Christopher J Waller: Centralized and decentralized finance - substitutes or complements?

Speech by Mr Christopher J Waller, Member of the Board of Governors of the Federal Reserve System, at the Vienna Macroeconomics Workshop, organised by the Institute of Advanced Studies, Vienna, Austria, 18 October 2024.

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Thank you for inviting me to speak today.[1] I have participated in this conference for nearly 20 years and have often presented my research on monetary theory, banking, and payments. So, I believe this is the right audience to speak to regarding the role of centralized finance and the emergence of decentralized finance, or defi for short. Over the past few years, there has been a lot of attention and work on defi, which will be a major focus of my remarks. Many argue that defi will replace traditional centralized finance while others argue that it merely extends traditional finance methods and trading activities onto new platforms. It is in this sense that I want to address the question of whether centralized finance and defi are substitutes or complements to each other.

Advances associated with defi have the potential to profoundly affect financial market trading. While I believe these advances could lead to efficiency gains, I recognize the significant value that has been delivered for centuries by financial intermediaries and through centralized financial markets. Before I share my views on the promise of these new technologies, let me tell you where I'm coming from on these issues.

I am an economist, and so my first inclination is to think about the underlying economics driving an issue. But to understand the value proposition of defi, it is useful to first recall why *centralized* financial market trading arose in the first place. Centralized finance clearly provides benefits to people, but obviously also comes with some costs. I am going to take a few minutes to discuss those benefits and costs before turning to the question at hand.

Let's start with the economics of trading. Most financial trades are "pairwise" in that the seller of an object needs to find a buyer of that exact object. The problem is that it is often complicated, costly, and time-consuming to search for a buyer. This gives rise to the need for someone to step in and help buyers and sellers match in a faster and less costly manner. In short, there is a profit opportunity for someone to intermediate the trade.

Another name for intermediaries is middlemen. Why would we pay a middleman? In their paper from nearly 40 years ago, Ariel Rubenstein and Asher Wolinsky described it eloquently: "What makes the middlemen's activity possible is the time-consuming nature of the trade, which enables middlemen to extract surplus in return for shortening the time period that sellers and buyers have to wait for a transaction."[2]

Let me contextualize the value of middlemen with an example I used for years when teaching money and banking. Suppose you had some extra income from saving and wanted to lend it out to earn interest. How would you do that? First, you would have to

advertise that you had funds to lend. Then, you would have to wait for the right person who needed that exact amount of funds, which could be a long time. Once you met the right person, you would have to negotiate when repayment would occur. Next, you would need to know a lot of information about the person receiving your funds and the likelihood you would get repaid. This is needed to assess the risk of the transaction and the compensation you would need to give up your funds. You would also need a lot of legal advice to draw up a contract and stipulate how the contract would be enforced under a range of conditions. Finally, since you are the sole source of funding, you will bear the entire cost of a default. It should be clear that this would be a daunting exercise for most people and explains why they would turn to a middleman who specializes in this type of activity to do all this on their behalf.

It is for these reasons that banks arose as early as in ancient Mesopotamia to carry out some of these functions.[3] Similar issues arise when it comes to other ways of transferring resources from one person to another, as occurs from non-bank debt, equities and insurance contracts. Many point to trades of shares in the Dutch East India Trading Company in Amsterdam in the 1660s as the origins of the first modern stock exchange. Lloyds of London was founded as a means of pooling funds to share risk and return in the shipping industry, thus becoming the first insurance firm. The fact that similar arrangements still exist centuries later is a testament to the value of intermediation and centralized financial trading.

However, these arrangements are not without drawbacks. An obvious drawback of intermediation from the perspective of those wishing to trade is that those middlemen must get paid. That is, there are transaction costs. Another drawback of intermediation is that you typically must turn over control of your assets, such as savings or stocks, to the intermediary for them to be traded. This creates a classic "principal-agent" problem whereby incentives between the principal-you-and the agent-the intermediary-may not be aligned. That can raise concerns about custody arrangements and recourse to regain control of one's assets. Intermediation also requires recordkeeping arrangements that customers can trust accurately reflect their true holdings. In other words, centralized finance requires a substantial amount of trust. With all that in mind, let me turn to how and why technological innovations have given rise to defi.

In a capitalist system, the existence of profits provides incentives for others to enter the market, offer a better product, and compete away any excess profits. This can be done by the creation of new financial firms that can provide the same or better service at a lower cost. Often that occurs through innovations and exploiting new technologies. Think about how the invention of the telegraph and the telephone revolutionized trading. More recently, the advent of the internet further advanced the ease and speed of financial trading. These are examples of how financial trading has evolved over time. And the next wave of innovations in financial market trading could be driven by technological advances that alleviate some potential drawbacks of the centralized approach.

Often broad technological advances emanate from narrower efforts to design products or processes that solve specific problems. For example, one technology used to support portable home appliances like vacuum cleaners was originally developed to support the space program.[4] Similarly, the development of crypto-assets led to the development of technologies that are fueling possibilities in defi.

We don't have enough time for me to cover the full history of crypto-assets, but I will focus on several key elements that have affected the evolution toward defi. An early crypto-asset-Bitcoin-was developed to function in a world in which trust among individuals did not exist. Rather than relying on intermediaries which require trust, Bitcoin relied on technology to facilitate trade. Bitcoin was also designed for privacy. No one would know who was buying or selling Bitcoin. This was achieved through cryptographic technology and private keys. In addition, it allowed individuals to maintain control of their crypto-assets throughout the entire trading process. That is, they no longer had to delegate control to others. Finally, all records were kept on a form of distributed ledger called a blockchain, which has design features that promote transparency and are censorship-proof. No individual or government could destroy the records of trades or take ownership of the objects traded.

With that history in mind and before we delve into the question of whether defi and centralized finance are substitutes or complements, I think it is useful to carefully define some terms. This will make sure we're all talking about the same things. As I described in a speech last year, I think of the crypto ecosystem as consisting of three parts:

- a crypto-asset, which generally refers to any digital object traded using cryptographic techniques;
- technology that directly facilitates trading crypto-assets; this includes smart contracts and tokenization;[5] and
- a database management protocol used to record trades and ownership of assets, commonly referred to as the blockchain, which includes both permissioned and permissionless distributed ledger technologies.

It is easy to see how the emergence of these technologies could lead one to think of defi as a *substitute* for centralized finance. For example, the technologies are allowing for individuals to trade assets without giving up control of those assets to an intermediary-a critical distinction with centralized finance.

However, there are other uses emerging from these technologies that look more like *complements* to centralized finance. For example, distributed ledger technology, or DLT, may be an efficient and faster way to do recordkeeping in a 24/7 trading world. We already see several financial institutions experimenting with DLT for traditional repo trading that occurs 24/7. But before these ledgers can be used to facilitate transactions in traditional assets-like debt, equity, and real estate-these assets must be tokenized. Undertaking the process to tokenize assets and use distributed ledgers like blockchain can speed up transfers of assets and take advantage of another innovation: smart contracts.

Rather than relying on each party to separately carry out the transaction, smart contracts can effectively combine multiple legs of a transaction into a single unified act executed by a smart contract. This can provide value as it can mitigate risks associated with settlement and counterparty risks by ensuring the buyer will not pay if the seller does not deliver. While these efforts are still in early stages, the functionality could expand to a broad set of financial activities. The bottom line is that things like DLT,

tokenization, and smart contracts are just technologies for trading that can be used in defi or also to improve efficiency in centralized finance. That is why I see them as complements.

Stablecoins are another important innovation in defi. Stablecoins were created in the crypto universe in hopes of providing a "safe" asset with a stable value for trading. Nearly all stablecoins are pegged to the U.S. dollar one-for-one. They provide an opportunity for buyers and sellers to transact in a decentralized fashion with the stablecoin used as the settlement instrument. Because they are effectively digital currency, stablecoins can reduce the need for payment intermediaries and thereby reduce costs of payments globally. But their safety is not assured. History is replete with cases in which synthetic dollars became subject to runs. Stablecoins thus face all of the same issues any substitute for genuine U.S. dollars faces. If appropriate guardrails can be erected to minimize run risk and mitigate other risks, such as their potential use in illicit finance, then stablecoins may have benefits in payments and by serving as a safe asset on a variety of new trading platforms.

These technologies will almost certainly lead to efficiency gains over time, but as they develop, we should think carefully about their role in the broader financial landscape.

Is it really possible to completely decentralize finance using these technologies? The answer is obviously "no." Intermediation is still valuable for the average person, and we see this by the existence of trading exchanges in the crypto world. All these platforms involve giving custody of one's crypto-assets to an intermediary, who conducts trades on behalf of the client. This reintroduces the need for trust in these platforms just as trust is needed in modern banking systems.

Returning to the technologies behind defi, one must ask whether there are unique risks associated with the use of these technologies. If so, what is the nature of these risks? Are they contained to just those people directly engaging with the technologies, or could there be broader spillovers to society? For example, can these technologies increase the risk of inadvertently providing funds to bad actors? In centralized finance there are regulations that require banks to know who their clients are. Are similar rules and regulations needed around some of these new technologies? When it comes to our financial plumbing, which affects every person or business in one way or another, I think a balanced view of expeditious disruption and long-term sustainability is merited.

So where does that leave us? Ultimately, I believe that advances in technology have the potential to drive efficiency gains in finance, just as technological innovation has done for centuries. While there are certain services emerging through defi that cannot be provided by centralized finance, the technological innovations stemming from defi are largely complementary to centralized finance. They have the potential to improve centralized finance, thereby increasing the significant value that financial intermediaries and centralized financial markets deliver. I look forward to seeing the continued evolution of financial technology and the benefits that evolution will bring to the households and businesses served by the financial system.

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[1] I would like to dedicate these remarks to an old friend and longtime participant of this conference, Paul Klein, who passed away unexpectedly two months ago. The views

expressed here are my own and are not necessarily those of my colleagues on the Federal Reserve Board or the Federal Open Market Committee.

[2] See Ariel Rubinstein and Asher Wolinsky, "Middlemen," *The Quarterly Journal of Economics* 102 (August 1987): 581–93, https://academic.oup.com/qje/article-abstract/102/3/581/1887969.

[3] See Benjamin Bromberg, "The origin of banking: religious finance in Babylonia (PDF)," *The Journal of Economic History* 2 (May 1942): 77–88.

[4] See National Aeronautics and Space Administration, "Spinoff from a Moon Tool (PDF)," January 1, 1981.

[5] See Christopher J. Waller, "Thoughts on the Crypto Ecosystem" (speech at Global Interdependence Center Conference: Digital Money, Decentralized Finance, and the Puzzle of Crypto, La Jolla, CA, February 10, 2023).