

Decentralized Finance & Accounting – Implications, Considerations, and Opportunities for Development

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Abstract. The blockchain and cryptoasset sector, since coming to the attention of the mainstream business and financial markets during the bitcoin bull run of 2017, continues to accelerate and evolve rapidly. Decentralized finance (DeFi), a new iteration of what was previously referred to as open finance, has emerged as an innovative use case and service enabled by blockchain technology. As with any innovation or new tool, however, there remains a range of questions and considerations that will have to be addressed prior to wider adoption and utilization. This research attempts to contextualize the development of DeFi, frame it within the blockchain and cryptoasset sector, and explain potential obstacles and challenges to further development. Subsequent to this examination of DeFi trends, challenges, and opportunities, a potential framework for further development and implementation will be presented. Outlined and written in a manner approachable to both practitioners and academic users, this research should be used a springboard for further discussion, analysis, and progress.

Keywords: Decentralized finance, stablecoins, blockchain, accounting, financial reporting.

1. INTRODUCTION

Blockchain and cryptoassets have, and continue to, disrupt the financial services sector and how both individuals and institutions access capital and other financial

information. That said, there has emerged a trend and direction that can be viewed as somewhat paradoxical to the original intent and idea of bitcoin and cryptocurrencies. As larger institutions, including large multinational organizations and institutional investors allocate capital and personnel to the sector, this has led to a pivot to more permissioned, private, otherwise more centralized blockchain options. Accompanying these investments has been the proliferation of new applications, as well as increased scrutiny and regulatory interest (Kharif, 2020a). These developments, although necessary for increased institutional adoption and acceptance of blockchain and cryptoassets, have led to some developers to build out a new set of applications and services.

Specifically, decentralized finance (DeFi) seems to represent a return more of a loosely organized operating structure and business model as opposed to the more centralized options that have been proliferating the marketplace, and represents the potential for truly decentralized finance. What this paper attempts to do is as follows. Firstly, the research conducted within this piece will examine, analyze, and explain the mechanics of DeFi as they connect to both blockchain technology as well as current financial services. Secondly, and building on the fundamentals established in the first section of this research, certain accounting specific opportunities and challenges will be presented and documented. This section will include accounting reporting and valuation issues, as well as a how these accounting issues can impact business implementation. Lastly, and rounding out the research, a potential framework for integrating physical assets with DeFi technology will be presented.

2. DEFI CHARACTERISTICS & POTENTIAL

Decentralized finance and operations therein, although connected to blockchain and cryptoassets, are not designed like some of the permissioned options and use cases that have proliferated in the enterprise space following the initial busting of the bitcoin price bubble in 2017. Conversely, several of the core tenants of DeFi applications seem to, on the one hand, be a return and linkage back to the original idea and ideals of bitcoin itself. Specifically, DeFi protocols and projects enable lower cost, faster, and more efficient cross border payments and transactions, similar to how bitcoin was designed to facilitate remittances and other international transfers. While every DeFi project will be different, and will operate in a slightly different manner, there are several core characteristics that are common to virtually every project in the marketplace that are consistent with governance and operating

a decentralized network (Hughes & Smith, 1991). Not presented as an exhaustive nor all-inclusive listing, these common characteristics should be used to form the basis for more robust and comprehensive analysis of said projects.

Firstly, is the importance of smart contracts, both to the blockchain sector at large, as well as the importance of these applications for DeFi projects to operate and function as advertised. Put simply, and directly because there is no centralized authority or decision maker, the decentralized operations of a DeFi enterprise or project need to be governed in some way. While not a cure-all solution nor a guarantor of no additional issues, smart contracts do allow a certain level of automation to take place while also allowing some level of manual review to still occur. On the other hand, smart contracts and the increased errors that can result from increased automation mitigates against solely relying on smart contracts and automated execution (Morris, 2020). The need for audits, controls, and attestation best practices all remain open items that require resolution for the DeFi sector to move forward.

Secondly, the potential and possible upside of DeFi applications and use cases expand far beyond relatively straight forward crypto lending and crypto borrowing to more emerging concepts such as Universal Basis Income (UBI). Once considered a fringe or not terribly realistic idea or concept, the idea of UBI has more recently moved to the forefront of the macroeconomic conversation. Mentioned frequently during the 2020 U.S. Presidential Election, and potentially amplified by the economic repercussions of the COVID-19 pandemic and associated lockdown policies, the appeal and some would say necessity of such an idea raises several implementation questions. Specifically, and highlighted by the frustrations and complications that surrounded the CARES Act and distribution of economic relief payments and funds, there is indeed a requirement and need for an increased digitization of payment processes.

Rounding out the discussion on the potential and upside of DeFi applications prior to returning to more operationally focused tasks and processes, the potential impact of flash loans and increased accessibility to credit and other financial resources is difficult to overstate. Although the underpinning idea of blockchain and bitcoin in particular was how to enable greater accessibility at lower costs, DeFi may ultimately be how these aspirations become reality. Flash loans, for example, enable borrowers and lends to exchange fund and information without having to go

through the traditional comprehensive credit checking and review process. Risks obviously do exist with such an arrangement, but it would also entail the true creation of an alternative to existing loan creation and syndication processes.

Any substantive analysis of the issue must also acknowledge the reality that while several major incumbents, including global payment processors such as PayPal, Visa, and Mastercard, have begun to offer cryptocurrency options, that these are not DeFi substitutes. In addition to these efforts underway at these payment processors there is also the collaboration underway between Visa and Anchorage, the first digital asset bank to receive a U.S. federal banking charter (Roberts, 2021). From an end user perspective this may certainly seem to be the case, but these crypto options are being facilitated and managed through incumbent players. Such approaches are certainly amendable for the much larger non-expert population to understand and utilize cryptocurrencies and blockchain, but do not seem to represent true DeFi applications. Regardless of the specific initiative that is being discussed or examined, there are certain regulatory considerations that need to be part of the implementation plan.

2.1. Regulatory Issues

One item that needs to be taken into account are the regulatory issues that exist both as they connect to blockchain itself, as well as the issues that are unique to the DeFi sector. Clearly there are control and disclosure considerations that are connected to DeFi applications, and it is worth allocating some time to examine them (Bain, 2020). Especially pertinent for DeFi application are the (worthwhile) concerns that can be raised with regards to Know-Your-Customer (KYC) and Anti-Money-Laundering (AML) laws. For example, if an organization is truly operating in a decentralized manner, what are the controls and policies in place to help maintain accurate records and controls around customer data management? This has already been an issue that been raised previously as it connects to blockchain and crypto transactions, and should be revisited given the aspirations of DeFi to truly replicate the functionality and associated benefits of the current financial system.

On top of these banking regulations and issues, there are policies and considerations that need to be linked to how the organization will collateralize itself. The fiat banking system is routinely subject to so-called stress tests and other external examinations to try and maintain the integrity of the financial system. Adding to these challenges is the reality that there is the possibility that some of the individuals

involved in the DeFi sector may not be experienced with financial markets or the banking system. Events in 2021, including but not limited to the fallout surrounding the trading issues highlighted by Robinhood, illustrate the risk of regulatory misinterpretation or misunderstanding is a significant one that can cause substantial controversy in the wider marketplace.

Honing in on the specific issues that could curtail further investment and growth in the space is also focused around the idea of interoperability. The intersection of the crypto economy with the fiat economy is an issue that is worthy of additional analysis, and is one that is a factor at every decision point along the way. A common refrain among some blockchain and crypto skeptics is that there remains a bifurcation between these two sets of economies, and the potential damages that can occur should these gaps remain. In a practical sense what this results in is a cryptoasset landscape and outlook that is separated and potentially broken off from the still much larger fiat based economy. One such example of how this integration and overlap continues to expand is represented by the rapid growth in the non-fungible token (NFT) sector (Leising, 2021), which are yet another recent application and iteration of the blockchain and crypto economy.

In addition to the regulations linked to customer knowledge and identification, the importance of collateral and the ability to interoperate with that collateral is important. For example, if a DeFi organization both lends and operates in solely certain types of cryptoassets, how will this entity have the ability to work with fiat based banking institutions? Even seemingly simple issues as what accounting or book-keeping software to use can quickly become an exceedingly complicated issue when real world examples are brought to the table. Adding on to this issue is also the importance of Federal Deposit Insurance Corporation (FDIC) coverage, i.e., how are the reserves secured?

At a higher level, the host of regulatory and policy issues that can spring up with regards to DeFi can be summarized with one relatively simple statement; regulators tend to regulate third party institutions. Regardless of the organization, or service provided, regulators and policy makers tend to focus enforcement efforts on the intermediaries instead of the end users themselves. Without centralized organizations to focus enforcement efforts on, however, the entire regulatory paradigm is potentially distorted. While some proponents will certainly view this opacity as a benefit to the sector this regulatory ambiguity is certain to remain an

obstacle and headwind to broader utilization. Policy questions, however complicated as they may be, are not the only open items that remain broadly unaddressed at this time.

3. DEFI ACCOUNTING CHALLENGES

As with any blockchain or cryptoasset application there are accounting issues that exist for the sector at large, but there are also several that are specific to the DeFi sector. First is the continuing lack of consistency with regards to how cryptoassets are treated, accounted for, and reported on a global basis. Even within the same legal jurisdictions, for example the United States, different regulators often have contrasting viewpoints or perspectives with regards to how these financial instruments should be treated. Moving beyond those issues, which do not appear to be on a path to speedy resolution, there are several considerations that need to be a part of any accounting related DeFi conversation or implementation (Vincent & Wilkins, 2020). Let's take a look at a few of these factors below.

Volatility

An issue that spans crypto applications across the board is the volatility that is commonly associated with, or linked to, cryptoassets of all kinds, as well as the implications for this volatility on DeFi functionality and operations. Even a relatively simple DeFi transaction, crypto lending or borrowing, can be complicated by the price volatility of an underlying asset. Considering that many of these DeFi transactions need to be collateralized in excess of the amounts borrowed – sometimes in excess of over 150% - any change in the price of the underlying can cause these covenants to be breached. Instead of simply requiring paperwork, however, a breach of these collateralization clauses can lead to the immediate liquidation of the smart contract itself.

Debt covenants, and managing the risks associated with the potential breaching of these debt covenants are, of course, a routine part of any treasury or cash management function in an institution. The primary difference in the DeFi sector is that this is driven by the potential volatility of the underlying asset serving as collateral or otherwise equivalent basis for the loan or financing being provided. Even as DeFi applications and organization grow in scale, scope, and assets under management (AUM), this embedded potential risk is something that has seemingly flown under the radar.

Smart contracts

Secondly, and circling back to the topic of smart contracts, these semi-autonomous blockchain applications simultaneously allow organizations to operate in a decentralized manner, but also create risks. Benefits of smart contracts driving the operations of an entity or firm are that integrating smart contracts into the management of a firm allows fewer manual touch points and opportunities for delays and control breaches to occur. On the other side, however, increased automation and digitization of processes and protocols does introduce the potential for incomplete or erroneous processes simply being completed faster. In addition, there are also risks that can be introduced with regards to what specific individuals have access to, or control over, the underlying code that drives and manages the smart contracts themselves.

Forced liquidations

Additional accounting considerations include the fact that, as the value of some cryptoassets increase or decrease, this may result in the forced liquidation of certain positions or open contracts. This is not an idle or abstract concern, as this is exactly what can occur with the MakerDAO stablecoin and DeFi project. Without diving into too much technical detail or specifications of this specific project, and creation of the Dai (the native token or coin issued and governed by MakerDAO) requires 150% collateralization. This is an of itself would not be a critical failure, rather just a feature of the system, but if that ratio is breached, any contracts or other applications associated with that situation are automatically liquidated. This is yet another example as to why the stablecoin aspect of the cryptocurrency marketplace has continued to experience such an uptick in investment, growth, and interest.

Adding to these issues is the reality that many DeFi applications rely on, and operate in conjunction with, public or permissionless blockchains. From an accounting perspective it is obviously a positive development to have additional security and data integrity with a blockchain-based or blockchain-augmented accounting platform, but this does also raise several integral accounting related issues. Specifically, attempting to trace and confirm the information being documented and reported out of DeFi organizations may prove a challenge to accounting and auditing organizations. Such a mismatch and bifurcation between the accounting and reporting compared to private sector innovation is evidence by the lack of blockchain and crypto specific accounting and reporting standards. Compounding

the lack of guidance that is formally oriented toward these emerging areas is the lack of centralization in terms of how DeFi firms operate and function.

To that end, there are additional questions and considerations that need to be asked as DeFi applications become more sophisticated and more similar to incumbent fiat banking and lending options. For example, fiat deposits held at financial institutions are treated as liabilities for the institution in question, because those fiat deposits – although they are loaned out or packaged into other instruments – belong to the depositing customer. In a DeFi ecosystem, with limited or no centralization as a facet of the system, will this play out in a similar manner? Taking a bigger picture perspective, it is increasingly becoming clear that in order for DeFi applications to operate as advertised, a stable foundation is required. Prior to that discussion, however, it is important to understand what type of cryptoassets underpin many DeFi application – stablecoins.

4. STABLECOINS

To enable a robust conversation around DeFi it is integral to understand the role and potential use cases for stablecoins in this emerging conversation. Developed as an alternative to decentralized stablecoins, the purported benefits of stablecoins include, but are not limited to, the following. Many of the issues that are commonly associated with cryptocurrencies, but perhaps most pointedly the price volatility commonly linked to bitcoin and others, can be potentially offset or even resolved via the broader introduction of stablecoins (Kharif, 2019). Prior to any further discussion or conversation around the potential overlap of stablecoins for new and emerging blockchain applications such as DeFi it is important to break down and understand what exactly stablecoins are, and how they are differentiated from existing decentralized cryptocurrencies.

Perhaps most importantly is the simple fact that stablecoins are almost universally issued, managed, and governed by a single entity or a relatively small group of organizations. As opposed to examples such as bitcoin and ether, or the idea of a public blockchain at large, these cryptoassets appear to be semi-centralized or even centralized in nature. This semi-centralized operating framework does present many potential benefits, but can also open the door to potential abuse and misappropriation by various parties (Bain, 2020). Although this may lead cryptocurrency enthusiasts or some advocates to categorize these financial instruments as not “true” cryptocurrencies, the reality on the ground is far different.

Stablecoins or other asset-backed-coins have rapidly developed and grown since initial introduction during 2018, and currently have obtained a market capitalization in the tens of billions of dollars. In addition to helping reduce the volatility oftentimes linked to cryptoassets, stablecoins can also form the basis for a more authentic version of a decentralized and blockchain based financial system and platform.

Drilling deeper into this concept, there are also several different types of stablecoins that can be utilized by any number of larger DeFi initiatives, which highlights the need for consistent and objective crypto taxonomy to be a part of any cryptoasset conversation (van der Merwe, 2021). For example, there are stablecoins that are pegged or connected specifically to one fiat currency such as the U.S. dollar, which accounts for the majority of stablecoins currently in the marketplace. In addition, there is the potential for some stablecoins to be connected, pegged, or tethered to some external commodity such as gold, oil, or other external asset. There are also other options have entered into the marketplace that are stablecoins connected to other stablecoins, or have a value derived from a algorithmic formulation. In other words, these are stablecoins that are instruments or derivatives of other cryptocurrencies; this results in one cryptocurrency serving as the default reserve currency for these other instruments.

Regardless of how exactly a stablecoin is designed or is operating, the true value additive nature of any of these cryptoassets is the reduced price volatility associated with them. DeFi may have certainly originated as a potential return to the decentralized ideals of cryptocurrency, but increasingly looks dependent on more stable cryptoassets. Maintaining this price stability is the responsibility of the issuing or sponsoring organization, but will have also have an impact on the other products and services launched that are dependent on this price stability. In other words, the entire DeFi sector and proposed applications require a more stabilized cryptoasset foundation than could be provided by bitcoin or other decentralized cryptocurrencies. Of particular focus should be the need for increased stability in the cryptoasset marketplace to develop and better expand other applications such as crypto ETFs (Kharif, 2021). While not necessarily linked directly to DeFi applications and use cases, the rise of increasingly regulated and transparent applications and products will need to occur to spur further investment and sector support.

Returning to the DeFi conversation, if the connection between DeFi and stablecoins are examined at a surface level the connection can seem tenuous at best. Decentralized is, clearly, the opposite of centralized options and use cases but upon closer inspection this apparent paradox begins to diminish. One of the key issues with decentralized financial options is the fact that the entire basis for this financial system and structure is underpinned by, so far, financial instruments that are volatile in terms of price action. This is not simply an opinion, but rather has proven a key argument as to why the Securities and Exchange Commission (SEC) has yet to approve a bitcoin or other crypto exchange-traded-fund (ETF).

Linking back to an earlier point, the issue of insurance is something that needs to be transparently addressed and examined as a part of any DeFi application or use case. A core strength and oft-cited benefit of stablecoins is that these cryptoassets are underpinned and supported by some kind of external asset. Questions that are related to this, however, can include how this information is disclosed and reported to the external marketplace.

5. REPORTING AND DISCLOSURE CONSIDERATIONS

On top of the issues related to blockchain and cryptoassets, there are also several specific accounting considerations that are unique to the DeFi sector. Even with stablecoins serving as the basis for DeFi operations, there are still going to be considerations from the valuation, reporting, and disclosure perspective. Clearly, every Defi project or idea is different and will operate in a unique manner, but regardless of the specifics there are several general concepts that will have to be taken into account. Taking a closer look at some of these issues, practitioners will not only have to be able to address them from a technical perspective, but also be able to have comprehensive conversations with clients.

Kicking off the accounting conversation is the question as to how the underlying assets of a DeFi platform should be accounted and reported as going forward. For example, if the assets that are underpinning a DeFi function are then lent out as part of a crypto lending function or project, which entity is entitled to hold these assets on their books? Ripple and the associated cryptocurrency XRP demonstrate just how active regulatory and other enforcement agencies are becoming in terms of crypto and crypto reporting enforcement (Nayak, 2021). This might seem like a simple question, but is complicated by the question of custody and how to best determine and track custody. The so-called law of private keys – dictating that if an

individual or institution does not control the private keys ownership is not established – notwithstanding, the reality on the ground can be more complicated. Especially for individuals, who are used to handing over custody and control to the institutions themselves, having to actively manage private keys or other crypto specific information can seem like an unnecessary risk or obligation.

In addition to the accounting specific issues in terms of valuation, taxation, and bookkeeping issues there are also considerations that are going to need to be taken into account with regards to the reporting of this information. Specifically, and building on the blockchain reporting issues that already exist in the blockchain and crypto sector, there are specific reporting and disclosure issues linked to DeFi that should be taken into account. Not meant to be an exhaustive listing or all-inclusive compilation, these factors are going to be present with any such organization.

1. What specific information needs to be disclosed and reported in terms of how the underlying blockchain actually operates? In other words, what, if any, specifics how a DeFi operation is underpinned should be publicly reported?
2. Is there a process in place to accurately and consistently report the valuation of cryptoassets connected to the DeFi operation? Circling back to some of the baseline accounting issues that already exist with regards to cryptoassets, the timing and expectation of reporting obligations do need to be a part of the disclosure process
3. How are counterparties identified and reported? Especially given the decentralized nature of some DeFi applications, and fully acknowledging that semi-centralized or more centralized options exist, how are the changes in counterparties accounted for, disclosed, and reported out on a consistent basis?
4. Jurisdictional risk also must be built into how DeFi initiatives operate, reflecting the global nature of blockchain and cryptoasset applications. Certain major world economies, including China and India, have moved actively to limit the use of blockchain and cryptocurrencies. It would seem to be unreasonable to conclude that DeFi will be treated any differently as the sector continues to expand, develop, and grow.

5. Even something as seemingly simple and straightforward as the accounting methodology and standards that are implemented at an organization are items that will most likely have to be disclosed to the marketplace. While this might seem radical, or a unique aspect to DeFi, this is akin to how organizations have to disclose and report inventory accounting choices, depreciation options, and fair market value reporting selections.

An additional consideration that should be factored into the DeFi reporting and disclosure analysis is how the concept of triple entry accounting can be integrated into DeFi applications. Triple entry accounting has long been discussed as the potential future for accounting and auditing, with a common ledger (blockchain) serving as an additional record and backstop for all involved counterparties to verify individual records against (Ryan, 2021). For enterprise and private blockchains, the realization of triple entry accounting has not yet materialized in a significant manner. DeFi operations, particularly those that are truly decentralized in nature, provide a virtually tailor-made opportunity for triple entry accounting to add quantitative value to the blockchain and crypto ecosystem. Applications and use cases that seek to replicate financial services without a trusted third party would benefit significantly from a transparent ledger that can be monitored in real time by all network participants. In other words, the promise of triple entry accounting might be the missing piece in the DeFi sector that encourages further institutional and enterprise investment and involvement.

6. OPERATIONAL CHALLENGES

In addition to the blockchain and cryptoasset specific issues, there are also operational items that are unique to the DeFi sector and space. Specifically, and one of the major issues that has been raised to date is that many blockchain applications are not always connected to existing financial markets, external assets, or other traditional items. This continues to exist even as organizations debut and launch specific funds and other financial market projects connected to DeFi during the 2021 bull run for crypto at large (Grelfield & Hajric, 2021). Although this has begun to be addressed via the rise of tokenized assets based on tangible and physical assets, there is still another item that can potentially fly under the collective radar of financial services; the crypto dependency of the DeFi sector.

DeFi, as should be evident following the analysis conducted herein as well as other market commentary, is a blockchain and crypto native financial services

application. Being that this is the case, there are several issues that exist outside of blockchain and crypto considerations; non-crypto organizations cannot access DeFi options because the entire system is dependent on crypto being used as the collateral. Stated another way, any organization that seeks to borrow, access, or otherwise leverage the benefit of the DeFi sector will have to have access to crypto to pledge as collateral.

To some market participants this might seem like a beneficial attribute of the entire DeFi concept and sector, but upon closer inspection this is a limiting factor that could provide a substantial headwind moving forward. While it is true that the blockchain and cryptoasset sector has expanded dramatically since bitcoin was first introduced in late 2008/early 2009, it is still dwarfed by the fiat-based commercial payment system. Specifically, something that needs to be understood is that while organic solutions are indeed being developed and implemented in the marketplace, there is also reciprocating movement being delivered by incumbent institutions and regulators. These include, but are not limited to, the efforts and initiatives underway at financial institutions such as JP Morgan, Visa, PayPal, and others; these should be seen as yet another sign of blockchain and crypto maturation. That said, even though there are continuing advancements in product and service offerings, there remains a significant obstacle; the lack of cash flow linked to cryptoassets.

6.1. Decentralized Finance Cash Flow

An additional consideration that should be part of an evaluation of DeFi projects is the importance of cash flow generation as a part of the initiative. Stocks and bonds have certain cash flows associated with them, and while these can certainly vary from instrument to instrument, the underlying fact remains the same. Investors, particularly the larger institutional investors that contribute significantly to market liquidity and price discovery, expect and in some cases rely on cash flows to fulfill investment goals. To that end, to truly expand the concept of DeFi from a niche area to one more amendable to mainstream investors, these projects should also be linked to projects that – if not self-sustaining – at least generate some level of cash flow for investors.

This also raises an additional factor that will continue to exist in the DeFi sector; the bifurcation of DeFi projects into those that operate primarily internal to an organization, and those that are seeking external capital. Coins and tokens that are used inside of an organization have existed, in various forms, for almost as long as

organizations have existed. Rewards points, membership rewards, and airline miles are mainstays of the retail and consumer economy; DeFi can and already is leveraging this familiarity. Commonly referred to as utility tokens, these coins and tokens can also play a role in financial market development, especially if they are issued and connected to tangible financial assets. Shares, represented by a coin or token, can represent a share in the management of an organization, and while every individual project will operate in its own distinct manner, there are several core examples that are relevant for any discussion around coin or token classification.

True utility tokens

At the beginning of the Initial Coin Offering (ICO) bubble there was a flurry of activity and orientation for organizations seeking to have the instruments labeled as utility tokens. The SEC and other regulators, however, took an opposing view to these positions and – generally speaking – did not agree with these classifications (Bouaziz & DeWolf, 2019). Given this, the default approach by the SEC and other regulators has been to treat and regulate coin and token issuances as the equivalent as equity securities. Recent statements by SEC head Gary Gensler caused price downturn as investors considered the true cost of eliminating bitcoin and other crypto fraud (Liedtka, 2021); illustrating the potential ramifications of increased regulatory scrutiny.

Security tokens

DeFi operations may have originated as the concept attempting to replicate the products and services that are available to individuals and institutions from the fiat banking and payment system, but as with any other organization this mission may evolve and change over time. The issuance of new tokens, coins, or other instruments is a logical extension of many projects seeking to raise capital or increase the liquidity linked to said project. With these benefits, however, also arise the complications that can result from issuing or managing securities.

Tokenized assets

An emerging trend that is quickly expanding and developing in the DeFi space is the idea and concept of tokenizing physical real-world assets. What this means will vary from project to project, but the general process will include the following components. The specifics of this will be documented in more detail below, but generally are developed to allow assets holders to generate liquidity from existing

assets. Drilling down into the tokenization process, and examining some of the issues linked to tokenizing assets in general, there are several core concepts and ideas that are part of this process.

The asset in question needs to be identified correctly, and this might be a more extensive process than it might appear on the surface. To launch a DeFi operation, and to tokenize certain properties and other physical assets there needs to be a clear cut ownership structure, which can be further complicated due to legal or jurisdictional issues (Mehboob, 2020). Following the identification of the specific asset in question, there is also going to have to be a need for a conversation and strategy as to how the tokenization will function. For example, if the tokenization process is purely oriented and developed to help raise capital or other sources of financing that is one approach. An alternative approach might be to combine the capital raising process with a distribution of ownership. In either event there are going to have to be controls, processes, and workflows to ensure consistent and comparable reporting.

6.2. Legal Differentiation

The importance of identifying and distinguishing what exactly a DeFi token, coin, or other type of protocol represents has been highlighted by significant regulatory and legal action taken in the United States by the Securities and Exchange Commission (SEC) against Ripple. Summarizing the core points of the complaint filed by the SEC, the following points are especially pertinent, and illustrate the importance of clear and transparent rule making and regulatory clarity. After several years of dialogue on the issue, the SEC alleges that Ripple – the parent company of the cryptocurrency XRP – has been conducting an ongoing illegal securities offering since the initial issuance. The implications of this action, taken on what was at the time the third largest cryptocurrency by market capitalization, are significant.

Starting the conversation is the impact to the market capitalization of the cryptocurrency, which what been experiencing significant price volatility following the announcement of this action at the end of 2020. In addition, and more pertinent to the DeFi conversation, this legal action provides a clear example of the impact regulatory uncertainty can, and that the SEC is just one regulator in one nation, albeit an influential one. Establishing and clarifying which cryptocurrencies are to be treated as the equivalent to current financial instruments is imperative, including

from both a reporting and income tax perspective (Davison & Versprille, 2019). Without these guidelines, or at least frameworks moving in that direction, further investment and allocation to this sector will continue to face significant headwinds. Fortunately, the OCC pivot and action taken on these issues has seemingly provided a viable pathway forward for organizations to adopt and implement.

6.3. The Office of the Comptroller of the Currency Pivot

Some regulators in the United States, such as the Internal Revenue Service and the Securities and Exchange Commission, have seemingly issued conflicting guidance or put forward rules that do not seem conducive to continued development and expansion of the space. Contrarily, the Office of the Comptroller of the Currency (OCC) issued two updates and pronouncements – one at the end of 2020 and one at the beginning of 2021 – that seem targeted and intended to further integrate blockchain and cryptoassets into the incumbent banking and payment infrastructure. Two specific updates and pronouncements from the OCC seemed to both target specific stablecoin implications as well as the possibility for a true blockchain based or blockchain led banking and payment system. This summarization should not be viewed as an all-inclusive listing or description, but rather a starting point for further analysis and discussion.

The first update, which was issued during the second half of 2020, focused specifically on the ability of federally chartered banking institutions to hold dollar deposits that as reserves for stablecoin issuers (Pedersen, 2020). Seemingly a mundane change and update to banking deposit methodology, the implications of this clarification are significant. Prior to this, there was still quite a bit of ambiguity as to what specific services and products could be offered to stablecoin issues. It is true that blockchain and cryptoassets were initially envisioned and designed to create an alternative financial system, this also means that a large number of the conveniences and features customers and organizations rely on are not present in the blockchain space. In addition to this increased level of certainty, it also opens the door for stablecoin issuers to be able to raise larger amounts of capital on a more continuous basis.

Secondly, and perhaps more significantly from the perspective of truly creating a blockchain or cryptoasset based banking system and infrastructure was the update issued during the early portion of 2021. In essence, this second update was pertaining to the ability for banking and other financial institutions to become active

members of public blockchains. It is interesting to note that while private or other forms of permissioned blockchains have attracted significant investment and inflows during the last several years, public blockchains seem to be the basis for many DeFi operations. This more recent update allows federally chartered banks to buy, sell, and issue stablecoins, as well participate in what is referred to as independent node verification networks (INVN), the OCC terminology for permissionless blockchains (Pedersen, 2021).

Taking a step back and looking at the wider blockchain and cryptoasset ecosystem these update from the OCC can be viewed one of two ways. On the one hand these updates and clarifications open the door for wider adoption of stablecoins to be utilized as a legitimate medium of exchange and realistic alternative to the fiat based financial system. This is a valid position, and is one that has a position that has been adopted by both market participants and policy makers. On the other hand, however, there is also the potential that these regulator updates will simply lead to more centralization and control by incumbent institutions. It is too early to say how these regulatory updates will ultimately be interpreted by the marketplace, but it is something worth observing in terms of how the future of truly decentralized finance options might develop.

6.4. Fraud Considerations

Any conversation around the proliferation of DeFi and associated applications would be incomplete without a conversation around the potential for fraud and other unethical activity connected to the sector. Specifically, there are potentially worrying signs of a parallels connected to the previous ICO bubble that should be acknowledged as emerging factors in the DeFi sector. Perhaps most obviously is the correlation that can be drawn between the hype and excitement that had previously surrounded the ICO aspect of the cryptocurrency marketplace. Based in large part around the information asymmetry that still exists in the blockchain and cryptoasset sector, DeFi introduces an additional layer of decentralization to this conversation. Seemingly an obvious point to make, this also creates numerous other opportunities for fraud or other unethical activity to occur. These factors and trends are also increasing the need for comprehensive audit and assurance standards updates and modifications (Ryan, 2021). As is discussed throughout this piece, this very decentralization makes it difficult to regulators to truly develop and enforce

standards, as well as making it difficult for users and investors seek and obtain recourse.

Compounding this potential, and further complicating the conversation is that DeFi in and of itself has developed and grown in new directions. Specifically, the issuance of governance tokens constitutes a potentially dangerous parallel to previous initiatives that was undertaken by ICO projects during 2017-2018. ICO advisors, who in some cases were little more than individuals seeking to promote the coin, increase the price of said coin, and benefit economically from those increases in price, seem to have been superseded by the issuance of governance tokens. Clearly there are economic reasons and logic behind incentivizing advisors and other individuals associated with projects, but care must always be taken to help ensure and offset against misaligned incentives (Quddus, 2020). Following in the aftermath of the ICO bubble bursting during the time period of 2017 and 2018 there have been quite a few enforcement actions against these initial coin issuers and associated parties.

Drilling down to some of the specific cases of fraud that have been connected to the DeFi sector during the 2020-2021 timeframe adds additional context to this conversation as well as illustrating the economic significance of these cases. Starting off this analysis are the findings from crypto intelligence company, CipherTrace, where hundreds of millions in DeFi specific losses were cited, even as crypto fraud overall declined on a year-over-year basis (Chavez-dreyfuss, 2021). Additional data provided by research firm CrossTower indicated that DeFi hacks and other losses had exceeded \$300 million by April 2021. In May of 2021, Rari Capital suffered a loss of \$10 million due to the exploitation of a weakness in smart contract to reroute and abscond with said funds (McIntosh, 2021). An additional hack at the DeFi exchange EasyPay resulted in \$60 million being stolen due to a breach in the underlying software of the platform itself.

A higher profile example of the potential risks associated with DeFi emerged with the losses at SushiSwap, which seemed to combine an alleged exit scam with other fraudulent activity, as the founder of the platform cashed out and collected nearly \$14 million (Kharif, 2020b). Following outcry from the developer and crypto community, however, the vast majority of funds were returned; the fact that such an event can occur is indicative of the susceptibility of the space to potential unethical actors. These events were followed by the losses at DODO, a

decentralized exchange offering an array of DeFi tokens and services to customers and investors, which suffered a nearly \$4 million loss due to fraudulent activities in March 2021 (Crawley, 2021). Interestingly enough, there are also DeFi organizations that have built DeFi specific solutions to combat fraud and other criminally caused losses in the space; the Samecoin protocol has been developed and marketed as a DeFi option that is transparent, understandable, and accessible (NewsBTC, 2021).

Especially with the growing demand and interest in DeFi applications there are certainly going to be opportunities for unethical and fraudulent activities, as well as operations that end up violating regulations or other compliance issues. On top of the fraud considerations there are also the many open items and unresolved issues connected to income taxes and taxable income derived from blockchain and crypto activities (Semanski, 2018). For example, if there is a DeFi operation that truly is decentralized in nature, this can result in numerous jurisdictional issuers, language and cultural barriers, as well as fragility in terms of connectivity and enforceability. Such an open model, of which DeFi is based on, is certainly appealing to some market participants, but as outlined below there have already been numerous instances where this lack of centralization can prove to be a hinderance to growth and adoption.

7. POTENTIAL FRAMEWORK FOR IMPLEMENTATION

To achieve broader and wider mainstream adoption it is necessary to develop and achieve more institutional usage it seems apparent that the development of a framework for implementation will be necessary. Constructing this bridge between different classes and types of financial systems is going to also require, potentially, the creation of new assets and asset reporting methodology. This also raises the following question; what existing assets, if any, are an appropriate or well considered fit for DeFi adoption and implementation? Taking a look at the expectations of coin and token holders, as well as some of the fundamental characteristics of DeFi at large, there are several asset categories and characteristics that seem to make the most sense.

Assets to serve as the basis for a DeFi based financial system should, before any other considerations are taken into account, be relatively stable in value and not experience large price swings and volatility. That is not to say that these assets must hold prices steady for an indefinite period; that is impossible. Rather, that would

seem to point to assets such as real estate, infrastructure related assets, or intangible assets relatively static in market valuation. Additional assets that might seem to make sense are stablecoins that actually are stable in value, or some forms of intangible assets that are either relatively static in value, or only subject to periodic examinations.

Examples of non-crypto assets that might be a good platform to run DeFi options on top of include, but are not limited to, the following. Clearly real estate buildings and property have taken a leading position in the DeFi and tokenization sector, but that is not the only asset class that is eligible or potentially applicable for DeFi application. Other assets that might, in fact, be applicable for adoption by DeFi sectors are related to intellectual property. Especially in the context of streaming becoming a commonplace part of the global economy, there is a unique opportunity for DeFi based applications to be utilized going forward

In order for DeFi applications and the underlying assets become a larger part of the economic conversation, it is also going to be necessary for the fundamental business and use cases to be transparent and understandable. To that end, and linking back to an earlier point, the assets themselves are going to need to be at least partially self-sustaining in order for this relatively new business model to operate as advertised. In terms of the assets, however, there is also going to need to be a conversation and evaluation around how these assets are safeguarded. Clearly there are blockchain and crypto specific risks and control issues that need to be taken into account, but even simply for the underlying asset itself, there are going to be additional items that will need to be reported and accounted for a DeFi project.

Specifically, if the underlying asset in question is owned or controlled in some sort of collective manner, i.e., not controlled by a single individual or small number of organizations, what control procedures are in place? Since a DeFi project of this kind would, in essence, rely on the underlying asset for a significant amount of associated value, ensuring that these assets are secured and controlled should be a priority. Control considerations and issues are even more important if there is any splitting up of ownership as a result of the DeFi operations; how is this fractional ownership or control updated to reflect changes that will invariably arise over time?

Business and organizations evolve over time, and it is critical that the underlying code or programmable language underpinning the DeFi application itself is both robust enough to ensure security, but also flexible enough to reflect changing

business conditions. Linking back to the conversation around the applicability of certain assets, are there processes in place to reflect changes in ownership, control, or other provenance issues? This might seem like a relatively straight forward consideration, but can be more complex than might otherwise be expected due to the fundamental nature of DeFi operations. Specifically, as governance tokens begin to enter the conversation in a more high profile manner, it is critical to help ensure that the governance relationships are clear and able to be transferred even in the underlying asset changes ownership.

7.1. Policy Considerations

After analyzing the current state of the DeFi landscape, as well as the economic factors that are driving this sector forward leads to the following question; what are some of steps that can be implemented to help improve the potential success of such a concept? Specifically, is there a framework or policy program that would be able to be developed that could bring together the crypto economy and the fiat economy? While it is too early to state definitively how this merging will ultimately play out, there do appear to be several considerations that should form the basis for any such framework.

Kicking off this conversation is the importance for selecting and establishing an appropriate asset or asset class to form the underpinning of a DeFi initiative or widespread adoption. Stated previously during this research, and taking into account the embedded uncertainty when it comes to blockchain or cryptoasset accounting, this is not a consideration that can be overstated. Following this selection, an additional factor that needs to play a primary role in this conversation is how specific different DeFi options should be structured and reported. For example, and similar to how trading, lending, and derivative markets operate in different manners, both in terms of operations as well as reporting, it makes sense that different projects should be accounted for differently.

Additionally, and something that can be overlooked in the midst of operational and technical challenges, is the policy perspective. Although the original idea of bitcoin might have been to disrupt or disintermediate the financial system or banking platform, the actuality of DeFi banking will require greater integration and collaboration between incumbents and new entrants to the marketplace. To actualize this desire into reality, however, this is going to require a greater and more

continuous dialogue between regulators, incumbent players, and the new DeFi entrants.

A specific approach that can be taken is the implementation and proliferation of sandbox environments. Sandboxes allow for the experimentation and development of innovative and non-conventional ways of doing business without having to remain in full compliance with a full suit of regulatory obligations. There are certainly reasons why these rules and guidelines exist, but it is unreasonable to expect that start-up organizations will be able to contend with them equally as well as long-established incumbent entities.

8. CONCLUSIONS

Clearly it is far too early to attempt to forecast the directions in which DeFi will evolve, either from an operational perspective or taking into account the accounting and auditing considerations. That said, there are several items that should be incorporated into future analyses and discussions around intersection of blockchain applications and the accounting implications of said applications. Firstly, and something that should be relatively straight forward, is the importance that should be placed on policy and potentially even legislation in this sector. Especially as institutional funds and actors become more actively engaged it is entirely reasonable to expect clear, consistent, and logical policies through which asset allocation can be conducted. Secondly, but connected to that point, are the numerous accounting questions that need to be addressed to enable further development of the cryptoasset ecosystem at large. As of this research there is no crypto-specific accounting guidance that has been issued by any globally recognized accounting standard setting body. A final area of research that should be explored further is the impact of DeFi (among other blockchain use cases) on how audits and other attestation engagements will be constructed and managed. Integrating more decentralization into how an entity operates and performs functions will invariably change tasks, workflows, and other processes; the audit profession must be able to evolve and keep pace.

DeFi and the entire ecosystem of blockchain based applications are clearly an emerging and fast growing aspect of the wider crypto economy. In order for this innovative use case to achieve wider and more mainstream adoption, however, there are several considerations that need to be examined in more depth as well as potentially resolved. Be it the operational challenges that will invariably arise as a

result of new technology applications, the regulatory landscape that continues to be ambiguous, or the continuing accounting and taxation standards that need to be updated there are certainly still many potential roadblocks to full implementation and adoption of DeFi by market participants. This research and analysis should not be viewed as an all-encompassing or solely authoritative guide to these issues. Rather, this research and the findings presented herein should be used as a starting point for more robust and rigorous debate.

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