Demystifying Decentralized Finance:
Understanding Promises and Pitfalls

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Introduction

For decades, traditional financial institutions in Canada, including banks, credit unions, and investment firms, have played a pivotal role as trusted intermediaries, facilitating transactions and generating revenue in a centralized way. While the centralized financial system is essential to provide intermediation services to the real economy, it may also be exclusive and impose high costs on users. For instance, credit card companies charge processing fees in the range 2%-4.35% of the transaction value; commercial banks often impose high service charges[3] and interest rates on loans, but pay very low interest rates on customer deposits. In addition, the cost of funding can be prohibitive for small borrowers who may not be able to access loans or mortgages and be forced to rely on credit cards which charge high interest rates. Furthermore, access to financial services, including the most basic payment services, is not always guaranteed. For instance, as of March 2022, 15%, or close to five million Canadians, are underbanked, and 3% are completely unbanked. The situation is even worse in underdeveloped countries where a significant fraction of the population is unbanked.

Some of the concerns presented by centralized financial platforms may be mitigated by the advent of distributed ledger technologies. Such technologies enable the transition to a decentralized trading environment, also known as *Decentralized Finance* (*DeFi*). We argue that Canadian financial institutions should take this disintermediation threat into account, potentially re-evaluate their existing business models, and explore novel avenues for delivering enhanced value to their customers.

DeFi Infrastructure

By eliminating the need for centralized intermediaries, DeFi empowers users to engage in a wide array of services such as exchanges, lending, derivatives trading, and insurance. At the core of this transformative landscape lies Ethereum (see [1]), a decentralized platform that made it all possible through the innovation implementation of smart contracts.

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[3] For instance, Canadians have been known to be among the highest spenders on banking fees in the world – between $185 and $200 per year, on average. See https://moneygenius.ca/blog/bank-fees

Smart contracts are digital contracts which are self-enforcing through automated execution. They can be programmed to guarantee locked in collateral for withdrawal of funds, or to make a payment to a digital address only if certain contingencies are met. Examples of smart contracts include automated market makers for decentralized exchanges (see [2]), and decentralized lending and borrowing protocols.[4]

Smart contracts offer two primary advantages. Firstly, their execution is based strictly on predefined programming, eliminating the risk of ambiguous interpretations. Secondly, smart contracts not only enhance operational efficiency, but they also provide an opportunity to circumvent human intervention entirely. This strategy serves to obviate contract misinterpretations and prejudiced decision-making.

DeFi versus Traditional Finance

To illustrate the transformative potential of DeFi over traditional financial intermediation, we turn our attention to the realm of borrowing and lending services. DeFi loans are overcollateralized because of pseudo-anonymous nature of the blockchain, which makes it difficult to assess the creditworthiness of borrowers. The over-collateralization can lead to severe downward price pressures on cryptocurrencies if collateral is liquidated during periods of stress, as demonstrated during events such as the Black Thursday.[5]

Transparency, Guaranteed Enforcement, Lower Execution Cost. Despite the risks, decentralized lending offers benefits over traditional centralized lending, including transparency, guaranteed enforcement, and lower execution costs. First, the rules which specify lending and borrowing terms are hard-coded in the smart contract and fully auditable. These rules, including the condition for loan origination (e.g., maximum collateralization rate), the algorithm for setting interest rates, and the trigger for collateral liquidation, are automatically enforced by smart contracts. Moreover, assets deposited in the lending pool, originated loans, and received interest payments are publicly observable in real-time. This unprecedented level of transparency has the potential to reduce monitoring costs, because it eliminates the need of human supervision and thus simplifies regulations.

Flash Loans. Decentralized lending platforms also enable a set of services such as flash loans, which would not be possible to offer on traditional centralized lending platforms. Flash loans are a type of unsecured lending that imposes no borrowing limits, enabling users to borrow and repay funds within the same transaction. In practice, a user specifies a sequence of instructions—akin to placing an order—that includes borrowing, utilizing, and returning the funds, all encapsulated within a single atomic procedure. Leveraging blockchain technology, this procedure can culminate

[4] We refer to https://phemex.com/academy/aave-defi for additional details.

[5] If many loans default at the same time (such as during a market crash or similar stressful event), a large amount of cryptocurrency (used as collateral) may be liquidated at once. This sudden increase in supply can outstrip demand, leading to a rapid decrease in price.

in two potential outcomes: it either executes to completion successfully, or, if the loan is not repaid within the same procedure, the entire process is considered to be failed.

This service provides potentially infinite leverage to users, and has been used to fund arbitrage strategies that improve market efficiency (i.e., consistency of prices across different markets and exchange platforms).

Can DeFi democratize financial inclusion?

Digital assets on blockchain are tokenized, i.e., ownership rights of an asset are represented as digital tokens. A token is a digital certificate of ownership for an asset (physical or digital). When you hold tokens, you hold a digital proof of your ownership in that asset. These tokens can be transferred, traded, or sold, enabling the secure and facile management of the underlying asset on the blockchain. To put it simply, a token stands to a digital asset what a share represents in the context of a corporation. Asset tokenization has the potential to enhance accessibility in DeFi.

A prominent example is the pilot project launched by Ejara, the first and most established decentralized investment and savings platform in Francophone Africa, to overcome barriers to access of the banking system in Cameroon (see [3]). In Cameroon, users must pay management fees or entry fees between $10,000 and $50,000, and in some banks with poor digital service, clients need to pay to consult their savings accounts. This limits access to financial services for the mass market consisting of smallholder farmers and marginalized rural populations. Ejara offers fractionalized government bonds in the form of savings plans, i.e., it tokenizes government bonds after purchasing government bonds from the Bank of Central African States so that the mass market can afford purchasing them. Such bonds are available for purchase in 1,000 CFA denominations ($1.53 USD) and have maturities ranging from 26 weeks to several years, with higher yields charged for higher maturities. Each token represents a 1,000 CFA portion of a government bond, enabling fractional ownership and making these financial instruments more accessible to a wider range of investors. Each bond has its own smart contract which is stored and maintained on the Ejara's blockchain. Hence, the system created by Ejara allows the mass to enter the market at low price points, and additionally eliminates entry or management fees because all processes are automated through the smart-contract DeFi blockchain.

DeFi governance

Governance systems within DeFi have the potential to substantially enhance traditional financial systems, particularly in areas such as voting procedures and ownership tracking. Nonetheless, they also introduce complications, especially concerning the alignment of stakeholder interests and the possibility of inadvertent centralization.

Voting. Canadian investors typically hold their stocks through brokerage accounts. Brokers are responsible for tracking ownership and interests, delivering voting material, collecting voting

decisions, and casting votes on behalf of their clients. This complex process often leads to technical glitches, such as over-voting, where a broker casts more votes than it or its clients are allowed to. The transparency of ownership tracking in blockchain and the automation provided by smart contracts can solve these imperfections. All users share the same distributed ledger, and the transaction flow history is transparently observed on the blockchain, enabling real-time tracking of voting power. Users who have voting power can directly submit their votes, without intermediaries, which eliminates technical problems due to delayed recording or information transmission, as well as inaccurate recording. The streamlined voting procedure is entirely automated on DeFi, which saves the operational costs that exist in proxy voting.

DeFi governance also allows to implement sophisticated voting structures at reduced costs. In the traditional financial system, a company's board can issue different types of shares to attribute voting rights, such as ordinary shares with one vote per share and executive shares with 100 votes per share. However, these structures are expensive to implement and maintain, mostly because of the high auditing and compliance costs. Governance tokens can be programmed to make voting rights a pre-specified function of token holdings, and smart contracts would automatically enforce the voting rules, thus eliminating the need of costly legal and administrative fees.

Conflict of interest. As for traditional corporate governance, DeFi governance suffers from the misalignment of interests among governance token holders as they might also occupy other roles with conflicting interests. Governance tokens give holders the right to vote on proposals concerning changes to the protocol or platform they are associated with. Governors of decentralized lending platforms, for example, may also be providers of funds to the pool, and thus want to extract high interest. This creates an incentive for them to vote on proposals that set interest rates way too high to benefit the whole ecosystem. Governors who are part of the development team may want to pass proposals that do not bring new talent to the operating team, so that they can remain on board even with a reduced skill set.

Concentration of power. Despite the original intention of creating a transparent decentralized governance process, many DeFi projects have evolved towards an oligopolistic structure where a few accounts hold the vast majority of tokens. This centralization may lead to collusion, manipulation, and embezzlement by insiders. Smart contracts provide a powerful tool for mitigating centralization risks in DeFi governance. One approach is to design voting structures that curb the influence of large token holders. For example, one might conceive a voting structure where the marginal voting power of a token holder decreases as the number of his tokens increase. A second approach is to reward long-term token holders to deter strategic behavior where users acquire governance tokens solely for the purpose of influencing specific proposals.

Future Outlook

As the DeFi space continues to grow and evolve, there are still challenges to address. Nonetheless, the vision of a more accessible and effective financial framework propels the field forward. Scholars, developers, and DeFi actors are tirelessly architecting inventive methods to surmount

these challenges, thereby bolstering the resilience, inclusivity, and efficacy of the decentralized finance domain.

In the broader context, the lessons learned from these endeavors will not only shape the future of DeFi, but also have the potential to influence traditional financial systems. The progression and refinement of these tools and methodologies may provide valuable insights to tackle analogous issues within centralized finance, potentially fostering the emergence of more robust, inclusive, and efficient financial ecosystems on the whole.

References

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