

Stablecoins

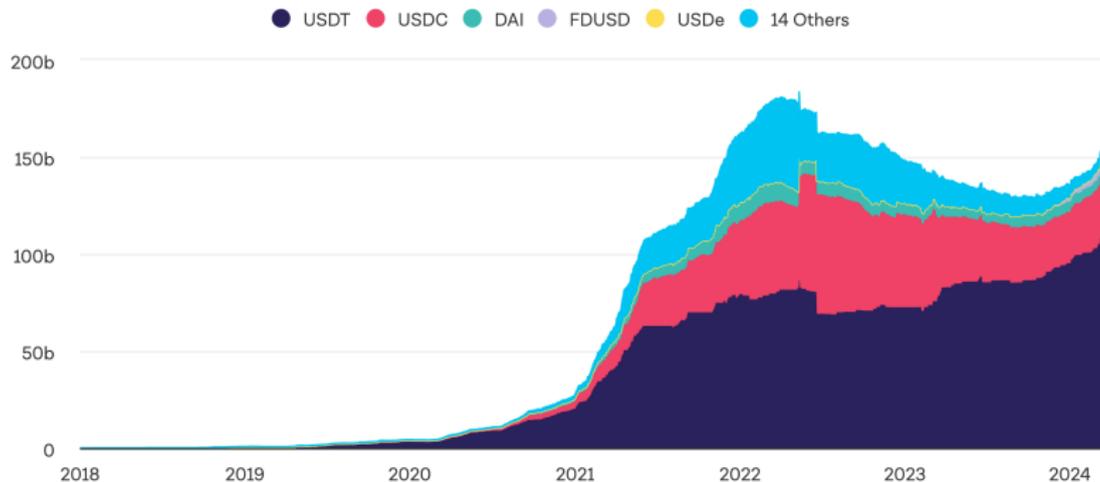
Anthony Lee Zhang

April 9, 2024

Stablecoins!



Total Stablecoin Supply



SOURCES: THE BLOCK, COIN METRICS, DEFI LAMA
UPDATED: MAR 22, 2024

Stablecoins

- ▶ Fiat-backed stablecoins
 - ▶ Basic design
 - ▶ Classic bank runs, Diamond & Dybvig (1983)
 - ▶ Fiat-backed stablecoins and bank runs
 - ▶ Interest rate competition, supply and demand
 - ▶ Compliance, macro/micro concerns. . .
- ▶ MakerDAO DAI, other risky asset-backed stablecoins
 - ▶ Design compromises
 - ▶ “Decentralization”?
 - ▶ Basis trade stablecoins
- ▶ Algorithmic Stablecoins
 - ▶ Basic design
 - ▶ Do they work. . . ?

Fiat-Backed Stablecoins

- ▶ Simplest stablecoin design:
 - ▶ I put a USD in Circle's a bank account, Circle issues me a crypto token USDC
 - ▶ Token can be traded around
 - ▶ Any time*, holder can send 1 USDC token to Circle, and Circle sends 1 USD
 - ▶ Circle takes USD and buys "stuff", sells some to meet redemptions
- ▶ Since tokens are always* redeemable for 1 USD, tokens always worth 1 USD
- ▶ Why are these tokens useful?

Fiat-Backed Stablecoins

- ▶ Simplest stablecoin design:
 - ▶ I put a USD in Circle's a bank account, Circle issues me a crypto token USDC
 - ▶ Token can be traded around
 - ▶ Any time*, holder can send 1 USDC token to Circle, and Circle sends 1 USD
 - ▶ Circle takes USD and buys "stuff", sells some to meet redemptions
- ▶ Since tokens are always* redeemable for 1 USD, tokens always worth 1 USD
- ▶ Why are these tokens useful?
- ▶ Unlike bank-account USDs, they can be:
 - ▶ Held without US bank account
 - ▶ Sent quickly, without* KYC/AML issues, across jurisdictional boundaries
 - ▶ Used in smart contracts (swaps, derivatives...)
- ▶ "Dollars on steroids": dollars with crypto functionality

Stablecoins and Banking

- ▶ A stablecoin is like a **crypto bank!**

Stablecoins and Banking

- ▶ A stablecoin is like a **crypto bank!**
- ▶ To understand stablecoins, we want to ask:
 - ▶ Why do banks exist? What purpose do they serve?
 - ▶ How are stablecoins similar and different?

Bank Runs

(Simplified) **Diamond & Dybvig (1983)**, 2022 Nobel prize!

- ▶ Core point: banks are in the business of **liquidity transformation**
- ▶ Banks create **liquid liabilities** out of **illiquid assets**, exposing them to **run risk!**

Bank Runs

(Simplified) **Diamond & Dybvig (1983)**, 2022 Nobel prize!

- ▶ Core point: banks are in the business of **liquidity transformation**
- ▶ Banks create **liquid liabilities** out of **illiquid assets**, exposing them to **run risk!**

Setup:

- ▶ **Illiquid assets:**
 - ▶ Alice need \$1mil to build a restaurant, guaranteed payoff \$1.2mil in 2026
 - ▶ However, in 2025, Alice will only have \$0.5mil in profits
 - ▶ Investment is “illiquid”: can't be turned into cash in 2025

Bank Runs

(Simplified) **Diamond & Dybvig (1983)**, 2022 Nobel prize!

- ▶ Core point: banks are in the business of **liquidity transformation**
- ▶ Banks create **liquid liabilities** out of **illiquid assets**, exposing them to **run risk!**

Setup:

- ▶ **Illiquid assets:**
 - ▶ Alice need \$1mil to build a restaurant, guaranteed payoff \$1.2mil in 2026
 - ▶ However, in 2025, Alice will only have \$0.5mil in profits
 - ▶ Investment is “illiquid”: can’t be turned into cash in 2025
- ▶ **Liquid liabilities:**
 - ▶ “Savers” want to store their cash somewhere, and get some interest
 - ▶ However, some savers will need cash in 2025!
 - ▶ Savers demand “liquid” assets, that can be switched for cash in 2025

Bank Runs

- ▶ Setup:
 - ▶ **Illiquid assets:** \$1mil to build a restaurant, payoff \$1.2mil in 2026, “liquidation value” of \$0.5mil in 2025
 - ▶ **Liquid liabilities:** “Savers” want to store their cash, some need cash in 2024

Bank Runs

- ▶ Setup:
 - ▶ **Illiquid assets:** \$1mil to build a restaurant, payoff \$1.2mil in 2026, “liquidation value” of \$0.5mil in 2025
 - ▶ **Liquid liabilities:** “Savers” want to store their cash, some need cash in 2024
- ▶ Solution: **bank** takes “demand deposits” from savers, which can be withdrawn at any time, and invests in restaurant
 - ▶ “Illiquid” restaurant gets funding, but savers still have “liquid” assets that can be withdrawn in 2025!
 - ▶ But liquidity in 2025 is not “real”: the bank “creates” liquidity, but hopes that not too many people will use it

Bank Runs

- ▶ Setup:
 - ▶ **Illiquid assets:** \$1mil to build a restaurant, payoff \$1.2mil in 2026, “liquidation value” of \$0.5mil in 2025
 - ▶ **Liquid liabilities:** “Savers” want to store their cash, some need cash in 2024
- ▶ Solution: **bank** takes “demand deposits” from savers, which can be withdrawn at any time, and invests in restaurant
 - ▶ “Illiquid” restaurant gets funding, but savers still have “liquid” assets that can be withdrawn in 2025!
 - ▶ But liquidity in 2025 is not “real”: the bank “creates” liquidity, but hopes that not too many people will use it
- ▶ If not too many people withdraw, restaurant will pay off in 2026, and everything will be good
- ▶ But what if I think 50% of people will withdraw in 2025?

Bank Runs

- ▶ Setup:
 - ▶ **Illiquid assets:** \$1mil to build a restaurant, payoff \$1.2mil in 2026, “liquidation value” of \$0.5mil in 2025
 - ▶ **Liquid liabilities:** “Savers” want to store their cash, some need cash in 2024
- ▶ Solution: **bank** takes “demand deposits” from savers, which can be withdrawn at any time, and invests in restaurant
 - ▶ “Illiquid” restaurant gets funding, but savers still have “liquid” assets that can be withdrawn in 2025!
 - ▶ But liquidity in 2025 is not “real”: the bank “creates” liquidity, but hopes that not too many people will use it
- ▶ If not too many people withdraw, restaurant will pay off in 2026, and everything will be good
- ▶ But what if I think 50% of people will withdraw in 2025?
 - ▶ Restaurant sold for \$0.5mil in 2025, \$\$ handed out to withdrawers
 - ▶ No money will be left for me in 2026!
 - ▶ I should take my money out while I can...

Bank Runs

- ▶ Setup:
 - ▶ **Illiquid assets:** \$1mil to build a restaurant, payoff \$1.2mil in 2026, “liquidation value” of \$0.5mil in 2025
 - ▶ **Liquid liabilities:** “Savers” want to store their cash, some need cash in 2024
- ▶ Solution: **bank** takes “demand deposits” from savers, which can be withdrawn at any time, and invests in restaurant
 - ▶ “Illiquid” restaurant gets funding, but savers still have “liquid” assets that can be withdrawn in 2025!
 - ▶ But liquidity in 2025 is not “real”: the bank “creates” liquidity, but hopes that not too many people will use it
- ▶ If not too many people withdraw, restaurant will pay off in 2026, and everything will be good
- ▶ But what if I think 50% of people will withdraw in 2025?
 - ▶ Restaurant sold for \$0.5mil in 2025, \$\$ handed out to withdrawers
 - ▶ No money will be left for me in 2026!
 - ▶ I should take my money out while I can...
- ▶ Runs are bad: \$1mil was invested for \$0.5mil!

Banks, Liquidity Transformation, and Run Risk

What have we learned about banks?

- ▶ Banks create “synthetic liquidity”, taking “liquid” deposits from savers, and making “illiquid” loans
- ▶ This is socially valuable, but fragile: if I think other savers will withdraw, I should withdraw, so “runs” are self-fulfilling
- ▶ Diamond: bank runs caused by “fear of fear itself”!

Banks, Liquidity Transformation, and Run Risk

What have we learned about banks?

- ▶ Banks create “synthetic liquidity”, taking “liquid” deposits from savers, and making “illiquid” loans
- ▶ This is socially valuable, but fragile: if I think other savers will withdraw, I should withdraw, so “runs” are self-fulfilling
- ▶ Diamond: bank runs caused by “fear of fear itself”!

What does this tell us about stablecoins?

- ▶ When you send Circle/Tether \$1 and get a USDC/USDT, where does Circle/Tether put the \$\$\$?

Stablecoins' Assets

Table 3: Asset Composition

This table shows the breakdown of reserves by asset class for USDT and USDC. Data are available for the dates on which reserve breakdowns are published by USDT and USDC. For USDT, the “Deposit” category includes bank deposits, while for USDC, the “Deposit” category includes US dollar deposits at banks and short-term, highly liquid investments.

(a) USDT

	Deposits	Treas	Muni	MM	Corp	Loans	Others
2021/06	10.0	24.3	0.0	50.7	7.7	4.0	3.3
2021/09	10.5	28.1	0.0	45.7	5.2	5.0	5.5
2021/12	5.3	43.9	0.0	34.5	4.6	5.3	6.4
2022/03	5.0	47.6	0.0	32.8	4.5	3.8	6.4

(b) USDC

	Deposits	Treas	Muni	MM	Corp	Loans	Others
2021/05	60.4	12.2	0.5	22.1	5.0	0.0	0.0
2021/06	46.4	13.1	0.4	24.2	15.9	0.0	0.0
2021/07	47.4	12.4	0.7	23.0	16.4	0.0	0.0
2021/08	92.0	0.0	0.0	6.5	1.5	0.0	0.0
2021/09	100.0	0.0	0.0	0.0	0.0	0.0	0.0
2021/10	100.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: “Stablecoin Runs and the Centralization of Arbitrage”, Ma, Zeng, & Zhang (2023)

Stablecoins

Fiat-backed stablecoins, like banks, are potentially subject to runs!

- ▶ If we all try to redeem stablecoins for cash, issuer must sell all assets, and might not be able to meet redemptions 1-for-1
- ▶ But if I think you're going to redeem, I should redeem first. . .

Stablecoins

Fiat-backed stablecoins, like banks, are potentially subject to runs!

- ▶ If we all try to redeem stablecoins for cash, issuer must sell all assets, and might not be able to meet redemptions 1-for-1
- ▶ But if I think you're going to redeem, I should redeem first. . .

But there's a catch!

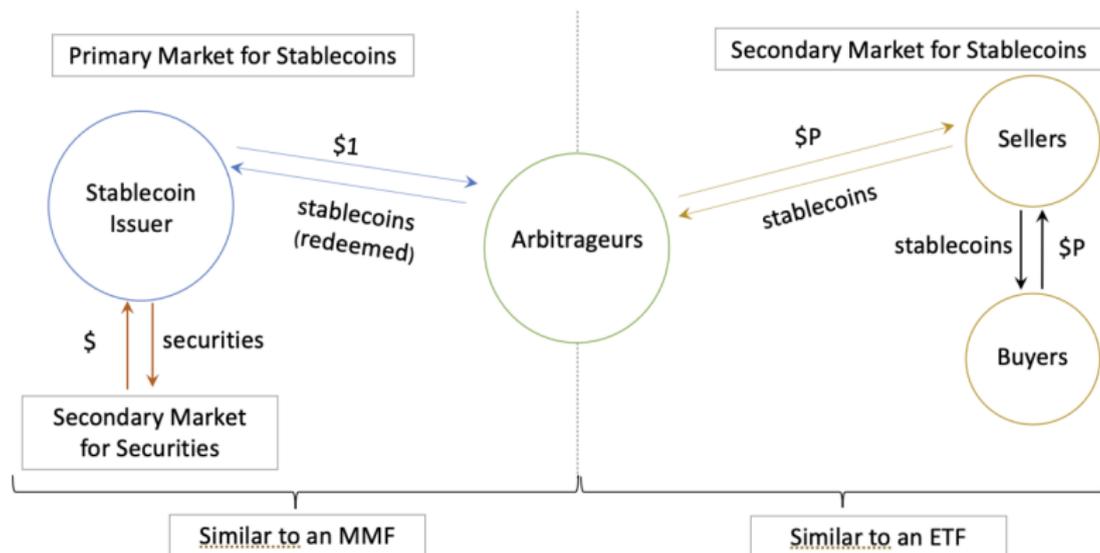
- ▶ Not everyone can create/redeem stablecoins for cash!
- ▶ Only a small set of “arbitrageurs” (mostly hedge funds) is allowed to do this
 - ▶ Arbitrage structure essentially the same as ETFs with authorized participants
- ▶ Does the “centralization of arbitrage” influence stablecoin run risks?

Stablecoin Runs and the Centralization of Arbitrage

Yiming Ma, Yao Zeng, Anthony Lee Zhang

Figure 2: The Design of Fiat-backed Stablecoins

This figure illustrates the design of fiat-backed stablecoins.

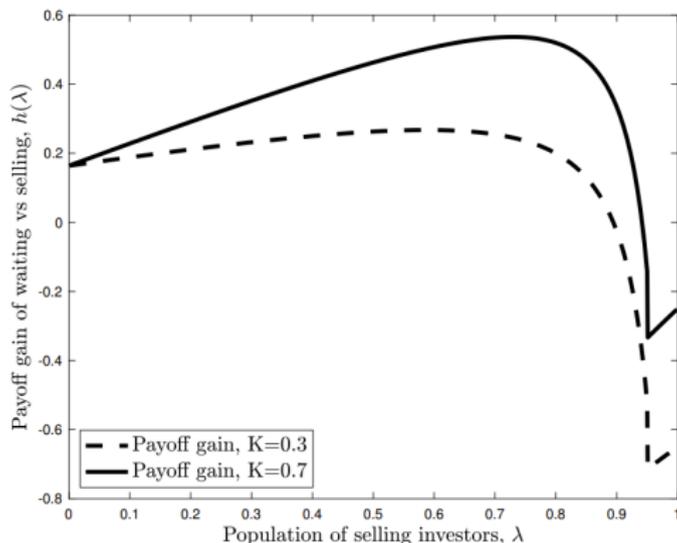


Stablecoin Runs and the Centralization of Arbitrage

Yiming Ma, Yao Zeng, Anthony Lee Zhang

Figure 6: Investors' Payoff Gain from Waiting versus Selling Early: Comparative Statics with respect to K

This figure shows an investor's payoff gain from waiting until $t = 3$ relative to selling early at $t = 2$. Parameters used are $\pi(\theta) = 0.97$, $\eta = 0.2$, and $\phi = 0.05$.



Why is everyone playing it safe now?

Table 3: Asset Composition

This table shows the breakdown of reserves by asset class for USDT and USDC. Data are available for the dates on which reserve breakdowns are published by USDT and USDC. For USDT, the “Deposit” category includes bank deposits, while for USDC, the “Deposit” category includes US dollar deposits at banks and short-term, highly liquid investments.

(a) USDT

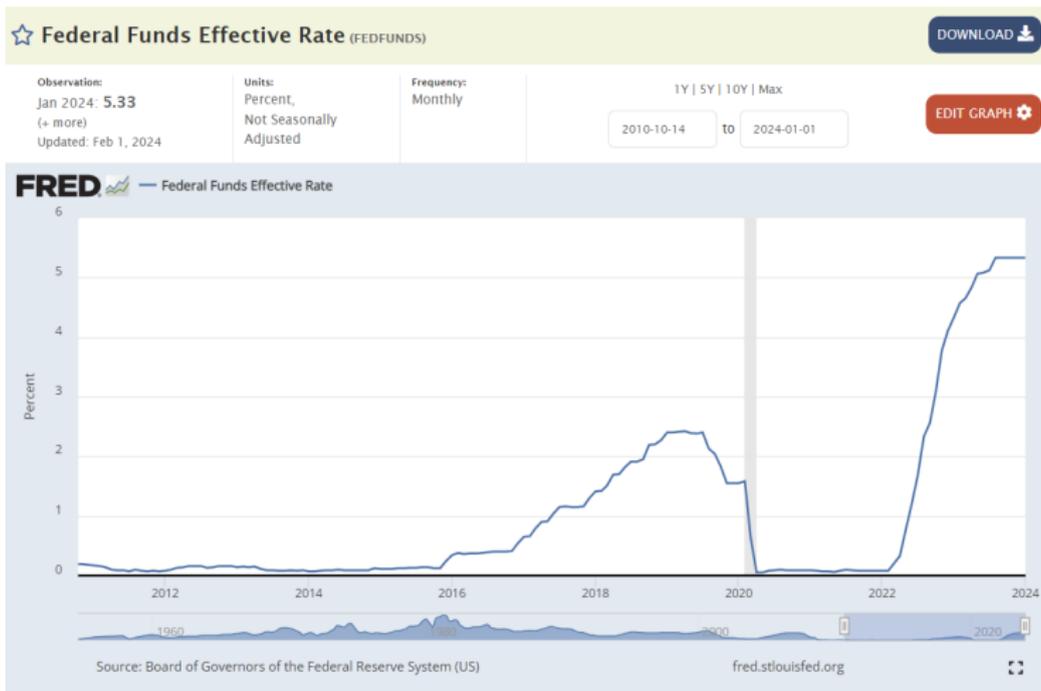
	Deposits	Treas	Muni	MM	Corp	Loans	Others
2021/06	10.0	24.3	0.0	50.7	7.7	4.0	3.3
2021/09	10.5	28.1	0.0	45.7	5.2	5.0	5.5
2021/12	5.3	43.9	0.0	34.5	4.6	5.3	6.4
2022/03	5.0	47.6	0.0	32.8	4.5	3.8	6.4

(b) USDC

	Deposits	Treas	Muni	MM	Corp	Loans	Others
2021/05	60.4	12.2	0.5	22.1	5.0	0.0	0.0
2021/06	46.4	13.1	0.4	24.2	15.9	0.0	0.0
2021/07	47.4	12.4	0.7	23.0	16.4	0.0	0.0
2021/08	92.0	0.0	0.0	6.5	1.5	0.0	0.0
2021/09	100.0	0.0	0.0	0.0	0.0	0.0	0.0
2021/10	100.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: “Stablecoin Runs and the Centralization of Arbitrage”, Ma, Zeng, & Zhang (2023)

Interest rates...



Coinbase in 2021...

Net Revenue						Full-Year	
NET REVENUE (\$M)	Q4'20	Q1'21	Q2'21	Q3'21	Q4'21	2020	2021
Transaction revenue							
Retail, net	451.8	1,455.2	1,828.0	1,022.0	2,185.8	1,040.2	6,491.0
Institutional, net	24.6	85.4	102.4	67.7	90.8	55.9	346.3
Total Transaction revenue	476.4	1,540.6	1,930.4	1,089.7	2,276.6	1,096.2	6,837.3
Subscription and services revenue							
Blockchain rewards	3.0	9.0	34.4	77.0	102.7	10.4	223.1
Custodial fee revenue	8.0	23.5	31.7	31.5	49.6	18.6	136.3
Earn campaign revenue	6.1	11.1	16.9	15.2	19.9	7.7	63.1
Interest income	2.2	3.3	6.5	8.4	7.6	5.5	25.8
Other subscription and services revenue	1.4	9.5	13.1	13.0	33.6	2.8	69.2
Total Subscription and services revenue	20.7	56.4	102.6	145.1	213.4	45.0	517.5
Net Revenue	497.1	1,597.0	2,033.0	1,234.7	2,490.0	1,141.2	7,354.8

Source: [Coinbase 2021 shareholder letter](#)

Coinbase in 2023

Total Revenue (\$M)

TOTAL REVENUE	Q2'22	Q3'22	Q4'22	Q1'23	Q2'23
Transaction revenue					
Consumer, net	616.2	346.1	308.8	352.4	310.0
Institutional, net	39.0	19.8	13.4	22.3	17.1
Total transaction revenue	655.2	365.9	322.1	374.7	327.1
Subscription and services revenue					
Blockchain rewards	68.4	62.8	62.4	73.7	87.6
Custodial fee revenue	22.2	14.5	11.4	17.0	17.0
Interest income	32.5	101.8	182.2	240.8	201.4
Other subscription and services revenue	24.3	31.4	26.7	30.1	29.4
Total subscription and services revenue	147.4	210.5	282.8	361.7	335.4
Net Revenue	802.6	576.4	604.9	736.4	662.5
Other revenue					
Corporate interest and other income	5.7	14.0	24.2	36.1	45.4
Total other revenue	5.7	14.0	24.2	36.1	45.4
Total Revenue	808.3	590.3	629.1	772.5	707.9

Source: [Coinbase 2023 shareholder letter](#)

Stablecoins and Price Competition

- ▶ Stablecoin issuers are like banks that are banned from paying interest on deposits!
 - ▶ Hence, as rates rise, issuers make a lot of money!
 - ▶ In free markets, new issuers would pop up and pass higher rates to hodlers. . .
 - ▶ But the rules around paying interest are very fuzzy

Stablecoins and Price Competition

- ▶ Stablecoin issuers are like banks that are banned from paying interest on deposits!
 - ▶ Hence, as rates rise, issuers make a lot of money!
 - ▶ In free markets, new issuers would pop up and pass higher rates to hodlers. . .
 - ▶ But the rules around paying interest are very fuzzy
- ▶ Securities law essentially protects incumbent issuers from price competition!
- ▶ And prevents interest income from flowing to stablecoin hodlers!
- ▶ Some groups working on this: MakerDAO, Ondo USDY, USDM

But...

You are trying to access from a restricted jurisdiction

Mountain Protocol's products, including the USDM token, the platform, or any other services, are not available to residents of restricted jurisdictions. There is no certainty about the regulatory status of digital assets in these restricted jurisdictions. Therefore, the Company has chosen to adopt a conservative approach in compliance with applicable regulations.

This means that, for residents of restricted jurisdictions:

- USDM cannot be purchased.
- Mountain Protocol will not engage in marketing.
- Our main website (mountainprotocol.com) will not be accessible.

If you have any questions about restrictions in your country or believe that these restrictions do not apply to you based on a valid exception, please contact us at **support@mountainprotocol.com**.

If you are interested in learning more about Mountain Protocol and USDM, please visit our **documentation page**.

Putting it together: Interest Rates and the Supply and Demand for Stablecoins

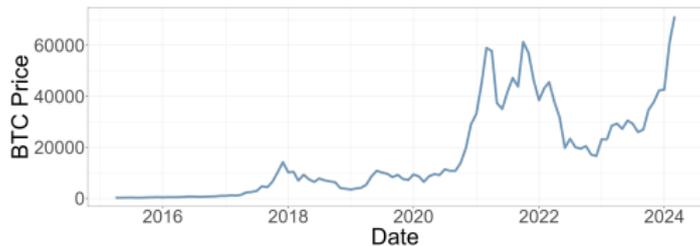
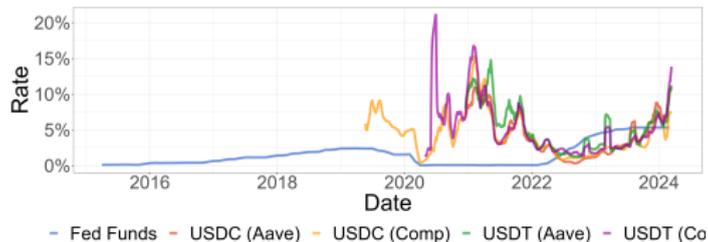
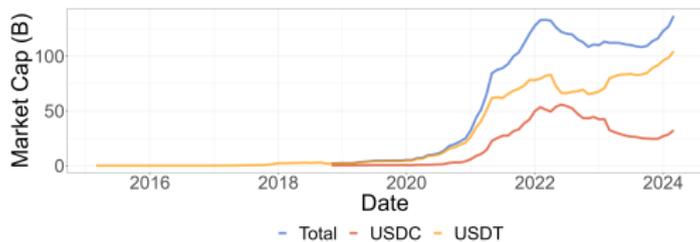
- ▶ **Stablecoin Demand:**

- ▶ Borrow stables for leveraging crypto; high when rates are high
- ▶ Use stables for transacting; relatively stable source of demand

- ▶ **Stablecoin Supply:**

- ▶ “Reach for yield” rel. tradfi: high when tradfi rates low rel. defi
- ▶ “Store of value/transactions”; relatively stable source of supply

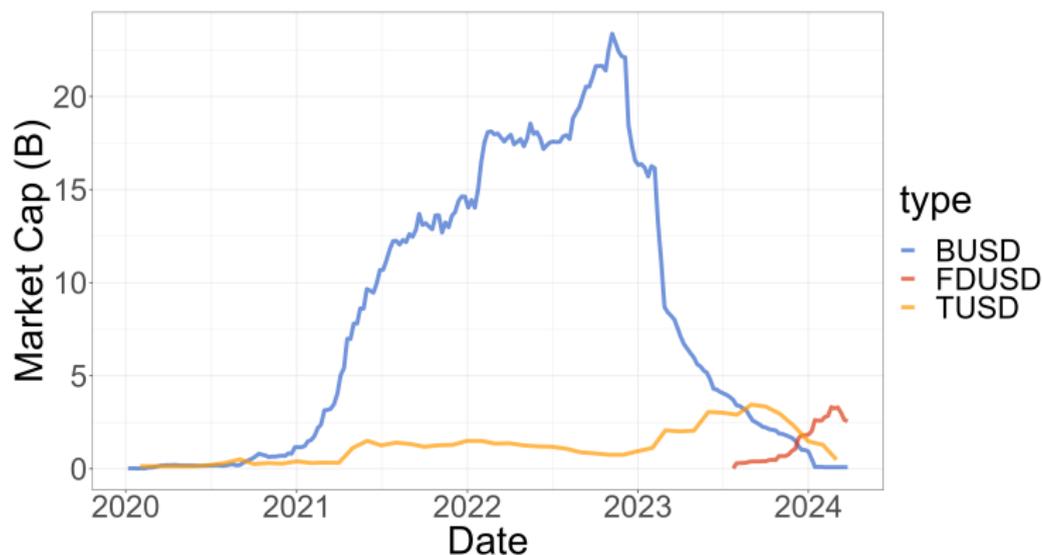
Interest Rates and the Supply and Demand for Stablecoins



Stablecoins and “integrations”

- ▶ “Money” is useful if other people accept it
- ▶ Large “application layer” protocols can increase stablecoin adoption if they support a stable!
- ▶ In particular, exchanges. . .

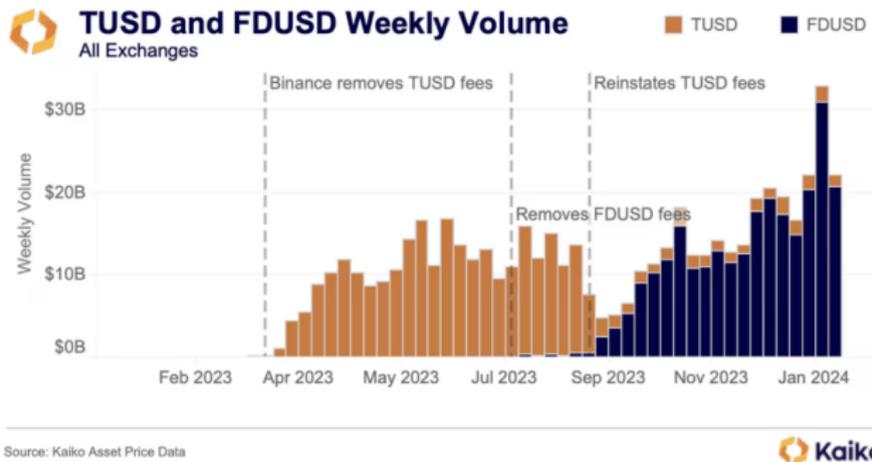
Binance and Stablecoin Market Shares



- ▶ Feb 2023: BUSD stops minting due to NY regulatory pressure
- ▶ March 13 2024: Binance delists TUSD trading pairs

Source for pic 2

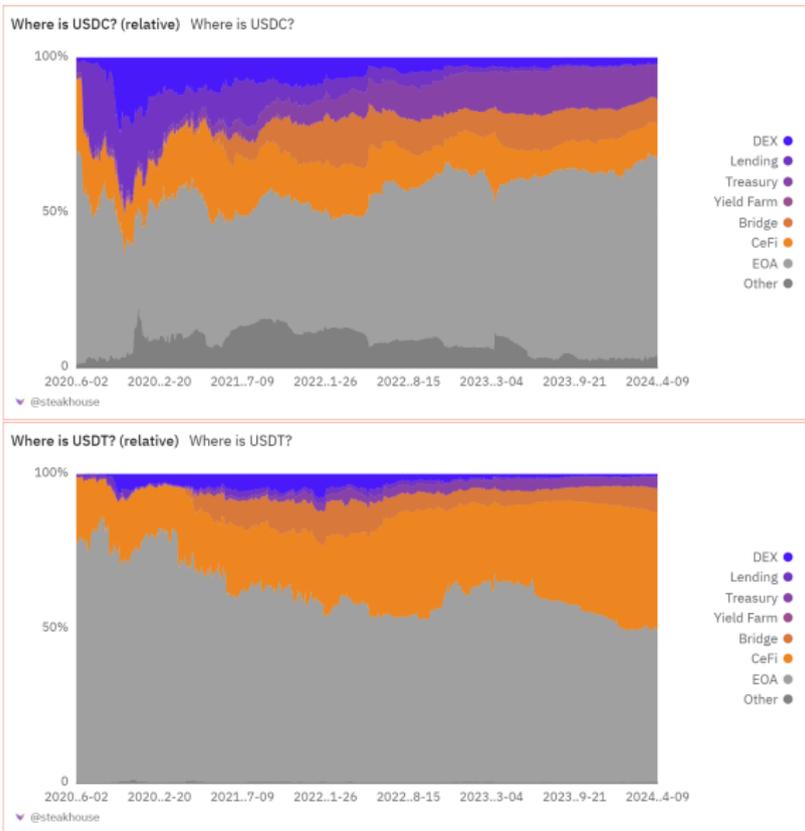
Binance and Stablecoin Market Shares



- ▶ Feb 2023: BUSD stops minting due to NY regulatory pressure
- ▶ March 13 2024: Binance delists TUSD trading pairs

Source for pic 2

Where are all the stables?



Source: **Dune**

Compliance

- ▶ Fiat-backed stablecoins rely on USD deposits in US banks, hence, must* comply with US regulation
- ▶ Circle, Tether token contracts have a blacklist of addresses: anyone blacklisted has their tokens frozen, and can't send/receive
- ▶ Circle blacklists in response to **law enforcement requests**
- ▶ When Tornado Cash was sanctioned, Circle **blacklisted \$75k USDC in Tornado**
- ▶ Blacklists also used in response to **hacks**

*In a purely logistical sense! If they don't, the US can come after their USD

Banking, Payments, and Lending

- ▶ Classically, in the US banking system, banks hold your \$, and provide payment services
 - ▶ Dollars in Chase are more useful than cash dollars! Can pay your utilities, credit card, ACH transfers, Zelle. . .
- ▶ Chase ends up with a lot of your dollars!

Banking, Payments, and Lending

- ▶ Classically, in the US banking system, banks hold your \$, and provide payment services
 - ▶ Dollars in Chase are more useful than cash dollars! Can pay your utilities, credit card, ACH transfers, Zelle. . .
- ▶ Chase ends up with a lot of your dollars!
- ▶ Chase uses these dollars to make loans to businesses, homebuyers, auto buyers, credit card borrowers. . .

Banking, Payments, and Lending

- ▶ Classically, in the US banking system, banks hold your \$, and provide payment services
 - ▶ Dollars in Chase are more useful than cash dollars! Can pay your utilities, credit card, ACH transfers, Zelle. . .
- ▶ Chase ends up with a lot of your dollars!
- ▶ Chase uses these dollars to make loans to businesses, homebuyers, auto buyers, credit card borrowers. . .
- ▶ Stablecoins also provide transaction services!
 - ▶ Dollars held with Circle can be sent overseas, used on Uniswap. . .

Banking, Payments, and Lending

- ▶ Classically, in the US banking system, banks hold your \$, and provide payment services
 - ▶ Dollars in Chase are more useful than cash dollars! Can pay your utilities, credit card, ACH transfers, Zelle. . .
- ▶ Chase ends up with a lot of your dollars!
- ▶ Chase uses these dollars to make loans to businesses, homebuyers, auto buyers, credit card borrowers. . .
- ▶ Stablecoins also provide transaction services!
 - ▶ Dollars held with Circle can be sent overseas, used on Uniswap. . .
- ▶ Circle also ends up with a lot of USDs in a bank account!

Banking, Payments, and Lending

- ▶ Classically, in the US banking system, banks hold your \$, and provide payment services
 - ▶ Dollars in Chase are more useful than cash dollars! Can pay your utilities, credit card, ACH transfers, Zelle. . .
- ▶ Chase ends up with a lot of your dollars!
- ▶ Chase uses these dollars to make loans to businesses, homebuyers, auto buyers, credit card borrowers. . .
- ▶ Stablecoins also provide transaction services!
 - ▶ Dollars held with Circle can be sent overseas, used on Uniswap. . .
- ▶ Circle also ends up with a lot of USDs in a bank account!
- ▶ However, Circle tends to invest in treasuries, corporate bonds. . .

Lending

- ▶ **Macro concerns:** what are the implications, if Circle takes over, and transaction services fund short-maturity treasuries, instead of mortgages/business loans?
 - ▶ Alternatively, will stablecoin issuers eventually make riskier mortgage/business loans?
 - ▶ Related to “narrow banking” ideas: what if everyone just had an account at the Fed?

Lending

- ▶ **Macro concerns:** what are the implications, if Circle takes over, and transaction services fund short-maturity treasuries, instead of mortgages/business loans?
 - ▶ Alternatively, will stablecoin issuers eventually make riskier mortgage/business loans?
 - ▶ Related to “narrow banking” ideas: what if everyone just had an account at the Fed?
- ▶ **Micro concerns:** Crypto markets are cyclical: when markets crash, USDCs are less useful and everyone tries to redeem
 - ▶ When I redeem, Circle has to sell treasuries to meet my redemption
 - ▶ This could make **demand for treasuries more volatile**, which may affect treasury yield curve

Lending

- ▶ **Macro concerns:** what are the implications, if Circle takes over, and transaction services fund short-maturity treasuries, instead of mortgages/business loans?
 - ▶ Alternatively, will stablecoin issuers eventually make riskier mortgage/business loans?
 - ▶ Related to “narrow banking” ideas: what if everyone just had an account at the Fed?
- ▶ **Micro concerns:** Crypto markets are cyclical: when markets crash, USDCs are less useful and everyone tries to redeem
 - ▶ When I redeem, Circle has to sell treasuries to meet my redemption
 - ▶ This could make **demand for treasuries more volatile**, which may affect treasury yield curve
- ▶ **Audit concerns:** are issuers actually holding \$1 in safe assets for each token? Can't they just make up some tokens?

Policy Issues (and Project Ideas)

- ▶ **Payments policing:** Stablecoins make it easier for people to hold USD assets
 - ▶ Ultimately increases holdings of treasuries, etc.: good for US!
 - ▶ However, stablecoins are harder to police, track, freeze, etc. than e.g. USD bank deposits
 - ▶ Unclear, to me, that US regulators understand this well...
 - ▶ How should existing frameworks for payments regulators apply for stablecoins?
- ▶ **Risk management:** What should issuers be allowed to hold?
 - ▶ Banks are subject to risk limits: should stablecoins?
 - ▶ Currently conservative, partly due to regulation: but should they be allowed to e.g. make loans, eventually?
- ▶ **Disclosure:** How do we make sure stablecoin issuers actually hold what they say they're holding?

Stablecoins as the Unit of Account

- ▶ In hindsight, somewhat surprising the extent to which the defi ecosystem has dollarized!
- ▶ The founders of Bitcoin thought of it as an alternative currency, that would displace fiat!
- ▶ Instead, the infrastructure of crypto proved to be useful (wallets, smart contracts...)
- ▶ ... But we still use fiat USD as the unit of account!

MakerDAO DAI

- ▶ Put a bunch of ETH in a “smart contract safe” (“vault”)
- ▶ Print a token, supposed to be worth a dollar
- ▶ Make sure that the ETH in the vault is always worth at least \$1.5
 - ▶ Use a price oracle: on-chain input for ETH-USD price
- ▶ If ETH worth less than \$1.5, and you don't “top up” ETH is automatically sold to cover the debt
- ▶ Behaves like a “crypto margin loan”
- ▶ Highly successful! \$7bil DAI outstanding, largest defi protocol on Defipulse

Analogy: Pawn Shops

- ▶ DAI behaves like a “margin loan”
- ▶ Let's think about a “pawn shop”, where you can “pawn” property, like an iPhone worth \$1,000, for cash up to \$500
- ▶ If you pay \$500 + interest, get your iPhone back
- ▶ No one else can take your iPhone!

Analogy: Pawn Shops

- ▶ DAI behaves like a “margin loan”
- ▶ Let’s think about a “pawn shop”, where you can “pawn” property, like an iPhone worth \$1,000, for cash up to \$500
- ▶ If you pay \$500 + interest, get your iPhone back
- ▶ No one else can take your iPhone!
- ▶ Shop lends you only \$500, so they don’t have risk if you don’t return the \$\$

Analogy: Pawn Shops

- ▶ DAI behaves like a “margin loan”
- ▶ Let’s think about a “pawn shop”, where you can “pawn” property, like an iPhone worth \$1,000, for cash up to \$500
- ▶ If you pay \$500 + interest, get your iPhone back
- ▶ No one else can take your iPhone!
- ▶ Shop lends you only \$500, so they don’t have risk if you don’t return the \$\$
- ▶ Hypothetically, suppose iPhone prices fluctuate a lot: what’s wrong if iPhone price drops from \$1,000 to \$300?

Analogy: Pawn Shops

- ▶ DAI behaves like a “margin loan”
- ▶ Let’s think about a “pawn shop”, where you can “pawn” property, like an iPhone worth \$1,000, for cash up to \$500
- ▶ If you pay \$500 + interest, get your iPhone back
- ▶ No one else can take your iPhone!
- ▶ Shop lends you only \$500, so they don’t have risk if you don’t return the \$\$
- ▶ Hypothetically, suppose iPhone prices fluctuate a lot: what’s wrong if iPhone price drops from \$1,000 to \$300?
 - ▶ iPhone worth less than \$500: you have no incentive to pay \$500 to get it back

Analogy: Pawn Shops

- ▶ DAI behaves like a “margin loan”
- ▶ Let’s think about a “pawn shop”, where you can “pawn” property, like an iPhone worth \$1,000, for cash up to \$500
- ▶ If you pay \$500 + interest, get your iPhone back
- ▶ No one else can take your iPhone!
- ▶ Shop lends you only \$500, so they don’t have risk if you don’t return the \$\$
- ▶ Hypothetically, suppose iPhone prices fluctuate a lot: what’s wrong if iPhone price drops from \$1,000 to \$300?
 - ▶ iPhone worth less than \$500: you have no incentive to pay \$500 to get it back
- ▶ Solution: monitor iPhone prices, borrow up to 1/2 of current iPhone price
 - ▶ When iPhone price drops to \$800, can only borrow \$400
 - ▶ Pay back \$100, or pledge more stuff worth at least \$200

MakerDAO DAI

- ▶ ETH worth \$1,500. Overcollateralization rate 150%. By putting 1ETH in “vault”, can print up to 1000 DAI
- ▶ Suppose I print 800 DAI. How much does ETH have to drop for my position to be under-collateralized?

MakerDAO DAI

- ▶ ETH worth \$1,500. Overcollateralization rate 150%. By putting 1ETH in “vault”, can print up to 1000 DAI
- ▶ Suppose I print 800 DAI. How much does ETH have to drop for my position to be under-collateralized?

$$800 \times 1.5 = \$1,200$$

MakerDAO DAI

- ▶ ETH worth \$1,500. Overcollateralization rate 150%. By putting 1ETH in “vault”, can print up to 1000 DAI
- ▶ Suppose I print 800 DAI. How much does ETH have to drop for my position to be under-collateralized?

$$800 \times 1.5 = \$1,200$$

- ▶ If ETH drops towards \$1,200, I can:
 - ▶ “Top up” vault by adding more ETH
 - ▶ “Pay down” debt in vault by paying back DAI

MakerDAO DAI

- ▶ ETH worth \$1,500. Overcollateralization rate 150%. By putting 1ETH in “vault”, can print up to 1000 DAI
- ▶ Suppose I print 800 DAI. How much does ETH have to drop for my position to be under-collateralized?

$$800 \times 1.5 = \$1,200$$

- ▶ If ETH drops towards \$1,200, I can:
 - ▶ “Top up” vault by adding more ETH
 - ▶ “Pay down” debt in vault by paying back DAI
- ▶ Vault associated DAI gains interest, called “stability fee”

MakerDAO DAI: Leverage

- ▶ Why would you want to vault ETH and get DAI?
- ▶ Suppose you do:
 - ▶ Buy \$2,000 ETH
 - ▶ Vault, get \$1,000 DAI
 - ▶ Sell \$1,000 DAI
- ▶ End result: paid \$1,000 USD, own \$2,000 vaulted ETH

MakerDAO DAI: Leverage

- ▶ Why would you want to vault ETH and get DAI?
- ▶ Suppose you do:
 - ▶ Buy \$2,000 ETH
 - ▶ Vault, get \$1,000 DAI
 - ▶ Sell \$1,000 DAI
- ▶ End result: paid \$1,000 USD, own \$2,000 vaulted ETH
- ▶ If ETH price rises 10%, what happens?

MakerDAO DAI: Leverage

- ▶ Why would you want to vault ETH and get DAI?
- ▶ Suppose you do:
 - ▶ Buy \$2,000 ETH
 - ▶ Vault, get \$1,000 DAI
 - ▶ Sell \$1,000 DAI
- ▶ End result: paid \$1,000 USD, own \$2,000 vaulted ETH
- ▶ If ETH price rises 10%, what happens?
 - ▶ Vaulted ETH worth \$2,200
 - ▶ Pay back \$1,000 debt (ignore stability fee), get and sell ETH for \$2,200
 - ▶ End result: made $\$2,200 - \$1,000 = \$1,200$
- ▶ 10% change in ETH price gives you 20% profits!

MakerDAO DAI: Leverage

- ▶ Why would you want to vault ETH and get DAI?
- ▶ Suppose you do:
 - ▶ Buy \$2,000 ETH
 - ▶ Vault, get \$1,000 DAI
 - ▶ Sell \$1,000 DAI
- ▶ End result: paid \$1,000 USD, own \$2,000 vaulted ETH
- ▶ If ETH price rises 10%, what happens?
 - ▶ Vaulted ETH worth \$2,200
 - ▶ Pay back \$1,000 debt (ignore stability fee), get and sell ETH for \$2,200
 - ▶ End result: made $\$2,200 - \$1,000 = \$1,200$
- ▶ 10% change in ETH price gives you 20% profits!
- ▶ But, if ETH price decreases 10%, you lose 20%!

MakerDAO DAI: Leverage

- ▶ Why would you want to vault ETH and get DAI?
- ▶ Suppose you do:
 - ▶ Buy \$2,000 ETH
 - ▶ Vault, get \$1,000 DAI
 - ▶ Sell \$1,000 DAI
- ▶ End result: paid \$1,000 USD, own \$2,000 vaulted ETH
- ▶ If ETH price rises 10%, what happens?
 - ▶ Vaulted ETH worth \$2,200
 - ▶ Pay back \$1,000 debt (ignore stability fee), get and sell ETH for \$2,200
 - ▶ End result: made $\$2,200 - \$1,000 = \$1,200$
- ▶ 10% change in ETH price gives you 20% profits!
- ▶ But, if ETH price decreases 10%, you lose 20%!
- ▶ Intuitively, you bought \$2,000 ETH with \$1,000 USD
- ▶ This is leverage: buy with borrowed money, to increase risk exposure

MakerDAO DAI: Vault Mechanics

- ▶ I deposit \$1,500 ETH into a vault, borrow \$800 DAI. When I pay back \$800 DAI, I get my ETH back. Can anyone pay back \$800 and get ETH?
 - ▶ No! Why not?
 - ▶ Otherwise, no one has incentive to put DAI in vaults! Lose ETH whenever unlocked. . .

MakerDAO DAI: Stability...?

Dai Price Chart (DAI/USD)

Last updated 01:55AM UTC. Currency in USD.

Price Market Cap Live Chart

24h 7d 14d 30d 90d 180d 1y Max

Logarithmic Linear

Nov 18, 2019 → Aug 29, 2022



MakerDAO DAI: Stability...?

- ▶ Very early mover: founded Dec 2017!
- ▶ In principle, each DAI backed by \$1.5 of ETH, hence DAI worth at least a dollar

MakerDAO DAI: Stability...?

- ▶ Very early mover: founded Dec 2017!
- ▶ In principle, each DAI backed by \$1.5 of ETH, hence DAI worth at least a dollar
- ▶ But very weak guarantee it's actually worth a dollar!

MakerDAO DAI: Stability...?

- ▶ Very early mover: founded Dec 2017!
- ▶ In principle, each DAI backed by \$1.5 of ETH, hence DAI worth at least a dollar
- ▶ But very weak guarantee it's actually worth a dollar!
- ▶ In early days, DAI's peg stability was very weak
- ▶ Interestingly, peg often broke to the upside!
 - ▶ Demand for DAI to unlock/replenish collateral vaults?

MakerDAO DAI: Stability...?

- ▶ Very early mover: founded Dec 2017!
- ▶ In principle, each DAI backed by \$1.5 of ETH, hence DAI worth at least a dollar
- ▶ But very weak guarantee it's actually worth a dollar!
- ▶ In early days, DAI's peg stability was very weak
- ▶ Interestingly, peg often broke to the upside!
 - ▶ Demand for DAI to unlock/replenish collateral vaults?
- ▶ “Hacky” solution: make DAI 1:1 redeemable for USDC!

MakerDAO DAI: USDC effect on Prices

Dai Price Chart (DAI/USD)

Last updated 01:55AM UTC. Currency in USD.

Price Market Cap Live Chart

24h 7d 14d 30d 90d 180d 1y Max

Line Area Full Screen

Logarithmic Linear Nov 18, 2019 → Aug 29, 2022



MakerDAO DAI: Decentralization

- ▶ DAI synthesizes USD-like assets, using fully on-chain components!

MakerDAO DAI: Decentralization

- ▶ DAI synthesizes USD-like assets, using fully on-chain components!
- ▶ Thus, logistically, DAI doesn't use US bank accounts, hence can't be easily shut down by regulators

MakerDAO DAI: Decentralization

- ▶ DAI synthesizes USD-like assets, using fully on-chain components!
- ▶ Thus, logistically, DAI doesn't use US bank accounts, hence can't be easily shut down by regulators
- ▶ Unlike USDC/USDT, DAI contract doesn't have a blacklist: can't freeze DAI balances

MakerDAO DAI: Decentralization

- ▶ DAI synthesizes USD-like assets, using fully on-chain components!
- ▶ Thus, logistically, DAI doesn't use US bank accounts, hence can't be easily shut down by regulators
- ▶ Unlike USDC/USDT, DAI contract doesn't have a blacklist: can't freeze DAI balances
- ▶ Can never be changed!

MakerDAO DAI: Decentralization

- ▶ DAI synthesizes USD-like assets, using fully on-chain components!
- ▶ Thus, logistically, DAI doesn't use US bank accounts, hence can't be easily shut down by regulators
- ▶ Unlike USDC/USDT, DAI contract doesn't have a blacklist: can't freeze DAI balances
- ▶ Can never be changed!
- ▶ Governance through voting with MKR token, held by founders, and a bunch of VCs
 - ▶ Approx \$1mil MKR voting power is delegated to our student group!
- ▶ Interesting example of a “very decentralized” protocol

MakerDAO DAI: Decentralization

MakerDAO faces a tension of more decentralization vs more impact

- ▶ As of 2022, approx half of collateral is USDC: what if, hypothetically, Circle blacklisted Maker?
- ▶ Founder [Rune](#) made a radical proposal: float DAI, remove dependence on USDC!
- ▶ See also [here](#)

MakerDAO DAI: Real World Assets

- ▶ DAI is fungible, and inherits the “goodness” of the entire backing collateral
- ▶ If you have enough “good collateral”, you can put in other stuff, and people will probably still be OK

MakerDAO DAI: Real World Assets

- ▶ DAI is fungible, and inherits the “goodness” of the entire backing collateral
- ▶ If you have enough “good collateral”, you can put in other stuff, and people will probably still be OK
- ▶ Maker has done this! Financed/considering financing:
 - ▶ \$30M of SocGen bonds
 - ▶ \$7.8M loan for a Tesla factory

MakerDAO DAI: Real World Assets

- ▶ DAI is fungible, and inherits the “goodness” of the entire backing collateral
- ▶ If you have enough “good collateral”, you can put in other stuff, and people will probably still be OK
- ▶ Maker has done this! Financed/considering financing:
 - ▶ \$30M of SocGen bonds
 - ▶ \$7.8M loan for a Tesla factory
- ▶ Can we use oracles to value these things...?

MakerDAO DAI: Real World Assets

- ▶ DAI is fungible, and inherits the “goodness” of the entire backing collateral
- ▶ If you have enough “good collateral”, you can put in other stuff, and people will probably still be OK
- ▶ Maker has done this! Financed/considering financing:
 - ▶ \$30M of SocGen bonds
 - ▶ \$7.8M loan for a Tesla factory
- ▶ Can we use oracles to value these things...?
- ▶ Even if we did, can we efficiently liquidate them if the oracle said the price was low...?

MakerDAO DAI: Real World Assets

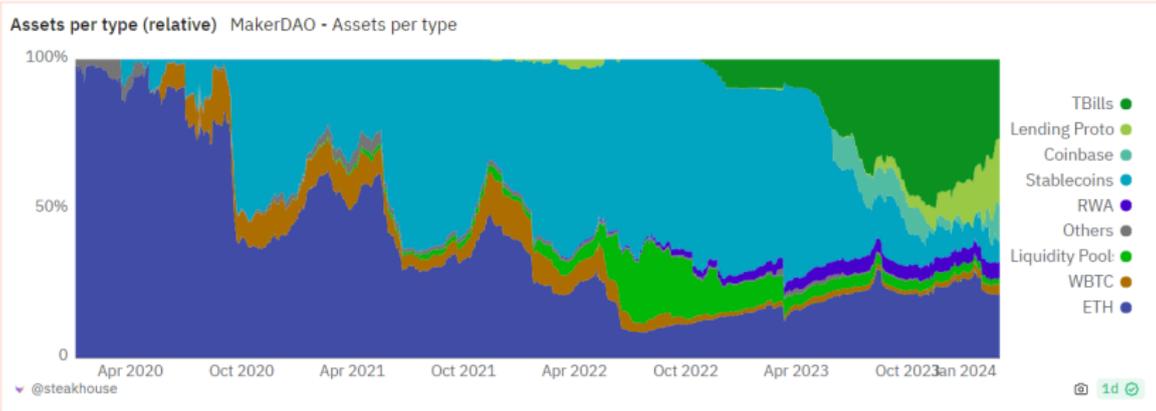
- ▶ DAI is fungible, and inherits the “goodness” of the entire backing collateral
- ▶ If you have enough “good collateral”, you can put in other stuff, and people will probably still be OK
- ▶ Maker has done this! Financed/considering financing:
 - ▶ \$30M of SocGen bonds
 - ▶ \$7.8M loan for a Tesla factory
- ▶ Can we use oracles to value these things...?
- ▶ Even if we did, can we efficiently liquidate them if the oracle said the price was low...?
- ▶ Founder Rune also pushing against RWA efforts
- ▶ Interesting blog post on Maker governance drama

MakerDAO DAI: Real World Assets

- ▶ Holding USDC doesn't pay well when rates are 5.5%!
- ▶ What did MakerDAO do instead?

MakerDAO DAI: Real World Assets

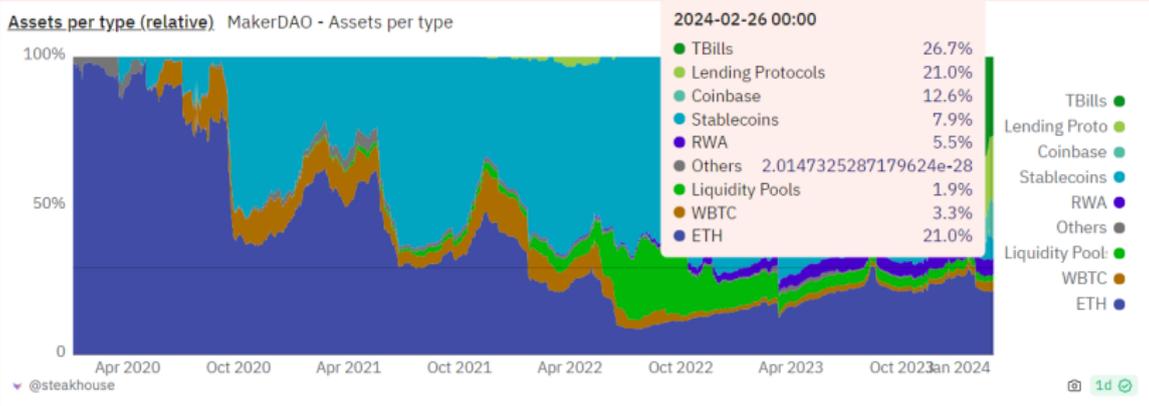
- ▶ Holding USDC doesn't pay well when rates are 5.5%!
- ▶ What did MakerDAO do instead?



Source: [Dune](#), see also [here](#)

MakerDAO DAI: Real World Assets

- ▶ Holding USDC doesn't pay well when rates are 5.5%!
- ▶ What did MakerDAO do instead?



Source: [Dune](#), see also [here](#)

MakerDAO DAI: Recent developments

- ▶ There's a new plan called **Endgame** which I can't make any sense of, but involves a rebrand and launching a bunch of other stuff, launching summer 2024
- ▶ Maker also making some “vertical integration” plays:
 - ▶ Lending protocol, **Spark** (non-US only)
 - ▶ Oracle protocol, **Chronicle**

MakerDAO: Spark

[FAQ](#)[Docs](#)[Audits](#)[Forum](#)[Discord](#)[Launch App](#)

Powered by  MAKER

- > This is the landing page for a truly community-built  DeFi infrastructure **SPARK**.



Deposit DAI and earn 15.00%

Earn the DAI Savings Rate (DSR)

Earn



Borrow DAI at 16.00%

Against ETH, stETH, rETH and other assets

Borrow

MakerDAO: Takeaways

- ▶ Elegant initial idea!
- ▶ Bunch of “hacks” for implementation
- ▶ Now substantially RWA-based to harvest yield: legal basis for this...?
- ▶ “Very decentralized” in principle, a few people have large influence in practice. Philosophical direction unclear. . .

The Limits of Risky On-Chain Assets

- ▶ Issue with ETH as collateral is ETH price fluctuates a lot
- ▶ Need margin to insure 1 DAI backed by at least \$1 USD in ETH
 - ▶ In DAI, around 50%!

The Limits of Risky On-Chain Assets

- ▶ Issue with ETH as collateral is ETH price fluctuates a lot
- ▶ Need margin to insure 1 DAI backed by at least \$1 USD in ETH
 - ▶ In DAI, around 50%!
- ▶ What kinds of assets require more/less margin?

The Limits of Risky On-Chain Assets

- ▶ Issue with ETH as collateral is ETH price fluctuates a lot
- ▶ Need margin to insure 1 DAI backed by at least \$1 USD in ETH
 - ▶ In DAI, around 50%!
- ▶ What kinds of assets require more/less margin?
 - ▶ The more volatile X/USD prices are, the higher margin needed
- ▶ On-chain assets tend to be volatile – using them as collateral for stablecoins has low capital efficiency
- ▶ How can we get on-chain assets that have low USD volatility?

Basis Trade Stablecoins

- ▶ Recent idea: create synthetic USD assets: buy on-chain ETH, and sell on-chain ETH derivatives
 - ▶ Like buying S&P 500, shorting S&P 500 futures: you're left with USDs!

Basis Trade Stablecoins

- ▶ Recent idea: create synthetic USD assets: buy on-chain ETH, and sell on-chain ETH derivatives
 - ▶ Like buying S&P 500, shorting S&P 500 futures: you're left with USDs!
- ▶ \$1 of hedged ETH is basically 1 USD! Much higher capital efficiency

Basis Trade Stablecoins

- ▶ Recent idea: create synthetic USD assets: buy on-chain ETH, and sell on-chain ETH derivatives
 - ▶ Like buying S&P 500, shorting S&P 500 futures: you're left with USDs!
- ▶ \$1 of hedged ETH is basically 1 USD! Much higher capital efficiency
- ▶ Old examples: **UXD**, **Basis cash**; now, **Ethena** with 1.3bil USD TVL
- ▶ Long “spot”, short “futures” called the (spot-futures) basis trade

Basis Trade Stablecoins: Pros and Cons

- ▶ Pros: high capital efficiency, without using off-chain assets!

Basis Trade Stablecoins: Pros and Cons

- ▶ Pros: high capital efficiency, without using off-chain assets!
- ▶ Cons: basis trade is risky, doesn't perfectly create dollar assets

Basis Trade Stablecoins: Pros and Cons

- ▶ Pros: high capital efficiency, without using off-chain assets!
- ▶ Cons: basis trade is risky, doesn't perfectly create dollar assets
- ▶ Surprisingly, basis trade has been quite profitable over past few years!
- ▶ Not guaranteed to hold, so uncertain future for these coins

The Leverage/Basis Trade Duality

Leverage and Stablecoin Pegs

Gary B. Gorton, Elizabeth C. Klee, Chase P. Ross, Sharon Y. Ross, and Alexandros P. Vardoulakis
NBER Working Paper No. 30796

December 2022

JEL No. G0,G1,G10

ABSTRACT

Money is debt that circulates with no questions asked. Stablecoins are a new form of private money that circulate with many questions asked. We show how stablecoins can maintain a constant price even though they face run risk and pay no interest. Stablecoin holders are indirectly compensated for stablecoin run risk because they can lend the coins to levered traders. Levered traders are willing to pay a premium to borrow stablecoins when speculative demand is strong. Therefore, the stablecoin can support a \$1 peg even with higher levels of run risk.

Source

The Leverage/Basis Trade Duality

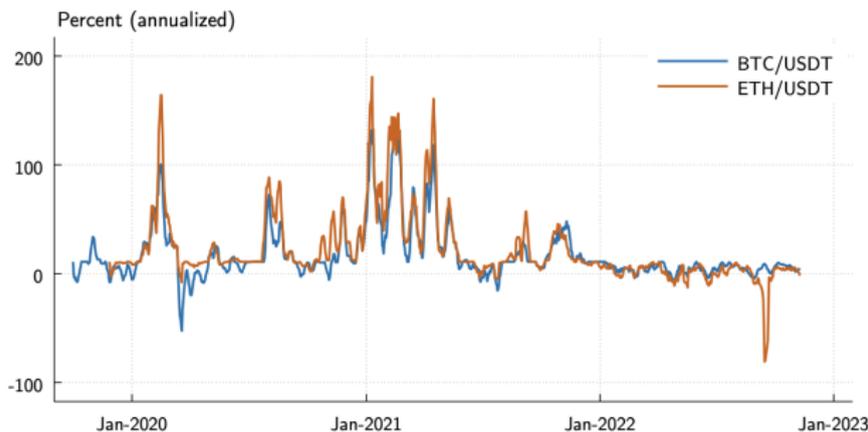


Figure 2: Perpetual Futures Funding Rate. Figure plots the annualized funding rate of USDT-settled Bitcoin perpetual futures for Bitcoin and Ether on Binance. A positive funding rate indicates that long-future investors make payments to short-future investors. Series are seven-day trailing averages.

Source

Two ways to buy leverage

A has \$10, wants to buy \$100 of BTC, *B* wants to lend \$90 to *A*

Collateralized lending:

- ▶ *A* borrows \$90 from *B* (Aave, or CEX), uses \$100 of BTC as collateral, pays 10% interest

Two ways to buy leverage

A has \$10, wants to buy \$100 of BTC, B wants to lend \$90 to A

Collateralized lending:

- ▶ A borrows \$90 from B (Aave, or CEX), uses \$100 of BTC as collateral, pays 10% interest

Perps/futures:

- ▶ A longs \$100 in BTC on perps/futures, puts \$10 in margin
- ▶ B holds \$100 in BTC spot, shorts \$100 BTC perps/futures; spends \$100, for a “mostly riskless” trade
- ▶ Futures price is slightly above spot/perp “funding rate” slightly favors shorts, hence A effectively pays B interest

Two ways to buy leverage

A has \$10, wants to buy \$100 of BTC, *B* wants to lend \$90 to *A*

Collateralized lending:

- ▶ *A* borrows \$90 from *B* (Aave, or CEX), uses \$100 of BTC as collateral, pays 10% interest

Perps/futures:

- ▶ *A* longs \$100 in BTC on perps/futures, puts \$10 in margin
- ▶ *B* holds \$100 in BTC spot, shorts \$100 BTC perps/futures; spends \$100, for a “mostly riskless” trade
- ▶ Futures price is slightly above spot/perp “funding rate” slightly favors shorts, hence *A* effectively pays *B* interest

What happens if BTC price falls?

Is Ethena centralized?

▼ Why not have all of the protocol functionality onchain?

Unfortunately, at this moment in time decentralized perpetuals have yet to reach mass adoption, with CeFi open interest 25 times higher than DeFi open interest. In order to scale to the size we believe is needed to serve the masses, Ethena has prioritized accessing centralized exchanges for the far superior liquidity on offer whilst still maintaining DeFi's core ethos of transparency and censorship resistance. Again, Ethena takes a pragmatic approach in delivering an onchain stablecoin that can scale to serve the masses, and weighing the various risks of different approaches we believe the use of custodians adequately protects USDe from regulatory censorship risk and exchange counterparty risk.

Source

Is Ethena centralized?

▼ Explain the fully centralized components of the protocol

In the early stages of the protocol, the delta-hedging algorithm and execution model will be internalized and therefore our most centralized piece. Conceptually this is similar to other applications which run an onchain system with offchain matching - for example dYdX and CowSwap.

Over time, we will decentralize this infrastructure as soon as possible and we have no incentive to continue running it ourselves. We do not skim fees from users in this process so there is no revenue incentive for the Ethena Labs team, and there is a potential regulatory and legal disincentive in having this server centralized as we work towards full decentralization. We intend to move towards an open RFQ model where market makers can step in and compete for execution of the hedge.

Source

Is Ethena centralized?

▼ How does the protocol manage delta-hedging?

Our systems are continuously running and maintaining delta neutrality, when mint and burns are requested they get added to a queue and netted out if possible.

When a delta is detected, we seek optimal execution among venues using multiple metrics:

1. Synthetic price

Calculating the fair value of a given asset is the cornerstone of good execution, when a perpetual is trading at a temporary premium/discount this is taken into account.

2. Funding rate

Projection of future yield and its persistence is used to adjust the synthetic price, given current and recent historical funding rates as well as platform native futures premium.

3. Risk limits

Our portfolio needs to be balanced, with exposure on each venue being maintained at optimal levels of the total portfolio size according to venue specific contribution to total open interest. Position on a single venue must have a percentage of open interest cap.

The hedge is either executed in full or partially distributed over connected exchanges. Market impact is always taken into account to ensure a high execution quality.

An aggregated orderbook with synthetic price offsets is maintained, making it possible for us to identify where the liquidity is located and how to route it.

When liquidity is sourced from multiple venues, latencies between our systems and the venue are taken into account and hitting orders are sent in such a way that they hit simultaneously.

Large mint/burn requests, that can't be automatically performed within 10bps of fair value, enter our "manual" flow, where the request is fulfilled at a future price found according to a TWAP plus a risk markup.

Source

Is Ethena centralized?

▼ How does Off-Exchange Custody "OES" work?

"OES" stands for "Off-Exchange Settlement". In short, it enables Ethena to always and only custody funds with a third-party custodian as so users' funds never reside on centralized exchange servers. This collateral being held by custodians can then be mirrored onto CEXs for trading margin. OES providers enable us to delegate/undelegate funds to support trading between multiple exchanges without collateral ever leaving our onchain wallet.

▼ Have any of your custody providers ever lost user funds?

We are not aware of any instance of client fund loss related to any custody solution utilized by Ethena.

▼ Has an OES solution ever been used in practice to save user funds?

When FTX collapsed, certain arrangements with prime brokers and clearing agents (largely proprietary "insurance" products) resulted in customers being made immediately whole, despite assets being lost on the exchange due to the bankruptcy.

In addition, based on publicly available information, Copper's Clearloop offering insulated customers utilizing Clearloop to access Coinflex from any losses resulting from Coinflex's bankruptcy in 2022.

Source

Is Ethena centralized?

▼ How are Copper Clearloop and Fireblocks OES different in their offerings?

Copper offers a custodian approach where funds are either segregated or held in a co-mingled omnibus wallet. In a segregated wallet, Ethena retains a key share and the funds are not exposed to any operational issues from Copper's side. In the co-mingled omnibus wallet, the funds are held on behalf of Ethena by Copper in a bankruptcy-remote trust whereby the funds are accessible in the event of Copper entering administration or bankruptcy. Funds would only be released after all trades are cleared, which involves direct API calls with exchanges to close out trades.

Fireblocks' OES solution mirrors in many ways the traditional Fireblocks' MPC wallet solution. Fireblocks' OES solution enables Ethena to store funds in an onchain wallet wherein only Ethena and our custody partners have the key shares. In the event of Fireblocks entering administration or bankruptcy, our users assets are held separately to the Fireblocks entity.

▼ What are the risks of OES?

There are three principal risks with using an OES:

1. **Accessibility and Availability.** Ethena's ability to deposit, withdraw, and delegate to & from exchanges. Any of these abilities being unavailable or degraded would impede the trading workflows & availability of the mint/redeem *USDe* functionality.

2. **Performance of Operational Duties.** In the event of an exchange failure, the protocol is reliant upon cooperation and reasonable legal behavior to facilitate the expedient transfer of any PnL at risk with an exchange. Ethena mitigates this risk by settling PnL with exchanges frequently to avoid large balances being owed to the protocol.

3. **Operational Failure of Custodian.** While we are not aware of any material operational failures or insolvencies for large scale crypto custodians, this does remain a possibility. While assets are held in segregated accounts an insolvency of a custodian would pose operational issues for the creation and redemption of *USDe*.

These three risks are remedied by Ethena never exposing too much of users' collateral to a single OES provider and ensuring the assets are held in separate accounts.

It's important to keep in mind that we use multiple OES providers with the same exchanges to mitigate both of the aforementioned risks.

Basis trade stables: summary

- ▶ **The vision:** “Hedged risky asset” collateral enables fully-on-chain, censorship-free, and capital efficient USD-valued asset creation

Basis trade stables: summary

- ▶ **The vision:** “Hedged risky asset” collateral enables fully-on-chain, censorship-free, and capital efficient USD-valued asset creation
- ▶ **The reality:** There’s no perp liquidity onchain. . .
 - ▶ But the hedge happens to pay positive funding rates in bull markets, so people do the trade despite centralization

Basis trade stables: summary

- ▶ **The vision:** “Hedged risky asset” collateral enables fully-on-chain, censorship-free, and capital efficient USD-valued asset creation
- ▶ **The reality:** There’s no perp liquidity onchain. . .
 - ▶ But the hedge happens to pay positive funding rates in bull markets, so people do the trade despite centralization
 - ▶ **In bull markets. . .**

Risky Asset Backed Stablecoins: Project Ideas

- ▶ Real World Assets (RWAs):
 - ▶ **Very hot area!**
 - ▶ Very interesting legal problems in particular: see **6s Capital**
 - ▶ My understanding: create a “legal wrapper” whose “constitution” says, “I do whatever the DAO tells me to”
 - ▶ Gluing the legal system to the blockchain is hard and interesting!
- ▶ Basis trade stablecoins
 - ▶ Any other creative ways to synthesize “on-chain low volatility assets”?
 - ▶ How to solve the centralization/custody questions?

Some other misc readings

- ▶ Coinmetrics *State of the network*, Dec 2023

Algorithmic Stablecoins!

So far, stablecoins are kind of boring

- ▶ **Fiat-backed:** You can turn a dollar into a crypto dollar

Algorithmic Stablecoins!

So far, stablecoins are kind of boring

- ▶ **Fiat-backed:** You can turn a dollar into a crypto dollar
- ▶ **Crypto-backed:** You can turn more than a dollar of crypto into something like a crypto dollar

Algorithmic Stablecoins!

So far, stablecoins are kind of boring

- ▶ **Fiat-backed:** You can turn a dollar into a crypto dollar
- ▶ **Crypto-backed:** You can turn more than a dollar of crypto into something like a crypto dollar
- ▶ Compliance, blah blah blah...

Algorithmic Stablecoins!

So far, stablecoins are kind of boring

- ▶ **Fiat-backed:** You can turn a dollar into a crypto dollar
- ▶ **Crypto-backed:** You can turn more than a dollar of crypto into something like a crypto dollar
- ▶ Compliance, blah blah blah. . .

But what if we could **make a dollar out of less than a dollar???**

- ▶ The **undercollateralized/algorithmic stablecoin:** the “perpetual motion machine”, “lead-into-gold transmutation” of defi!

Algorithmic Stablecoins

Every algorithmic stablecoin has same basic idea*:

- ▶ Issue token, supposed to be worth \$1
- ▶ If token worth more than \$1, sell some tokens to push price down to \$1
- ▶ If token worth less than \$1, buy some tokens to push price up to \$1

Sounds great! What's the problem?

Algorithmic Stablecoins

Every algorithmic stablecoin has same basic idea*:

- ▶ Issue token, supposed to be worth \$1
- ▶ If token worth more than \$1, sell some tokens to push price down to \$1
- ▶ If token worth less than \$1, buy some tokens to push price up to \$1

Sounds great! What's the problem? **Where do you get the money to buy the token?**

*One old reading: [Seignorage Shares](#). Also see whitepapers of [Terra](#) and [Frax](#)

Algorithmic Stablecoins: Design Choices

- ▶ Algo stables have a ton of BS-marketing, but all fundamentally variants of this idea
- ▶ Most have an “equity token”, which has some cash flow/tx fee rights, and is “diluted” to buy the stable token
- ▶ Some hold “fractional reserves” instead of zero reserves (FRAX, IRON)
- ▶ Some have a big pot of money/crypto to defend peg (Terra LFG)
- ▶ Some adjust interest rates as a demand/supply tool, in addition to buying/selling pressure
- ▶ However, smoke and mirrors aside, all boil down to “stabilize prices through buying/selling”

Why Do Algo-Stables Exist?

Good case:

- ▶ We want to have money which is “decentralized”, outside of state control
- ▶ DAI does this, but it’s too expensive/compromised by USDC exposure
- ▶ Algo stables to the rescue! “Cheap” production of stable decentralized money

Why Do Algo-Stables Exist?

Good case:

- ▶ We want to have money which is “decentralized”, outside of state control
- ▶ DAI does this, but it’s too expensive/compromised by USDC exposure
- ▶ Algo stables to the rescue! “Cheap” production of stable decentralized money

Less good case:

- ▶ I print a token, tell you it’s worth a dollar

Why Do Algo-Stables Exist?

Good case:

- ▶ We want to have money which is “decentralized”, outside of state control
- ▶ DAI does this, but it’s too expensive/compromised by USDC exposure
- ▶ Algo stables to the rescue! “Cheap” production of stable decentralized money

Less good case:

- ▶ I print a token, tell you it’s worth a dollar
- ▶ I sell it to you for a dollar

Why Do Algo-Stables Exist?

Good case:

- ▶ We want to have money which is “decentralized”, outside of state control
- ▶ DAI does this, but it’s too expensive/compromised by USDC exposure
- ▶ Algo stables to the rescue! “Cheap” production of stable decentralized money

Less good case:

- ▶ I print a token, tell you it’s worth a dollar
- ▶ I sell it to you for a dollar
- ▶ I get a dollar!

Why Do Algo-Stables Exist?

Good case:

- ▶ We want to have money which is “decentralized”, outside of state control
- ▶ DAI does this, but it’s too expensive/compromised by USDC exposure
- ▶ Algo stables to the rescue! “Cheap” production of stable decentralized money

Less good case:

- ▶ I print a token, tell you it’s worth a dollar
- ▶ I sell it to you for a dollar
- ▶ I get a dollar!

If I make money for every token I print, I end up with a lot of money!

Case Study: LUNA Terra

Terra Luna Classic Price Chart (LUNC/USD)

Last updated 01:29AM UTC. Currency in USD.



Case Study: LUNA Terra

TerraClassicUSD Price Chart (USTC/USD)

Last updated 01:32AM UTC. Currency in USD.

Price

Market Cap

24h

7d

14d

30d

90d

180d

1y

Max



Logarithmic

Linear



May 1, 2022



May 14, 2022

\$1.20

\$1.00

\$0.800000

\$0.600000

\$0.400000

\$0.200000

\$0.00

2. May

3. May

4. May

5. May

6. May

7. May

8. May

9. May

10. May

11. May

12. May

13. May

14. May



CoinGecko

Case Study: LUNA Terra

Terra Luna Classic Price Chart (LUNC/USD)

Last updated 01:29AM UTC. Currency in USD.

Price Market Cap TradingView

24h 7d 14d 30d 90d 180d 1y Max

Line Area Full Screen

Logarithmic Linear

May 6, 2022 → May 14, 2022



Anatomy of a Run: The Terra Luna Crash

Jiageng Liu, Igor Makarov, Antoinette Schoar

Anatomy of a Run: The Terra Luna Crash

Jiageng Liu¹, Igor Makarov², and Antoinette Schoar^{*3}

¹MIT Sloan

²London School of Economics

³MIT Sloan, NBER and CEPR

Abstract

Terra, the third largest cryptocurrency ecosystem after Bitcoin and Ethereum, collapsed in three days in May 2022 and wiped out \$50 billion in valuation. At the center of the collapse was a run on a blockchain-based borrowing and lending protocol (Anchor) that promised high yields to its stablecoin (UST) depositors. Using detailed data from the Terra blockchain and trading data from exchanges, we show that the run on Terra was a complex phenomenon that happened across multiple chains and assets. It was unlikely due to concentrated market manipulation by a third party but instead was precipitated by growing concerns about the sustainability of the system. Once a few large holders of UST adjusted their positions on May 7th, 2022, other large traders followed. Blockchain technology allowed investors to monitor each other's actions and amplified the speed of the run. Wealthier and more sophisticated investors were the first to run and experienced much smaller losses. Poorer and less sophisticated investors ran later and had larger losses. The complexity of the system made it difficult even for insiders to understand the buildup of risk. Finally, we draw broader lessons about financial fragility in an environment where a regulatory safety net does not exist, pseudonymous transactions are publicly observable, and market participants are incentivized to monitor the financial health of the system.

Luna Consequences

- ▶ Luna \$37bil, UST \$18bil at peak!
- ▶ Crashed to 0 very quickly, creating a domino effect. . .
- ▶ 3 Arrows Capital crashed, bringing down a number of crypto lenders, then FTX, creating a general panic
- ▶ See ecosystem lecture, next few classes

Algo-Stables

- ▶ We seem to be out of algo-stable season for now, but the idea seems to come back every cycle or so
- ▶ Like transmutation and perpetual motion machines, I personally think they're flawed at a fundamental level
- ▶ But, crypto is full of surprises. . .

Algo-Stable Project Ideas

Algo-Stable Project Ideas

- ▶ Please don't