

American University Washington College of Law

## Digital Commons @ American University Washington College of Law

---

Articles in Law Reviews & Other Academic Journals

Scholarship & Research

---

2022

### DeFi: Shadow Banking 2.0?

Hilary J. Allen

Follow this and additional works at: [https://digitalcommons.wcl.american.edu/facsch\\_lawrev](https://digitalcommons.wcl.american.edu/facsch_lawrev)



Part of the [Banking and Finance Law Commons](#), [Bankruptcy Law Commons](#), [Law and Economics Commons](#), [Science and Technology Law Commons](#), and the [Secured Transactions Commons](#)

---



## American University Washington College of Law

Washington College of Law Research Paper No. 2022- 02

### **DEFI: SHADOW BANKING 2.0?**

Hilary J. Allen

This paper can be downloaded without charge from  
The Social Science Research Network Electronic Paper Collection

## DeFi: Shadow Banking 2.0?

Hilary J. Allen<sup>1</sup>

*The growth of so-called “shadow banking” was a significant contributor to the financial crisis of 2008, which had huge social costs that we still grapple with today. Our financial regulatory system still hasn’t fully figured out how to address the risks of the derivatives, securitizations, and money market mutual funds that comprised Shadow Banking 1.0, but we’re already facing the prospect of Shadow Banking 2.0 in the form of decentralized finance, or “DeFi.” DeFi’s proponents speak of a future where sending money is as easy as sending a photograph – but money is not the same as a photograph. The stakes are much higher when money is involved, and if DeFi is permitted to develop without any regulatory intervention, it will magnify the tendencies towards heightened leverage, rigidity, and runs that characterized Shadow Banking 1.0.*

*Fortunately, though, there is still time to prevent DeFi from becoming Shadow Banking 2.0. This Essay argues for precautionary regulation of DeFi, designed to limit its growth and to cordon off whatever remains from the established financial system and real-world economy. While proponents of DeFi will contend that this will limit innovation, this Essay argues that DeFi innovation has limited benefits for society. DeFi doesn’t aspire to provide new financial products and services – it simply aspires to provide existing financial products and services in a decentralized way (meaning, without intermediaries). This Essay will demonstrate that the DeFi ecosystem is in fact full of intermediaries and explain why full disintermediation of financial services is an entirely unrealistic aspiration. This Essay will then proceed from that finding to argue that if DeFi cannot deliver on decentralization, regulators should feel emboldened to clamp down on DeFi in order to protect the stability of our financial system and broader economy.*

I. INTRODUCTION .....	2
II. SHADOW BANKING 1.0 .....	4
A. Credit Default Swaps .....	5
B. Mortgage-Backed Securities .....	6
C. Money Market Mutual Funds.....	7
III. DeFi.....	8
A. Introduction to DeFi .....	9
B. DeFi as Shadow Banking 2.0.....	10
i. Leverage.....	10
ii. Rigidity.....	12
iii. Runs.....	13
IV. HOW TO RESPOND.....	15
A. The Cost-Benefit Calculus .....	17

---

<sup>1</sup> Professor, American University Washington College of Law. Many thanks to participants in the William & Mary Law Review’s Cryptocurrency Symposium for their comments and perspectives, as well as to Ryan Clements, Stephen Diehl, and Todd Philips for helpful engagement with earlier drafts.

i. Decentralization.....	17
ii. Efficiency and Financial Inclusion .....	22
B. Regulatory Proposals.....	24
V. CONCLUSION.....	26

## I. INTRODUCTION

“DeFi” or “decentralized finance” has become one of the hottest trends in finance in the last few years. DeFi is usually discussed in aspirational terms, invoking comparisons to other types of technological innovations: we frequently hear that DeFi will make sending money as easy as sending a photograph, or an email.<sup>2</sup> But money is not the same as photographs and emails – the consequences of losing money (both for the affected individual and for confidence in the financial system as a whole) are much greater than the consequences of a lost photograph or email. Because money and finance are the lifeblood of our economy, finance has always been highly regulated in a way that Kodak’s provision of photographs, and FedEx’s delivery of couriered letters, never were.<sup>3</sup>

The existence of strong financial regulation has often spurred attempts to arbitrage it – and that regulatory arbitrage is sometimes facilitated by complex financial innovation.<sup>4</sup> That’s what happened in the lead up to the 2008 crisis, when credit default swaps and mortgage-backed securitizations evolved around existing financial regulation, just as money market mutual funds had decades earlier (because these services provided functional equivalents for banking products but operated outside the regulated banking sphere, they came to be known as “shadow banking”, and this Essay will refer to them as “Shadow Banking 1.0”). Few steps were taken to rein in these types of innovation, and the increased leverage, rigidity, and fragility they created became evident during the 2008 financial crisis – only in the aftermath of that crisis did legislators and regulators step up with some regulatory fixes (which have helped, but not fully addressed, the problems associated with Shadow Banking 1.0).

The crisis of 2008 had searing social consequences. The recession that followed had obvious and immediate impacts on employment and wealth, but it also generated a lingering mental and physical toll for the most vulnerable members of our society.<sup>5</sup> Nearly fifteen years after the financial crisis of 2008, we are still learning more about the damage that the crisis caused: recent work has focused on how the crisis has exacerbated inequality;<sup>6</sup> another developing area of literature considers the political repercussions of the crisis (and financial crises more generally), suggesting that such crises can lead to political radicalization.<sup>7</sup> The 2008 crisis was not inevitable,

---

<sup>2</sup> For example, see “Ethereum makes sending money around the world as easy as sending an email.” Ethereum, *Decentralized Finance (DeFi)*, available at <https://ethereum.org/en/defi/>.

<sup>3</sup> Carnell *et al.*, *THE LAW OF FINANCIAL INSTITUTIONS* 7<sup>TH</sup> Ed., 3 (2021).

<sup>4</sup> Saule T. Omarova, *License to Deal*, 90 WASH U. L. REV. 63, 70 (2012).

<sup>5</sup> Janet L. Yellen, *A Painfully Slow Recovery for America’s Workers: Causes, Implications, and the Federal Reserve’s Response* (speech dated Feb. 11, 2013), available at <http://www.federalreserve.gov/newsevents/speech/yellen20130211a.htm>.

<sup>6</sup> Bridges *et al.*, *Credit, Crises and Inequality*, Bank of England Staff Working Paper No. 949 (Nov. 2021).

<sup>7</sup> For a literature review (as well as findings that the severe banking crisis in Germany in 1931 not only led to “broad-based political radicalization shortly thereafter; once the Nazis were in power, both pogroms and

though. Some of the blame can be laid at the feet of financial regulators for taking a “wait and see” approach to Shadow Banking 1.0: in its report on the causes of the crisis, the Financial Crisis Inquiry Commission concluded that “widespread failures in financial regulation and supervision proved devastating to the stability of the nation’s financial markets”.<sup>8</sup>

Confidence in our traditional financial system (and the agencies that oversee it) was justifiably shaken by the crisis of 2008; this has understandably piqued interest in visions of an alternative decentralized financial system where no one needs to trust any intermediary because intermediaries have been rendered superfluous. Unfortunately, this is an entirely unrealistic goal – DeFi users have to trust in some combination of ISPs, core software developers, miners, wallets, exchanges, stablecoin issuers, oracles, providers of client APIs used to access distributed ledgers, and concentrated owners of governance tokens.<sup>9</sup> In short, DeFi doesn’t so much disintermediate finance as replace trust in regulated banks with trust in new intermediaries who are often unidentified and unregulated. This Essay will argue that DeFi innovations that are supposed to displace the need for trust in intermediaries succeed only in making DeFi more fragile than traditional financial services.

I have posed this Article’s title, “DeFi: Shadow Banking 2.0?”, as a question. There is already abundant evidence that DeFi mirrors and magnifies the fragilities of shadow banking innovations that resulted in the crisis of 2008; the question is whether policymakers will allow DeFi to grow and become sufficiently integrated with the established financial system that it can cause widespread harm. This Essay argues that such an outcome is not inevitable: policymakers should take a precautionary approach to DeFi regulation, limiting the use of DeFi where financial regulators are able to exercise jurisdiction, and then cordoning off whatever DeFi remains from the established financial system and real-world economy.

This approach will admittedly limit innovation in the DeFi ecosystem, but not all innovation is good innovation: if the risks of innovation outweigh any possible benefits it might have, then preventing that innovation is good public policy. In this context, it is important to understand that DeFi does not purport to provide any new types of financial products or services – it just aspires to deliver existing financial products and services in a decentralized way. Given that decentralization is an entirely unrealistic goal, we are left with technology that may be interesting from an academic perspective,<sup>10</sup> but in practical terms is inefficient in its complexity (and as a result, doesn’t respond well to the needs of those who are underserved by our existing financial system). As such, policymakers would serve us well by taking preemptive steps to prevent the growth of Shadow Banking 2.0.

This Essay will proceed as follows. Section II will provide an overview of Shadow Banking 1.0, with a focus on the fragilities of credit default swaps, mortgage-backed securitizations, money market mutual funds, and their contributions to the financial crisis of 2008.

---

deportations were more common in places more affected by the banking crisis”), see Sebastian Doerr *et al.*, *Financial Crises and Political Radicalization: How Failing Banks Paved Hitler’s Path to Power*, BIS WORKING PAPER No. 978 (Nov. 2021).

<sup>8</sup> Financial Crisis Inquiry Commission, *THE FINANCIAL CRISIS INQUIRY REPORT*, xviii (2011).

<sup>9</sup> See Section IV.A.i *infra* for elaboration.

<sup>10</sup> Cryptographic consensus mechanisms are an elegant solution to the double spending program associated with digital assets. Edmund Schuster, *Cloud Crypto Land*, 84 MODERN L. REV. 974, 988 (2020).

Section III will describe how the key fragilities created by Shadow Banking 1.0 (namely increased leverage, rigidity, and susceptibility to runs) will be present, and sometimes magnified, in a DeFi ecosystem built on distributed ledgers, tokens, smart contracts, and stablecoins. Section IV argues that the correct regulatory response to these fragilities is not to provide incomplete regulatory fixes to DeFi's individual fragilities, but to stop the DeFi ecosystem from growing and integrating with the established financial system. While this kind of regulatory approach will limit innovation, Section IV argues that DeFi is not particularly decentralized or efficient, and that limiting this kind of innovation is therefore a good policy outcome.

## II. SHADOW BANKING 1.0

Following the financial crisis of 2008, a significant amount of academic and policy work was done on “shadow banking”. Generally speaking, shadow banking describes financial activities that are the functional equivalent of activities carried out in the regulated banking system, but which escape bank regulation.<sup>11</sup> Around the time of the crisis, shadow banking included “such familiar institutions as investment banks, money-market mutual funds (MMMFs), and mortgage brokers; some rather old contractual forms, such as sale-and-repurchase agreements (repos); and more esoteric instruments such as asset-backed securities (ABSs), collateralized debt obligations (CDOs), and asset-backed commercial paper (ABCP).”<sup>12</sup> Because they facilitate new forms of leverage outside of the banking system,<sup>13</sup> credit default swaps are also considered part of the shadow banking system.<sup>14</sup> This Section of the Essay will use credit default swaps, as well as money market mutual funds and mortgage-backed securitization (a particular type of asset-backed securitization), to illustrate some of the fragilities that the first generation of shadow banking introduced into the financial system.

Although these forms of shadow banking differ in many respects, one thread that unites them is their complexity, which is a destabilizing force in and of itself. Complexity can make financial products (and their possible interactions with the broader financial system) harder to understand, increasing the chance that risks will go unanticipated.<sup>15</sup> Even if risks are anticipated, complexity-induced opacity increases the chance that such risks will be underestimated in good times (causing bubbles), and overestimated in bad times (making panics worse).<sup>16</sup> More generally, there is a whole discipline of complexity science that considers how increased complexity can make systems more fragile (particularly by obscuring how steps that are taken to make individual system components more robust can end up transmitting problems with those components throughout the broader system).<sup>17</sup> Increased complexity writ large is certainly part of the shadow

---

<sup>11</sup> “Shadow banks are financial intermediaries that conduct maturity, credit, and liquidity transformation without explicit access to central bank liquidity or public sector credit guarantees.” Zoltan Pozsar *et al.*, *Shadow Banking*, FRBNY ECONOMIC POLICY REVIEW, 1 (Dec. 2013).

<sup>12</sup> Gary Gorton & Andrew Metrick, *Regulating the Shadow Banking System*, BROOKINGS PAPERS ON ECON. ACTIVITY, 261-2 (2010).

<sup>13</sup> John Geanakoplos, *Solving The Present Crisis and Managing the Leverage Cycle*, 16 (Dec. 22, 2009), available at [https://fraser.stlouisfed.org/files/docs/historical/fct/fcic/fcic\\_report\\_geanakoplos\\_20100226.pdf](https://fraser.stlouisfed.org/files/docs/historical/fct/fcic/fcic_report_geanakoplos_20100226.pdf).

<sup>14</sup> Zoltan Pozsar *et al.*, *supra* Note 11 at 4.

<sup>15</sup> Dan Awrey, *Complexity, Innovation and the Regulation of Modern Markets*, 2 HARV. BUS. L. REV. 235, 250 (2012).

<sup>16</sup> Nicola Gennaioli *et al.*, *Financial Innovation and Financial Fragility*, FONDAZIONE ENI ENRICO MATTEI NOTA DI LAVORO 114.2010, 2 (May, 2010).

<sup>17</sup> For an overview of this literature, see Hilary J. Allen, *Payments Failure*, 62 B.C. L. REV. 453, 463 *et seq.* (2021).

banking story: this Section will explore the particular types of complexity inherent in credit default swaps, mortgage-backed securitization, and money market mutual funds.

### A. Credit Default Swaps

In finance, “leverage” refers to using debt to acquire financial assets. Banks loans are perhaps the most familiar and simple form of debt: investors (including other financial institutions) can use the money they borrow from banks to increase their exposure to the assets they want to invest in. Another familiar form of leverage entails investors borrowing some of the purchase price for an asset from their broker, which is known as trading on margin. Leverage can multiply profits, but when an investor only puts down a little bit of their own money to buy an asset and borrows the rest, their down payment can be quickly wiped out if the price of the asset falls.<sup>18</sup> Then the investor may have to sell the asset (or something else) in order to repay their debt (or to satisfy a lender’s demand for more loan collateral). From a financial stability perspective, too much leverage is problematic both because of its ability to multiply exposure to assets (which can inflate bubbles), and also because the deleveraging process once the market turns south generates significant “fire sale externalities” as the borrower is forced to sell assets at a discount in order to satisfy their lender.<sup>19</sup> This drives down the market price for the assets that are being sold, which may force other market participants to deleverage, and may even drive them into insolvency. Economist John Geanakoplos has observed that “[a]ll leverage cycles end with (1) bad news that creates uncertainty and disagreement, (2) sharply increasing collateral rates, and (3) losses and bankruptcies among the leveraged optimists.”<sup>20</sup>

Because too much leverage makes the financial system more fragile, traditional bank lending (as well as margin lending from brokers) has long been subject to regulatory requirements that have the practical effect of ensuring that some kind of minimum down payment is always made by the borrower, preventing unlimited leverage.<sup>21</sup> The development of credit default swaps (“CDS”) in the mid-1990s, however, created a new and initially unlimited way of creating leverage.<sup>22</sup> CDS work like a type of insurance policy that will pay out if the underlying bond suffers some kind of credit-related problem – except that you don’t need to hold the underlying bond to buy a CDS.<sup>23</sup> For this reason, multiple CDSs can reference the same underlying bond, and by doing so, multiply the number of people getting exposure to that bond. In the lead up to 2008, CDS buyers often failed to demand any “downpayment” of collateral from their counterparties, and so an unlimited amount of leverage could be created: “many firms, like AIG, were allowed to make naked bets, without any credible showing of collateral to back up their promise to pay in the event the default they were “insuring” against came to pass.”<sup>24</sup> And so the development of CDS allowed for the creation of more leverage in the financial system, which came to a head during the 2008 crisis. The Financial Crisis Inquiry Commission report on the causes of

---

<sup>18</sup> Anat Admati & Martin Hellwig, *THE BANKERS’ NEW CLOTHES*, 17 (2013).

<sup>19</sup> “Losses by leveraged buyers of assets can cause a chain reaction when a margin call forces a leveraged buyer to sell, which lowers the price forcing another leveraged buyer to sell and so on.” Geanakoplos, *supra* note 13 at 20.

<sup>20</sup> *Id.* at 2.

<sup>21</sup> *Id.* at 19.

<sup>22</sup> For a comprehensive recount of the development of credit default swaps, see Gillian Tett, *FOOL’S GOLD* (2009).

<sup>23</sup> Geanakoplos, *supra* note 13 at 16.

<sup>24</sup> *Id.* at 20.

the 2008 crisis noted that leverage was hidden in derivatives positions, and labeled derivatives (particularly CDS) as a significant contributor to the crisis.<sup>25</sup>

In the aftermath of the 2008 crisis, Congress and regulators took steps to reduce the amount of leverage that swaps could create in the financial system: Title VII of Dodd-Frank encouraged clearing of swaps (with the expectation that clearinghouses would impose margin requirements as well as net out obligations), and introduced margin requirements for uncleared swaps.<sup>26</sup> We have already discussed how the “down payment” required by margin requirements limits leverage; netting is another way of reducing the amount of leverage in the system. When CDS obligations are netted out against one another, they cancel each other out, reducing the amount of leverage associated with an asset. Geanakoplos demonstrates this using the following example:

*A firm F that was neutral, betting one way against firm A on [a bond], and betting the opposite way on the same [bond] against firm C could come out a loser anyway. If firm A defaults on its insurance payment, then F will be unpaid by A but still on the hook for paying C. So instead of just one firm A going bankrupt and another firm C going unpaid in the absence of collateral, as would happen with netting, another firm F might also go bankrupt, closing shop, firing workers, and creating other social costs.*<sup>27</sup>

Regulation requiring netting as part of the clearing process eliminates exposure for parties like F and reduces the amount of leverage in the system overall (although it does concentrate a significant amount of risk in clearinghouses themselves). Title VII of Dodd-Frank is an improvement over the unregulated status quo that prevailed before it was enacted (which allowed CDS to create almost unlimited leverage), but Title VII has many limitations and has come in for its fair share of criticism (particularly regarding the amount of risk building up in clearinghouses).<sup>28</sup>

### *B. Mortgage-Backed Securities*

When banks make loans and hold them on their books, they are required to meet regulatory capital requirements with respect to those loans (in other words, to continue funding them with specified amounts of equity).<sup>29</sup> However, if banks make loans and then sell them, then they have no continuing obligation to satisfy capital requirements with respect to those loans (they also avoid any ongoing default risk associated with those loans). Securitization provides a way for banks to sell their loans right away: shortly after the bank makes the loans, they are sold to a bankruptcy-remote entity that pays for the loans by selling bonds or other debt instruments to investors (in exchange, those investors receive payments of principal and interest over time that are derived from the pool of loans).<sup>30</sup> Where the assets are mortgage loans, payments to investors come indirectly from borrowers’ repayments on their individual mortgages.

---

<sup>25</sup> Financial Crisis Inquiry Commission, *supra* Note 8 at xx; xxiv.

<sup>26</sup> Michael S. Barr *et al.*, FINANCIAL REGULATION: LAW AND POLICY, 1084 (2016).

<sup>27</sup> Geanakoplos, *supra* note 13 at 20.

<sup>28</sup> See, for example, Adam J. Levitin, *The Tenuous Case for Derivatives Clearinghouses*, 101 GEO. L. J. 445 (2013).

<sup>29</sup> For a more detailed description of regulatory capital requirements, see Hilary J. Allen, *Let’s Talk About Tax: Fixing Bank Incentives to Sabotage Stability*, 18 FORDHAM J. OF CORP. & FIN. L. 821, 828 *et seq.* (2013).

<sup>30</sup> Gorton & Metrick, *supra* Note 12 at 270.



Mortgage-backed securitization therefore provides a way for the capital markets to fund the types of loans that were traditionally made by banks, and to do so in a way that avoids the regulatory capital requirements designed to regulate how banks fund such loans. Mortgage-backed securitization can be very efficient, but when banks don't hold onto the loans they make, we lose the benefit of their assessment and ongoing monitoring of the credit risk associated with those loans. Without any "skin in the game", the banks making the loans may have limited incentives to ensure borrowers' ability to repay.<sup>31</sup> Furthermore, the securitization structure introduces new rigidities that came back to haunt the financial system during the 2008 financial crisis. Law professors Anna Gelpern and Adam Levitin have observed that MBS were intentionally made inflexible by including contractual prohibitions on modifications, and by structuring the transactions to be remote from the modifying powers of bankruptcy courts.<sup>32</sup> Gelpern and Levitin vividly describe these features as "a layering of rigidities designed to produce a species of hyperrigid contracts that boost commitment in good times but function as suicide pacts in bad times."<sup>33</sup>

When bad times came, in the form of a nationwide mortgage foreclosure crisis, "the mortgage securitization pipeline lit and spread the flame of contagion and crisis."<sup>34</sup> The rigidities of the securitization structure made it harder for the underlying mortgages to be modified (thereby increasing the number of foreclosures); they also exacerbated the turmoil in the financial markets. Because securitization contracts did not contemplate a nationwide foreclosure crisis, and because they were so hard to renegotiate once such a crisis occurred, the value of the securities produced became very unclear.<sup>35</sup> This valuation uncertainty made MBS very difficult to trade (or at least, to trade without a significant discount), and leveraged financial institutions that had significant holdings of MBS were often forced to sell off other assets in fire sales, depressing the values of other financial asset classes (forcing leveraged institutions exposed to *those* asset classes to engage in fire sales, in a vicious cycle).<sup>36</sup> In sum, Gelpern and Levitin observe that "although securitization contracts generate significant externalities and impose costs on a wide range of constituencies beyond the contracting parties, they are designed to limit the government's capacity to mitigate their potential adverse impact on the economy."<sup>37</sup> No real reform was made to the regulation of securitizations after the 2008 crisis, so the rigidities associated with the structure remain.

### C. Money Market Mutual Funds

Deposit-taking banks used to face caps on the amount of interest they could pay, and as interest rates rose in the 1970s, this proved very frustrating for depositors. Money market mutual

---

<sup>31</sup> Barr *et al.*, *supra* Note 26 at 1154.

<sup>32</sup> Anna Gelpern & Adam Levitin, *Rewriting Frankenstein Contracts: The Workout Prohibition in Residential Mortgage-Backed Securities*, 82 S. CAL. L. REV. 1077, 1079 (2009)

<sup>33</sup> *Id.*

<sup>34</sup> Financial Crisis Inquiry Commission, *supra* Note 8 at xxiii.

<sup>35</sup> Gelpern & Levitin, *supra* Note 32 at 1124-7.

<sup>36</sup> On fire sale externalities generally, see Anil S. Kashyap *et al.*, *The Macroprudential Toolkit*, 59 IMF ECON. REV. 145 (2011).

<sup>37</sup> Gelpern & Levitin, *supra* Note 32 at 1127.

funds (“MMFs”) were developed to capture this market.<sup>38</sup> Because these shares were not *actually* bank deposits, though, no interest rate caps applied – and neither did deposit insurance. These MMFs work as a functional substitute for deposits because of special accounting treatment that allows a share in a fund to be consistently valued at one dollar, notwithstanding that a share in a MMF is actually a share in a pool of assets with fluctuating prices and so its value changes constantly.<sup>39</sup> If the value of a MMF share deviates too far from \$1, the special accounting treatment ceases to be available and MMF shareholders will find their shares revalued below one dollar (which is known as “breaking the buck”).

In September 2008, the Reserve Primary Fund (a MMF with exposure to Lehman Brothers) broke the buck, and that event caused many investors in other money market mutual funds to panic.<sup>40</sup> A run ensued as panicked investors rushed to redeem their MMF shares as quickly as possible. They feared that if they waited too long, their fund would have already sold its best assets to satisfy other investors’ redemption requests, leaving them less likely to receive one dollar per share – a calculation that mirrors the calculation that depositors make during bank runs (or at least, a calculation they used to make before the introduction of deposit insurance).<sup>41</sup> During a run, redemption requests can force MMFs to start liquidating investments at fire sale prices in order to satisfy redemption requests, depressing asset markets, and cutting off credit for the corporations in which MMFs usually invest through the commercial paper market.<sup>42</sup>

Three days after the Reserve Primary Fund broke the buck, the Treasury Department temporarily guaranteed the \$1 share price for all MMMFs, and the Federal Reserve provided emergency liquidity to MMMFs, in order to limit fire sales and prop up the commercial paper market.<sup>43</sup> Once these temporary measures expired, policymakers considered multiple reform proposals that would make MMMFs less susceptible to runs. A variety of reforms were adopted in 2010 and 2014<sup>44</sup> – but these measures were insufficient to prevent a run at the beginning of the Covid pandemic in March 2020. As MMMF shareholders again began to increase their redemptions, a repeat of the 2008 emergency intervention by the Federal Reserve was required.<sup>45</sup> These multiple instances of government support have most likely created expectations among managers of MMFs that they will receive similar support in the future – expectations of future support may encourage managers to include riskier (and therefore more profitable) assets in their reserves going forward.<sup>46</sup> These kinds of perverse incentives are known as “moral hazard”.

### III. DEFI

---

<sup>38</sup> Gary B. Gorton & Jeffery Zhang, *Wildcat Stablecoins*, 21 (Jul. 19, 2021), [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3888752](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3888752).

<sup>39</sup> The special accounting treatment is authorized by 17 CFR § 270.2a-7(c).

<sup>40</sup> Hilary J. Allen, *Money Market Fund Reform Viewed Through a Systemic Risk Lens*, 11 J. Bus. & Sec. L. 87, 94-5 (2010).

<sup>41</sup> On the theory of bank runs, see Douglas W. Diamond & Philip H. Dybvig, *Bank Runs, Deposit Insurance, and Liquidity*, 91 J. POLITICAL ECON. 401, 403 (1983).

<sup>42</sup> *Id.* at 95-6.

<sup>43</sup> Gorton & Zhang, *supra* Note 38 at 23.

<sup>44</sup> Report of the President’s Working Group on Financial Markets, *Overview of Recent Events and Potential Reform Options for Money Market Funds*, 6-8 (2020).

<sup>45</sup> Gorton & Zhang, *supra* Note 38 at 24.

<sup>46</sup> Barr *et al.*, *supra* Note 26 at 1211.

CDS, MBS, and MMFs all had a role to play in spurring or exacerbating the financial crisis of 2008. The FCIC report on the causes of the crisis finds that “the mortgage securitization pipeline lit and spread the flame of contagion and crisis”,<sup>47</sup> discusses leverage hidden in derivatives positions,<sup>48</sup> and labels derivatives (particularly credit default swaps) as a significant contributor to the crisis.<sup>49</sup> While MMFs did not cause the crisis, the run on the Reserve Primary Fund following Lehman Brothers’ collapse certainly exacerbated panic in the financial markets, and necessitated government support for MMFs. In short, Shadow Banking 1.0 damaged financial stability by helping to multiply the amount of leverage in the financial system, and by making the system more rigid and more susceptible to runs with spillover effects. This Section will explore whether the nascent DeFi ecosystem has the potential to do the same.<sup>50</sup>

### A. Introduction to DeFi

DeFi, like any new and evolving business model or technology, is hard to pin down with a precise definition.<sup>51</sup> Right now, the term is typically used to describe a software application (known as a “Dapp”) that serves as a simulacrum of traditional financial services provided using coins and tokens hosted on a permissionless distributed ledger. A distributed ledger is at its core a database hosted on multiple computers, and a distributed ledger is “permissionless” if there is no central authority in charge of determining who has the right to record transactions on the ledger – currently, the Ethereum blockchain (a permissionless ledger) is the ledger that is predominantly used for DeFi Dapps<sup>52</sup>. Tokens and coins are computer files stored on the distributed ledger, and payments in DeFi are often made using a type of coin known as a “stablecoin”<sup>53</sup> (stablecoins try to avoid the volatility associated with cryptocurrencies like Bitcoin by pegging their value to the US Dollar or some other fiat currency).<sup>54</sup> Dapps are built using smart contracts,<sup>55</sup> which are computer programs that run on the distributed ledger and govern the operation of tokens and coins in a way that is intended to be self-executing and self-enforcing. However, because most users of DeFi Dapps cannot easily access the distributed ledger directly from their phones or laptops, Dapps usually integrate the smart contracts with more traditional forms of software to create “user-facing interfaces.”<sup>56</sup>

Proponents of DeFi assert that these technologies will be used in concert to provide new versions of “payments, lending, trading, investments, insurance, and asset management”

---

<sup>47</sup> Financial Crisis Inquiry Commission, *supra* Note 8 at xxiii.

<sup>48</sup> *Id.* at xx.

<sup>49</sup> *Id.* at xxiv.

<sup>50</sup> For another comparison of DeFi to credit default swaps, mortgage-backed securities, and money market mutual funds, see Michael Hsu, *Cryptocurrencies, Decentralized Finance, and Key Lessons from the 2008 Financial Crisis* (Sept. 21, 2021), <https://www.occ.gov/news-issuances/speeches/2021/pub-speech-2021-101.pdf>.

<sup>51</sup> One widely used working definition describes DeFi as having four defining characteristics: 1. “Financial Services”; 2. “Trust-minimized operation and settlement”; 3. “Non-custodial design”; and 4. “Open, programmable, and composable architecture”. Wharton Blockchain and Digital Asset Project, *DeFi Beyond the Hype*, 2-3 (May 2021), <https://wifpr.wharton.upenn.edu/wp-content/uploads/2021/05/DeFi-Beyond-the-Hype.pdf>.

<sup>52</sup> President’s Working Group on Financial Markets, REPORT ON STABLECOINS, 9 (November 2021).

<sup>53</sup> *Id.* at 8

<sup>54</sup> The President’s Working Group describes stablecoins as “digital assets that are designed to maintain a stable value relative to a national currency or other reference assets.” *Id.* at 1.

<sup>55</sup> Wharton Blockchain and Digital Asset Project, *supra* Note 51 at 3.

<sup>56</sup> *Id.*

services.<sup>57</sup> To be clear, this is largely aspirational: as it operates right now, DeFi has few applications outside of the self-referential cryptoverse,<sup>58</sup> and it is rife with new types of scams like “rug pulls”.<sup>59</sup> I will return to the realities of DeFi in Section IV; in this Section, though, I will take DeFi proponents at their word and consider how DeFi might create new versions of existing financial services. These new versions may avoid much of the regulation that typically applies to the existing financial services they are emulating, but they still have many of the same (or worse) fragilities as those existing services. Specifically, (i) the unlimited production of tokens can introduce more leverage into the system, potentially outstripping the leverage associated with credit default swaps in the lead-up to the 2008 crisis; (ii) smart contracts are designed to be even more rigid than the mechanisms that turned mortgage-backed securitizations into “suicide pacts” during the crisis; and (iii) stablecoins share many of the features of money market mutual funds that made them susceptible to runs in 2008 (and again in 2020).

In addition to these fragilities, DeFi Dapps are highly complex. Most investors (including established financial institutions) are used to reviewing balance sheets and written disclosures to assess investments. Few are able to read the computer code of the smart contracts that make up the Dapps – and even those who can will struggle to find flaws simply by looking at the code in the abstract.<sup>60</sup> While it’s possible for the operators of Dapps to provide written disclosures to their users, written disclosure documents may prove to be highly inconsistent with how the code of the relevant smart contracts actually functions<sup>61</sup> – and there’s no way for investors (or regulators) to verify this unless they can run a beta test, or at the very least read the code. Finally, added complexity arises as a result of the convoluted governance structure that often controls the Dapps’ software, as well as the governance structure of the permissioned ledgers on which the Dapps run. This means that if a problem were to occur and emergency intervention needed to be provided within the DeFi ecosystem to head-off catastrophic spillover effects for the rest of the financial system, it could be difficult to figure out who to provide emergency support to. DeFi therefore has many complexity-related fragilities; the next Part will look more particularly at how DeFi resembles Shadow Banking 1.0.

## B. DeFi as Shadow Banking 2.0

### i. Leverage

Credit default swaps can create leverage in the financial system by multiplying the number of times someone can get exposure to the same underlying asset (typically, a bond). The amount of leverage in the system can also be increased by simply multiplying the number of assets available to borrow against. That is a significant concern with DeFi, where financial assets in the form of tokens can be created out of thin air by anyone with computer programming knowledge,

---

<sup>57</sup> *Id.* at 2.

<sup>58</sup> “The problem is that all this fancy financial engineering has, as yet, no “real” economy to service. Instead it underpins an incorporeal casino: most of those using DeFi do so to facilitate or leverage their bets on one of many speculative tokens.” Alice Fulwood, *Decentralized Finance is Booming, But it Has Yet to Find Its Purpose*, THE ECONOMIST (Nov. 8, 2021).

<sup>59</sup> *DeFi Scams 101: How to avoid the most common cryptocurrency frauds*, COINTELEGRAPH, <https://cointelegraph.com/defi-101/defi-scams-101-how-to-avoid-the-most-common-cryptocurrency-frauds>.

<sup>60</sup> On the limitations of reviewing source code, see Joshua A. Kroll et al., *Accountable Algorithms*, 165 U. Pa. L. REV. 633, 638, 647 (2017).

<sup>61</sup> Shaanan Cohney et al., *Coin-Operated Capitalism*, 119 COLUM. L. REV. 591 (2019).

then used as collateral for loans that can then be used to acquire yet more assets.<sup>62</sup> An unconstrained supply of financial assets means more opportunities for asset bubbles to grow, and more assets to be dumped during fire sales (more assets also means more trading transactions, which could create operational problems: distributed ledgers often struggle to scale, and could become overwhelmed at peak times – these operational failures can have their own spillover effects).<sup>63</sup>

As mentioned in the earlier discussion of credit default swaps, regulations relating to reserve, capital, margin, and netting requirements are all used to limit leverage in the established financial system, but research has found that “[t]he maximum permitted margin in [decentralized exchanges] is higher than in regulated exchanges in the established financial system.”<sup>64</sup> Market practices requiring DeFi transactions to be overcollateralized with stablecoins could theoretically act as a constraint on leverage in the DeFi ecosystem, but when stablecoins are used as collateral for loans, the proceeds of those loans are often used as collateral for other loans, which can then be used as collateral for further loans, and so on<sup>65</sup> (and in any event, market practices around overcollateralization are not the same as regulatory requirements – market practices allowed AIG to issue “naked” CDS in the lead up to the 2008 crisis).<sup>66</sup> Tokens are also being used (just as CDS were) to create synthetic exposure to real-world assets: for example, the Mirror Protocol has been developed to create synthetic exposure to real-world assets on the distributed ledger.<sup>67</sup> A recent report from the Bank for International Settlements also observed that unregulated DeFi versions of derivatives trading on decentralized exchanges are multiplying the amount of leverage in the DeFi ecosystem.<sup>68</sup> The same report noted that fire sales occurred in the DeFi ecosystem in September 2021 as a result of deleveraging, when “[f]orced liquidations of derivatives positions and loans on DeFi platforms accompanied sharp price falls and spikes in volatility.”<sup>69</sup>

Financial regulators should be very wary of the possibility of unlimited leverage building up in the DeFi ecosystem, particularly if there are channels of contagion that would allow deleveraging/fire sales in the DeFi ecosystem to impact the mainstream financial system and broader economy. Recent IMF research has found increasing correlation between the performance of crypto investments and more traditional investments like equities (especially during market volatility), and cautioned that “[i]ncreased crypto-stocks correlation raises the possibility of

---

<sup>62</sup> Saule T. Omarova, *New Tech v. New Deal: Fintech as a Systemic Phenomenon*, 36 YALE J. REG. 735, 775 (2019).

<sup>63</sup> For a discussion of spillovers from operational failures in payments systems, see Allen, *supra* Note 17.

<sup>64</sup> Sirio Aramonte *et al.*, *DeFi Risks and the Decentralization Illusion*, BIS QUARTERLY REVIEW, 29-30 (Dec. 2021).

<sup>65</sup> *Id.* at 29.

<sup>66</sup> For a discussion of why market participants don’t address systemic risks on their own, see Notes 134-136 and accompanying text.

<sup>67</sup> “Through the use of advanced smart contracts, the platform allows anyone to issue and trade synthetic assets that monitor and track the price of arbitrary real-world assets. Impressively, this is all accomplished without requiring physical backing... the goal of the project is to speed up the integration of traditional assets entering the blockchain sector.” David Hamilton, *Investing in the Mirror Protocol (MIR) – Everything You Need to Know*, SECURITIES IO (Jan. 29, 2022), <https://www.securities.io/investing-in-the-mirror-protocol-mir-everything-you-need-to-know/>.

<sup>68</sup> Aramonte *et al.*, *supra* Note 64 at 29.

<sup>69</sup> *Id.* at 30.

spillovers of investor sentiment between those asset classes.”<sup>70</sup> Other, more direct channels for contagion might include regulated financial institutions investing in, or even offering their own, DeFi products – and traditional financial institutions are becoming increasingly interested in investing in, and offering, crypto. The head of JPMorgan’s blockchain team, for example, is “keeping a very close eye on the DeFi evolution”, and a consortium of regulated banks have recently proposed issuing a stablecoin to compete with Tether and USDC.<sup>71</sup> Aave has partnered with Fireblocks to “whitelist” crypto wallets that have satisfied “know your client” requirements, so that regulated financial institutions feel comfortable transacting with those wallets (when asked whether their technology goes against the whole principle of decentralized technology, Fireblocks CEO responded “[t]he simple answer is that it does”).<sup>72</sup>

What might spur a great deleveraging in the DeFi ecosystem? There are many possibilities. There could be a problem with an intermediary on which DeFi relies (these intermediaries are discussed in detail in Section IV). DeFi is also rife with scams, and “forks, hacks, rug pulls, vampire attacks, and flash loans all have the potential to surprise, erode trust, and spark fear.”<sup>73</sup> While these types of events have not yet destroyed confidence in DeFi, most current users are likely to be “hardcore believers in the technology and thus are both understanding of the risks and willing to forgive them.”<sup>74</sup> That is unlikely to remain the case if DeFi is more widely adopted, in which case these kinds of events could destroy confidence in the value of DeFi assets more generally. Or deleveraging might start simply as a correction to a crypto bubble if the “irrational exuberance” starts to wear off.<sup>75</sup>

## ii. Rigidity

When critical parts of the financial system become overleveraged, flexibility may be needed during the bust cycle to release the largest entities from obligations to respond to margin calls or repay loans – otherwise the failures of intermediaries and fire sales will have ripple effects that can drag down the whole system.<sup>76</sup> Unfortunately, smart contracts may prove too rigid to provide the flexibility needed to avoid such an outcome. Smart contracts are designed to execute their preprogrammed instructions instantly, without waiting for input from the parties (or a regulator, or a court). In good times, this makes things more efficient – but smart contracts will execute just as quickly in bad situations, even if the people involved would be better off if they didn’t. It has already become evident that flaws in smart contracts can be exploited by hackers to steal tokens and coins,<sup>77</sup> but less attention has been paid to the fact that in the future, there may be situations where the stability of the financial system would benefit if smart contracts simply didn’t execute.

---

<sup>70</sup> Tobias Adrian *et al.*, *Crypto Prices Move More in Sync With Stocks, Posing New Risks*, IMF BLOG (Jan. 11, 2022), <https://blogs.imf.org/2022/01/11/crypto-prices-move-more-in-sync-with-stocks-posing-new-risks/>.

<sup>71</sup> Jamie Crawley, *US Banks Form Group to Offer USDF Stablecoin*, COINDESK (Jan. 12, 2022).

<sup>72</sup> Ian Allison, *Fireblock ‘Whitelists’ 30 Trading Firms for Aave’s Institutional DeFi Debut*, COINDESK (Jan. 5, 2022).

<sup>73</sup> Hsu, *supra* Note 50.

<sup>74</sup> *Id.*

<sup>75</sup> On the psychology of bubbles, see Robert J. Shiller, *IRRATIONAL EXUBERANCE* (2000).

<sup>76</sup> On the need for legal elasticity to ensure the survival of the financial system, see Katharina Pistor, *A Legal Theory of Finance*, 41 *J. Comparative Econ.* 315, 320 (2013).

<sup>77</sup> For the discussion of the hack of the Poly Network, see Ephrat Livni, *For Rules in Technology, the Challenge is to Balance Code and Law*, N.Y. TIMES (Nov. 23, 2011).

DeFi loans, for example, are often structured so that they are automatically liquidated if there is insufficient collateral posted.<sup>78</sup> The disappearance of the loaned funds could prove disastrous for the borrower, forcing them to sell off other assets or even driving them into insolvency. There might be situations where it would be better not to liquidate a loan in this fashion, but the execution of a Dapp can only be paused, changed, or undone with the consent of whoever controls it. Control of the Dapp might lie with the creators of the Dapp, or those creators may have ceded control to a DAO (a blockchain-based entity, often controlled by the holders of governance tokens).<sup>79</sup> Locating the creators, let alone coordinating a dispersed group of governance token-holders, would take time, and it seems highly unlikely that this could be achieved *before* the smart contract executes its programming. That leaves us with the possibility of undoing the transaction once it has occurred, but this would require making changes to the distributed ledger on which the Dapp operates, and where the ledger in question is decentralized and permissionless (like the Ethereum ledger), there is no single intermediary who could coordinate the process. Instead, any reversal of a transaction would require the consensus of all the nodes in the ledger, which would take time (after a DAO was hacked in 2016, it took over a month for the nodes of the Ethereum distributed ledger to coordinate their response).<sup>80</sup> Any intervention may come too late to prevent runs, fire sales, and other destabilizing harms.

While there are steps that can be taken to better equip a smart contract to adapt to unexpected events (for example, a smart contract can be programmed to consult another smart contract, or an external data source known as an “oracle” that is controlled by a trusted party), taking these kinds of steps will increase transaction costs. The Ethereum ledger charges a “gas cost” for any computing done, and consulting an oracle would increase the amount of computing power (and thus the gas charge) necessary to execute a smart contract.<sup>81</sup> Participants in the DeFi markets will probably be willing to bear these charges up to a certain point, but eventually, these ongoing operational costs will discourage measures that cater for very unusual events. Unfortunately, when we’re talking about financial stability, low-probability high-consequence tail events are the ones we’re most concerned about. These are the types of events that turned mortgage-backed securitizations into “suicide pacts” – smart contracts may prove to be even more dangerous in the midst of such events, if the speed of their self-execution leaves no time for emergency intervention.

### *iii. Runs*

Because MMFs were created to be a functional equivalent of deposit accounts, it is not surprising that their vulnerabilities can manifest as analogues to traditional bank runs. A number of scholars have observed that stablecoins, which make up the building blocks of DeFi arrangements, may be similarly susceptible to runs.<sup>82</sup> Uncertainty around the redemption mechanics for these stablecoins complicates this analysis, though. There are different kinds of stablecoins, with some offered by a centralized issuer (like Tether or USDC), and others (like DAI)

---

<sup>78</sup> Aramonte *et al.*, *supra* Note 64 at 27.

<sup>79</sup> andressen horowitz, Letter to Senate Banking Committee re: Request for Proposals for Clarifying Laws Concerning Cryptocurrency and Blockchain Technologies (Sept. 27, 2021), <https://a16z.com/wp-content/uploads/2021/10/Andreessen-Horowitz-Senate-Banking-Proposals.pdf>.

<sup>80</sup> Primavera De Filippi & Aaron Wright, BLOCKCHAIN AND THE LAW: THE RULE OF CODE, 188 (2018).

<sup>81</sup> Hilary J. Allen, DRIVERLESS FINANCE: FINTECH’S IMPACT ON FINANCIAL STABILITY, 99 (2022).

<sup>82</sup> *See, for example*, Gorton & Zhang, *supra* Note 38; Dan Awrey, *Bad Money*, 106 CORNELL L. REV. 1 (2020).

being more decentralized. In either case, the redemption mechanisms for stablecoin holders are not entirely clear.

Tether, for example, does not allow U.S. resident holders of its stablecoins to redeem them directly from Tether, so holders are forced to go to a crypto exchange (like Coinbase) if they want to convert their Tether to fiat currency.<sup>83</sup> It's not clear whether these exchanges are contractually obligated to exchange Tether for \$1, or whether they could refuse to do so in some circumstances (for example, only allowing Tether to be exchanged for another cryptocurrency). It's also not clear whether a crypto exchange could turn around after exchanging a Tether for a customer and contractually demand that Tether give the exchange \$1 for the stablecoin. Assuming, though, that stablecoin holders could demand an exchange for fiat *and* that the exchanges could demand a redemption for fiat from the stablecoin issuer (potentially forcing a liquidation of the reserve), then centralized stablecoins would have many similarities to MMFs. Decentralized stablecoins like DAI operate in a more complicated way, and their potential run dynamics are even harder to follow as a result. Instead of having a centralized entity like Tether managing a reserve of real-world assets, DAI is maintained by a DAO (MakerDAO), and relies on smart contracts buying and selling a reserve of cryptoassets (including a significant amount of the centralized stablecoin USDC) to stabilize DAI's price.<sup>84</sup> As with centralized stablecoins, holders of DAI can seek to convert them into fiat using an exchange, but unlike centralized stablecoins, the ultimate decision to liquidate the reserve of cryptoassets (and provide them to DAI holders) is not made by a centralized entity, but instead must go through the MakerDAO governance process.<sup>85</sup>

Runs happen when people lose confidence that a particular asset (like a share in a MMF) will continue to remain accessible at the expected value.<sup>86</sup> This “confidence” aspect of runs means that runs are unlikely to occur if the people holding an asset never expected it to have a stable value in the first place. Right now, it appears that the vast majority of stablecoins are not being used for payments for real-world goods and services. Instead, the recent exponential growth in stablecoin usage has been driven by people who have purchased stablecoins to speculate in the crypto markets<sup>87</sup> – SEC Chair Gary Gensler has described them as “poker chips” that are the price of admission to the “casino”.<sup>88</sup> If something were to shake confidence in stablecoins’ acceptance in the DeFi ecosystem (this ‘something’ could range from a hack, to a problem with the reserve of assets backing a stablecoin, to a problem with the smart contracts managing the value of a decentralized stablecoin), we could then expect holders to exchange their stablecoins for fiat currency and exchanges to seek redemption, forcing stablecoin issuers to start liquidating the

---

<sup>83</sup> Alexis Goldstein, Testimony before the Senate Committee on Banking, Housing, and Urban Affairs, Hearing on *Stablecoins: How Do They Work, How Are They Used, and What Are Their Risks?*, 3 (Dec. 14, 2021).

<sup>84</sup> Lyle Daly, 5 Things to Know Before You Buy DAI, MOTLEY FOOL (Sept. 1, 2021), <https://www.fool.com/the-ascent/cryptocurrency/articles/5-things-to-know-before-you-buy-dai/>.

<sup>85</sup> “A Global Settlement is a last resort process to guarantee the Target Price to the holders of DAI. When a Global Settlement is triggered, it shuts down the system. This means that holders of DAI...receive the net value of assets that they are entitled to. The process is fully decentralized and Maker voters govern the access to it in the case of an emergency.” Sharon Manrique, *What is DAI, and how does it work?*, MEDIUM (Feb. 7, 2019), <https://medium.com/mycrypto/what-is-dai-and-how-does-it-work-742d09ba25d6>.

<sup>86</sup> Diamond & Dybvig, *supra* Note 41 at 403.

<sup>87</sup> At the time of publication of this report, stablecoins are predominantly used in the United States to facilitate trading, lending, and borrowing of other digital assets.” PWG Report, *supra* Note 52 at 8.

<sup>88</sup> Cheyenne Ligon, *SEC's Gensler Calls Stablecoins 'Poker Chips' at the Wild West Crypto Casino*, COINDESK (Sept. 21, 2021).



reserve of assets backing the stablecoin, depressing the market value of those assets. Whether this kind of run would pose a significant threat to the broader financial system and economy will depend on the contents of stablecoins' reserves.

The recent President's Working Group Report on stablecoins observed that "[b]ased on information available, stablecoins differ in the riskiness of their reserve assets, with some stablecoin arrangements reportedly holding virtually all reserve assets in deposits at insured depository institutions or in U.S. Treasury bills, and others reportedly holding riskier reserve assets, including commercial paper, corporate and municipal bonds, and other digital assets."<sup>89</sup> It is possible that mass withdrawals by stablecoins from insured deposit accounts could trigger runs on the institutions (like banks) that provide those deposit accounts. I will argue in Section IV.B that banks should therefore be prohibited from holding stablecoin reserves on deposit.

With regard to other types of assets in stablecoin reserves, fire sales of those assets could be a significant concern, but their systemic impact will depend on the size of the stablecoin reserve. A decentralized stablecoin like DAI, for example, holds its reserves in cryptoassets, and so the impact of a sell-off on the prices of real-world assets might be limited (although DAI invests heavily in USDC,<sup>90</sup> so a run on DAI might trigger a run on USDC, which does invest its reserve in real-world assets). Interestingly, the reserves of Tether, which currently has by far the largest market value of any stablecoin, may not actually be as big as expected. As one recent report put it: "[e]xactly how Tether is backed, or if it's truly backed at all, has always been a mystery. For years a persistent group of critics has argued that, despite the company's assurances, Tether Holdings doesn't have enough assets to maintain the 1-to-1 exchange rate, meaning its coin is essentially a fraud."<sup>26</sup> If true, this would be highly problematic for holders of Tether, but it would also limit the systemic impact of any fire sale of Tether's reserve assets – because there wouldn't be so many of them. However, if these centralized stablecoin issuers start to become an important source of capital for the real economy (as money market mutual funds did before them) then runs on stablecoins will be a potential source of systemic risk.

#### IV. HOW TO RESPOND

The previous Section gave an overview of DeFi's inherent fragilities, and what they might mean for the stability of our broader financial system in the future. However, in deciding how regulation should respond to DeFi, it is important to take a step back from what DeFi aspires to be, and consider what DeFi actually is right now. A recent report from the Bank for International Settlements described DeFi as largely self-referential, and concluded that "[g]iven this self-contained nature, the potential for DeFi-driven disruptions in the broader financial system and the real economy seems limited for now."<sup>91</sup> DeFi is not yet an entrenched part of our financial system, and regulators still have the opportunity to take a precautionary approach that will have a real impact on how DeFi develops. Regulators may be able to ensure that DeFi never reaches a scale at which it could threaten the stability of our broader financial system – and if steps are taken from the outset to limit the growth of DeFi and its integration with the traditional financial system regulation, regulators won't need to respond directly to the destabilizing problems discussed in

---

<sup>89</sup> PWG Report, *supra* Note 52 at 4.

<sup>90</sup> <https://daistats.com/#/>

<sup>91</sup> Aramonte *et al.*, *supra* Note 64 at 21.

Section III. If the DeFi ecosystem does grow and become integral to broader economic functioning, regulators *will* need to respond to those destabilizing problems – but experience with regulating Shadow Banking 1.0 suggests that those kinds of reforms will be an incomplete solution. The more effective approach is to deploy regulation to separate DeFi from the established financial system, and limit its growth more generally: subjecting DeFi to bank-like regulation too early runs the risk of legitimizing and turbocharging the growth of DeFi in a way that would not be possible without regulatory imprimatur (essentially making Shadow Banking 2.0 a self-fulfilling prophecy).<sup>92</sup>

The growth of Shadow Banking 1.0 was not inevitable; a series of policy choices allowed it to develop. This is illustrated most obviously by Congress’ passage of the Commodity Futures Modernization Act in 2000, which prevented the SEC and CFTC from regulating swaps – and which Congressman Bliley justified as necessary in part because “[d]erivative instruments...reflect the unique strength and innovation of American capital markets” and because “U.S. markets and market professionals have been global leaders in derivatives technology and development.”<sup>93</sup> We hear the same rhetoric with regard to stablecoins and other DeFi projects,<sup>94</sup> and this kind of rhetoric could encourage regulators to accommodate the growth of DeFi. As I have argued previously, though, this is “not a neutral approach. Instead, it stacks the deck in favor of the innovators who get to profit by generating risks that, if they come to fruition, will be borne primarily by the rest of society.”<sup>95</sup> Regulators should instead pursue a precautionary approach to DeFi, erring on the side of caution to protect society from the risks it would otherwise generate (which include not only the financial stability risks discussed in Section III.B, but also serious consumer protection concerns, environmental costs, and national security risks).<sup>96</sup>

Given these risks, regulators would be more than justified in taking steps to limit the growth of DeFi and preventing its integration with the established financial system – unless there were something truly transformative about DeFi innovation. As this Section will explore, many of the touted benefits of DeFi are illusory, though, and so lawmakers and regulators should have few qualms about using regulation to limit DeFi innovation. The latter half of this Section will provide some brief discussion of the forms this kind of DeFi regulation could take.

---

<sup>92</sup> Hilary J. Allen, Testimony before the Senate Committee on Banking, Housing, and Urban Affairs, Hearing on *Stablecoins: How Do They Work, How Are They Used, and What Are Their Risks?*, 6 (Dec. 14, 2021).

<sup>93</sup> Congressman Bliley, Report on the Commodity Futures Modernization Act of 2000, 45-46 (Sept. 6, 2000).

<sup>94</sup> Senator Toomey, for example, recently said that stablecoin legislation should be “designed to promote innovation in the rapidly evolving global digital economy” and “seek to maintain the international competitiveness of the United States.” Toomey Outlines Stablecoin Principles to Guide Future Legislation (Dec. 14, 2021), <https://www.banking.senate.gov/newsroom/minority/toomey-outlines-stablecoin-principles-to-guide-future-legislation>.

<sup>95</sup> Allen, *supra* Note 81 at 41.

<sup>96</sup> “Bitcoin is notorious for consuming as much electricity as the Netherlands, but there are around 10,000 other cryptocurrencies, most using similar infrastructure and thus also in aggregate consuming unsustainable amounts of electricity. Bitcoin alone generates as much e-waste as the Netherlands, cryptocurrencies suffer an epidemic of pump-and-dump schemes and wash trading, they enable a \$5.2B/year ransomware industry, they have disrupted supply chains for GPUs, hard disks, SSDs and other chips, they have made it impossible for web services to offer free tiers, and they are responsible for a massive crime wave including fraud, theft, tax evasion, funding of rogue states such as North Korea, drug smuggling, and even as documented by Jameson Lopp's list of physical attacks, armed robbery, kidnapping, torture and murder.” David Rosenthal, *EE380 Talk*, (Feb. 9, 2022), <https://blog.dshr.org/2022/02/ee380-talk.html>.

## A. The Cost-Benefit Calculus

### i. Decentralization

DeFi, together with the broader vision of a decentralized “Web3”, is marketed in aspirational terms; its value is consistently described as lying in its potential.<sup>97</sup> However, there are many reasons to doubt that potential. Most obviously, crypto technology has existed for over a decade and has yet to find an application for much other than trading other crypto.<sup>98</sup> Putting that aside, it’s important to recognize that DeFi doesn’t aspire to provide any new financial product or service: instead, the idea is to provide existing financial products and services in a decentralized way. And so any benefits associated with DeFi innovation are largely dependent on their decentralization – but “decentralization” is a largely unrealistic goal.<sup>99</sup>

Recent research from the Bank for International Settlements has observed that there is “a ‘decentralisation illusion’ in DeFi due to the inescapable need for centralised governance and the tendency of blockchain consensus mechanisms to concentrate power.”<sup>100</sup> No less than internet pioneer Tim O’Reilly has noted that “history teaches us that there will always be new avenues for power to become centralized”, and that “Blockchain turned out to be the most rapid recentralization of a decentralized technology that I’ve seen in my lifetime.”<sup>101</sup> The “inescapable need for centralized governance” derives in part from issues we’ve already discussed in the context of smart contracts: because it’s not possible to address all possible eventualities in advance, an intermediary is often needed to resolve unanticipated situations (for example, reversing erroneous or problematic transactions).<sup>102</sup> Where there are opportunities to profit from streamlining unwieldy decentralized services for users (especially when venture capitalists are standing ready to fund such projects), the evolution of centralized intermediaries seems inevitable.<sup>103</sup> Ultimately, the need for intermediaries is an economic issue, not a technological one, and therefore not something that technology can fix: as tech veteran David Rosenthal puts it “economics forces successful permissionless blockchains to centralize.”<sup>104</sup>

We often think of computerized activities as dehumanized (and as having greater legitimacy as a result of their dehumanization),<sup>105</sup> and so it’s not surprising when people overlook the fact that distributed ledger technology relies on *people* to operate. But every level of

---

<sup>97</sup> “web3 is a somewhat ambiguous term, which makes it difficult to rigorously evaluate what the ambitions for web3 should be, but the general thesis seems to be that web1 was decentralized, web2 centralized everything into platforms, and that web3 will decentralize everything again. web3 should give us the richness of web2, but decentralized.” Moxie Marlinspike, *My first impressions of Web3* (Jan. 7, 2022), <https://moxie.org/2022/01/07/web3-first-impressions.html>

<sup>98</sup> Molly White, *It’s not still the early days* (Jan. 14, 2022), <https://blog.mollywhite.net/its-not-still-the-early-days/>

<sup>99</sup> The likely endgame is “a costly, inefficient database, which is not in fact decentralized.” Schuster, *supra* Note 10 at 992.

<sup>100</sup> Aramonte *et al.*, *supra* Note 64 at 22.

<sup>101</sup> Dan Patterson, *Internet guru Tim O’Reilly on Web3: “Get ready for the crash”*, CBSNEWS (Feb. 10, 2022).

<sup>102</sup> Aramonte *et al.*, *supra* Note 64 at 27.

<sup>103</sup> Rosenthal, *supra* Note 96.

<sup>104</sup> *Id.*

<sup>105</sup> This tendency is known as “automation bias”. See Linda J. Skitka et al., *Accountability and Automation Bias*, 52 Int. J. Human- Computer Studies 701 (2000).

infrastructure involved in providing DeFi products and services does indeed depend on decisions made by human beings, and so it is important to recognize that these human beings have the same incentives to concentrate wealth and power that people have always had. For example, the actual Dapps offered to consumers might, as we have already established, be controlled by their creators, or the creators may have ceded control to a DAO that is controlled by the (human) holders of governance tokens.<sup>106</sup> These DAOs aren't always so decentralized, though: one recent research paper found that "DeFi's voting rights are highly concentrated, and the exercise of these rights is very low" and that "minority rule is the probable consequence of tradable voting rights plus the lack of applicable anti-concentration or anti-monopoly laws."<sup>107</sup> Many of the investors driving the growth of DeFi are institutional players, often engaging in transactions worth \$10 million or more of cryptocurrency,<sup>108</sup> and the holder of a single governance token in a DAO administering a DeFi Dapp is unlikely to have any real voice in how the DAO or the Dapp operates (especially if the original developer holds onto lots of governance tokens or has governance tokens with special rights, just as the founders of corporations like Snap and Google own shares that allow them to retain control of their now publicly-traded corporations).<sup>109</sup> The promises that the industry makes about decentralization – that everyday people will have "the opportunity to read, write and now own the very internet services we depend on"<sup>110</sup> – seem illusory.

The Dapps operate on top of another layer of infrastructure: a distributed ledger, like the Ethereum blockchain, which is also dependent on many humans for its functioning (Grimmelman and Windawi point out an important and often unappreciated layer of infrastructure needed to support the distributed ledgers – the internet itself.<sup>111</sup> The actions of ISPs could therefore impact the operation of distributed ledgers, although we tend to take the neutral functioning of ISPs for granted).<sup>112</sup> Most decisions relating to the operation of a distributed ledger are made by the people with the power to validate transactions on that ledger, and by the core developers of the computer code governing that ledger. While the underlying code of ledgers like the Ethereum and Bitcoin blockchains is open-source, that doesn't mean that there is no hierarchy in terms of the computer programmers able to modify that code. Instead, so-called "core developers" "function as the leaders and decision makers in relation to the code."<sup>113</sup> Validators are also important actors, because they determine the definitive version of the ledger (which is the definitive record of who owns the cryptoassets associated with that ledger).

---

<sup>106</sup> See notes 79 and accompanying text.

<sup>107</sup> Tom Barberau *et al.*, *Decentralized Finance's Unregulated Governance: Minority Rule in the Digital Wild West* (Feb. 8, 2022), <https://ssrn.com/abstract=4001891>.

<sup>108</sup> Chainalysis, *DeFi Whales Turned Central, Northern & Western Europe into the World's Biggest Cryptocurrency Economy* (Oct. 14, 2021) (available at <https://blog.chainalysis.com/reports/central-northern-western-europe-cryptocurrency-geography-report-2021-preview/>).

<sup>109</sup> Amy Deen Westbrook & David A. Westbrook, *SnapChat's Gift: Equity Culture in High Tech Firms*, 46 FL. ST. U. L. REV. 861, 871-2 (2019).

<sup>110</sup> Dante Disparte, *10 Stablecoin Myths: Internet Wildcat Banks or Always-On Dollars*, 6 (Dec. 2021), <https://www.circle.com/en/10-stablecoin-myths-busted>.

<sup>111</sup> Grimmelman & Windawi [in symposium volume]

<sup>112</sup> De Filippi & Wright, *supra* Note 80 at 177-8.

<sup>113</sup> Angela Walch, *In Code(rs) We Trust: Software Developers as Fiduciaries in Public Blockchains*, in REGULATING BLOCKCHAIN: TECHNO-SOCIAL AND LEGAL CHALLENGES (Hacker *et al.*, Eds), 61 (2019).

Right now, the two most common validation mechanisms for distributed ledgers are proof-of-work and proof-of-stake. Proof-of-work relies on people known as “miners” attempting through trial and error to guess the answer to a mathematical problem that relates to a block of transactions. Once a miner has an answer, they can submit it to all the nodes that host the ledger, and it’s very easy for those nodes to verify if the miner’s answer works—if it all checks out, those nodes by consensus will adopt the block of transactions that the miner has proposed, adding it to the distributed ledger and thereby consummating those transactions.<sup>114</sup> However, Professor Angela Walch has highlighted that “[m]iners select, order, and propose transactions to be added to the blockchain record”, meaning that “[t]ransactions do not appear on the blockchain record unless a miner chooses to put them on” and that “the exploitation of the transaction ordering power has become a major issue” because miners can profit from selling off earlier processing slots.<sup>115</sup> Miners in a proof-of-work system are not only people; they are people with conflicts of interest. It’s also inaccurate to think of miners as dispersed individuals: in recent years, the majority of Bitcoin mining power has consistently been concentrated in a few mining pools.<sup>116</sup>

Proof-of-work verification is extremely energy intensive (because significant amounts of electricity are needed to generate enough computer power to make the repeated guesses). As a point of reference, some estimates suggest that Bitcoin mining uses the same amount of electricity as the Netherlands.<sup>117</sup> As a result, the Ethereum blockchain plans to shift away from proof-of-work, and adopt a proof-of-stake verification process. In proof-of-stake systems, the right to validate transactions in a particular cryptoasset comes in part from already owning a significant amount of that type of cryptoasset. While proof-of-stake may help address environmental concerns, it is not expected to address transaction validators’ conflicts of interest.<sup>118</sup> Some have argued that proof-of-stake will encourage concentration of ownership and collusion, making conflicts of interest even worse.<sup>119</sup>

Ultimately, the computer code is not running the show on its own – DeFi is governed by institutions and individuals, and we have already seen these institutions and individuals exercising their power. In 2016, when \$60 million of Ether were stolen from an early DAO (known as “The DAO”), core developers and some miners banded together to “hard fork” the Ethereum distributed ledger, which “effectively rolled back the Ethereum network’s history to before The DAO attack and reallocated The DAO’s ether to a different smart contract so that investors could withdraw their funds.”<sup>120</sup> More recently, when “a software upgrade in Compound in September [2021]

---

<sup>114</sup> De Filippi & Wright, *supra* Note 80 at 23-4.

<sup>115</sup> Angela Walch, Testimony before the Senate Committee on Banking, Housing, and Urban Affairs, Hearing on *Cryptocurrencies: What Are They Good For?*, 9 (Jul. 27, 2021).

<sup>116</sup> “It only took six years for Bitcoin to fail Nakamoto’s goal of decentralization, with one mining pool controlling more than half the mining power. In the seven years since no more than five pools have always controlled a majority of the mining power.” Rosenthal, *supra* Note 96.

<sup>117</sup> *Id.*

<sup>118</sup> “[N]or [would] moving to proof-of-stake...solve the MEV problem on Ethereum.” Michelle Lim, *Could Ethereum’s upgrade affect miners’ manipulations for extra profits?* FORKAST (Aug. 5, 2021), <https://forkast.news/how-will-ethereums-upgrade-affect-miners-mev/>

<sup>119</sup> Aramonte *et al.*, *supra* Note 64 at 28.

<sup>120</sup> Cryptopedia Staff, *What Was The DAO?* (Apr. 27, 2021), <https://www.gemini.com/cryptopedia/the-dao-hack-makerdao#section-what-is-a-dao>.

resulted in \$90 million being erroneously issued to users [the founder] said recipients who didn't return the crypto would be reported to tax authorities."<sup>121</sup>

Many centralized intermediaries are also critical to the DeFi ecosystem. This is not really surprising: as encryption pioneer Moxie Marlinspike has observed, decentralized services do not scale well,<sup>122</sup> and many DeFi intermediaries exist to compensate for the difficulties associated with decentralized technology. Exchanges, for example, are critical to DeFi, because they enable users to exchange digital assets like cryptocurrencies (including stablecoins) for one another.<sup>123</sup> While exchanges with more decentralized governance structures (like Uniswap) are available, they generally charge more per transaction (especially for smaller transactions), and process far fewer transactions than exchanges operated by centralized intermediaries like Coinbase.<sup>124</sup> Marlinspike also observed that DeFi Dapps rely on APIs that allow users' devices to access the distributed ledger on which transactions take place, because "blockchains are designed to be a network of peers, but not designed such that it's really possible for your mobile device or your browser to be one of those peers."<sup>125</sup> Marlinspike found that almost all DeFi users ultimately rely on client APIs provided by either Infura or Alchemy for this purpose – Infura and Alchemy are therefore critical intermediaries for the DeFi ecosystem, as are the wallet providers who provide users with access to their digital assets<sup>126</sup> (again, these are needed because most users can't access assets on a distributed ledger directly). All of these centralized intermediaries have the power to prevent users from engaging in crypto transactions, and yet users trust them not to. Commenting specifically on the intermediaries Infura and Alchemy, Marlinspike observed that "[s]o much work, energy, and time has gone into creating a trustless distributed consensus mechanism, but virtually all clients that wish to access it do so by simply trusting the outputs from these two companies without any further verification."<sup>127</sup>

Ultimately, trust is required in the DeFi ecosystem. A decentralized foundation just makes financial services more convoluted and replaces trust in established institutions (particularly government institutions and regulated banks) with trust in different – and sometimes unidentified – actors.<sup>128</sup> The DeFi ecosystem also depends heavily on stablecoins issued by centralized firms like Tether and Circle<sup>129</sup> (and these stablecoins in turn depend on traditional financial services like banks and fiat currencies, in order to stabilize their value).<sup>130</sup> Although there are more

---

<sup>121</sup> Livni, *supra* Note 77.

<sup>122</sup> "If something is truly decentralized, it becomes very difficult to change, and often remains stuck in time." Marlinspike, *supra* Note 97.

<sup>123</sup> Wharton Blockchain and Digital Asset Project, *supra* Note 51 at 8.

<sup>124</sup> Aramonte *et al.*, *supra* Note 64 at 26. For a discussion of crypto exchanges' conflicts of interest, see <https://www.ft.com/content/4e15d5b6-033b-4294-8aba-d95e02f51b3b>.

<sup>125</sup> Marlinspike, *supra* Note 97.

<sup>126</sup> Wallets are "software interfaces for users to manage assets stored on a blockchain." Wharton Blockchain and Digital Asset Project, *supra* Note 51 at 2.

<sup>127</sup> Marlinspike, *supra* Note 97.

<sup>128</sup> It was recently revealed that the head of Treasury for the Wonderland DeFi project had previously been incarcerated for financial fraud – and that revelation led to a significant reduction in the value of the related TIME token. As one commentator put it, "If the anonymous nature of DeFi means that a person like Michael Patryn can be in charge of a major DeFi treasury, that's a pretty big problem." Emily Nicolle, *Crypto Secrecy Makes DeFi a Wonderland to Felon Tied to Quadriga*, BLOOMBERG QUINT (Jan. 27, 2022).

<sup>129</sup> PWG Report, *supra* Note 52 at 9.

<sup>130</sup> Aramonte, *supra* Note 64 at 25.

decentralized stablecoins like DAI with smaller market shares, DAI is collateralized by centralized stablecoins like USDC in order to stabilize its value, and so ultimately depends on centralized intermediaries too. Intermediaries may also be called upon to perform “know your client” diligence on crypto wallets.<sup>131</sup> The operation of DeFi Dapps depends on data feeds from oracles maintained by trusted third parties.<sup>132</sup> DeFi users may need search engines like Etherscan that allow them to search a distributed ledger for transactions.<sup>133</sup> The list goes on.

The conflicts of interest that individuals and institutions in positions of authority face can lead to suboptimal outcomes for crypto investors. We can also expect that these individuals and institutions will fail to take financial stability into account. There is little incentive for them to protect financial stability, because it is a public good that people can’t be excluded from or forced to pay for, and even if the members of the crypto community were unusually altruistic, they would not have enough information about other parts of the financial system to gauge the impact of their actions (or be able to force their competitors to join them even if they did know how to minimize systemic risk).<sup>134</sup> Although SEC Commissioner Hester Peirce has complimented the crypto community on its ability to “collectively figure out how to deal with unanticipated problems,”<sup>135</sup> this view of self-correcting markets neglects the fact that crypto intermediaries lack both the incentives and the information needed to address the negative externalities that crypto can create for the broader economy.<sup>136</sup>

While it seems implausible to suggest that DeFi will ever deliver financial services entirely “without centralized intermediaries or institutions”,<sup>137</sup> using the term “decentralized” to describe these services does serve marketing and political functions. The word “decentralized” taps into the current fervor for “Web3”, maximizing chances that startups will receive funding from venture capital firms,<sup>138</sup> and also appeals to potential customers interested in “decentralized” products. The commercial appeal of decentralization is driven in part by the political significance of the term: “[t]he promise is a financial system that is democratized, decentralized, and secure. No banks. No bailouts. No more being ignored or betrayed.”<sup>139</sup> The appeal of this kind of rhetoric lies in the belief that the internet works as a countervailing force against government entities and regulated financial institutions (and neglects the reality that internet services can be another source of concentrated power with their own conflicts of interest).<sup>140</sup> In a book titled *The Politics of Bitcoin*, David Golumbia argues that much of crypto’s pro-decentralization rhetoric actually derives from extreme right-wing talking points about the evils of government: the existence of DeFi intermediaries can be more easily reconciled with decentralization rhetoric if DeFi

---

<sup>131</sup> Ian Allison, *Fireblocks ‘Whitelists’ 30 Trading Firms for Aave’s Institutional DeFi Debut*, COINDESK (Jan. 5, 2022).

<sup>132</sup> Oracles are “Data feeds that allow information from sources off the blockchain, such as the current price of a stock or a fiat currency, to be integrated into DeFi services.” Wharton Blockchain and Digital Asset Project, *supra* Note 51 at 3.

<sup>133</sup> Emily Perryman, *What is Etherscan?*, YAHOO (Oct. 28, 2019).

<sup>134</sup> Allen, *supra* Note 81 at 20.

<sup>135</sup> Hester M. Peirce, *Lawless in Austin*, (Oct. 8, 2021), <https://www.sec.gov/news/speech/peirce-2021-10-08>.

<sup>136</sup> As one commentator put it, “Libertarianism’s attraction is based on ignoring externalities, and cryptocurrencies are no exception.” Rosenthal, *supra* Note 96.

<sup>137</sup> Wharton Blockchain and Digital Asset Project, *supra* Note 51 at 2.

<sup>138</sup> McMillan Cotton, *supra* Note 148.

<sup>139</sup> Hsu, *supra* Note 50.

<sup>140</sup> David Golumbia, *THE POLITICS OF BITCOIN: SOFTWARE AS RIGHT-WING EXTREMISM*, 7 (2016).

intermediaries are seen as less problematic than other kinds of intermediaries (extreme right-wing ideology holds that “no matter how much power corporations take, their power can never be “evil” in the way that governmental power inherently is”).<sup>141</sup> Cynically describing DeFi as “decentralized” can also be an effective rhetorical strategy for avoiding regulation, because if policymakers believe the decentralization hype, they may be misled into thinking that there are no intermediaries to regulate.

ii. *Efficiency and Financial Inclusion*

Returning to our core question of whether the likely benefits of DeFi are sufficient to justify the financial stability risks associated with Shadow Banking 2.0, we also need to consider whether DeFi may have other benefits that are more prosaic than decentralization. In particular, there is interest in making transactions quicker and cheaper, and this “increased efficiency” is sometimes pitched as a way to promote financial inclusion.<sup>142</sup> However, it does not seem possible that a technology that has been intentionally made more complex (in order to nominally decentralize) could ever be more efficient than a simpler, centralized alternative.<sup>143</sup> No matter which validation mechanism is chosen for a decentralized ledger (proof-of-work, proof-of-stake, or something else), it will always be slower and more cumbersome than validation by a centralized intermediary – costly computations are the sinequanon of decentralized consensus mechanisms.<sup>144</sup> And yet, DeFi innovation is proliferating. This Part will argue that technological superiority is *not* the primary driver of this innovation.

It became apparent following the 2008 crisis that some Shadow Banking 1.0 innovation was not a “rational demand-side response to market imperfections”.<sup>145</sup> Instead, the innovation was often driven by supply-side incentives: financial institutions could profit from offering financial products that capitalized on interest in the “next big thing”, notwithstanding that the result was sometimes socially-useless over-innovation that hid risks from purchasers and created risks for the broader economy.<sup>146</sup> There are similarly perverse incentives for innovation in the tech industry, which can encourage firms to pursue innovation that is “buzzy” enough to attract venture capital funding, even if it is not particularly good technology.<sup>147</sup>

Notwithstanding the significant VC buzz about distributed ledger technology and a decentralized Web3,<sup>148</sup> some software engineers have become increasingly vocal in their criticisms

---

<sup>141</sup> *Id.* at 10

<sup>142</sup> *Id.* at 7-8. *See also*, Disparte, *supra* Note 110.

<sup>143</sup> Schuster, *supra* Note 10 at 992.

<sup>144</sup> *Id.* at 981.

<sup>145</sup> Awrey, *supra* Note 15 at 260.

<sup>146</sup> *Id.* at 263-4.

<sup>147</sup> For a discussion of the limitations of the venture capital funding model that result in suboptimal innovation, *see* Peter Lee, *Enhancing the Innovative Capacity of Venture Capital* (forthcoming YALE J. L. & TECH.). In particular, “While VCs enjoy an iconoclastic reputation, in many contexts they tend to invest in the same popular technologies while eschewing truly revolutionary innovations. Historical evidence reveals several trends of “hot” technologies receiving significant VC funding and then losing favor.”

<sup>148</sup> “[S]ome V.C.s have invested a lot in making blockchain inevitable. And the amount that V.C.s have available to throw at investments has ballooned over the past 10 years in a way the average person can’t appreciate.” Tressie McMillan Cotton, *Wealth Inequality Drives the Appeal of Crypto*, N.Y. TIMES (Jan. 31, 2022).



in recent months, asserting that the technology is simply not very good.<sup>149</sup> For example, in a blog post titled “The Case Against Crypto”, software engineer and blogger Stephen Diehl writes that:

*The real world has fundamental constraints that make the technology unworkable, whenever it has to interact with the outside world the benefits of decentralization disappear and the solutions end up simply recreating slower and worse versions of processes and structures that already exist...There are fundamental limitations to the scalability of blockchain-based technologies, and every use case is better served by another simpler technology except for crime, ransomware, extralegal gambling, and sanctions evasion; all of which are a drain on society not a benefit. Taken as a whole the technology has no tangible benefits over simply using trusted parties and centralized databases.<sup>150</sup>*

Another software engineer and blogger, Molly White, similarly describes blockchain technology as “inefficient in every sense of the word” and also challenges assertions that this technology is in its infancy and just needs more time to develop useful applications, asking whether “we are to believe that as technology soared forward over the past decade, blockchain technologies spent that time tripping over their own feet?”<sup>151</sup>

It goes without saying that there are technologists who take the opposite view, but the burden should be on them to demonstrate why this aspirational technology is – in reality – superior to the simpler, centralized alternatives we could develop with the venture capital funding that is currently being poured into DeFi. In particular, the idea that DeFi can be used to improve financial inclusion is a dubious claim that the industry should be required to support with concrete examples, because, as a recent World Economic Forum report on stablecoins found:

*stablecoins are subject to many of the same barriers that constrain citizens from accessing other financial products and services, such as bank accounts, mobile money accounts or fully digital remittance providers. Where stablecoins are accessible, they generally address financial inclusion barriers to a similar degree as other digital financial services...stablecoins as currently deployed would not provide compelling new benefits for financial inclusion beyond those offered by pre-existing options.*

Barriers (like the need for internet access) apply not just to stablecoins, but also limit the utility of other DeFi Dapps for underserved communities. More generally, we should think about what DeFi asks of underserved communities: reading financial disclosures is already hard enough, should people really be expected to understand the ins and outs of code as well before they can understand their financial services? As White puts it, “[h]ow long must the laymen, who are so eagerly hustled into blockchain-based projects that promise to make them millionaires, be scolded as though it is their fault when they are scammed as if they should be capable of auditing smart contracts

---

<sup>149</sup> See, for example, Rosenthal, *supra* Note 96.

<sup>150</sup> Stephen Diehl, *The Case Against Crypto*, <https://www.stephendiehl.com/blog/against-crypto.html>.

<sup>151</sup> White, *supra* Note 98.

themselves?”<sup>152</sup> Analogies are already being drawn between crypto’s exploitation of vulnerable communities, and the predations of the pre-2008 subprime mortgage market.<sup>153</sup>

### B. Regulatory Proposals

To summarize the previous Part, the inefficiencies and complexities of DeFi technology simply do not make sense outside of the decentralization narrative, and the decentralization narrative does not hold up to scrutiny. Given the financial stability risks that DeFi would create if it were allowed to grow into Shadow Banking 2.0, and given that proponents of the technology involved struggle to demonstrate any concrete superiority over simpler centralized alternatives, policymakers should pursue policies that prevent DeFi from growing. This Part will sketch in broad strokes some possible ways to achieve this. If DeFi remains largely disconnected from both real-world economic applications and the established financial system, then the risks articulated in Section III.B will not be a significant concern.

Because negative spillover effects from DeFi will wreak the most havoc on the real economy if regulated banks become integrated into the DeFi ecosystem, steps should be taken to insulate regulated banks from DeFi.<sup>154</sup> As a priority, regulated banks should be prohibited from: issuing stablecoins or providing any Dapps; holding stablecoin reserves in a deposit account; or investing in any Dapp or stablecoin (banking regulators already have the authority they need to take these steps).<sup>155</sup> Some of these recommendations run counter to the President’s Working Group Report, which recommended that “legislation should require stablecoin issuers to be insured depository institutions.”<sup>156</sup> This recommendation seeks to address stablecoin-related run risk, but if followed, would create moral hazard by extending the public safety net of deposit insurance to the DeFi ecosystem in which stablecoins are deployed. I have argued against pursuing the PWG’s recommendation at this point in time, because taking this step now would legitimize stablecoins in a way that would likely fuel, rather than limit, the growth of DeFi.<sup>157</sup>

We should also explore other regulatory strategies designed to prevent DeFi from growing into Shadow Banking 2.0. Gorton and Zhang have noted that when it comes to stablecoins at least, Congress has the authority to “tax competitors of [the US dollar] out of existence.”<sup>158</sup> An alternative or complementary strategy would be for Congress to adopt a licensing regime for Dapps and stablecoins where the applicant would need to demonstrate: (i) that the Dapp/stablecoin has a purpose that is connected to real-world economic growth; (ii) that the applicant has the institutional capacity to manage both the financial and technological risks associated with the Dapp/stablecoin; and (iii) that the Dapp/stablecoin is unlikely to have a negative impact on the stability of the

---

<sup>152</sup> *Id.*

<sup>153</sup> “I remember the days when subprime mortgage lending was similarly celebrated — when it was hailed as a way to open up the benefits of homeownership to previously excluded groups.” Paul Krugman, *How Crypto Became the New Subprime*, N.Y. TIMES (Jan. 27, 2022).

<sup>154</sup> For an exploration of the financial stability and broader economic threats likely to arise from the integration of traditional finance and crypto, see Allen *supra* Note 81,

<sup>155</sup> For further elaboration on these proposals, see Allen, *supra* Note 92 at 18.

<sup>156</sup> PWG Report, *supra* Note 52 at 2.

<sup>157</sup> Allen, *supra* Note 92 at 2. It is also critical that antitrust measures be used to prevent any large tech firm from leveraging its network of users into a stablecoin platform, which would also boost DeFi growth. *Id.* at 18.

<sup>158</sup> Gorton & Zhang, *supra* Note 38 at 40.

financial system or on monetary policy.<sup>159</sup> With regard to the first prong, purely aspirational goals would not satisfy this test. For example, stablecoin issuers should have to demonstrate in detail how they plan to scale up to provide a real-world payments service that is superior to what is already available – it would not be enough to speak broadly about aspirations if most real-world merchants show no willingness to accept stablecoins for payments. The second prong of the licensing test is relatively straightforward, and would require DeFi startups to invest in financial (as well as tech) expertise commensurate with the risks involved. With regard to the third prong, while it can be hard to predict the precise systemic impact of a Dapp or stablecoin, the tendencies for DeFi to increase leverage and introduce more rigidity and runs into the financial system certainly raise red flags.

Most of the stablecoins and Dapps currently available would struggle to satisfy these licensing requirements, and so such a licensing regime would limit the growth of DeFi (if a license were ultimately awarded, the licensing process would still offer regulators the opportunity to make interventions to protect consumers and the financial system). However, with a more decentralized Dapp or stablecoin (for example, DAI), there may be some confusion about who should apply for the license. If such a Dapp or stablecoin were launched without a license, enforcement action could be brought against the original founder (sticking with the DAI example, that would be Rune Christensen, the entrepreneur who established MakerDAO, which is the DAO that maintains DAI), or if control has been handed over to a DAO, against the managers of the DAO (Christensen acted as CEO of the Maker Foundation, which managed MakerDAO at least into 2021) or significant beneficial owners of DAO governance tokens (MakerDAO uses MKR tokens; venture capital firm Andreessen Horowitz appears to have a significant holding of these MKR tokens).<sup>160</sup>

While regulators may sometimes struggle to assert jurisdiction over the relevant people (either because regulators cannot determine their identities, or because they are located outside of the United States and lack US assets to enforce judgments against), the licensing regime could still help contain Dapps and stablecoins by prohibiting centralized intermediaries (like wallets and exchanges) from providing any services in connection with an unlicensed Dapp or stablecoin. Admittedly, there could also be jurisdictional issues associated with ancillary services that are provided in more decentralized ways (the Uniswap exchange, for example, is more decentralized), and so there is no single silver bullet measure that can stop the growth of DeFi. However, if DeFi were forced to live up to its claims of decentralization by operating without *any* centralized intermediaries, it would be very difficult for users to access DeFi or for DeFi services to scale up,<sup>161</sup> and this would limit the real-world fallout from any DeFi failures.

Until such licensing measures can be put in place, the SEC and CFTC should continue to regulate stablecoins and Dapps as speculative investments where appropriate, and the Financial Stability Oversight Council and the Office of Financial Research should continue to monitor the DeFi ecosystem for potential spillovers that could harm the financial system and real economy. If

---

<sup>159</sup> For a more detailed proposal for such a licensing regime, see Allen, *supra* Note 81 at 182 *et seq.* This licensing regime builds on proposals made in Omarova, *supra* Note 4.

<sup>160</sup> *The Cointelegraph Top 100: Rune Christensen*, COINTELEGRAPH, <https://cointelegraph.com/top-people-in-crypto-and-blockchain-2021/rune-christensen>; andreessen horowitz, *Maker*, <https://a16z.com/2018/09/24/maker/>.

<sup>161</sup> See Notes 122-127 and accompanying text.

necessary, the Financial Stability Oversight Council could explore using its designation authority under Title VIII for payment, clearing, and settlement activities that are systemically important.<sup>162</sup>

## V. CONCLUSION

Innovation is certainly occurring in the DeFi space. Trying to decentralize financial services seems to be an engaging intellectual exercise for technologists, and venture capitalists are certainly throwing money at these kinds of projects. But the job of policymakers is not to promote innovation at all costs, but to consider when the downsides of innovation justify intervention. As Acting Comptroller of the Currency Michael Hsu put it, “[i]nnovation for innovation’s sake... risks creating a mountain of fool’s gold.”<sup>163</sup> This kind of innovation can distract with unrealistic promises, discouraging the hard work that is needed in the here and now to address pressing problems. As tech ethicist Elizabeth Renieris has observed, “increasingly apparent in the Web3 discourse is a kind of *imaginative* obsolescence: As one vision of the future rapidly replaces the next, the technologies and systems now in place suffer decay and disrepair. Our imaginations and resources are once again diverted from fixing or rehabilitating what exists.”<sup>164</sup> Despite DeFi’s flawed realities, DeFi’s aspirational promises can distract us from fixing and rehabilitating the financial system we actually have.

For example, part of DeFi’s appeal derives from suspicions about concentrations of power in the largest banks, yet some of these largest banks are considering how they can profit in the DeFi ecosystem<sup>165</sup> – DeFi could ultimately enlarge, rather than disrupt, the biggest banks. *Real* solutions to the problem of “too big to fail” require actually shrinking the largest banks, and many reforms have already been suggested to this end – what is lacking is the political will to implement them.<sup>166</sup> Interest in decentralization (particularly Web3) is also being driven by distrust of large tech companies like Amazon, Google, and Meta (formerly Facebook) – but tech giants (and venture capitalists) are already eyeing Web3 as an opportunity to profit.<sup>167</sup> The large tech companies pose very real threats as a result of their market power and dominance as disseminators of information: these threats are beyond the scope of this paper, but as a start, legislation could be adopted that prevents these firms from issuing stablecoins or providing any other financial services.<sup>168</sup>

---

<sup>162</sup> 12 USC S 5463.

<sup>163</sup> Hsu, *supra* Note 50.

<sup>164</sup> Elizabeth M. Renieris, *Amid the Hype Over Web3, Informed Skepticism is Critical* (Jan. 14, 2022), <https://www.cigionline.org/articles/amid-the-hype-over-web3-informed-skepticism-is-critical/>

<sup>165</sup> See Notes 71-72 and accompanying text.

<sup>166</sup> For a survey of these proposals and their political challenges, see Jeremy C. Kress, *Solving Banking’s “Too Big to Manage” Problem*, 104 MINN. L. REV. 171 (2019).

<sup>167</sup> Ephrat Livni, *Tales from Crypto: A Billionaire Meme Feud Threatens Industry Unity*, N.Y. TIMES (Jan. 18, 2022). For example, venture capital firm Andreessen Horowitz is one of the most influential promoters of Web3; its founder Marc Andreessen also sits on Meta’s board. *Id.* Meta is aggressively moving into the web3 space. Brian Quarmby, *Rise of Web3: Metaverse tokens surge as Meta’s share price plunges*, COINTELEGRAPH (Feb. 4, 2022)

<sup>168</sup> Allen, *supra* Note 81 at 208-212.

Financial inclusion is also a very real problem, with significant proportions of Americans being unbanked or underbanked.<sup>169</sup> But it makes little sense to compare vague technological potential with the current inadequate status quo – a better comparison would be between the potential of DeFi, and the potential of “all other solutions that *also* require a wholesale change of the status quo.”<sup>170</sup> Unbanked and underbanked individuals would benefit enormously from access to simple, quick, low-cost financial services, and it seems to be a lack of political will (rather than lack of innovation) that prevents these from being provided.<sup>171</sup> Perhaps if DeFi can be contained so that it does not evolve into Shadow Banking 2.0, then policymakers can devote more of their energies to solving these underlying problems.

---

<sup>169</sup> Aaron Klein, *Opening statement at roundtable on America’s unbanked and underbanked* (Dec. 15, 2021), <https://www.brookings.edu/opinions/opening-statement-of-aaron-klein-at-roundtable-on-americas-unbanked-and-underbanked/>

<sup>170</sup> Schuster, *supra* Note 10 at 997.

<sup>171</sup> Klein, *supra* Note 169. For example, “[t]he single most impactful thing the federal government could do is to give people access to their own money immediately. This can be done by simply amending the Expedited Funds Availability Act to require immediate access for the first several thousand dollars of a deposit, instead of permitting the lengthy, costly delays that harm people living paycheck to paycheck.” *Id.*