

# A critique on decentralized finance from a social, political, and economic perspective

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**Abstract:** Throughout the ages, social change has largely been brought as a reaction against an establishing entity or idea. Communism, for instance, was a reaction against the industrial revolution that exacerbated the exploitative nature of capitalism. Contemporarily, we are living through perhaps one of the most critical turning points in finance that began as a reaction against the solipsistic nature of Wall Street bankers prior to the 2008 financial crisis. This new movement exists within the robust ecosystem of decentralized finance (DeFi). Throughout the past decade, innovation within DeFi has grown exponentially, such that literature on its social, political, and economic effects is yet to be well-understood. Thus, this research paper intends to deconstruct the underlying socio-economic systems surrounding DeFi in order to understand, analyze, and critique its fundamental values and assumptions. The primary philosophical concern is whether decentralized finance can be a suitable substitute to the current financial system via its notions of personal financial freedom.

**Keywords:** decentralized finance; cryptocurrencies; non-fungible tokens; decentralized autonomous organizations; regulation; economics; social issues

## 1. Introduction

Decentralized Finance (DeFi) has most arguably gained prominence throughout the last decade as a result of cryptocurrencies, in particular Bitcoin. The emergence of new technologies, such as Blockchain, and new systems of governance, such as decentralized autonomous organizations (DAO), are fundamentally a reaction against the authoritative systems within society. From the everyday media that “manufactures” our consent [1], to the Wall Street bankers that privatize gains while simultaneously socializing losses, decentralized finance attempts to derail existing solipsistic systems by shifting interaction based on mutual human trust to that of trust in mathematics and computer science, primarily through distributed ledgers [2, 3].

From Bitcoin’s meteoric soar beyond \$60,000 per coin to Nayib Bukele’s declaration of Bitcoin as a legal tender in El Salvador [4], DeFi as paradigm shift has gained significant social, economic, and political momentum. Despite the popularity, there are a myriad of issues associated with DeFi. For instance, intrinsic investors argue that most digital assets follow the greater fool theory; that is, value is derived not from the asset’s future cash flows but rather from the aspiration that a “greater fool” will be willing and able to purchase the asset at a higher price [5, 6]. Likewise, DeFi’s lack of a



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centralized intermediary not only poses a regulatory issue but also a monetary problem. The decentralized nature of DeFi systems allows actors with dishonest intentions to utilize DeFi systems to launder money and fund criminal activities [7, 8]. According to Foley *et al.*, they estimated that around 46% of Bitcoin transactions were predicated on illegal activity [9], and thus, DeFi presents itself as an effective way to bypass traditional financial protocols, such as Know Your Customer (KYC).

Although DeFi is a testament to financial innovation, endemic speculation and financial dishonesty present a significant risk to existing financial systems. This matter is well understood and regulations are settling in; however, with the fast-paced, micro-economic changes in DeFi's environment, there will inherently be insufficient literature to build an effective regulatory framework. This is further demonstrated through a paper written by Ozili, where he shows that (1) DeFi literature is very recent, beginning in 2020 per a search in Google Scholar, and (2) he argues that most studies hold a positive view about DeFi but do not analyze its challenges in-depth. Furthermore, they do not explicitly criticize the movement [7]. Additionally, according to a systematic research review conducted by Meyer *et al.*, only one paper amongst their chosen 83 collected primary data for research, and 49 of them were focused on the Ethereum blockchain [10]. With both of these papers in mind, this paper contributes to the broader DeFi literature by (1) adding to the existing literature by analyzing a novel DeFi financial innovation called NFTs, (2) utilizing primary research to analyze protocols within the DeFi space, in particular the Solana blockchain, from a micro, meso, and macro level as defined by Meyer *et al.*, and (3) analyze and present some of the current challenges in DeFi along with a critique on it. In the end, we hope this paper may serve as a considerable reference point in understanding the socio-cultural aspects of DeFi for policy-making.

The structure of this paper is as follows: Section 2 will understand, analyze, and deconstruct the liberal views surrounding cryptocurrencies and stablecoins, and further delve into the downfall of FTX as a result; Section 3 will critique modern NFT tokenomics systems and their Ponzi features (Micro and Meso level); Section 4 will evaluate the effectiveness of DAOs as a form of “decentralized regulation”; And section 5 will present the limitations of this study while offering suggestions for futures of areas of research as well as a critical discussion on DeFi's liberal ideals. Ultimately, we conclude with an optimistic view on DeFi but with some important caveats (Macro level).

## 2. Cryptocurrencies and stablecoins

### 2.1. The general nature of bitcoin and altcoins

Throughout the past decade, Bitcoin and altcoins have garnered extensive attention for their technology and its repercussions. Blockchain technology underpins these cryptocurrencies, and anarchistic libertarianist views lie within this new innovation [11]. Notions of “decentralization”, “transparency”, and “privacy” are often preached via the whitepapers of these cryptocurrencies. Furthermore, a prominent argument has been their role as “stores of value” similar to physical gold, yet gold has consistently provided returns during portfolio drawdowns while Bitcoin, the epitome of this ideal, has provided inconsistent results [12]. With the cryptocurrency market capitalization shrinking from \$2.9 trillion USD to \$836.65 billion USD (nearly two-thirds) in less than a year and as of this writing [13], its integrity as an alternative to fiat currency is brought greatly into question and the extent to which speculation plays a role in its rise and fall from a historical understanding.

In renowned historian and economist Niall Ferguson's book *The Ascent of Money* where he delves into the reasons and effects of financial innovation across history, he

observes a general pattern that leads to the rise and fall of such innovations, outlining [14]:

1. *Displacement*: Some change in economic circumstances creates new and profitable opportunities for certain companies
2. *Euphoria* or overtrading: A feedback process sets in whereby rising expected profits lead to rapid growth in share prices
3. *Mania* or bubble: The prospect of easy capital gains attracts first-time investors and swindlers eager to mulct them of their money
4. *Distress*: The insiders discern that expected profits cannot possibly justify the now exorbitant price of the shares and begin to take profits by selling
5. *Revulsion* or discredit: As share prices fall, the outsiders stampede for the exits, causing the bubble to burst altogether

Reflecting on the past decade, Bitcoin's emergence with its liberal doctrines of privacy and decentralization post-2008 financial crisis and the novel use of blockchain technology created a scene of *displacement*. This new innovation could suddenly undermine wealthy and powerful institutions that had previously capitalized on the unaware, and blockchain technology could provide a myriad of advantages through smart contracts [15]. After its potential was grasped, it subsequently *built euphoria* that attracted many investors. Institutional investors remained skeptical, but with the lack of regulations, large media exposure, and a general dissent for greedy financial institutions, retail *mania* ushered in that was very well represented by the ideas of FOMO (Fear of Missing Out), WGMI (We're All Going to Make It) and Going to the Moon (meaning the investment will pay off) [16]. The rise of cryptocurrency exchanges and DeFi that offered financial leverage exacerbated existing optimism that effectively inflated market bubbles that, when busted, led to severe market corrections (e.g., 70% - 80% for Bitcoin as of this writing). Equity markets have also shown crashes, such as the speculative dot-com bubble, but the cryptocurrency market, since its first inception in 2009, have seen four major speculative bubbles within the span of 13 years [17]. The relative frequency and severities of market booms and busts vindicated existing *distress* and *revulsion*.

Ultimately, the value of cryptocurrencies and decentralized finance are significantly based on faith - faith in "decentralization", "privacy", in blockchain technology, and its medium as a currency. Fiat currency functions in the same way, except that there is mass belief in government credit and fiat's means as an exchange for necessary goods and services [18]. Decentralized finance lacks backing and sufficient, institutional faith in crypto's use as barter. Although cryptocurrencies have provided advantageous real-life use cases (e.g., cross-border payments) and thereby have some intrinsic value, it is nonetheless clear that most of the value has largely been derived from faith and the surrounding romanticisms of decentralized finance. Many scholars have argued that the best theory for the value of bitcoin is that it rests on self-fulfilling beliefs, and that the set of beliefs that can be self-fulfilling is huge [19, 20]. Without doubt, this belief system poses significant systemic risks to society as many individuals no longer buy cryptocurrencies for its use but in hopes that there is a "greater fool" that will be willing and able to purchase the same asset at a higher price. Schilling *et al.* tested this by comparing the relationship between the use of bitcoin and its price, and showed that during equilibrium within his bitcoin pricing model, if bitcoin prices and its marginal utility of consumption were negatively correlated, then agents would hold bitcoin with an expectation of price appreciation [21]. Thus, should cryptocurrencies, and DeFi in general, be continued to be mass promoted with the same libertarian ideals that so well mask its mutual-exploitative nature, individuals and society as a whole will suffer significantly. This has been explored in the Terra UST's crash in the next section.

## 2.2. Terra UST Crash

Most recently, the crypto market witnessed a black-swan event — the death spiral of Terra Luna and TerraUSD (UST). Terra is an open-source blockchain that primarily housed two important tokens: (1) Terra Luna and (2) TerraUSD. Luna is the protocol’s native staking coin used for governance and mining while UST marketed itself as an “algorithmic stablecoin” [22]. Luna and UST had an inextricable relationship. In order to maintain UST’s peg to the US Dollar, the protocol altered the supply of UST through Luna. For example, should UST’s price level fall below the peg target, then users and arbitragers would be incentivized to send 1 UST to the system and receive \$1 USD worth of Luna. This would reduce the supply of UST and repeg the token. Likewise, should UST’s price level be greater than \$1 USD, users and arbitragers can send \$1 USD worth of Luna to the system to receive 1 UST [23]. This relationship is demonstrated in Table 1.

**Table 1.** The Terra Algorithmic Tokenomics.

|                 | (1) TerraUST is >\$1 USD                           | (2) TerraUST is <\$1 USD                             |
|-----------------|--|--|
| Effects on Luna | Reduce supply of Luna<br>Increase in price of Luna | Increase supply of Luna<br>Decrease in price of Luna |
| Effects on UST  | Increase supply of UST<br>Re-peg to \$1            | Reduce supply of UST<br>Re-peg to \$1                |

The founder of Terra, Do Kwon, perpetually marketed TerraUSD as “decentralized money” [24], and within 8 months, Terra had an overall valuation of \$60 billion USD [25]. However, on the fateful day of May 4th 2022, following extremely volatile markets, UST lost its peg, and subsequently both UST and Luna imploded. By May 13th, UST was worth 15 cents, and Luna \$0.00001 from its peak of \$116 the month prior [26, 27]. In less than a year, the ideals of “decentralized money” inflated arguably one of the biggest cryptocurrency bubbles in history, and ironically, it was the very same thing that brought its downfall from a \$60 billion USD valuation to now a forked chain without any hope.

### 2.2.1. Unsustainable yields and parallels to George Soros

Luna and UST’s crash draws stark parallels to George Soros’ short of the Great British Pound (GBP) in 1992. The British government had previously joined the European Exchange Rate Mechanism in an effort to unite European economies. Prior to the 1990s, the GBP shadowed the German Deutschmark (DEM) in hopes that the exchange rate between the DEM and the GBP would be maintained above 2.7 DEM per GBP [28]. This was largely unrealistic as Britain had a higher inflation rate relative to Germany, thereby making the GBP unattractive to investors [28]. This prompted Britain to raise interest rates to a height of 15% to attract foreign investors, but foreseeing an imminent implosion, Soros heavily shorted the GPB to ultimately profit \$1 billion himself [28, 29].

The fundamental flaws in Britain’s scheme and the unsustainability of high-interest yields can be compared to UST and Luna. Anchor Protocol is a borrowing and lending protocol within the Terra blockchain that offered up to 19.5% annual percentage yield (APY) on UST deposits [30]. This lucrative APY proved to be very successful, as a month prior to the crash, blockchain explorer DeFi Llama showed that Terra was the second-largest ecosystem behind Ethereum, with \$20 billion USD (1/3 of Terra’s market capitalization) of value locked (TVL) in DeFi, and Anchor Protocol had nearly 77% of Terra’s TVL within it [31]. A stablecoin offering a nearly 20% annual yield interest was effectively understood to be a virtually *risk-free* 20% gain. US Treasury bond yields that are known to be risk-free only offered 2-3% returns prior to the crash (Current US

Yield Curve Today [32]). This 10x return served as a prominent marketing stunt that attracted many investors to Terra's ecosystem.

However, due to extreme market volatility and an untimely algorithm, UST lost its peg for a considerable amount of time. When UST was fluctuating sideways between 90 cents and 93 cents on the 8th of May, it became apparent that a risk-reward analysis justified a significant short on Luna (as arbitrage would reduce the supply of UST but increase the supply of Luna, decreasing its price). Intuitively, the downside for a short, assuming no additional margin, depended on a successful UST repeg from \$0.93 to \$1 USD. Should UST fail to repeg due to market volatility, Terra's algorithm and uncertainties on its stablecoin would create relentless sell-side pressures that would further reinforce the aforementioned factors. Essentially, the upside on shorting Luna was significantly higher than the downside, potentially even offering a 100% return without leverage. As a simple macroeconomic analysis justified a good risk-reward payoff, retail and institutional investors began to short Luna, which was finally justified by a brief dead cat bounce from \$0.50 to \$6 to finally fall below a cent (heavily-shorter assets have a sporadic uprise in price as shorts have to repurchase the asset). The above analysis is precisely what occurred. Fear engulfed the Terra discord, forcing them to disable messages, and Terra Luna and TerraUSD, which are both currently situated at \$0.00016 and \$0.021 respectively, had to be relinquished for a new forked chain [33].

Reinforced by the ideals of "decentralization" and golden dreams of 20% APY, Terra rose to prominence with ease, and just as quickly collapsed, effectively evaporating \$40 billion dollars in combined market cap in less than a week. The Terra subreddit, a discussion forum for the Terra blockchain, was filled with gloomy thoughts of suicide [34]. Traditional financial systems, like Britain's, have effective establishments such as regulations and taxations to justify a mass belief in their monetary systems, but without an intermediary or a strong regulatory body within decentralized finance to prevent excessive optimism, the financially illiterate players could be easily taken advantage of.

### *2.3. Optimism and the FTX crash*

FTX was a cryptocurrency exchange founded in 2019 by Sam Bankman-Fried (SBF) and Gary Wang. It was a spinoff of SBF's hedge fund Alameda Research, which after FTX's inception, became the platform's main market maker, or otherwise, liquidity provider. Within the span of two years, FTX had over a million users and ranked third in terms of volume, behind exchange giants Binance and Coinbase [35]. Its valuation had risen to over \$32 billion USD in January of 2022, despite a growing concern of a bear market due to tight monetary policies by the US government [36]. Relevant stakeholders and the cryptocurrency community were very optimistic about the future of FTX, but after Terra Luna's crash in May and a series of fund misappropriation, FTX had no other choice but to declare bankruptcy on November 2022.

The initial catalyst that resulted in FTX's downfall was a report written by one cryptocurrency newsletter, CoinDesk, on November 2nd, 2022 regarding the asset holdings of Alameda Research. The article presented that within Alameda's balance sheet as of June 2022, out of the \$14.6 billion USD in assets, \$3.66 billion was in "unlocked FTT" and an additional \$2.16 billion was in "FTT collateral" [37]. FTT is FTX's native token, meaning FTX has significant control over its distribution. This meant that, effectively, more than 30% of Alameda's assets were not in highly-liquid assets such as fiat currencies but rather a centrally-owned token that its founder, SBF, had "printed" and marketed to investors. Furthermore, it argued that Alameda had \$8 billion USD in liabilities at that time, so its leverage ratio (total debt / total assets), without counting FTT, was in reality 91% as opposed to 55%, meaning that 91% of assets were funded through debt. FTT's dominant position in Alameda's balance sheet



suggested two things: (1) that Alameda was not an independent entity as argued by SBF, and (2) that Alameda may have insolvency and liquidity issues. Both of these turned out to be true.

The authors followed closely the situation as one of them had a short on FTT. The series of events was as follows: four days after the report, on November 6th, Binance decides to sell its FTT position worth over \$500 million USD [38]. This raises concerns in cryptocurrency communities. A day later, FTX declares a liquidity crisis while seeking a bailout from Binance. Binance is interested in acquiring FTX only after it conducts its due diligence [39], but after close consideration, Binance walks away from the deal. On November 11th, FTX files for chapter 11 bankruptcy. According to Reuters and a leaked balance sheet, FTX had \$1-2 billion USD of missing funds [40], and that it held \$1 billion USD of liquid assets against \$9 billion USD in liabilities [41].

The primary cause of FTX's implosion came from excessive leverage that was enabled by the intricate relationship between Alameda and FTX. In a court hearing, Alameda's CEO, Caroline Ellison, admitted that Alameda was provided "an unlimited line of credit without being required to post collateral, without having negative balances and without being subject to margin calls" [42]. By effectively having a risk-free last resort, Alameda took on more hefty bets. It had, for instance, borrowed significant amounts of money from now-defunct companies, such as Voyager Digital, to finance its venture investments, and when the market capitulation occurred, most notably through Terra Luna's downfall, these companies went bankrupt, recalling their loans to FTX. From FTX's bankruptcy filings, most of its assets were highly illiquid, which resulted in their misappropriation of customer funds to pay back those loans. There were other instances of nepotism, such as FTX executives taking out billions of loans to fund their own investments [42].

Similar to Terra Luna's crash, FTX's quick downfall elucidated how severe cryptocurrency optimism was. Without the general optimism in FTX and trust in DeFi protocols (high yields, for example), cryptocurrency valuations would not have been so high and borrowing would not have been so easy. Coupled with conflicts of interest, optimism-induced excessive leverage led to one of the biggest and quickest downfalls of a cryptocurrency entity. The current CEO of FTX, John Ray III, had previously helped Enron with its corporate restructuring after bankruptcy but had to acknowledge that "never in my career have I seen such a complete failure of corporate controls and such a complete absence of trustworthy financial information as occurred here" [43]. FTX is a prime example of how opaque the DeFi ecosystem can be and how any investor, retail and institutional, can fall prey to its ideals. This is further presented next section.

### 3. Non-Fungible tokens and ponzinomics

#### 3.1. From digital art to unregulated IPOs

Non-fungible tokens (NFTs) are unique digital representations of objects like art, collectibles, and in-game items. They are generally encoded through smart contracts in blockchains and can be traded using cryptocurrencies. The total NFT volume exceeded \$2 billion USD in the first quarter of 2021, representing a 10 times increase from the previous year, whereas in the first quarter of 2022, the NFT volume neared \$8 billion USD, a 4 times increase from 2021 [44]. With Bored Ape Yacht Club (BAYC) recently dethroning CryptoPunks as the most active project, boasting a \$1.2 billion trading volume in Q1 of 2022, and the emergence of Play-2-Earn games such as Axie Infinity, it has become increasingly clear that NFTs are trending away from being merely unique digital assets. "Roadmaps" that detail foreseeable objectives have become critical to successful NFT launches, and oftentimes these roadmaps include the idea of "NFT

Staking”. NFT staking is a new way of earning “passive income” as NFT holders can lock their NFTs in DeFi platforms to earn rewards, usually through the project’s native cryptocurrency [45]. Using Freni *et al.*’s proposed morphological token classification framework [46], NFTs have now acquired “dividend/earning potential” through native tokens and self-created, self-perpetuated tokenomics systems.

This, in turn, has created another layer of financial incentives to prospective NFT buyers and draws significant parallels to traditional frameworks of crowdfunding, such as Initial Public Offerings (IPOs) and Venture Capital (VC) investing. The comparisons and examples are aptly summarized in Table 2.

**Table 2.** Comparisons between NFT crowdfunding with VC funding and IPOs.

|   | NFT Crowdfunding                    | VC Funding                               | Public Offering                        |
|---|-------------------------------------|--|--|
| Which investment vehicles are there?    | Non-Fungible Tokens                 | Equity                                   | Equity                                 |
| What does the business generally offer? | Web 3 services and real-life goods  | Real-life goods and services             | Real-life good and services            |
| What returns are offered to investors?  | NFT appreciation and passive income | Equity appreciation                      | Equity appreciation and passive income |
| How are the returns distributed?        | Sec. market sales and native tokens | Public offerings, buy backs, <i>etc.</i> | Sec. market and dividends              |
| Examples                                | BAYC, DeGods                        | Facebook, WhatsApp                       | Saudi Aramco, AIA Group                |

In essence, many NFT projects crowdfund by selling NFTs and thereby present similar behaviors to (1) VC-funded startups and (2) companies paying dividends through equities. For example, NFT projects tend to begin with an idea that is marketed through their “roadmap”, which makes it analogous to an online pitch by a startup to gather funding. On the other hand, it also possesses traits like a publicly-traded company by providing a “passive income” through periodic “dividends”. This is explored later on in-depth. Additionally, NFT crowdfunding possesses traits like an Initial Coin-Offering where their success is determined by characteristics such as the project’s tokenomics, entrepreneurs, and signals of quality such as whitepapers [20]. The primary issue, however, is that NFT projects crowdfund in a highly unregulated environment where information on the team tends to remain hidden, tokenomics poorly constructed, and roadmaps and whitepapers short-sighted with very little intention to provide value outside of the projects’ own community. This effectively makes NFT crowdfunding “unregulated initial public offerings” with poor startup execution. As a result, the social costs have been severe as clearly shown through endemic “rug-pulls”, or otherwise NFT sales and runs, and further explored as a brief case study in the next few sections.

### 3.2. Decentralized exchanges, tokenomics, and NFT initial coin offerings

Decentralized exchanges (or DEXs) are peer-to-peer marketplaces that connect cryptocurrency buyers with sellers. The main difference between DEXs and centralized exchanges (CEXs) is the use of smart contracts that self-execute under certain conditions and record transactions on blockchains. Furthermore, DEXs are non-custodial, meaning users are strictly responsible for their private keys and behavior within the platform [47]. Within a CEX, the centralized institution is ultimately the one presiding over any trade and fund, thereby creating the famous adage of “not your keys, not your crypto”. The emergence of DEX has enabled “permissionless market creation”, meaning that anyone can create a market for a token [47], which is aptly defined as a “socio-economic dummy tool to promote the coordination of the actors in a regulated ecosystem towards the pursuit of a network objective function through a set of incentive systems” [46]. This feature has significantly advanced NFT token creation as founders can create and

market their native tokens with ease. Coupled with an unregulated form of marketing, perceived forms of “passive income”, and generally poorly-created tokenomic systems, the current NFT trend has significant similarities to Ponzi schemes, which is explored within the next two subsections.

### 3.2.1. Case study on Solana NFTs and their tokenomics

The Solana blockchain ecosystem dates back since its inception in 2017, yet the Solana NFT environment has been fairly new based on the first release of its NFT, Kreechures, on March 26 2021 [48]. Solana NFTs are seen as a friendlier alternative to Ethereum NFTs, since there are lower fees and therefore lower barrier to entries. As such, the Solana NFT ecosystem borrows many inspirations from Ethereum NFTs, such as staking and burning mechanisms. Throughout the year, many prominent projects have emerged in Solana (e.g., DeGods, Okay Bears, Degenerate Ape Academy), and NFT projects have offered a form of business or an innovative approach towards their roadmap in exchange for NFT funding. For instance, Degen Coin Flip has offered non-custodial gambling services, meaning individuals can utilize Solana to play coin flips and interaction is done through smart contracts [49]. Likewise, DeGods has offered a raffling store where individuals can utilize the native token, \$DUST, to enter raffles for Solana NFTs [50]. Ultimately, Solana NFT projects are similar to “isolated silos” where founders promise their vision and a form of payment to loyal NFT holders. This payment is then maintained through their own token and respective tokenomics, which tend to be extremely unsustainable.

It follows that, generally, NFT investors are able to receive “staking rewards” if they lock their NFTs in a smart contract, and subsequently they can either immediately utilize the obtained cryptocurrency in the project’s business or sell it for a stablecoin or Solana via DEXs. The staking rewards therefore serve as a form of periodic “dividend” that has been recorded via “passive income reports” from NFT Key-Opinion Leaders [51, 52].

Figure 1 defines the general attributes of Sol NFT tokens. Most notably, the underlying value is tied to an existing crypto-asset (e.g., USDC or Sol), to the network value, or “community”, and demonstrates “share-like” behavior through a prevalent emphasis on the NFT’s “dividend/earning potential”. This has significant implications.

Observing the Top 20 NFT projects based on annual return on investment (or ROI) in @angelodemoniotv’s spreadsheet [51], there are a few significant general features to the current NFT tokenomics trend, being:

1. Immediate or near-immediate native token distribution through NFT staking mechanisms
2. Native token liquidity provisions funded through initial NFT sales and distributed via DEXs (alternatively, there is also Initial Dex Offerings, or IDOs )
3. Addition of burning/spendability mechanisms to prevent fast liquidity pool drains
4. Should point (3) fail, then the floor price of the project plummets significantly and becomes a slow-rug or an outright rug-pull

Liquidity pool provisions (LP provisions) are initial additions of a stablecoin or cryptocurrency alongside the native token, thereby setting an initial price for the native token via supply and demand. This tactic demonstrates “share-like” behavior where holders receive token rewards funded from their NFT purchase and royalties derived from secondary-market sales (e.g., Dazed Ducks). This behavior calls into question the Howey Test, which determines whether there is an “investment contract” if there is an “investment of money in a common enterprise with a reasonable expectation of profits to be derived from the efforts of others” [53]. In the case of many current NFT projects, investors invest in these projects (common enterprise) with a strong financial incentive derived from the dividend expected to earn (reasonable expectation of profits)



| TECHNOLOGY                  |                |                       |                     | BEHAVIOUR    |               |               |              |              |              | COORDINATION     |                                  |                    |   |
|-----------------------------|----------------|-----------------------|---------------------|--------------|---------------|---------------|--------------|--------------|--------------|------------------|----------------------------------|--------------------|---|
| Chain                       | Permission     | Number of Blockchains | Representation Type | Burnability  | Expirability  | Spendability  | Fungibility  | Divisibility | Tradability  | Underlying Value | Supply Strategy                  | Incentive Enablers | Incentive Drivers                                   |
| New Chain, new code         | Permissioned   | Single Chain          | Common              | Burnable     | Expirable     | Spendable     | Fungible     | Fractional   | Tradable     | Asset-based      | Schedule-based                   | Right to work      | Get access (to content/service)                     |
| New Chain, forked code      | Permissionless | Cross Chain           | Unique              | Non-Burnable | Non-Expirable | Non-Spendable | Non-Fungible | Whole        | Non-Tradable | Network Value    | Pre-mined scheduled distribution | Right to use       | Get discount  |
| Forked Chain, forked Code   |                |                       |                     |              |               |               | Hybrid       | Singleton    | Delegable    | Share-like       | Pre-mined one-off distribution   | Right to vote      | Get revenue (increase existing business)            |
| Issued on top of a protocol |                |                       |                     |              |               |               |              |              |              |                  | Discretionary                    | Unit of account    | Get reward (new economy creation)                   |
|                             |                |                       |                     |              |               |               |              |              |              |                  | Matching demand                  | Medium of exchange | Dividend/Earning Potential (for holding or staking) |
|                             |                |                       |                     |              |               |               |              |              |              |                  |                                  | Store of value     | Appreciation potential (Speculation)                |
|                             |                |                       |                     |              |               |               |              |              |              |                  |                                  |                    | Participate in governance                           |
|                             |                |                       |                     |              |               |               |              |              |              |                  |                                  |                    | Gain reputation                                     |

Figure 1. Sol NFT token classification using Freni *et al.*'s' Token Framework

by those who purchase the NFT from the primary or secondary market (effort of others). A clearer example that provides a strong basis for the Howey Test will be explored next subsection. Nonetheless, there has been a more honest alternative route, namely IDOs, where tokens are immediately listed on decentralized exchanges and liquidity is provided based on its purchase by retail investors. This has recently been an unpopular alternative to NFT project founders, for it could fail miserably as in the case of utility NFT collection Yawww [54].

A general unsustainability of NFT tokenomics design led to a variety of mechanisms to prevent quick liquidity pool drainages. A common mechanism includes NFT “lock-up periods” where NFTs and staking rewards are “locked up” in smart contracts for a period of time (e.g., 7, 30, and 60 days). This reduces short-term, quick sales at the cost of periodic, intensive sales (e.g., see Bone for first and subsequent months in Bulldog Billionaires [55]). Likewise, there have also been more quantitative methods such as a long-term reduction in cryptocurrency distribution — that is, staking rewards are reduced every time period (e.g., see Boryoku Dragonz’ Boku). Furthermore, burning mechanisms are also popular ways to increase sustainability, but it is largely attributed to the spendability of the token, and the degree of spendability depends on the business the NFT project is conducting and its popularity (e.g., BAYC metaverse land sales [56]). Generally, the degree of spendability is far lower than the financial incentives provided. Many businesses, such as DeGods’ raffling system, offer a negative expected value to investors, and community-lead initiatives, such as clothing and merchandise, are generally unfavored. Overall, every token, irrespective of the business the NFT conducts itself in, has shown a general downtrend in price, showing how its increase in supply over time far exceeds the demand for it.

The fundamental issue to NFT projects is that they provide short-term tokenomics solutions to a long-term issue. Ultimately, NFT projects conduct themselves as businesses, and the only way to maintain sustainability is by offering goods and services that generate cash-inflows outside of the community. This has been the recent emerging trend within NFTs, where projects have begun to seek value via real services such as Web 3 gambling (e.g., DeGods), NFT doxxing and launching services (e.g., Radrugs and MonkeLabs), NFT marketplaces (e.g., Taiyrobotics), *etc.* Despite a slow shift towards more sustainable business models, these NFT projects still pose a significant risk, in particular to less financially literate audiences, due to their short-term extremely high APR. A recent real-life example is Move-2-Earn NFT project, STEPN.

### 3.2.2. Case study - STEPN and the commercialization of daily activities

STEPN is an interesting real-life application of decentralized finance. STEPN defines itself as “Web3 lifestyle app with Social-Fi and Game-Fi elements” where “users equipped with NFT Sneakers” can “walk, jog or run outdoors to earn GST” [57]. Green Satoshi Token (GST) is STEPN’s utility token where users can burn GST to upgrade their sneakers (to earn more GST) or outright exchange it for USDC or Sol via decentralized exchanges. It also has a governance token called Green Metaverse Token (GMT). The project shows stark similarities to its GameFi predecessor, Axie Infinity, with its “play to earn” mechanism analogously defined as “move to earn” and its dual-token mechanism. It is also important to note that there can only be limited GST earnings per day depending on the type of shoe and the number of shoes a player can have. Unlimited earnings are not possible via infinite-time runs.

STEPN gained significant momentum in early 2022, with user activity showing signs of exponential growth. GST had surpassed \$9 per coin and the cheapest NFT shoes were around 12 Sol (about \$960) [58]. Despite the large entry costs, a payback period and case analysis justified the risk. As an investor, one of the author recorded

his assumptions and analysis starting mid-April 2022, seen below.

| STEPN Business Venture |         |
|------------------------|---------|
| Total Shoe Costs       | \$7,938 |
| Time Frame (Months)    | 3       |
| Daily GST Earned       | 58.18   |
| Repair Costs           | 11.89   |
| Net GST                | 46.29   |

**Figure 2.** NFT Shoe Business Data

| Pessimistic Case      |          | Base Case             |          | Optimistic Case       |          |
|-----------------------|----------|-----------------------|----------|-----------------------|----------|
| Price per GST         | \$3      | Price per GST         | \$4      | Price per GST         | \$5      |
| Quarterly Income      | \$12,498 | Quarterly Income      | \$16,664 | Quarterly Income      | \$20,831 |
| ROI (Quarterly)       | 57.45%   | ROI (Quarterly)       | 109.93%  | ROI (Quarterly)       | 162.41%  |
| Payback Period (days) | 57       | Payback Period (days) | 43       | Payback Period (days) | 34       |

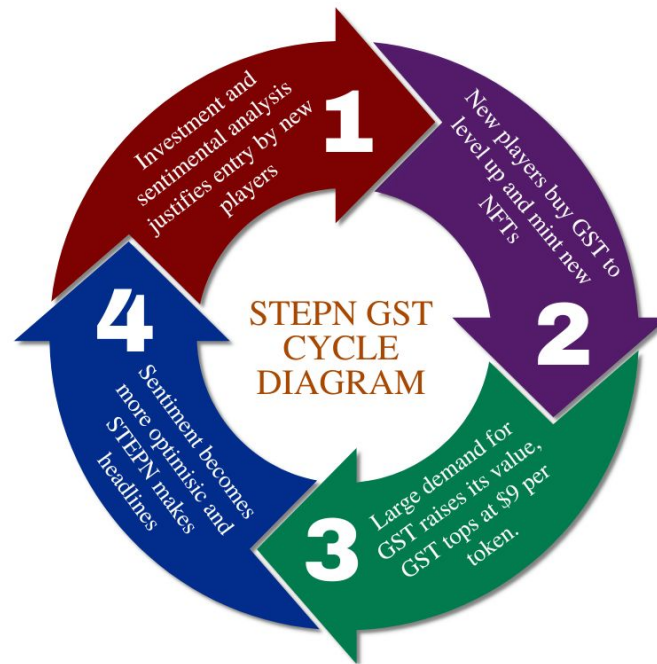
**Figure 3.** Scenario Analysis for ROI and Payback Periods

Figure 3. demonstrates how lucrative the project presented itself during the first quarter of 2022. The payback periods were between 30-60 days, and the return on investment (ROI) every quarter was net positive in every case. Naturally, there were many assumptions related to STEP N investment calculations, but the most important one was a monthly increase in active user growth. With DeFi enabling a global outreach, STEP N soon promoted its NFT shoes to the Americas, Europe, Asia, *etc.*, and thus presented exponential growth that fulfilled the aforementioned assumption [59].

Although the information outlined above is anecdotal, it sheds light on a very important aspect of the whole project — that is, if individuals are rational, then STEP N should be considered an investment, not a game nor for leisure. The ability to earn lucrative returns by doing simple 10-minute runs per day greatly presented STEP N as an investment opportunity.

As STEP N was being regarded as an “investment”, it became clear that its mechanisms posed similarities to a Ponzi scheme. A Ponzi scheme is defined as a “fraudulent investing scam which generates returns for earlier investors with money taken from later investors” [60]. The buying pressure for GST was financed by those leveling up their NFT shoes to earn more GST (and therefore tradable for more USD), whereas the selling pressure was derived by those who earn their limited GST per day and dump it immediately. Figure 4. depicts a self-perpetuating hype and investment cycle for STEP N.

Using an extreme long-run consideration, early investors who leveled up to the highest level would have no other reason but to sell their GST, whereas later investors would have to level up to make their GST-earning worthwhile. It is known that from a cost-benefit analysis that the optimal shoe levels are level 9 and level 19 respectively [61]. Those who stop in one of these two levels earn their daily income from investors who have yet to level up their shoes to the optimal level. It therefore becomes apparent that any return by an early investor is indirectly paid by the investments of a later investor, with the same desire to earn more GST by levelling up. Investors mutually exploit each other while tacitly agreeing to being taken advantage of. Although capitalizing on human greed is nothing new as all participants from all financial markets do the same,



**Figure 4.** Hype Cycle Diagram for STEPN and its GST Token

the difference, however, is that traditional dividends are paid by the sale of goods and services. Fundamentally, the earnings STEPN is providing to its users do not come from company profits but rather other shoe investors. Individual utility within STEPN is primarily monetary. No individual buys or runs with the NFT without considering the potential monetary gains from it. In less than 3 months from its all-time high of \$9 USD in late April, STEPN GST has crashed all the way until \$0.05, effectively a -99.4% downfall [58], not due to widespread regulatory crackdown but rather the reduction in daily (and monthly) active user growth [62].

Investment Ponzi schemes tend to be regional with extensive regulatory oversight - one would have needed a United States securities account to invest in Charles Ponzi's scheme. However, with the global outreach of DeFi and its severely unregulated environment, creating Ponzi schemes has never been so easy. This is the biggest issue - how is it that STEPN was able to garner so much funding from prominent VC firms like Sequoia Capital? Furthermore, how is it that any entity can suddenly commercialize simple and daily activities such as running? Concepts such as "Play-2-Earn" which was driven by Axie Infinity and "Move-2-Earn" by STEPN have mostly collapsed, effectively wiping out most investors while allowing a minority (including the team and VC firms themselves) to profit immensely. DeFi has enabled a new form of Ponzi scheme via its ease of token creation, ease of crowdfunding, and blank promises largely driven by its liberal ideals.

## 4. The influence of DAOs and "decentralized" power

### 4.1. Decentralized autonomous organizations vs centralized entities

Decentralized Autonomous Organizations (DAOs) have largely gained popularity throughout the past few years with their concept of power distribution across the network. One significant benefit is that it enables online communities to cooperate with each other on a peer-to-peer basis; that is, there is no formal board executive or CEO that decides for everyone else but rather the whole P2P network through

votes and proposals [63, 64]. On the other hand, centralized management is prone to agency problems and a lack of visibility for other stakeholders [65]. In theory, DAOs are platforms for democratic votes and discussions that should ultimately bring the most benefit to the whole community via increased visibility and greater community contribution. A theoretical net positive may not necessarily be true, however.

#### 4.1.1. Dodd-Frank parallels within DeFi

The recent cryptocurrency bear market has led to severe market capitulation. Centralized lending platforms such as Voyager Digital and Celsius Network have declared bankruptcy [66], and the founders of hedge fund 3 Arrows Capital (3AC) had gone silent after the firm's implosion [67]. The excessive optimism throughout Covid-19 led to an overleveraged financial system, posing significant risks to the whole ecosystem. With the dire consequences in mind, DeFi communities have begun to take matters in their own hands via legitimate protocol votes. In mid-June, Solana-based borrowing and lending platform Solend called for a DAO vote to liquidate a large investor's vulnerable asset, totalling \$20 million USD via over-the-counter (OTC) trades [68]. Should Solana's price drop below \$22.30 at the time of vote of \$32.27, the whale's position would be margin called and yield significant structural damage to the whole Solana ecosystem [68]. The "emergency powers" effectively prevented a short-term catastrophe through a democratic vote, but this case illustrated the inherent vulnerabilities within DeFi and the drastic solutions protocols are willing to execute should consequences arise.

Solend's action draws stark parallels to the United States' "Dodd-Frank Wall Street Reform and Consumer Protection Act" (Dodd-Frank), which emerged as a response to the financial crisis of 2008. Dodd-Frank's primary objective is to prevent institutions from becoming "too big to fail" by adding stringent rules and regulations to the US financial system [69]. For example, the Financial Stability Oversight Council and the Orderly Liquidation Authority monitor the financial stability of major financial firms as the failures of these companies would yield significant damage to the US economy (and thereby be deemed "too big to fail"). Ultimately, the law lends authority to governmental bodies to dismantle financial institutions that are considered so large as to pose systemic risk [69]. Solend's action of forcefully, yet democratically, acquiring and liquidating a wealthy participant's funds is analogous to Dodd-Frank enacting its lawful overtake of a large financial institution. Although Solend's action was deemed to be critically important and passed via protocol votes, it significantly undermines the concept of power "decentralization" that is preached extensively within DeFi. Furthermore, Solend's action sets an important precedent - that with any DAO vote, everything is permitted, including forceful takeovers of other peoples' assets should a suitable reason be provided. Undoubtedly, this has many unintended consequences, which are shown in the next subsection.

#### 4.1.2. Consequences of DAOs and potential advantages

On March 11th, 2022, a Cosmos blockchain DAO, the Juno DAO, proposed an infamous proposition called "Juno prop 16". Proposition 16 was defined as a means to "Correcting the gamed stakedrop" of a now-known Japanese wealthy investor (called a whale). Stakedrops are token allocations to wallets based on fulfilled criteria. Proposition 16 called for a community-driven, forceful takeover of the whale's Juno tokens, then amounting to \$122 million USD, on the basis of potential community-wide consequences, outlined as [70]:

- High risk to on-chain governance (already has half of quorum)



- Potential of buying validators with delegations in order to bribe them away from acting
- Whale gamer can single-handedly wipe out the entire DEX liquidity in 10 min or less (Should his funds be unbonded)
- Fear in the community on a daily basis

The DAO engaged in meaningful and intense debates on whether to revoke the whale's token, and the whale wrote lengthy articles to argue in favor of him. Ultimately, the proposition passed and the whale's tokens were confiscated by the DAO. It appeared as if democracy and the community had succeeded in fighting a potential evil and self-interested individual; however, within the subsequent month (after unstaking periods finished), Juno's price had fallen from an all-time high of \$44 to \$20 [71]. Previously, Juno was considered a rising token, with its price exceeding Atom (Cosmos native token), but the severe fear, uncertainty, and doubt that followed the proposition led to its sharp downfall. Wealthy investors began unstaking in fear of their tokens being seized while believers in decentralization found the whole matter to their distaste. The proposition did indeed redistribute power throughout the network by limiting monopolizing behavior, but, ironically, the final effects proved to be the very same thing that was feared and outlined within proposition 16.

The infamous "Juno prop 16" perfectly demonstrates an inherent core-value conflict within DeFi; that is, the core belief that if one controls their own private keys, then one must have complete control over their own assets as well, yet DAOs and DeFi providers have numerous shown that this value can be breached as long as there is adequate reason to. Overall, there is undoubtedly a "decentralization illusion" in DeFi due to the need for centralized governance during dire times [72].

## 5. Conclusions and discussions

### 5.1. *The perils of decentralized finance*

Throughout the exploration of decentralized finance from the perspective of social, political, and economic lenses, there is a myriad of perils and pitfalls within decentralized finance. There are (1) a seemingly misguided infatuation with libertarian notions, (2) unsustainable incentives that are promulgated and reinforced by DeFi mechanisms that create and market borderline Web 3 Ponzis, and (3) a tendency for centralization and socially-acceptable asset extortion during moments of stress. Cryptocurrencies are no longer merely a privacy-protecting payment method but rather vehicles for relentless speculation and extremely high leverage [73], and NFTs are no longer merely appear to be unique digital assets but rather quasi-securities offered largely by individuals who may, at any moment and with no consequences, run away with the funds. Furthermore, the emerging trend of NFTs as new businesses that can, with relative ease, commercialize daily and simple activities, will perhaps be one of the most critical issues with extreme social and economic consequences. Thus, we argue that notions of "greater equality" and "financial freedom" should be analyzed with a skeptical lens and acknowledge DeFi as an extension of the traditional financial system by offering some more significant advantages, like faster cross-border payments.

### 5.2. *Limitations and considerations*

The limitations of this study are primarily two-fold: (1) the non-geographical analysis of the implications of DeFi protocols and phenomena, and (2) the generalizability of our findings. Although this study delved into the potential social, political, and economic repercussions of DeFi in society, we did not explicitly look at any particular

geographic region. In more developed countries, investors can perhaps stomach the financial losses; however, in lesser developed countries with a more financially illiterate population, the repercussions will be more severe. Our analysis, therefore, lacks an important consideration of how different communities are affected in different degrees. Furthermore, our final limitation is that we attempted to draw general conclusions on the social, political, and economic impacts of DeFi from relatively niche cases within the ecosystem. NFTs represent a relatively small market compared to the whole ecosystem comprised of daily DEXs transactions, CEX derivatives trading, cross-border payments, *etc.* NFTs' passive income may be doing DeFi an injustice by having Ponzi traits, but other sections of DeFi are beneficial to society. Overall, given our limitations of a non-geographical analysis and a lack of generalizability, close considerations and improvements should be made should researchers expand upon this paper.

### 5.3. Suggestions for future research

This research paper delved into DeFi from a historic understanding of financial innovation to more niche categories such as NFTs and specific DAOs. Given the issues raised within this paper, from Terra Luna and FTX's collapse to NFT-enabled commercialization of daily activities, we propose the following areas for further research: (1) risks and regulations post-FTX collapse, (2) the potential implications of NFT-enabled commercialized activities, and (3) the possibilities of "decentralized regulation".

#### 5.3.1. Risks and regulations post-FTX collapse

After the collapse of FTX, Binance's overall market share rose by 7 percentage points to 55%, in stark contrast to the next best competitor, Coinbase, at nearly 10% [74]. Binance's influence may therefore present significant centralized issues or conflicts of interest, and therefore more research should be done in gauging the role and influence of centralized entities in the DeFi space post-FTX collapse. Furthermore, the downfall of Terra Luna and FTX wiped out tens of billions of dollars within a matter of days, leading to a series of contagions, such as Terra Luna to 3AC and FTX to Solana. The increased mainstream adoption of cryptocurrencies and DeFi protocols increases the interconnectedness between DeFi and traditional financial systems. This gives rise to potential negative spillovers to major financial markets and therefore to the real economy [75]. It is then imperative to set regulatory systems to (1) measure leverage, and (2) maintain a healthy level of assets by centralized institutions. After the FTX crisis, one method promoted by Changpeng Zhao is the Proof of Reserves (PoR), which is a "method that uses techniques of cryptographic verification to publicly demonstrate possession of digital assets sufficient to cover outstanding liabilities" [76]. This method still requires rigorous testing and further consideration of its limitation, and, additionally, more research should be done in creating new techniques for addressing the aforementioned concerns.

#### 5.3.2. The commercialization of daily activities

NFT popularity primarily surged throughout 2021 as a result of a significant rise in cryptocurrency market liquidity following WHO's declaration of the Covid-19 pandemic [77, 78]. However, given the relative novelty of NFTs, existing research is still moderately little compared to existing DeFi literature [79, 77]. Some scholars believe that NFTs present many favorable opportunities through digital scarcity and greater and easier entrepreneurship [77]. Furthermore, this innovative disruption has led to other scholars

believing that NFTs will grow at a rate similar to cryptocurrencies, which may constitute an even greater role in future blockchain initiatives [80].

NFTs as a form of crowdfunding for Web 2 and Web 3 businesses have certainly enabled easier entrepreneurship, but, likewise, its ease has led to the creation and proliferation of hugely unsustainable ecosystems like STEPN's. STEPN's lucrative business model and ease of marketing through DeFi's international outreach have inspired many other similar initiatives. Sleepagotchi, for example, is similar to STEPN in that it offers in-game items if the player does a simple task like sleeping. This has garnered significant interest, with a recent seed round closing \$3.5 million USD, and although it has yet to fully develop, its whitepaper already presents a roadmap similar to STEPN's (crates, in-game token, marketplace, *etc.*) [81, 82]. Potentially, as long as marketing efforts are strong, more and more "commercialized" simple activities will emerge. This may have very significant social issues that need to be further understood, in particular in areas where financial illiteracy is widespread.

### 5.3.3. The possibilities of "decentralized" regulations

Lastly, in Section 4, this paper touched upon the idea of Dodd-Frank within DeFi, and this may be a suitable avenue for much-needed regulations. The issue with current regulatory bodies is its hesitations in trying to draw parallels between DeFi applications and traditional finance vehicles (e.g., proving the Howey Test). We believe this may prove to be an ineffective approach as regulations would merely exist externally. With the recent use of DAOs to command over potentially bad entities, internal regulations could be an intriguing path to explore. For example, there could be international cooperation in setting up DeFi DAOs, and regulations would be written through smart contracts. In this way, government authorities would have influence within DeFi and have the ability to better measure its impacts and implications. Furthermore, with improvements in Regulatory Technologies (RegTech), internal modes of regulation can be more easily explored and better enforced than external regulations. Naturally, an effective DeFi-encompassing DAO authority would need greater blockchain interoperability, so this will take a considerable amount of time before this concept could materialize. Nonetheless, internal DAO regulatory bodies could serve as "decentralized" regulations, for not only would the government have the ability to contribute and educate accordingly, but individual participants would also be able to provide unique perspectives that may have otherwise eluded these regulatory bodies.

### 5.4. Optimism on DeFi's role in society

Despite the negative outlook generally provided throughout this paper, the chosen examples are merely specific cases within decentralized finance in order to critique its fundamental and emerging concepts. The benefits of decentralized finance, however, are vast. From a social perspective, for example, decentralized finance can broaden financial inclusion, lead to permission-less business and fintech innovation, eliminate intermediaries while preserving transaction and ledger integrity, lead to greater transparency and faster and more global cross-border transactions, *etc.* [7]. Furthermore, clients in developing countries with weak financial environments need to rely on costly workarounds; however, DeFi can bridge this gap by providing a more direct access to global markets [83]. Recent real-life cases, for instance, have been rapid, decentralized donations to Ukraine during the Russian-Ukraine war as well as DeFi being an alternative to domestic currencies in countries plagued by hyperinflation (e.g., Venezuela and Turkey). The current DeFi environment may have many weaknesses that are easily exploitable, but the answer to "bad DeFi" is not its abandonment but rather "good DeFi" that acknowledges its

weaknesses and social repercussions while looking for methods for improvement. As literature within DeFi is more well-understood and regulations become a pillar that does not prevent its growth but rather encourages it, DeFi will, without doubt, serve as a critical component of the future financial system.

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