

The Future of Money and Its Implications for Society, Central Banks, and the International Monetary System

Eswar S. Prasad

This article is based on the Homer Jones Memorial Lecture delivered at the Federal Reserve Bank of St. Louis, October 19, 2022.

This new wave of financial innovations has broad implications for society, banking, and central banking: Digital platforms can ease entry for financial services providers, increase transactional efficiency, and widen access to and participation in the financial system. They could also decrease the use of cash and alter the U.S. dollar's role as today's vehicle currency.

JEL Codes: E42, E44, E50, E58, E59, G21, G23, G28, G34

Federal Reserve Bank of St. Louis *Review*, forthcoming 2023.

Economists are storytellers at heart. So I have for you today a story of remarkable technological innovation, some unfulfilled promises, and unintended consequences. The story, of course, revolves around money, which makes it especially appropriate that I'm giving this lecture here today. I am very privileged to be following in the footsteps of many distinguished people who have delivered the Homer Jones Memorial Lecture, which, after all, is to honor somebody who had a great deal to do with the development of monetary economics and thinking about how money affects us.

The story I have for you today is going to revolve around how money is going to be reshaped: in the way we think about it, the way we relate to it, and the way it helps us organize our economic activities. And it's going to go through a lot of terrain. We'll start by thinking a little bit about basic financial innovations, then delve into the world of cryptocurrencies (including Bitcoin and much more), and then talk about the possibility that we might have digital versions of the paper currency we are all used to. But then we'll think about what all of this means for financial markets and institutions, for central banks such as the Fed, and, indeed, for the international monetary system. But it's not just going to be about finance and economics. It's ultimately going to have some implications for thinking about how we organize society and our day-to-day interactions.

Eswar S. Prasad is the Nandlal P. Tolani Senior Professor of Trade Policy in the Dyson School at Cornell University, a senior fellow and New Century Chair in International Economics at the Brookings Institution, and a research associate at the National Bureau of Economic Research. This lecture draws on his latest book, [The Future of Money: How the Digital Revolution is Transforming Currencies and Finance](#).

© 2023, Federal Reserve Bank of St. Louis. The views expressed in this article are those of the author(s) and do not necessarily reflect the views of the Federal Reserve System, the Board of Governors, or the regional Federal Reserve Banks. Articles may be reprinted, reproduced, published, distributed, displayed, and transmitted in their entirety if copyright notice, author name(s), and full citation are included. Abstracts, synopses, and other derivative works may be made only with prior written permission of the Federal Reserve Bank of St. Louis.

FINANCIAL INNOVATIONS

Let's start at the beginning, by thinking about this broad term that you may have heard about called "fintech" or financial technologies. Financial innovation is nothing new. Money itself is a wonderful financial innovation that has allowed us to do a variety of things. I think of money as really enabling us to transform resources or transfer them across time and across space.

So money plays a very powerful role in the way societies are organized and in the way economies are organized.

Of course, the creation of paper currency in China, which took place in the seventh century, was another innovation. You didn't have to carry around huge amounts of commodities or big chunks of stone. But what's new about *this* wave of innovation? I will argue that there is something fundamentally important and distinct about this wave: It is built on digital technologies. And that has two very important implications. One implication is that it means that you have much easier entry of financial services and providers who can bring new innovations, more competition, and thereby make the provision of financial services—and financial intermediation more broadly—more efficient.

The second implication is that these products and services can now be provided much more easily at scale on digital platforms because the marginal cost of servicing an additional client, even if that happens to be a very low-net-worth, low-income client, is still viable using the digital technologies. And we are beginning to see the transformative effect of fintech, especially in the emerging market world.

EXPANDING ACCESS TO FINANCE

Now, one reason why emerging markets seem to be leapfrogging developed markets is that there was a much greater need in countries such as China and India, and even in low-income economies such as Kenya, for better payment services and better banking products and services. So we are beginning to see these gain traction. You've all seen the images of farmers in Kenya, who may have very low levels of literacy or even numeracy, being able to participate in the financial system through mobile payments.

Now, this shift is very important, not just in terms of making finance work better. I think that the fintech revolution has broader consequences for society. When people feel more vested in the financial system, in the economy, in the success of their economy, they are willing to endure the disruption and pain that economic reforms invariably involve. Any reform that you can imagine that is going to lead us to a better place has a dislocative effect in the short-term. And the reason why many reforms don't work very well is simply because people don't feel that they are going to gain the benefits of those changes.

I think fintech has promise not just in the organization of finance but in terms of thinking about the evolution of economics and even broader reforms that could lead us to a better place. And we've seen transformative effects, especially in the context of payments. This issue of payments is something that I will keep coming back to. Ultimately, if you think about economic transactions of any sort, be they related to trade, buying a piece of fruit, undertaking a financial transaction, payments are really an essential lubricant. And this is one area where technology is really having a transformative effect.

In countries such as China and India, hardly anybody uses cash or physical currency anymore. In these economies, the ability to gain easy access to very low-cost, efficient digital payments is now proliferating. This is all very good. And we are beginning to see a world where domestic payments in particular are becoming much more efficient.

But it's not just payments. It turns out that the sort of revolution that we are seeing even in low-income countries is providing a portal for basic banking products and services for households and individuals to manage credit, savings risk, and so on. These things were not easily accessible to low-

income consumers, in particular, in developing economies and even in advanced economies such as the United States.

I think the basic elements of fintech were already putting in place an architecture that will have important consequences. And then, with impeccable timing, a new wave of revolution entered the stage. In finance and everything else, timing is everything. And Bitcoin's timing was impeccable.

CRYPTOCURRENCY

You may recall the dark days of September 2008—September 15, 2008, in particular. This was the Lehman moment, when the iconic investment banking firm Lehman Brothers collapsed and looked like it might take the entire U.S. and perhaps global financial system down with it. Six weeks later, a very modest-sounding proposal appeared on the internet: The Bitcoin white paper was released, authored by someone calling themselves Satoshi Nakamoto. What it promised was something remarkable.

What Bitcoin suggested that it could accomplish was to allow transactions to be conducted between individuals who did not even need to reveal their true identities. They just needed to use their digital identities, and they could conduct payments without relying on central-bank-provided money or a trusted intermediary such as a commercial bank or a credit card or any other services provider.

This concept sounded mind-boggling. How on Earth could you use a purely digital medium of exchange that is not issued by a trusted party and without even revealing your identity? It turns out—and this is the magic of Bitcoin—there was a way to do this. And much like the anonymous nature of Bitcoin transactions, it's not clear to this day who actually came up with Bitcoin.

I attend many cryptocurrency conferences. At one of those conferences, I was seated in the panel next to a gentleman who claimed he was the true Satoshi Nakamoto who had invented Bitcoin. Who knows? He was half credible, not fully credible.

Whoever the inventor was, it is a remarkable invention. What Bitcoin provides relies on principles that are borrowed from cryptography but which are used very effectively with a variety of tools. At one level, what makes Bitcoin work is what I think of as radical transparency: In every transaction ever undertaken with any Bitcoin, the digital identities of the transacting parties are all posted on these digital ledgers that are placed on multiple computers around the world and synchronized in real time.

Again, as mind-boggling as this sounds, it actually works. There is a decentralized procedure whereby people with computing power that they are willing to devote to this process are able to validate these transactions. Now, let's think about something more conventional: a \$20 bill. When I go to a cafe and buy a latte, I hand over a \$20 bill. Immediately, my account balance is updated, and the account balance of the cashier is updated. This is what settlement of a transaction is about.

It turns out that when you're thinking about purely digital money, there is a complication. I might use digital money to buy myself a cup of coffee. I might decide to then go out and use that same digital unit to buy you a cup of coffee. How do you prevent double spending?

Bitcoin involves a way of essentially validating transactions and posting them on these public digital ledgers, called a blockchain, in a way that is very difficult to override. Once people in the system have an incentive to ensure the system doesn't fall apart and trust in the system is maintained, the process turns out to be viable. This is really cool technology.

There is only one problem. *It doesn't work.* But it doesn't work in a very specific sense. It turns out it works for what it was supposed to do. But it cannot be scaled up. If I were to try to buy a cup of coffee with a Bitcoin, first of all, I'd pay very large transaction fees. It also takes about 10 minutes for a transaction to be added to the blockchain and validated in that block of transactions. So it's expensive and slow to process, and the cup of coffee would probably cool in my hands before I could actually complete the payment. So this is not a viable transaction medium. Bitcoin has become what it was never meant

to be—a purely speculative financial asset. And the value of this asset seems to come from its scarcity and nothing more.

There is a hard-coded element of the algorithm that restricts the number of Bitcoins to about 21 million. About 19 million have been created so far. People who own Bitcoin seem to embrace the fact that it is scarce compared with the fiat currency that the Federal Reserve can print essentially in infinite quantities (not literally, but conceptually) and that something this scarce must hold value better.

To an economist, this is a dubious proposition. Just because something is scarce, it's not obvious it should have value. But there are true believers out there. I worry about those who seem taken in by the razzle dazzle of the technology and are investing in Bitcoin. But whatever Bitcoin's failings, it has left us with the technology, the blockchain technology, that I think is going to be lasting in many ways. And it has catalyzed a very important revolution.

There are many aspects to this that I will now touch upon. One is that there are new cryptocurrencies that are trying to make up for Bitcoin's limitations. In addition to the constraints that I mentioned in terms of processing time, processing volume, and so on, it turns out one of the fundamental problems of Bitcoin as a medium of exchange is that it has unstable value. If I walk into a coffee shop with a fraction of a Bitcoin, and one day I'm able to walk out the door with half a dozen croissants and as many lattes but the next day able to walk out with just a small cup of coffee, then Bitcoin is not a very viable medium of exchange.

There are new cryptocurrencies, stablecoins, that include a way to deal with precisely this problem. Stablecoins are ostensibly backed up by stores of fiat currencies or financial instruments such as Treasury securities that are seen as very solid instruments. Essentially, stablecoins provide a more effective way—or at least this is the way they are marketed—of using fiat currencies by providing them in digital form. These stablecoins are underpinning some new revolutions in finance.

DECENTRALIZATION AND DEMOCRATIZATION

The blockchain technology that Bitcoin established has allowed the creation of new products and services in a way that does not exist within the realm of traditional finance. The notion of decentralized finance built on blockchains is, on one level, very appealing and has three important aspects:

One is decentralized architecture. The digital ledgers, or blockchains, are maintained on multiple computers so there isn't a single point of failure. Then there are the decentralized validation or consensus protocols so there is no institution responsible for issuing, validating, or managing this process. And then there is decentralized governance so there is no institution or agency that determines the rules of the game. The community has a vested interest in determining the rules of the game.

The idea here is that maybe this will underpin the democratization of finance, making it easier not just for the “big bad banks.” But the idea is to give space to new financial services providers to compete on a level playing field and, more importantly, for even the common man to be able to access products and services. These new technologies make it possible to do this thing that, right now, is not financially viable.

Right now, if I walk into the door of Goldman Sachs or Morgan Stanley with a couple million bucks in my pocket, they'd welcome me. If I walked in with \$10,000, they wouldn't give me the time of day. The potential here is that finance could be democratized by making it easy for anybody at very low cost to access these financial products.

This potential future is appealing. But, again, there is a bit of a gap between the principle and the reality. The parts of decentralized finance that seem to work well are actually the ones that are quite centralized. I referred to stablecoins. They give up all of the elements of decentralization inherent in something like Bitcoin. A stablecoin has a centralized issuer. Validation is undertaken by the stablecoin issuer. And you have the governance determined by the stablecoin issuer.

Likewise, what we have seen so far in this realm of decentralized finance is a lot of financial engineering. We've seen a lot of products being offered that seem to help in democratizing finance but in fact are making people take on much more risk that they don't fully understand or knowingly accept. So I worry a little bit that all the potential benefits that could be gained by decentralized finance, in fact, are being subverted into a world of greater centralization.

There is promise here, but it hasn't been realized yet. And I worry, again, that it might lead us to the wrong direction rather than to true democratization of finance.

Amidst all of this, central banks have been taking notice that the currency they supply is much less viable than it used to be in terms of retail transactions in particular. In certain countries such as China and India, the use of cash is plummeting. In a country such as Sweden, less than 2% of transactions are conducted using cash. Why? Because we all are getting used to the convenience of digital payments.

But, again, there are many people left out of this revolution. Even in the United States, about 5% of households are unbanked or underbanked. You and I, or anyone, may be able to easily use Apple Pay or Google Pay. But these apps must connect to a bank account or a credit card. What about those who have neither?

CENTRAL BANK DIGITAL CURRENCIES

Central banks are thinking about whether or not to issue central bank digital currencies (CBDCs), which would essentially be the physical currency you and I have right now, or at least some of us still have right now, in our billfolds but in a purely electronic or digital form. Why are central banks considering this?

Even if a central bank stopped issuing currency altogether, it could perfectly well conduct its business of managing monetary policy by affecting the cost of funds. So currency is not essential for a central bank. So why should central banks even consider CBDCs? It turns out there is a range of motivations at play.

In developing countries, CBDCs seem to be a way of broadening financial inclusion. Where the private sector does not provide these services, maybe the central bank could provide a payment mechanism. In a country such as the Bahamas, which has issued the world's first nationwide CBDC, the sand dollar, this seems to be the main objective.

In a country such as Sweden, where the private sector is doing a very good job of providing digital payments at scale, a financial stability imperative seems to be leading the Riksbank to create a CBDC, which will essentially serve as a backstop to the private infrastructure in terms of payments, which may be vulnerable to confidence or other issues.

Then there's China. China, as in everything else, is unique in this regard. Alipay and WeChat Pay have dominated the payments space in China. They give very easy and economical access to both merchants and households. You can literally buy a dumpling on the streets of Beijing with these apps.

But the Chinese government is concerned that these two payment giants are dominating the payment space and also have been gathering up troves of data, which until recently they were not willing to share with the government. So the Chinese central bank has talked about wanting to maintain the relevance of its money at the retail level and essentially create a payments infrastructure that other payment providers could build upon.

Countries such as China, Japan, Sweden, and Brazil are already experimenting with CBDCs. There are many others that plan to introduce CBDCs at some stage. But all of them seem to be moving toward an architecture where, essentially, the central bank would provide a payments infrastructure and, on top of that, the digital tokens themselves, much as it provides currency to commercial banks right now in exchange for reserves. And the commercial banks can go out and distribute their currency to their customers, be they merchants or households.

So the idea is that you would have a digital liability of the central bank that would work much as currency now does. But there are risks. There are significant risks that, in fact, if you could offer digital wallets that allow you to hold central bank money in digital form, that could lead to a flood of deposits away from commercial banks into these digital wallets. And commercial banks are still very important in the creation of money in modern economies. They create credit. The disintermediation of commercial banks is a risk. Another issue is that you may not want the central bank to provide payment services that could outcompete the private sector. Nobody wants the central bank to be doing things the private sector can do perfectly well.

There are ways through conceptual and technical design choices that these risks can be mitigated but not entirely eliminated. The Bahamas, for instance, has put a cap on the amount of money that can be held in a CBDC account to prevent wholesale flight of deposits from the banking system. That cap may fall apart at a time of financial turmoil, when people are clamoring to put their money in what is seen as a safer place. After all, what place can be safer than the central bank?

So even central banks that are contemplating CBDCs have to deal with a variety of risks. And then there is the broader question about whether we as a society want to live in a world where any financial transaction might be visible because it is in digital form. Either to a central bank or to a private payments provider.

PRIVACY AND INTEGRITY

Now, privacy might still mean something. To my kids' generation, maybe privacy is a chimera right now. They seem to be willing to accept being tracked in every dimension. But I think it is an important discussion to have because it's not just that you can think about a CBDC being used to track your transactions. Digital transactions can be subverted in different ways.

You could think about potentially making monetary policy more effective by issuing units of currency, say, in the middle of a pandemic, which has an expiry date on it. This would incentivize people to go out and spend, which is exactly what the government wants to do. But then you might have different units of central bank money floating around that could trade on secondary markets at different values.

So now you have created a situation where the integrity of central bank money starts coming into question. You could even think about a government deciding that its central bank digital currency cannot be used for certain purposes, such as maybe buying illicit drugs or pornography or weapons. So you could end up with social policy being directed through the CBDC.

Now, this is a very dark picture I'm painting. Central banks that talk about CBDC talk about it just as being a digital equivalent of cash with no programmable features. But I worry. We've seen many, many instances where technology was supposed to lead us to better places, give us all much easier ways of staying in touch with friends and family, and look where that got us. So I think we should be a little cautious about taking technology at its word.

THE INTERNATIONAL MONETARY SYSTEM

Then there is the international aspect, which is also worth thinking about. International payments are beset by frictions. They involve multiple currencies, moving money across different financial institutions in different jurisdictions. They are slow, expensive, and difficult to track in real time. In this environment, technology can have real benefits and is beginning to have benefits already.

If you can reduce the frictions related to international payments, that could be very good in terms of bringing the world closer together. Economic migrants sending remittances back to their home

countries could do it more cheaply and quickly. If you think about small and medium enterprises and even developing economies trying to get access to a global pool of capital, that might be easier if the frictions were lower. It could also make it easier for savers to engage in international portfolio diversification opportunities.

But, again, as with anything else, there are potential problems. Think about an emerging market country that is already beset by the whiplash effect of capital flows, where foreign investors put money into the country when they think it's doing well but pull that money out when it's not doing well. Once the barriers to capital flows start declining, those capital flows could become even more volatile, creating not just capital flow but also exchange rate volatility. For mature economies, it's not that much of a problem dealing with capital, or capital flow or exchange rate volatility. For emerging markets, it's a real problem.

There is also potential for some changes to the international monetary system. As you're all well aware, the dollar still remains dominant in international finance in practically every dimension in terms of denominating trade transactions, settling those transactions, and serving as a reserve currency. I think we're going to see some changes. Some of these are related to the developments I've talked about today. But there are other developments at work already with countries around the world building up their own payment systems.

China has built up the cross-border interbank payment system, which allows its commercial banks to more directly communicate with commercial banks in other countries, including, as it happens, Russia. This channel makes it easier to trade between pairs of emerging market currencies without having to go through a vehicle currency such as the dollar. Right now, it's difficult to directly transact between the renminbi and the ruble or even the rupee. Those barriers are beginning to fall.

I think the reality is that, over time, we're perhaps going to see the role of the dollar as a vehicle currency decline. But there are counterbalancing forces at work. I spoke about stablecoins. They could play bigger roles in international payments in particular. And what stablecoin is likely to get the most traction in international finance? I'd bet on a stablecoin backed up by U.S. dollar reserves. The U.S. dollar is still the currency of the world at large. So we might actually move to a world where, indirectly, the dollar starts gaining even more prominence as a payment currency.

The Chinese are moving forward with their digital currency. Is that going to threaten the dollar's prominence as a reserve currency? I think most emphatically not. In my previous two books, which are about the dollar and the renminbi, I made this point that what is really important for a reserve currency status is not just economic size, not just financial market debt and liquidity, although both of those are very important.¹ Ultimately, the institutional framework that inspires the trust of domestic and foreign investors is most important.

And that institutional framework includes an independent central bank. It includes the rule of law, by which even the government has to play by the rules, and an institutionalized system of checks and balances. And despite all the knocks the institutional framework in the United States might have taken, the good thing is that, in international finance, it's all relative.

And relatively speaking, if you think about the size of the U.S. economy, the size of its financial markets and its institutional framework, it's hard to see a serious rival to the U.S. dollar as a reserve currency. In particular, I don't think the renminbi, although it has accounted for about 2½ percent of global foreign exchange reserves, is going to be a major rival to the U.S. dollar.

There is a shakeout coming, though. That shakeout is for currencies of countries that are relatively small and have central banks that are not credible. I can well see that if a digital dollar or digital renminbi

¹ *Gaining Currency: The Rise of the Renminbi and The Dollar Trap: How the U.S. Dollar Tightened Its Grip on Global Finance*. Bibliographic and other information can be found on [the author's faculty page](#).

were easily available around the world, you could well end up in a situation where those currencies might be preferred to the domestic currencies of several countries.

You could even think about stablecoins issued not only the way I described, but by major corporations—perhaps Amazon or Meta. Those currencies might well be seen as much more trustworthy than the currencies of some of these smaller economies. So I think there could be a real shakeout in terms of the relative importance of different currencies and potentially even existential threats for certain currencies.

CONCLUSION

The broad theme in all of this, I think, is that we are entering a very interesting era of competition in money, but competition that has a domestic as well as international form in one very specific dimension: the use of money as a transaction medium, as a medium of exchange. In the domestic sphere, I can see a world in which we have digital payment systems, perhaps stablecoins, perhaps even a CBDC coexisting and providing alternative means of payment.

But in all of this, including in the context of stablecoins, the fundamental store of value remains the fiat currency. Likewise, if you think about the international monetary system, I can well see certain currencies, including emerging market currencies, becoming more important in terms of international payments. But as stores of value, as reserve currencies, I think there is unlikely to be a major change in the configuration. So, more currency competition but in a circumscribed way.

As one considers the broader implications, though, I think it is worth contemplating that all of this technology is going to solve certain problems in terms of giving people more access to financial markets—broader financial inclusion—which could have certain beneficial effects. But leaving technology by itself to fix many of our underlying problems, I think, is not going to be the answer.

If you take issues such as inequality, there is a sense right now that the democratization of finance perhaps will also lead to a less unequal world. I worry that what we are seeing right now is something quite the opposite. People who are undertaking investments in these crypto assets are wealthier people for whom this is a roll of the dice. They are willing to take on more risk. They can afford to take on more risk.

On the other hand, you have many people who are putting their life savings into crypto assets. I've met many of these at the crypto conferences I attend. I worry about them. They don't quite know what risk they're taking on.

And there is this broader prospect that we might be shifting to a world bereft of the promises of decentralization and greater anonymity of transactions. In fact, we might end up with much greater centralization in a worrying way: a world with purely digital currencies where central banks, governments, and major financial and nonfinancial institutions all become much more intrusive into our daily economic, personal, and social lives.

I leave you with just one final thought, which is the title of the last chapter of my book and I think sums it all up: A glorious future beckons, perhaps.