Digital Assets, Payment Systems, and Financial Regulation

Introduction

Arvind Krishnamurthy

The topic of this panel is digital assets, payment systems and financial regulation. And in the context of this conference, this panel is about new challenges. The last decade has witnessed considerable flux around the topics of the panel.

The landscape around financial technology, and particularly technology around money, payments, and settlements, has seen massive innovation in the last decade. The landscape around financial intermediation has also changed significantly with the movement of activities outside the banking sector over the last decade. This is a topic we will hear about in this panel. Finally, a particularly new challenge that has come to the fore in the last few months concerns the reserve currency role of the dollar. In the postwar era, the liquidity of US financial markets and the safety of US Treasuries have undergirded the dollar as the reserve currency of the world. And since April, there have been cracks in those foundations, posing a particularly new challenge to the international financial system. So with that, I am going to stop and turn it over to the panelists. I look forward to hearing their views on these topics.

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Tokenizing Reserves and Treasuries

Darrell Duffie

I want to add to the respect for John Taylor. I have known John for decades as a close colleague. Something that he and I worked on together, which he led and hasn't yet been emphasized today, is his work on making it possible for large financial institutions to fail without bringing down the financial system. His leadership on that project, which became known as a proposed "Chapter 14" of the Bankruptcy Code, had a big influence on the related Dodd-Frank Wall Street Reform and Consumer Protection Act. So thank you for that, John, and for the opportunity to work with you.

Our charge on this panel includes new forms of digital assets and payment systems. I want to discuss some upcoming changes in the way money and assets are likely to move through the financial system.

To do that, I will set the stage back in history, to June 26, 1974, when a medium-sized bank in Cologne, Germany, named Bank Herstatt failed. This bank had been doing massive speculation in the foreign exchange (FX) market. When it failed, it had received very large settlement payments for foreign exchange transactions for which it had not yet paid its counterparties. For example, large banks in London and New York were settling FX

trades that day with Bank Herstatt and failed to receive hundreds of millions of dollars on behalf of their customers. Chase Manhattan alone did not get $620 million in payments. In those days, that was a lot of money!

As a consequence of this failure, there was a massive disruption in the foreign exchange market. Medium and smaller banks were pretty much shut out of the market. Only large banks were able to conduct transactions. Even Eurodollar interest rates were disrupted. Spurred by Peter Cooke of the Bank of England, the failure of Bank Herstatt led to the formation of the Basel Committee on Banking Supervision, which is well known for its bank capital standards, Basel I, Basel II, and now Basel III. The resulting famous 8% capital ratio, some of you may remember, was then known by some as "the Cooke ratio."

In addition to causing more systematic regulatory capital requirements for banks, this affair eventually triggered a multidecade project known as the Continuous Linked Settlement (CLS) Bank, designed to mitigate the Herstatt form of foreign-exchange settlement risk. CLS Bank became the new way for large banks to make and receive foreign exchange payments. You can think of CLS Bank as a virtual island sitting in the middle of the Atlantic Ocean. When a bank in Germany wants to pay a bank in the United States for foreign exchange, the German bank sends the euros over to this island. The euros wait there until the dollars get to the island from New York. Once the euros and dollars have arrived, the dollars continue on their way to Europe and the euros are sent on to the United States. Neither bank will have made a payment and find itself at risk of not receiving the payment from the other. This form of settlement is called "payment versus payment."

CLS Bank is complex in terms of operations, governance, and oversight. It now handles about $5 trillion a day but still only covers about 60% of the major currencies. There

are opportunities to go from that second-generation approach to the next new-generation approach for conducting large-scale financial settlements, based on the tokenization of financial assets.

Figure 7.1. An exchange of $500 million for €400 million.
Source: Figure by the author.

Please let me illustrate how that works with the example shown in figure 7.1, where $500 million is to be exchanged for €400 million. The US bank cryptographically assigns its dollars to the European bank, conditional on the European bank cryptographically assigning its euros to the US bank. Neither bank is at risk of the other's failure to deliver because the transfers are contingent on both cryptographic signatures.

This new approach to foreign exchange trade settlement has already been tested by the Federal Reserve Bank of New York, in Project Cedar, and by the Swiss National Bank and the Banque de France, in Project Jura. This approach is not yet being heavily used, but I predict it will be.

Figure 7.2 illustrates how this works. The diagram shows a "state machine" whose status, *X(t)*, is updated by instructions from any of the participating banks. The resulting ledger can be recorded, for example, on a blockchain, but it doesn't need to be a blockchain ledger. The US bank sends an irrevocable message to this ledger stating that its $500 million belongs to the European bank once the European bank sends an analogous message saying that its €400 million belongs to the US bank. The state machine records all of the commitments and balances of the participating banks and processes their payments. By the "miracle" of cryptography, there is no need for an intermediary "island" that holds the assets in flight. Because of this, we can cut out some costly financial market infrastructure.

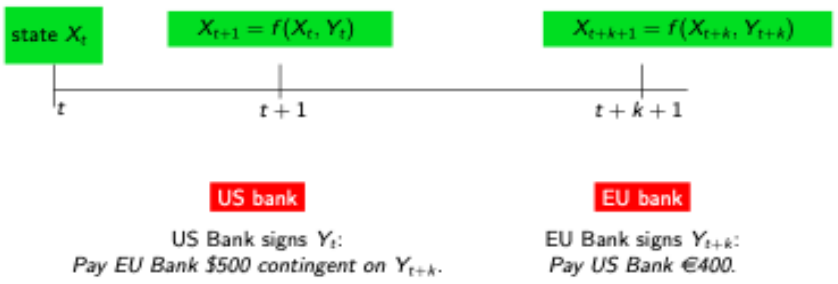

Figure 7.2. The status *X(t)* of a state machine is updated by messages from a US bank and an EU bank.
Note: The US bank sends an irrevocable message stating that its $500 million belongs to the European bank once the European bank sends an analogous message that its €400 million belongs to the US bank.
Source: Figure by the author.

Let me turn to the case of US Treasuries. Suppose the European bank is not selling euros but instead is selling US Treasuries to the New York bank. This can be done by the same process shown in figure 7.2. While this might seem futuristic, it's happening today.

Already, billions of dollars in US Treasuries have been tokenized and exchanged by this method. This approach is now being tested by major firms like Bank of New York Mellon, using a platform called Canton. Potentially trillions of dollars a day in transfers of Treasury securities could eventually use this form of tokenized exchange.

As you may have noticed, we're in the midst of a big movement toward the central clearing of Treasury market transactions. The next-gen form of settlement that I described does not require a central counterparty. How long will it take for this to become a common way to move cash and securities? We'll see, but it's already in motion.

Let me conclude with some of the key challenges that may engage some of the central bankers here. First, there are some legal issues. What is it exactly that perfects your property interest in the transfer of these tokenized securities and cash? In the United States, there is a movement to update the Uniform Commercial Code so that court precedents will lock down that you actually own the Treasuries when they're assigned to you on a distributed ledger. That could be circumvented by digital-asset legislation that may go through Congress.

Second, who is going to tokenize the Treasuries, and who is going to tokenize the cash? We have some precedents in the Treasury market. In the early 1980s, private-sector firms decided that it would be nice to have zero-coupon long-term Treasury securities. So they purchased coupon Treasury securities, put them in a legal lockbox, and then issued zero-coupon securities from that lockbox. These were legal claims to the individual coupon and principal payments of the underlying Treasuries. In 1985, the Treasury Department said, "Wait a minute, these stripped Treasury securities are trading in the market at prices that are sometimes richer than those implied by the Treasuries that we're issuing. We can do that!"

I think the same thing could happen in the case of tokenized Treasuries. If the superior liquidity and mobility of tokenized Treasuries created by the private sector start to become apparent and tokenized Treasuries therefore begin to have a convenience yield, I expect the Treasury Department will eventually get around to issuing its own tokenized Treasury securities.

What about the cash side of the transaction? Who's going to tokenize the cash dollars? Well, I don't think hundreds of billions of dollars' worth of Treasuries will be exchanged each day for fully decentralized stablecoins like Tether or USDC. I doubt that the biggest actors in the core of the financial system would be satisfied with that. Will they instead use tokenized commercial bank deposits? Perhaps, but because of the risks involved in a multitrillion-dollar-a-day market, the tokenized commercial bank deposits used for settlement of these trades may be backed one-for-one with Fed reserves. Perhaps the Fed itself, or foreign central banks in their cases, will eventually issue tokenized reserves. Would that be a central bank digital currency (CBDC)? I would not use that term. This is no more a CBDC than are current-day reserves. Both are central-bank-issued, digitally recorded cash. Instead of calling them CBDCs, I would just call them tokenized reserves. These are merely reserves held in a new type of ledger. President Donald Trump recently banned CBDCs. There's no reason to think of that ban as applying to anything like tokenized reserves.

There are still, however, other challenges. You'll notice in figure 7.1 that the US bank had to put up the money before the transaction was completed. In today's conventional financial system, the US bank wouldn't need to actually commit the cash until the settlement of the trade. In the next-gen example illustrated in figure 7.2, the bank may need to have the cash before it enters the trade. That implies a larger demand for cash. The definition of

ample reserves may change if the private sector decides to hold a lot of tokenized reserves for this purpose. That's true whether the reserves are issued by the Fed directly or the reserves are first placed into a legal lockbox, with private-sector tokenized cash issued from that lockbox. I think the Fed needs to be flexible in terms of its determination of ample reserves. Structural changes in the economy may end up causing the Fed's balance sheet to get bigger simply because of changes in the way that finance is conducted. Researchers are working on approaches that would economize on the necessary amount of reserves.

In summary, we should look ahead to a world in which tokenized Treasuries and perhaps tokenized central bank deposits will change the financial system. I expect that's going to work out rather well. It will be important to the United States, which currently has about $29 trillion of outstanding US Treasury debt and will eventually struggle to find buyers for all of those Treasuries—a quantity projected to be $52 trillion by 2035, according to the Congressional Budget Office. And that's even without considering legislation coming through Congress that will further increase US deficits. The quantity of US Treasuries owned by foreign investors has gone down from 52% in 2009 to around 35% today. Unless Treasury securities can be mobilized rapidly and used as collateral around the clock and around the world, it's going to get harder and harder for foreign investors to find sufficient needs for Treasury securities, not only to own them, but for collateral mobility and financing.

Thank you!

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Let Banks Compete:

Digital Money's Challenge to Europe's Protected Banking Model

Luis Garicano

> "This bill represents a once-in-a-generation opportunity to expand dollar dominance and US influence in financial innovation. Without it, stablecoins will be subject to a patchwork of state regulations instead of a streamlined federal framework that is more conducive to growth and competitiveness." —Treasury Secretary Scott Bessent (2025)

The scale of private digital money, particularly dollar-backed stablecoins, is no longer trivial.[1] By March 2025, their combined assets exceeded $200 billion, and their activity (e.g., purchasing nearly $40 billion in US Treasury bills in 2024) rivals that of traditional financial players (Ahmed and Aldasoro 2025). US Treasury Secretary Scott Bessent's social media post in reaction to the US Senate's initial failure to advance the GENIUS (Guiding and Establishing National Innovation for US Stablecoins) Act in early May of 2025 reflects the emerging battle between state-controlled and private digital currencies—a modern version of the historical tension between state-controlled and private money systems. A modified compromise version of the Genius Act was eventually passed in July 2025, as I discuss below.

Throughout history, currencies have evolved from physical coins issued by governments to more abstract forms of value based on promises and debts. Initially, money was mostly a physical object, consisting of coins stamped by a king or government (state money). But physical coins were often scarce. The change came when banks figured out how to convert promises and debts into a form that could be used like money (bank money). As described in Paolo Zannoni's *Money and Promises* (2024), banks in Renaissance Italy did so by keeping ledgers. If someone owed you money, instead of paying you in coins, the bank could just mark down that credit in your name, and you could then use that recorded credit to pay someone else. This bank money helped trade flourish where physical currency was hard to find.

Of course, this system relied heavily on trust in honest bookkeeping by the banks. When banks failed, as many did in Venice, governments stepped in with regulations, demanding banks hold more actual coins to back up their promises. Later, governments got more directly involved. The Bank of England, for example, was established partly to turn government debts (like taxes owed) into a form of widely accepted bank money, effectively creating a national currency backed by government guarantees.

This was the central axis of the clash over America's financial system in the late eighteenth century. Alexander Hamilton favored a strong national bank and currency (more central control), while Thomas Jefferson preferred state-level banks and currencies (more decentralized). For a long time, much of the US economy ran on money created by numerous state-chartered banks, based on promises and debts.

This tension is now being relitigated across the Atlantic, between official digital money (central bank digital currencies, or CBDCs) and private digital money (stablecoins).

The United States and the European Union are placing different bets. The United States currently backs private digital money with a lighter regulatory touch, while the European Union pursues a twin-track approach: launching a digital euro while concurrently building high regulatory walls around the private market.

Table 8.1 offers a simplified view of the landscape in July 2025.[2] Obviously, this is fast-moving terrain, particularly in the United States, where the legislation was recently passed.

	United States	**Europe**
Private	Lightly regulated stablecoins (GENIUS Act)	MiCA-compliant stablecoins (EU-level laws, e.g., MiCA effective)
Public	Forbidden by Executive Order, January 22, 2025	Digital euro (CBDC) (legislation facing challenges and stalled in the European Parliament)

Table 8.1: US versus EU approaches to private and public digital currencies.
Note: MiCA stands for Markets in Crypto-Assets Regulation, which created uniform EU market rules for crypto-assets.

Digital Currencies: Private and Public

Stablecoins are cryptocurrencies designed to maintain a stable value by pegging to established currencies, like the US dollar or the euro. While Bitcoin and other cryptocurrencies are too volatile to be used as a means of payment, dollar- or euro-pegged stablecoins can be used to make payments in a predictable way. Unlike actual dollars or euros, stablecoins function like the ledgers of Renaissance banks: They represent claims on

value rather than the value itself. This structure introduces credit risk, as private issuers might fail to maintain adequate reserves backing their coins.

Hence, as currently regulated, stablecoins are a form of "narrow banks" (as proposed by Frank Knight and Henry Simons at the University of Chicago in 1933 as part of the "Chicago plan"), which must keep 100% of reserves against all demand deposits and restrict their assets to central-bank reserves or Treasury bills (Tavlas 2020). But unlike a narrow bank proper, and as currently regulated (as we see below), stablecoins use ledger-based architecture, i.e., they mint cryptographic tokens on public blockchains. And unlike a narrow bank, they allow some maturity transformation, which involves a broader but still high-quality reserve mix—cash, central bank deposits, and short-term government paper, plus, in MiCA, a quota of overnight bank deposits. Also, unlike a narrow bank, the law in Europe (MiCA) and the United States (Genius Act) forbids any interest or yield on the tokens to prevent playing the role of a money market fund. It is likely, however, that issuers will find ways to transfer some of the interest margin to holders—recall how banks gave gifts (from toasters to free checking) to attract depositors when regulations prohibited interest on demand deposits. In the same way, stablecoin issuers could offer implicit returns to token holders. This could be done by waiving or reducing transaction fees, offering rebates on purchases, or distributing other crypto-assets, such as governance tokens that give holders influence over the protocol's future. Also, nothing prevents the possibility of a more "bank-like" balance sheet with more risk, and that seems the natural evolution of the system.

Dollar-backed stablecoin assets surpassed $200 billion by March 2025 (Ahmed and Aldasoro 2025). Transaction volumes have reached hundreds of billions of dollars, making stablecoins a digital alternative to traditional currencies, although they remain much smaller

than established payment networks like Visa (Quinio et al. 2025). Stablecoins' influence extends directly into core financial markets. Ahmed and Aldasoro find that a $3.5 billion inflow into stablecoins can measurably decrease three-month US Treasury yields by 2–2.5 basis points within days.

CBDCs, like Europe's proposed digital euro, offer a public alternative—electronic versions of official currency issued directly by central banks. They are a tokenized form of central bank money. From the perspective of the consumer, a euro CBDC is like having a (limited) bank account directly with the central bank.

Diverging Regulatory Philosophies: US Versus EU

The key driver of Europe's legislative and regulatory efforts is "strategic autonomy," meaning less day-to-day reliance on US financial companies and the dollar. Beyond monetary sovereignty, EU discourse expresses concerns about financial stability, consumer protection, and pan-European payment system integration. In the euro area, each country has its own payment system, contributing to the fragmentation of the single market. This explains the large role played by private providers, which could be reproduced with digital payments. Philip Lane (2025) has warned about the risk of walled gardens, noting that by "bundling payments with other services and restricting interoperability, platforms can establish so-called walled gardens, leveraging network effects to lock in users and making the loss of convenience or the cost of leaving the platform prohibitively high." This desire drives both the official digital euro project and the strict MiCA rules for private crypto-assets. The aim is EU control over its money system, promoting the euro, and strong user protection.

The United States is building a system to support private dollar stablecoins while enhancing, as made clear in the Treasury secretary's quote that introduced this chapter, the US dollar's dominance. This approach, while potentially leading to faster innovation and expansion, carries higher systemic and consumer risks, particularly given the lack of regulation of foreign issuers. Ahmed and Aldasoro (2025) lends weight to these systemic concerns by showing that stablecoin outflows can raise benchmark Treasury yields two to three times more than inflows lower them. This dynamic suggests a tangible "fire sale" risk during periods of stress, where forced selling by stablecoin issuers could destabilize short-term debt markets. The US GENIUS Act was approved by Congress and signed into law by President Donald Trump in July 2025. Relative to the European legislation, it leans toward facilitating innovation with a potentially lighter touch, focusing on domestically issued stablecoins.

Despite different legislative paths and timetables, both the United States and the European Union are moving to bring stablecoins within the regulatory perimeter, driven by shared concerns over financial stability, consumer protection, and the prevention of illicit finance. Both jurisdictions mandate full reserve backing for stablecoins to ensure their value and redeemability. Significantly, a clear convergence has emerged on the noninterest-bearing nature of payment stablecoins, with both proposed US legislation and the EU MiCA framework explicitly prohibiting issuers from offering interest or yield. This common stance underscores a shared policy direction to delineate stablecoins primarily as payment instruments rather than savings or investment vehicles, aiming to prevent direct competition with traditional bank deposits or money market funds on this front. Furthermore, both are

implementing measures to ensure issuers comply with anti–money laundering laws appropriate to their jurisdictions.

Key differences emerge, however, in the overarching regulatory philosophy and resulting structural choices. The European Union, with its MiCA regulation already in force, has adopted a comprehensive, harmonized framework across all twenty-seven member states, emphasizing strong consumer protection, strict requirements for issuers (including EU authorization for any stablecoin offered in the European Union), and the explicit goal of defending EU monetary sovereignty. This reflects a preference for detailed up-front regulation and the maintenance of sovereign control over the currency and payment landscape. The US approach, based on the GENIUS Act—recently approved but as of this writing, not yet in force (most of its provisions will go into effect January 1, 2026)—leans toward increasing innovation, particularly for dollar-backed stablecoins issued by federally or state-licensed entities, with a lighter initial touch to encourage growth and maintain US dollar dominance in digital finance. The United States is also developing a dual federal-state regulatory system, which allows for state-level experimentation within a federal framework, in contrast to the European Union's single rulebook.

Dollar-Denominated Stablecoins Could Be Attractive to Europeans

At first glance, dollar-denominated stablecoins might seem unattractive to Europeans, who would incur currency risk by using them. However, these stablecoins offer three significant advantages that could enable them to gain traction in Europe.

First, dollar stablecoins enjoy overwhelming market dominance. Euro-denominated stablecoins represent a minuscule fraction of the market—the top ten have a combined

capitalization of only €600 million, less than 0.24% of the total stablecoin market (CoinMarketCap 2025). This limited liquidity makes euro stablecoins less practical, creating higher transaction costs through wider bid-ask spreads.

Second, as detailed above, the less restrictive (though riskier) US regulatory environment may allow dollar stablecoins to innovate and expand more rapidly than their more tightly regulated European counterparts.

Third, US dollar (USD) stablecoins already dominate early use cases and benefit from network effects. The cryptocurrency trading ecosystem and decentralized finance (DeFi) platforms primarily use USD stablecoins. Each agent wants to pay in a way others will accept, so once a unit of account is established, it is hard to change it (consider the dollar's position in global trade, for example). Businesses with international operations priced in dollars may find efficiency gains in using these instruments for cross-border payments and hedging, particularly when there are capital controls or currencies are unstable. For instance, according to the *Financial Times* (Quinio et al. 2025): "Elon Musk's SpaceX uses them to repatriate funds from selling Starlink satellites in Argentina and Nigeria, while ScaleAI offers its large workforce of overseas contractors the option of being paid in digital tokens."

For most other European users and businesses whose economic lives revolve around the euro, it appears that the downsides, especially the currency risk and the hurdles imposed by MiCA on foreign stablecoins, make it unlikely they will be attracted to foreign stablecoins. And yet the immense power of network effects, which caused widespread alarm in banking circles during Facebook's Libra project, can trigger rapid adoption once a critical mass is reached.[3] If these stablecoins offer other compelling advantages, like "pseudo-

interest" payments (in the form of some kind of kickback as with checking accounts in the past) or usability benefits, in contrast to the unremunerated, sticky traditional bank deposit accounts, a significant outflow of funds from the banking system becomes a credible threat.

The Macro Risk of Digital Dollarization

The widespread adoption of dollar stablecoins within Europe would constitute a form of "digital dollarization" (Brunnermeier et al. 2019), with serious macroeconomic implications. As Philip Lane (2025) puts it:

> A growing prevalence of digital dollarisation would undermine monetary sovereignty by compromising the ability to control the unit of account within its jurisdiction. This means the domestic currency would risk losing its status as the dominant currency for expressing prices and settling most trades.

Such a development would weaken the European Central Bank's (ECB) ability to manage the euro area economy, as a significant portion of transactions would bypass the euro system, reducing the effectiveness of interest rate adjustments and other monetary policy tools.

Ahmed and Aldasoro (2025) provide empirical evidence that stablecoins are impacting US Treasury yields, a key channel for monetary policy transmission, even at this very early stage. This suggests that large-scale adoption of dollar stablecoins could indeed interfere with a central bank's ability to influence market rates and effectively transmit its policy stance.

This scenario also creates financial stability risks. European businesses and households earning euros but making payments in dollar stablecoins would face significant

currency mismatches if the euro weakened. Additionally, the ECB cannot act as a lender of last resort for dollar-denominated instruments, limiting its capacity to manage crises involving these stablecoins.

Ultimately, the proliferation of foreign digital currencies would erode Europe's monetary sovereignty, reducing the ECB's control over its payment system and increasing dependence on US financial infrastructure.

The Digital Euro as an Alternative

Recognizing these threats, the ECB and European Commission view a digital euro as essential for preserving monetary autonomy. Philip Lane (2025), again, put it clearly: "The digital euro is also an effective tool to limit the dominance of foreign digital currencies, including the monetary sovereignty risks created by widely adopted foreign currency stablecoins." The goal of the digital euro is to give everyone a wallet held at the central bank. European citizens would be able to store money and make payments directly from an account at the ECB instead of using private banks.

The introduction of CBDC is a response to private digital currencies like Bitcoin. This is how monetary innovation has historically occurred: Private monies fill gaps in the official monetary system—for instance, providing small denominations when public currency doesn't—but are typically short-lived as public money systems adopt their features (Brunnermeier et al. 2019). CBDC aims to incorporate the elements that make private digital currencies attractive—from their programmability through smart contracts to instant, low-cost cross-border payments. The goal is to make payments easier and cheaper, thereby

improving the value proposition of public money. At the very least, merchants and consumers would avoid paying the fees charged by oligopolistic card issuers.

However, the project faces strong opposition from traditional banks, which are concerned about losing deposits to central bank accounts. Their lobbying has resulted in severe limitations on the digital euro's functionality. The ECB's proposal limits the digital euro's usefulness by imposing the following:

- No interest payments on holdings
- Strict limits on the amount of money individuals can hold in their wallets
- Mandatory linkage to bank accounts for amounts over the holding limit, with excess amounts automatically transferred to linked bank accounts or transactions declined

It's like designing a fantastic new car but limiting it to thirty miles per hour to avoid competing with existing taxis. Who would buy such a car? In the ECB's view, this is necessary to preserve financial stability: "To preserve the economic function of commercial banks, individual digital euro holdings would be limited. Merchants would be able to receive and process digital euros but would not be able to hold them at all—protecting the corporate deposit base of the banking system" (Bindseil et al. 2024).

This seems peculiar. Banks hold enormous reserves (€3 trillion) in their ECB accounts—effectively money in interest-bearing ECB accounts. Why should citizens be different? The risk of destabilization that the ECB is worried about stems from the transition. Banks have used deposits to provide long-term loans. If the digital wallet had no limit,

offering a safe and fast means of payment, deposits might flood out of banks, creating a mismatch with their illiquid long-term loans.

But Is the Status Quo Worth Protecting?

Beyond the transition costs, is the banking system worth such protection? The traditional justification is that banks serve a unique and vital economic function through "maturity transformation," by converting liquid, short-term deposits into long-term loans like mortgages. This narrative is increasingly at odds with reality:

- Nonbank lenders handle 55% of US mortgages (Cruz and Gull 2024).
- Private credit funds manage $2 trillion globally (Cohen et al. 2024).
- Payment processing has been transformed into software by companies like Stripe.
- Specialized private equity funds are disrupting traditional corporate lending.

Almost every core banking function is now done more efficiently by specialists. But banks retain one distinctive feature. While specialized firms have taken over most banking functions, they haven't inherited banking's fundamental vulnerability: the susceptibility to runs. This critical flaw, rather than any special economic function, has become the defining characteristic of modern banking, demanding ever-larger state guarantees to maintain stability.

Banks are mainly financed with debt (including deposits), which accounts for about 90% of bank assets. Banks consider onerous the regulatory (Basel III) requirement that their leverage ratio (the share of capital out of total exposure) be 3%. Hence, even a small drop in

asset prices can leave banks insolvent, forcing them to sell holdings at fire-sale prices, setting in motion a doom loop of falling values and mounting withdrawals.

The 2008 collapse of British bank Northern Rock still demonstrated a "traditional" bank run. But modern runs happen at the speed of social media, as seen with Silicon Valley Bank's WhatsApp-coordinated exodus. As runs have evolved, so has the state's solution, deposit insurance. It has become an elaborate fiction. Officially, it protects small depositors while maintaining market discipline. In practice, it expands to cover all deposits during crises. Recent examples demonstrate this pattern. All deposits in Northern Rock were guaranteed by the United Kingdom in 2007. The Irish state guaranteed the entirety of the deposits in the Irish financial system in 2008 and subsequently went bust as a result (Germany immediately followed suit). In March 2023, the US Treasury invoked a "systemic risk exception" allowing Signature Bank and Silicon Valley Bank's uninsured depositors to receive full protection beyond the insured $250,000 limit.

With subsidized funding, banks take large risks. One current example is the real estate portfolios of US banks. According to Jiang et al. (2023), banks hold about $2.7 trillion in commercial real estate loans. These loans, often guaranteed by empty (post-Zoom) office buildings, account for about 25% of their business and are worth a lot less than what appears on their books. Given the tiny sliver of equity available, many banks are underwater. Jiang et al. (2023) show that with a 10% commercial real estate (CRE) default rate—modest by historical examples—the median US bank has negative equity. The only reason they avoid a run is deposit insurance.

The scale of state intervention, which has grown with each crisis, will certainly grow in the next. The combined balance sheets of recent US bank failures (Silicon Valley Bank,

Signature Bank, and First Republic Bank) surpass the combined assets of the twenty-five banks that collapsed in the 2008 financial crisis. The Swiss central bank provided almost CHF 168 billion in assistance to Credit Suisse. Banks have effectively established a model where they collect government-guaranteed deposits, make risky investments with those deposits, keep profits during good times, and receive taxpayer bailouts when things go wrong.

Banks are losing utility, and they have become unwieldy and risky. Could we do without them? There are two main objections.

First, banks function as the state's financial monitoring infrastructure, aiding in tax enforcement and anti–money laundering efforts. In 2022, US financial institutions filed more than 3.6 million Suspicious Activity Reports, better known as SARs (Thomson and Reuters 2023). On paper, a CBDC could solve this problem at a lower cost. But in Europe's case, the ECB has emphasized privacy—not surveillance—as a key feature of the digital euro. The ECB aims to make the digital euro as anonymous as using cash. This creates a paradox: If it offers stronger privacy protections than bank accounts, it could weaken anti–money laundering efforts. Ideally, the ECB would treat large transactions in the digital wallet like we treat large cash payments today, governed by monitoring requirements while keeping small payments private.

Second, banks perform maturity transformation. But do we really need banks to do this anymore? Many other financial institutions and modern services can connect savers with borrowers without taking on as much financial risk as banks do. According to Jiang et al. (2020), the US shadow banking system operates with less leverage than banks, on average half as much.

The Digital Euro Dilemma

How would deposits at the ECB be turned into loans if a digital euro were widely adopted? The ECB could be obliged to buy market-rate European public debt with the proceeds from issuing the digital euro while lifting restrictions on remuneration and amounts of digital euros held by private households or nonbank firms. This could offer greater stability and similar liquidity while keeping interest rate and default risks on the central bank's balance sheet minimal.

Instead, the ECB is trying to thread an impossible needle: Make the restrictions tough enough to protect banks while keeping the digital euro attractive enough to encourage adoption. With the current design, adoption will probably be minimal. All this appears to be aimed at protecting the (subsidized) profits of the largely inefficient traditional banking system.

The ECB has two choices. First, it can design the best digital euro possible to encourage adoption. In this case, most of the restrictions on its use will have to go, since they undermine the wallet's functionality, and people will rightly not understand why banks earn interest on their digital euros, called "reserves," while citizens do not.

Second, the ECB can follow the Federal Reserve and the Bank of England's wait-and-see approach. As Bank of England Governor Andrew Bailey questions, "Are [there] reasons why in the retail space, digital payments need to be done in a newly created Central Bank Digital Currency? A priori, I think the answer to this is that commercial bank money—i.e., banks—is the best home for such innovation" (Bailey 2024).

Digital currencies offer a chance to reimagine our financial system, but Bailey asks us to consider whether central banks are the right institutions to lead this innovation. Concentrating deposits at the central bank could create new risks even as it solves old ones.

The ECB's current approach risks failure on both fronts. It creates a digital currency that is too restrictive to be useful, while simultaneously preserving many of the weaknesses of our existing financial system. This gives us the worst of both worlds, neither significant innovation nor enhanced stability via a public option.

These design compromises risk making the digital euro unattractive compared with private alternatives. Even if it successfully navigates the complex EU legislative process, a heavily restricted digital euro might struggle to compete with both MiCA-compliant private euro stablecoins and globally dominant dollar stablecoins. Although potentially less secure, these alternatives offer advantages like no holding caps, and freedom from bank account linking requirements. Features intended to protect the banking sector may ultimately undermine the digital euro's adoption.

Conclusion: Europe's Untenable Position

Europe cannot have it both ways. It wants to protect its banks from competition while also defending the euro in the digital age. This won't work. By coddling banks with a deliberately hobbled digital euro, Europe may hand victory to dollar stablecoins in its own backyard. The demonstrated ability of dollar-backed stablecoins to influence core sovereign debt markets, coupled with their substantial and growing asset base, underscores the urgent need for action. If Europe's public digital currency option is not compelling, the gravitational pull of large, market-moving dollar stablecoins could accelerate digital dollarization, with the

attendant risks to monetary policy transmission and financial stability highlighted by recent research.

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[1] The ideas in this chapter were developed in two posts in Substack on this topic (Garicano 2024, 2025).

[2] The GENIUS act was approved while this document was under review. The author has updated it to reflect the final version.

[3] Facebook's Libra project aimed to create a global digital currency backed by a mix of major world currencies on top of Meta's Facebook network. It startled regulators into action and central banks because a private company with billions of users could threaten their control over monetary policy and the economy.

9

How Stablecoins Will Transform Banking

Charles W. Calomiris

Introduction

Stablecoins are about to transform the financial system. The initial transformation they will produce comes from their ability to operate as a new medium of exchange, replacing bank deposits and the antiquated Fed- and bank-based payment system that is based on check writing and interbank deposit clearing. Instead, stablecoins offer a new decentralized retail payments network and a new way to clear payments among stablecoin issuers.

This shift away from a reliance on transaction deposits at banks to stablecoins will result in major social benefits by making payments faster and more secure, and it will increase the interest paid on balances maintained to execute those payments. Stablecoins will also allow payments to occur in combination with the transmission of other, related information in new ways.

Because banks will lose transaction deposits as a major source of funding, they will have to rely more on wholesale sources of funding and engage more in securitization, which will move more intermediation off bank balance sheets into specialized intermediaries.

Securitization will be funded by short-term bank debt to support banks' short-term working capital needs, and long-term securities raised in the market to fund loans.

One might wonder whether banks' loss of deposits would entail social costs from separating the two lines of business. The best answer to that concern is to note that, if there were costs related to the lost synergies between banks' transaction deposits and lending, then banks would be able to avoid the loss of deposits through market competition. The fact that banks have lost, and will likely continue to lose, transaction deposits to stablecoin issuers implies little need for concern about the social costs of the movement of funds from deposits to stablecoins.

Why have the historical synergies between banks' activities as lenders and transaction deposit providers become less important? This change likely reflects new types of information technology that have made the synergies between loans and transaction balances much less important than they used to be, as described later in this chapter.

At the time of this writing, Congress is debating new legislation that would charter stablecoin issuers and limit the issuance of stablecoins by nonchartered entities. There are important potential social advantages from permitting stablecoin issuers to obtain charters, but there is no obvious justification for making charters mandatory other than protecting unsophisticated consumers from abusive practices that chartering would avoid.

Stablecoins throughout the world are almost exclusively denominated in dollars, and the stability of their value is gauged relative to the dollar. However, in the future, because stablecoin transactions are cleared through blockchain, they offer an additional potential source of social benefit: a means to create a new unit of account, or units of account, that would be superior to the dollar. The technology to produce those new units of account

already exists, but making use of that technology to supplant the dollar entails major economic, political, and legal challenges that will determine how quickly it diffuses.

From the perspective of financial history, stablecoins present the possibility of the most important financial technology for generating social benefits in over four centuries. Not since the Wisselbank's (Bank of Amsterdam) innovations of the seventeenth century has the world seen such a major potential change in both the global medium of exchange and the unit of account. Like the Wisselbank, stablecoins will make it possible to create a substantially improved unit of account (Quinn and Roberds 2023).

The Wisselbank first offered the world's merchants a centralized location for clearing bills, thereby greatly facilitating international trade. The Wisselbank then improved upon the unit of account for denominating transactions by creating its own synthetic unit of value, which was not subject to the problems of clipping, debasement, and forgery associated with the use of coins as units of account. Stablecoins are a much bigger potential improvement than even the Wisselbank when it comes to both the medium of exchange and the unit of account, and could bring the transacting system closer to the imagined money-free, frictionless world of the Walrasian auctioneer.[1]

This chapter is organized as follows. In the next section, I will examine why the synergies between deposit issuing and lending are not likely to be important enough in today's world to require intermediaries to engage in both kinds of business. This implies that those synergies are not powerful enough to prevent banks' losses of transacting balances to stablecoin issuers, who would operate as "narrow" intermediaries, which eschew lending and devote themselves solely to providing payment services. Then I will discuss the improvements from stablecoins as a medium of exchange relative to deposits. Next, I will

explore why the voluntary chartering of stablecoin issuers offers potential social benefits by improving verification through a reliance on examination by government agencies. Later, I will review the current competitive landscape of stablecoins and the likely importance of networks in the competition among stablecoin issuers going forward. Finally, I will consider the more distant future of stablecoins, and specifically note that stablecoins can make use of blockchain to provide a new unit of account, or perhaps multiple units of account, to supplant the dollar. It considers the potential advantages of this change and explores the political, legal, and economic challenges that will have to be overcome for that to occur.

Stablecoin Narrow Banking in Equilibrium

Although stablecoins may seem a bit boring compared to Bitcoin, whose price regularly soars and crashes, given that their purpose is to execute payments, boring should be considered a desirable feature, not a hindrance. People do not want to maintain transaction balances that are subject to any significant risk of depreciation. Throughout the history of banking, prior to the creation and spread of government deposit insurance, deposit market discipline has forced banks that offer transaction accounts to maintain adequate capital and cash holdings so that changes in the value of risky assets had little possibility of affecting the value of transaction accounts (Calomiris and Wilson 2004; Calomiris and Carlson 2016; Calomiris and Jaremski 2019). Stablecoin holders will demand the same reliable stability from issuers of stablecoins. Maintaining sufficient capital and cash assets and limiting the riskiness of risky assets remains the obvious solution.

Indeed, it is not clear that there is an economic argument in favor of stablecoin issuers holding any risky assets. In the case of banks, historically, there are two fundamental

synergistic arguments for combining deposit issuing with lending, and both relate to the mitigation of costs related to asymmetric information. Those arguments focus either on the gains from resolving agency conflicts or the improvements in bankers' monitoring from observing changes in transaction balances.

With respect to the first of these, Calomiris and Kahn (1991) shows that asymmetric information about the value of bank loans, which is a natural consequence of delegating to bankers the tasks of screening and monitoring borrowers, can produce conflicts of interest between banks and depositors, which they model as an ex post banker absconding risk. Calomiris et al. (2018) shows that a similarly problematic conflict takes the form of banker underinvestment in ex ante monitoring efforts in certain circumstances. By funding the bank with demandable debt deposits subject to a sequential service constraint, banks incentivize some depositors to engage in monitoring, which prevents or reduces the principal-agent problem associated with legation. This makes deposits liquid and creates a natural synergy between transaction balances and bank lending.

It is also possible that the monitoring costs incurred by bankers with respect to their borrowers can be mitigated when a bank that lends also offers transaction balances (Mester et al. 2007). Firms' cash flows reveal important information about their changing prospects and risks, and changes in transaction balances reflect informative changes in cash flows.

Other information costs, specifically, those related to learning about clients and their needs, and thereby developing valuable intangible assets in the form of persistent client relationships that give rise to multiple transactions of different kinds, can justify additional bundling of activities in banks. Such activities include connecting traditional commercial banking (deposit taking and lending) with underwriting, asset management, insurance, and

other financial services. There is empirical evidence for such informational synergies, especially between lending and underwriting, both historically and in recent years (Kroszner and Rajan 1994; Puri 1994; Calomiris and Pornrojnangkool 2009). In the 1980s and 1990s, US banks underwent both a merger and branching wave, and an expansion of their abilities to offer a variety of products and services. These changes produced a small number of nationwide universal banks operating for the first time in the United States.

Notwithstanding all the evidence for advantageous bundling in the past—for lending and deposit issuing, and for lending and underwriting—in recent years, improvements in information technology, along with changes in "open banking" regulation, have pushed in the opposite direction toward unbundling. Fintech firms are providing highly competitive and innovative services, and they tend to specialize in one activity. Typically, it involves some type of payment service, lending, or asset management, but not more than one.

Access to a wide array of information about customers, made possible by the revolution in information technology, makes it less important for intermediaries to produce information about customers as part of the structure of their enterprises. The new availability of nonproprietary information fundamentally undermines the case for bundling. For example, open banking laws require banks that provide payment services to share the records associated with transaction accounts for businesses or consumers with other lenders at the request of customers. Lenders with access to such information can screen and monitor borrowers as effectively as the bank that provides the transaction account services (Rishabh 2025).

The ability to scrape a wide variety of information about clients from the web provides another new source of information. For consumers, in addition to FICO credit

scores, new techniques make use of other consumer information, such as utility bills and payment records, which is particularly helpful for the many US consumers for whom FICO scores do not exist.

A lender that connects with consumers online has much lower overhead costs, and therefore, can afford to make small-dollar loans at much more favorable terms than a brick-and-mortar bank. Such lenders can also make innovative use of new web-based means to overcome language barriers and other impediments that have often blocked poorer borrowers from accessing bank services (Calomiris 2021).

With respect to small business lending, consider OakNorth Bank, which operates in the United Kingdom and has developed an innovative means of tracking information related to small business borrowers using thousands of data sources. OakNorth is now able to use that information to predict problems at borrowing firms before they happen, and notify firms in advance so that the problems can be avoided. Doing so allows OakNorth to avoid nonperforming loans. The company has since entered the US market as an information platform, providing data to lenders to track small businesses. A small business lender with access to OakNorth's information and to transaction accounts records under open banking laws would gain little or nothing from engaging in bundling as an alternative means of creating client-specific proprietary information.

The ability to rely upon web-based information and having a means of connecting with clients explains why specialized fintech firms have been so successful in growing their market shares in lending and payment services at the expense of traditional lenders and payment providers. The explosion in the growth of fintech firms in these two areas occurred

between 2013 and 2018. Marketplace lenders saw their market share of personal loans rise from 5% to 38% over that time.

The combination of access to new information and low physical costs of operation has allowed fintech firms to focus competitively on one type of service and gather whatever client information they need from external sources. It is not surprising that specialization has emerged as the preferred approach. After all, bundling of services is always inferior to specializing, unless there are strong synergies driving the advantages of bundling. Specializing permits greater managerial focus, avoids governance costs associated with organizational complexity, and reduces the agency cost inefficiencies associated with incentive conflicts that support losers within diversified enterprises.

There are three key implications of this analysis for the future of stablecoins. First, with respect to the Mester-Nakamura-Renault motivation for bundling (Mester et al. 2007), stablecoin issuers will be able to compete with banks as payment service providers. This is because banks will not continue to enjoy advantages from private information related to observing transaction account changes that would prevent payment services to a client from being separated from lending to that client.

Second, with respect to the Calomiris-Kahn motivation for bundling (Calomiris and Kahn 1991), the available sources of publicly available information substantially reduce the amount of private information that lenders possess about their borrowers. This decrease thereby avoids the need to discipline bankers through the threat of deposit withdrawal. Of course, deposit insurance has also weakened the practical relevance of deposit withdrawal risk as a disciplinary device.

Third, not only can one conclude that private information will not be as important as it once was to keep depositors attached to their banks, it also seems clear that there is no economic rationale for stablecoin issuers to involve themselves in lending or other activities unrelated to payment services, so long as they are able to compete effectively for customers on a standalone payment service basis. That implies that if stablecoin issuers can provide an efficient payment system alternative to deposits on a standalone basis, they should specialize in payment activities, back stablecoins with riskless assets (such as short-term Treasury bills), and avoid holding loans or other risky assets on their balance sheets. By doing so, it will permit them to exhibit income streams that are simple and predictable.

What Can Stablecoin Payments Do Better Than Deposit-Based Bank Systems?

Stablecoins will be able to out-compete bank-supplied deposits because they are superior to deposits as a payment technology in several respects. Stablecoin issuers are not burdened with the physical and regulatory costs of banks, and therefore, will be able to operate with lower spreads between interest earned and interest paid. Competitive stablecoin issuers should be able to pay close to Treasury bill yields.

Stablecoins are an inclusive technology that can access payments from a smartphone, something the vast majority of people already use. This means that many people who currently lack a bank account will be able to transact in all retail transactions using stablecoins linked to their cellphones.

Stablecoins will not only offer more people access to payment services and higher interest on transaction balances, but they will also allow payments to be processed much faster. Stablecoin issuers operating in a blockchain-based, decentralized system will be able

to execute transactions with finality using gross real-time settlement virtually at the speed of light.

Stablecoins will clear through a decentralized blockchain-based network, which will be more secure and less prone to hacking than the centralized Fed-based system, which even Fed researchers concede will almost certainly, sooner or later, be the locus of major payment system disruptions related to hacking (Eisenbach et al. 2020).

The separation of stablecoin issuance from lending will reduce systemic risk. Stablecoins provided by intermediaries that avoid lending avoid the risk that an asset value collapse related to risky loans will disrupt the payment system (for example, through a run on deposits or commercial paper), which have been the primary sources of payment system risks related to banking crises in the past.

Because stablecoins operate on the blockchain, transactions involving stablecoins could be accompanied by messages related to payments that would permit the execution of more complicated, conditional payments. For example, one will be able to demonstrate (using third-party verification) one's age, residential location, citizenship, and other personal details to counterparties as one sees fit when purchasing goods and services. One will also be able to make payments contingent on verifiable outcomes. These messaging and contingency payment services will be a new dimension of competition among payment providers and also a source of fee income for stablecoin issuers.

Recent years have seen helpful payment system innovations, such as PayPal, Venmo, and Zelle, but these still piggyback on the existing centralized, Fed- and bank-based network. None of these services created a fundamentally different core network plumbing for executing payments. Stablecoins would permit a revolutionary payments network to arise

with many benefits. In comparison with bank deposits, stablecoins will pay more interest, be more broadly accessible, be able to execute much faster, be secure from hacking, and be immune to systemic problems buffeting lending markets. Stablecoins will also enable a newly enriched platform for structuring payments to include helpful information about the payor and about contingencies that are relevant for the payment. All of this will imply substantial increases to social welfare from the shift from bank deposits to stablecoins as a medium of exchange.

Advantages of Chartering Stablecoin Issuers

At the time of this writing, Congress is considering legislation to permit, and in some circumstances to require, the chartering of stablecoin issues. Currently, the outstanding $200 billion in stablecoins was issued by non-chartered entities. There are significant potential advantages to chartering stablecoin issues, all of which would reinforce competitive pressures to favor the most efficient suppliers. Because a charter should be a competitive advantage to a stablecoin issuer, charters will be welcomed by users. Therefore, it is hard to say why charters need to be mandated, apart from arguments from consumer advocates that some consumers may need the protection from unscrupulous issuers.

As Calomiris (2020) explains, the record of national bank examinations provides useful evidence about the gains that attend charters. Most obviously, stablecoin issuers would benefit from credible third-party examinations that convey important verifications to users. When potential users can verify that the issuer maintains the amount and quality of assets that it claims it maintains, that should help high-quality issuers compete for funds. Examiners should focus on verifying that balances are maintained over time, not just at a

point in time. They can also verify that the algorithms used to execute transactions or other features of the issuer's business model are as advertised.

There are also additional social gains from the examination of chartered entities. Issuers will be required to ensure that sales taxes are paid as prescribed by law and that prohibited criminal uses of the payment network are not occurring. Using examination to verify these practices serves the public interest.

Charters need not require redemption of stablecoins because there are alternative means of ensuring stable value. For example, issuers can maintain purchase and sale orders (at 0.99 and 1.01, respectively) on a coin exchange that would ensure the maintenance of parity, so long as sufficient riskless reserves are maintained. Requiring redemption is not only unnecessary, but doing so can create the potential for undesirable liquidity risk (Calomiris 2021).

Charters need not require 100% riskless asset holdings. They could permit structures that make use of alternative means of ensuring payment, or of allowing some risk of nonpayment, if this is considered by some consumers to be a desirable feature of a stablecoin. For example, if issuers are earning fee income and that income flows continually and has a reliably large lower bound, then it may be able to substitute for cash to some extent. A private standby granted by a qualified counterparty backed by that fee income might be a close substitute for cash.

It is also conceivable that some stablecoin holders may prefer a little risk of default so that they can earn higher interest (like depositors in uninsured banks have historically done). A default could take the form of recognizing a loss and algorithmically reducing the number of stablecoins commensurately, then resetting the value of stablecoins at parity and

resuming business. So long as a stablecoin issuer is transparently and honestly executing a business strategy, stablecoin holders should be allowed to choose to deviate from 100% riskless holdings if they want to do so.

All stablecoin issuers, even those committed to maintaining 100% of their outstanding coin balance in riskless Treasury bills, should construct and advertise their algorithmic reset protocol to deal with losses that would undermine their ability to maintain one-to-one parity of their stablecoins. Fraud is a common source of loss in banking, and there is no reason to believe that stablecoin banking will be devoid of dishonest behavior. When losses occur that are sufficient to undermine the ability to maintain parity due to fraud or other causes, those losses need to be allocated predictably (with a commensurate fractional write-down of outstanding stablecoins) so that the issuer can reset its position and continue with little disruption.

Networks and the Competitive Landscape Among Stablecoin Issuers

In the history of payment system innovation, incumbents rarely play the role of major technological innovators. Perhaps because incumbents seek to preserve their existing cash flows related to the customer relationships they possess and the transactions they already offer, for such incumbents, innovating is a two-edged sword. New entrants face no such trade-off, and consequently, they are understandably more willing to promote innovation and able to leapfrog the previous innovators, like Western Union and American Express, which were the pioneers of their day with wire transfers, travelers' cheques, and payment cards.

Similarly, although banks have tinkered with stablecoin issuance, the main entrants so far have been nonbanks. Tether, which operates as an unchartered intermediary from

headquarters outside the United States, has a greater than 90% market share in stablecoin issuance.

That dominance does not reflect a stellar record for transparency and stablecoin value stability (Tether has had a bit of a dodgy reputation on those accounts), but rather, it reflects Tether's first-mover advantage, specifically, the way it has positioned itself within the global crypto network. Tether is uniquely useful for purchasing other crypto-assets because crypto exchanges allow Tether holders to maintain balances at their exchanges, because they execute contracts to buy Bitcoin, Ethereum, and other crypto-assets in exchange for Tether, and because Bitcoin and Ethereum allow Tether to live within their blockchains. My understanding is that this means that Tether stablecoins can effectively be stored within those blockchains.

The case of Tether's current dominance illustrates the importance of network economies in determining competitive success. Stablecoin issuers that want to challenge Tether for market share will have to compete not only on the basis of their product quality—the interest they pay, their speed of execution, and the quality of their messaging technology—they will also have to prove to be practically useful for operating within existing networks to execute retail transactions and purchase crypto-assets.

It is therefore not surprising that one of the emerging new stablecoin competitors is the Global Dollar Network, an alliance among companies that include Paxos, Anchorage Digital, and Robinhood, among others, aimed at attracting a wide range of partners to participate in a single stablecoin. The advantage of a single coin is that it could achieve a similar liquidity status to Tether by virtue of its common use in many applications. My understanding is that, say, Walmart or Amazon could join the Global Dollar Network and

maintain control of the retail relationships they bring to the network, while also enjoying the scale economies that come from using a common stablecoin.

Regulators could provide constructive guidance to encourage competition among stablecoin issuers by deciding in advance what sorts of policies will be applied to these new network infrastructures. For example, if a group builds some infrastructure for facilitating retail payments, what kind of "common carrier" rules would be applied to other parties' access to that network? Clarity on this issue might be beneficial for encouraging the construction of such infrastructure.

Supplanting the Dollar as the Unit of Account

Economists studying general equilibrium market outcomes and consumer welfare have long recognized that the use of nominal prices in contracts and exchange (denominated in the unit of account) is a source of friction that tends to limit the optimality of market allocations (Jevons 1875). From the perspective of Walrasian equilibrium, executing transactions sequentially using nominal prices denominated in money is a source of welfare loss because of fluctuations in the value of money relative to the various items being traded. A worker accepts a wage contract expecting it to be worth a certain proportion of that person's desired consumption, but then finds that the prices of the goods and services in the bundle have changed, so that the utility of consumption is not as great as the worker expected it would be.

What if we were able to construct a medium of exchange denominated in a unit of account that maintains a perfectly stable value relative to the desired consumption bundle? That would be an ideal unit of account because it would allow us to receive and give nominal payments, knowing that they would preserve their real value.

Stablecoins, in fact, offer a remarkable amount of progress in that direction. They provide a medium of exchange for making payments quickly, securely, legally, accompanied by helpful information and contingencies, and with a very small amount of foregone interest. Because blockchain maintains a complete record of all transactions, the ledger can then be used to define a consumption bundle that would, by construction, have a very stable real value.

The distributed ledger could construct not only a single, constant unit of account for the entire United States, but it could construct units of account that vary across regions and over time to ensure that they track consumption bundle differences across time and space. The new national unit of account could be a weighted average of those local units of account.

Blockchain can record the physical address of each purchaser, which means that it would be possible to construct local, as well as national units of account, so that cities or regions within the United States with very different consumption bundles could choose to use different units of account.

Presumably, there would be a trade-off between scale economies that would favor fewer units of account and the utility benefits of a better match between the unit of account and the local consumption bundle, which would favor more units of account.

Furthermore, changes in preferences over time could be accommodated. As consumption bundles change, an algorithm could track those changes and have units of account change to preserve their stability relative to the changing consumption bundle.

The core blockchain technology for constructing such units of account already exists, so in a sense, we could imagine that once stablecoins become a dominant medium of

exchange, they could also produce these imagined changes in the unit of account. But creating a new network of decentralized blockchain-based stablecoin transacting would only be the first step toward supplanting the dollar as the unit of account. There are many practical challenges—economic, political, and legal—that must be confronted before these consumption bundle-based units of account could supplant the dollar.

Politically, the government would have to be willing to permit the supplanting of the dollar. If the government wanted to prevent it, it could pass a law making it illegal to adopt units of account other than the dollar. Or Congress could discourage progress simply by an unwillingness, under its Article I authority, to consider alternatives to the dollar as legally valid for denominating transactions. The political argument in favor of allowing new units of account to supplant the dollar would be the consequent consumer welfare gains from doing so. The opposing argument would be the loss of control over the unit of account by the Fed and the national government. Clearly, there is no reason for monetary policy in an economy where payments take the form of stablecoins exchanged in a decentralized network using a unit of account other than the dollar.

It seems likely that, as the new dollar-free world becomes increasingly possible, some politicians will favor trying to prevent it from taking shape, perhaps to preserve the global free lunch of the dollar's reserve currency status, or to preserve the Fed's power to undertake countercyclical policy. Although the primary contributor to countercyclical instability in United States history has been the Fed itself, some would argue that the dollar and the Fed provide an important tool for countering the cyclical effects of other shocks. The COVID-19 epidemic provided a recent case in point.

Of course, countercyclical policy could be pursued using tools other than monetary policy (which attempts to affect the economy by varying the short-term interest rate). For example, the government could construct a cyclical policy that taxes or subsidizes the interest rates paid in loan and bond contracts depending on perceptions about the state of the economy. One can imagine something that might be called the "Federal Loan Tax and Subsidy Committee" (FLTC), which could operate in place of the current Federal Open Market Committee (FOMC) to determine when to impose taxes on interest payments, when to set a neutral policy, and when to offer subsidies. Whether and how the United States would decide to permit the dollar to disappear, and allow some kind of new countercyclical policy institutions to arise, would likely be a major source of political disagreement.

Note that the government's support for unit of account innovation will be helpful, not only to make new units of account a legal tender, but also to facilitate the aggregation of information that would be necessary to construct those units of account. Open banking laws that require the sharing of transaction data, if approved by customers, could take a new form: requiring that anonymized versions of all transactions that appear on the blockchain would be publicly available to permit the construction of new units of account based upon optimal consumption bundles.

Once the aforementioned political and legal hurdles have been surmounted, there are practical economic challenges that must be addressed when constructing the new units of account. Given that agents within cities and locations are heterogeneous, whose consumption bundle will be used to define the unit of account? Apartment rental costs should be a major component of a consumption bundle, but whose apartment? Some people eat fast food, others don't. Some will favor focusing on the consumption bundles of low-income

households, and some will favor using an average. Furthermore, any answer to the question of the bundle's composition, it turns out, is also tied to the answer to another question: how to clear transactions denominated in the bundle. As I will show, the need to clear transactions tends to favor certain items for inclusion in the bundle.

As Jevons (1875) recognized, a unit of account must itself be transactable in order to be used as a unit of account. When my stablecoin issuer pays your stablecoin issuer, it must send something that will be mutually recognized as having value equal to so many units worth of a unit of account. Once a new unit of account is created based on a consumption bundle, how will issuers clear their payments? How will issuers maintain adequate reserves so that they can clear payments once the dollar is gone?

Presumably, issuers will hold and clear tokenized Treasury securities denominated in the new nationwide unit of account. But that answer begs the question of how the US Treasury and other debtors will make their payments to creditors once dollars have disappeared. And how will interregional exchanges occur whereby some value denominated in one local unit of account is exchanged for some value denominated in another local unit of account?

The obvious answer is that there must be a way to transfer a claim on the consumption bundle that is generally recognized as a valid claim. Here is one approach. Begin with the tokenization of IOUs by local providers of goods and services. Just as firms today issue gift cards that entitle you to a certain amount of dollars spent at their establishments, one can imagine tokenized IOUs that entitle you to some real consumption. For instance, the fast-food chain McDonald's could issue Big Mac tokens that can be used to buy its Big Macs. A landlord can issue a token that can be used to pay a portion of the rent in

a particular apartment. If a unit of account combines various actual consumption items, then a tokenized reserve unit can be created that combines those tokenized IOUs, which can be used to execute payments denominated in the unit of account.

Once one thinks about reserves as tokenized IOUs, it is immediately apparent that there would likely be gains from limiting the consumption bundle definition so that it includes a small number of tokenized IOUs (not tokenized IOUs for every item consumed), which together do a reasonable job of spanning the value of a bundle of consumption goods and services that maintains a stable real value. A fly-by-night restaurant's steak-tokenized IOU is not as good as a token from a well-known chain like Ruth's Chris Steak House, because it has high default risk. An apartment complex with thousands of similar units will be able to issue lots of tokenized IOUs that are useful to pay a fraction of a (quality-adjusted) apartment rent, as per its specified quality-adjustment comparisons (higher units are worth a bit more than lower ones, etc.). The tokenized IOUs issued by the landlord of a small building with highly heterogeneous apartments would probably not be included as a component of the optimal bundle. I conjecture that large-scale enterprises will earn some "reserve rents" by virtue of the fact that greater scale will make tokenized IOUs more desirable as reserves, and therefore, more desirable for inclusion in the reference consumption bundle used to define the unit of account.

What happens when an issuer of tokenized IOUs goes bust? There would need to be a pre-specified algorithmic solution that would involve some loss sharing for holders of reserves, and that would reset the unit of account by replacing this element of the bundle with another similar tokenized IOU.

No, Dorothy, we are not in Kansas anymore. Constructing new units of account based on consumption bundles to replace the dollar will not be a trivial exercise, despite the fact that the core technology to do so (blockchain) already exists. First, stablecoins will have to supplant deposits as a medium of exchange. Then we will have to reach a political consensus that will favor the change and make related legal changes. Finally, we will need to decide on the local, regional, or national consumption bundles, based partly on which issuers' tokenized IOUs are good candidates as reserves.

I conclude that supplanting the dollar is not imminent. However, I think it is a mistake to see it as an impossibility. The welfare gains to consumers from getting rid of the dollar (and the unpredictable fluctuations in its value produced by Fed actions) would likely be large. All of the political, legal, and economic challenges, in principle, can be addressed. Whether and when we will do so, however, will depend not only on the prospective economic advantages of replacing the dollar but on the ability of our government apparatus to confront complex technical challenges in a thoughtful way. This may take some time, but the sooner economists and lawyers begin thinking and writing about the trade-offs of alternative design approaches, the faster it will be feasible to make the change.

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[1] A Walrasian auctioneer is a hypothetical figure in economic theory capable of determining a price that ensures supply equals demand in a competitive market for any good. It is a central component of the general equilibrium theory developed by Leon Walras and first presented in 1874.