UST's Doomsday Event

May 13th, 2022

Key concepts

Terra

Terra is a blockchain built within the Cosmos ecosystem. Cosmos is a platform for blockchains: it offers developers the possibility to delegate certain features on their infrastructure (ie. validation and security) to allow them to develop customized blockchains often specialized in the type of dApps in can deploy. .
Terra is the most relevant project built on Cosmos, specializing in stablecoins.

Stablecoins

They are digital assets whose value is pegged to another one like a commodity or another currency, and therefore have a price that remains stable.
For the price to remain stable, stablecoins usually require the backing of a reserve asset as collateral, so that it can always be traded for its value in the original asset.
Peg (to USD, EUR, gold...) and collateralization(fiat, crypto, or algorithmical) are the main criteria that classify stablecoins.

Algorithmic stablecoins

Algorithmic stablecoins use automated algorithms instead of collateral to maintain their peg. They work analogously to central banks: algorithms are in charge of creating or reducing the supply of the stablecoin to maintain a 1:1 relation to a sister digital asset, instead of fiat or crypto collateral. These changes in supply, provided by algorithms and enforced by arbitrageurs, guarantee stability in price.
The independence from third-party assets has allowed algorithmic stablecoins to claim to be fully digital and decentralized.

UST

UST is Terra's algorithmic stablecoin. Its value is pegged to the US Dollar and maintained by a 1:1 relation with Terra's native token, LUNA.
Terra guarantees that 1 UST will always be exchanged by 1 dollar equivalent in LUNA.
Whenever the value of the UST diverges from $1, it is either arbitraged or re-pegged by the algorithm, through the creation or destruction of either UST or LUNA.

Terraform Labs

Terraform Labs is a Seoul-based company founded in 2018 by Do Kwon. It is responsible for the development of the Terra blockchain, as well as some of its most relevant dApps, namely Anchor: a lending protocol that offers high yields to UST lenders.

Luna Foundation Guard

The Luna Foundation Guard was created by Terraform Labs in collaboration with relevant investors in the crypto world with the mission of defending UST's peg to the US Dollar. LFG reportedly planned to purchase $10B in BTC (and become the world's #1 holder of bitcoin) to use it as a reserve for UST

Backdrop

Terra´s stablecoin, UST, works as a dollar-pegged algorithmic stablecoin maintained by a relationship with the LUNA token: by definition, users can always exchange 1 UST for $1 worth of LUNA. LUNA is also used as Terra's native currency (for governance and mining incentives), but its role as the tool to absorb the volatility of UST is its most important use case. LUNA helps UST remain stable thanks to its algorithmic design.

Algorithmic stablecoins were created in opposition to fiat or crypto-collateralized stablecoins:

- **Fiat collateralized stablecoins** are minted at a 1:1 ratio with fiat reserves or other forms of collateral like gold or silver, or commodities like oil. Fiat collateralized stablecoins, such as Tether's USDT or Circle's USDC are more vulnerable to TradFi trends and regulation because of their dependence on regulated assets.
- **Crypto collateralized stablecoins** use other digital assets as collateral. As a defense mechanism against crypto's inherent volatility, they are overcollateralized. MakerDAO's DAI is an example of crypto collateralized stablecoin. Its value is pegged to the US Dollar, but traders who want to purchase DAI will have to send more than $1 in collateral to obtain $1 in DAI.

Algorithmic stablecoins were meant to solve the dependence on real-world assets of fiat-collateralized stablecoins, while also avoiding the friction of crypto-collateralized ones, whose growth was slowed by over-collateralization.

Algorithmic stablecoins rely on algorithms and arbitrage to reduce volatility.

> *Rather than keeping reserves, these coins rely on **algorithms** that maintain a stablecoin's price similarly to a central bank, which manipulates a fiat currency's price by controlling the supply of cash. When a stablecoin's price rises too high, its algorithms mint more tokens to lower its price—or the reverse if the price falls too low. Such moves are all coded into its blockchain's smart contracts, which execute automatically when specified conditions are met. [Fastcompany.com]*

TerraUSD (UST) is a stablecoin pegged to USD, but not backed by USD. Nevertheless, there is a redemption promise similar to that of fiat-backed stablecoins. Namely, the Terra Protocol allows every 1 UST it issued to be redeemed for 1 USD worth of Terra's other native token LUNA. So, if for example UST trades at $0.99, ***arbitrageurs*** *can make a profit by*

- *buying 1 UST for 0.99 USD*
- *redeeming the bought 1 UST for 1 USD worth of LUNA (if LUNA were to trade for example at $100, that would be 0.01 LUNA)*
- *selling the redeemed LUNA for 1 USD*

Hjalmarpeters

The endogenous nature of the algorithmic mechanism exposes these stablecoins to a doomsday scenario, where a sudden change in UST supply can lead to a de-peg from dollar value, thet increases pressure of the LUNA. A change too sudden and too voluminous can lead the prices of both UST and LUNA on a downward spiral.

Terraform Labs had tried building defense mechanisms against this death spiral:

- By **creating demand** and use for UST and LUNA, through payment agreements and the deployment of dApps such as Anchor protocol and Mirror.
- By **creating a reserve** to back the UST. Terra promoted the creation of the Luna Foundation Guard: an organizatoin responsible for sustaining UST's peg to the dollar. LFG had been purchasing massive amounts of BTC -their aim was to reach $10B in BTC. The creation of the Luna Foundation Guard followed a UST de-peg crisis of a smaller size happened in May 2021. Through the Luna Foundation Guard, Terra was entering the era of the Bitcoin standard.

The facts

The de-peg event kicked off with a massive offload of UST in UST's Curve liquidity pool and Binance, followed by panic sells from Anchor users.

The dreaded doomsday event for Terra **started on Saturday, May 7th, and spread across the weekend**. Simultaneous movements in **Curve** (decentralized exchange) **Binance** (centralized exchange) and **Anchor** (Terra's most important lending protocol), led to a massive dump of UST in the market, that created a de-peg phenomenon which kicked off the death spiral.

The events kicked off in Curve's UST pool (which traded UST with DAI USDC and USDT) Luna Foundation Guard was in the process of transitioning funds from that pool to a new Curve pool, and had removed $150M worth of UST. The subsequent reduced liquidity made the pool more vulnerable to price changes. It was after that withdrawal that some wallets started dumping UST in it, increasing the supply of UST in Curve. At the same time, large amounts of UST were unloaded on the Binance centralized exchange, creating more selling pressure on the UST that kicked off the initial de-peg event. The moves made on Curve and Binance have later been attributed to a coordinated attack.

Following the fear induced by the drop in price, major withdrawals of UST happened in Anchor, Terra's most important lending protocol. Over $3B was withdrawn throughout the weekend, leading to a decrease of 22% in Anchor's Total Value Locked (TVL) from its all-time high: from $14B to $11B (Anchor would eventually end up holding ~$2B at the time of writing).

LUNA was hardly absorbing UST's volatility of the initial de-peg when all the Anchor liquidations added more pressure on Terra's native token, and drew the price drastically down. The centralized exchange Binance halted sales on May 10th, and Terra Network also suspended withdrawals for several hours.

What ensued was the dreaded death spiral that brought UST to unprecendented lows (it reached $0.3) and has virtually rendered LUNA useless (from $85 to $0).

Luna Foundation Guard had to deploy the recently purchased BTC. The re-pegging mechanism had not yet been put into place, so the only intervention possibe was to release of great amounts of BTC impacting the general market.

Since February 2022, Terraform Labs had given impulse to the Luna Foundation Guard: an organization with the sole purpose of safeguarding UST's peg to the dollar. And to that end, it was announced that it would eventually purchase $10B worth of bitcoin. Up until May, the LFG had already purchased $3B worth of bitcoin.

Luna Foundation Guard indeed managed a large sum of BTC, but the mechanisms by which it would serve the purpose of holding off UST against volatility had not been finished and tested. On Monday 9th, just after the weekend of the great debacle, LFG announced the deployment of all its BTC reserves in an attempt to minimize the damage. $1.5B worth of bitcoin left LFG's wallets to incentivize trading firms to operate in favor of the peg.

https://twitter.com/LFG_org/status/1523512201088143360

The general market conditions were not favorable either, with bitcoin already showing signs of weakness in the light of the macro events, and bearish sentiment settling in the minds of investors.

The measures taken had little impact on UST's peg. Despite the active participation of market makers and the intervention of the Luna Foundation Guard with full force, the 1:1 ratio of UST with the USDollar remained broken and even reached new lows in the following days, falling to $0,30 per UST during May 11th.

Terraform Lab's founder Do Kwon, [spoke to the community via Twitter]() recapping the situation. The main takeaways were:

- UST would slowly pursue the recovery of its peg following its algorithmic model. No bailout was in place, although it had been rumored that firms like Jump Capital or Alameda were looking into a possible massive intervention.
- To achieve the peg, LUNA would change its issuance model to absorb a more significant supply of UST. This involves massive minting of LUNA, which virtually meant assuming its demise. LUNA dropped from $85 to a fraction of a dollar during the days of the collapse.
- In the future, Terra is likely to move towards a collateralized version of a stablecoin.

The de-peg event has ended with a very weak UST, struggling to come as close as possible to its $1 value (<$0.1 at the time of writing), an a LUNA token turned virtually useless, after dropping from ~$76 in the early hours of the crisis, to valuations of one hundredth of a dollar in just a few days.

At the time of writing this report, UST stands at $0,1, LUNA has virtually dropped to $0 ($0.00005) and the Terra blockchain has halted twice ([it is currently not operating]) wile dealing with code updates meant to deal, among other things, with the governance issues derived from the massive minting of LUNA

Insights and conclusions

Are algorithmic stablecoins even possible?

The dream of a decentralized, algorithmic stablecoin that could become the reserve currency for crypto has a history of failing to come true. Before the UST collapse, other projects such as the Empty Set Dollar or Basis Cash[1] had already fallen through.

Terra's story did seem different than its predecessors in many aspects. Terraform Labs had indeed managed to pull off an actual, fully-functional working blockchain, where the assets involved in the stablecoin, UST and LUNA, operated as the lifeblood of the processes and projects built on top of it.

A functional currency depends on public demand for its use cases and reserve assets to back it up. In Terra's case, UST looked like it was racing to safety. It had an increasing penetration in different markets and blockchains, and had become the most important , thanks to its use as a payment method and its expanding applications in DeFi. Meanwhile, the team leveraged that growing penetration to raise a reserve fund. Terra's success story depended on surviving long enough to become too big to fail.

Crypto is also not immune to charismatic personalities and triumphant narratives. Do Kwon and his team made it seem like if there were somebody who could pull this off, it would be them.

According to Vitalik Buterin, there is a fallacy in how some investors perceive stablecoins.

(Some investors might say)"If the stablecoin's price stays between 0,99 and 1,01, it's good". That mindset is very wrong. Whether a stablecoin jumps up or down by 2% or 0.2% isn't a function of how good the stablecoin is, it's a function of how good the market maker is.

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[1] It was later revealed that Terra founder Do Kwon was possibly one of the anonymous developers behind the failed Basis Cash project: https://twitter.com/CoinDesk/status/1524408439287463936

With UST, the story of algorithmic stablecoins, entirely detached from other assets, whether fiat or virtual, has experienced an immeasurable blow. Probably one they will never recover from.

Regulation is coming

If politicians needed a newsworthy event to add a sense of urgency to their plans of regulating stablecoins, now they have it.

After the UST crash, politicians on both sides of the Atlantic were quick to remind everyone about the need for an urgent intervention by governments. Treasury secretary Janet Yellen "confirmed that "it is important, even urgent" that Congress pass stablecoin legislation. She further called it "highly appropriate" that Congress do so by the end of the year."

Meanwhile, in the EU, politicians are trying to find the right balance between freedom for innovation and control. The UST de-peg event has led to a stricter stance and revived the ideas of enforcing the harsher versions of stablecoin regulation, according to new documents that have emerged following the crisis.

Stablecoins have been the main focus for lawmakers worldwide in the current new wave of crypto regulation. They are the assets that allow funds to move globally and permissionlessly across DeFi, without the intervention of traditional financial institutions or public organizations. Funds flowing through DeFi protocols do not need fiat money as an intermediary currency. Thus investors can move large sums through different platforms without the funds ever going through a bank. This has many implications, like taxes, anti-money laundering mechanisms, and fraud protection policies are still generally missing.

Governments have also warned about the risk posed by the market size stablecoins are achieving and their increasing interconnection with traditional finance. They have expressed concerns about the potential ripple effects in the economy if a systemic failure in the stablecoin ecosystem were to happen.

There is also a certain sense of competition. Governments working in their digital currencies (Central Bank Digital Currencies or CBDCs) see stablecoins as competitors for mass adoption. This competition led China to ban crypto to massively implement the government's e-CNY.

At the same time, stablecoins are somehow easier to regulate because of their similarity with other current financial assets. Current regulation already has legal frameworks that regulators could adapt to include stablecoins. Still, governments are also trying to regulate sensibly not to harm an innovation that brings progress.

Stablecoins were already in the regulators' crosshairs worldwide. In November 2021, when crypto was approaching its last all-time-high moment, the President's Working Group on Financial Markets released a report with recommendations for stablecoin regulation. Later, in March 2022, Joe Biden signed an executive order to kick off nationwide coordinated regulatory efforts, emphasizing stablecoins, including creating a government-issued one.

"Stablecoins that are well-designed and subject to appropriate oversight have the potential to support beneficial payments options. But the absence of appropriate oversight presents risks to users and the broader system," said Secretary of the Treasury Janet L. Yellen. "Current oversight is inconsistent and fragmented, with some stablecoins effectively falling outside the regulatory perimeter. Treasury and the agencies involved in this report look forward to working with Members of Congress from both parties on this issue. While Congress considers action, regulators will continue to operate within their mandates to address the risks of these assets." President's Working Group on Financial Markets Releases Report and Recommendations on Stablecoins

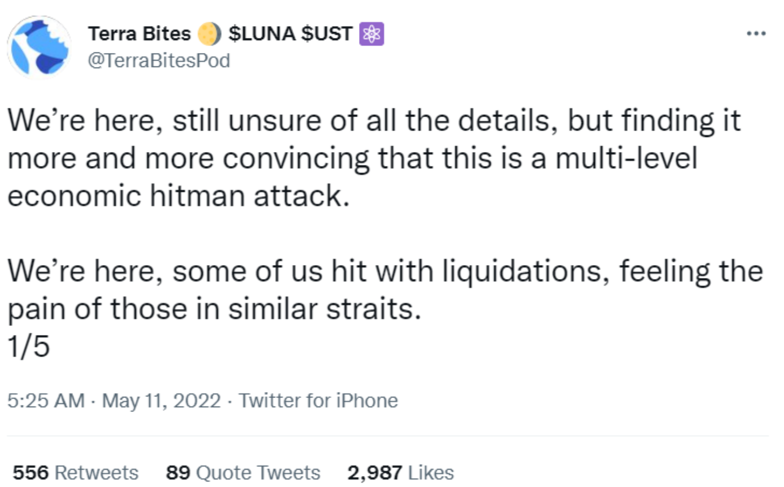
In the EU, the most prominent regulatory framework taking shape in the Union, the Markets in Crypto Assets (MiCA), also has a special place for stablecoins. According to the initial formulations of this document, stablecoins could be facing stricter enforcement, analogous to the regulation applied to e-money.

The coordinated attack theory

Amid the turmoil, certain clues point at a possible deliberate attack on the UST stablecoin. In a since-deleted tweet, Do Kwon was the first to suggest this theory:

“Men will literally attack a stablecoin unsuccessfully instead of going to therapy,” he tweeted.

The idea was repeated by Terra days later on Twitter, where the company defined it as a “multi-level economic hitman attack,” to many people, reminiscent of the day George Soros “broke” the British pound.


Terra Bites 🌖 $LUNA $UST ⚛
@TerraBitesPod

We’re here, still unsure of all the details, but finding it more and more convincing that this is a multi-level economic hitman attack.

We’re here, some of us hit with liquidations, feeling the pain of those in similar straits.
1/5

5:25 AM · May 11, 2022 · Twitter for iPhone

556 Retweets 89 Quote Tweets 2,987 Likes

https://twitter.com/TerraBitesPod/status/1524229263469293570

The earliest reports of the activity on the Curve pool did indeed point at a deliberate attack on UST. Analysts have pointed out the elements that helped this perfect storm occur:

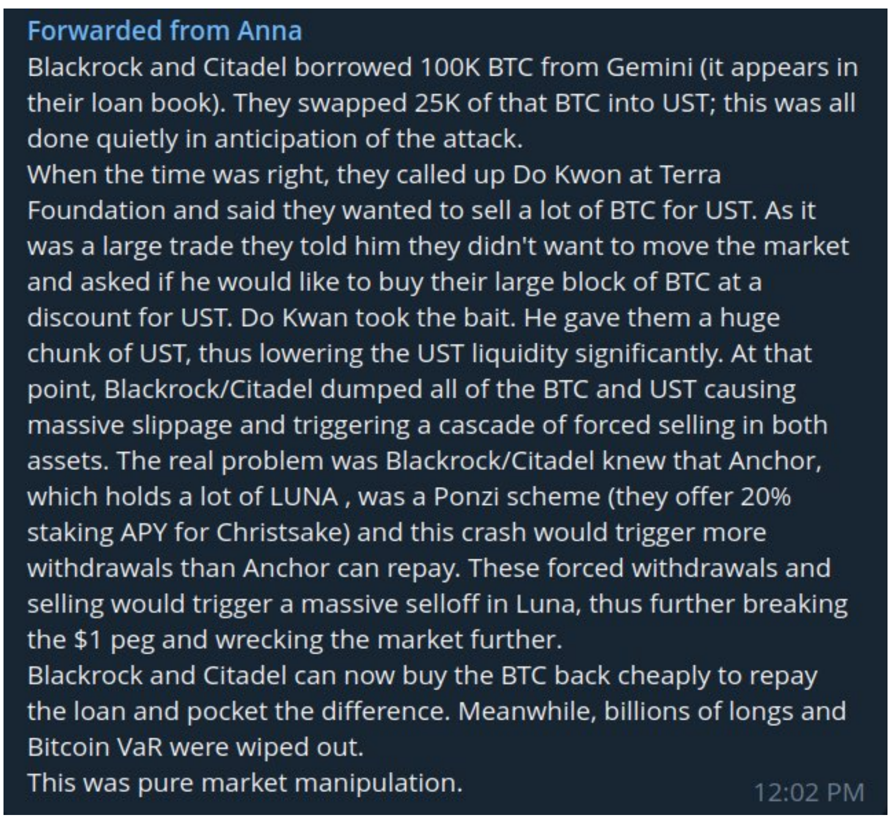
- Luna Foundation Guard had been purchasing BTC, but a proper system that automatically balanced UST with the reserve funds was only being designed. If LFG were to intervene, it would have to do so by offloading BTC onto the market.
- Do Kwon had announced a new Curve pool for UST (4pool) that would involve moving funds from the previous Curve pool, where UST traded alongside USDC, DAI, and USDT. The move would necessarily involve reducing the liquidity

of the previous pool, making it more vulnerable to an attack: the attacker would require fewer funds to create a de-peg.

- Reportedly, a coordinated Twitter campaign took place simultaneously, extending the panic of the de-peg to Anchor protocol users. The bank run led to ~$3B reduction in Anchor's TVL in just the first days.

The hypothetical upside for the attacker could come from BTC operations, whether they be shorts triggered by LFG's unloading of BTC on the market or by selling and purchasing bitcoin for profit.

Rumors ensued, and conspiracy theorists have pointed in many directions. There are suspicions that government officials (Janet Yellen's came up) were eager to create a black swan event that justified a powerful intervention. Also, Some mentioned traditional and crypto-native investment companies as potentially interested in toppling down a protocol that was too dangerous and becoming too big.


Forwarded from Anna
Blackrock and Citadel borrowed 100K BTC from Gemini (it appears in their loan book). They swapped 25K of that BTC into UST; this was all done quietly in anticipation of the attack.
When the time was right, they called up Do Kwon at Terra Foundation and said they wanted to sell a lot of BTC for UST. As it was a large trade they told him they didn't want to move the market and asked if he would like to buy their large block of BTC at a discount for UST. Do Kwan took the bait. He gave them a huge chunk of UST, thus lowering the UST liquidity significantly. At that point, Blackrock/Citadel dumped all of the BTC and UST causing massive slippage and triggering a cascade of forced selling in both assets. The real problem was Blackrock/Citadel knew that Anchor, which holds a lot of LUNA , was a Ponzi scheme (they offer 20% staking APY for Christsake) and this crash would trigger more withdrawals than Anchor can repay. These forced withdrawals and selling would trigger a massive selloff in Luna, thus further breaking the $1 peg and wrecking the market further.
Blackrock and Citadel can now buy the BTC back cheaply to repay the loan and pocket the difference. Meanwhile, billions of longs and Bitcoin VaR were wiped out.
This was pure market manipulation.
12:02 PM

This message was shared by Cardano founder, Charles Hoskinson, shared this message, and later deleted after Gemini denied their participation in any related operation.

Regardless of the attacker's identity, it seems very plausible that it was a single entity who designed and performed the attack in a coordinated effort to benefit from the de-peg event. The fact that this was possible with a relatively modest capital investment proves that the UST model was not solid enough. The stablecoin ecosystem, DeFi, and crypto in general, need to take time to learn from the mistakes to come back stronger.

Conclusions

The UST doomsday event is an extremely relevant crisis in crypto with very important ramifications:

- The collapse happened in the middle of a **bear market moment for crypto**, marked by inflation spikes, a rise in interest rates and the war in Ukraine. The whole crypto ecosystem, already in a vulnerable position, has taken a blow, both in price and reputation.
- The collapse of UST harms the **trust of many retail investors**, especially those newcomers attracted to the ecosystem by the alleged stability of stablecoins and the high yield of the Anchor protocol.
- UST's failure probably **closes the door to algorithmic stablecoins**. Algorithmic stablecoins had been more competitive than its sister fiat-based and crypto-collateralized stablecoins and had fueled faster growth. The price of this growth has turned out to be very high.
- The reputational damage has benefitted other projects such as MakerDAO in the short term, but it will probably have a **longer term impact in the credibility of stablecoins**, especially beyond the walls of crypto savvy investors.
- **Regulators have reacted swiftly**, urging governments to accelerate the speed and enforce harsher versions of the regulations proposed until the moment.
- The **impact on hedge funds** is yet to be measured but it might be considerable given the broad exposure to UST, LUNA or the Terra ecosystem in general.

Recommended reads

- Twitter thread from March explaining UST's model: https://twitter.com/ZeMariaMacedo/status/1504508920261402625
- A breakdown of the events, describing the hypothesis of a Soros-like operation: https://twitter.com/OnChainWizard/status/1524123935570382851
- Minute-by-minute recollection of the events by crypto researcher and investor @mhonkasalo: https://mhonkasalo.substack.com/p/navigating-the-ust-crash?s=r
- Analysis of the Anchor protocol sellout: https://twitter.com/pedroexplore1/status/1523232362565627906
- A Twitter user's prediction of the UST/ LUNA debacle from November 2021: https://twitter.com/FreddieRaynolds/status/1463960623402913797
- The story of the attack: https://twitter.com/4484/status/1524006086147252227
- LUNA - REKT: https://rekt.news/luna-rekt/