the website Messari.io. This website provided data in a consistent format across all crypto-assets. Information was obtained from various federal banking agency websites related to existing regulatory actions, rules, and regulations. For information on the events analyzed in the cases, a general web search was performed and information was obtained from various third-party publications and news sources.

The general criteria used to select the cases presented include: (1) the market capitalization of each crypto-company (priority given to larger market caps), (2) the size of the loss to crypto-users, if applicable, (3) the extent of publicity each event resulted in (due to regulatory action taken, or number of publications written). In addition, cases selected were generally limited to events occurring in 2021 and 2022.

The "Findings" section entails a synopsis of the adverse events/best practices occurring within each case, and ends with an assessment of the key risks associated with each case. The section concludes with an assessment of whether existing banking rules and regulations are sufficient to control these various risks. The "Recommendations" section provides a brief synopsis of regulatory action that should be taken, and whether stablecoin issuers or affiliated parties should fall under the purview of federal regulation.

Procedures used to identify the key risks in each case and develop appropriate recommendations tailored for a regulatory agency included: (1) reviewing news articles and reports on each event, and drawing conclusions on the risk through the author's understanding of banking regulation and risk management, and (2) reviewing third-party publications to better explain important, technical concepts critical to support the analysis.

Research Limitations

This research paper has some limitations, though there is a vast amount of publicly available third-party information on this topic. Those limitations include, but are not limited to, the following:

- This analysis attempts to synopsize and assess concerns associated with stablecoins using a relatively small sample size. This is both in an effort to consolidate analysis into a reader-friendly format and to focus on recent cases. This complex topic requires a case-by-case approach to evaluate risk. While there may be commonalities in stablecoin risks, there is also the potential for large variances based on the use-case. Therefore, this sample may not be reflective of all of the key risks associated with stablecoins.
- This paper contains a limited scope of review, given the complexity of the subject matter discussed. Therefore, all pertinent risks may not be addressed. For example, while highly relevant, risks associated with IT/Cybersecurity, Payment Systems, and Money Laundering/Terrorist Financing were not fully assessed in the scope of this paper.
- Given the generally unregulated nature of the companies assessed in this paper, data and information was collected from third-party sources whose information portrayed in news articles and reports is not subject to validation. Further, the lack of reliable and accurate data on crypto markets is a limitation.
- The risks described in this analysis are largely based on a review and assessment of qualitative data and information, instead of quantitative data. Further, the assessments rely, to some extent, on the author's perspective of the risks. A limitation associated with this paper is the lack of comparable qualitative data to compare one crypto-entity against another. By the very nature of crypto-assets, each stablecoin issuer has a different unit of account, and each company engages in different activities with different exposures.

- Lack of bank-specific information on crypto-related activities and exposure. There is generally insufficient publicly available data/information to assess crypto-related activities across insured depository institutions. Additionally, the author's organization did not authorize use of agency-sensitive information, such as information on crypto-related activities reported by State, Nonmember banks. Therefore, banks were not used in the cases presented.
- The cases selected were based on a combination of quantitative and qualitative factors. This process was not randomized or based on a well-defined set of criteria. Therefore, there is potential that author bias may influence the case selections.

FINDINGS AND CONCLUSIONS

This analysis will explore three cases with material adverse events occurring between 2021 and 2022 that negatively affected the stablecoin issuers. These case studies consist of analyzing (1) LUNA/TerraUSD (UST), (2) Tether (USDT), and (3) Gemini Dollar (GUSD). The analysis will discuss pertinent facts, an assessment of the key risks associated with each case, and the conclusion will address whether the existing banking framework is sufficient to regulate these entities.

Conversely, this paper also considers some of the stronger risk management practices implemented by one stablecoin issuer (in this case, USD Coin (USDC)), which has experienced relatively less severe and frequent adverse events compared to their peers. That section of the analysis will offer insights into the differences in operations, policies, and practices between USDC and other stablecoin issuers which have experienced significant adverse events. Therefore, in contast to the analysis performed on LUSA/UST, USDT, and GUSD, the assessment for USD Coin will emphasize some of the differences and highlight some of the strengths in their risk management framework.

LUNA / TerraUSD (UST)

This case will discuss the adverse events experienced by LUNA/UST (under "Pertinent Facts"), a summary of the coin's key risks (under "Key Risks"), and the potential impact of regulatory controls, if applied.

Pertinent Facts:

The Terra network launched in January 2018 by Do Kwon and Daniel Shin, and by April 2018, the Terra blockchain was incorporated in Singapore.[81] LUNA was first issued via an initial coin offering in January 2019.[82]

Throughout 2020, the Terra network announced several new protocols. In February 2020, the first staking product related to LUNA was announced.[83] Staking crypto-assets involves "staking" or effectively pledging a certain amount of crypto-assets to serve as a validator in a proof-of-stake consensus mechanism, whereby the validator is rewarded in the native crypto-asset if they form a new block.[84] In July 2020, the Terra Network announced Anchor, which offered principal-protected stablecoin savings products.[85] Anchor lent out deposits to borrowers who staked assets from other blockchains as collateral. Therefore, the interest paid to Anchor depositors was paid through block rewards from major Proof-of-Stake blockchains (ex.

[81] (Sandor & Genc; "The Fall of Terra: A Timeline of the Meteoric Rise and Crash of UST and LUNA")
[82] (Sandor & Genc; "The Fall of Terra: A Timeline of the Meteoric Rise and Crash of UST and LUNA")
[83] (Terra & Kwon, "Announcing Gdac GROW Staking with Luna")
[84] (Sandor, "Crypto Staking 101: What Is Staking?")
[85] (Terra & Platias; "Introducing Anchor")

Ethereum, Cardano, Solana, etc.). [86, 87] Most notably, UST, the Terra blockchain's stablecoin was announced in September 2020.[88] The stablecoin was presented as a scalable solution to previous stablecoins, such as Dai on the Ethereum blockchain, which had challenges associated with maintaining their peg.[89] Also in 2020, Terra announced Mirror, a platform that allows users to trade in synthetic equity securities called "mirrored assets" or "mAssets" that mirror the price of major stocks traded on US exchanges.[90]

Terra's network continued to growth throughout 2021, with LUNA's price nearly doubling by year-end.[91] In January 2022, Terra launched the Luna Foundation Guard (LFG) to build reserves supporting the UST peg, with Jump Crypto and Three Arrow Capital being the lead investors.[92] By the end of February 2022, LFG had raised $1 billion.[93] LFG purchases 39,898 bitcoin, worth approximately $1.7 billion, in an effort to support UST demand and maintain the peg between March 25 to April 11, 2022.[94] Terraform Labs also gave 10 million LUNA (worth approximately $820 million) to LFG.[95] By late April, the supply of LUNA had hit an all-time low due to the number of tokens used to maintain the rising demand for UST.[96] On May 7, UST briefly lost its dollar peg and LUNA fell 10 percent as a result of significant withdrawals from the Anchor protocol and several other sources, such as Curve, where investors can swap in crypto-assets.[97] Some news sources and insiders associated with Terra Network stated the May 7th de-peg was a coordinated sell-off by a few entities;[98] however, a study performed by Nansen reviewing activity on the blockchain concluded that numerous wallets identified the shallow liquidity associated with the UST peg, so it was not considered a targeted sell-off.[99]

On May 9, 2022, the coin lost its peg a second time due to the Anchor protocol experiencing $5 billion in withdrawals (approximately one-third of the coin base). [100, 101] Over the course of the next few days, UST fell from $80 to a few cents on May 12, 2022. LUNA followed a similar decline falling from a high of $120 in April 2022 to less than 10 cents by May 12, 2022.[102] The LUNA and USD tokens are highly interconnected since LUNA tokens are used to support the UST

[86] (Terra & Platias; "Introducing Anchor")
[87] (Sandor, "Crypto Staking 101: What Is Staking?")
[88] (Terra & Kwon; "Announcing TerraUSD (UST)— the Interchain Stablecoin")
[89] (Terra & Kwon; "Announcing TerraUSD (UST)— the Interchain Stablecoin")
[90] (Dale, "Terra Brings 24-Hour Trading to Synthetic Versions of Stocks Like TSLA and AAPL")
[91] (Sandor & Genc; "The Fall of Terra: A Timeline of the Meteoric Rise and Crash of UST and LUNA")
[92] (Dale, "Jump and Three Arrows Lead $1B LUNA Buy to Secure UST Against Black Swans")
[93] (Sandor & Genc; "The Fall of Terra: A Timeline of the Meteoric Rise and Crash of UST and LUNA")
[94] (Reynolds, "Luna Foundation Guard Holds Almost 40,000 BTC After Weekend Purchase")
[95] (Sandor, "Terraform Labs Gives $820M in LUNA Tokens to Luna Foundation Guard")
[96] (Sandor, "LUNA Supply Drops to All-Time Low – But Don't Call It Deflationary")
[97] (Kessler, "UST Stablecoin Briefly Loses Peg, Luna Drops 10%")
[98] (Kessler, "UST Stablecoin Briefly Loses Peg, Luna Drops 10%")
[99] (Barthere, Baraki, Grushyn, Ho, & Li Khoo; "On-Chain Forensics: Demystifying TerraUSD De-peg")
[100] (Sandor, "Investors Flee Terra's Anchor as UST Stablecoin Repeatedly Loses $1 Peg")
[101] (Kessler, "UST Stablecoin Loses Dollar Peg for Second Time in 48 Hours, LUNA Market Cap Falls Below UST's")
[102] (Malwa, "Terra's LUNA Has Dropped 99.7% in Under a Week. That's Good for UST")

peg. When UST's price fell, additional LUNA were issued which drove down the price of that token.[103]

As a result of the significant price declines, activity on the Terra blockchain was halted on May 12, 2022.[104] On May 16th, LFG announced on Twitter that they had depleted almost all Bitcoin (valued around $3 billion) in an effort to maintain the UST peg.[105] As a result of the UST/LUNA collapse, venture capital firms and retail investors lost approximately $45 billion in market value.[106]

On February 16, 2023, The SEC charged Terraform Labs and Do Kwon with fraud. The SEC complaint states that, from April 2018 until the company's collapse in May 2022, Terraform and Kwon raised billions in the sale of an inter-connected suite of crypto-asset securities. During this period, the complaint alleges that the company and Kwon repeatedly issued misleading statements on future value increases of LUNA, engaged in unregistered security sales, and misled investors on the stability of UST.[107] SEC Chairman Gary Gensler added that "Terraform and Do Kwon failed to provide the public with full, fair, and truthful disclosure as required for a host of crypto asset securities, most notably for LUNA and TerraUSD."[108]

For additional information on the market price, volume, market capitalization, and other details, please refer to Exhibits 1 and 2 in the Appendix.

Key Risks:

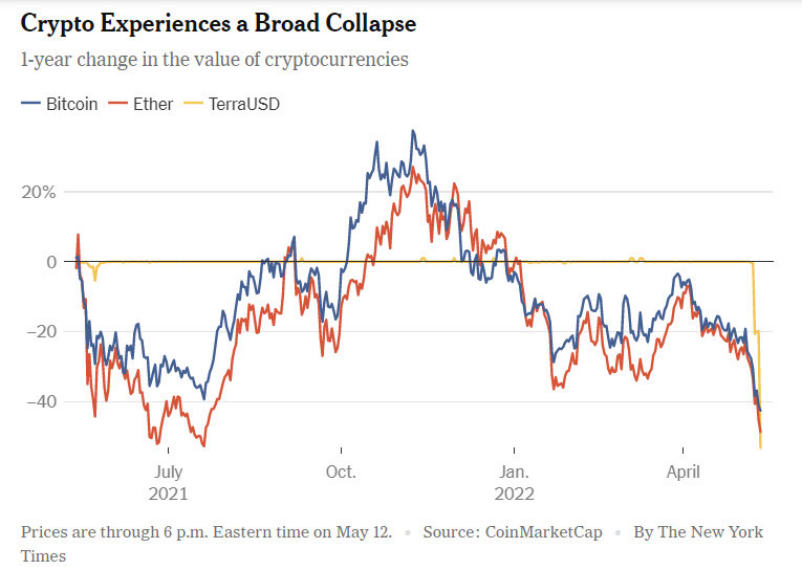
- Instability associated with algorithmic stablecoins. High complexity in creating a token that can remain pegged to the USD when placed under extreme sell pressure. Normally, the minting versus selling UST result in the same price of LUNA, thereby pegging the price of UST to $1.[109] While Terra could theoretically mint more LUNA to maintain the peg, when the value of LUNA fell to almost zero, the spread (i.e. cost) between minting LUNA and selling UST increased exponentially resulting in UST coming unpegging.[110]
- The common denominator in UST and other stablecoins (ex. DEI) becoming de-pegged is their under-collateralization.[111] Additionally, there is no regulation on the level of reserves, or types of reserves required.
- Price volatility and the unsustainable growth of LUNA/UST was a major contributor to UST's failure. The volatile LUNA token served as collateral for Anchor's UST. Due to the high interest paid on the Anchor deposits (upwards of 20 percent) that were paid

[103] (Malwa, "Terra's LUNA Has Dropped 99.7% in Under a Week. That's Good for UST")
[104] (Crawley, "Terra Blockchain Resumes Following 9-Hour Halt")
[105] (Luna Foundation Guard (@LFG_org), May 16, 2022 Tweet "As of Saturday, May 7, 2022....")
[106] (Miller, "Terra $45 Billion Face Plant Creates Crowd of Crypto Losers")
[107] (SEC, "SEC Charges Terraform and CEO Do Kwon with Defrauding Investors in Crypto Schemes")
[108] (SEC, "SEC Charges Terraform and CEO Do Kwon with Defrauding Investors in Crypto Schemes")
[109] (Wong & FRB of Richmond; "Why Stablecoins Fail: An Economist's Post-Mortem on Terra")
[110] (Wong & FRB of Richmond; "Why Stablecoins Fail: An Economist's Post-Mortem on Terra")
[111] (Wintermeyer, "From Hero To Zero: How Terra Was Toppled In Crypto's Darkest Hour")

through block rewards/staking, investors were highly incentivized to take on an excessive risk positions and overleverage.

- The de-pegging of UST brought to light the run risk associated with a relatively small pool of investors. As analyzed by Nansen, only seven wallets contributed to most of the run on Anchor Deposits and swaps from UST to other crypto-assets[112]. This highlights the susceptibility of stablecoins to attacks on their value.
- More broadly, contagion risk was present both due to the linked nature between UST and LUNA, as well as the declines the entire crypto-market experienced as a result of UST's crash. The entire market lost an estimated $300 billion in value between May 9th – May 12th, affecting the price of other significant coins and exchanges (refer to the chart below). TerraUSD's crash set off a chain reaction that contributed to the downfall of crypto-lenders Voyager Digital and Celsius Network, and hedge fund Three Arrows Capital.

Table Two: Crypto Experiences a Broad Collapse



- A lack of transparency, lack of disclosures, and misleading information is a contributor to UST/LUNA's crash and the significant harm caused to consumers. The Terra Network and other crypto exchanges (such as Binance) claimed that algorithmic stablecoin was not vulnerable to the same scaling issues that had plagued other crypto-assets. Terra's co-founder, Do Kwon, provided unsupported promises on the safety of the stablecoin, repeatedly stating that the coin would always remain at its $1 peg.[113] Further, Terra was not transparent to investors about their reserves, or the deployment of those reserves to maintain the UST peg. In June 2022, cryptocurrency exchange Binance was sued in a class-action suit alleging the company falsely advertised the stability of

[112] (Barthere, Baraki, Grushyn, Ho, & Li Khoo; "On-Chain Forensics: Demystifying TerraUSD De-peg")
[113] (Knight & CoinDesk; "Over 2,000 Terra investors say false marketing is what caused them to lose their money")

TerraUSD, and failed to comply with SEC security exchange and registered broker-dealing requirements by not registering LUNA or UST as a security.[114] The class-action suit states this caused a loss to investors of approximately $18 billion in value.[115]

- Lack of appropriate governance structure and risk management controls. This allowed Do Kwon to operate with excessive control anonymously (as he operated using a pseudonym), without appropriate accountability and controls.
- The Terra Network and its protocols operated without the basic risk management policies and practices to ensure safe & sound operations. Most notably, appropriate liquidity monitoring and stress testing was not performed. The stablecoin did not maintain an appropriate level of reserves, and did not consider the impact to reserves in a stress event. No policies or oversight was provided as to the management or composition of reserve assets. This ultimately led to UST/LUNA becoming illiquid.

Potential Impact of Regulatory Controls:

In the case of TerraUSD/LUNA, some additional regulatory controls may have prevented or lessened the residual risk.

- **Monetary Controls and IT Controls** – The pricing instability of the algorithmic stablecoin, driven by significant shifts in the supply and demand of UST could have been controlled with monetary policy restrictions that are staples of FIAT/centralized currencies, and more rigorous IT controls and testing prior to bringing the algorithmic stablecoin to market. Potentially tighter controls on the volume of coins that can be minted and staked, as well as considering a peg that is designed around a centralized asset whose supply is already regulated, would have prevented some of the flight risk of this coin. Additionally, if the algorithmic stablecoin were subject to stress testing and other IT control testing prior to its release; the issuer could have identified what level of supply fluctuations reserves could support.
- **Reserve Requirements, Liquidity Controls, and Concentration Controls** – More stringent requirements on reserve balances would have reduced some of the liquidity, credit, and run-risk. Regulatory requirements on minimum asset holdings based on coins outstanding, the composition of these assets, and the marketability/liquidity of those assets, may have prevented or limited the flight to safety that occurred once the coin became unpegged. Further, TerraUSD held reserves in other crypto-assets, primarily Bitcoin, which presented elevated systemic risk during the crypto-wide market downturn. Common regulatory controls for concentrations, such as concentration reporting, stress testing, and contingency planning, may have mitigated some of the run risk. Effective controls would have identified asset and liability concentrations (ex. in reserve holdings, and funding concentrations within the user base), established whether reserve balances were sufficient during periods of unexpected stress, and define clear and effective contingency plans to maintain the peg and adequately fund reserves.

[114] (Perera & FNF Law; "Binance Hit With Investor Suit Over Terra Stablecoin Collapse")
[115] (Perera & FNF Law; "Binance Hit With Investor Suit Over Terra Stablecoin Collapse")

- **Compliance and Legal Controls (Investor Disclosure)** – Regulatory controls involving disclosures to investors may have reduced the number of accounts established without an understanding of the key risks. Users should have received appropriate disclosures involving the potential for loss, lack of insurance, and liability for the investor in the case of fraud. Investor disclosures should also note the accessibility of the coin and whether the issuer has the authority to freeze withdrawals. Transparently advertising insurance coverage may have reduced the general consumer confusion.
- **Audit and Internal Controls** – Publicly available accounting and attestation reports would have ensured reserve balances were accurate and verified by a third-party. Moreover, the auditor used to validate financial reporting should be a firm that has a history of complying with Accounting Standards and is in good standing with regulatory bodies, such as the Public Company Accounting Oversight Board (PCAOB). Maintaining these heightened audit standards, would have prevented or reduced the risk of mismanagement experienced by TerraUSD. Further, transparent disclosure on the financial condition of the stablecoin issuer could have led to a faster detection of financial weaknesses as well as notify investors of potential risk for loss. Commonplace banking audit and internal control standards such as appropriate segregation of duties, implementing processes to prevent excessive control or conflict of interest by management, and the use of independent third parties to provide attestation services, may have reduced the likelihood of these significant control weaknesses occurring at TerraUSD.
- **Capital and Growth Controls** – Minimum capital standards would have prevented some of the excessive growth and imprudent investment decisions made by TerraUSD and its founders. By implementing minimum capital ratios that are tied to a risk-weighted asset framework, TerraUSD would have had a buffer to absorb loss, investors would have had some equity interests de-incentivizing some of the market manipulation, and the risk associated with the stablecoin assets would have been apparent to investors through the reporting of risk-adjusted assets. Therefore, stablecoins holding lower-risk assets would need to hold less in capital. In the case of TerraUSD, holdings of other crypto-assets and the significant level of leverage should have triggered the need to hold greater capital reserves, if subject to capital regulations.

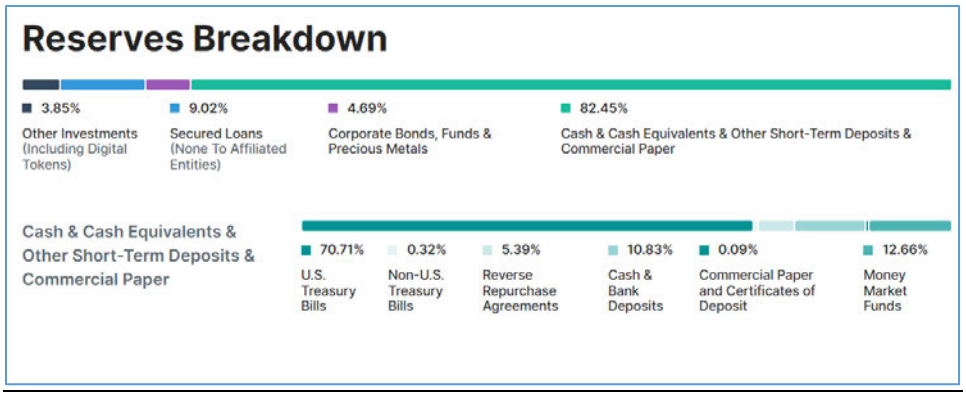
Tether (USDT)

This case will discuss the adverse events experienced by USDT (under "Pertinent Facts"), a summary of the coin's key risks (under "Key Risks"), and the potential impact of regulatory controls, if applied.

Pertinent Facts:

Tether (USDT), founded in 2014, is a FIAT-collateralized stablecoin that is issued on the Ethereum and Bitcoin blockchains.[116] Tether remains the stablecoin with the largest market cap as of January 2023 (refer to Table One); however, it has also experienced volatility in its price. Over the past two years, Tether has fallen below its peg twice: In May 2022 and November 2022, correlating with widespread price crashes in the crypto-market associated with the failure of TerraUSD and FTX, respectively. For additional information on the market price, volume, market capitalization, and other details, please refer to Exhibits 3 in the Appendix.

Table Three: Tether Reserves as of September 30, 2022[117]



The company has received significant regulatory scrutiny on their claims that all Tethers are fully backed by US Dollars at all times. Tether originally stated that its tokens are 100 percent backed by U.S. dollar deposits. In March 2019, the company changed their terms to identify that the tokens are 100 percent backed with Reserves.[118] In February 2021, an investigation performed by the New York State Attorney General revealed that the company has falsely claimed that funds were backed by US Dollars at all times.[119] The State of New York's investigation revealed that Tether, despite operating since 2014, did not have access to a bank account until 2017.[120] The OAG's investigation noted that Tether opened a bank account in

[116] (https://messari.io/asset/tether/profile)
[117] (Tether, Tether Transparency Website "Reserves Breakdown")
[118] (Hochstein, "Tether's First Reserve Breakdown Shows Token 49% Backed by Unspecified Commercial Paper")
[119] (New York State Office of the Attorney General, Press Release "Attorney General James Ends Virtual ...")
[120] (New York State Office of the Attorney General, Press Release "Attorney General James Ends Virtual ...")

2017, but only moved sufficient funds in to cover Tether for one day when the verification occurred.[121]

In a similar instance, in November 2018, the company moved cash to a bank account in the Bahamas for one day, and the next day transferred funds to accounts at Bitfinex (another crypto-asset exchange).[122] The investigation also noted that Bitfinex lost approximately $850 million in Tether-related funds to another entity called Crypto Capital Corp. During the time it took Bitfinex and Tether to recover the funds, the investigation states that the two companies issued misleading statements that the accounts had been recovered.[123]

Tether and Bitfinex were fined $18.5 million by the State of NY and barred from doing business in the state.[124] Furthermore, the OAG requires that Tether offer public disclosures on the assets in their reserve. Tether provided their first attestation in May 2021. This revealed about half of the reserve claiming to be cash and cash-equivalent balances were actually commercial paper, a form of commercial debt which may or may not easily converted to cash depending on the issuer and market conditions (Tether did not disclose the issuer or issuer credit ratings).[125] On Tether's website, as of January 1, 2023, they state, "Every Tether token is 100% backed by our reserves, which includes traditional currency and cash equivalents, and may include other assets and receivables from loans made by Tether to third parties." Independent Accountant Reports published on Tether's website as of September 30, 2022, indicate an improvement in this position with approximately 58 percent of reserves held in US Treasury Bills and commercial paper holdings declining to under 0.01 percent of reserve balances.[126]

While the settlement requires Tether to release quarterly attestations of its reserves, a full scope audit of the company and its reserves has not been performed[127] and Tether has faced years of pressure from regulators and law enforcement to receive an audit. Tether has been the subject of claims that its third-party audits are not performed according to professional and accounting standards. In September 2022, the SEC settled charges against Friedman LLP, the auditor for Tether from May 2017—January 2018, for violating federal securities law and not conducting audits in accordance with standards set by the Public Company Accounting Oversight Board (PCAOB).[128] The SEC's Order, details the company's failure to "respond to fraud risks" and "exercise due professional care and professional skepticism," among other things.[129]

[121] (New York State Office of the Attorney General, Press Release "Attorney General James Ends Virtual ...")
[122] (New York State Office of the Attorney General, Press Release "Attorney General James Ends Virtual ...")
[123] (New York State Office of the Attorney General, Press Release "Attorney General James Ends Virtual ...")
[124] (New York State Office of the Attorney General, Press Release "Attorney General James Ends Virtual ...")
[125] (Hochstein, "Tether's First Reserve Breakdown Shows Token 49% Backed by Unspecified Commercial Paper")
[126] (BDO Italia, 9/30/22 Audit Report "Tether Holdings Limited - Independent Auditors' Report...")
[127] (Sinclair, "Tether Pushes Back Timeline on Audit")
[128] (Ligon, "Tether's Former Auditor Fined $1M by SEC for Sloppy Accounting")
[129] (SEC, "SEC Release No. 95887, Cease-And-Desist Proceedings against Friedman LLP")

Key Risks:

- Price volatility associated with the crypto-markets systemically, as well as with company-specific negative publicity.
- Lack of transparency, which has resulted in widespread uncertainty related to the company's reserve holdings.
- Lack of management accountability.
- Weaknesses in critical risk management functions, including audits, financial reporting, and liquidity management.
- Inadequately controlled counterparty and third-party risks associated with exposure to payment processors and other critical third parties, as well as third-party audit firms.

Potential Impact of Regulatory Controls:

In the case of Tether, certain regulatory controls could have prevented or reduced the frequency and severity of adverse events affecting the issuer:

- **Reserve Requirements, including Liquidity Controls** – Regulatory controls addressing reserve requirements may have reduced the liquidity and credit risk associated with the stablecoin. Regulatory requirements should set a minimum level of reserve holdings, establish the composition of assets or asset that are impermissible, define marketability requirements (i.e. how easily can the asset be sold? Would the company incur a loss upon sale?), and restrict any concentrations unless the asset-type is risk-free. The implementation of reserve requirements would have better protected investors, reduced run-risk, and lessened pricing volatility.
- **Capital Requirements** – Regulatory controls involving minimum capital levels or equity investment by the issuer could have reduced the price volatility and provided for a buffer for any losses. Given the absence of capital requirements, the issuer did not have the capacity to absorb potential losses associated with the Bitfinex scheme or when it lost its peg.
- **Audit and Internal Controls, including Vendor Due Diligence** – In the beginning years of Tether's operations, the stablecoin did not provide reports on asset holdings. The issuer has been investigated and fined associated with fraudulent disclosures/statements on the reserve holdings. While current laws exist that penalize such fraudulent activities and misstatements to investors, additional controls could have reduced the likelihood of this occurrence, as well as result in more timely corrective action. A requirement to receive regular attestation reports on reserve holdings would have provided investors with some assurance that the peg was maintained in a safe and sound manner. Furthermore, the audits and attestations, while performed years into the company's operations, were completed by an audit firm accused of not performing audits in accordance with standards set by PCAOB. Regulatory controls involving appropriate vendor due diligence and consideration of the history and integrity of certain vendors, may have reduced the likelihood of this event occurring and lasting for over three years.

- **Reporting Transparency and the Integrity of Management** – Tether management did not operate the company in a safe and sound manner, and did not uphold basic financial reporting requested by their investors. Existing regulatory controls may have prevented the poor risk-culture that developed at Tether, such as the evaluation of management by regulators and potential individual enforcement actions and fines imposed against suspected fraudulent or illegal activity. While Tether was regulated by the NYDFS, regulatory action was delayed due to a lack of transparency by Tether during its first seven years of operation. These issues could have been addressed if the issuer were subject to ongoing supervisory examinations, similar to financial institutions.
- **Controls to Reduce Counterparty Exposure / Third-Party Risks** – As discussed under the Audit controls, the issuer did not have a robust framework to evaluate third-party vendors (ex. Friedman LLP, Bitfinex). A framework for the company to risk-assess critical vendors could have identified some of the weaknesses before they occurred. Further, controls to assess counterparty exposure at Bitfinex, may have reduced the operational disruption experienced. Controls could have included assessing the operational risks associated with each vendor and systemically related companies, as well performing a test on payment system resiliency and recovery plans.

Gemini Dollar (GUSD)

This case will discuss the adverse events experienced by GUSD (under "Pertinent Facts"), a summary of the coin's key risks (under "Key Risks"), and the potential impact of regulatory controls, if applied.

Pertinent Facts:

The Gemini Dollar (GUSD) is an Ethereum-based stablecoin that was founded in 2018 by the Gemini Trust Company, LLC (Gemini).[130] GUSD is a unique stablecoin in that users are able to directly redeem their stablecoin for USD. Gemini is one of the first regulated stablecoins, operating under the supervision of the New York State Department of Financial Services (NYDFS).[131] GUSD is subject to NYDFS guidance on backing, redeemability, reserves, and attestations. Additionally, Gemini is required to comply with regulatory requirements when customers convert to US Dollars, such as know-your-customer rules and AML/CFT regulations.[132, 133] Gemini attests that their stablecoin is backed with cash deposits at banks, money-market funds, and US Treasury Bills. The company receives a monthly attestation performed by a third-party accounting firm.[134]

Despite the increased supervision of Gemini, the company still proved susceptible to systemic market disruptions. During the collapse of the crypto-exchange, FTX, in November 2022, Gemini paused withdrawals from their program Earn, where investors could stake cryptocurrency in exchange for high annual yields (which advertised yields upwards of eight percent).[135] Gemini reported that they had experienced $563 million in customer outflows on November 16, 2022, and paused withdrawals on both the Earn program as well as Genesis, the lending arm. Genesis reported days before the collapse of FTX, that the company had $175 million locked in on the FTX exchange. As a result of concerns for the company's exposure to FTX, GUSD was shorted and experienced a significant pricing drop in November 2022, after the news of FTX's bankruptcy was released.[136] On January 12, 2023, the SEC charged Genesis and Gemini for unregistered offer and sale of crypto-assets through the Gemini Earn Lending Program.[137] The complaint further alleges that in November 2022, Genesis announced it would not allow Gemini Earn investors to withdraw their coins due to Genesis' insufficient liquidity. Approximately $900 million in Gemini Earn assets have not been able to be withdrawn to date.[138]

[130] (Messari, Webpage profile for "Gemini Dollar")
[131] (Messari, Webpage profile for "Gemini Dollar")
[132] (Groves, "What Is GUSD...")
[133] (Gemini, Website "https://www.gemini.com/dollar")
[134] (Gemini, Website "https://www.gemini.com/dollar")
[135] (Q.ai & Forbes; "Gemini Crypto Pauses Withdrawals, Fallout Continues From FTX Collapse")
[136] (Hyatt, "Crypto Exchange Gemini Modifies Terms Of Service ...")
[137] (SEC, Press Release 2023-7 "SEC Charges Genesis and Gemini for the Unregistered Offer and Sale...")
[138] (SEC, Press Release 2023-7 "SEC Charges Genesis and Gemini for the Unregistered Offer and Sale...")

In a separate event, Gemini GUSD has also been the subject of an FDIC Cease & Desist Order (Order) due to false advertising that GUSD reserves are FDIC-insured.[139] Cryptonews.com, is listed as the recipient of the Order dated August 18, 2022, based on the company publishing reviews of cryptocurrency exchanges, such as Coinbase, Gemini, and eToro, which falsely advertised FDIC Insurance coverage.[140] Gemini's website stated that reserves were eligible for FDIC insurance up to $250,000 per customer, while custodied at a third-party bank, State Street Bank and Trust, Boston, MA.[141] Cryptonews.com's website stated, "[Gemini is] one of the biggest regulated crypto exchanges with FDIC Insurance for USD deposits, a user-friendly platform, and zero publicly known large scale hacks."[142]

For additional information on the market price, volume, market capitalization, and other details, please refer to Exhibits 4 in the Appendix.

Key Risks:

- Systemic risk due to macroeconomic factors in the crypto-market, as well as the interconnectedness of crypto-companies and asset exposures.
- Liquidity risk due to generally low levels of liquidity held, and an instable funding base, which results in run risk.
- Inadequate capital to absorb price fluctuations in the stablecoin.
- Compliance/legal risk associated with false advertising and the resultant consumer confusion.

Potential Impact of Regulatory Controls:

- **Liquidity and Funding Controls** – Gemini's stablecoin was largely funded through a high-yield program (Earn). Therefore, during periods of market stress (such as the collapse of FTX), these funds were more likely to withdraw. Sound liquidity and funds management practices, commonly implemented in the banking sector, could have prevented some of the liquidity and run-risk experienced by the coin. Policies and procedures that address minimum liquidity requirements, monitoring and limits for any funding concentrations, studies and stress tests performed to assess the stability of funding, and contingency plans to replace lost funding. If these measures were implemented by Gemini, this could have prevented funding concentrations in their Earn product that existed with minimal, if any, monitoring. This also may have prevented or shortened the operational disruptions that occurred when Gemini Earn withdrawals were paused.
- **Capital and Growth Controls** – Gemini lacked sufficient capital holdings to buffer the company from losses or fluctuations in the value of the stablecoin or underlying reserve

[139] (Williams & Pedersen; "FDIC calls out FTX US, other crypto firms over insurance claims")
[140] (FDIC, Press Release "FDIC Issues Cease and Desist Letters to Five Companies...")
[141] (@StevenKelly49, Twitter Thread "It appears Gemini's stablecoin..." posted on November 16, 2021)
[142] (FDIC, Press Release "FDIC Issues Cease and Desist Letters to Five Companies...")

assets. By implementing controls of the minimum level of capital held and the composition of those capital sources, this would have prevented the company's substantive growth using a relatively unstable funding source (Earn).

- **Controls to Ensure Compliance with Laws and Regulations** – The issuer has several occurrences (or instances) of violating federal laws and regulations, including false advertising of FDIC-insurance with a C&D issued by the FDIC and the sale of unregistered securities with fines by the SEC. Regulatory controls related to the risk management framework, as well management and Board oversight of the issuer, could have prevented or reduced non-compliance with rules and regulations. This would include developing Board-approved policies for all significant business lines to meet regulatory requirements; appropriate knowledge, expertise, and reporting by management and the Board to ensure compliance; performing appropriate due diligence, including receiving advise from legal counsel, prior to engaging in new transactions or updating consumer disclosures; and, establishment of an independent audit process to validate existing practices. Regular examinations by a supervisory authority may also reduce the occurrence of violations of law.

USD Coin (USDC)

This analysis is intended to address some of the stronger risk management practices by a stablecoin issuer. While USD Coin (USDC) has experienced some adverse events, the company has adopted a set of practices focused on transparency which has lessened some of the risk exposure experienced by peer stablecoins.

Pertinent Facts & Comparative Analysis:

USDC, launched in October 2018, is a fiat-collateralized stablecoin issued by Centre (a consortium created by Circle and Coinbase). USDC is available on numerous blockchains, including Ethereum, Solana, Avalanche, TRON, Algorand, Stellar, Flow, and Hedera.[143] The coin is redeemable 1:1 for U.S. Dollars and is backed by U.S.-dollar-equivalent assets. USDC has the second largest market capitalization, following Tether (USDT), and operates in a similar manner. Both stablecoins can be sent and received by any ERC-20 compliant wallet or exchange. ERC-20 is the standard for smart-contract-enabled tokens on the Ethereum Blockchain.[144]

When combining Tether and USD Coin, these two stablecoins account for over 80 percent of the total market capitalization for US dollar-pegged stablecoins.[145] However, there are some notable differences in performance between USDC and USDT during recent market stress events. During the collapse of the FTX exchange in November 2022, USDT briefly lost its peg due to concerns with Tether's exposure to Alameda Research and FTX, resulting in a significant price drop in the crypto-asset. Conversely, USDC maintained its peg, and, despite holding a smaller market capitalization than USDT, experienced over 4-times the transfer volume per day from FTX holdings to its coin.[146] This indicates that USDC was viewed by investors as a potentially safer option compared to USDT, at a time when investors were seeking a flight to safety from the FTX market.

Unlike some other stablecoins whose value is tied to a single asset or reserve of various assets, USDC's value is tied directly to the U.S. dollar. The coin is fully backed by U.S.-dollar-equivalent assets held in reserves for USDC coin-holders. Since its formation in 2018, the company provides monthly reserve attestation reports that are audited by independent third parties. The most recent attestation report provided by Grant Thornton, New York, NY, as of December 31, 2022, indicates that USDC maintains a slightly over-collateralized reserve of $44.7 billion, compared to USDC in circulation. These reserves consist of approximately $34.1 billion in Short-term US Treasury Securities, $10.6 billion in cash held at US. Financial Institutions, and $13.2 million in net cash receivables due to settlement differences. The Attestation Report indicates that cash is held in the custody and management of U.S.-regulated financial

[143] (Singh, "What is USD Coin (USDC), fiat-backed stablecoin explained")
[144] (Reiff & Investopedia; "What Are ERC-20 Tokens on the Ethereum Network?")
[145] (Antolin, "How Does USDC Work?")
[146] (Huigsloot, "USDC's ERC-20 transfer volume hit 5X USDT's in fallout from FTX collapse")

institutions, including: Bank of New York Mellon, Citizens Trust Bank, Customers Bank, New York Community Bank, a division of Flagstar Bank, N.A., Signature Bank, Silicon Valley Bank, Silvergate Bank."[147] In addition, USDC has partnered with Blackrock, as the primary asset manager of USDC reserves.[148] Beginning in November 2022, the Circle Reserve Fund began moving reserves into a government money market fund managed by BlackRock Advisors, and expects to be fully transitioned by the end of March 2023.[149, 150]

Table Four: Circle Reserve Fund Assets as of December 31, 2022[151]

CIRCLE RESERVE FUND ASSETS[6]

The Circle Reserve Fund (the "Fund") is a government money market fund under Rule 2a-7 of the Investment Company Act of 1940, as amended. The Company owns one hundred percent of the equity interests in the Fund represented by the market value of the assets of the Fund presented below. The Fund's assets consist of the following:

U.S. TREASURY SECURITIES:

Cusip	Maturity Date	Market Value ($)[8]
912796ZJ1	01/10/23	2,970,760,086
912796XR5	01/12/23	499,566,000
912796ZK8	01/17/23	2,496,422,500
912796ZL6	01/24/23	4,007,004,160
912796ZM4	01/31/23	774,619,272
912796XT1	02/02/23	532,305,618
912796ZT9	02/07/23	1,544,108,450
912796XZ7	02/09/23	398,404,400
912796ZU6	02/14/23	3,158,083,727
912796YA1	02/16/23	398,010,800
912796Y60	02/21/23	1,789,817,400
912796T33	02/23/23	1,441,273,900
912796YK9	03/09/23	2,977,017,000
912796U31	03/23/23	594,415,800
TOTAL U.S. TREASURY SECURITIES		**23,581,809,113**
Cash		48,991,340
Cash due to/(owed by) Circle Reserve Fund due to timing and settlement differences, net[9]		33,056,600
TOTAL CIRCLE RESERVE FUND ASSETS		**23,663,857,053**

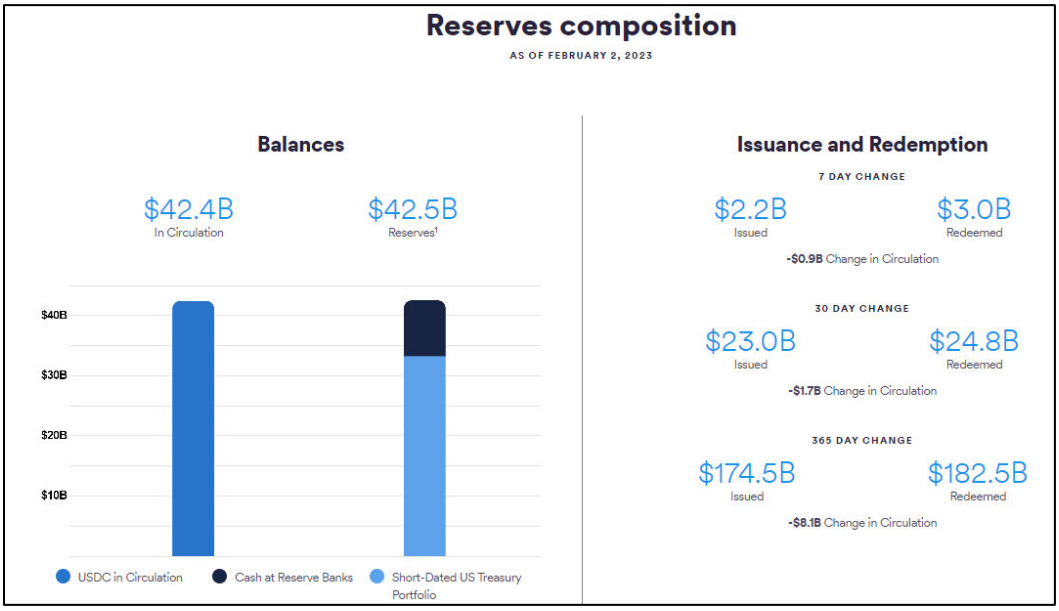
OTHER USDC RESERVE ASSETS

U.S TREASURY SECURITIES:

Cusip	Maturity Date	Market Value ($)
912796X95	01/05/23	8,011,214,864
912796XR5	01/12/23	2,512,500,719
TOTAL U.S. TREASURY SECURITIES		**10,523,715,583**
Cash held at U.S. financial institutions[10]		10,526,235,601
Cash due to/(owed by) the Company due to timing and settlement differences, net[9]		(19,844,536)
TOTAL OTHER USDC RESERVE ASSETS		**21,030,106,648**
TOTAL USDC RESERVE ASSETS		**44,693,963,701**

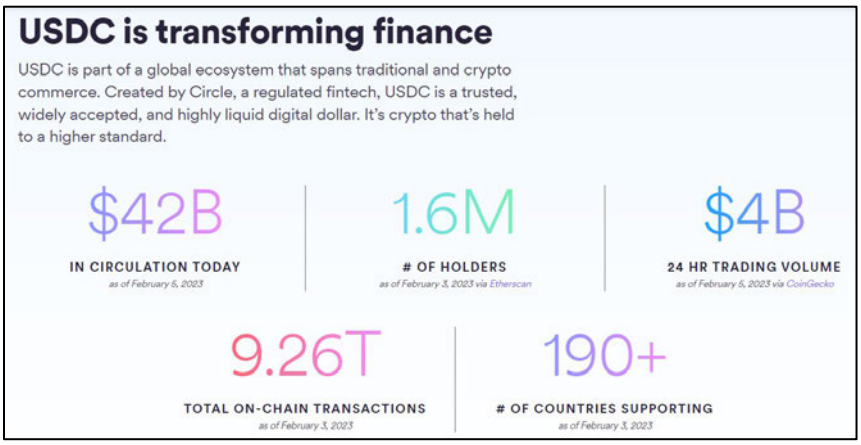
[147] (Grant Thornton LLP, "USDC Circle Attestation Report December 2022")
[148] (CoinMarketCap, Webpage "USD Coin....Overview")
[149] (Hamilton, "Circle Begins Putting Reserves Into New BlackRock Fund")
[150] (BlackRock, Website "Circle Reserve Fund")
[151] (Circle, Website "https://www.circle.com/en/transparency")

Table Five: Reserves Composition as of February 2, 2023[152]



Moreover, the recent announcement of Binance, a cryptocurrency exchange to merge stablecoin dollars on their platform, is expected to lead to greater ease of converting in/out of USDC on Binance. Formerly, USDC customers would need to convert to Binance USD (BUSD) or Tether (USDT) to trade. With the changes, USDC can be directly traded in Binance, which is expected to improve the overall marketability and liquidity of the coin.[153]

Table Six: USD Is Transforming Finance[154]



USDC has also proven to be an effective means of payment, due to its relative price stability associated with its peg; availability on most large crypto wallets, exchanges, service providers,

[152] (Circle, Website "https://www.circle.com/en/transparency")
[153] (Sun, "Circle co-founder says converged dollar books on Binance would be good for USDC")
[154] (Circle, Website "https://www.circle.com/en/usdc")

and decentralized apps; and, instantaneous redemption. To date, USDC has not halted or interrupted redemptions for their coins. This lies in stark contrast to other stablecoins, such as Gemini (GUSD) and TerraUSD, which froze buy/sell activities during times of stress.

Circle is a regulated money transmitter under U.S. State law, and direct supervision is provided by the state authority, NYDFS. USDC issuance is regulated pursuant to U.S. state money transmission laws, and is subject to ongoing examination of Circle and its operations. Circle and USDC are required to comply with applicable AML/CFT rules and regulations as a registered money transmitter.

The crypto-issuer is also expanding its risk management and governance practices. The Centre Consortium, founded by Circle and Coinbase, have been developing open network protocols called "Verite" that are available to developers to assist in crypto transmittal, identity decisions, rules for settlement, and providing a secure Know-Your-Customer (KYC)/AML exchange.[155] The goal of many of the Verite protocol is to validate the identity of customers and confirm the validity of transactions, without revealing Personally Identifiable Information (PII). These protocols could allow USDC to satisfy regulatory KYC rules, AML/CFT monitoring, sanction monitoring, reduce cybersecurity threats and protect customer information, and achieve other regulatory obligations related to payments. Further, implementation of these technologies may help with more wide-spread adoption of crypto-assets for payments and allow for better integration with centralized payment systems.

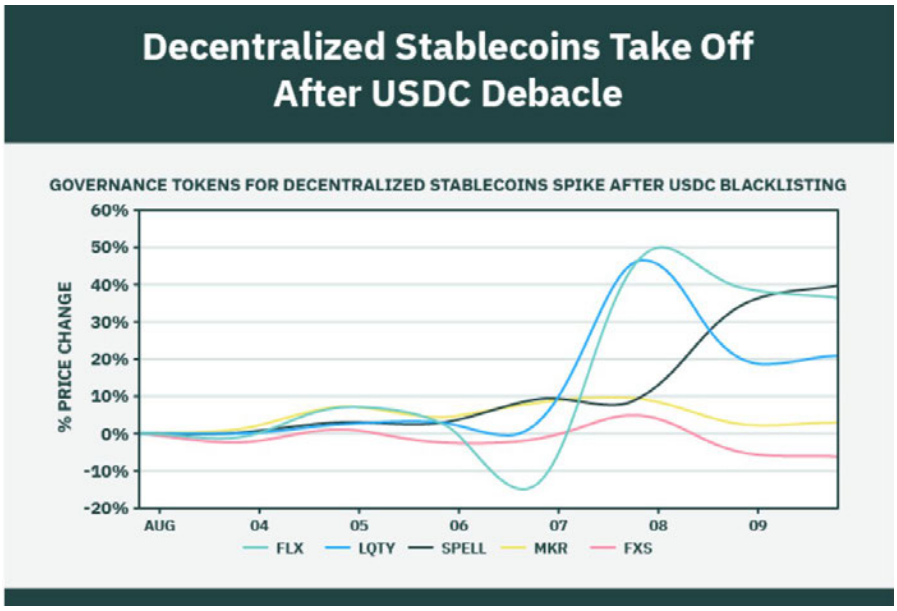
Nonetheless, the stablecoin's stricter compliance with regulatory and AML/CFT standards has resulted in some market-pushback and reduction in market capitalization. On August 8, 2022, the Treasury Department's Office of Foreign Asset Control (OFAC) sanctioned Tornado Cash (a currency mixer) and many other Ethereum and USDC wallets due to their use of bitcoin "mixers" or "tumblers," used to launder over $7 billion in cryptocurrency since 2019.[156] In an attempt to maintain anonymity in the transactions, mixers and tumblers jumble up information in private bitcoin pools or send the funds to another user, before sending them out to their final recipients.[157] The ability of these mixers to obfuscate transactions presents heightened risk for money laundering, tax evasion, and illicit financing, and has been a focus in recent investigations and criminal charges by the Department of Justice. [158] For example, Bitcoin Fog allegedly laundering $335 million in cryptocurrency over 10 years.[159]

After OFAC issued their sanctions in August 2022, Centre, premptively blacklisted wallet addresses controlled by Tornado cash, resulting in approximately $75 thousand in frozen USDC.[160, 161] Meanwhile, competitors suich Tether announced that they would not

[155] (Centre, Website "https://www.centre.io/verite")
[156] (DOT, Press Release "U.S. Treasury Sanctions Notorious Virtual Currency Mixer Tornado Cash")
[157] (Stevens, "Bitcoin Mixers: How Do They Work and Why Are They Used?")
[158] (Lemasson & Rahman Ravellli; "Arrest of Alleged Bitcoin Fog Operator Signals Continued DOJ Focus on...")
[159] (U.S. Department of Justice, "Individual Arrested and Charged with Operating Notorious Darknet...")
[160] (Pandey, "Analyzing USDC's falling utility post the Tornado Cash fiasco")
[161] (Avan-Nomayo & Keely; "Circle freezes USDC funds in Tornado Cash's US Treasury-sanctioned wallets")

preemptively ban sanctioned accounts unless requested to do so by law enforcement.[162] Following this freeze, USDC experienced a significant number of withdrawals and their market capitalization fell by almost 20 percent over the following 3 months. This is generally attributed to investor fear over stablecoin censorship, with a notable shift to more decentralized stablecoins occurring around the same time (refer to the Exhibit below). Centre also blacklisted another individual account with $100 thousand in USDC balances in July 2020.[163]

Table Seven: DeFi stablecoins experienced increased investment after sanctions[164]



For additional information on the market price, volume, market capitalization, and other details, please refer to Exhibits 5 in the Appendix.

Key Risk Management Strengths:

- The level and quality of asset reserves: The company has maintained appropriate collateral levels in reserves, at times maintaining a reserve balance that exceeds coins in circulation. Additionally, the company maintains reserve balances in U.S. Dollar or Dollar-equivalent assets which presents reduced credit and liquidity risk.
- Given the composition and level of asset reserves, overall liquidity risk associated with USDC is lessened. As coins are redeemed, dollar and dollar-equivalent assets are purchased or liquidated. Given the availability of these funds, this lessens the potential for significant run risk.
- Since the coin is pegged 1:1 to the U.S. Dollar and Dollar-equivalents, the price of the coin has exhibited less volatility compared to peer stablecoins. As identified in this case,

[162] (Thompson, "Tether Sticks to Decision Not to Bar Tornado Cash Addresses")
[163] (The Block, "CENTRE appears to have blacklisted an address holding USDC for the first time")
[164] (Alo, "Decentralized Stablecoins Take Off After USDC Funds Frozen")

the coin has experienced fluctuations in market capitalization based on utilization, but the price of the coin has not experienced significant pricing changes.

- Transparency and disclosure in financial reporting: The company provides daily reports on asset reserves, and undergoes a monthly attestation.
- Risk management and regulatory compliance framework that satisfies the requirements for money transmitters. The company has demonstrated effective compliance with applicable laws and regulations, particularly related to AML/CFT-measures. This is evidenced through many of the KYC products released by Verite.
- Establishing relationships with regulated and trusted third parties. Management and custodial services for the reserves are provided by known, regulated third-parties (ex. BlackRock, BNY Mellon and other financial institutions), which further reduces the risk of fraud, misuse of funds, or failures in internal controls. Furthermore, Grant Thornton, a large audit firm that is subject to regulatory oversight and conducts business following Generally Accepted Accounting Principles and U.S. and international auditing standards, has been responsible for performing the attestations.

Summary of Key Risks Themes

Despite the wide-spread use of crypto-assets by consumers and indications that banks are interested in crypto-related activities and partnerships, the risks and failures described in the cases and the recent failure of FTX has challenged banks and regulators to determine the level of involvement insured banks should have in crypto-activity. The analysis of USD Coin also indicates how some stablecoin issuers are implementing best practices, which align closer to sound banking principles. Nonetheless, unmitigated risks associated with stablecoins remain.

Several recent events have highlighted the general reluctance of the banking industry and regulators to further absorb any risks associated with crypto-assets. On January 27, 2023, the FRB announced the denial of an application by Custodia Bank, Inc. (Custodia), to join the Federal Reserve System.[165] Custodia is a special purpose depository institution based in Wyoming that has proposed to engage in issuing a crypto-asset on a decentralized network. On that same day, the FRB released a statement indicating that both insured and uninsured banks supervised by the Board will be subject to the same restrictions on crypto-asset activity.[166]

In other news, New York-based Signature Bank, the first bank to offer a blockchain-based digital payment platform[167], will be taking a step back and no longer supporting transactions for crypto-exchange customers of less than $100 thousand.[168] Additionally, on February 13, 2023, Stablecoin issuer Paxos, regulated by the NYDFS, announced they would cease creating new units of the Binance stablecoin (BUSD) amid regulatory concern of their management of the Binance-relationship and pending enforcement action by the SEC.[169] BUSD is the third largest U.S. Dollar-based stablecoin by market capitalizations, and the issuance of this coin has come under scrutiny by the SEC for unregistered security trading. These recent events showcase an emerging divide between the traditional banking sector and stablecoins, even those viewed as potentially lower-risk. To that end, the best solution could involve partitioning the risks between traditional banking and crypto-activity through separate regulatory and insurance structures.

Based on the case studies reviewed, some significant key risks were identified associated with the above case studies. The next question becomes: Can banking regulators control these risks using the current banking regulatory framework? And if so, should stablecoins be federally insured? These are two areas that require critical and timely consideration by banking regulators. Regulators would need to quickly and comprehensively assess whether the existing banking regulatory infrastructure and existing laws and regulations could generally suffice, if initially applied to a stablecoin.

[165] (FRB, Press Release "Federal Reserve Board announces denial of application by Custodia Bank, Inc...")
[166] (FRB, "Federal Reserve Board issues policy statement to promote a level playing field for all...")
[167] (Signature Bank, Press Release "Coinbase Commences Partnership With Signature Bank...")
[168] (Rubin, "Binance Says Signature Bank Won't Support Transactions for Crypto Exchange Customers....")
[169] (Hollerith, "Stablecoin issuer Paxos ordered to halt creation for Binance USD")

In general, most of the key risks identified in the cases above fall within the purview of existing banking regulations. While not intended to be all-inclusive, a short summary of the risks identified and whether they have banking regulations to potentially prevent or limit such occurrence is detailed below. This analysis also explores how the potential regulatory approach might be adapted, if needed, to address some general risks.[170]

1. **Inability to Scale Algorithmic Stablecoins**: Instability and a high complexity associated with algorithmic stablecoins, and maintaining their peg particularly under high sell pressure.

   Existing Banking Framework: Additional regulations would need to be developed. In general, banking laws relating to Information Technology would ensure an appropriate IT governance structure is established; however, they are not specific enough to the operation of algorithmic stablecoins. 12 CFR Appendix B to Part 364 addresses Standards for Information Security, which could apply to an algorithmic stablecoin, and would require the entity ensure the security of customer information and protect against anticipated threats or hazards. [171] In addition, the implementation of robust business continuity plans and disaster recovery plans related to a de-pegging of the asset could have minimized or prevented some of the loss experienced by customers.

   Potential Regulatory Approach: This is an area requiring additional research and study, if regulated. As the coins function with an absence of traditional assets to support their value, each individual issuer would need to provide their own algorithm and assessment on the peg stability to regulators. This would require a case-by-case approach of reviewing the algorithm, testing its functionality, and stress testing its performance during periods of significant supply/demand shifts. Additionally, existing regulations and guidance applicable to IT cybersecurity, IT Controls (Audit), Vendor Management, and IT Disaster Recovery/Business Continuity Planning would be highly relevant. While these controls are necessary for all stablecoin issuers, the algorithmic stablecoins are even more reliant on continuous IT operations to maintain their value. Algorithmic stablecoin issuers would need to demonstrate how they protect their platform and customer information from cybersecurity threats. This includes implementing a robust IT audit program to identify and resolve control weaknesses, and points of vulnerability.

   Additionally, the issuers would need to appropriately monitor and control risks associated with the use of third parties, particularly those that play a significant part of stablecoin operations. The issuers would also want to demonstrate and test their ability to recover disrupted operations timely and with minimized loss to the company and customers.

[170] *Of note: Banking laws and regulations cited below may be cited differently or have varying naming conventions, based on the regulatory agency. The banking principles discussed are very similar in substance, and citations can be used interchangeably.*
[171] (FDIC, "12 CFR Part 364")

Given the lack of traditional assets supporting the values of algorithmic stablecoins, regulators should still supervise these coins; however, it may be prudent to consider initially excluding algorithmic stablecoins from the scope of stablecoin issuers which could be eligible for federal insurance coverage. The lack of marketable assets for a regulator to sell to offset losses and pay creditors would present a challenge for providing insurance. China has taken a similar approach by excluding algorithmic stablecoins from its proposed stablecoin licensing framework.

2. **Credit and Liquidity Risk Associate with Inadequate Collateralization**: Stablecoins being under-collateralized, or reserved with assets that carry higher credit or liquidity risks than those present in U.S. Dollars and equivalents.

   Existing Banking Framework: While regulations would have to be developed addressing requirements of stablecoin reserves, in general many existing banking principles are relevant. First, FDIC Rules and Regulations Part 364 (Standards for Safety and Soundness) addresses operational and managerial standards used in banking.[172] Part 364 requires federal banking regulators establish baseline requirements for internal controls and audit systems, loan documentation, credit underwriting, interest rate exposure, asset quality/growth, earnings, and management compensation.[173] This could be adapted to address baseline standards related to stablecoin operations and reserves. Similarly, for liquidity, FDIC Rules and Regulations Part 329 establishes minimum liquidity standards and stable funding standards for large and complex financial institutions. [174] This regulation could be adapted to address the liquidity and reporting needs of stablecoin issuers.

   Potential Regulatory Approach: Regulators would need to establish regulations that (1) require minimum liquidity or reserve levels, and (2) develop guidelines on the permissible holdings to satisfy liquidity/reserve requirements. By leveraging requirements of Part 329, regulators could provide a scale determining an asset-type's liquidity /marketability, and use this approach to determine a weighted approach to a crypto-issuer's liquidity and reserve levels. If liquidity levels decline below the required threshold, stablecoin issuers would need to either replenish assets or secure funding. To accomplish this level of oversight, stablecoin issuers would need to complete standardized and publicized forms on their reserve holdings. The frequency of this reporting may vary depending on the risks associated with the issuer (i.e. daily reporting for problematic issuers, and weekly or monthly reporting for all others).

3. **High level of price volatility**: This volatility can be associated with adverse market events, negative publicity, or declines in market liquidity.

[172] (FDIC, "12 CFR Part 364")
[173] (FDIC, "12 CFR Part 364")
[174] (FDIC, "12 CFR Part 329")

Existing Banking Framework: In general, price volatility was symptomatic of larger market events that were occurring, or concerns associated with the stablecoin becoming de-pegged. The application of banking principles for capital (FDIC Rules and Regulations Part 324[175]), asset growth (FDIC Rules and Regulations Part 364 Appendix A[176]), and liquidity (discussed in Items Two, Four, Five, and Six), could have reduced this volatility. Further, if the funds were insured, they would not experience such significant price fluctuations due to coin-holder flight during a stress event.

Potential Regulatory Approach: The price volatility associated with stablecoins is attributed to several factors discussed in this paper. By addressing some of the underlying safety and soundness weaknesses, such as a lack of capital, inadequate liquidity, an unsustainable growth, this could provide greater security to stablecoin holders, and therefore result in less dramatic fluctuations in pricing. Regulators should focus on implementing appropriate frameworks for capital (Item Four), liquidity/reserve balances (Items Two and Six), and growth (Item Five) to reduce pricing volatility. As described under each of these areas, many of the safety and soundness principles already applying to banks, and could be adapted to suit the needs of a stablecoin issuer.

After controlling for risks internal to each issuer, regulators must consider the systemic risk of failure associated with the industry, as well as the interconnected nature of many of the crypto-companies. Therefore, the recommendations outlined under Item 11 regarding providing deposit insurance, as well as Item Nine on third-party risk management should be considered.

4. **Inadequate Capital Levels**: Stablecoin issuers not maintaining sufficient capital to absorb losses and price fluctuations.

Existing Banking Framework: The current banking framework provides for required capital levels for financial institutions. FDIC Rules and Regulations Part 324 addresses minimum capital requirements.[177] This Part establishes minimum capital levels, defines what sources can be included within the scope of regulatory capital, and provides for a framework for calculating risk-weighted assets.[178] Based on the risk-weighted asset formula, greater capital holdings against assets, both on- and off-balance sheet, are required for entities with greater risk (traditionally credit, market, or liquidity risk). Importantly, this Regulation also grants the FDIC authority to require an FDIC-supervised institution to hold amounts greater than what is required if the institution's risk is greater.[179] Capital requirements also ensure that asset growth is controlled and consistent with safe and sound banking activities. This also provides regulators with the ability to require banks to hold additional capital if they are taking on excessive risks.

[175] (FDIC, "12 CFR Part 324")
[176] (FDIC, "Appendix A to Part 364, Title 12")
[177] (FDIC, "12 CFR Part 324")
[178] (FDIC, "12 CFR Part 324")
[179] (FDIC, "12 CFR Part 324")

Potential Regulatory Approach: Many of the principles from existing capital regulations could be applied to stablecoin issuers. Regulators should adapt current capital frameworks to address a minimum level of capital holdings relative to the coins issuance's outstanding. This minimum capital level should consider the pricing volatility of the coin, as well as the risks of the underlying assets. For example, in the case of Tether, which previously held a large portion of its reserves in commercial debt, may have been required to hold greater capital reserves compared to USD Coin who held lower-risk assets such as US Treasury Securities and U.S. Dollars.

Another aspect that should be factored into the minimum capital requirement should be the types of activities the various stablecoins are engaged in. Many of the declines experienced in the case studies were driven by relationships with other crypto-companies (ex. Tether and Bitfinex), or off-balance sheet obligations (e.g., the obligation to fund LUNA maintain the TerraUSD peg). Therefore, it is critical to establish a methodology to quantify the vastly different risk profiles of each of these activities. The practical approach to initially establishing a minimum capital requirement may be a case-by-case calculation for each issuer. Over time, this methodology can be refined as risks are identified, assessed, and monitored and a standardized risk-rating system is developed. This regulatory approach would also require that stablecoin issuers file publicly available data on their capital, similar to what banks file in their quarterly Call Report.

5. **Unsustainable and Uncontrolled Growth:** Unsustainable and inadequately monitored growth associated with the volume of coins in circulation, without appropriate reserves and operational integrity.

   Existing Banking Framework: The application of banking regulations for capital and asset growth discussed in Item Four would prevent a stablecoin from growing in such an exponential manner. Furthermore, Part 364 addresses establishing policies and practices for sound asset growth.[180] This regulation considers the source, volatility, and use of funds to support growth; increases in credit or interest rate risk related to growth; and the effect of growth on capital.[181] Additionally, if there were more stringent liquidity requirements (Part 329) and regulation of algorithmic stablecoins, transactions occurring would be more normalized and would not create the significant supply-demand gaps as was the case with LUNA/USD.

   FIL-13-2009, "The Use of Volatile or Special Funding Sources by Financial Institutions That are in a Weakened Condition," released on March 3, 2009, also specifies that a financial institution in a weakened financial condition (Institutions rated a Composite 3, 4, or 5) which aggressively grow assets or shift balance sheet composition may be engaging in

[180] (FDIC, "12 CFR Part 364")
[181] (FDIC, "12 CFR Part 364")

unsafe and unsound practices.[182] This section provides further insights into the ability of federal banking regulators to enforce growth restrictions and reduce the risk profile for troubled banks. If regulated, stablecoin issuers that are in a weakened financial condition or have a weak risk management structure should be considered for similar growth restrictions, likely made applicable through the use of various enforcement actions. This could lower the severity of loss associated with a stablecoin's failure, or even prevent their failure if unsafe growth were curtailed early.

Potential Regulatory Approach: As described in Item Four, the adaptation of regulatory capital requirements, based on an existing regulatory framework, could temper growth and ensure such growth is well-managed. Moreover, implementation of a regulation similar to Part 364 could control risks associated with volatile funding or added credit exposure. Regulators should also consider how implementing liquidity rules, similar to those for banks, would require stablecoin issuers to secure less volatile funding and reduce concentrations of assets/liabilities. Refer to the discussion on these liquidity considerations in Items Two and Six. Furthermore, as discussed above, if stablecoin issuers were subject to the same growth restrictions placed on financial institutions, many of the concerns presented in the cases could have been mitigated.

6. **Liquidity Risk Associated with Instable Funding and Concentrations (Run-risk):** Association with other product types that incentivized investors to take on excessive risk causing unsupported and uncontrolled growth, and harm to consumers. The accounts paid a high yield, and encouraged investors, including retail consumers, to overleverage and chase the best rate. This attracted investors seeking higher returns to the stablecoin platforms and, consequently, led to higher withdrawals during adverse events. Also, funding concentrations were associated with a relatively small pool of investors, which comprised a significant portion of coin funding and could become market makers in that digital asset.

   Existing Banking Framework: Part 329 establishes liquidity risk measurement standards such as a minimum Liquidity Coverage Ratio and a Net Stable Funding Ratio. This ensures large financial institutions maintain a minimum amount of stable funding to support their asset, unfunded commitment, and derivative exposures over a one-year period.[183] These minimum liquidity and funding ratios could be adapted for stablecoin issuers.

   Further, prudent banking practices related to funding sources and monitoring liquidity are detailed in supervisory policy statements. Specifically, FIL-13-2010 "Interagency Policy Statement on Funding and Liquidity Risk Management" details numerous sound liquidity principles.[184] These include developing liquidity policies and contingency funding plans, implementing liquidity risk monitoring systems that monitor cash flow sources and uses,

[182] (FDIC, FIL-13-2009 "The Use of Volatile or Special Funding Sources...")
[183] (FDIC, "12 CFR Part 329")
[184] (FDIC, FIL-13-2009 "The Use of Volatile or Special Funding Sources...")

and performing stress testing that addresses adverse liquidity events and emergency cash flow requirements.[185] FIL-13-2010 also addresses the diversification of funding sources.[186]

FDIC Rules and Regulations Part 337.6 and Part 337.7 restrict a bank's ability to obtain and renew brokered deposits (considered an unstable funding source due to their rate-sensitivity), as well as limits the interest rates banks can offer on deposit accounts depending on their capital levels and other regulatory requirements.[187] Limitations on the use of brokered deposits and restrictions on interest rates are also triggered by the presence of certain types of formal enforcement actions.[188] This style of regulation could be adapted to address restricting certain unstable funding sources and interest rates paid for stablecoins, depending on their financial condition and conformance with safety and soundness standards (based on examination-assigned ratings and/or the presence of any supervisory action).

Potential Regulatory Approach: A regulatory framework for sound liquidity and funding practices exists and could be adapted to suit stablecoin issuers. In addition to the liquidity and reserve reporting considerations discussed in Item Two, existing regulatory guidance limits the use of unstable funding sources without appropriate risk controls. A similar framework on unstable funding and funding concentrations could be applied to stablecoins. The use of high-yield products such as Tether's Earn, incentivizes coin-holders to invest in the account promising the greatest return. Regulators should require stablecoin issuers to hold greater liquidity reserves or contingency funding sources, if they hold potentially rate-sensitive accounts.

Additionally, the funding concentrations maintained by the stablecoins in this case are inconsistent with sound banking practices further detailed in FIL-13-2010.[189] By requiring stablecoin issuers to identify and monitor their funding sources, and establishing regulatory policies which restrict concentrations to single or unstable funding sources, regulators could reduce the level of liquidity risk with stablecoins and potentially have prevented the run-type liquidity events which occurred. Regulators should consider implementing a framework similar to the brokered deposit restrictions and interest rate restrictions in Part 337.[190] Furthermore, if the funds were insured, coin-holders may have been less likely to cause a run on the TerraUSD stablecoin that precipitated the coin's liquidity failure.

7. **Compliance and Legal risks from Misreporting and/or Lack of Disclosure of Risk**: A lack of transparency, lack of disclosures, and misleading information which caused investor and consumer harm. Issues regarding transparency and reporting were noted related to the functioning of the Algorithmic stablecoin TerraUSD, reserve holdings for Tether, attestation

[185] (FDIC, FIL-13-2009 "The Use of Volatile or Special Funding Sources...")
[186] (FDIC, FIL-13-2010 "Funding and Liquidity Risk Management")
[187] (FDIC, "12 CFR Part 337")
[188] (FDIC, "12 CFR Part 337")
[189] (FDIC, FIL-13-2010 "Funding and Liquidity Risk Management")
[190] (FDIC, "12 CFR Part 337")

and audit reports for Tether, and false/misleading information related to deposit insurance coverage.

Existing Banking Framework: Some of the risks related to investor disclosure are being resolved through SEC actions, as the SEC has taken the stance that the stablecoins discussed in this analysis fall under the definition of a "security." See the "Enforcement of Unlawful Crypto-asset activities" section in the Introduction. The SEC, CFTC, and federal banking agencies all have reporting requirements for banks or issuers of securities. These reports serve to provide investors and depositors with information on the bank/organization's financial condition, disclose any material risks, and provide projections on future performance (in the case of many SEC disclosures). Many of these reports are standardized and publicly available. In the case of financial institutions, quarterly Reports of Condition and Income ("Call Reports") are required which reflect the financial condition of the bank for prior and current periods. Further, if a bank were to publicly issue securities, SEC filings disclosing material risks and projected future performance would be needed.

Furthermore, there are numerous compliance and consumer protection regulations which address required disclosures to consumers. While relevant existing compliance and consumer protections will not be fully discussed within the scope of this analysis, one key risk that has emerged is misleading advertisement of FDIC deposit insurance coverage for stablecoins and related products. FDIC Part 328 addresses misrepresentation of insured status, and has been implemented in several FDIC Cease & Desist actions which are detailed above.[191] However, misleading information provided to investors and false advertising of FDIC Insurance can cause consumer harm before an action is taken. Therefore, it is critical that more timely compliance with rules and regulations is enforced. This could be accomplished through establishing many of the practices for audit detailed under Item Eight, but would also be accomplished through active regulatory supervision.

Additionally, banking regulators issued a joint interagency statement on retail sales of nondeposit investment products in 1994, which expands on disclosures that banks must provide to inform consumers of the risk associated with non-FDIC insured products.[192] A statement similar to the 1994 policy could be adapted for stablecoin issuers.

Potential Regulatory Approach: As noted under several of the other Items, regulators should develop a standardized reporting system for stablecoin issuers which provides information on their financial condition, reserve holdings, liquidity position, capital position, etc. This would provide coinholders and third-parties the ability to evaluate the pertinent risks associated with each stablecoin.

Existing processes are in place through compliance and consumer protection regulations, including Part 328 (misrepresenting deposit insurance coverage) and Interagency Guidance

[191] (FDIC, "12 CFR Part 328")
[192] (FRB, FDIC, OCC, and OTS; "Interagency Statement on Retail Sales of Nondeposit Investment Products")

on the Retail Sale of Non-deposit Investment Products, which should continue to be applied in the case of stablecoins. To strengthen disclosure for consumers, stablecoin issuers should be required to explicitly advertise the lack of insurance and presence of any material risks for consumers. By fully disclosing related risk for loss to consumers, stablecoins could reduce any customer confusion that resulted during the failure of TerraUSD. Lastly, by insuring stablecoins, the harm to consumers caused by this misinformation about federal insurance coverage would be reduced or eliminated.

8. **Operational Risk from Weak Internal Controls and Inappropriate Governance**: Lack of appropriate internal control and governance structure. This allowed the coin founders/operators to operate as a dominant official with little or no controls. Further, it allowed stablecoin issuers to operate without needing to comply with commonplace accounting standards.

   Existing Banking Framework: Numerous federal banking regulations are applicable to internal controls (such as the FDIC Rules and Regulations Part 364) and audit program requirements (such as FDIC Rules and Regulations Part 363[193], and Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA))[194]. These regulations require an independent set of controls, audits, and attestations. Furthermore, under these regulations, auditors would need to comply with other audit standards, such as those in the U.S. set by the Financial Accounting Standards Board (FASB) and PCAOB. In addition to audit requirements, banking principles incorporated into a bank's supervisory rating include management and governance factors, Board oversight, a review of dominant officials, and assessment of any control risks. If implemented, existing banking regulations for internal controls and governance would have generally addressed the risks in the case studies.

   Potential Regulatory Approach: Existing U.S. criminal code and regulations being enforced by the SEC, CFTC, and Department of Justice penalize many of the fraudulent activities, insider abuses, and misrepresentations of the risks associated with the stablecoins discussed in this paper. As these processes appear to be effective, regulators for stablecoins should ensure development of an appropriate audit and internal control environment to better detect and prevent instances of fraud, insider abuse, and market manipulation.

   Regulators would need to establish an audit requirement and set of audit standards for all stablecoin issuers. These audit reports should be made public, or at minimum, be provided to the stablecoin's regulator. This would ensure stablecoin issuers establish an appropriate internal control framework, accurately report on their financial condition, and operate in compliance with outstanding laws and regulations. Many of the principles contained within Part 363 could be adapted for stablecoin issuers, such as the requirement to receive audited financial statements and establish an independent Audit Committee. Importantly, audits

[193] (FDIC, "12 CFR Part 363")
[194] (Congress, S.543 "Federal Deposit Insurance Corporation Improvement Act of 1991")

would need to be performed by independent firms, which are in good standing with accounting oversight bodies for their respective countries (similar to PCAOB in the U.S.). Receiving regular audits by an independent and qualified firm may have prevented some of the fraud and eventual loss that occurred at Terra. Further, these audits would have resulted in greater transparency for investors at Tether.

Similar to the requirements under Part 363 and FDICIA, a stablecoin issuer should be required to establish an effective audit program, including an assessment of risk, control testing, and reporting thes stablecoin issuer's Board/Committee responsible for oversight of the issuer. Moreover, stablecoin issuers need to establish mechanisms for investors and insiders at the company to report fraud. This can either be through internal processes with reporting to an individual/committee independent from the operations staff, or to the stablecoin issuer's regulator. An effective supervisory program for stablecoin issuers would incorporate a review of audit and internal control processes, to validate their effectiveness and assign an appropriate supervisory risk-rating. The establishment of a robust audit and internal control program, consistent with the framework accepted in the banking industry, may have identified or prevented some of the weaknesses identified in the case studies.

Regulators should also leverage off of existing banking limitations on exposures to insiders and affiliates. Presently, bank regulations limit transactions between insiders and affiliates through FRB Regulations O[195] and W[196], respectively. This type of limitation should be considered to reduce the likelihood of insider abuse and misappropriation, as was observed with TerraUSD and FTX.

9. **Ineffectively-Controlled Third-Party and Counterparty Risk:** Inadequately controlled counterparty and third-party risk associated with exposure to payment processors and other critical entities, as well as external audit firms.

   Existing Banking Framework: Existing banking regulations and policy statements address the management of third parties and controlling counterparty risks. FIL-44-2008, "Guidance for Managing Third-Party Risk," describes potential risk arising from third-party relationships and provides risk management principles to assess those relationships.[197] FIL-44-2008 further defines some potential third-party relationships can produce strategic risks (achieving corporate goals, receiving an adequate return on investment), credit risk (third-party cannot meet terms of agreement), compliance risk (violation of laws and regulations, or noncompliance with internal policies), as well as potential liquidity, market, price, foreign currency, and country risks.[198] Appropriate processes to control this risk include a risk assessment, due diligence, appropriate contract structuring, and oversight by an issuers management and Board. Third-party guidance provides flexibility to scale these processes up or down, depending on the nature and scope of the relationship. While the third-party

[195] (FRB, "12 CFR Part 215")
[196] (FRB, "12 CFR Part 223")
[197] (FDIC, FIL-44-2008 "Guidance for Managing Third-Party Risk")
[198] (FDIC, FIL-44-2008 "Guidance for Managing Third-Party Risk")

risk associated with a stablecoin issuer may vary from those of a traditional bank, the concepts described in FIL-44-2008 continue to apply.

Potential Regulatory Approach: Regulators should consider leveraging off of existing third-party risk management guidance, and producing additional clarifying interpretations for unique third-party risks applicable to stablecoins. This paper analyzed numerous instances of mismanaged third-party risk. For example, Terra Labs offered several products that interfaced either directly or indirectly with TerraUSD, such as LUNA (a crypto-asset staking company), Anchor (a high-yield staking account largely used to fund TerraUSD), and Mirror (used for synthethic stock trading). These partnerships resulted in increased liquidity risk, pricing risk, reputational risk, and compliance risk for TerraUSD. Furthermore, the interconnected pricing between LUNA and TerraUSD was not made apparent until times of market stress, endangering investor funds. Several of the case studies were also impacted by third-party risks between the issuer and crypto-exchanges or crypto-lenders (e.g. Tether and Bitfinex, and FTX impacting the stablecoin market overall).

If Terra had performed a risk assessment and independent due diligence of these TerraUSD partnerships, the coin could have identified the inherent risks early-on, developed appropriate protocols to ensure a more stable funding base, tightened IT controls on the algorithmic peg, and build greater safeguards to isolate adverse impacts to the stablecoin's value. Also, greater safeguards should have been developed in contracts to ensure all parties satisfy their obligations and to prevent one protocol's failure from significantly impacting TerraUSD. Moreover, third-party risk for the Terra network was largely driven by inter-related business lines. Given these conflicts of interest, stablecoins should ensure all aspects of managing these third-party relationships are performed by entities independent from the proposed transaction. This may require a greater utilization of outside counsel and parties external to the company, to aid in the development of risk assessment, robust due diligence, contract development, and ongoing oversight of the relationships.

In the case of Tether and its relationship with Bitfinex, the crypto-exchange, Tether did not appropriately review Bitfinex's payment systems and IT controls to determine whether the company has sufficient continuity plans, cybersecurity protections, and IT controls. In this case, Tether should have performed a review of Bitfinex and required Bitfinex submit certain audits attesting to control testing and the entity's financial condition. Some of the disruptions to Tether's operations and associated price decline could have been prevented or minimized with appropriate third-party safeguards. These safeguards should have consisted of a risk assessment process, due diligence, ongoing monitoring of financial condition, review of IT control testing, and contracts identifying service level agreements.

10. **Operational Risk from an Ineffective Risk Management Framework:** Numerous weaknesses were noted in risk management policies and practices to ensure safe and sound operations including, but not limited to, weaknesses in liquidity planning, monitoring and stress testing; a lack of operational policies and procedures in general; weak contingency planning for liquidity and operations; inadequate processes involving reserves; ineffective

or absent audit programs; a lack of reporting to investors/coin-holders and effective compliance program; and, inappropriate oversight of third-party relationships.

Existing Banking Framework: In the issuers explored in the case study, many of the issues stemmed from a poorly developed risk management program. Banking regulations and/or policies discussing sound banking principles directly address concerns related to capital, asset reserves, audit programs, governance, internal controls, liquidity, growth and concentrations, and third-party risk. These are all existing elements reviewed to provide a complete assessment of a bank's risk as part of the CAMELS rating system (Capital, Asset Quality, Management, Earnings, Liquidity, and Sensitivity to Market Risk).[199] Refer to Items One through Nine above for specific reference to applicable banking regulations / sound banking practices, and a potential regulatory approach that could be applied to stablecoins.

Potential Regulatory Approach: If stablecoins were subject to regulatory oversight, a rating system similar to CAMELS could be established to differentiate risk between the different issuers. Similar to banks, this supervisory rating assessment would be incorporated into the stablecoin's insurance premium. Refer to the "Recommendations" section for more information on a proposed supervisory structure.

11. **Contagion Risk, and Market-wide Systemic Risk:** Contagion risk resulting from one or multiple digital asset, exchange, or crypto-asset companies experiencing an adverse event. This risk appears to be both related to the interconnected nature of the crypto-companies (either by sharing significant operational services or holding exposures to one another), or due to market-wide systemic downturns.

    Existing Banking Framework: While the fundamental cause of the market contagion is likely tied to numerous factors (many of which are detailed in the other Items), the market contagion may have been contained if the stablecoins were federally insured. Within TerraUSD, the liquidity event experienced, and subsequent collapse of other crypto-companies may have not occurred if coin-holders had assurance that their funds were insured.

    Through the use of federal deposit insurance and targeted supervisory efforts, banking regulators have managed the systemic risk in the traditional banking sector. The Dod-Frank Wall Street reform and Consumer Protection Act ("Dodd-Frank Act") expanded the FDIC's responsibilities to supervise Systemically Important Financial Institutions (SIFIs) and designated non-bank companies, which present systemic risk due to their significant share of banking assets and deposits held.[200] Through powers granted under Title I and II of the Dodd-Frank Act, FDIC monitors and measures systemic risks, oversees the development of resolution plans, and ensures an orderly liquidation if the companies were to fail.[201]

[199] (FDIC, "Uniform Financial Institution Rating System")
[200] (Congress, H.R. 4173 "Dodd-Frank Wall Street Reform and Consumer Protection Act")
[201] (FDIC, FDIC Website "Activities Related to Systemically Important Financial Institutions")

The Financial Stability Oversight Council (FSOC), created under the Dodd-Frank act in 2010, includes representatives from federal banking agencies and is tasked with promoting the financial stability of the U.S.[202] The FSOC's role includes identifying threats to financial stability, designating certain financial markets and payment systems as systemically important, and coordinating supervisory efforts and rulemaking.[203] The framework that has been established for overseeing systemically important entities could be leveraged to support the oversight and regulation of stablecoin issuers given the importance stablecoins serve in the cryptomarket.

Potential Regulatory Approach: Firstly, banking regulators should consider providing federal insurance to protect U.S. customers against loss associated with the failure of a stablecoin, as further discussed in the "Recommendations" section. This would greatly reduce the contagion risk and run-risk (described in Item Six) associated with stablecoins.

Regulators should also limit exposures to other crypto-companies. This is similar to FRB Regulation F[204], which addresses limitations and monitoring for inter-bank liabilities. This regulation is intended to restrict one bank's credit or liquidity risk exposure to another institution. The regulation works to minimize any concentrations from other financial institutions, as well as establish mechanisms for monitoring those exposures (such as reviewing the financial condition and limiting exposure to banks with lower capital levels). The principles established under Regulation F should be adapted to consider the exposures various stablecoin issuers might have to other crypto-companies. This exposure could be related to an inter-connectedness in operations, or to general asset or liability exposures. By restricting this exposure or requiring a crypto-company to maintain a stronger financial condition, this may reduce or prevent the contagion risk to the entire industry due to a small group of poorly performing crypto-companies.

Regulators should leverage the framework of Title I and II, established under Dodd Frank, to supervise stablecoins. Some key aspects of Title I and II that should be considered is the development of stablecoin-issuer specific resolution plans as well as regulatory strategies to liquidate the issuer.[205] If these systems were in place during the failure of TerraUSD, investors may not have lost nearly $45 billion in market value. Further, it may have prevented the market decline by other stablecoin issuers occurring concurrently with Terra's failure. Additionally, regulators should establish required reporting processes to monitor stablecoin issuers and identify any emerging or related risks within the stablecoin industry. This further supports standardized reporting (e.g. a Call Report) for stablecoins on key risk areas such as reserve holdings, balance sheet/income statement, liquidity, and capital levels.

[202] (DOT, DOT Website "Financial Stability Oversight Council")
[203] (DOT, DOT Website "Financial Stability Oversight Council")
[204] (FRB, "12 CFR Part 206")
[205] (Congress, H.R. 4173 "Dodd-Frank Wall Street Reform and Consumer Protection Act")

Through the analysis performed using reported information on crypto-markets, domestic and international regulatory bodies would identify emerging risks and develop a coordinated supervisory strategy given the borderless nature of most crypto transactions. To this end, efforts by U.S. banking regulators to supervise stablecoin issuers and develop liquidation/resolution plans would require coordination with other global regulators to reduce the likelihood of regulatory arbitrage and recognize that these issuers might operate under differing rules, regulations, and bankruptcy laws. For example, failed crypto-exchange FTX, was regulated in the Bahamas, but has dealt with accusations that funds were inappropriately moved between U.S. and Bahamian accounts convoluting bankruptcy proceedings.[206] This has resulted in delays in the bankruptcy proceedings and potential evasion of existing U.S. bankruptcy rules. To effectively resolve and liquidate a stablecoin, it would require international regulatory cooperation and development of consistent standards.

Conclusion

In conclusion, many of the key risks identified above would be addressed, if pulled into the existing banking regulatory framework. This analysis indicates that existing banking laws, with some modification, could be implemented to expeditiously begin to regulate stablecoins. This includes implementing existing banking regulations for stablecoin issuers, such as:

- **Liquidity and Funding Controls** – 12 CFR Appendix A to Part 364 (Safety and Soundness Standards), 12 CFR Part 329 (Liquidity Risk Measurement Standards), 12 CFR Part 206 (FRB Regulation F – Limitation on Interbank Liabilities), 12 CFR Part 337.6 (Brokered Deposits), 12 CFR Part 337.7 (Interest Rate Restrictions), and other Liquidity sound banking practices detailed in FIL-13-2010 (such as policies, contingency funding plans, diversified funding, cash flow monitoring, and stress testing).
- **Capital and Growth Controls** – 12 CFR Appendix A to Part 364, 12 CFR Part 324 (Capital Adequacy of FDIC-Supervised Institutions), and the use of enforcement actions to restrict unsafe and unsound growth as described in FIL-13-2009.
- **IT and Cybersecurity Controls** – 12 CFR Appendix B to Part 364 (Standards for Information Security), and other FFIEC IT standards such as audits and control testing, vendor management, and disaster recovery/continuity planning.
- **Compliance and Legal Risk Controls** – U.S. Civil and Criminal Code addressing fraud, insider abuses, unregistered securities trading, and market manipulation. Additionally, banking regulations provide a disclosure framework, such as 12 CFR Part 328 (Advertisement of Membership) and the 1994 Interagency Policy Statement on Retail Sales of Nondeposit Investment Products.
- **Audit and Internal Controls** – 12 CFR Part 364, 12 CFR Part 363 (Annual Independent Audits and Reporting Requirements), Federal Deposit Insurance Corporation Improvement Act of 1991 (Required controls, audits, and attestation requirements), and

[206] (Handagama, "FTX Transferred $7.7B From Bahamian Estate to US Units Ahead of Bankruptcy Filing...")

domestic and international accounting standards enforced by agencies such as the PCAOB in the U.S.

- **Controls on Insider Activities** – 12 CFR 215 (FRB Regulation O – Loans to Executive Officers, Directors, and Principle Shareholders), and 12 CFR 223 (FRB Regulation W – Transactions Between Member Banks and Their Affiliates).
- **Third-Party Risk Controls** – FIL-44-2008, "Guidance for Managing Third-Party Risk."
- **Reporting Standards** – 12 U.S. Code § 1817 (Reports of Condition (Call Report), Access To Reports for State, Nonmember Banks).[207] Further, the Securities Exchange Act of 1934 requires certain companies engaged in security sales to report a registration statement for a public offering as well as periodic financial reports.[208]
- **Controls for Systemic Risks** – Title I and II of the 2010 Dodd Frank Act, and consideration of providing Federal Insurance coverage.

Risk areas that have limited or no existing supervisory standards include: controls over stablecoin reserve assets, controls for algorithmic stablecoins, controls to limit exposures between crypto-companies, and development of a supervisory ratings system (similar to the CAMELS rating system).

This analysis supports development of a more robust regulatory framework for stablecoin issuers, that could largely use the framework of existing banking rules and regulations. Additionally, if the risks described above could be controlled through a robust supervisory framework, stablecoins should be considered for federal insurance coverage, similar to deposit insurance. This would reduce systemic risk and better protect consumers and global financial markets. These findings could be applied in the future, should stablecoins fall under the regulatory purview and/or if they were to receive insurance. Further details on the proposed supervisory oversight and insurance structure are in the "Recommendations" section.

[207] (FDIC, "U.S. Code § Section 1817")
[208] (SEC, Website Investor.gov "The Laws That Govern the Securities Industry")

RECOMMENDATIONS

Proposed Supervisory Program

Given growth in crypto-assets, widespread customer use, and the susceptibility to systemic risks, it is critical that some level of regulatory oversight is provided for stablecoin issuers and companies integral to their operations. This level of oversight would be similar to that provided to financial institutions, and compliance with banking laws and regulations would be necessary. As noted in the case analysis, almost all of the risks present in stablecoins could be corrected if subject to existing banking laws, regulations, and sound banking principles. By regulating stablecoins, it also provides an avenue for penalizing bad actors in the space or companies that engage in unsafe behavior, while protecting consumers from a significant loss of value.

Digital Asset Stability Board

Lawmakers and regulatory agencies should consider implementing a supervisory program, similar to those provided to insured depository institutions, for stablecoin issuers. While efforts to develop a supervisory approach and related policy should be coordinated across federal banking and securities regulators, supervision should be provided by one agency to reduce the likelihood of regulatory arbitrage. For the illustrative-purposes of this paper, the agency is referred to as the "Digital Asset Stability Board (DASB)."[209] DASB would be an independent government agency responsible for the supervision and resolution of Insured Digital Asset Issuers (IDAIs) and any significant third-party providers to IDAIs. Their mission would be to ensure the stability of digital assets and financial markets. As such, the agency would be both the chartering authority for stablecoins as well as the insurer.

DASB would also be responsible for the maintence of a Federal Digital Asset Insurance Fund (FDAIF, or "Insurance Fund"), described under "Proposed Insurance System". The Board of DASB would consist of an appointed Chairperson, and eight Board member from each of the primary federal and state banking and securities regulatory agencies: the FDIC, OCC, FRB, National Credit Union Administration (NCUA), the Conference of State Bank Supervisors (CSBS), SEC, CFTC, and the FSOC. This robust and extensive representation ensures all significant agencies involved in overseeing financial markets receive appropriate input and regulatory authority.

The agency would operate as an independent government agency, with funding appropriated by fees paid by IDAIs. While an independent agency, the DASB should be subject to audits, evaluations, and investigations by an independent government agency (similar to the Office of the Inspector General), to promote effectiveness and prevent waste or misconduct. The agency workforce would consist of banking regulators and individuals experienced in crypto-asset

[209] *Of note, all agency naming and the naming of the insurance fund are developed by the author to better illustrate the proposed regulatory structure.*

operations. For initially staffing the agency, existing regulatory authorities should consider sharing their staffing resources with the DASB.

Supervisory Program

Supervisory efforts at the DASB would function in a manner similar to those at federal banking agencies today. The DASB would initially perform an investigation of the IDAI to determine the risk to the Insurance Fund. After Insurance Coverage is granted, the IDAI would then fall under normal supervisory processes. The supervision process for IDAIs may be more similar to the Continuous Examination Process implemented by the FDIC and large banking program implemented by federal banking regulators. This consists of ongoing reporting to federal regulators, an offsite review of the entity's financial and operating condition, and a set of ongoing targeted review areas. Moreover, given the systemic and inter-related risks for many stablecoin issuers, the DASB would also need to review risk at an industry-wide, or horizontal level. This will result in the identification of emerging risk trends in a more timely manner, also it could identify stablecoin risk outliers. Information from horizontal reviews, in coordination with IDAI-specific examinations, would then be used to develop a supervisory plan for each IDAI. This plan would ensure the areas presenting the greatest risks are reviewed first and incorporated into the IDAI's risk premium for insurance. Depending on the size and complexity of each IDAI and their supervisory plan, each IDAI may have different staffing and examination needs. For example, smaller and less complex issuers may be able to be overseen by a team that supervises several issuers; whereas, a larger, more complex, or troubled IDAI, may have a team dedicated solely to that issuer.

Regulators at the DASB and lawmakers would also be responsible for determining a standardized rating system, similar to the Uniform Financial Institutions Rating System (UFIRS). The current UFIRS rating system provides a composite rating, and component ratings for Capital, Asset Quality, Management, Earnings, Liquidity, and Sensitivity to Market Risk (CAMELS). Furthermore, ratings are assessed for IT, Trust, AML/CFT, and other specialty areas. As described in the "Findings" Section, many of the areas included in the CAMELS and Specialty rating systems for financial institutions would be relevant to stablecoin issuers. This rating assessment would be updated at least annually, or more readily, depending on the changing condition of the IDAI. Offsite review processes should consist of a quarterly validation of the existing ratings. To implement the Continuous Examination Program approach and update ratings timely, this requires that IDAIs report using some type of standardized reporting tool, such as the Call Report for financial institutions. At minimum, reporting should address all of the risks detailed in the "Findings" section such as liquidity risks, reserve holdings, capital levels, and basic balance sheet and income statement composition, etc.

Another key responsibility of the DASB would be to review and assess resolution plans and strategies to liquidate stablecoin issuers, similar to the authorities granted under Title I and II of the Dodd Frank Act.

Finally, the DASB should develop appropriate regulatory guidance, rules, and laws that consider the key risks and potential regulatory approach described in the "Findings" section of this paper. The Findings section concluded that many existing banking laws and regulations could be adapted to suit the needs of stablecoin issuers. Future stablecoin laws, regulation, and guidance should be developed factoring in the following risk areas:

- Inability to Scale Algorithmic Stablecoins
- Credit and Liquidity Risk Associated with Inadequate Collateralization
- High Level of Price Volatility
- Inadequate Capital Levels
- Unsustainable and Uncontrolled Growth
- Liquidity Risk Associated with Instable Funding and Concentrations (Run-Risk)
- Compliance and Legal Risk from Misreporting and/or a Lack of Disclosure of Risk
- Operational Risk from Weak Internal Controls and Inappropriate Governance
- Ineffectively Controlled Third-Party and Counterparty Risk
- Operational Risk from Ineffective Risk Management Framework
- Contagion Risk and Market-wide Systemic Risk

Proposed Insurance System

To protect the public and limit contagion/systemic risks, eligible stablecoins should receive deposit insurance and be chartered as an entity separate from financial institutions. Stablecoin issuers, once approved for a charter and insurance, should maintain a separate insurance fund. In this case, referred to as the Federal Digital Asset Insurance Fund (FDAIF, or "Insurance Fund"). In doing so, the insurance provider (DASB) can assess the risks related to each stablecoin issuer and determine an appropriate risk premium to be paid.

Similar to the way the Deposit Insurance System works, the DASB would establish a separate division responsible for determining risk premiums to be paid by stablecoin issuers (IDAIs). The Insurance Premiums would be tied to a risk assessment process. This process would consider inputs from the IDAI's initial investigation for insurance/chartering, risk-ratings assigned during continuous examination activities, ongoing monitoring for emerging risk trends, as well as a horizontal analysis which considers the broader risk present in the industry.

Insurance Level

To promote consistency and prevent consumer confusion of their insured Digital Asset accounts, the DASB should establish a standard for the level of insurance coverage provided to each individual. Additionally, to compare one stablecoin to another, the DASB would be responsible for determining a conversion factor for determining the value of stablecoins relative to a standard FIAT currency (for example, the U.S. Dollar). For the purposes of illustration, should USD Coin receive insurance and chartering under the DASB, insurance coverage could be quoted in the U.S. Dollar equivalence since USD Coin holds reserves backing

the U.S. Dollar 1:1. For example, insurance coverage could be limited to $500,000 in U.S. Dollars, which equates to $500,000 in USD Coin. This could present challenges with stablecoins which do not hold values in FIAT-equivalents, and would be even more problematic with an algorithmic stablecoin. For those reasons, the DASB may consider starting its chartering/insurance program by only insuring stablecoins that are fully backed by stable, FIAT-currencies.

Insurance Fund

Based on the general immaturity of the crypto-market and the generally unknown level of risk, it is anticipated that this fund would require elevated reserves compared to the current Deposit Insurance Fund's minimum reserve level ("Designated Reserve Ratio") consisting of 1.35 percent of total deposits. The DASB should perform analysis of the Digital Asset Industry to determine an appropriate minimum reserve level. Individual premiums paid by IDAIs would be based on the issuer's individual risks and ratings assigned by the DASB. Moreover, DASB should retain the capacity to request additional premiums as industry conditions change, similar to the current FDIC Deposit Insurance process.

Another consideration is if the Insurance Fund were to fall insolvent, would the insurance fund receive financial support from the full faith and credit of the U.S. Government (as is the case with the Deposit Insurance Fund)? These are considerations that require additional analysis by regulators and lawmakers. If the stablecoins maintain balances in U.S. Dollar or Dollar-equivalent assets, strong consideration should be given to providing full backing by the U.S. government. Until a more robust stablecoin regulatory and resolution framework is developed, the DASB's Insurance Fund could end up taking on signficiant additional risk before reserves are funded to an appropriate level.

Positive or Negative Consequences

There are many positive consequences to providing regulatory oversight and deposit insurance for stablecoins. The largest upside to regulating and insuring stablecoins would be an increase in stability in the financial markets as well as a reduction in consumer harm with a failed stablecoin. Additionally, this would integrate new technology in the banking system, which could improve the efficiency of payment systems in the future, as well as draw more people into the banking system.

Alternatively, there are negative consequences as well, particularly from a logistics/staffing and deposit insurance fund standpoint. By pulling stablecoins under regulatory oversight by one of the federal banking regulators, this could result in a substantial need to expand the regulatory workforce. Individuals regulating stablecoin issuers would need to have the appropriate training and expertise. Therefore, there could be a shortage of individuals willing to join regulatory agencies or individuals could lack the appropriate expertise.

By providing deposit insurance to stablecoins, there are some complex logistical considerations as well as a general increase in risk to the insurance fund. The stablecoins would each need to be assessed individually, similar to insured depository institutions, which could be logistically challenging to accomplish in a reasonable time-period. A new rating assessment level, and potentially separate insurance fund would need to be established based on the risk in the stablecoins.

Given the immature risk management framework of many stablecoins, and the uncertainty surrounding all stablecoin risks, the insurance fund may have to hold a higher balance relative to stablecoins outstanding, when compared against the current Designated Reserve Ratio of 1.35 percent of total deposits. Regulators and lawmakers would need to develop a process to determine minimum Insurance Fund levels and provide a risk premiums from each issuer.

Some additional challenges may be in implementing a system for paying insurance claims. To establish a limit and payout individual claims, the coin holders would need to reveal a certain level of Personally Identifiable Information to be eligible for claims in liquidiation. In addition, a consistent unit of account would need to be established for each stablecoin, likely the US Dollar, to understand stablecoin risks, fund an insurance system, pay claims, and receive insurance assessment fees from stablecoin issuers. This may require Federal Regulators to require all insured stablecoins be easily converted to U.S.- Dollar or equivalents.

Finally, given the current weakened conditions of the crypto-industry, stablecoin issuers may not have the financial capacity to absorb the cost associated with raising capital, strengthening their reserve balances, paying new insurance fund assessments, and paying for the cost of an improved risk management framework. Regulators would need to analyze the potential economic impact of these regulatory changes on the crypto-economy and global financial economy.

Achieving the Mission

Essential financial protections can be provided to consumers by insuring and regulating stablecoin issuers. This could lessen or prevent the wide-spread instances of consumer harm identified in the cases presented in this paper. In a speech on April 8, 2022, Acting Comptroller of the Currency Michael Hsu remarked that nearly one in five Americans have exposure to crypto.[210] This disproportionately affects young, diverse, and underbanked populations. He noted that 70 percent of crypto users were born after 1980[211]; 56 percent earn under $50 thousand annually[212]; and, black, Hispanic, and Asian adults are significantly more likely to hold crypto-assets[213]. In addition, 37 percent of underbanked people own crypto, compared to 10 percent who are fully banked.[214] To strengthen the number of “banked” customers and

[210] (Hsu & OCC: Remarks "Thoughts on the Architecture of Stablecoins", 1)
[211] (Principato, "Unbanked and Underbanked - Future of Service")
[212] (Principato, "Unbanked and Underbanked - Future of Service")
[213] (Perrin, "16% of Americans say they have ever invested in, traded or used cryptocurrency")
[214] (Principato, "Unbanked and Underbanked - Future of Service")

provide appropriate protections in a market downturn, stablecoins should be considered within the scope of assets subject to federal insurance and regulatory oversight.

Without the presence of deposit insurance or regulatory oversight, there are systemic and contagion risks that cannot otherwise be controlled, resulting in harm to the financial markets and consumers. While the size of the crypto-market (estimated at around $2 trillion) remains significantly below the size of the US economy (roughly $23 trillion), this market continues to grow.[215] Further, SEC Chairman Gensler stated recently that 80-85 percent of trading and lending in crypto involves stablecoins.[216] Therefore, since stablecoins are such a significant part of the crypto-market in general, and have similarities to traditional finance, they should be considered as the first crypto-asset type for consideration under the proposed framework. Further, it would be more effective to absorb new stablecoin market participants into the regulatory perimeter over time by beginning supervision sooner rather than later.

At the heart of this discussion remains the missions of federal banking regulators (FDIC, FRB, and the OCC), which remain universal:

- The FDIC's mission is to maintain stability and public confidence in the nation's financial system.[217]
- The FRB's mission is to foster the stability, integrity, and efficiency of the nation's monetary, financial, and payment systems so as to promote optimal macroeconomic performance.[218]
- The OCC's mission is to ensure that national banks and federal savings associations operate in a safe and sound manner, provide fair access to financial services, treat customers fairly, and comply with applicable laws and regulations.[219]

As banking and technology have advanced, the mission of banking regulators remains the same. Many of the risks detailed in this analysis mirror those of traditional, centralized banking. If implemented in a manner consistent with existing safety and soundness standards, subject to routine regulatory oversight, and eligible for deposit insurance coverage; stablecoins could be the next step in banking/payment systems drawing in a new, unbanked population into the financial industry while providing expanding stability to the financial system.

[215] (Gensler & SEC; Remarks on "Crypto Markets" at Penn Law Capital markets Association Annual Conference)
[216] (Gensler & SEC; Remarks on "Crypto Markets" at Penn Law Capital markets Association Annual Conference)
[217] (FDIC, FDIC Website "Mission, Vision, and Values")
[218] (FRB, FRB Website "Mission, Values, and Goals of the Board of Governors")
[219] (OCC, OCC Website "About Us")

BIBLIOGRAPHY

Alo, Kingsley. 2022. "Decentralized Stablecoins Take Off After USDC Funds Frozen." *The Tokenist.* The Tokenist, August 12. Accessed January 2023. https://tokenist.com/decentralized-stablecoins-take-off-after-usdc-funds-frozen/.

Antolin, Mike. 2022. "How Does USDC Work?" CoinDesk, June 6. Accessed January 2023. https://www.coindesk.com/learn/how-does-usdc-work/.

Arner, Douglas, Raphael Auer, and Jon Frost. 2020. *BIS Working Papers No. 905, Stablecoins: risks, potential and regulation.* Working Paper, Monetary and Economic Department, Bank for International Settlements, Bank for International Settlements, 2,6. Accessed December 2022. https://www.bis.org/publ/work905.pdf.

Au, Lavender. 2023. "How Hong Kong Is Gearing Up to Regulate Stablecoins." CoinDesk, February 21. Accessed February 2023. https://www.coindesk.com/policy/2023/02/21/how-hong-kong-is-gearing-up-to-regulate-stablecoins/.

Author. Year. "Title." *Pub Title.* Vol. Volume. no. Issue. Edited by Editor. Translated by Translator. Compiled by Compiler. City, State: Publisher, Month Day. Pages. Accessed Month Access Day Access, Year Accessed. doi:DOI.

Avan-Nomaya, Osato, and Aislinn Keely. 2022. "Circle freezes USDC funds in Tornado Cash's US Treasury-sanctioned wallets." *The Block.* The Block, August 8. Accessed January 2023. https://www.theblock.co/post/162172/circle-freezes-usdc-funds-in-tornado-cashs-us-treasury-sanctioned-wallets.

Bank for International Settlements. 2022. "Second consultation on the prudential treatment of cryptoasset exposures." Bank for International Settlements, September 30. Accessed November 2022. https://www.bis.org/bcbs/publ/d533.pdf.

Barthere, Aurelie, Beili Baraki, Yong Li Khoo, Philip Grushyn, and Joshua Ho. 2022. "On-Chain Forensics: Demystifying TerraUSD De-peg." Nansen Research, May 27. Accessed December 2022. https://www.nansen.ai/research/on-chain-forensics-demystifying-terrausd-de-peg?utm_source=twitter&utm_medium=organic&utm_campaign=Research_USTdepeg_27May22.

BDO Italia S.pA. 2022. "Tether Holdings Limited Independent Auditor's Report on the Consolidated Reserves Report (As of 9-30-22)." Tether, November 10. Accessed December 2022. https://tether.to/en/transparency/#reports.

BlackRock. n.d. *Circle Reserve Fund.* Accessed January 2023. https://www.blackrock.com/cash/en-us/products/329365/.

Board of Governors of the Federal Reserve Bank. n.d. "12 CFR Part 206, Limitations on Interbank Liabilities." FRB. https://www.ecfr.gov/current/title-12/chapter-II/subchapter-A/part-206?toc=1.

Board of Governors of the Federal Reserve System. n.d. "12 CFR Part 215." https://www.ecfr.gov/current/title-12/chapter-II/subchapter-A/part-215?toc=1.

—. n.d. "12 CFR Part 223." FRB. https://www.ecfr.gov/current/title-12/chapter-II/subchapter-A/part-223?toc=1.

—. 2023. "Federal Reserve Board issues policy statement to promote a level playing field for all banks with a federal supervisor, regardless of deposit insurance status." Board of Governors of the Federal Reserve System, January 27. Accessed January 2023. https://www.federalreserve.gov/newsevents/pressreleases/bcreg20230127a.htm.

Board of Governors of the Federal Reserve System. 2022. *Money and Payments: The U.S. Dollar in the Age of Digital Transformation.* Research & Analysis, Board of Governors of the Federal Reserve System. Accessed November 2022. https://www.federalreserve.gov/publications/files/money-and-payments-20220120.pdf.

—. 2023. "Press Release - Federal Reserve Board announces denial of application by Custodia Bank, Inc. to become a member of the Federal Reserve System." Board of Governors of the Federal Reserve System, January 27. Accessed February 2023. https://www.federalreserve.gov/newsevents/pressreleases/orders20230127a.htm.

—. 2022. "SR 22-6 / CA 22-6: Engagement in Crypto-Asset-Related Activities by Federal Reserve-Supervised Banking Organizations." Board of Governors of the Federal Reserve System, August 16. Accessed October 2022. https://www.federalreserve.gov/supervisionreg/srletters/SR2206.htm.

—. n.d. *www.federalreserve.gov.* Accessed February 2023. https://www.federalreserve.gov/publications/gpra/2011-mission-values-and-goals-of-the-board-of-governors.htm#subsection-142-21B7B547.

Board of Governors of the Federal Reserve System; Federal Deposit Insurance Corporation; Office of the Comptroller of the Currency; Office of Thrift Supervision. 1994. "Interagency Statement on Retail Sales of Nondeposit Investment Products." FDIC, February 15. https://www.fdic.gov/news/financial-institution-letters/1994/fil9409.html.

Brainard, Lael; Board of Governors of the Federal Reserve System. 2022. "Crypto-Assets and Decentralized Finance through a Financial Stability Lens." *Bank of England Conferencce.* London, United Kindgom: Board of Governors of the Federal Reserve System. Accessed October 2022. https://www.federalreserve.gov/newsevents/speech/brainard20220708a.htm.

Centre. n.d. *https://www.centre.io/verite.* Accessed January 2023. https://www.centre.io/verite.

Circle. n.d. *https://www.circle.com/en/transparency.* Accessed February 5, 2023. https://www.circle.com/en/transparency.

—. n.d. *https://www.circle.com/en/usdc.* Accessed January 2023. https://www.circle.com/en/usdc.

CoinMarketCap. 2022. *https://coinmarketcap.com.* October 28. Accessed October 28, 2022. https://coinmarketcap.com/.

—. n.d. *https://coinmarketcap.com/currencies/usd-coin/, USD Coin Overview.* Accessed January 2023. https://coinmarketcap.com/currencies/usd-coin/.

Comply Advantage. 2022. "5th Anti-Money Laundering Directive (5AMLD): What You Need To Know." Comply Advantage, August 25. Accessed November 2022. https://complyadvantage.com/insights/5mld-fifth-anti-money-laundering-directive/.

—. n.d. "Cryptocurrency Regulations Around The World." *Insights.* Comply Advantage. Accessed November 2022. https://complyadvantage.com/insights/cryptocurrency-regulations-around-world/.

Conference of State Bank Supervisors. 2022. "Findings from the 2022 National Survey of Community Banks." *10th Annual Community Banking Research Conference.* St. Louis, MO: Conference of State Bank Supervisors. 3,8. Accessed October 2022. https://www.csbs.org/2022-csbs-national-survey-community-banks.

Congress (102nd). 1991. "S. 543, Federal Deposit Insurance Corporation Improvement Act of 1991." November 27. https://www.congress.gov/bill/102nd-congress/senate-bill/543.

Congress (111th). n.d. "H.R. 4173, Dodd-Frank Wall Street Reform and Consumer Protection Act." https://www.congress.gov/bill/111th-congress/house-bill/4173/text.

Crawley, Jamie. 2022. "Terra Blockchain Resumes Following 9-Hour Halt." CoinDesk, May 13. Accessed December 2022. https://www.coindesk.com/business/2022/05/13/terra-blockchain-resumes-following-9-hour-halt/.

Dale, Brady. 2022. "Jump and Three Arrows Lead $1B LUNA Buy to Secure UST Against Black Swans." Yahoo!, February 22. Accessed February 22, 2022. https://www.yahoo.com/now/jump-three-arrows-lead-1b-054508397.html.

—. 2020. "Terra Brings 24-Hour Trading to Synthetic Versions of Stocks Like TSLA and AAPL." CoinDesk, December 3. Accessed December 2022. https://www.coindesk.com/tech/2020/12/03/terra-brings-24-hour-trading-to-synthetic-versions-of-stocks-like-tsla-and-aapl/.

Duggan, Wayne. 2022. "Celsius Crypto Meltdown: A Crypto Lender in Crisis." Edited by Farran Powell. (Forbes Advisor). Accessed October 2022. https://www.forbes.com/advisor/investing/cryptocurrency/what-is-celsius/.

Federal Deposit Insurance Corporation. n.d. "12 CFR Part 324, Capital Adequacy of FDIC-Supervised Institutions." https://www.ecfr.gov/current/title-12/chapter-III/subchapter-B/part-324.

—. n.d. "12 CFR Part 328, Advertisement of Membership, False Advertising, Misrepresentation of Insured Status, and Misuse of the FDIC's Name or Logo INSURED STATUS, AND MISUSE OF THE FDIC'S NAME OR LOGO." https://www.ecfr.gov/current/title-12/chapter-III/subchapter-B/part-328.

—. n.d. "12 CFR Part 329, Liquidity Risk Measurement Standards." https://www.ecfr.gov/current/title-12/chapter-III/subchapter-B/part-329.

—. n.d. "12 CFR Part 337, Unsafe and Unsound Banking Practices." https://www.ecfr.gov/current/title-12/chapter-III/subchapter-B/part-337.

—. n.d. "12 CFR Part 363, Annual Independent Audits and Reporting Requirements." https://www.ecfr.gov/current/title-12/chapter-III/subchapter-B/part-363.

—. n.d. "12 CFR Part 364, Safety and Soundness Standards." https://www.ecfr.gov/current/title-12/chapter-III/subchapter-B/part-364.

—. n.d. "Appendix A to Part 364, Title 12." https://www.ecfr.gov/current/title-12/chapter-III/subchapter-B/part-364/appendix-Appendix%20A%20to%20Part%20364.

—. 2022. "FDIC Issues Cease and Desist Letters to Five Companies For Making Crypto-Related False or Misleading Representations about Deposit Insurance." Federal Deposit Insurance Corporation, August 19. Accessed November 2022. https://www.fdic.gov/news/press-releases/2022/pr22060.html.

—. n.d. *FDIC.gov, "Mission, Vision, and Values".* Accessed February 2023. https://www.fdic.gov/about/strategic-plans/strategic/mission.html.

—. n.d. *FDIC.gov, Activities Related to Systemically Important Financial Institutions.* Accessed January 2023. https://www.fdic.gov/about/financial-reports/report/2018annualreport/section-1-activities-related.html.

—. 2023. "FIL-01-2023, Joint Statement on Crypto-Asset Risks to Banking Organizations." Federal Deposit Insurance Corporation, January 5. Accessed January 2023. https://www.fdic.gov/news/financial-institution-letters/2023/fil23001.html.

—. 2009. "FIL-13-2009, The Use of Volatile or Special Funding Sources by Financial Institutions That are in a Weakened Condition." FDIC, March 3. https://www.fdic.gov/news/financial-institution-letters/2009/fil09013.html.

—. 2010. "FIL-13-2010, Funding and Liquidity Risk Management." FDIC, April 5. https://www.fdic.gov/news/financial-institution-letters/2010/fil10013.html.

—. 2022. "FIL-16-2022, Notification of Engaging in Crypto-Related Activities." FDIC, April 7. Accessed October 2022. https://www.fdic.gov/news/financial-institution-letters/2022/fil22016.html.

—. 2022. "FIL-35-2022, Advisory to FDIC-Insured Institutions Regarding Deposit Insurance and Dealings with Crypto Companies." Federal Deposit Insurance Corporation, July 29. Accessed October 2022. https://www.fdic.gov/news/financial-institution-letters/2022/fil22035.html.

—. 2008. "FIL-44-2008, Guidance for Managing Third-Party Risk." FDIC, June 6. https://www.fdic.gov/news/financial-institution-letters/2008/fil08044.html.

—. n.d. "U.S. Code § Section 1817, Assessments." FDIC. https://www.govinfo.gov/app/details/USCODE-2010-title12/USCODE-2010-title12-chap16-sec1817.

—. 1997. "Uniform Financial Institution Rating System." FDIC, January 1. https://www.govinfo.gov/content/pkg/FR-1997-01-06/html/97-155.htm.

Financial Action Task Force. 2019. "Public Statement on Virtual Assets and Related Providers, Interpretive Note to Recommendation 15." FATF, June 21. Accessed November 2022. https://www.fatf-gafi.org/en/publications/Fatfrecommendations/Public-statement-virtual-assets.html.

Financial Stability Oversight Council. 2022. *Report on Digital Asset Financial Stability Risks and Regulation 2022.* Report, Department of the Treasury. Accessed December 2022. https://home.treasury.gov/system/files/261/FSOC-Digital-Assets-Report-2022.pdf.

Gemini. n.d. *https://www.gemini.com/dollar.* Accessed December 2022. https://www.gemini.com/dollar.

Gensler, Gary; U.S. Securities Exchange Commission. 2022. "Prepared Remarks of Gary Gensler On Crypto Markets." SEC, April 4. Accessed January 2023. https://www.sec.gov/news/speech/gensler-remarks-crypto-markets-040422.

Grant Thornton, LLP. 2023. "USDC Circle Attestation Report December 2022." Centre, January 25. https://www.centre.io/hubfs/2022%20USDC_Circle%20Examination%20Report%20December%202022.pdf?hsLang=en.

Groves, Kevin. 2023. "What is GUSD, What's It Used For - Its Pros and Cons." *HedgewithCrypto.* HedgewithCrypto, February 3. Accessed February 2023. https://www.hedgewithcrypto.com/what-is-gusd/.

Gruenberg, Martin J.; Federal Deposit Insurance Corporation. 2022. "Speeches and Testimony: Remarks by FDIC Acting Chairman Martin J. Gruenberg at the Brookings Institution on The Prudential Regulation of Crypto-Assets." Federal Deposit Insurance Corporation, October 20. Accessed October 2022. https://www.fdic.gov/news/speeches/2022/spoct2022.html.

Gupta, Vinay. 2017. "A Brief History of Blockchain." *Harvard Business Review* (Harvard Business Review). Accessed November 2022. https://hbr.org/2017/02/a-brief-history-of-blockchain.

Hamilton, Jesse. 2022. "Circle Begins Putting Reserves Into New BlackRock Fund." CoinDesk, November 3. Accessed January 2023. https://www.coindesk.com/business/2022/11/03/circle-begins-putting-reserves-into-new-blackrock-fund/.

Handagama, Sandali. 2023. "FTX Transferred $7.7B From Bahamian Estate to US Units Ahead of Bankruptcy Filing, Court Told." CoinDesk, February 15. Accessed February 2023. https://www.coindesk.com/policy/2023/02/15/ftx-transferred-77b-from-bahamian-estate-to-us-units-ahead-of-bankruptcy-filing-court-told/.

Hertig, Alyssa. 2023. "What Is a Stablecoin?" CoinDesk, January 19. Accessed January 2023. https://www.coindesk.com/learn/what-is-a-stablecoin/.

HM Treasury. 2022. "Government to strengthen rules on misleading cryptocurrency adverts." HM Treasury, January 18. https://www.gov.uk/government/news/government-to-strengthen-rules-on-misleading-cryptocurrency-adverts.

Hochstein, Marc. 2021. "Tether's First Reserve Breakdown Shows Token 49% Backed by Unspecified Commercial Paper." CoinDesk, September 14. Accessed December 2022. https://www.coindesk.com/markets/2021/05/13/tethers-first-reserve-breakdown-shows-token-49-backed-by-unspecified-commercial-paper/.

Hollerith. 2023. "Stablecoin issuer Paxos ordered to halt creation for Binance USD." Yahoo!, February 13. Accessed February 2023. https://finance.yahoo.com/news/stablecoin-issuer-paxos-ordered-to-halt-creation-for-binance-usd-134410434.html.

Horwarth, Josh. 2022. "How Many Cryptocurrencies are There In 2023?" Exploding Topics, November 25. Accessed November 2022. https://explodingtopics.com/blog/number-of-cryptocurrencies.

Hsu, Michael J.; Office of the Comptroller of the Currency. 2022. "Remarks at DC Fintech Week 2022, "Skeumorphism, Commingling, and Data Gaps in Crypto"." Office of the Comptroller of the Currency, October 11. 2-9. Accessed October 2022. https://www.occ.gov/news-issuances/speeches/2022/pub-speech-2022-125.pdf.

Hsu, Michael; Office of the Comptroller of the Currency. 2022. ""Don't Chase," Remarks to the Harvard Law School and Program on International Financial Systems." *Roundtable on Institutional Investors and Crypto Assets.* Office of the Comptroller of the Currency, October 11. Accessed October 2022. https://www.occ.gov/news-issuances/speeches/2022/pub-speech-2022-126.pdf.

—. 2022. "Remarks at Institute of International Economic Law at Georgetown University Law Center, “Thoughts on the Architecture of Stablecoins”." OCC, April 8. Accessed December 2022. https://www.occ.gov/news-issuances/speeches/2022/pub-speech-2022-37.pdf.

Huigsloot, Luke. 2023. "USDC's ERC-20 transfer volume hit 5X USDT’s in fallout from FTX collapse." Cointelegraph, January 11. Accessed January 2023. https://cointelegraph.com/news/usdc-transfer-volume-hit-5x-usdt-s-in-fallout-from-ftx-collapse.

Hyatt, John. 2022. "Crypto Exchange Gemini Modifies Terms Of Service As Gemini Dollar, Its Own Stablecoin, Gets Caught In Market Contagion." Forbes, December 16. Accessed January 2023. https://www.forbes.com/sites/johnhyatt/2022/12/16/crypto-exchange-gemini-modifies-terms-and-services-as-gemini-dollar-its-own-stablecoin-gets-caught-in-market-contagion/?sh=32e89bba71c5.

John, Alun, Samuel Shen, Tom Wilson, and Krystal Hu. 2021. "China's top regulators ban crypto trading and mining, sending bitcoin tumbling." Edited by Michelle Price, Nick Macfie, Carmel Crimmins, Emelia Sithole-Matarise and Giles Elgood. Reuters, September 24. Accessed November 2022. https://www.reuters.com/world/china/china-central-bank-vows-crackdown-cryptocurrency-trading-2021-09-24/.

Jose, Renju, and Byron Kaye. 2021. "Australia proposes new laws to regulate crypto, BNPL." *Reuters*, December 8. Accessed November 2022. https://www.reuters.com/markets/currencies/australia-plans-update-regulatory-framework-payment-systems-2021-12-07/.

Kelly, Steven (@StevenKelly49). 2021. "Twitter Thread "It appears Gemini's stablecoin, GUSD, is pretty blatantly deceiving its customers on the safety of their funds..."." Twitter, November 16. Accessed December 2022. https://twitter.com/stevenkelly49/status/1460645534255878144.

Kessler, Sam. 2022. "UST Stablecoin Briefly Loses Peg, Luna Drops 10%." CoinDesk, May 8. Accessed December 2022. https://www.coindesk.com/business/2022/05/08/ust-briefly-loses-peg-luna-drops-10/.

—. 2022. "UST Stablecoin Loses Dollar Peg for Second Time in 48 Hours, LUNA Market Cap Falls Below UST's." CoinDesk, May 9. Accessed December 2022. https://www.coindesk.com/business/2022/05/09/ust-stablecoin-falls-below-dollar-peg-for-second-time-in-48-hours/.

Knight, Oliver; CoinDesk. 2022. "Over 2,000 Terra investors say false marketing is what caused them to lose their money." June 13. Accessed December 2022. https://fortune.com/2022/06/13/binance-us-over-2000-terra-investors-say-false-marketing-is-what-caused-them-to-lose-their-money/.

Lemasson, Salome; Rahman Ravelli. 2021. "Arrest of Alleged Bitcoin Fog Operator Signals Continued DOJ Focus on Crypto "Mixers"." Rahman Ravelli, May 18. Accessed January 2023. https://www.rahmanravelli.co.uk/articles/arrest-of-alleged-bitcoin-fog-operator-signals-continued-doj-focus-on-crypto-mixers/.

Ligon, Cheyenne. 2022. "Tether's Former Auditor Fined $1M by SEC for Sloppy Accounting." CoinDesk, September 26. Accessed December 2022. https://www.coindesk.com/policy/2022/09/26/tethers-former-auditor-fined-1m-by-sec-for-sloppy-accounting/.

Luna Foundation Guard (@LFG_org). 2022. Twitter, May 16. Accessed December 2022. https://twitter.com/LFG_org/status/1526126703046582272.

Malwa, Shaurya. 2022. "Terra's LUNA Has Dropped 99.7% in Under a Week. That's Good for UST." CoinDesk, May 12. Accessed December 2022. https://www.coindesk.com/markets/2022/05/12/terras-luna-has-dropped-997-in-under-a-week-thats-good-for-ust/.

Messari. n.d. *https://messari.io.* Accessed December 2022. https://messari.io/asset/gemini-dollar/profile.

—. n.d. *https://messari.io/asset/tether/profile.* Accessed December 2022. https://messari.io/asset/tether/profile.

Miller, Hannah. 2022. "Terra $45 Billion Face Plant Creates Crowd of Crypto Losers." Bloomberg, May 13. Accessed December 2022. https://www.bloomberg.com/news/articles/2022-05-14/terra-s-45-billion-face-plant-creates-a-crowd-of-crypto-losers#xj4y7vzkg.

Mola, Simona; Cornerstone Research. 2022. "SEC Cryptocurrency Enforcement 2021 Update." Cornerstone Research, January 19. Accessed October 2022. https://www.cornerstone.com/insights/press-releases/sec-maintains-focus-on-cryptocurrency-enforcement-under-chair-gensler/.

New York State Office of the Attorney General. 2021. "Press Release, Attorney General James Ends Virtual Currency Trading Platform Bitfinex's Illegal Activities in New York." New York State Office of the Attorney General, February 23. Accessed December 2022. https://ag.ny.gov/press-release/2021/attorney-general-james-ends-virtual-currency-trading-platform-bitfinexs-illegal.

Office of the Comptroller of the Currency. 2020. "Interpretive Letter #1170, Authority of a National Bank to Provide Cryptocurrency Custody Services for Customers." Office of the Comptroller of the Currency, July 22. Accessed December 2022. https://www.occ.gov/topics/charters-and-licensing/interpretations-and-actions/2020/int1170.pdf.

—. 2020. "Interpretive Letter #1172, OCC Chief Counsel's Interpretation on National Bank and Federal Savings Association." Office of the Comptroller of the Currency, September 21. Accessed November

2022. https://www.occ.gov/topics/charters-and-licensing/interpretations-and-actions/2020/int1172.pdf.

—. 2021. "Interpretive Letter #1174, OCC Chief Counsel's Interpretation on National Bank and Federal Savings Association Authority to Use Independent Node Verification Networks and Stablecoins for Payment Activities." Office of the Comptroller of the Currency, January 4. Accessed November 2022. https://www.occ.gov/topics/charters-and-licensing/interpretations-and-actions/2021/int1174.pdf.

—. 2021. "Interpretive Letter #1176, OCC Chief Counsel's Interpretation of National Trust Banks." Office of the Comptroller of the Currency, January 11. Accessed October 2022. https://www.occ.gov/topics/charters-and-licensing/interpretations-and-actions/2021/int1176.pdf.

—. 2021. "News Release 2021-19, OCC Conditionally Approves Conversion of Protego Trust Bank." OCC, February 5. Accessed December 2022. https://www.occ.gov/news-issuances/news-releases/2021/nr-occ-2021-19.html.

—. 2021. "News Release 2021-49, OCC Conditionally Approves Chartering of Paxos." OCC, April 23. Accessed November 2022. https://www.occ.gov/news-issuances/news-releases/2021/nr-occ-2021-49.html.

—. 2021. "News Release 2021-6, OCC Conditionally Approves Conversion of Anchorage Digital Bank." *News Release 2021-6, OCC Conditionally Approves Conversion of Anchorage Digital Bank.* Office of the Comptroller of the Currency, January 13. Accessed October 2022. https://www.occ.gov/news-issuances/news-releases/2021/nr-occ-2021-6.html.

—. 2022. "News Release 2022-4, OCC Conditionally Approves SoFi Bank, NA." OCC, January 18. Accessed November 2022. https://www.occ.gov/news-issuances/news-releases/2022/nr-occ-2022-4.html.

—. 2020. "OCC Bulletin 2020-59, National Bank and Federal Savings Association Digital Activities: Advance Notice of Proposed Rulemaking." Office of the Comptroller of the Currency, June 4. Accessed November 2022. https://www.occ.gov/news-issuances/bulletins/2020/bulletin-2020-59.html.

—. n.d. *OCC Website, Supervision & Examinations, Digital Assets.* Accessed December 2022. https://www.occ.gov/topics/supervision-and-examination/digital-assets/index-digital-assets.html.

—. n.d. *www.occ.treas.gov.* Accessed February 2023. https://www.occ.treas.gov/about/index-about.html#:~:text=Our%20Mission,with%20applicable%20laws%20and%20regulations.

Office of the Comptroller of the Currency; Board of Governors of the Federal Reserve System; Federal Deposit Insurance Corporation. 2021. "Joint Statement on Crypto-Asset Policy Sprint Initiative and Next Steps." November 23. Accessed November 2022. https://www.occ.gov/news-issuances/news-releases/2021/nr-ia-2021-120a.pdf.

Pandey, Shubham. 2022. "Analyzing USDC's falling utility post the Tornado Cash fiasco." AMBCrypto, September 15. Accessed January 2023. https://ambcrypto.com/analyzing-usdcs-falling-utility-post-the-tornado-cash-fiasco/.

Perera, Katryna; Freedman, Normand, & Friedland Law. 2022. "Binance Hit With Investor Suit Over Terra Stablecoin Collapse." Edited by Andrew Cohen. Freedman, Normand, & Friedland Law, August 16.

Accessed December 2022. https://www.fnf.law/binance-hit-with-investor-suit-over-terra-stablecoin-collapse.

Perrin, Andrew; Pew Research. 2021. "16% of Americans say they have ever invested in, traded or used cryptocurrency." *Pew Research.* Pew Research, November 11. Accessed January 2023. https://www.pewresearch.org/fact-tank/2021/11/11/16-of-americans-say-they-have-ever-invested-in-traded-or-used-cryptocurrency/.

President's Working Group on Financial Markets; Federal Deposit Insurance Corporation; Office of the Comptroller of the Currency. 2021. *Report on STABLECOIN.* Regulatory Report, U.S. Department of the Treasury. Accessed November 2022. https://home.treasury.gov/system/files/136/StableCoinReport_Nov1_508.pdf.

Principato. 2021. "Unbanked and Underbanked - Future of Service." *Morning Consult.* Morning Consult, August 17. Accessed January 2023. https://morningconsult.com/2021/08/17/trust-awareness-paynents-unbanked-underbanked/.

Q.ai; Forbes. n.d. "Gemini Crypto Pauses Withdrawals, Fallout Continues From FTX Collapse." *Forbes.* 2022: Forbes. Accessed December 2022. https://www.forbes.com/sites/qai/2022/11/30/gemini-crypto-pauses-withdrawals-fallout-continues-from-ftx-collapse/?sh=3dd95ca44a84.

Reiff, Nathan; Investopedia. 2023. "What Are ERC-20 Tokens on the Ethereum Network?" *Investopedia.* Edited by Amilcar Chavarria and Timothy Li. Investopedia, February 4. Accessed February 2023. https://www.investopedia.com/news/what-erc20-and-what-does-it-mean-ethereum/.

Reynolds, Sam. 2022. "Luna Foundation Guard Holds Almost 40,000 BTC After Weekend Purchase." CoinDesk, April 11. Accessed December 2022. https://www.coindesk.com/markets/2022/04/11/luna-foundation-treasury-holds-almost-40000-btc-after-weekend-purchase/.

Rooney, Kate. 2022. "Mastercard Will Help Banks Offer Cryptocurrency Trading." CNBC, October 17. Accessed November 2022. https://www.cnbc.com/2022/10/17/mastercard-will-help-banks-offer-cryptocurrency-trading.html.

Rubin, James. 2023. "Binance Says Signature Bank Won’t Support Transactions for Crypto Exchange Customers of Less Than $100K." *CoinDesk.* CoinDesk, January 22. Accessed February 2023. https://www.coindesk.com/business/2023/01/23/binance-says-signature-bank-wont-support-transactions-for-crypto-exchange-customers-of-less-than-100k/.

Sandor, Krisztian. 2023. "Crypto Staking 101: What Is Staking?" CoinDesk, February 21. Accessed January 2023. https://www.coindesk.com/learn/crypto-staking-101-what-is-staking/.

—. 2022. "Investors Flee Terra’s Anchor as UST Stablecoin Repeatedly Loses $1 Peg." CoinDesk, May 9. Accessed December 2022. https://www.coindesk.com/markets/2022/05/09/investors-flee-terras-anchor-as-ust-stablecoin-repeatedly-loses-1-peg/.

—. 2022. "LUNA Supply Drops to All-Time Low – But Don’t Call It Deflationary." CoinDesk, April 27. Accessed December 2022. https://www.coindesk.com/markets/2022/04/27/luna-supply-drops-to-all-time-low-but-dont-call-it-deflationary/.

—. 2022. "Terraform Labs Gives $820M in LUNA Tokens to Luna Foundation Guard." CoinDesk, April 14. Accessed December 2022. https://www.coindesk.com/markets/2022/04/14/terraform-labs-gifts-820m-in-tokens-to-luna-foundation-guard/.

Sandor, Krisztian, and Ekin Genc. 2022. "The Fall of Terra: A Timeline of the Meteoric Rise and Crash of UST and LUNA." CoinDesk, December 22. Accessed December 2022. https://www.coindesk.com/learn/the-fall-of-terra-a-timeline-of-the-meteoric-rise-and-crash-of-ust-and-luna/.

Schonberger, Jennifer. 2022. "SEC Chair Gensler warns on investing in crypto after meltdown." *Yahoo!news*, May 16. Accessed November 2022. https://news.yahoo.com/sec-gensler-warns-on-investing-in-crypto-185859765.html.

Scrivner, Brad, interview by Hugo Dante. 2021. "How a Community Bank Launched a Retail Crypto Platform." *ABA Banking Journal Podcast*, edited by Evan Sparks. American Banking Association, S&P Global Market Intelligence, (September 8). Accessed October 2022. https://bankingjournal.aba.com/2021/09/how-a-community-bank-launched-a-retail-crypto-platform/.

Signature Bank. 2022. "Press Release - Coinbase Commences Partnership With Signature Bank to Provide Real Time Settlement via Signet." Signature Bank, October 12. Accessed February 2023. https://investor.signatureny.com/pme/press-releases/news-details/2022/Coinbase-Commences-Partnership-With-Signature-Bank-to-Provide-Real-Time-Settlement-via-Signet/default.aspx.

Sinclair, Sebastian. 2022. "Tether Pushes Bank Timeline on Audit." Blockworks, August 29. Accessed December 2022. https://blockworks.co/news/tether-pushes-back-timeline-on-audit-report.

Singh, Onkar. 2022. "What is USD Coin (USDC), fiat-backed stablecoin explained." *Cointelegraph.* Cointelegraph, December 30. Accessed January 2023. https://cointelegraph.com/explained/what-is-usd-coin-usdc-fiat-backed-stablecoin-explained.

Stangarone, Troy. 2021. "South Korea Tightens Regulations on Cryptocurrencies." The Diplomat, July 3. Accessed October 2022. https://thediplomat.com/2021/07/south-korea-tightens-regulations-on-cryptocurrencies/.

Stevens, Robert. 2022. "Bitcoin Mixers: How Do They Work and Why Are They Used?" *CoinDesk.* CoinDesk, August 22. Accessed January 2023. https://www.coindesk.com/learn/bitcoin-mixers-how-do-they-work-and-why-are-they-used/.

Sun, Mengqi. 2022. "CFTC Signals Intent to Increase Enforcement of Crypto-Related Cases." *The Wall Street Journal*, May 18. Accessed October 2022. https://www.wsj.com/articles/cftc-signals-intent-to-increase-enforcement-of-crypto-related-cases-11652908480.

Sun, Zhiyuan. 2022. "Circle co-founder says converged dollar books on Binance would be good for USDC." *Cointelegraph.* Cointelegraph, September 6. Accessed January 2023. https://cointelegraph.com/news/circle-co-founder-says-converged-dollar-books-on-binance-would-be-good-for-usdc.

Terra; Kwon, Do. 2020. "Announcing Gdac GROW Staking with Luna." Medium, February 23. Accessed December 2022. https://medium.com/terra-money/announcing-gdac-grow-staking-with-luna-7725ba51d539.

—. 2020. "Announcing TerraUSD (UST)— the Interchain Stablecoin." Medium, September 21. Accessed December 2022. https://medium.com/terra-money/announcing-terrausd-ust-the-interchain-stablecoin-53eab0f8f0ac.

Terra; Platias, Nicholas. 2020. "Introducing Anchor." Medium, July 6. Accessed December 2022. https://medium.com/terra-money/introducing-anchor-25d782cbb509.

Tether. n.d. *https://tether.to/en/transparency/#reports.* Accessed January 12, 2023. https://tether.to/en/transparency/#reports.

The Block. 2020. "CENTRE appears to have blacklisted an address holding USDC for the first time." The Block, July 8. Accessed January 2023. https://www.theblock.co/linked/70850/centre-blacklist-usdc-address.

Thompson, Cam. 2022. "Tether Sticks to Decision Not to Bar Tornado Cash Addresses." *CoinDesk.* CoinDesk, August 24. Accessed January 2023. https://www.coindesk.com/business/2022/08/24/tether-sticks-to-decision-not-to-bar-tornado-cash-addresses/.

Thomson Reuters Tax & Accounting; Ledgible. 2022. "Refresher: Infrastructure and Investment Jobs Act's Crypto Reporting Requirements." Thomson Reuters, December 6. Accessed December 2022. https://tax.thomsonreuters.com/news/refresher-infrastructure-and-investment-jobs-acts-crypto-reporting-requirements/.

U.S. Department of Justice. 2021. "Individual Arrested and Charged with Operating Notorious Darknet Cryptocurrency "Mixer"." U.S. Department of Justice, April 28. Accessed January 2023. https://www.justice.gov/opa/pr/individual-arrested-and-charged-operating-notorious-darknet-cryptocurrency-mixer.

U.S. Department of the Treasury. 2022. *Action Plan to Address Illicit Financing Risks of Digital Assets.* Digital Asset Action Plan, Department of the Treasury. Accessed November 2022. https://home.treasury.gov/system/files/136/Digital-Asset-Action-Plan.pdf.

—. n.d. *https://home.treasury.gov/policy-issues/financial-markets-financial-institutions-and-fiscal-service/fsoc.* Accessed January 2023. https://home.treasury.gov/policy-issues/financial-markets-financial-institutions-and-fiscal-service/fsoc.

—. 2022. "Press Release - U.S. Treasury Sanctions Notorious Virtual Currency Mixer Tornado Cash." U.S. Department of the Treasury, August 8. Accessed January 2023. https://home.treasury.gov/news/press-releases/jy0916.

—. 2021. "Press Releases, President's Working Group on Financial Markets Releases Report and Recommendations on Stablecoins." U.S. Department of the Treasury, November 1. Accessed November 2022. https://home.treasury.gov/news/press-releases/jy0454.

U.S. Securities and Exchange Commission. n.d. *Crypto Assets and Cyber Enforcement Actions.* Accessed October 22, 2022. https://www.sec.gov/spotlight/cybersecurity-enforcement-actions.

—. 2022. "Press Release 2022-78, "SEC Nearly Doubles Size of Enforcement's Crypto Assets and Cyber Unit"." Securities and Exchange Commission, May 3.

—. 2023. "Press Release 2023-32, SEC Charges Terraform and CEO Do Kwon with Defrauding Investors in Crypto Schemes." U.S. Securities Exchange Commission, February 16. Accessed February 2023. https://www.sec.gov/news/press-release/2023-32.

—. 2023. "Press Release 2023-7, SEC Charges Genesis and Gemini for the Unregistered Offer and Sale of Crypto Asset Securities through the Gemini Earn Lending Program." SEC, January 12.

—. 2022. "SEC Release No. 95887, Cease-And-Desist Proceedings against Friedman LLP." SEC, September 23. Accessed December 2022. https://www.sec.gov/litigation/admin/2022/34-95887.pdf.

U.S. Securities Exchange Commission. n.d. *https://www.investor.gov/introduction-investing/investing-basics/role-sec/laws-govern-securities-industry#secexact1934.* Accessed January 2023. https://www.investor.gov/introduction-investing/investing-basics/role-sec/laws-govern-securities-industry#secexact1934.

Vast Bank, NA. 2021. "Vast Bank Partners with Coinbase to Complete Successful Bitcoin Transaction." Tulsa, Oklahoma: Vast Bank, February 4. Accessed November 2022. https://www.vast.bank/resource-center/press-release-vast-bank-completes-seamless-digital-currency-transaction.

Williams, Claire, and Brendan Pedersen. 2022. "FDIC calls out FTX US, other crypto firms over insurance claims." American Banker, August 19. Accessed December 2022. https://www.americanbanker.com/news/fdic-calls-out-ftx-us-other-crypto-firms-over-insurance-claims.

Wintermeyer, Lawrence. 2022. "From Hero To Zero: How Terra Was Toppled In Crypto's Darkest Hour." Forbes, May 25. Accessed December 2022. https://www.forbes.com/sites/lawrencewintermeyer/2022/05/25/from-hero-to-zero-how-terra-was-toppled-in-cryptos-darkest-hour/?sh=b658ae6389e2.

Wong, Russell; Federal Reserve Bank of Richmond. 2022. *Economic Brief No. 22-24, Why Stablecoins Fail: An Economist's Post-Mortem on Terra.* Economic Brief, Federal Reserve Bank of Richmond. Accessed December 2022. https://www.richmondfed.org/publications/research/economic_brief/2022/eb_22-24.

APPENDIX

Table of Contents

Terra LUNA (LUNA) 2

Exhibit 1A. Key Metrics (As of January 11, 2023) 2

Exhibit 1B. Price 1/1/2021 – 1/1/2023 2

Exhibit 1C. Real Volume 1/1/2021 – 1/1/2023 3

Exhibit 1D. Sharpe Ratio 1/1/2021 – 1/1/2023 3

Exhibit 1E. Volatility 1/1/2021 – 1/1/2023 4

TerraUSD (UST) 5

Exhibit 2A. Key Metrics (As of January 11, 2023) 5

Exhibit 2B. Price 1/1/2021 – 1/1/2023 5

Exhibit 2C. Real Volume 1/1/2021 – 1/1/2023 6

Exhibit 2D. Sharpe Ratio 1/1/2021 – 1/1/2023 6

Exhibit 2E. Volatility 1/1/2021 – 1/1/2023 7

Tether (USDT) 8

Exhibit 3A. Key Metrics (As of January 12, 2023) 8

Exhibit 3B. Price (1/1/21 – 1/1/23) 8

Exhibit 3C. Real Volume (1/1/21 – 1/1/23) 9

Exhibit 3D. Sharpe Ratio (1/1/21 – 1/123) 9

Exhibit 3E. Volatility (1/1/21 – 1/1/23) 10

Gemini Dollar (GUSD) 11

Exhibit 4A. Key Metrics (As of January 14, 2023) 11

Exhibit 4B. Price (1/1/21 – 1/1/23) 11

Exhibit 4C. Real Volume (1/1/21 – 1/1/23) 12

Exhibit 4D. Sharpe Ratio (1/1/21 – 1/123) 12

Exhibit 4E. Volatility (1/1/21 – 1/1/23) 13

USD Coin (USDC) 14

Exhibit 5A. Key Metrics (As of February 5, 2023) 14

Exhibit 5B. Price (1/1/21 – 1/1/23) 14

Exhibit 5C. Real Volume (1/1/21 – 1/1/23) 15

Exhibit 5D. Sharpe Ratio (1/1/21 – 1/123) 15

Exhibit 5E. Volatility (1/1/21 – 1/1/23) 16

References 16

Terra LUNA (LUNA)

Exhibit 1A. Key Metrics (As of January 11, 2023) [1]

Key Metrics	
Price	$1.52
1H Range	$1.55 - $1.59
24H Range	$1.55 - $1.59
Real Volume (24H)	$21.08M
ATH	$119.15
ATH Date	April 5th, 2022
Down from ATH	-98.73%
Cycle Low	$0.00
Cycle Low Date	May 21st, 2022
Up From Cycle Low	+1486169.74%
	View more >

Exhibit 1B. Price 1/1/2021 – 1/1/2023 [2]

[1] (Messari, Website "Terra LUNA" Overview and Market Data)
[2] (Messari, Website "Terra LUNA" Overview and Market Data)

Exhibit 1C. Real Volume 1/1/2021 – 1/1/2023 [3]

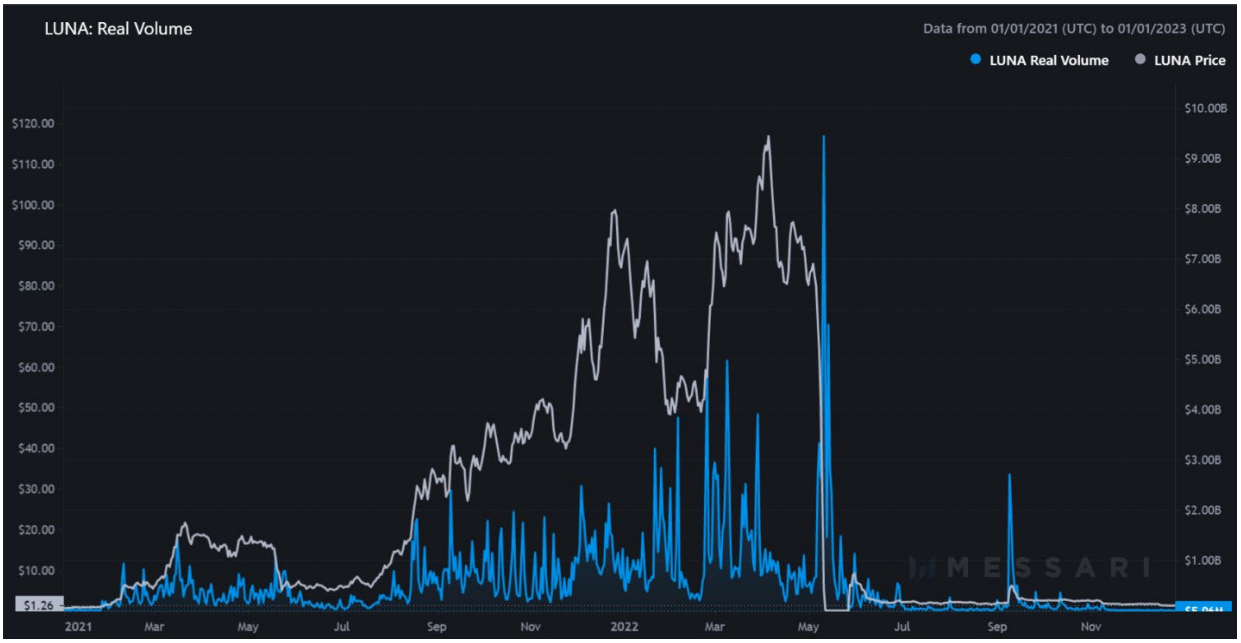
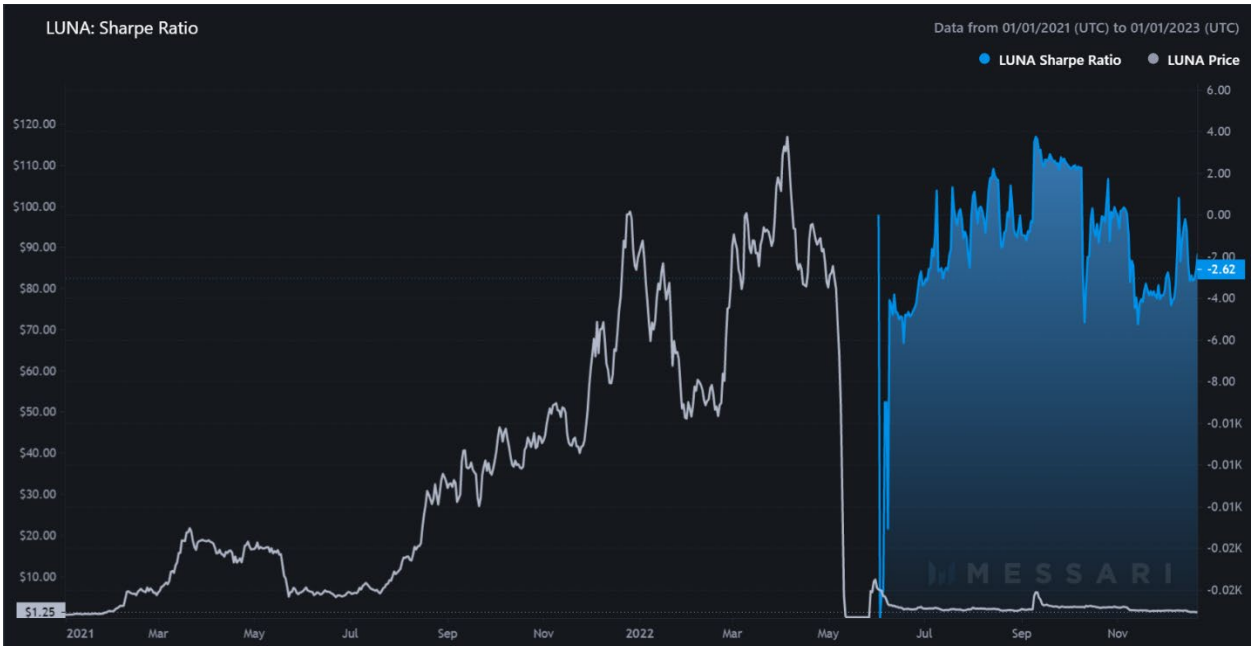
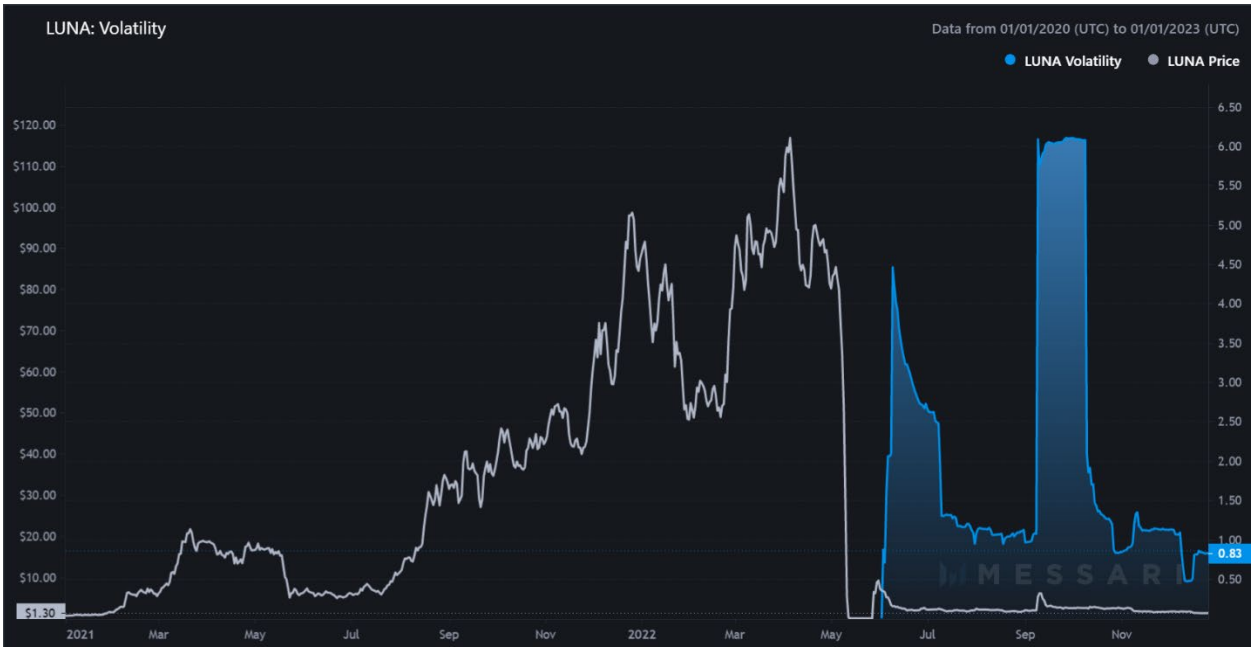


Exhibit 1D. Sharpe Ratio 1/1/2021 – 1/1/2023 [4]



[3] (Messari, Website "Terra LUNA" Overview and Market Data)
[4] (Messari, Website "Terra LUNA" Overview and Market Data)

Exhibit 1E. Volatility 1/1/2021 – 1/1/2023 [5]



[5] (Messari, Website "Terra LUNA" Overview and Market Data)

TerraUSD (UST)

Exhibit 2A. Key Metrics (As of January 11, 2023) [6]

Key Metrics	
Price	$0.02
1H Range	$0.0210 - $0.0210
24H Range	$0.0213 - $0.0213
Real Volume (24H)	$4.55M
Marketcap	$206M
ATH	$1.29
ATH Date	December 3rd, 2020
Down from ATH	-98.38%
Cycle Low	$0.01
Cycle Low Date	June 18th, 2022
Up From Cycle Low	+245.55%
	View more >

Exhibit 2B. Price 1/1/2021 – 1/1/2023[7]

[6] (Messari, Website for "TerraUSD" Overview and Market Data)
[7] (Messari, Website for "TerraUSD" Overview and Market Data)

Exhibit 2C. Real Volume 1/1/2021 – 1/1/2023 [8]

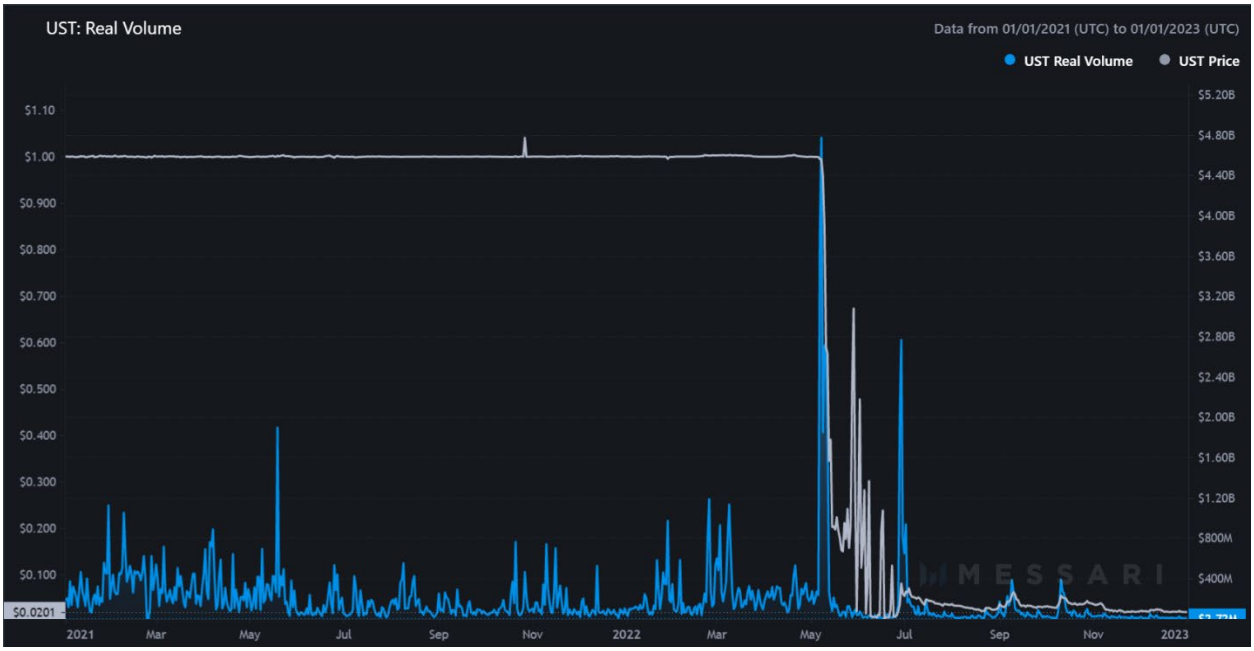
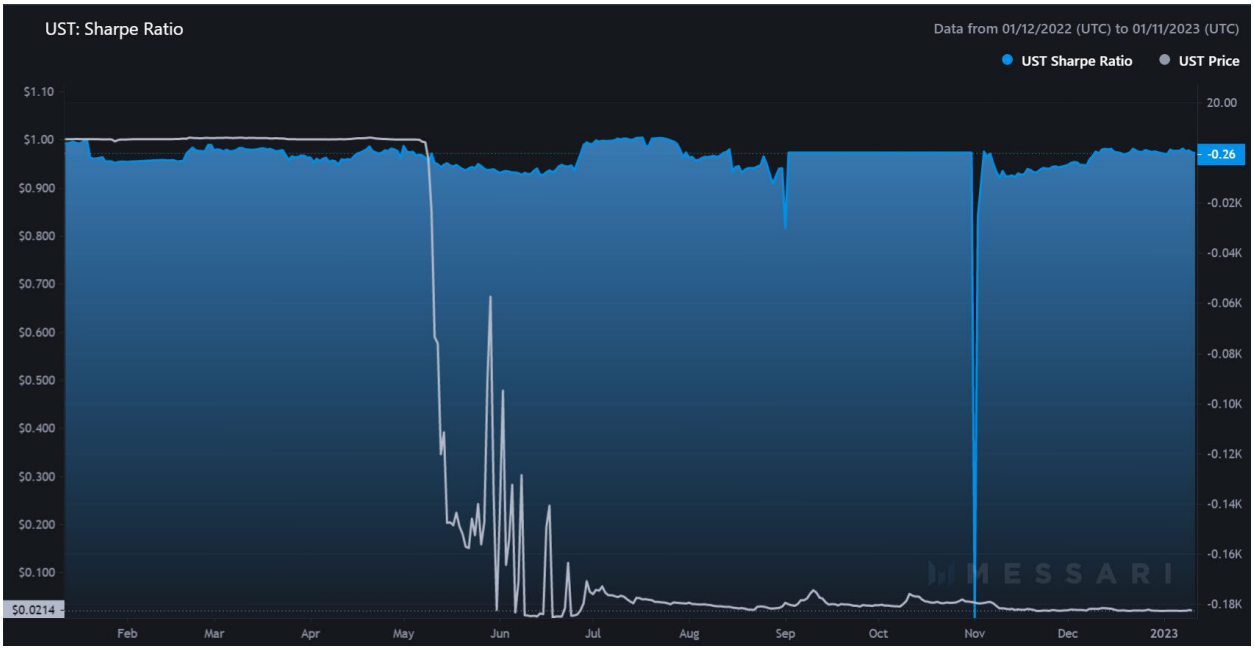
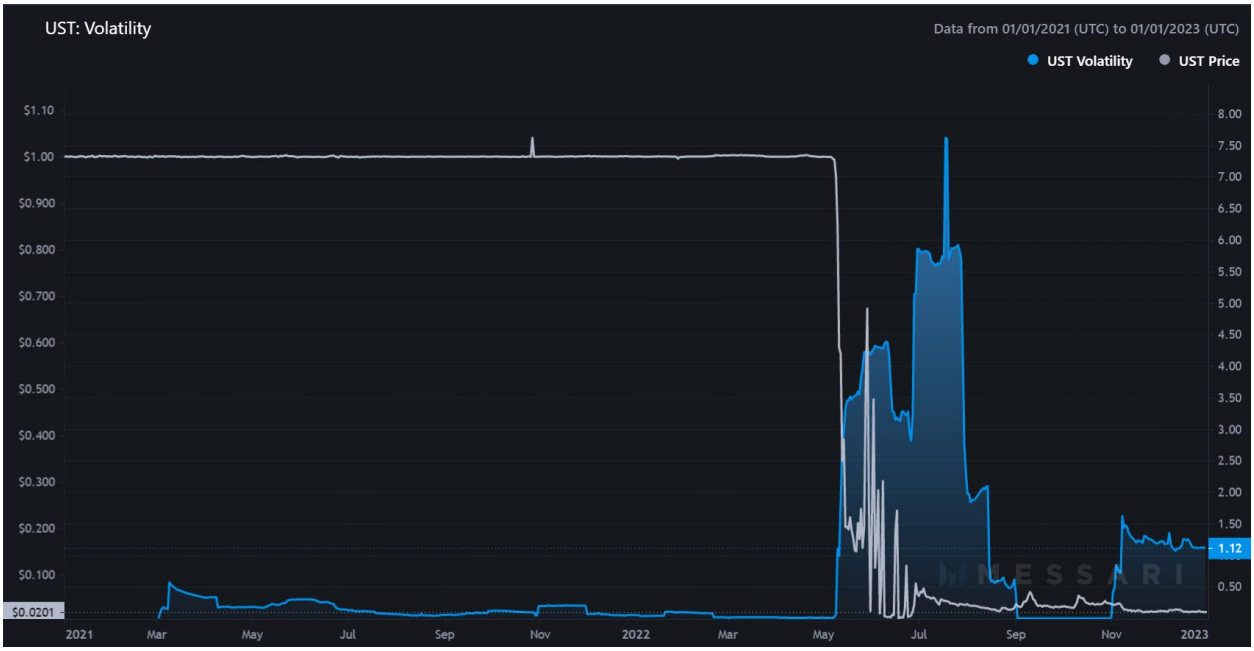


Exhibit 2D. Sharpe Ratio 1/1/2021 – 1/1/2023 [9]



[8] (Messari, Website for "TerraUSD" Overview and Market Data)
[9] (Messari, Website for "TerraUSD" Overview and Market Data)

Exhibit 2E. Volatility 1/1/2021 – 1/1/2023 [10]



[10] (Messari, Website for "TerraUSD" Overview and Market Data)

Tether (USDT)

Exhibit 3A. Key Metrics (As of January 12, 2023) [11]

Key Metrics	
Price	$1.00
24H Range	$1.00 - $1.00
Real Volume (24H)	$516M
Marketcap	$66.27B
ATH	$2.10
ATH Date	January 6th, 2020
Down from ATH	-52.46%
Cycle Low	$0.96
Cycle Low Date	May 12th, 2022
Up From Cycle Low	+4.15%
View more >	

Exhibit 3B. Price (1/1/21 – 1/1/23)[12]

[11] (Messari, Website on "Tether" Overview and Market Data)
[12] (Messari, Website on "Tether" Overview and Market Data)

Exhibit 3C. Real Volume (1/1/21 – 1/1/23) [13]

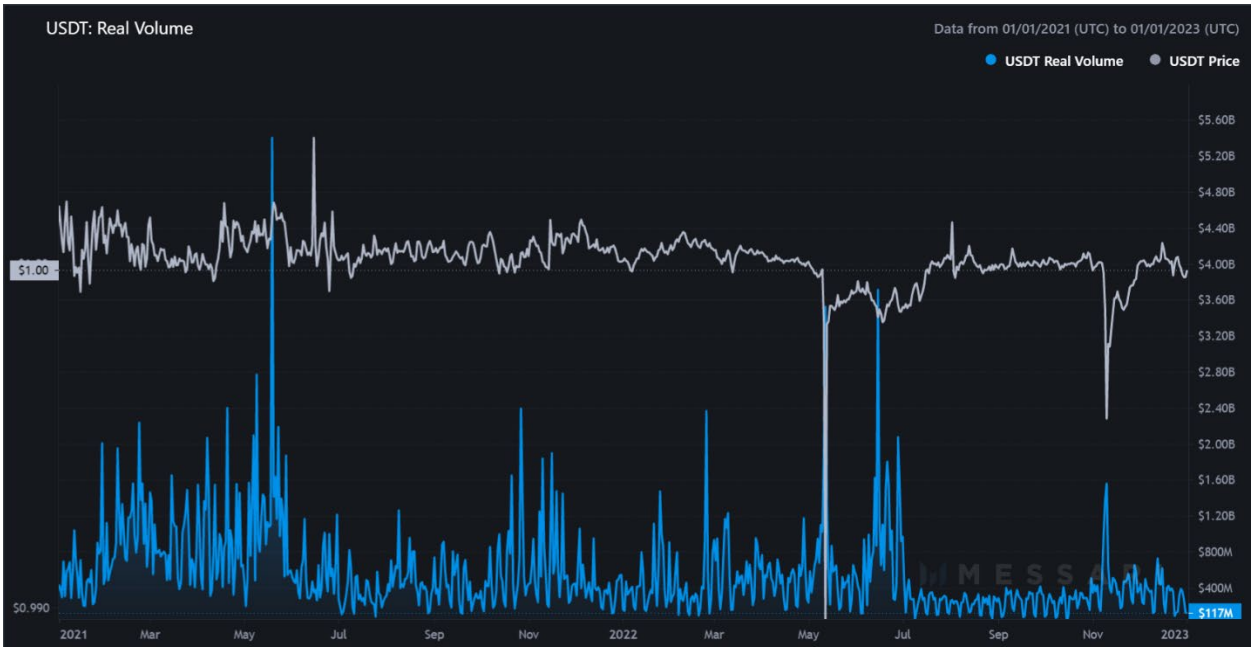
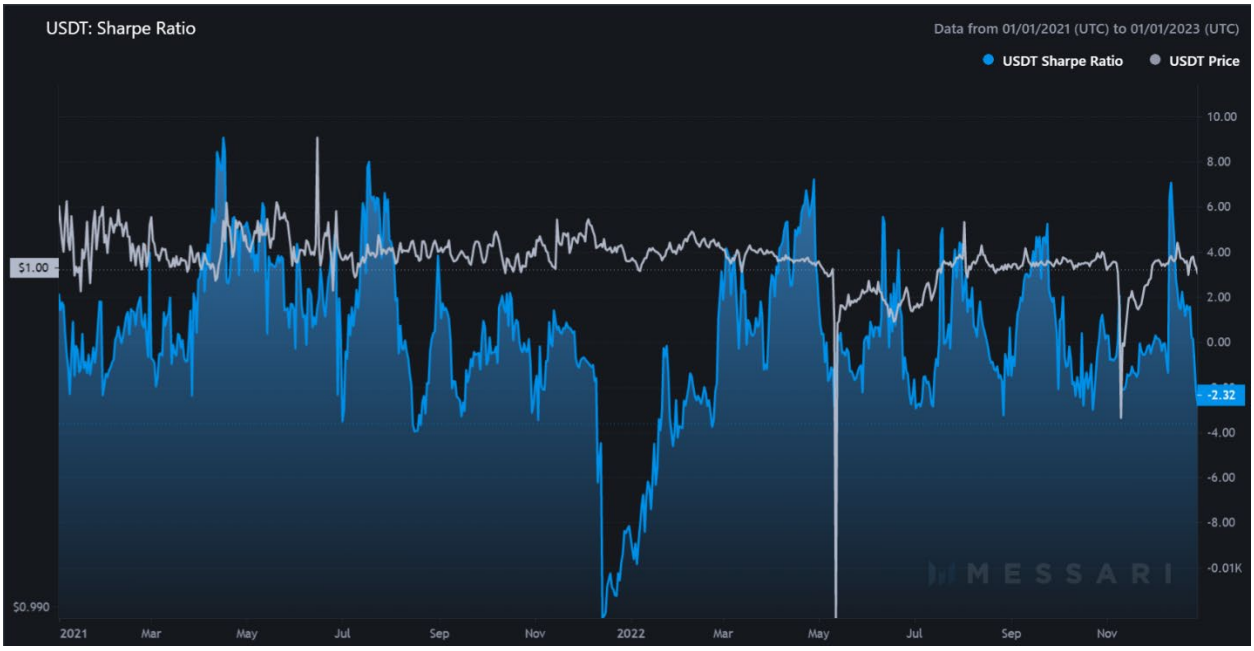
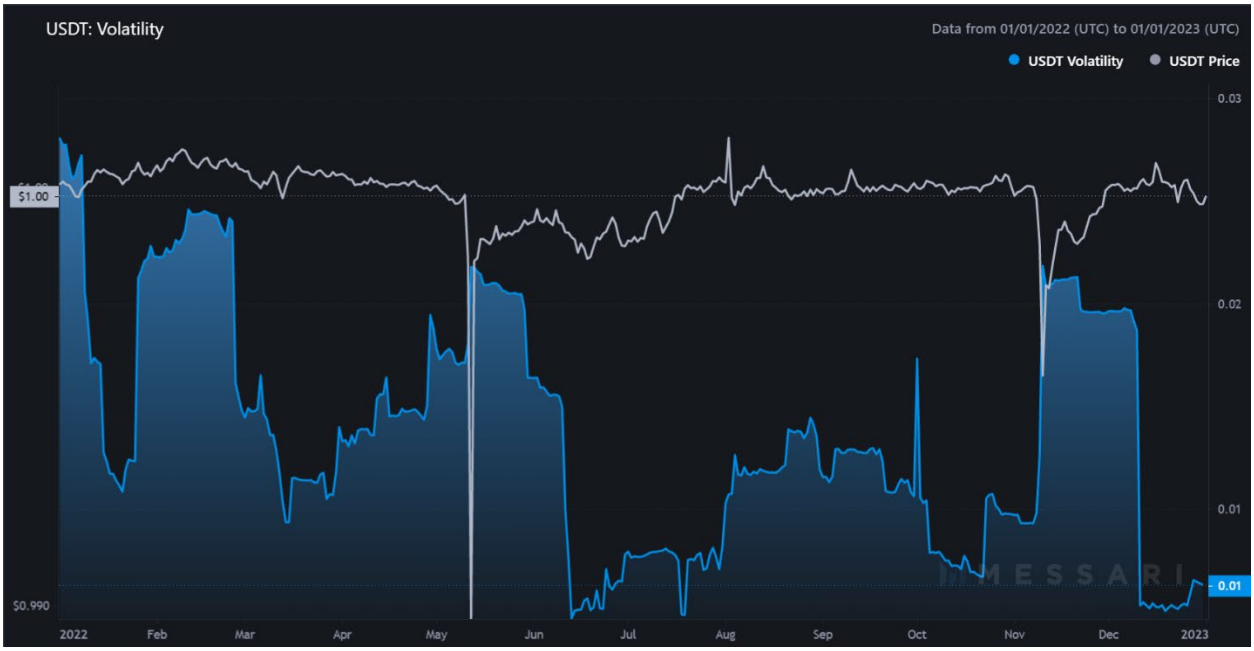


Exhibit 3D. Sharpe Ratio (1/1/21 – 1/123) [14]



[13] (Messari, Website on "Tether" Overview and Market Data)
[14] (Messari, Website on "Tether" Overview and Market Data)

Exhibit 3E. Volatility (1/1/21 – 1/1/23) [15]



[15] (Messari, Website on "Tether" Overview and Market Data)

Gemini Dollar (GUSD)

Exhibit 4A. Key Metrics (As of January 14, 2023) [16]

Key Metrics	
Price	$1.00
24H Range	$1.00 - $1.00
Real Volume (24H)	$66,738.91
Marketcap	$606M
ATH	$1.09
ATH Date	January 11th, 2023
Down from ATH	-8.01%
Cycle Low	$0.96
Cycle Low Date	January 11th, 2023
Up From Cycle Low	+4.77%

Exhibit 4B. Price (1/1/21 – 1/1/23) [17]

[16] (Messari, Website "Gemini Dollar" Overview and Market Data)
[17] (Messari, Website "Gemini Dollar" Overview and Market Data)

Exhibit 4C. Real Volume (1/1/21 – 1/1/23) [18]

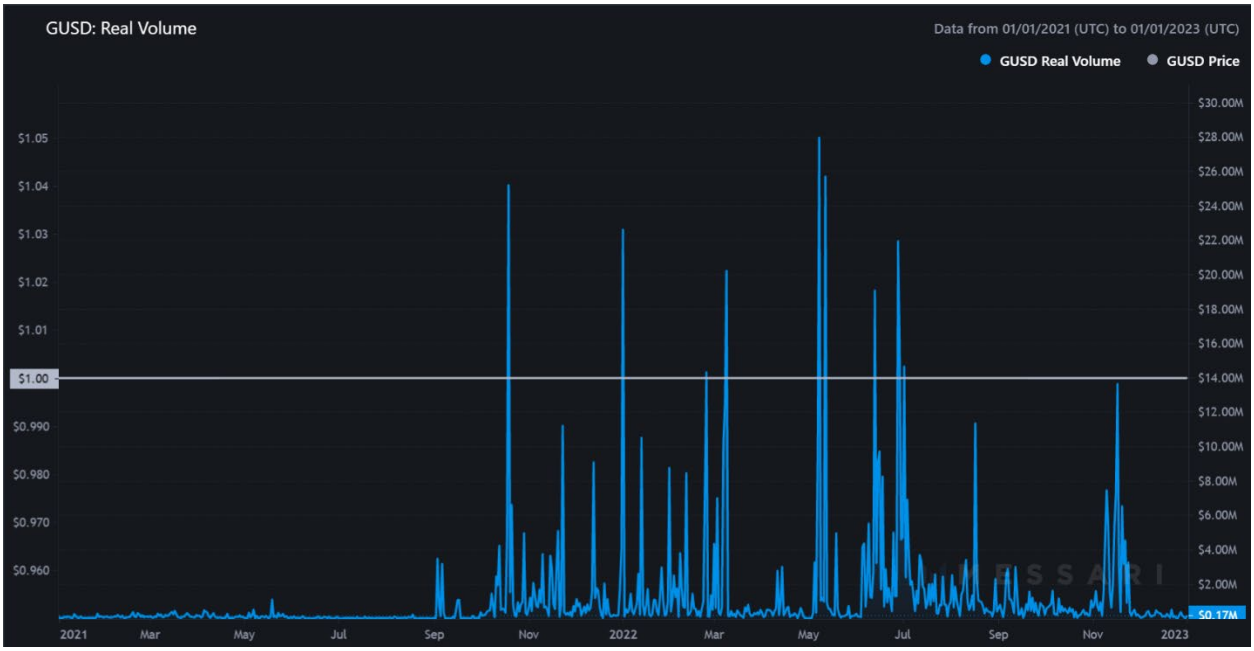
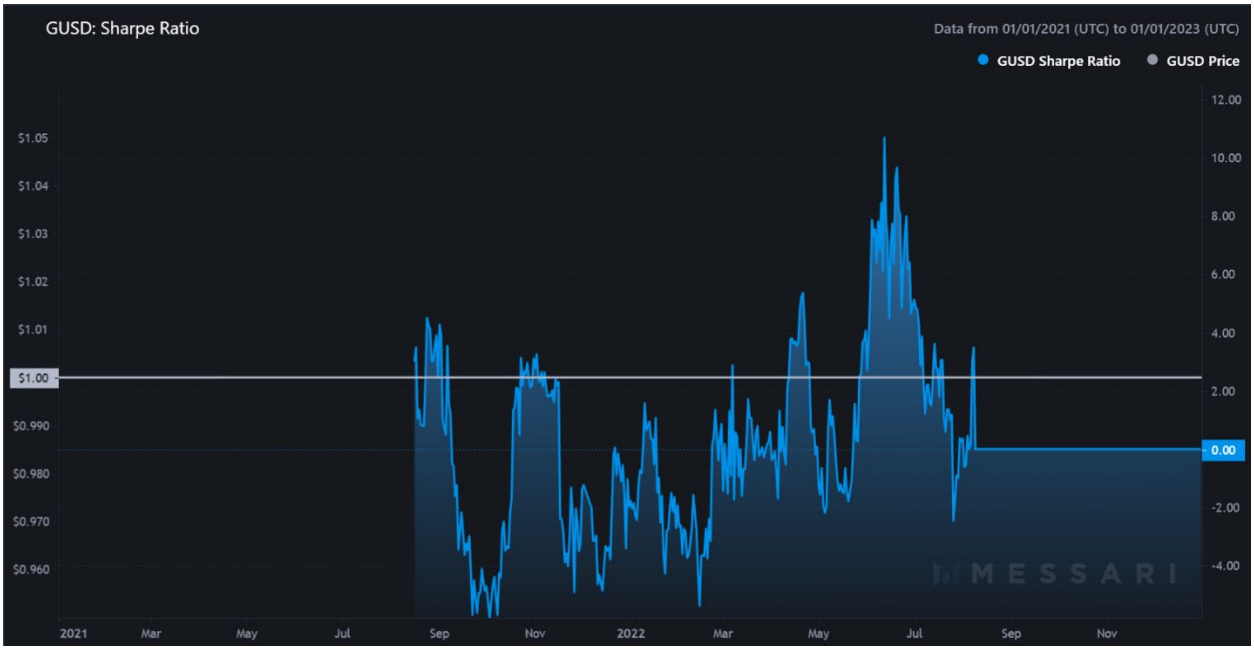
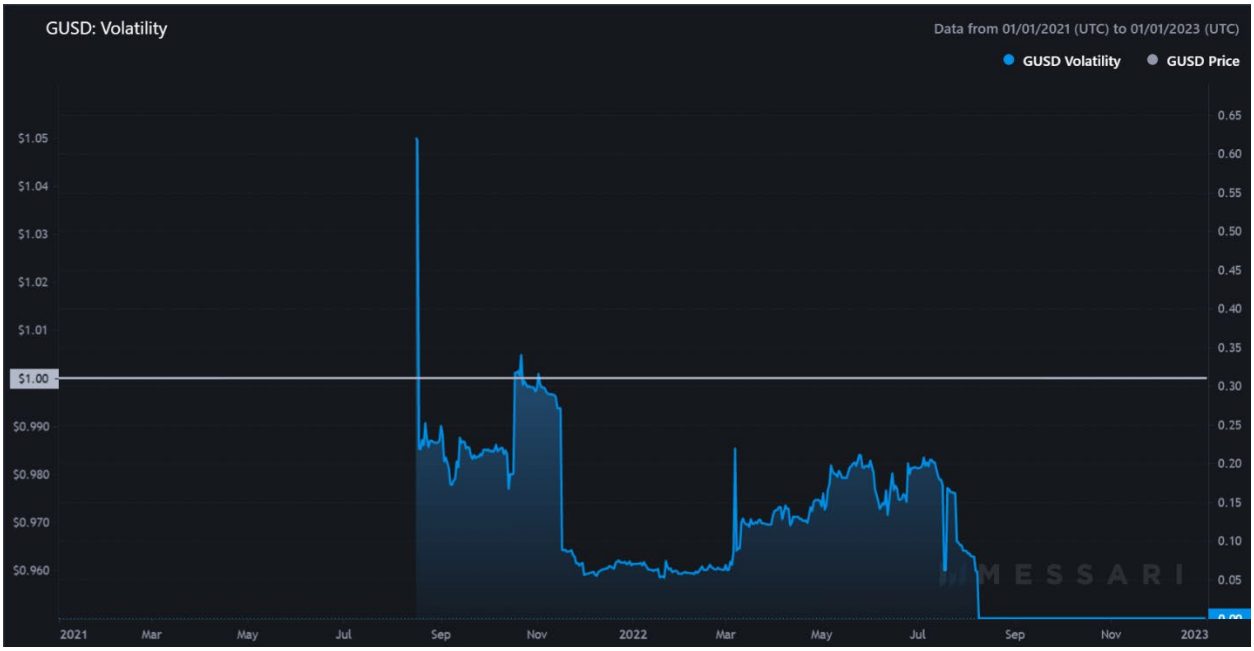


Exhibit 4D. Sharpe Ratio (1/1/21 – 1/123) [19]



[18] (Messari, Website "Gemini Dollar" Overview and Market Data)
[19] (Messari, Website "Gemini Dollar" Overview and Market Data)

Exhibit 4E. Volatility (1/1/21 – 1/1/23) [20]



[20] (Messari, Website "Gemini Dollar" Overview and Market Data)

USD Coin (USDC)

Exhibit 5A. Key Metrics (As of February 5, 2023) [21]

Key Metrics	
Price	$1.00
1H Range	$1.00 - $1.00
24H Range	$1.00 - $1.00
Real Volume (24H)	$369M
Marketcap	$41.96B
ATH	$1.21
ATH Date	January 17th, 2023
Down from ATH	-17.52%
Cycle Low	$0.79
Cycle Low Date	January 26th, 2023
Up From Cycle Low	+25.98%

Exhibit 5B. Price (1/1/21 – 1/1/23) [22]

Note: Price Drops on July 8, 2022, and August 18, 2022

[21] (Messari, Website on "USD Coin" Overview and Market Data)
[22] (Messari, Website on "USD Coin" Overview and Market Data)

Exhibit 5C. Real Volume (1/1/21 – 1/1/23) [23]

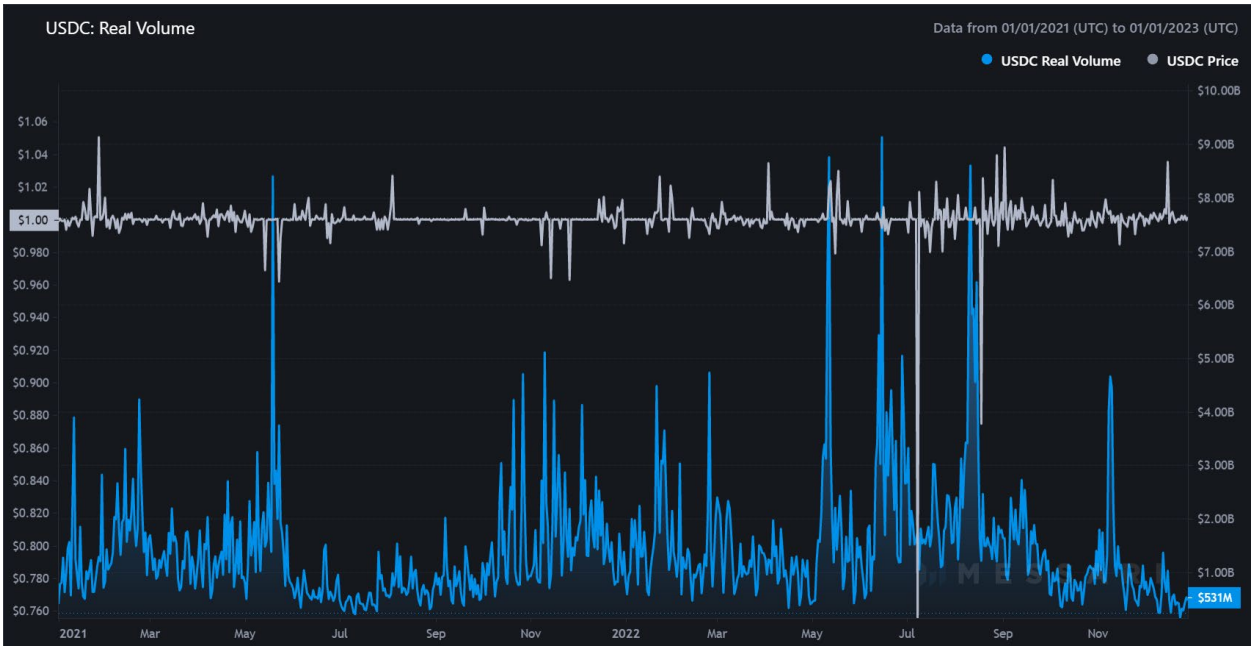
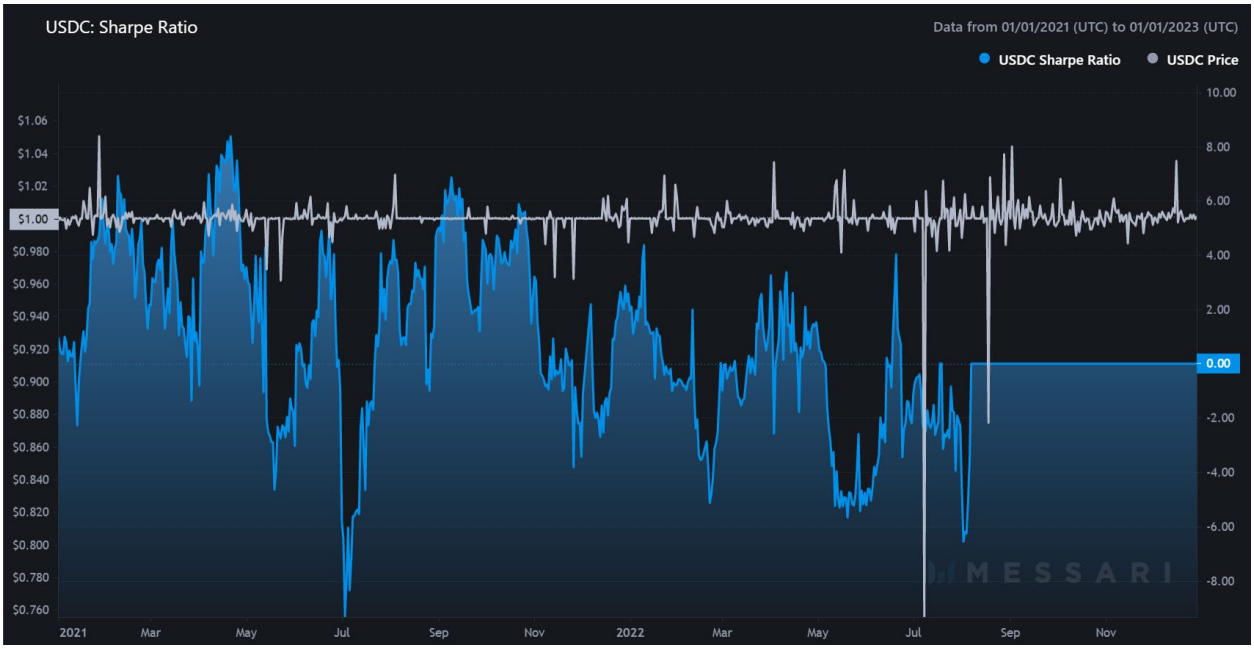
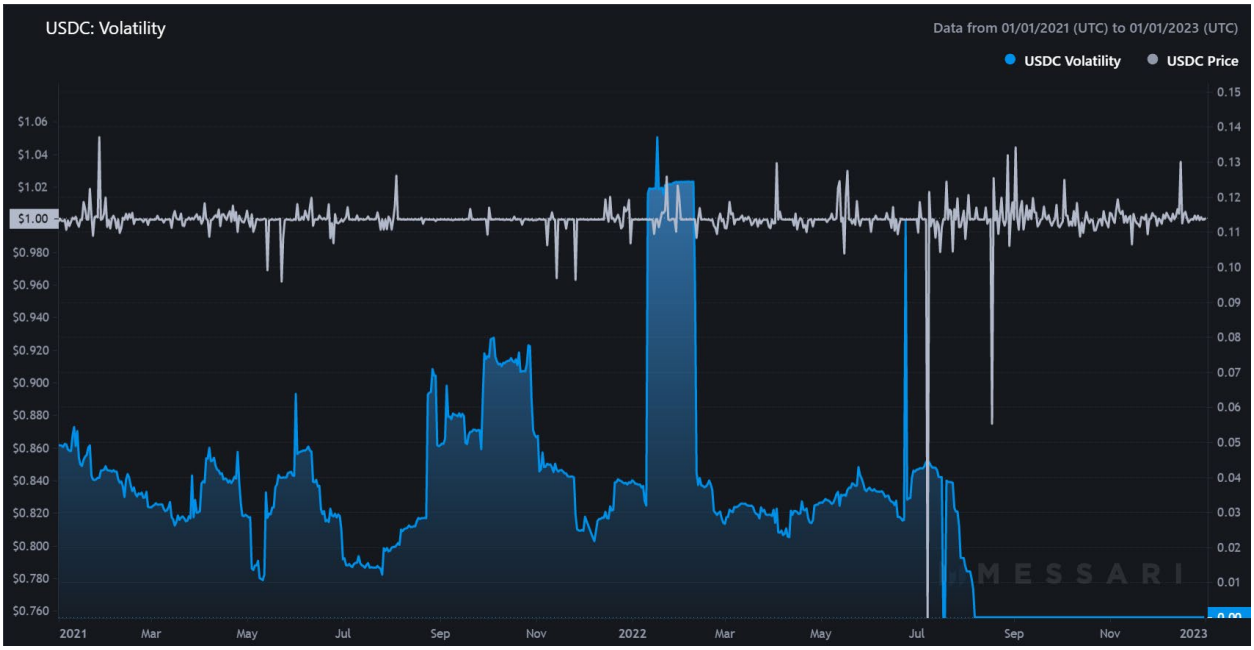


Exhibit 5D. Sharpe Ratio (1/1/21 – 1/123) [24]



[23] (Messari, Website on "USD Coin" Overview and Market Data)
[24] (Messari, Website on "USD Coin" Overview and Market Data)

Exhibit 5E. Volatility (1/1/21 – 1/1/23)[25]



References

Messari. n.d. *https://messari.io.* Accessed January 11, 2023. https://messari.io/asset/terra.

—. n.d. *https://messari.io.* Accessed January 14, 2023. https://messari.io/asset/gemini-dollar.

—. n.d. *https://messari.io.* Accessed February 5, 2023. https://messari.io/asset/usd-coin.

—. n.d. *https://messario.io.* Accessed January 11, 2023. https://messari.io/asset/terrausd.

—. n.d. *https://messario.io.* Accessed January 12, 2023. https://messari.io/asset/tether.

[25] (Messari, Website on "USD Coin" Overview and Market Data)