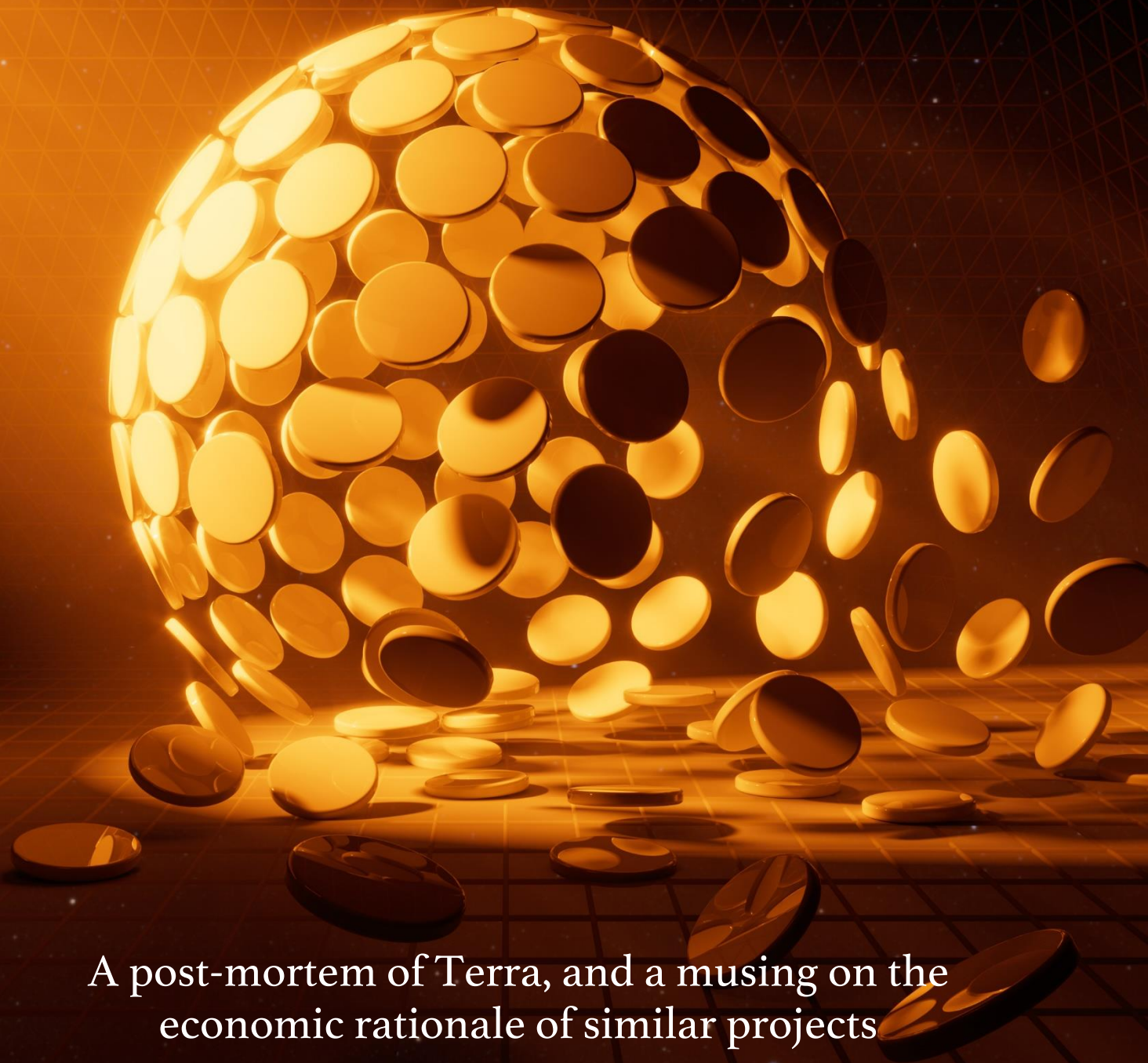


All Falls Down



A post-mortem of Terra, and a musing on the economic rationale of similar projects

All Falls Down: A post-mortem of Terra, and a musing on the economic rationale of similar projects

May 2022 | Nic Carter and Allen Farrington

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The authors also credit Ross Stevens for his invaluable feedback on previous drafts of this paper.

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Introduction

“Cause when it all falls down, then whatever
When it don't work out for the better
If it just ain't right, and it's time to say goodbye
When it all falls down, when it all falls down
I'll be fine.”

— Alan Walker, [All Falls Down](#), feat. Noah Cyrus and Digital Farm Animals

By now, virtually everyone reading will be familiar with the saga of Terra/Luna and its ill-fated, so-called stablecoin, UST. Many investors are looking to move on from the failure, which wiped out almost \$60b in nominal value, but the ecosystem should not do so without considerable reflection first. In many respects, Terra was deeply emblematic of the magical thinking which characterizes the crypto space, and the DeFi sector more specifically. It's worth understanding precisely why Terra failed so that the flawed mechanisms intrinsic to its design can be identified elsewhere and be exposed to the scrutiny they deserve.

Terra/Luna was an industry darling in the most recent bull market. Luna, the native token on the Terra network, surged from \$4-\$6 in the summer of 2021 to a peak of around \$116 in early April, later crashing to effectively 0, evaporating around \$40b in investor value. The “stablecoin” it supported, UST, has been abandoned, after peaking at a nominal supply of \$18b. Perhaps more importantly than pricing metrics, the Terra ecosystem, in which these digital assets natively reside, seems to have lost all credibility. The architects of Terra have instrumentalized a plan to launch Terra 2.0 and recapitalize the system, but this tepid restart has gained little traction. Ultimately, we are skeptical any novel algorithmic stablecoin can or will work. And, as we will allude to several times throughout the paper, in our eyes the problem is not so much that this *did* happen, but that it even *could have* happened.

As was explicated at length in [Only The Strong Survive](#), the present authors are of the view that blockchains are first and foremost monetary phenomena. While different projects and ecosystems seem to enable different capabilities around distributed computation, our belief is that it is the monetary foundation that will make or break such projects in the very, very long run. If anything, too much complexity in the form of applications, too early, may well be more likely to doom the project to failure via sacrificing monetary credibility and robustness than it is to spur a project to success.

This paper will proceed as follows in an attempt to trace the motivation for and construction of the Terra ecosystem: first we will describe the design of the Terra/Luna system in plain terms. Then we will give a blow-by-blow account of its collapse. Finally, we will muse on what lessons can and should be learned from this incident.

The Design

“Phil has recruited me and another guy. Now, we are getting three people each. The more people we get involved, the more people are investing, the more money we are all going to make! It’s not a pyramid scheme. It is a – it’s not even a scheme, per se.”

— *Michael Scott from The Office (season 2, episode 19), on “yield” in DeFi*

Terra is its own ‘layer 1’ blockchain, like Ethereum. The ‘native’ token (the equivalent of Ether, or “ETH” in the Ethereum system) in Terra is called Luna. Luna serves as a pseudo-equity within the system, and can be used for transactions, collateral, transaction fees, staking, and anything else you might expect of a basic network token. Additionally, Terra is distinct from other Layer 1s in that it has an embedded native stablecoin token, called UST. UST is a theoretically dollar-stable token envisioned as the primary transactional instrument on the Terra blockchain. Unlike stablecoins like USD Coin (“USDC”) UST is not fully reserved, nor backed by dollar assets. Instead, it targets a peg through a combination of reserves (consisting of Bitcoin and a smattering of other assets) and an algorithmic guarantee that holders of UST can redeem their USTs for an equivalent value of Luna, although this is limited by the size of the Luna market cap and aggregate liquidity.

The chief collateral backing of the UST coin was Luna. As a monetary policy, this is deeply troubling given Luna’s value is mostly derived from the market’s perceptions of the robustness of UST, alongside the perceived vibrancy of the Terra network. On the one hand, one could make the case that the gas token for a layer 1 smart contracting blockchain ought to increase in value with the utility of the ecosystem it supports due to pure supply and demand, and little else. On the other, if you find this worryingly recursive and self-referential, you are not alone.

In theory, holders could redeem \$1 worth of UST for \$1 worth of Luna. This (hoped-for) arbitrage mechanism would in theory keep UST in line with \$1. If UST fell below \$1, you could buy it and redeem it for \$1 worth of Luna, creating buy pressure to restore the peg. New units of Luna are created when UST is redeemed into Luna, so destroying large quantities of UST is inflationary for Luna.

Starting in Jan 2022, the Terra leadership [announced](#) a plan to acquire BTC and other cryptoassets (less correlated with Luna) in order to diversify the backing. The plan was to eventually acquire \$10b worth of Bitcoin, although the Luna Foundation only ever acquired around \$3b¹. Keep in mind this Bitcoin reserve was only equivalent to around 15% of extant USTs at peak. Even if sufficient quantities of BTC had been procured to match the UST supply, Bitcoin’s exchange rate fluctuations would have still presented an obvious asset-liability mismatch.

The justification for backing UST with Luna, alongside other cryptoassets like Bitcoin, was that only then could UST be credibly decentralized and censorship resistant. This was held up in the Luna community as a strong value proposition, especially relative to established fiat-backed stablecoins like USDC. Later, the claimed decentralization of the system would be revealed as almost entirely specious (on May 12th, the blockchain was actually [halted](#) by the validators¹), but it is worth recalling that this was a powerful part of the Terra/UST mythology. The aspiration to be the first major under-reserved, crypto-backed, and decentralized stablecoin was a common justification for why UST should exist – even if there were already very large and successful stablecoins with long track records.

At peak (March-April 2022), Luna was worth \$40b, UST was worth \$18b, with non-Luna reserves backing UST reaching \$4b. The most popular product in the Terra ecosystem was Anchor, which contained \$14b worth of deposits at peak, accounting for about 75% of UST supply. Anchor was a lending protocol built on Terra which paid a guaranteed 19.5% rate to depositors. The yield was theoretically derived from market-based borrowing activity, but in practice, was mostly derived from a subsidy provided by Terra affiliates. Anchor was by far the most popular product offered by the Terra system.

The reason that UST swelled to such a large size in the first place was because of the very high interest rate available to UST holders who deposited UST in the Anchor protocol. The Anchor “yields” were subsidized by a pool that was periodically refilled by entities associated with Terra. This subsidy was machinated to make Terra stand out relative to other yield opportunities in DeFi, inducing UST creation well above where it would have settled organically. Thanks to the subsidy, Anchor grew to become the single largest DeFi lending protocol by deposits in the entire crypto space, surpassing lending stalwarts Aave and Compound. The subsequent collapse might have been avoided or at least the damage mitigated had UST growth not been artificially incentivized via the massive Anchor subsidy.

Aside from Anchor, there was little exogenous demand to use UST, as the Terra ecosystem, while numerous in its applications, was not particularly well developed. One theory among Terra enthusiasts was that if Anchor “yields” came down, other sources of outside demand for UST could be discovered, potentially through the creation of DeFi products within the Terra ecosystem. Thus, Terra could have a soft landing as UST holders found new reasons to hold the stablecoin. But no such sources of demand materialized, and the Terra leadership had far less time than anticipated to engineer such a soft landing.

¹ And note that this is *precisely* the thesis of Section 2 of [Only The Strong Survive](#): the way blockchains *actually work*, without a credible monetary policy, they cannot hope to be decentralized in any meaningful sense. And vice versa, of sorts: if not decentralized, one wonders from where the monetary policy is coming, and if those setting it know anything about history, finance, or economics ...

The Collapse

*"Get out ... GET OUT! GET OUT OF HERE! GET THE F*** OUT OF HEEEEEEERE!"*

— *Andre Hayworth, Get Out, on "investors" in "yield" in DeFi*

In April 2022, with general financial conditions tightening, crypto markets started to sell off, including Luna in particular, eventually causing the Luna market cap to decline to below the value of all the outstanding UST. This was more symbolic than it was of immediate financial relevance, but caused concern among onlookers nevertheless. A small handful of minor de-pegging events in early May also caused jitters in the Terra community.

On May 9th, alongside a big selloff in risk and crypto markets, UST started to lose its peg. Redemptions via the Luna channel were artificially gated by the on-chain protocol, so holders seeking to exit instead mostly sold at a loss on the secondary market (such as relatively liquid UST-USDT markets on Binance, or on decentralized exchanges). This was akin to a bank run. Over the next few days, the supply of Luna inflated rapidly as caps on UST-Luna redemptions were lifted, and UST holders exited through the Luna channel. Because UST-Luna conversions were inflationary, this caused massive dilution for Luna. Luna holders, seeing the quantity of UST still exiting to make the system whole, abandoned Luna for fear of being further diluted. This made Luna ineffectual as a 'backing' for UST, and the market cap of Luna withered away to virtually nothing within days. On May 11th, a day in which Luna collapsed from \$17 to \$1, the supply of Luna [increased by 3.4x](#), as USTs were redeemed for rapidly depreciating, newly-printed Luna. The collapse of Luna in USD terms meant that more and more Luna was required to be minted per unit of UST redemptions.² Luna quickly became almost worthless as the protocol mechanically churned out more and more units in a desperate, robotic, amusingly Gresham's Law-esque attempt to shore up the UST peg. The Luna supply [increased](#) from 345 million units on May 9th to 6.5 trillion units on May 14th.

The much-touted Bitcoin reserve was not active in terms of an exit channel, and the BTC moved on-chain to an indeterminate address. It [later emerged](#) that the Luna Foundation Guard had sold around 80k BTC between May 8th and 10th for UST in a failed attempt to support the peg. After all the ballyhooing about the accumulation of Bitcoin reserves, it became a largely irrelevant afterthought, and certainly did not inhibit a collapse. Early on in

² At the time of writing, there are unconfirmed reports circulating online that what is described here was actually a coordinated attack intending to profit from a complicated pair trade. We have no insight as to the accuracy of these reports, or even their likelihood of being true. But even if they turn out to be accurate – or, for the sake of argument, the truth turns out to be *even worse* – we feel that narrative ought not to distract from the more important point: if a financial ecosystem *can* be attacked in such a sophisticated manner, then it is only a matter of time before it *will*. The real story is not that the attack happened, but that it was possible.

the de-pegging, Terra leadership mused about an additional injection of capital into the system from outside investors, but this failed to materialize.

At this point it appears unlikely that Terra will regain any meaningful credibility as an ecosystem, even as the chain is relaunched.

The collapse was swift and devastating for both retail and institutional investors with exposure to Luna, UST, Anchor, and other derivatives and affiliated projects and investments. Terra was one of the most widely-used DeFi protocols and Layer 1s, and a darling industry trade in 2021 (Luna was the middle third of the trade so popular it was given the nickname: “solunavax,” a portmanteau of Solana, Luna, and Avalanche). At peak, Luna was the fourth largest cryptoasset according to most rankings sites, and Terra had the second-largest “total value locked” of any DeFi ecosystem.³ Despite the prevailing view within the crypto industry that the ecosystem participants – high profile backers alongside numerous users and application developers – gave Terra a degree of momentum and permanence, the flawed economics of the Luna/UST pairing nevertheless doomed the system.

The scale and rapidity of the destruction, combined with how ubiquitous exposure was in the crypto industry, makes this collapse largely unprecedented. Additionally, unlike Ponzis like PlusToken, which was largely confined to Chinese retail, or Bitconnect, which was mainly owned by S.E. Asian retail, Terra was widely owned by U.S. retail and funds alike. It later emerged that the retail crypto lender Celsius had [\\$500m worth of client assets](#) tied up in Anchor. Luckily for Celsius’ depositors, the lender was able to extricate these funds before serious losses were incurred. Others weren’t so lucky. Certain start-up neobanks,⁴ advertising safe high yields to non-crypto natives, had entrusted Anchor with tens of millions of unwitting client deposits, which were virtually wiped out. Retail depositors to Anchor via UST, numbering in the hundreds of thousands worldwide, lost almost everything.

³ “Total Value Locked” (TVL) is a nonsensical industry metric, often wildly overcounted, which ostensibly tracks the value of deposits in a given protocol or crypto ecosystem. TVL is often cited as a justification for the valuation of associated assets. In the case of Luna, the significant TVL in Terra was widely assumed to grant it some underlying fundamental value. In practice, tens of billions of TVL evaporated overnight, providing no backstop for Luna.

⁴ Stablegains, a YC-backed startup, put \$42m worth of client deposits in Anchor: <https://twitter.com/FatManTerra/status/1527153694218797058>

The Lesson?

"Oh, when it all, it all falls down

And when it falls down, who you gon' call now?"

— Kanye West, [*All Falls Down*](#), feat. Syleena Johnson

The Terra fiasco yet again typifies the recklessness in this ecosystem perhaps appropriate to app development but entirely unbecoming of any purportedly serious attempt to build financial infrastructure. Furthermore, there appears to be an alarming level of economic, financial, and historic illiteracy. Or, once again, the instigators of this catastrophe were clueless on both monetary policy in general and the practical and logical implications of *their own monetary policy* specifically.

It is telling, for example, that this event can be readily interpreted as the collapse in the face value of centrally issued and unbacked fiduciary media due to imprudent capital allocation decisions on the part of the issuer. Telling, because this is exactly the risk of commercial fractional reserve banking which modern central banks were designed to prevent. Of course, we would argue that this “cure” was far worse than the disease, and so we now find ourselves in the curious situation in which many in crypto are revisiting the worst excesses imposed by reckless commercial banks, rather than proposing more credible alternatives. If blockchains are, at root, monetary innovations, it behooves us to be aware of the mechanics of the technologies and institutions on which the innovations allegedly improve.

Even “capital allocation” may be overly generous as a description of the strategy employed here. This expression presupposes that the recipient of invested capital is at least attempting to generate a real return by engaging in uncertain but hopefully productive activity. A “yield” depends on a return on capital, which in turn depends on the positive-sum game of employing this capital to meet perceived consumer needs in the real economy. Whether distributed to investors or not, yield is the generated excess *flow* created by effective management of some *stock* of economically productive assets, and made available to further grow this stock. It is the product of entrepreneurship, which is to say it depends entirely on human intuition, creativity, and initiative. It cannot, at root, rely on arbitrage. It certainly cannot rely on an “algorithm”; it must rely on human action. Calling something “yield” does not make it yield. Crypto enthusiasts keep using the word “yield” but it does not mean what they think it means.⁵

A true yield also cannot be provided by rerouting external capitalizations to those expecting a yield to be generated by the enterprise itself. Such a “rerouting” is, obviously, at best zero-sum and, in the realms of crypto and traditional finance alike are more likely negative-sum given the capitalizers will likely take a management fee. Hence the idea that a

⁵ We are rather more partial to “*levered algorithmic seigniorage*,” suggested to us in conversation by somebody who would prefer not be named.

“yield” can emerge from perpetually refinancing an unproductively employed pool of capital is patently false. It is robbing Peter to pay Paul. Amazingly, it is even dumber than a traditional Ponzi scheme⁶ because the newcomers are not being scammed to reward the scammers, but rather the scammers are rewarding the newcomers for providing the dry powder to lever the system to the point the scammers’ own equity will inevitably be wiped out. What is astonishing to the point of pitiful in this case is that everybody involved seem to *actually believe* in what they were doing.

The construction of Luna appears to have employed a host of financial misunderstandings or outright category errors. The face value of fiduciary media, if not fully backed by that which it is intended to represent, is necessary both leveraged and maturity mismatched. Furthermore, it is dependent on the success of capital allocation decisions by a centralized party. In other words, a “bank run” is always possible.

This does not invalidate the practice on its own. Bank runs are possible in traditional finance also. What would usually happen in such a circumstance is an injection of capital to shore up reserves. That is to say: to deleverage and to reduce the mismatch of maturity causing the problem in the first place. One form of capital injection, albeit on the riskier end, is for a bank to issue more of its own equity. Note, however, that all involved must understand the inherent uncertainty of this process, given the price of the equity will be a function of the market’s belief in the bank’s ability to manage its own solvency. Given this solvency depends on generating yield from real economic activity, it is, in a roundabout sense, a judgment call on the bank’s ability as a capital allocator.

We mention this because, in the case of Terra, the issuance of Luna is best understood as attempting to guarantee the value of its fiduciary media by purporting to always be open to trading in the media for newly issued equity at par.⁷ It is an interesting concept, for sure, but the idea that this could ever hope to “algorithmically hold the peg” is almost incomprehensibly silly. The price of Luna is determined by the market on the basis of judging the Terra leadership’s effectiveness at capital allocation. *It is not arbitrage!* It is fundamentally uncertain. This is not to say that it cannot work, but rather that it can neither be *guaranteed* to work. A bank that claims it literally cannot go bankrupt because it can always issue more equity will very soon discover it *can* go bankrupt because the market will take this claim as well-enough proof that the bank is utterly incompetent at capital allocation.

Given a fractional reserve bank is fundamentally highly leveraged, the redemption of liabilities in these circumstances will almost certainly exceed the absolute value of the reserve assets *and* the equity base by many multiples. “Issuing equity” is not creating new value, it is diluting the old value of existing shareholders. If a bank is having its liabilities

⁶ Bet you never thought you’d *miss* Ponzi schemes, huh?

⁷ We won’t even get into why there is any rationale for Luna to have value as we believe our critique is thorough enough without. Clearly it cannot be in order to buy UST because that is too blatantly circular even for this space. The short answer is “utility”, and the reader is directed to [Only The Strong Survive](#) for an in-depth critique of this much more involved argument.

called in at a higher value than there even is of reserves to liquidate and equity to dilute, it will collapse. This is more or less what just happened to Terra. The only difference was that the spiral of default was driven by an algorithm rather than any social process. The “capital allocation” was not the result of dumb humans but of dumb code. It was the dumbest “smart contract” of all time.

In fact, it is even worse in Terra’s case because the false belief in the sustainability (in some sense, the “realness”) of the “yield” derived from the perpetual refinancing of the fundamentally unproductive capital pool of Anchor is what attracted the immense liabilities in the first place and virtually guaranteed the system would attain a leverage ratio that could not possibly survive a bank run.

But *even worse than this*, the fact that users needed to buy Luna in order to mint UST to then deposit in Anchor, and in doing so burn Luna, meaning ever-increasing demand and stable or even decreasing supply, virtually guaranteed that Luna would pump, which in turn masked the root insolvency of the system so long as everything was going up and Anchor at least *appeared* to be working. So, in other words, the fake “yield” on Anchor drives up the demand for UST, which drives up the demand for Luna, in exactly such a way that UST outstanding increases but Luna outstanding does not. This means the ecosystem *seems* perfectly solvent so long as the price of Luna is rising because this means there will be no difficulty maintaining the UST peg. And yet, the very fact of the price of Luna rising sets into motion a series of events that necessarily ends with the exposure of dramatic insolvency.

The desire to recapitalize by moving away from this unworkable model to full reserves is equivalent to an outside capitalization from another bank or financial institution – a less risky way to inject capital in traditional finance, nowhere near as bizarre or questionable as the “promise for equity at par” scheme outlined above, and yet *still* subject to the valuation whims of the market.

And so, we come full circle, because in traditional finance, consumers are at least protected by the existence of a lender of last resort. Their fiduciary media cannot instantaneously go to zero. Instead, it is eroded over time by an economic process which arguably cannot be resisted,⁸ guarded by a political process in which they cannot become involved.

It hopefully goes without saying that Bitcoin suffers none of the aforementioned problems. It is certainly possible for a single entity to get arbitrarily levered to the price of bitcoin but it does not affect the operation of the technical ecosystem in any way whatsoever. If \$50bn of leveraged bitcoin exposure explodes, our expectation remains that the next block will be mined ten minutes after the last. This, again, is the thesis of [Only The Strong Survive](#): a blockchain’s monetary policy must be independently robust prior to any attempt to scale decentralized financial applications. Its robustness must also be a function of its operational and social decentralization. Terra was centralized for all intents and purposes

⁸ See [Enders Game](#) by Parker Lewis for the best contemporary presentation of this argument of which we are aware.

and had a batshit crazy monetary policy rooted in a profound ignorance of history, economics, and finance. Bitcoin has a robust and transparent monetary policy *because* it is sufficiently decentralized. Therefore, the authors expect we can look forward to decentralized financial applications on Bitcoin. If they take longer to build because Bitcoin is designed – and it is socially understood – such that risks to the entire ecosystem are avoided at all costs, so be it.

You cannot design your way out of financial absurdity. No amount of complexity can cheat financial physics, and, in fact, in financial services specifically, complexity is a terrible thing, to be avoided at all costs, or at least *reduced* to the greatest possible extent. Terra (and more!) is worse than unnecessary or reducible complexity: it is (or was) complexity for complexity's sake, shrouded with a mélange of impenetrable novel jargon and misused traditional jargon. Basically nobody knew what was really going on, and most of those small few who did thought it was a great idea because they didn't know any better.

Many in crypto are (re)creating problems solved by central banks, while the Bitcoin ecosystem is solving the problems created by central banks.

Nic Carter and Allen Farrington

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Appendix

The History and Motivations Behind Algorithmic Stablecoins

In order to best understand why UST subjected itself to such strictures, one must consider the history of stablecoins. First, there was Bitcoin. Bitcoin works great, but it never really caught on for payments because it is not stable in nominal fiat terms. In many jurisdictions, whenever you use Bitcoin for anything, you have to keep track of your basis and do complicated tax accounting. This is one reason the dollar is often held to be superior to other currencies, especially cryptoassets; you don't have to worry about the change in price of your dollars whenever you transact with them. With Bitcoin, you do. Thus, in a move mirroring the design of dollar-denominated, pre-Bitcoin digital cash schemes, entrepreneurs started experimenting with ways to pair convenience and fast settlement of blockchains paired with dollar stability to create a high-powered medium of exchange (MoE).

Additionally, since the inception of the industry, crypto traders and exchanges wanting to trade Bitcoin have chronically suffered from deplatforming from their financial institutions. So it became apparent that a non-bank means of settling with crypto firms and each other would be important. Enter Tether. Tether was created in 2014 by folks affiliated with BitFinex, one of the largest crypto exchanges at the time, to help deal with the banking trouble they continually suffered. Tether is simple: coins are redeemable for an equivalent amount of USD. In practice the collateral is a bit more [exotic](#) than mere dollars, but it is generally dollar adjacent. The reserves mostly consist today of treasuries and commercial paper. Just recently, Tether processed \$9b of redemptions without incident, demonstrating the relative strength of the fully convertible model.

Once the Tethers are in circulation, traders can deposit and withdraw from exchanges without touching the cumbersome (and exclusionary) banking system. But Tether settlements aren't always final. The organization behind Tether can always freeze someone's balance if they deem it necessary, and they have done so a number of times. The true 'Tether ledger' is therefore maintained off-chain by Tether itself. This is the case with virtually all fiat-backed stablecoins. USDC is equally freezable. Gradually, a view emerged in the crypto industry that dollar-denominated digital cash was worthwhile, but it ought to be done in a more censorship resistant way. So far, USDT and USDC haven't been particularly tyrannical in terms of freezing user balances, but the threat remains. Regulators could always demand more aggressive seizures.

BitUSD, an overcollateralized crypto-backed stablecoin built on the Bitshares protocol in 2014, explicitly [cited](#) the reduced risk of confiscation in its original marketing. The notion of censorship-resistance is a core objective of the Dai stablecoin, which is based on an overcollateralized, crypto-backed model. However, due to difficulties holding the peg, Dai is mostly backed by USDC today – so it inherits the seizability of its underlying collateral. And while stablecoins like Dai appear to work well enough, they are considered capital inefficient, as risk management stipulates that over a dollar of, say, Ether is necessary to create a dollar's worth of Dai.

The alleged *holy grail* of stablecoins systems is an under-collateralized model relying on crypto collateral and stabilized by automated, on-chain mechanisms. This would provide the system a truly decentralized capital base (that wouldn't be exposed to the risk of the seizure of underlying collateral), enabling the creation of a privacy-focused and highly censorship resistant token, which also tracks the dollar and hence serves as a suitable MoE with strong final settlement.

The most popular undercollateralized, crypto-backed model is known as the *seigniorage shares* model. Variations exist on the theme, but the basic tenet is that the coin is not fully convertible for any underlying collateral. Rather, a parallel equity-like asset exists alongside the coin, which provides a backstop if the peg were ever to be broken to the downside. Sometimes, holders of this pseudo-equity can benefit from the creation of new units of currency in times of high demand (hence the name 'seigniorage').

Seigniorage shares models have been coveted by crypto entrepreneurs for a long time. Mastercoin, the first ICO on top of Bitcoin, proposed a seigniorage shares stablecoin in its 2012 [whitepaper](#). Nubits was the first deployed seigniorage shares coin but failed in 2016. The team behind Basecoin/Basis raised \$130m in 2017 but never launched, citing regulatory concerns. They may have simply come to their senses regarding the likely instability of the system. Empty Set Dollar was another seigniorage shares implementation that collapsed in 2020. Later, Basis Cash was abortively launched (by certain individuals who we would later learn were [behind Terra](#)), implementing some of the ideas behind Basis. Most infamously, the Iron/Titan seigniorage shares stablecoin [failed dramatically](#) in a death spiral in 2021, wiping out about \$2b in nominal 'total value locked'. Virtually every seigniorage shares stablecoin ever launched has collapsed. Celo, which follows a hybrid asset backed /seigniorage shares model maintaining around 50% backing by external assets, boasts a market cap of ~\$100m after about a year of operation. The Frax stablecoin, another hybrid with around 90% collateral backing, boasts an outstanding supply of \$1.4b.

And this is to say nothing of currency pegs at the sovereign level which routinely collapse despite being supported by the full firepower of central banks. Suffice to say, there is ample historical evidence both in conventional monetary economics as well as in the novel terrain of crypto-finance, not to mention fairly straightforward financial theory to which we will return in the final section, to determine that unbacked, algorithmic stablecoins are unlikely to succeed. Our view is essentially that they *can* work, but the idea that they can be *guaranteed* to work (by an algorithm, no less) is incredibly foolish. It seems to be a question of time, more than anything else. They will work, and they will keep working, until suddenly they don't.

Understanding that the UST model was likely to fail required either a knowledge of central banking, an appreciation for the history of stablecoins, or a close examination of the mechanism itself. While under-reserved, algorithmic stablecoin models will surely be reconsidered after this catastrophe, it's unlikely that enthusiasm for them will abate fully. Undoubtedly, we will get the opportunity to scrutinize many such models for years to come.