

# Fractionalizing Investment Securities: Using FinTech to Expand Financial Inclusion

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*Recent innovations in financial technology, or “FinTech,” are enabling the fractionalization of investment securities, such as shares of stock and bonds. We explain how this fractionalization can fundamentally expand financial inclusion both for investors and for businesses, including small and medium-sized enterprises (SMEs). Using the fractionalization of investment securities as a model, we also counter the argument that FinTech-enabled transactions should not need regulation because they are governed by mathematical algorithms under so-called smart contracts. Additionally, we derive and test a regulatory framework to identify and help to mitigate the risks caused by fractionalization. In the process, we also explain and de-mystify smart contracts, decentralized finance (“DeFi”), and other fundamental, but often confusing, concepts associated with FinTech.*

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## I. INTRODUCTION

Recent innovations in financial technology, or “FinTech,” are enabling the fractionalization of shares of stock, bonds, and other investment securities into units that are small enough for virtually any investor to afford purchasing (hereinafter, fractionalized interests in securities or, more simply, fractionalized securities).<sup>1</sup> By fundamentally expanding financial inclusion for investors, this fractionalization enlarges the pool of invested monies that businesses can borrow.<sup>2</sup> That, in turn, increases financial inclusion for small and medium-sized business enterprises (“SME”s).<sup>3</sup>

Notwithstanding the increased financial inclusion, fractionalization can cause a range of risks, including liquidity risk, which regulators must address.<sup>4</sup> Some ignore the possibility of risks because they believe that FinTech-enabled transactions lack imperfections, being governed by mathematical algorithms under so-called smart contracts.<sup>5</sup> We counter that and then derive and test a regulatory framework to identify and help to mitigate the risks.

Understanding these arguments requires a fuller perspective. Fractional ownership has been around for centuries in the form of shares of stock, which represent fractional interests in the ownership of firms, and in the form of bonds, which represent fractional interests in claims for repayment of debt issued by firms.<sup>6</sup> These traditional fractional interests are sold to investors, and

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<sup>1</sup> See *infra* Part II.

<sup>2</sup> See *infra* Part III.B.

<sup>3</sup> *Id.*

<sup>4</sup> See *infra* Part IV.

<sup>5</sup> See *infra* notes 100–104 and accompanying text.

<sup>6</sup> Bonds are the obligation of borrowers, usually corporations or governmental entities, to repay borrowed money over specified time periods along with the promise that their investment will be repaid with interest. See *Bonds*, INVESTOR.GOV, <https://www.investor.gov/introduction-investing/investing-basics/investment-products/bonds-or-fixed-income-products/bonds> [https://perma.cc/L94J-ERVN] (explaining that bonds typically pay interest twice a year, providing a predictable stream of income for investors). Fractional investments also have been around for decades in the form of shares in mutual funds, which represent fractional interests in pools of investment securities. See *Fractional Shares*, SCHWAB MONEYWISE, <https://www.schwabmoneywise.com/essentials/fractional-shares> [https://perma.cc/WSE8-A982] (“With mutual funds . . . you can put small cash balances to work rather than having to save up to buy a whole share.”).

thus are regarded as investment securities.<sup>7</sup> Traditional finance also would allow businesses to sell fractionalized interests in their assets.<sup>8</sup> For example, a firm could structure a subsidiary, in the form of a special purpose vehicle (“SPV”), and then transfer ownership of certain of its assets to the SPV.<sup>9</sup> The firm could then sell equity shares in the SPV, thereby giving investors exposure to the underlying assets in “fractional” form.<sup>10</sup> These traditional methods of structuring fractionalized investments have seen limited use, however, due to the high costs of creating an SPV and engaging in a securities offering.<sup>11</sup>

The FinTech innovations in fractionalizing securities, however, are profoundly expanding the universe of potential investors. Traditionally, for example, one can own a single share of Apple stock, thereby owning a fraction of the company.<sup>12</sup> A FinTech-enabled fractionalized interest in that share of Apple stock, though, could be minutely smaller. If the trading price of that share is \$138,<sup>13</sup> a ten-percent fractionalized interest would be valued, approximately,<sup>14</sup> at \$13.80, and a one-percent fractionalized interest would be valued at \$1.38. Even if (hypothetical) investor Jones is unwilling to pay \$138 for a single share, she may well be willing to purchase a ten-percent or one-percent interest in that share.

These markets are becoming real. Some broker-dealers are already selling investors fractionalized interests—albeit these are simply fractional interests

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<sup>7</sup> See generally 17 C.F.R. § 230.152a (2019) (describing U.S. regulation of fractional interests as securities).

<sup>8</sup> See Robert Nanni, *What Is Asset Fractionalization and Is Tokenization Required to Achieve It?*, *TEMPLUM* (Oct. 10, 2023), <https://www.templuminc.com/post/asset-fractionalization-and-tokenization> [<https://perma.cc/NDA5-9MP3>] (explaining the process of asset fractionalization).

<sup>9</sup> See *id.*

<sup>10</sup> See *id.* (explaining the process by which a firm can fractionalize an asset through traditional finance methods). While the above-described structure resembles an investment company, traditional finance would allow other structures to fractionalize assets.

<sup>11</sup> See Caterina Fake, *Stop Trying To Raise a Debut Venture Fund — Go for the SPV Instead*, *TECHCRUNCH* (Apr. 7, 2022), <https://techcrunch.com/2022/04/07/stop-trying-to-raise-a-debut-venture-fund-go-for-the-spv-instead/> [<https://perma.cc/WS4H-TCQ9>] (describing that the average cost of setting up a SPV is \$8,000); see also *infra* notes 260–263 and accompanying text (explaining that the high costs associated with utilizing securities exemptions typically deters SMEs from issuing securities).

<sup>12</sup> Shares of stock represent ownership of a company, like Apple, along with a claim against that company’s net assets based on the number of shares owned. *Overview of Equity Securities*, CFA INST., <https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/overview-equity-securities> [<https://perma.cc/L8BK-FBYK>].

<sup>13</sup> On January 20, 2023, the trading price of a share of Apple stock was \$137.87 at 6:00 PM. See *Apple Inc. (AAPL) Stock Historical Prices & Data*, YAHOO FINANCE, <https://finance.yahoo.com/quote/AAPL/history?> [<https://perma.cc/P7HS-VBVX>].

<sup>14</sup> Cf. *infra* Part IV.A (discussing liquidity concerns for resales of fractionalized securities, including the absence of formal secondary markets therefor).

that broker-dealers create themselves<sup>15</sup>—in the shares of stock of S&P 500 companies as well as in exchange-traded funds (“ETFs”).<sup>16</sup> One nonetheless might counter that most people should be able to afford \$138 if they wish to buy a share of Apple stock. However, sound investment requires a diversified portfolio of securities.<sup>17</sup> Ms. Jones would need to invest many hundreds or thousands of dollars to build a diversified portfolio of whole securities.<sup>18</sup> In contrast, she much more affordably could build a diversified portfolio of FinTech-enabled fractionalized securities.<sup>19</sup> This observation becomes even more compelling if Ms. Jones wishes her portfolio to include bonds, which often have face amounts of \$1,000 or more.<sup>20</sup>

By expanding the universe of potential investors, the FinTech innovations in fractionalizing securities are also expanding the pool of invested funds that businesses can access.<sup>21</sup> This has special significance for SMEs, which are generally defined as firms having fewer than 250–500 employees.<sup>22</sup> SMEs are critical to economic growth for various reasons, including by “contribut[ing] to economic dynamism by injecting competition into markets and spurring

<sup>15</sup> See *infra* notes 43–46 and accompanying text (explaining the process by which broker-dealers fractionalize securities). Broker-dealers do not currently sell actual fractionalized securities due to rules limiting equity-security trading to whole shares. See *infra* notes 46–48 and accompanying text (describing how shares in the U.S. only trade as whole shares).

<sup>16</sup> See *infra* Part II.A. ETFs are “funds that trade on exchanges, generally tracking a specific index.” *What is an ETF?*, CHARLES SCHWAB, <https://www.schwab.com/etfs/understand-etfs#beacon-deck—6836> [https://perma.cc/99N3-2KTV]. Vanguard’s S&P 500 ETF, for example, invests in the shares of stock of companies in the S&P 500 Index, with the goal of “closely track[ing] the index’s return, which is considered a gauge of overall U.S. stock returns.” *Vanguard S&P 500 ETF*, VANGUARD, <https://investor.vanguard.com/investment-products/etfs/profile/voo#overview> [https://perma.cc/4RFR-LWSG].

<sup>17</sup> See *infra* notes 114–117 and accompanying text.

<sup>18</sup> Ms. Jones could also just buy a fractionalized share of an ETF to achieve diversification, but this limits Ms. Jones’ ability to choose specific companies with which to invest. See *infra* notes 42–45 and accompanying text.

<sup>19</sup> Cf. *infra* notes 109–18 and accompanying text (discussing the importance of diversified investing).

<sup>20</sup> See, e.g., Rachel Caetero, *What Is the Face Value of a Bond?*, YAHOO! (Sept. 30, 2019), <https://www.yahoo.com/video/face-value-bond-151314119.html> [https://perma.cc/ZC5W-CVHW] (“Most bonds are issued in \$1,000 denominations . . .”).

<sup>21</sup> Cf. Caroline Banton, *Equity Financing: What It Is, How It Works, Pros and Cons*, INVESTOPEDIA, <https://www.investopedia.com/terms/e/equityfinancing.asp> [https://perma.cc/BGC8-VBZ5] (explaining how firms access equity financing).

<sup>22</sup> *Small and Medium-Sized Enterprises (SMEs)*, CORP. FIN. INST., <https://corporatefinanceinstitute.com/resources/knowledge/other/small-and-medium-sized-enterprises-smes/> [https://perma.cc/A7NX-FJJA]. The precise number of employees and revenue to be called an SME varies country to country. *Id.*

innovation”<sup>23</sup> and “captur[ing] the benefits of new technologies and opportunities.”<sup>24</sup> A World Bank report estimates that SMEs comprise 90% of businesses worldwide and represent 50% of worldwide employment.<sup>25</sup>

Like all businesses, SMEs rely on financing to operate and expand their activities.<sup>26</sup> Due to their relatively small size, SMEs lack the economy of scale to cost-effectively access capital market funding.<sup>27</sup> They therefore have been forced to borrow through financial intermediaries, such as banks.<sup>28</sup> The need to go through an intermediary, however, can limit an SME’s availability of financing<sup>29</sup> and increase its cost, creating a multi-trillion dollar financing gap for SMEs.<sup>30</sup> FinTech-enabled fractionalization can enable SMEs, for the first time, to directly access low-cost capital market funding by issuing their own fractionalized securities,<sup>31</sup> thereby increasing their available funding and lowering the cost of financing.<sup>32</sup>

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<sup>23</sup> Jason Wiens & Chris Jackson, *The Importance of Young Firms for Economic Growth*, KAUFFMAN FOUND. (Sept. 24, 2014), <https://www.kauffman.org/resources/entrepreneurship-policy-digest/the-importance-of-young-firms-for-economic-growth> [<https://perma.cc/N79A-YXHM>].

<sup>24</sup> Karen Gordon Mills & Brayden McCarthy, *The State of Small Business Lending: Innovation and Technology and the Implications for Regulation 22* (Harv. Bus. Sch., Working Paper 17-042, 2016). Various studies also indicate that the slow recovery after the 2008 financial crisis was partly a result many small businesses failing and the fact that those that survived were unable to obtain bank financing. *See id.* at 17–22.

<sup>25</sup> *Small and Medium Enterprises (SMEs) Finance*, WORLD BANK, <https://www.worldbank.org/en/topic/smefinance> [<https://perma.cc/6HJT-G38D>].

<sup>26</sup> Mills & McCarthy, *supra* note 24, at 38.

<sup>27</sup> *See id.* at 25 (“Unlike larger, established corporations, small businesses lack access to public institutional debt and equity capital markets. Moreover, the vicissitudes of small business profits makes retained earnings a necessarily less stable source of capital, so they become more dependent on bank credit.”).

<sup>28</sup> *See id.* at 38 (explaining that most small businesses have bank relationships to get loans for business operations or expansion).

<sup>29</sup> *See infra* notes 135–139 and accompanying text; *cf.* Iota Kaousar Nassr & Gert Wehinger, *Unlocking SME Finance Through Market-Based Debt: Securitisation, Private Placements and Bonds*, 2014/2 ORG. FOR ECON. COOPR. & DEVELOPMENT, FIN. MKT. TRENDS 89, 90 (2015) (reporting that “[n]on-bank market-based financing can improve the flow of credit to SMEs”).

<sup>30</sup> *See infra* notes 132–139 and accompanying text; *cf.* Mills & McCarthy, *supra* note 24, at 70–73 (describing that the costs of acquiring capital, underwriting, account management, servicing, and regulatory compliance all impose costs on the intermediary that are passed on to prospective borrowers). The need to go through an intermediary also might expose parties to risk should the intermediary fail. *See* Steven L. Schwarcz, *Intermediary Risk in a Global Economy*, 50 DUKE L.J. 1541, 1544 (2001) [hereinafter *Intermediary Risk*] (explaining intermediary risk).

<sup>31</sup> *See infra* Part III.B.2; *cf.* Christoph Gugelmann & Edgard Carneiro Vieira, *How Investing in Trade Finance Can Be Profitable and Help SMEs Thrive*, WORLD ECON. F. (June 23, 2022), <https://www.weforum.org/agenda/2022/06/investing-trade-finance-profitable-help-smes/> [<https://perma.cc/86ZZ-Z5MM>] (discussing how trade finance

To complete the perspective, it should be noted that FinTech itself has been around for decades.<sup>33</sup> The advent of computers, for example, made it feasible to transmit and settle payment orders electronically, to facilitate cross-border payments, and to develop online banking.<sup>34</sup> Advances in computing power have enabled high-frequency trading by allowing parties to analyze market conditions and execute orders in fractions of a second.<sup>35</sup> Increased computing power also has enabled firms to model potential new securities markets and their risks,<sup>36</sup> introducing innovative financing techniques such as securitization.<sup>37</sup>

More recently, FinTech has grown to include blockchain cryptography. By creating a secure but yet publicly traceable record of transfer, blockchain is being used to record—and thereby help to facilitate markets for—the sale of cryptocurrencies, such as bitcoin and stablecoins, as well as “tokenized” assets such as non-fungible tokens, or “NFT”s—which represent fractional interests in a diverse range of non-cash-generating assets.<sup>38</sup> Blockchain cryptography is

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generally can facilitate SME financing, and that fractional tokenized securities traded through smart contracts can be utilized to increase available financing for SMEs).

<sup>32</sup> By accessing capital market funding directly, for example, SMEs can avoid the profit-oriented interest-rate markup charged by intermediary banks. LUCIA CUSMANO, ORG. FOR ECON. COOPR. & DEVELOPMENT, NEW APPROACHES TO SME AND ENTREPRENEURSHIP FINANCING: BROADENING THE RANGE OF INSTRUMENTS 11–12, 42 (2015) [hereinafter *New Approaches to SME Financing*], <https://www.oecd.org/cfe/smes/New-Approaches-SME-full-report.pdf> [<https://perma.cc/EKA4-5PVU>].

<sup>33</sup> Eilene Zimmerman, *The Evolution of Fintech*, N.Y. TIMES, <https://www.nytimes.com/2016/04/07/business/dealbook/the-evolution-of-fintech.html> [<https://perma.cc/TN43-3G5Z>].

<sup>34</sup> *Id.*

<sup>35</sup> James Chen, *What Is High-Frequency Trading (HFT)? How It Works and Example*, INVESTOPEDIA, <https://www.investopedia.com/terms/h/high-frequency-trading.asp> [<https://perma.cc/6WYL-JSQ9>].

<sup>36</sup> See FIN. CRISIS INQUIRY COMM’N, THE FINANCIAL CRISIS INQUIRY REPORT 44 (Feb. 2011), <https://www.govinfo.gov/content/pkg/GPO-FCIC/pdf/GPO-FCIC.pdf> [<https://perma.cc/254J-9Q2A>].

<sup>37</sup> Securitization is the process by which assets are pooled and repackaged into interest-bearing securities. Andreas Jobst, *What Is Securitization?*, FIN. & DEV., Sept. 2008, at 48, 48. The 2008 financial crisis raises questions, however, whether the risks of securitization were adequately modeled. *Id.* at 49.

<sup>38</sup> Steven L. Schwarcz, *Next-Generation Securitization: NFTs, Tokenization, and the Monetization of ‘Things’*, B.U. L. REV. (forthcoming 2023) (manuscript at 18) [hereinafter *Next-Generation Securitization*], <http://ssrn.com/abstract=4044101>. Investors also can purchase fractional interests in single NFTs or in an NFT collection, often in hopes of a return on their investment. Karen Garnett, Jeffrey Neuburger & Frank Zarb, *NFTs Are Interesting but Fractionalized Non-Fungible Tokens (F-NFTs) May Present Even More Challenging Legal Issues*, PROSKAUER: BLOCKCHAIN & L. (Apr. 22, 2021), <https://www.blockchainandthelaw.com/2021/04/nfts-are-interesting-but-fractionalized-non-fungible-tokens-f-nfts-may-present-even-more-challenging-legal-issues/> [<https://perma.cc/TU23-YE3R>]. Compared to more standard NFTs, such fractional

now also being used to help facilitate a market for the sale of fractionalized securities.<sup>39</sup> In this market, these securities may be traded under smart contracts, which are governed by mathematical algorithms that replace human-managed intermediaries.<sup>40</sup>

We show why the fractionalization of investment securities creates liquidity risk and other potential risks. We also explain how regulation could limit these failures while preserving fractionalization's benefits. In that context, we address and counter the misperception that FinTech-enabled transactions intrinsically lack imperfections because their governance by mathematical algorithms virtually eliminates human error.<sup>41</sup>

This Article proceeds in four parts. Part II describes the fractionalization of investment securities, including FinTech-enabled fractionalization, and the relevance of blockchain technologies, asset tokenization, smart contracts, and decentralized finance ("DeFi"). Part III explains how fractionalization can increase financial inclusion for investors, thereby also benefiting SMEs and other firms seeking expanded and lower cost financing. Part IV examines how fractionalization nonetheless can create significant risks, which need correction. Finally, Part V examines and critiques the limits of existing regulation and then proposes new regulation that could mitigate fractionalization's risks in a cost-effective manner.

## II. FRACTIONALIZING INVESTMENT SECURITIES

This Part begins by describing the fractionalized securities that are currently available to investors. It then explains how blockchain technologies can further facilitate fractionalization and how the resulting fractionalized securities can be issued and traded using smart contracts on DeFi platforms.

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interests could be more accessible to small investors, and "could also facilitate the creation of a trading market." *Id.*

<sup>39</sup> See *infra* Part II; cf. Kai Ren & Zakie Twainy, *The Rise of Tokenization*, BNY MELLON (Sept. 2022), <https://www.bnymellon.com/us/en/insights/all-insights/the-rise-of-tokenization.html> [<https://perma.cc/ZPR3-PPXW>] (discussing using blockchain cryptography to create a market for sales of tokenized assets).

<sup>40</sup> See *infra* Part II.B.2. We observe, however, that smart contracts may require other human intermediaries, referred to as "oracles," in order to import relevant information onto a DeFi platform. See *infra* notes 237–241 and accompanying text.

<sup>41</sup> See *infra* notes 102–106 and accompanying text; cf. Mark Verstraete, *The Stakes of Smart Contracts*, 50 LOY. U. CHI. L.J. 743, 762–63 (2019) (describing how advocates of smart contracts contend such contracts will replace traditional contracts, while ignoring governance and market risks).

### A. Current Fractionalized Interests

FinTech firms and even conventional brokerages are beginning to sell fractionalized securities to their clients.<sup>42</sup> For example, FinTech firms Robinhood and SoFi, as well as brokerages Fidelity and Charles Schwab, are now selling fractionalized equity securities for as little as \$1–\$5.<sup>43</sup> Acorns, a so-called micro-investing firm, is selling fractionalized interests in exchange-traded funds (“ETFs”) also for as little as \$5.<sup>44</sup> And firms such as Singapore-based Capbridge are now selling fractionalized interests in debt securities, such as bonds—although at the relatively high investment threshold of \$1,000.<sup>45</sup>

So far, these sales of fractionalized securities by FinTech firms and conventional brokerages are not taking advantage of blockchain technologies. Rather, these companies appear to be buying whole securities and selling undivided fractional interests therein to their customers.<sup>46</sup> The companies

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<sup>42</sup>The market for selling fractional interests in investment securities started in 2019. See Kate Rooney, *Robinhood Joins a Wave of Fractional Stock-Trading Offers to Bring Investing to the Masses*, CNBC (Dec. 12, 2019), <https://www.cnbc.com/2019/12/12/robinhood-joins-a-wave-of-fractional-stock-trading-offers.html> [<https://perma.cc/X5LM-ZAUF>]; cf. David Gempesaw, Joseph J. Henry & Raisa Velthuis, *Piecing Together the Extent of Retail Fractional Trading*, 54 GLOB. FIN. J. 1, 4–5 (2022) (observing that Robinhood began selling fractional interests in equity in December 2019).

<sup>43</sup>*Schwab Stock Slices*, CHARLES SCHWAB, <https://www.schwab.com/fractional-shares-stock-slices> [<https://perma.cc/FGC6-XDGB>]; see also *Fractional Shares*, FIDELITY, <https://www.fidelity.com/trading/fractional-shares> [<https://perma.cc/2XAX-QGDL>]; Thomas Heath, *Shares by The Slice: Fractional Investing Sparks A Stock Market Stampede*, WASH. POST (July 10, 2020), <https://www.washingtonpost.com/business/2020/07/10/shares-by-slice-fractional-investing-sparks-stock-market-stampede/> [<https://perma.cc/3Y5V-BQMZ>].

<sup>44</sup>Stacy Rapacon, *What are Fractional Shares?*, ACORNS (Nov. 14, 2022), <https://www.acorns.com/learn/investing/fractional-shares/> [<https://perma.cc/M26T-7CJZ>]; see also *Acorns Invest*, ACORNS, <https://www.acorns.com/invest/> [<https://perma.cc/GP44-KQ9X>].

<sup>45</sup>*Bond Fractionalization – What Is It and How We Did It*, CAPBRIDGE, <https://capbridge.sg/bond-fractionalization-what-is-it-and-how-we-did-it/> [<https://perma.cc/R86R-85A6>]. Fractionalized bonds represent ownership and claims for principal and interest payments equal to the fraction of the total bond owned. See Miranda Marquit, *How Do Fractional Shares Work?*, FORBES, <https://www.forbes.com/advisor/investing/fractional-shares/> [<https://perma.cc/CF2T-ZRZ3>]. Generally, fractionalized securities give investors similar rights to dividends and payments as whole shares. *Id.* As Forbes explains, “[I]f a [dividend] payout is \$0.50 per share, and you have half of a share, you’ll receive \$0.25 as a payout.” *Id.*

<sup>46</sup>As Capbridge explains, “[O]ur fractionalized institutional-grade bonds are depository receipts of the underlying bond held by Citibank, and customized by global Custodian, Northern Trust.” *Bond Fractionalization – What Is It and How We Did It*, *supra* note 45; cf. *Intermediary Risk*, *supra* note 30, at 1544 (explaining the sale of undivided interests in assets).

themselves typically “maintain[] a separate account” to record each customer’s purchased fractional interests.<sup>47</sup> There are no exchanges on which to trade those fractional interests; equity securities, at least, must currently be traded on exchanges as whole shares.<sup>48</sup>

Even this limited fractionalization, however, appears to be significantly increasing retail investment.<sup>49</sup> Fractionalized trading through Robinhood, which began offering fractionalized equity securities<sup>50</sup> in December 2019,<sup>51</sup> is said to result in a 53% increased rate of ownership of fractionalized interests in higher priced stocks (defined as greater than \$100 per share) compared to lower priced stocks (defined as \$10–\$50 per share).<sup>52</sup> For certain higher priced stocks like Berkshire Hathaway Class A and Amazon, Robinhood’s fractionalized trading is said to result in “incremental increases in ownership of 240 to 2,600 percentage points compared to” lower priced stocks in similar categories.<sup>53</sup> These “large increase[s] in ownership of high-price securities after the introduction of fractional trading[] demonstrat[e] that [fractionalization] substantially alleviates price-based frictions on retail investing,” thereby stimulating that investing.<sup>54</sup> A Deloitte study likewise has found that fractionalization has been driving overall increases in the volume of securities trading by retail investors.<sup>55</sup>

For perspective, it may be helpful to compare the foregoing fractionalization of investment securities with the recent trend to fractionalize other types of assets. Firms such as Fundrise and Cadre, for example, have been selling fractionalized interests in real estate to investors,<sup>56</sup> and Royalty

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<sup>47</sup> U.S. SEC. & EXCH. COMM’N, STAFF REPORT ON EQUITY AND OPTIONS MARKET STRUCTURE CONDITIONS IN EARLY 2021 at 7 n.17 (Oct. 2021), <https://www.sec.gov/files/staff-report-equity-options-market-struction-conditions-early-2021.pdf> [<https://perma.cc/G96U-R8B3>].

<sup>48</sup> *Id.* at 7.

<sup>49</sup> Gempesaw, Henry & Velthuis, *supra* note 42, at 18 (“These incremental increases in unique Robinhood owners are consistent with the use of fractional trading to purchase securities with prohibitively expensive full-share prices.”); *cf.* Rapacon, *supra* note 44 (reporting how Acorns’ \$5 investment threshold can greatly increase accessibility in equity markets).

<sup>50</sup> As discussed previously, investors do not “own” a share, rather they are granted a fractional interest in a security by their broker-dealer. *See supra* notes 46–47 and accompanying text. The broker-dealer itself owns the underlying whole share. *Id.*

<sup>51</sup> Gempesaw, Henry & Velthuis, *supra* note 42, at 5.

<sup>52</sup> *Id.* at 18. Admittedly, these data suggest that SMEs may not be the primary issuer beneficiaries of fractionalization; larger firms will also benefit.

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

<sup>54</sup> *Id.* at 3.

<sup>55</sup> VAL SRINIVAS & JILL GREGORIE, DELOITTE, THE RISE OF NEWLY EMPOWERED RETAIL INVESTORS 4 (Feb. 2021), <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/financial-services/us-the-rise-of-newly-empowered-retail-investors-2021.pdf> [<https://perma.cc/38XD-2WC4>].

<sup>56</sup> Dylan Ketcham & Peter Johnson, *Alternative Investments: Democratization Through Fractionalization*, JUMP CAP. (Apr. 26, 2021),

Exchange has been selling fractionalized interests in music royalties.<sup>57</sup> Some see growth potential in these types of fractionalized interests.<sup>58</sup> As with investments in NFTs, however, fractionalizing interests in non-investment securities tends to be characterized by high entry costs, opaque valuation, and illiquidity.<sup>59</sup> This Article focuses on the fractionalization of investment securities which (as will be shown) not only can avoid or at least minimize those costs but also is likely to have a much larger market.

In contrast to the current market for fractionalized securities, we appear to be on the cusp of a more decentralized market that utilizes blockchain technology and so-called smart contracts to fractionalize securities and to arrange and record their sale. Part B next examines this developing market.

### B. Future Fractionalized Interests

The future market in fractionalized securities is likely to be strongly driven by advances in FinTech. Among other reasons, these advances promise to democratize fractionalization and to greatly reduce its transaction costs.<sup>60</sup> To understand why, one must first understand the rudiments of blockchain, asset tokenization, smart contracts, and DeFi.

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<https://jumpcap.com/insights/alternative-investments-democratization-through-fractionalization> [<https://perma.cc/M7DM-TNJH>].

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

<sup>58</sup> See, e.g., Glenn Woo & Scott Thiel, *Fractionalizing the Future of Asset Ownership, Securely*, NASDAQ (Dec. 1, 2020), <https://www.nasdaq.com/articles/fractionalizing-the-future-of-asset-ownership-securely-2020-12-01> [<https://perma.cc/747T-ETEB>] (describing how fractionalization and tokenization can be used to expand access to art, precious metals, real estate, and other markets); see also Ekin Genç, *How Can You Share an NFT? Fractional NFTs Explained*, COINDESK, <https://www.coindesk.com/learn/how-can-you-share-an-nft-fractional-nfts-explained/> [<https://perma.cc/W9BK-42VR>] (describing fractionalized interests in NFTs, art, and the relevant exchanges related to fractional NFT trading).

<sup>59</sup> Cf. *Next-Generation Securitization*, *supra* note 38 (manuscript at 34–37) (discussing those concerns). Fractionalizing interests in real estate, for example, typically has extremely high costs, such as hundreds of thousands of dollars to acquire a single building; and valuing a property may be difficult or costly, and it also may be difficult to sell property in the event of a market downturn. See Ketcham & Johnson, *supra* note 56 (describing how real estate showcases some of these market failures along with other asset classes).

<sup>60</sup> See *infra* Part II.B.2 (describing how the use of smart contracts reduces costs by eliminating intermediaries).

### 1. *Blockchain and Asset Tokenization*

Blockchain is often used to record the ownership of electronically transferred property, which can include fractionalized securities.<sup>61</sup> A fractionalized security would then be digitally represented on a blockchain through a process known as tokenization.<sup>62</sup> In that process, the fractionalized security would be represented by the token (hereinafter, “tokenized fractionalized security”),<sup>63</sup> which can then be sold to potential investors through various trading or financing platforms.<sup>64</sup> The token itself replaces a paper certificate or an intermediary’s account as evidence of ownership.<sup>65</sup> It represents the same economic rights and value linked to the actual fractionalized security.<sup>66</sup>

A blockchain is simply a computerized database that is used to record information—the electronic equivalent of a paper ledger.<sup>67</sup> The blockchain database is stored in different computers, known as nodes.<sup>68</sup> This provides cross-checking redundancy, which reduces the need for trusted central intermediation.<sup>69</sup> The descriptive “block” of the term “blockchain” refers to the fact that once the recorded data reach a certain storage capacity, they are

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<sup>61</sup> See Jagjit Singh, *How Blockchain Technology Revolutionizes Digital Ownership?*, COINTELEGRAPH (Mar. 12, 2023), <https://cointelegraph.com/explained/how-blockchain-technology-revolutionizes-digital-ownership> [https://perma.cc/XZ47-GZD7].

<sup>62</sup> IOTA KAOUSAR NASSR, ORG. FOR ECON. & COOP. DEV., *THE TOKENISATION OF ASSETS AND POTENTIAL IMPLICATIONS FOR FINANCIAL MARKETS* 11 (Jan. 2020) [hereinafter *TOKENISATION OF ASSETS*], <https://www.oecd.org/finance/The-Tokenisation-of-Assets-and-Potential-Implications-for-Financial-Markets.pdf> [https://perma.cc/4VMM-KX8P].

<sup>63</sup> Some of the industry terminology is confusing. For example, the term “security token,” unlike tokenized security, has no underlying “real-world” asset. See, e.g., *id.* at 14.

<sup>64</sup> Nanni, *supra* note 8.

<sup>65</sup> *What Are Security Tokens?*, GEMINI: CRYPTOPEDIA, <https://www.gemini.com/cryptopedia/security-token-offering-vs-initial-coin-offering-stos> [https://perma.cc/LHU7-NHJ7]; Christina Majaski, *Cryptocurrency Security Token: Definition, Forms, Investing In*, INVESTOPEDIA, <https://www.investopedia.com/terms/s/security-token.asp> [https://perma.cc/8D5M-XFFA].

<sup>66</sup> *What Are Security Tokens?*, *supra* note 65.

<sup>67</sup> *Where Blockchain Is Stored: Fundamentals Explained*, 101 BLOCKCHAINS (June 29, 2021), <https://101blockchains.com/where-blockchain-is-stored/> [https://perma.cc/ZZM6-YLGT].

<sup>68</sup> *Id.* The recorded information is also encrypted (“cryptography”) for further security. *What is Encryption? A Brief Overview*, GEMINI: CRYPTOPEDIA, <https://www.gemini.com/cryptopedia/what-is-encryption-blockchain-symmetric-asymmetric> [https://perma.cc/U25V-KJXJ].

<sup>69</sup> See *infra* text accompanying notes 165–176 (describing how DeFi can reduce the need for trusted third parties, lowering costs associated with third-party intermediation).

fixed as a permanent record, known as a “block.”<sup>70</sup> Thus, the data associated with the transfer of particular fractionalized securities<sup>71</sup> would be recorded through sequences, or “chains,” of blocks. Normally, each block would be timestamped when added to the chain by validators.<sup>72</sup> Validators are individuals or entities that volunteer their available computing power to validate transactions on the blockchain and receive rewards for doing so.<sup>73</sup> Because a blockchain’s data are (equally) available from any of the different node computers, blockchains are sometimes referred to as distributed ledger technology (“DLT”).<sup>74</sup>

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<sup>70</sup> Jake Frankenfield, *What Is a Block in the Crypto Blockchain, and How Does It Work?*, INVESTOPEdia, <https://www.investopedia.com/terms/b/block-bitcoin-block.asp> [https://perma.cc/K2F9-PZKM].

<sup>71</sup> Currently, blockchains most commonly record data for transferring cryptocurrencies. See *What Is Blockchain Used For?*, SANTANDAR (May 26, 2023), <https://www.santandar.com/en/stories/blockchain-used-for> [https://perma.cc/5W5V-WEVJ] (“Blockchain became widely known as bitcoin emerged . . .”). In principle, though, blockchains should be able to be used to record any other data. See *id.*; see also Pam Baker, *Today’s Blockchain Use Cases and Industry Applications*, TECHTARGET (July 6, 2023), <https://www.techtarget.com/searchcio/feature/Todays-blockchain-use-cases-and-industry-applications> [https://perma.cc/CA3G-TC7H].

<sup>72</sup> There are two blockchain models that vary in validation methods. See *What Is Proof of Work?*, COIN RIVET, <https://coinrivet.com/guides/altcoins/what-is-proof-of-work> [https://perma.cc/3TYV-NSSQ]. They are proof of work (“PoW”) and proof of stake (“PoS”). *Id.* In the PoW model, “network nodes validate the information by competing among themselves to find the solution to increasingly more complex mathematical riddles.” *Id.* These validators are given rewards in the form of transaction fees once they solve the problem. *Id.* A blockchain validator in a PoS model is “an individual or group [that] is randomly chosen to verify transactions by an algorithm that takes into consideration the number of tokens they have staked, or locked up, on the network as a form of collateral.” *How to Stake on Proof-of-Stake Blockchains*, GEMINI: CRYPTOPEDIA, <https://www.gemini.com/cryptopedia/staking-rewards-pos-blockchains> [https://perma.cc/HKLL2-3VD6]. These individuals or groups get transaction fees as a reward. *Id.*

<sup>73</sup> *Blockchain Validator*, PCMAG, <https://www.pcmag.com/encyclopedia/term/blockchain-validators> [https://perma.cc/3TJB-4NQF]; see also *How to Stake on Proof-of-Stake Blockchains*, *supra* note 72.

<sup>74</sup> See Curtis Miles, *Blockchain Security: What Keeps Your Transaction Data Safe?*, IBM (Dec. 12, 2017), <https://www.ibm.com/blogs/blockchain/2017/12/blockchain-security-what-keeps-your-transaction-data-safe/> [https://perma.cc/NSE5-GMJU]. Bitcoin updates its blockchain every 10 minutes, whereas the Ethereum blockchain updates every 10–20 seconds. Brandon Vigliarolo, *Ethereum Cheat Sheet: Everything You Need to Know*, TECHREPUBLIC (May 10, 2021), <https://www.techrepublic.com/article/ethereum-a-cheat-sheet-for-professionals-everything-you-need-to-know/> [https://perma.cc/33BZ-W6UF]. Blockchains maintain their security because hackers would need to alter the specific block containing the targeted record and all linked blocks to avoid detection. Miles, *supra*. Additionally, the lack of centralization means blockchains have no single point of failure and cannot be changed from a single computer, meaning a hacker would have to access 51% of all computing power (or node computers) and change all of them simultaneously. *Id.*

A company can issue tokenized fractionalized securities and offer them to investors on the blockchain.<sup>75</sup> Tokenized securities “can be programmed with unique characteristics and ownership rights,”<sup>76</sup> allowing investors to acquire “fractional ownership of [the tokenized security’s] underlying asset[.]” (such as a bond or stock).<sup>77</sup>

Next, consider how smart contracts and DeFi platforms are transforming the infrastructure for issuing and trading tokenized securities. This transformation will allow any firm or investor to engage with these platforms, which should further democratize finance and reduce transaction costs.

## 2. Smart Contracts and DeFi

Smart contracts promise to facilitate the trading of tokenized fractionalized securities. A smart contract is simply an algorithm—a precise list of step-by-step instructions to conduct specified actions, depending on the input—expressed in computer code.<sup>78</sup> These instructions (sometimes referred to as rules) are often called DeFi protocols.<sup>79</sup> The DeFi protocols of a smart contract might provide, for example, that by paying \$100 an investor gets a one percent

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<sup>75</sup> See *What Are Security Tokens?*, *supra* note 65. As a note, the following two forms of Fintech-enabled fractionalization can occur on blockchain: tokenized securities and security tokens. *Id.* For purposes of this article, they will be referred to as “tokenized securities,” because although they have slight differences, both offer similar promise in the ability for SMEs and other businesses to fractionalize securities. *Id.* A tokenized security represented by a digital token is essentially the same thing as the paper certificates companies used to give investors who purchased their stock. Majaski, *supra* note 65. The token represents the same economic rights and value linked to the actual fractionalized assets as a paper certificate would, such as the rights to dividends or revenue streams from a fractionalized security. *What Are Security Tokens?*, *supra* note 65.

<sup>76</sup> *Id.*

<sup>77</sup> *Id.* For example, the private equity firm KKR was one of the first companies to issue tokenized shares in one of its health-care funds, with the goal of “provid[ing] a more accessible investment vehicle to individual investors.” Oliver Knight, *Investment Giant KKR Puts Portion of Private Equity Fund on Avalanche Blockchain*, COINDESK, <https://www.coindesk.com/business/2022/09/13/investment-giant-kkr-puts-portion-of-private-equity-fund-on-avalanche-blockchain> [https://perma.cc/4RGT-73HP] (describing how KKR tokenized shares of its health-care fund); see also Lee Reniers, *Now I Know the Cryptocurrency Industry Is Here to Stay*, COINDESK (Jan. 10, 2023), <https://www.coindesk.com/consensus-magazine/2023/01/10/now-i-know-the-cryptocurrency-industry-is-here-to-stay> [https://perma.cc/D9SA-JT22] (explaining various firms that have engaged in tokenization of securities).

<sup>78</sup> *What Are Smart Contracts on Blockchain?*, IBM, <https://www.ibm.com/topics/smart-contracts> [https://perma.cc/T5MQ-6R7R].

<sup>79</sup> See Stuart D. Levi & Alex B. Lipton, *An Introduction to Smart Contracts and Their Potential and Inherent Limitations*, HARV. L. SCH. F. ON CORP. GOVERNANCE (May 26, 2018), <https://corpgov.law.harvard.edu/2018/05/26/an-introduction-to-smart-contracts-and-their-potential-and-inherent-limitations/> [https://perma.cc/WJ3D-ENPA]; Reniers, *supra* note 77.

fractionalized interest in a specified security of a particular issuer.<sup>80</sup> A DeFi “platform” is a collection of various DeFi protocols.<sup>81</sup> Depending on the programming, these protocols could allow an investor or other user to access the types of services typically offered through traditional financial intermediaries, including borrowing and trading.<sup>82</sup>

Because they are executed automatically based on the input, smart contracts do not require intermediaries.<sup>83</sup> For example, DeFi crypto-lending platforms utilizing smart contracts can bring together lenders and prospective borrowers without a central intermediary.<sup>84</sup> Smart contracts allow lenders to deposit their money into a liquidity pool<sup>85</sup> and borrowers to access the liquidity pool by providing pre-specified forms of collateral, thereby creating a form of peer-to-peer lending.<sup>86</sup> Loan disbursements can be nearly instantaneous, cutting lending costs.<sup>87</sup> Smart contracts similarly could “eliminate the need for intermediaries in financial transactions [more generally]—replacing exchanges, market-makers, asset managers, banks, and other lenders with software protocols.”<sup>88</sup>

This “disintermediation”—meaning removing the need for a financial intermediary—promises significant cost reductions.<sup>89</sup> Although financial intermediaries traditionally “have been the key nodes in the financial system that control the accuracy of customer accounts, perform bookkeeping

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<sup>80</sup>Other examples of smart contracts could include “(1) ensuring the payment of funds upon certain triggering events and (2) imposing financial penalties if certain objective conditions are not satisfied.” Levi & Lipton, *supra* note 79.

<sup>81</sup>See SIRIO ARAMONTE, SEBASTIAN DOERR, WENQIAN HUANG & ANDREAS SCHRIMPF, DEFI LENDING: INTERMEDIATION WITHOUT INFORMATION? 2 (June 2022), <https://www.bis.org/publ/bisbull57.pdf> [<https://perma.cc/ULS8-STXD>].

<sup>82</sup>Prash Raval & James Knight, *Compare the Best DeFi Platforms in 2023*, INVEZZ, <https://invezz.com/cryptocurrency/defi/platforms/> [<https://perma.cc/TDW6-CJMJ>]. DeFi is an umbrella term; while it can encompass varying aspects of decentralization, including decentralized ownership and various decentralized financial activities, it is generally regarded as attempting to replace traditional financial intermediaries with smart contracts. Alyssa Hertig, *What is DeFi?*, COINDESK, <https://www.coindesk.com/learn/what-is-defi/> [<https://perma.cc/ZGQ2-BFBD>].

<sup>83</sup>See, e.g., *What Are Smart Contracts on Blockchain?*, *supra* note 78 (stating that “all [smart contract] participants can be immediately certain of the outcome, without any intermediary’s involvement or time loss”).

<sup>84</sup>ARAMONTE, DOERR, HUANG & SCHRIMPF, *supra* note 81, at 2.

<sup>85</sup>Liquidity pools are separated into individual crypto-assets and represent the supply of funds available for borrowing in that specific crypto-asset. *Id.*

<sup>86</sup>*Id.* DeFi requires all loans to be collateralized. See *id.* (describing how DeFi requires collateral for loans due to the anonymity of the transactions).

<sup>87</sup>*Id.*

<sup>88</sup>Jai Massari & Christian Catalini, *DeFi, Disintermediation, and the Regulatory Path Ahead*, REGUL. REV. (May 10, 2021), <https://www.theregreview.org/2021/05/10/massari-catalini-defi-disintermediation-regulatory-path-ahead> [<https://perma.cc/6VZL-RXM3>]; see also TOKENISATION OF ASSETS, *supra* note 62, at 16.

<sup>89</sup>Massari & Catalini, *supra* note 88.

functions, and ensure that unauthorized persons do not have access to an account,”<sup>90</sup> such intermediation gives rise to “inefficiencies, structural inequalities, and hidden risks.”<sup>91</sup> In contrast, DeFi can reduce transaction costs, increase transparency through blockchain-based records, provide round-the-clock access to financial markets, improve settlement speed, and increase financial inclusion by allowing anyone globally with an internet connection to access DeFi platforms.<sup>92</sup> By utilizing multiple nodes,<sup>93</sup> blockchain recordkeeping also has the advantage over traditional bookkeeping of not having a single point of failure.<sup>94</sup>

In the specific context of this Article, smart contracts running on DeFi protocols can facilitate low-cost and efficient trading of tokenized fractionalized securities.<sup>95</sup> For example, FinTech company BondbloX is beginning to buy corporate bonds and sell fractionalized interests therein, in the form of blockchain-recorded tokens, to investors.<sup>96</sup> These transactions take place between BondbloX, as the issuer and seller of the tokenized

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<sup>90</sup> Igor Makarov & Antoinette Schoar, *Cryptocurrencies and Decentralized Finance (DeFi)*, 2022 BROOKINGS PAPERS ON ECON. ACTIVITY 141, 145.

<sup>91</sup> DAVID GOGEL, WHARTON BLOCKCHAIN & DIGIT. ASSET PROJECT, DEFI: BEYOND THE HYPE: THE EMERGING WORLD OF DECENTRALIZED FINANCE 2 (May 2021), [hereinafter DEFI: BEYOND THE HYPE] <https://wifpr.wharton.upenn.edu/wp-content/uploads/2021/05/DeFi-Beyond-the-Hype.pdf> [<https://perma.cc/JNP8-QKN2>].

<sup>92</sup> *See id.* at 7 (listing the potential benefits of DeFi over centralized finance and describing DeFi’s potential to allow global market access and make DeFi tools available to anyone); *see also* Ayushi Abrol, *DeFi Protocols: A Complete Overview*, BLOCKCHAIN COUNCIL, <https://www.blockchain-council.org/defi/defi-protocols/> [<https://perma.cc/28XC-2RZY>].

<sup>93</sup> *See supra* notes 68–74 and accompanying text.

<sup>94</sup> Makarov & Schoar, *supra* note 90, at 146 (“One of the main advantages of DLT is the elimination of a central point of failure. Since multiple copies of records exist, the corruption of a single node or a single copy has no effect on the security of the blockchain.”).

<sup>95</sup> *See* Melanie Lockert, *DeFi: The Peer-to-Peer Financial System Based Primarily on Ethereum*, BUS. INSIDER AFR. (Nov. 29, 2021), <https://www.businessinsider.com/personal-finance/what-is-defi> [<https://perma.cc/2JBE-336L>].

<sup>96</sup> *How It Works*, BONDBLOX (Apr. 30, 2021), <https://bondblox.com/all-featured-articles/what-is-bondblox-how-it-works> [<https://perma.cc/39V6-5KDB>]. Investors have similar rights to traditional bonds. *See id.* The original bonds are held by a designated custodian, and if investors’ holdings meet the original underlying bond’s value, the investor may choose to “convert their BondbloX into Underlying Bonds and have it sent back to their own custodians.” *Id.* Additionally, “[t]he debentures register maintained on blockchain provides the definitive record of BondbloX ownership.” *Id.* BondbloX’s exchange is currently regulated. *See id.* (“BondbloX is regulated by the Monetary Authority of Singapore as a Recognised Market Operator (“RMO”) and exempted from Section 49(1) of the Securities and Futures Act (Cap. 289) (“SFA”) under Section 49(7) of the SFA.”). Some firms are linking their smart contracts with an approved broker-dealer. *See infra* notes 209–212 (discussing the Fintech firm IX Swap’s proposal to link its DeFi platform with a centralized broker-dealer).

fractionalized securities, and investors,<sup>97</sup> without the need for an underwriter or other financial intermediary. Although non-FinTech-enabled fractionalization shares some characteristics with Fintech-enabled fractionalization,<sup>98</sup> this new method of fractionalizing securities promises to have numerous advantages, including lowering costs for issuers and increasing transparency for investors.<sup>99</sup>

DeFi proponents argue that regulation of DeFi platforms is unnecessary because algorithmic smart contracts and blockchain replace human-managed intermediaries, effectively eliminating the chance of human error. One industry leader explains that DeFi “operates through immutable code [in this case, smart contracts], and as such, represents ‘an economy of laws and not of men.’ It is this neutral, objective foundation for economic arrangement which future generations will look back upon and thank us for.”<sup>100</sup> A think-tank study adds that smart contracts “require contracting parties to complete contracts as much as possible ex ante,” since they are designed not to have recourse to the legal system.<sup>101</sup> Of course, it is nearly impossible to craft a contract that covers all possible scenarios,<sup>102</sup> meaning smart contracts must have some form of legal backing. Without legal backing for smart contracts, “up-front costs will become especially high when there is large uncertainty about the future states of the world or if these states are hard to imagine and to

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<sup>97</sup> See *id.*; see also *Honey I Shrank the Bonds! But You Can Funge Them Back Again!*, BONDBLOX (Oct. 20, 2021) [hereinafter *Honey I Shrank the Bonds!*], [<https://perma.cc/J32W-URPV>].

<sup>98</sup> Both Schwab and BondbloX are selling fractionalized interests to investors, but BondbloX does so utilizing blockchain and tokens rather than separate accounts. See *supra* notes 43, 46–47 (describing the process by which Schwab sells fractionalized securities to investors); see also Rahul Banerjee, *The Alchemy of Atomic Settlement*, BONDBLOX (Oct. 1, 2021), [<https://www.bondblox.com/all-featured-articles/the-alchemy-of-atomic-settlement>] [<https://perma.cc/WNX3-GZHW>] (explaining how smart contracts can be utilized to facilitate trading).

<sup>99</sup> See *supra* notes 42–47 and accompanying text (explaining that broker-dealers simply keep a record of fractionalized securities in separate accounts, rather than issuing a new form of a security in the form of tokens); see also *TOKENISATION OF ASSETS*, *supra* note 62, at 7 (explaining that DLT based trading and DeFi have the potential to deliver numerous benefits for SMEs in the form of tokenized fractionalized securities).

<sup>100</sup> Erik Voorhees, *A Response to SBF and Principled Crypto Regulation*, MONEY & ST. (Oct. 20, 2022), [<https://www.moneyandstate.com/blog/response-to-sbf>] [<https://perma.cc/AW9U-8246>].

<sup>101</sup> Makarov & Schoar, *supra* note 90, at 155.

<sup>102</sup> See, e.g., Jeremy M. Sklaroff, Comment, *Smart Contracts and the Cost of Inflexibility*, 166 U. PA. L. REV. 263, 291–302 (2017) (describing the costs associated with smart contracts and emphasizing that “[t]here is no contract technology that fits every possible transaction”). In the context of fractionalized securities, a DeFi platform could offer its own set of default smart contract terms that issuers and investors would have to agree to. Cf. Levi & Lipton, *supra* note 79 (“[T]he code [making up a smart contract] can either be the sole manifestation of the agreement between the parties or might complement a traditional text-based contract and execute certain provisions . . .”).

define *ex ante*.”<sup>103</sup> Because blockchains record all smart-contract-effectuated transactions on a distributed ledger, trust is also supposed to be built directly into the system.<sup>104</sup> At least in the context of fractionalized securities, we will show that this lack of regulation is untenable.<sup>105</sup> Because humans design the smart contracts, the risk of human error remains.<sup>106</sup>

Regulation should be balanced to protect an activity’s benefits while constraining its risks. Part III next examines how fractionalization can benefit society by expanding financial inclusion, both for businesses and investors. Thereafter, Part IV examines fractionalization’s risks. These set the stage for the analysis in Part V of how fractionalization should be regulated.

### III. UTILIZING FRACTIONALIZATION TO EXPAND FINANCIAL INCLUSION

Fractionalization has enormous potential to expand financial inclusion both for businesses, including SMEs, and for investors. Part A explains how fractionalization can expand financial inclusion for investors in those securities. Thereafter, Part B explains the current dilemma SMEs and other businesses face because of bank-intermediated financing, and then discusses how increased investor access through fractionalization can expand financial inclusion for businesses, as issuers of fractionalized securities.

#### A. *Benefits for Investors*

Fractionalization can offer numerous benefits to investors. The most important is the ability to invest in stocks and bonds notwithstanding the typical minimum investment amount, which ordinarily would be outside many retail investors’ purchasing capacity.<sup>107</sup> The cost of fractionalized securities can be much more affordable.<sup>108</sup> For example, the median account balance for

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<sup>103</sup> Makarov & Schoar, *supra* note 90, at 157.

<sup>104</sup> See Amber Smith, *What Are the Advantages of Decentralized Finance?*, BLOCKCHAIN COUNCIL (Nov. 4, 2022), <https://www.blockchain-council.org/info/what-are-the-advantages-of-decentralized-finance> [<https://perma.cc/8YTJ-9BPJ>] (explaining the various benefits DeFi offers over centralized finance); Singh, *supra* note 61 (explaining that blockchains record transactions onto ledgers).

<sup>105</sup> See *infra* Part IV (discussing the various risks presented by DeFi in its current unregulated state).

<sup>106</sup> The smart contracts that DeFi platforms are composed of are written by humans. James Grimmelmann, *All Smart Contracts Are Ambiguous*, 2 J. L. & INNOVATION 1, 2 (2019) (“The contracting parties write a computer program that embodies their agreement.”). One study explains “smart contracts must be written in precise, fully defined computer code since they cannot be modified once executed,” which showcases that in the event of human error in writing the code, the smart contract would likely become useless. Makarov & Schoar, *supra* note 90, at 157, 160.

<sup>107</sup> See *supra* notes 13–20 and accompanying text.

<sup>108</sup> *Id.*

a Robinhood retail investor is only \$240,<sup>109</sup> and the average order placed through Charles Schwab's fractional trading service is only \$300 (both lower than the cost of many major stocks and ETFs).<sup>110</sup>

This affordability should greatly expand retail investor inclusion. A Deloitte report finds that the introduction of fractional shares trading by brokerages is "another catalyst for the increased trading volumes by retail investors."<sup>111</sup> BondBloX explains that although the minimum investment size for a bond of HSBC Bank is \$200,000,<sup>112</sup> it has been able to sell \$1,000 fractionalized interests in bonds to a wide range of investors.<sup>113</sup>

Fractionalizing securities not only increases investor financial inclusion; it also enables investors to better diversify their investment portfolios, thereby reducing their risk.<sup>114</sup> As discussed earlier, hypothetical investor Jones may well prefer to buy ten \$100 fractionalized bonds of diversified companies than buy a single \$1,000 bond.<sup>115</sup> Similarly, an investor could choose to purchase ten \$100 fractionalized equity interests in diversified companies rather than a single share for \$1,000. Fractionalization thus enables investors to diversify their portfolios in ways previously unaffordable for them.<sup>116</sup>

Fractionalized securities thus can increase the number of retail investors participating in capital markets. Both in the United States and abroad, that number is relatively small.<sup>117</sup> In France, only 6% of the population,<sup>118</sup> and in Mexico, only 1% of the population,<sup>119</sup> invests in securities; and even in the United States, one-third of adults are not investing.<sup>120</sup>

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<sup>109</sup> Zhi Da, Vivian W. Fang & Wenwei Lin, *Fractional Trading* 1 (May 11, 2023) (Working Paper), <https://ssrn.com/abstract=3949697>.

<sup>110</sup> *Id.* at 3 n.3.

<sup>111</sup> SRINIVAS & GREGORIE, *supra* note 55, at 4.

<sup>112</sup> *Honey I Shrunk the Bonds!*, *supra* note 97.

<sup>113</sup> *See id.*

<sup>114</sup> Diversification is generally seen as beneficial for reducing an investor's risk and increasing their returns. *See generally* CHARTERED FIN. ANALYST MONTRÉAL, THE BENEFITS OF DIVERSIFICATION: HOW DIVERSIFICATION REDUCES RISK AND ENHANCES COMPOUND RETURNS (May 2016), [https://www.cfamontreal.org/static/uploaded/Files/bloc-pdf/documents/en/CFA\\_ProSheet\\_3A.pdf](https://www.cfamontreal.org/static/uploaded/Files/bloc-pdf/documents/en/CFA_ProSheet_3A.pdf) [<https://perma.cc/Y6WP-V892>].

<sup>115</sup> *See supra* notes 14–20 and accompanying text.

<sup>116</sup> *See* Marquit, *supra* note 45; *see also* Anne Kates Smith, *How to Invest \$1,000: Buy Fractional Shares (of Great Companies)*, KIPLINGER (Sept. 9, 2022), <https://www.kiplinger.com/investing/605205/how-to-invest-1000-buy-fractional-shares-of-great-companies> [<https://perma.cc/QC3V-KB2A>].

<sup>117</sup> Meagan Andrews & Sofia Eckrich, *Four Ways Retail Investors Can Take Control of Their Financial Future*, WORLD ECON. F. (Aug. 4, 2022), <https://www.weforum.org/agenda/2022/08/retail-investors-control-financial-future/> [<https://perma.cc/R36P-N4MX>].

<sup>118</sup> *Id.*

<sup>119</sup> *Id.*

<sup>120</sup> *Id.*

Studies indicate that three factors can increase investor participation: access, trust, and education.<sup>121</sup> Novice investors are primarily concerned with their own lack of financial literacy and losing money.<sup>122</sup> Fractionalized securities can address those concerns. Because fractionalized securities can be offered at low initial investment amounts, investors can begin investing without risking large amounts of capital.<sup>123</sup> Those investments, in turn, should help to develop the trust and education necessary to increase investor participation in capital markets.<sup>124</sup> For example, “[s]everal research studies have found that greater trust both at the individual and national levels is related to higher levels of investment and participation in the stock market.”<sup>125</sup> To further incentivize investing in fractionalized securities, the World Bank has suggested offering tax incentives or other subsidies for SME fractionalized securities.<sup>126</sup> In the context of fractionalized securities, lower trading costs and much smaller units of investment can profoundly expand the universe of potential investors.<sup>127</sup>

### B. Benefits for Issuers

Businesses, including SMEs, could potentially reap huge rewards through fractionalization because it could enable them, cost effectively, to issue and sell investment securities to both new and existing investors, thereby reducing

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<sup>121</sup> MEAGAN ANDREWS, SOFIA ECKRICH, KATE LAXSON, ARPAN CHAKRABARTI & RAVI DALAL, WORLD ECON. F., THE FUTURE OF CAPITAL MARKETS: DEMOCRATIZATION OF RETAIL INVESTING 11 (Aug. 2022) [hereinafter THE FUTURE OF CAPITAL MARKETS], [https://www3.weforum.org/docs/WEF\\_Future\\_of\\_Capital\\_Markets\\_2022.pdf](https://www3.weforum.org/docs/WEF_Future_of_Capital_Markets_2022.pdf) [https://perma.cc/B4A8-ZQ4C].

<sup>122</sup> *Id.* at 12.

<sup>123</sup> *See id.* at 23.

<sup>124</sup> *See* FIN. INDUS. REGUL. AUTH., FINRA REQUESTS COMMENT ON EFFECTIVE METHODS TO EDUCATE NEWER INVESTORS 1, 3 (June 2021), <https://www.finra.org/sites/default/files/2021-06/Special-Notice-063021.pdf> [https://perma.cc/GU7N-JEYK] (describing how fractionalized securities trading can enable investors to participate in capital markets and explaining the importance of investor education).

<sup>125</sup> K. JEREMY KO, U.S. SEC. & EXCH. COMM’N, ECONOMICS NOTE: INVESTOR CONFIDENCE 2 (Oct. 2017), [https://www.sec.gov/files/investor\\_confidence\\_noteOct2017.pdf](https://www.sec.gov/files/investor_confidence_noteOct2017.pdf) [https://perma.cc/N48N-RBT5]; *cf.* Nassr & Wehinger, *supra* note 29, at 90 (discussing an OECD report that finds that “[n]on-bank market-based financing can . . . enhanc[e] diversity and widen[] participation in the financial system”).

<sup>126</sup> ANA FIORELLA CARVAJAL, RICHARD MARK DAVIS, SHANTHI DIVAKARAN & TANYA KONIDARIS, WORLD BANK GRP., CAPITAL MARKETS AND SMES IN EMERGING MARKETS AND DEVELOPING ECONOMIES: CAN THEY GO THE DISTANCE? 67–69 (Jan. 2020), <https://documents1.worldbank.org/curated/en/270221582271669731/pdf/Capital-Markets-and-SMEs-in-Emerging-Markets-and-Developing-Economies-Can-They-Go-the-Distance.pdf> [https://perma.cc/A8F8-DVGC].

<sup>127</sup> *See supra* notes 12–20 and accompanying text.

the need for bank-intermediated financing. Although large firms with highly rated debt securities<sup>128</sup> usually can raise financing by issuing securities directly to investors,<sup>129</sup> SMEs rarely can do so because the high transaction costs make the effort uneconomic.<sup>130</sup> As next discussed, they therefore are forced to borrow through financial intermediaries, such as banks, which creates a financing problem.

### 1. *The SME Financing Dilemma*

SMEs worldwide face a unique dilemma when seeking financing due to their smaller size and higher relative risk. To operate and expand their businesses, they are often reliant on bank-intermediated financing.<sup>131</sup> Borrowing through financial intermediaries, however, imposes a middleman cost:<sup>132</sup> the spread, or difference, between the interest rate at which the intermediary borrows<sup>133</sup> and the interest rate that the intermediary charges on

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<sup>128</sup> Corporate bonds are generally bifurcated into “investment grade” and “speculative grade” (also known as high-yield or junk) bonds. See *What Makes a Bond a Bond?*, PAC. INV. MGMT. CO., <https://europe.pimco.com/en-eu/resources/education/everything-you-need-to-know-about-bonds> [<https://perma.cc/8V3C-7EYC>] (“Speculative-grade bonds are issued by companies perceived to have lower credit quality and higher default risk than more highly rated, investment grade companies. Within these two broad categories, corporate bonds have a wide range of ratings, reflecting the fact that the financial health of issuers can vary significantly.”); see also Nina Trentmann, *With Debt Coming Due, Investment-Grade Companies Are Paying Up, Too*, WALL ST. J. (Dec. 1, 2022), <https://www.wsj.com/articles/with-debt-coming-due-investment-grade-companies-are-paying-up-too-11669871795> [<https://perma.cc/Q5JF-L79A>] (describing corporate bond issuance by large companies with investment grade debt securities).

<sup>129</sup> See Trentmann, *supra* note 128 (describing investor demand for corporate bonds issued by large companies); see also Ben Luthi, *What Are Debt Securities and Are They Good Investments?*, EXPERIAN (Feb. 23, 2022), <https://www.experian.com/blogs/ask-experian/what-is-debt-security/> [<https://perma.cc/43TH-NXUX>] (explaining that debt securities are issued by corporations and sold to investors).

<sup>130</sup> See Mills & McCarthy, *supra* note 24, at 37–38 (finding that, compared to larger firms, SMEs often cannot access equity markets through securities issuances, and are therefore reliant on banks for financing); see also JOSHUA FORD BONNIE, KEVIN P. KENNEDY & JONATHAN H. PACHECO, SIMPSON THACHER & BARTLETT LLP, INITIAL PUBLIC OFFERINGS 2022, at 104 (June 2021), [https://www.stblaw.com/docs/default-source/publications/gtdt\\_initial-public-offerings\\_us\\_2022.pdf](https://www.stblaw.com/docs/default-source/publications/gtdt_initial-public-offerings_us_2022.pdf) [<https://perma.cc/ND9Z-UHWD>] (describing the high cost of an Initial Public Offering and ongoing reporting requirements).

<sup>131</sup> Mills & McCarthy, *supra* note 24, at 25 (“Bank credit is a vital lifeline for small businesses, and often ranks as high in importance as equity from the business owner or friends and family.”).

<sup>132</sup> Franklin Allen & Anthony M. Santomero, *The Theory of Financial Intermediation*, 21 J. BANKING & FIN. 1461, 1463 (1998).

<sup>133</sup> If the intermediary is a bank, this includes the interest rate the bank pays to its depositors. See Adam Hayes, *Net Interest Rate Spread: Definition and Use in Profit*

its loans to borrowers (the “interest spread”).<sup>134</sup> The need to go through a financial intermediary also can restrict the SME’s availability of financing because intermediaries normally set limits on their credit exposure to any given firm.<sup>135</sup> Because SMEs are generally seeking smaller loans,<sup>136</sup> banks are also discouraged from providing financing; smaller loans are generally not as profitable for banks due to relatively fixed loan-administration costs<sup>137</sup> and other transaction costs.<sup>138</sup> As a result, estimates of unmet financing needs for SMEs worldwide are as high as \$5.2 trillion.<sup>139</sup>

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*Analysis*, INVESTOPEDIA, <https://www.investopedia.com/terms/n/net-interest-rate-spread.asp> [<https://perma.cc/73J6-V3AL>].

<sup>134</sup>Pietro Calice & Nan Zhou, *Benchmarking Costs of Financial Intermediation Around the World*, WORLD BANK BLOGS: ALL ABOUT FINANCE (July 17, 2018), <https://blogs.worldbank.org/allaboutfinance/benchmarking-costs-financial-intermediation-around-world> [<https://perma.cc/CRM7-K9TH>]. The interest spread also can be said to represent the cost of financial intermediation to society. *Id.*

<sup>135</sup>See BASEL COMM. ON BANKING SUPERVISION, BANK FOR INT’L SETTLEMENTS, MEASURING AND CONTROLLING LARGE CREDIT EXPOSURES 1, 7 (Jan. 1991), <https://www.bis.org/publ/bcbsc121.pdf> [<https://perma.cc/UUL5-7QJH>] (explaining that bank diversification is a key concept in banking to avoid failure due to credit concentration risk).

<sup>136</sup>A Harvard study found that most U.S. small businesses are seeking loans under \$250,000, with nearly 44% of loan applications being for under \$50,000. Mills & McCarthy, *supra* note 24, at 24 fig.9.

<sup>137</sup>*Id.* at 42.

<sup>138</sup>These include the bank’s “funding/refinancing costs, capital requirements associated with the loan, SME default risk, administrative and infrastructure costs as well as the opportunity cost of placing the funds as loans to SMEs.” Nassr & Wehinger, *supra* note 29, at 152. In the United States, for example, banks have moved away from smaller dollar lending. Mills & McCarthy, *supra* note 24, at 42; *cf.* AGNES DASEWICZ, JOHN SIMON & SUNDAR R. RAMANUJAM, CTR. FOR STRATEGIC & INT’L STUD., FINANCING SMALL BUSINESS IS CRITICAL FOR A STRONG POST-COVID RECOVERY 4 (Sept. 2020), <https://www.csis.org/analysis/financing-small-business-critical-strong-post-covid-recovery> [<https://perma.cc/TNE6-ZKNN>] (observing that, in 2019, four out of five SMEs in the United States reported never having taken a bank loan or having any access to venture capital financing); Lerong Lu, *Promoting SME Finance in the Context of the Fintech Revolution: A Case Study of the UK’s Practice and Regulation*, 33 BANKING & FIN. L. REV. 317, 318–19 (2018) (observing that, in the UK, SMEs receive only 17% of bank loans despite accounting for 60% of the country’s employment and 50% of Gross Domestic Product).

<sup>139</sup>See JUAN ANTONIO BAHILLO, FRANK GERHARD, ABHIMANYU HARLALKA, ANDRÁS HAVAS & ANDREAS KREMER, HOW BANKS CAN REIMAGINE LENDING TO SMALL AND MEDIUM-SIZE ENTERPRISES 2 (May 2022), <https://www.mckinsey.com/capabilities/risk-and-resilience/our-insights/how-banks-can-reimagine-lending-to-small-and-medium-size-enterprises> [<https://perma.cc/Q5XR-CDHQ>] (explaining that “banks often struggle to create the right lending solutions for their SME customers and to cut the cost of serving them”); *cf.* DASEWICZ, SIMON & RAMANUJAM, *supra* note 138, at 3 (observing that, in Africa, banks tend to limit their lending to a minority of SMEs that have proven their creditworthiness, which prevents newer businesses from accessing financing even if they are seeking relatively small loans in the range of \$20–\$300).

Firms whose debt securities are not highly rated—which represent a large sector of businesses in America and worldwide<sup>140</sup>—suffer these same costs and funding restrictions.<sup>141</sup> They may be unable economically to raise financing by issuing securities directly to investors because investors demand very high rates of return on low-rated debt securities.<sup>142</sup> Like SMEs, those firms are forced to borrow through financial intermediaries, which (again) imposes middleman costs and can restrict their availability of financing.<sup>143</sup>

This financing dilemma spurred the worldwide growth of online lending and other alternative financing as a potential solution. In the late 1990s, CAN Capital was one of the first FinTech lenders offering merchant cash advances and small dollar loans to SMEs in America through online facilities (often called “online portals” or simply “portals”).<sup>144</sup> These online portals are “[peer-to-peer] lending websites [that] connect borrowers directly to investors. The site sets the rates and terms and enables the transactions.”<sup>145</sup> Since then, other FinTech companies have developed rapid underwriting techniques for making these small business loans by utilizing the applicant-borrower’s current cash-flow numbers and bank account information.<sup>146</sup> As a result, online lending portals<sup>147</sup> provided over \$82 billion in global funding in 2021, with estimates

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<sup>140</sup> An OECD study found that “in 2019, the portion of BBB rated bonds—the lowest quality of bonds that enjoy investment grade status—accounted for 51% of all investment grade issuance. During the period 2000-2007, the portion was just 39%,” and added that only 30% of bond issuances in 2019 enjoyed an “A” rating or above. MATS ISAKSSON, SERDAR ÇELİK & GÜL DEMIRTAŞ, ORG. FOR ECON. COOP. & DEVELOPMENT, CORPORATE BOND MARKET TRENDS, EMERGING RISKS AND MONETARY POLICY 6 (Feb. 2020), <https://www.oecd.org/corporate/ca/Corporate-Bond-Market-Trends-Emerging-Risks-Monetary-Policy.pdf> [<https://perma.cc/3LUV-NQMU>].

<sup>141</sup> *Id.* at 42.

<sup>142</sup> *See id.* at 17 (explaining that “a prolonged decline in overall bond credit quality and longer maturities is consistent with increased risk-taking by investors that are searching for yield in a low interest rate environment”). As interest rates have risen, firms issuing lower quality debt have begun to issue fewer debt securities. *See* Peter Brennan & Umer Khan, *Lower-Rated US Companies Cut Debt as Bond Issuance Collapses to 11-Year Low*, S&P GLOBAL (Dec. 20, 2022), <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/lower-rated-us-companies-cut-debt-as-bond-issuance-collapses-to-11-year-low-73506524> [<https://perma.cc/NBZ9-6XCR>] (“U.S. nonfinancial companies rated non-investment-grade cut debt in the third quarter to the lowest level in 10 quarters.”). General bond issuance also collapsed because of higher interest rates. *See id.* (“Just \$532.48 billion of bonds have been issued [in 2022] as of Dec. 15, the lowest annual volume since 2011.”).

<sup>143</sup> *See* Allen & Santomero, *supra* note 132, at 1463.

<sup>144</sup> *See* Mills & McCarthy, *supra* note 24, at 46.

<sup>145</sup> Julia Kagan, *What Is Peer-to-Peer (P2P) Lending? Definition and How It Works*, INVESTOPEDIA, <https://www.investopedia.com/terms/p/peer-to-peer-lending.asp> [<https://perma.cc/4AQN-3PRM>].

<sup>146</sup> Mills & McCarthy, *supra* note 24, at 46.

<sup>147</sup> *See* Kagan, *supra* note 145 (explaining that peer-to-peer lending websites connect borrowers to investors).

that these portals will provide over \$800 billion in funding by 2030.<sup>148</sup> However, even if peer-to-peer portals provided \$800 billion in financing, they still would leave at least \$4.4 trillion in unmet SME financing needs.<sup>149</sup>

Small businesses are utilizing these online portals to meet some of their financing needs. The Federal Reserve found that 23% of U.S. SMEs applied to an online lender in 2021 for credit.<sup>150</sup> The UK's online financing industry equals nearly 14% of traditional bank lending, with over 20,000 SMEs applying for financing through online lenders.<sup>151</sup> These statistics highlight the major demand by SMEs for alternative financing sources. Fractionalization of investment securities should help to satisfy that demand.<sup>152</sup>

The fractionalization of investment securities would also help to further the efforts of the European Union ("EU") to establish a "Capital Markets Union," or "CMU." The goal of the CMU is to harmonize and expand the EU member nations' capital markets, and to make those markets work more efficiently as an alternative to bank financing.<sup>153</sup> A key provision of the CMU would require a bank to direct an SME to alternative funding providers if the bank denies the SME a loan.<sup>154</sup> Among these alternative providers, the CMU focuses on creating retail-investor-funded capital markets.<sup>155</sup> That focus is consistent with this Article's goal of expanding financial inclusion: it would create capital-market investment opportunities for retail investors, and thereby expand capital-market funding for SMEs.<sup>156</sup>

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<sup>148</sup> *P2P Lending Market Size to Touch USD 804.2 Billion by 2030, Says Acumen Research and Consulting*, ACUMEN RSCH. & CONSULTING (Jan. 11, 2023), <https://www.globenewswire.com/news-release/2023/01/11/2586809/0/en/P2P-Lending-Market-Size-to-Touch-USD-804-2-Billion-by-2030-Says-Acumen-Research-and-Consulting.html> [<https://perma.cc/5XLD-A3DX>]. For a thoughtful critique of person-to-person, or P2P, lending, see generally Andrew Verstein, *The Misregulation of Person-to-Person Lending*, 45 U.C. DAVIS L. REV. 445 (2011).

<sup>149</sup> See BAHILLO, GERHARD, HARLALKA, HAVAS & KREMER, *supra* note 139.

<sup>150</sup> ANN MARIE WIERSCH, LUCAS MISERA, ALEXANDER MARRÉ & EMILY WAVERING CORCORAN, U.S. FED. RSRV., SMALL BUSINESS CREDIT SURVEY: 2022 REPORT ON EMPLOYER FIRMS 20 (May 2022).

<sup>151</sup> Lu, *supra* note 138, at 320.

<sup>152</sup> See *infra* Part II.A.2 (outlining how fractionalization offers a preferable solution to the SME financing problem).

<sup>153</sup> See Theodor Weimer, *Capital Markets Union Is Key to a Sovereign EU*, FIN. TIMES (Feb. 25, 2022), <https://www.ft.com/content/6b5008f0-d101-4ed5-9270-bae5c32d7389> [<https://perma.cc/SYA8-KGQE>].

<sup>154</sup> DELOITTE, EUROPEAN COMMISSION PUBLISHES A NEW, AMBITIOUS ACTION PLAN TO BOOST THE EUROPEAN UNION'S CAPITAL MARKETS UNION (CMU), (Sept. 2020), <https://www2.deloitte.com/content/dam/Deloitte/lu/Documents/financial-services/IM/lu-rna-euro-commission-action-plan-cmu.pdf> [<https://perma.cc/X6FA-C7QD>].

<sup>155</sup> EUR. COMM'N, REPORT ON AN EU SME REFERRAL SCHEME 7–8 (June 2022), [https://ec.europa.eu/info/sites/default/files/business\\_economy\\_euro/banking\\_and\\_finance/documents/220628-report-sme-referral-scheme\\_en.pdf](https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/220628-report-sme-referral-scheme_en.pdf) [<https://perma.cc/T7AS-AD37>].

<sup>156</sup> See *id.* at 7.

## 2. How Fractionalization Can Help Solve the SME Financing Dilemma

To help solve their financing dilemma, SMEs could sell fractionalized securities directly to investors. This not only would disintermediate banks but would also lower borrowing costs by enabling SMEs to avoid having to pay an interest-rate markup.<sup>157</sup> It also would likely be more advantageous for SMEs than online lending portals. The OECD reports that traditional peer-to-peer lending communities tend to operate on full financing terms, which means a loan request gets funded only if it “receives enough bids to cover the entire amount requested by the borrower within an established pledging period, which may range from a few weeks to several months.”<sup>158</sup> Fractionalization would allow an SME to get funding as it comes, rather than having to wait for—and without being conditioned on—its full loan request being fulfilled.<sup>159</sup>

These fractionalized securities would represent portions of a share of a company, in the case of an equity security, or a portion of the capital and interest payments required for a debt security. There are numerous benefits to listing securities, including “a reduced dependence on bank funding, a higher degree of diversification of investors, easier access to additional equity capital and debt finance and a higher public profile and brand recognition.”<sup>160</sup>

Fractionalized securities can be offered directly to investors through alternative financing platforms, increasing cost-savings for SMEs.<sup>161</sup> FinTech platforms can offer significant cost savings for issuing securities compared to bank-intermediated financing, especially because such platforms rely on fewer physical locations and staff.<sup>162</sup> FinTech companies have also developed methods to quickly determine an SME’s fiscal health. For example, FinTech companies can analyze risk patterns in small business cash flows and use tools

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<sup>157</sup> See generally *New Approaches to SME Financing*, *supra* note 32 (discussing the profit-oriented interest-rate markup charged by intermediary banks).

<sup>158</sup> *Id.* at 54–55. Regulation Crowdfunding in the US also requires an issuer to include “a statement that if the sum of the investment commitments does not equal or exceed the target offering amount at the offering deadline, no securities will be sold in the offering, investment commitments will be cancelled and committed funds will be returned.” 17 C.F.R. § 227.201(g) (2021).

<sup>159</sup> See *TOKENISATION OF ASSETS*, *supra* note 62, at 16–18 (discussing how fractionalization could be done at small minimum investment amounts, presumably allowing borrowers to receive funding as they sell individual fractionalized securities).

<sup>160</sup> *SME Listing on Public Markets*, EUR. COMM’N, <https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/financial-markets/securities-markets/sme-listing-public-marketsen> [<https://perma.cc/48Y2-ERUB>].

<sup>161</sup> When selling securities, businesses must “describe their value proposition, detail the financial perspectives and legal structure of their project, distribute this information to eligible investors and provide the mechanisms for the transfer of funds in exchange for shares.” DEMELZA HAYS ET AL., COINTELEGRAPH, *THE SECURITY TOKEN REPORT* 49 (2021), <https://research-backend.cointelegraph.com/uploads/attachments/ckyy5h5bk000r0spdgc4v48bf-cointelegraph-security-token-report.pdf> [<https://perma.cc/6HZL-6FLB>].

<sup>162</sup> Lu, *supra* note 138, at 321.

that allow a company to instantly transfer data on their creditworthiness directly to a potential lender.<sup>163</sup> These platforms would be able to obtain funds from both retail and institutional investors.<sup>164</sup>

Of course, the fractionalization of investment securities, and the issuance of those fractionalized securities to investors, could itself have certain middleman costs—the costs related to having trusted third parties identify investors and verify and effectuate transactions, such as selling the fractionalized securities to investors and making payments.<sup>165</sup> The combination of DeFi and blockchain technology could help to reduce these middleman costs, thereby “minimizing the cost of transactions, which include coordination costs and the cost of controlling and managing the transactions and monitoring information.”<sup>166</sup> That combination could allow two parties to “forge agreements, make transactions, and build value without relying on

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<sup>163</sup> Mills & McCarthy, *supra* note 24, at 56.

<sup>164</sup> Lu, *supra* note 138, at 323. Fractionalized securities also offer new ways for issuers to access global capital market financing, which was over \$131 billion in 2021. THE FUTURE OF CAPITAL MARKETS, *supra* note 121, at 24. Global Fintech funding decreased slightly in 2022 to about \$71.4 billion as of September 30, 2022, largely because of higher interest rates and a “flight to quality” stocks. See Lorenzo Chiavarini, *Fintech Q3 2022 Report: Light at the End of the Tunnel*, DEALROOM (Oct. 6, 2022), <https://dealroom.co/blog/fintech-q3-2022-report-light-at-the-end-of-the-tunnel> [<https://perma.cc/483Y-ZK29>]; see also Hugh Son, *The Fintech Reckoning is Upon Us. Here's What to Expect Next Year*, CNBC (Dec. 28, 2022), <https://www.cnbc.com/2022/12/28/fintech-startups-2022-2023-a-reckoning-is-upon-us-heres-what-to-expect.html> [<https://perma.cc/XWN9-WJTQ>] (describing the reasons behind Fintech funding slowing slightly in 2022); *2022's Great FinTech Refocus Will Usher in New Names and Priorities*, PYMNTS (June 17, 2022), <https://www.pymnts.com/news/investment-tracker/2022/2022s-great-fintech-refocus-will-usher-in-new-names-and-priorities/> [<https://perma.cc/NRU9-LAMJ>]. In the context of DeFi, nearly \$65 billion has been deposited in decentralized exchanges in various forms of cryptoassets. Francesca Carapella, Edward Dumas, Jacob Gerszten, Nathan Swem & Larry Wall, *Decentralized Finance (DeFi): Transformative Potential & Associated Risks* 10 (Bd. Of Governors of the Fed. Rsrv. Sys., Working Paper 2022-057, 2022). Generally, the value of all crypto assets deposited into various DeFi platforms is referred to as “Total Value Locked,” as the assets are locked into a protocol and available to borrow or trade. See *Total Value Locked*, DEFI PULSE, <https://docs.defipulse.com/metrics/tvl> [<https://perma.cc/2GRH-5UBN>]; see also *Total Value Locked*, DEFI LLAMA, <https://defillama.com/> [<https://perma.cc/K99K-JP6P>]; *DeFi Lending*, DEFI PRIME, <https://defiprime.com/decentralized-lending> [<https://perma.cc/B3B4-X6P7>] (“Decentralized lending platforms provide loans to businesses, or the public with [sic] no intermediaries are present. On the other hand, DeFi lending protocols enable everyone to earn interest on supplied stable coins and cryptocurrencies.”).

<sup>165</sup> See Laura Grassi, Davide Lanfranchi, Alessandro Faes & Filippo Maria Renga, *Do We Still Need Financial Intermediation? The Case of Decentralized Finance – DeFi*, 19 QUALITATIVE RSCH. ACCT. & MGMT. 323, 328–29 (2022) (describing how DeFi promises to either completely remove intermediaries or have smart contracts be the substitute for traditional financial intermediaries to reduce costs).

<sup>166</sup> *Id.* at 329.

intermediaries” and “to verify their identities, establish trust, or perform the critical business logic—contracting, clearing, settling, and record-keeping tasks that are foundational to all forms of commerce.”<sup>167</sup>

Tokenized fractionalized securities offer SMEs the chance to directly reach huge numbers of investors previously unavailable to them.<sup>168</sup> An OECD report explains that “[p]rivate placements of equity or debt of [SMEs] are examples of security transactions that are traditionally restricted to large institutional investors and funds.”<sup>169</sup> The UK’s Financial Conduct Authority (“FCA”) experimented with tokenized securities issuances starting in 2016 through a regulatory sandbox, which allows FinTech firms to test new financial products.<sup>170</sup>

For example, Luxdeco, a luxury furniture company, took advantage of that sandbox to issue blockchain-based bonds in 2017.<sup>171</sup> This bond issuance showcased a few important aspects of Fintech-enabled fractionalization. First, legal fees and information gathering costs were reduced.<sup>172</sup> No registrar had to be paid for the bond issuance, and “payments could be made on a peer to peer basis with smart contracts being used to augment the formal legal contracts and automate the delivery of the bonds and the payment of interest and principal,” rather than paying an intermediary, which lowers costs to issuers.<sup>173</sup>

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<sup>167</sup> Alex Tapscott & Don Tapscott, *How Blockchain is Changing Finance*, HARV. BUS. REV. (Mar. 1, 2017), <https://hbr.org/2017/03/how-blockchain-is-changing-finance> [<https://perma.cc/6ZFS-VQ2S>] (describing how blockchain allows for the disintermediation of traditional intermediaries in value creating transactions, which can reduce costs).

<sup>168</sup> TOKENISATION OF ASSETS, *supra* note 62, at 7.

<sup>169</sup> *Id.* at 17.

<sup>170</sup> See generally *Regulatory Sandbox*, FIN. CONDUCT AUTH., <https://www.fca.org.uk/firms/innovation/regulatory-sandbox> [<https://perma.cc/Y2TU-ZEJG>].

<sup>171</sup> Richard Cohen, Philip Smith, Vic Arulchandran & Avtar Sehra, *Automation and Blockchain in Securities Issuances*, 2018 BUTTERWORTHS J. OF INT’L BANKING & FIN. L. 144, 144. Courts will generally be the final decisionmaker on who has legal title, but the blockchain ideally makes that ownership clear. See *Legal Title*, WESTLAW PRAC. L., <https://content.next.westlaw.com/practical-law/document/I8f271a4452d611e498db8b09b4f043e0/Legal-Title> [<https://perma.cc/F8PR-DRF6>] (explaining that legal title is defined as “[a]bsolute ownership of real property that is enforceable in a court of law”). The Nivaura bond issuance was recorded on the Ethereum blockchain, which was deemed to be an independent third-party bond registrar according to the UK’s FCA. Cohen, Smith, Arulchandran & Sehra, *supra*, at 146–47.

<sup>172</sup> Cohen, Smith, Arulchandran & Sehra, *supra* note 171, at 147.

<sup>173</sup> *Id.* This is an example of reducing costs associated with centralized finance intermediation by removing the need for trusted third-parties. TOKENISATION OF ASSETS, *supra* note 62, at 42. Tokenized fractionalized bonds also offer major benefits for SMEs seeking small dollar capital financing because they help disintermediate third parties, which cuts costs. *Id.* at 16. Just as in a traditional bond offering, a firm issuing fractionalized and tokenized bonds must set offering volumes, the interest rate, and

Smart contracts are particularly useful in the context of fractionalized bonds, as principal and interest payments would be made periodically and automatically to the ultimate owner of a tokenized fractionalized bond.<sup>174</sup> Furthermore, if an issuer needs to collateralize the fractionalized debt security, it could do so by tokenizing a real world asset such as its real estate or equipment.<sup>175</sup> With tokenization of fractionalized securities, issuers, including SMEs, can have access to a potential global pool of capital.<sup>176</sup>

Major companies are also beginning to explore tokenized securities. Singapore-based bank DBS was one of the first corporations to engage in a bond-based tokenized fractionalized security offering.<sup>177</sup> A DBS Digital Bond was issued for \$11.3 million with a 6-month expiry paying 0.6% interest per year, and each fractionalized bond was traded in increments of \$7,600.<sup>178</sup> The fractionalized bonds were issued in compliance with relevant jurisdictional laws, meaning holders of the bonds have the “same legal certainties and protections over their rights as [holders of] traditional bonds.”<sup>179</sup> Societe Generale SFH, a French bank, also experimented with issuing bonds via tokenized fractionalized securities.<sup>180</sup> While not a public offering, the fractionalized securities represented “a covered bond, a security that is backed by a pool of assets on the issuer’s balance sheet,” with a 5-year maturity subject to a 1-year extension.<sup>181</sup> Moody’s and Fitch, two leading credit rating agencies, gave the securities the highest-possible credit rating of AAA.<sup>182</sup> As key factors, Moody’s noted that the issuance of bonds in this manner lowered the likelihood of errors due to a reduced number of intermediaries and increased transparency through the use of blockchain technology.<sup>183</sup>

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duration. *See id.* Purchases of the bonds can then occur on a DeFi platform, with terms being visible through smart contracts. *Id.* at 16, 32. As a result of utilizing blockchain and smart contracts, delivery of those bonds is trustless and instant, which removes the need for payment agents and escrow services usually required in traditional bond issuances and lowers costs for the issuer. *Id.* at 16–17.

<sup>174</sup> *See, e.g.*, TOKENISATION OF ASSETS, *supra* note 62, at 43 (explaining how the Nivaura tokenized bond utilized smart contracts to automate principal and interest payments).

<sup>175</sup> ARAMONTE, DOERR, HUANG & SCHRIMPF, *supra* note 81, at 6.

<sup>176</sup> TOKENISATION OF ASSETS, *supra* note 62, at 17.

<sup>177</sup> Sebastian Sinclair, *DBS Issues \$15M Digital Bond in First Security Token Offering*, COINDESK, <https://www.coindesk.com/markets/2021/05/31/dbs-issues-15m-digital-bond-in-first-security-token-offering/> [<https://perma.cc/2LC6-AEYR>].

<sup>178</sup> *Id.*

<sup>179</sup> *Id.*

<sup>180</sup> Lukas Hofer, *French Bank Issues AAA-Rated Security Token – A Pilot for Something Way Bigger?*, ICO.LI (May 2, 2019), <https://ico.li/french-bank-issues-aaa-rated-security-token/> [<https://perma.cc/K8T9-C778>].

<sup>181</sup> *Id.*

<sup>182</sup> *Id.*

<sup>183</sup> *Id.*

SMEs can follow these precedents. Utilizing tokenized fractionalized securities for blockchain-based funding can reduce trading friction and transaction costs that exist in traditional bank lending.<sup>184</sup> Companies no longer have to rely on centralized services to record and track corporate loans.<sup>185</sup> Tokenized fractionalized securities replace centralized entities, reducing costs, while also increasing transparency through publicly available information on blockchains.<sup>186</sup>

Regardless of the type of offering, market-based solutions to capital financing will help SMEs become more resilient in the face of economic instability. An OECD report explains how “broadening the range of non-bank debt financing instruments for SMEs,”<sup>187</sup> such as the potential to issue fractionalized securities, “should help to make [SMEs] more resilient to financial shocks.”<sup>188</sup>

#### IV. IDENTIFYING FRACTIONALIZATION’S RISKS

Part III of this Article discussed how fractionalization of investment securities can expand financial inclusion for both issuers and investors. This Part examines how fractionalization nonetheless can create significant risks, including those arising from the exchanges on which fractionalized securities will be issued and traded. Part V of this Article will later discuss how regulation could help to control these risks while preserving fractionalization’s benefits.

##### A. Liquidity Risk

Fractionalizing investment securities can create a range of risks, of which the most significant is liquidity risk—the risk that an investor might be unable to realize a bargained-for return on her investment because they cannot sell it.<sup>189</sup> Illiquidity is the main cause of bankruptcy<sup>190</sup> as well as a major systemic

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<sup>184</sup> *Why Marketlend’s Tokenization i0s Big News for Business Lending*, POLYMATH, <https://info.polymath.network/blog/why-marketlend-tokenization-big-news-business-lending> [<https://perma.cc/SWG8-GEKZ>]. The blockchain removes the need for third-party verification of tokenized security transactions and the transaction process is less costly and more efficient. *Id.*

<sup>185</sup> *See id.*

<sup>186</sup> *See id.* But see D. SORNETTE & S. VON DER BECKE, *CRASHES AND HIGH FREQUENCY TRADING* 10–14 (UK Gov. Off. Sci. Ed., 2011) (explaining that algorithmic trading with limited human intervention can potentially worsen financial shocks).

<sup>187</sup> Nassr & Wehinger, *supra* note 29, at 90.

<sup>188</sup> *Id.*

<sup>189</sup> See Jun Muranaga & Makoto Ohsawa, *Measurement of Liquidity Risk in the Context of Market Risk Calculation*, INST. FOR MONETARY AND ECON. STUD. 193, 195 (2017) (“Liquidity risk . . . is defined as the risk of being unable to liquidate a [securities] position in a timely manner at a reasonable price.”); cf. *Next-Generation Securitization*,

threat to the financial system,<sup>191</sup> which poses risks to issuers, investors, and the public.

To understand liquidity risk, it is important to differentiate fractionalized interests in debt and equity securities. Other things being equal, fractionalized interests in debt securities have less liquidity risk than fractionalized interests in equity securities.<sup>192</sup> Investors that choose to hold their fractionalized interests in debt securities till maturity have no liquidity risk—other than that associated with a payment default on the securities<sup>193</sup>—because they should receive their principal and interest payments as scheduled.<sup>194</sup> Increasingly, however, investors do not want to hold debt securities to final maturity; instead, when they need cash, they may wish to sell their securities to other investors.<sup>195</sup> This creates a liquidity risk: the uncertainty whether other investors will want to purchase those securities.<sup>196</sup>

Although the market for resales of bonds (any such resale market for securities being a “secondary market”) is robust,<sup>197</sup> it is far less clear that there is a viable secondary market for the resale of fractionalized debt securities.<sup>198</sup>

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*supra* note 38 (manuscript at 8) (discussing liquidity risk in the context of the NFT market).

<sup>190</sup> See, e.g., Kenneth Ayotte & David A. Skeel, Jr., *Bankruptcy Law as a Liquidity Provider*, 80 U. CHI. L. REV. 1557, 1557 (“Since the outset of the [2008] financial crisis, liquidity problems have been cited as the cause behind the bankruptcies and near bankruptcies of numerous firms, ranging from Bear Stearns and Lehman Brothers in 2008 to Kodak more recently.”). Ayotte and Skeel also stress how tightly linked liquidity is to corporate bankruptcy. *Id.* at 1560; see also Inmaculada Aguiar-Díaz & María Victoria Ruiz-Mallorquí, *Causes and Resolution of Bankruptcy: The Efficiency of Law*, 13 SPANISH REV. FIN. ECON. 71, 76 (“Liquidity problems are one of the primary reasons for [firm] bankruptcy filings.”).

<sup>191</sup> See, e.g., Allan M. Malz, *Liquidity Risk After the Crisis*, 38 CATO J. 35, 37 (2018) (“Financial crises are often triggered by liquidity [risk] events coinciding with abrupt changes in sentiment.”). Illiquidity was a defining characteristic of the 2008 financial crisis. INT’L MONETARY FUND, GLOBAL FINANCIAL STABILITY REPORT: DURABLE FINANCIAL STABILITY: GETTING THERE FROM HERE 75–76 (Apr. 2011).

<sup>192</sup> See *Bond Liquidity—Factors to Consider and Questions to Ask*, FINRA (Sept. 13, 2022) [hereinafter *Bond Liquidity*], <https://www.finra.org/investors/insights/bond-liquidity-factors-questions> [<https://perma.cc/PG2Y-ZAVD>].

<sup>193</sup> Investors in fractionalized debt securities are still subject to credit/obligor risk, which represents the chance the issuer will not be able to repay the promised principal and interest. See *infra* notes 215–216 (discussing credit risk).

<sup>194</sup> *Bond Liquidity*, *supra* note 192.

<sup>195</sup> Cf. Steven L. Schwarcz, *Rethinking Corporate Governance for a Bondholder Financed, Systemically Risky World*, 58 WM. & MARY L. REV. 1335, 1344 (2017) [hereinafter *Rethinking Corporate Governance*] (discussing the increasing tendency of bond investors, when they need cash, to sell their bonds to other investors pre-maturity).

<sup>196</sup> *Next-Generation Securitization*, *supra* note 38 (manuscript at 8).

<sup>197</sup> See *Rethinking Corporate Governance*, *supra* note 195, at 1344–45.

<sup>198</sup> See *Investment Risks*, WISEALPHA, <https://www.wisealpha.com/risk-statement> [<https://perma.cc/K2NK-C29K>] (explaining that users seeking to sell their fractional bonds

Investors that wish to resell their fractionalized debt securities may have to utilize a bond dealer that will either match them with buyers or buy the fractionalized interest itself, taking a risk that the underlying bond's price will decline.<sup>199</sup> In the event there is a rush to sell fractionalized interests in any particular bond, there will likely be an inability to find buyers.<sup>200</sup> Additionally, bonds lack uniformity, as they have significantly different interest rates and repayment terms, which can add to liquidity pressures.<sup>201</sup>

An investor in a fractionalized interest in an equity security, such as a share of stock, may have even greater liquidity risk. Although equity investors sometimes expect to receive periodic dividend payments, their more fundamental bargained-for return on investment is the ability to resell their shares in secondary markets at a profit.<sup>202</sup> Thus, their fundamental liquidity risk is in the inability to resell those shares.<sup>203</sup> Although there are robust secondary markets for the trading of shares of stock,<sup>204</sup> it is (again) far less clear that there is a viable secondary market for the sale of fractionalized interests in stock.<sup>205</sup>

It is possible that such a secondary market may develop. The potential for equity securities to offer a greater upside return than debt securities assumes

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must use the company's specific secondary market where there is no guarantee of liquidity).

<sup>199</sup> *Bond Liquidity*, *supra* note 192.

<sup>200</sup> *Id.*

<sup>201</sup> *Id.*

<sup>202</sup> *See What Are Equity Investments*, BLACKROCK, <https://www.blackrock.com/us/individual/education/equities> [https://perma.cc/GQX5-WWNF] (explaining that “[t]he main benefit from an equity investment is the possibility to increase the value of the principal amount invested” through capital gains).

<sup>203</sup> *See id.*

<sup>204</sup> PWC, GLOBAL FINANCIAL MARKET LIQUIDITY STUDY 23 (Aug. 2015), <https://www.pwc.com/gx/en/financial-services/publications/assets/global-financial-market-liquidity-study.pdf> [https://perma.cc/UT82-ZKSF].

<sup>205</sup> *See id.* (“[E]quity of smaller capitalization companies is typically traded far less frequently than large corporate equities.”); *see also Fractional Share Investing – Buying a Slice Instead of the Whole Share*, U.S. SEC. & EXCH. COMM’N (Nov. 9, 2020) [hereinafter *Fractional Share Investing*], <https://www.sec.gov/oiea/investor-alerts-and-bulletins/fractional-share-investing-buying-slice-instead-whole-share> [https://perma.cc/APT4-BQHA] (explaining the risks associated with fractional shares, including lack of liquidity). Current fractionalized share investing is sometimes limited to ETFs or shares of companies in the S&P 500 to minimize liquidity risks. *Id.* Charles Schwab, for example, only offers fractional trading in companies listed on the S&P 500 index and cautions investors about liquidity risk. *Schwab Stock Slices*, *supra* note 43. For example, Schwab’s terms and conditions for utilizing its fractionalized share program note that “Schwab does not guarantee that there will be a market for Fractional Shares of any particular stock.” *Id.*; *Schwab Stock Slices™ Terms and Conditions*, CHARLES SCHWAB 1, 4 (last accessed Oct. 30, 2023), <https://www.schwab.com/public/file/P-12533231> (On file with the *Ohio State Law Journal*).

that the investor is actually able to resell her securities.<sup>206</sup> Furthermore, to guarantee liquidity of fractionalized equity interests, some issuers of such interests might consider agreeing to buy them back at a price determined, for example, by an appraiser or in some other manner.<sup>207</sup> The growth of traditional equity fractionalized securities markets is encouraging for the potential development of Fintech-enabled fractionalized equity securities markets.<sup>208</sup>

Although the liquidity risk described above should be the same whether or not FinTech enables the fractionalization, FinTech-enabled fractionalization can present additional liquidity risk. The primary additional risk is that FinTech firms that make markets and act as brokers in fractionalized securities may not have the required licensing or other legal authority to engage in securities trading.<sup>209</sup> At least one FinTech firm, IX Swap, is currently working to try to resolve this concern by connecting its DeFi platform, which acts as the market-maker for fractionalized securities, with a licensed broker-dealer and custodian.<sup>210</sup> This is a “solution to bring liquidity to the secondary trading” of those securities,<sup>211</sup> recognizing that “licensed brokers and custodians [are required] to facilitate these transactions.”<sup>212</sup>

## B. Other Risks

Fractionalization of investment securities can raise other risks, many of which are typical to securities. Credit risk is the primary additional risk

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<sup>206</sup> Cf. *Next-Generation Securitization*, *supra* note 38 (manuscript at 22) (explaining that regardless of whether the security is issued traditionally or via blockchain, investors may incorrectly assume that liquidity exists for their securities).

<sup>207</sup> See, e.g., Joseph M. Green & John F. Coyle, *Crowdfunding and the Not-So-Safe Safe*, 102 VA. L. REV. ONLINE 168, 178–79 (2016) (describing the repurchase conditions for a simple agreement for future equity (“SAFE”)). For example, some crowdfunding issuers have clauses that allow them to repurchase a SAFE from investors at prices determined by an independent appraiser. *Id.*

<sup>208</sup> See *supra* Part II.A.

<sup>209</sup> See, e.g., IX SWAP, THE UNISWAP FOR SECURITY TOKENS AND TOKENIZED STOCKS 3–4 (Aug. 2021) [hereinafter THE UNISWAP FOR SECURITY TOKENS], <https://ixswap.io/app/uploads/2022/04/IX-Swap-Litepaper.pdf> [<https://perma.cc/SM8B-LK8T>] (IX Swap is partnering “with the first CEX partner InvestaX, a Singapore licensed security token investment and trading platform.”). Many FinTech firms engage in simple cryptocurrency trading, maintaining that cryptocurrencies are not securities. See, e.g., *id.* at 4.

<sup>210</sup> *Id.* at 3, 14.

<sup>211</sup> *Id.* at 3.

<sup>212</sup> *Id.* at 9. The complexities surrounding tokenized stocks include the need to register the fractionalized interests on a share registry and the fractional investment securities would be sent to a third-party custodian by the smart contract when traded. *Id.*

investors will face when investing in fractionalized securities.<sup>213</sup> Because SMEs typically have limited financial information, for example, it will be more difficult for investors to assess the creditworthiness of fractionalized SME securities.<sup>214</sup> Moody's Analytics identifies seven factors contributing to the challenge of assessing SME credit risk: financial information, difficulty predicting future cash flow, accuracy or relevancy of rating models, process efficiency and system infrastructure, audit/reporting requirements, problem loan management, and business model sustainability.<sup>215</sup> Information is at the center of most of these challenges, since a credit-rating model can only be effective with accurate financial information that correctly estimates cash flows and the sustainability of the business.<sup>216</sup>

Another risk is intermediary risk. At least in the United States, regulation already helps to protect against securities-related intermediary risk.<sup>217</sup> For example, investors who purchase their fractionalized securities through firms, such as Acorns, that are members of the Securities Investor Protection Corporation ("SIPC"),<sup>218</sup> are entitled to protection of up to \$500,000 for their securities and \$250,000 for cash in the event the member firm experiences financial distress.<sup>219</sup> Uniform Commercial Code (UCC) Article 8 also clarifies how an investor's risk may be limited in the event of a broker's bankruptcy.<sup>220</sup> The failure of the FinTech crypto-exchange FTX, however, may well reveal whether additional protection might be needed.<sup>221</sup>

Fractionalized securities also raise a principal-agent risk: that "[o]nce financing is received, the [issuer] may use funds in ways other than those for

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<sup>213</sup> See *supra* notes 163–164 and accompanying text (discussing how FinTech firms analyze SME credit risk); see also *supra* text accompanying note 193 (discussing obligor risk).

<sup>214</sup> See Mills & McCarthy, *supra* note 24, at 44.

<sup>215</sup> HELENE PAGE, MOODY'S ANALYTICS, SEVEN KEY CHALLENGES IN ASSESSING SME CREDIT RISK 2 (July 2016), <https://www.moodyanalytics.com/-/media/whitepaper/2016/seven-key-challenges-assessing%20small-medium-enterprises-sme-credit-risk.pdf> [<https://perma.cc/CH8W-VH5Z>].

<sup>216</sup> *Id.*

<sup>217</sup> See *Intermediary Risk*, *supra* note 30, at 1545.

<sup>218</sup> *The Fine Print of Acorns*, ACORNS, <https://www.acorns.com/disclosures/> [<https://perma.cc/K62K-DH7J>].

<sup>219</sup> *Is My Invest Account SIPC Protected?*, ACORNS, <https://support.acorns.com/hc/en-us/articles/360052528394-Is-My-Invest-Account-SIPC-Protected-> [<https://perma.cc/8C4S-FTEF>].

<sup>220</sup> See *Intermediary Risk*, *supra* note 30, at 1555–56 (explaining that UCC Article 8 was revised to clarify that investors have a property right in securities held for them by intermediaries).

<sup>221</sup> See Joe Rennison & David Yaffe-Bellany, *Wall St. Brokers Look to Buy Rights to Assets Trapped on FTX*, N.Y. TIMES (Nov. 18, 2022), <https://www.nytimes.com/2022/11/18/business/ftx-assets-wall-street.html> [<https://perma.cc/T5TA-K9R9>] (describing how billions of dollars of investors' assets were trapped on the platform during FTX's bankruptcy and how many investors will likely get little, if any, of their money back).

which it was intended. An entrepreneur might undertake excessively risky projects since all of the ‘upside’ of the project belongs to the entrepreneur while a banker [or investor] would prefer a less risky operation, even if profitability is less than under the riskier alternative.”<sup>222</sup> This risk might be particularly relevant in the case of SMEs, which sometimes are incentivized to pursue risky alternatives to maximize their returns on their financing.<sup>223</sup> Common methods to reduce this risk include requiring collateral for loans and imposing covenants in loan agreements, such as enabling lenders to veto specific proposed actions of the borrower.<sup>224</sup> Securities laws also typically require businesses to disclose the “principal purposes for which the net proceeds” are to be used by the issuer.<sup>225</sup>

Principal-agent risk also ties into the risk of investor dispersal, which can create a type of collective action problem.<sup>226</sup> Fractionalized interests in securities of a given issuer could have hundreds or even thousands of investors.<sup>227</sup> If the interests have voting rights, it may be difficult to obtain a required quorum of votes.<sup>228</sup>

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<sup>222</sup> *New Approaches to SME Financing*, *supra* note 32, at 16.

<sup>223</sup> *See id.*

<sup>224</sup> *Id.*

<sup>225</sup> *See* 17 C.F.R. § 229.504 (2020) (describing the use of proceeds provision in the SEC’s Regulation S-K).

<sup>226</sup> Increasing investor dispersal also can exacerbate the “marginalizing risk” problem. *See* Steven L. Schwarcz, *Marginalizing Risk*, 89 WASH. U. L. REV. 487, 488 (2012) (arguing that although risk dispersion can benefit investors, it also can cause them to underestimate and under-protect against risk; and observing that risk can even be so widely dispersed that rational investors individually lack the incentive to monitor it).

<sup>227</sup> Jo Won, *Jumpstart Regulation Crowdfunding: What Is Wrong and How to Fix It*, 22 LEWIS & CLARK L. REV. 1393, 1422 n.210 (2019) (stating that the average number of investors in a crowdfunding offering was 222). Because fractional investments are likely to be offered at low-price points to make them attractive to retail investors, it is likely that fractional offerings will have similar, if not greater, numbers of investors compared to crowdfunding offerings. *Cf.* TOKENISATION OF ASSETS, *supra* note 62, at 7 (describing how retail investors can access previously unreachable asset classes).

<sup>228</sup> *See* Won, *supra* note 227, at 1422–23 (describing how giving voting rights to crowdfunding shares generally imposes costs on issuers associated with needing investor approval for major decisions). The Trust Indenture Act requires bonds that are issued for over \$50 million to have a trustee to help solve this collective action problem of coordinating for large numbers of bondholders. Adam Hayes, *Trust Indenture Act (TIA) of 1939: History and Requirements*, INVESTOPEDIA, <https://www.investopedia.com/terms/t/trustindentureactof1933.asp> [<https://perma.cc/E3K3-R2SA>] (describing the Trust Indenture Act). “A trust indenture is a contract entered into by a bond issuer and an independent trustee to protect the interests of bondholders,” which allows the trustee to help coordinate bondholder actions. *Id.*

DeFi platforms that operate as exchanges for fractionalized securities present additional risks, including fraud, disclosure, and anonymity risk.<sup>229</sup> DeFi platforms epitomize the last—anonymity risk—because they typically lack centralized points where regulation could be applied to prevent fraud or market abuse.<sup>230</sup> Furthermore, the “identity of borrowers and lenders is [typically] hidden behind a cryptographic digital signature,” meaning parties to a transaction are anonymous and there is no way to establish trust between an issuer of a tokenized fractionalized security and an investor in that security.<sup>231</sup> It also may be difficult to hold any party accountable to investors in the event of fraud.<sup>232</sup>

The responsibility for evaluating the risk of investing through DeFi platforms appears to fall almost entirely on investors; the platforms themselves are not yet subject to any risk-management requirements.<sup>233</sup> SEC Commissioner Caroline Crenshaw thus cautions that DeFi’s “current ‘buyer beware’ approach is not an adequate foundation on which to build reimagined financial markets.”<sup>234</sup> Nearly \$2 billion has been lost in 2022 alone to DeFi hacks and scams,<sup>235</sup> and no clear methods for preventing market manipulation currently exist.<sup>236</sup>

Smart contracts also present risks. Being tied to the blockchain on which they are recorded, they are unable to access information not contained on that blockchain.<sup>237</sup> Accessing that information requires what are known as oracles: third parties that import relevant information, like an SME’s balance sheet, onto a DeFi platform to ensure the smart contract is performing its coded function.<sup>238</sup> For example, if an SME is trying to borrow \$10,000 through a

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<sup>229</sup> See LAEL BRAINARD, VICE-CHAIR, BD. OF GOVERNORS OF THE FED. RESRV. SYS., SPEECH AT BANK OF ENGLAND CONFERENCE, CRYPTO-ASSETS AND DECENTRALIZED FINANCE THROUGH A FINANCIAL STABILITY LENS (July 8, 2022).

<sup>230</sup> See *id.* (“While regulatory frameworks clearly apply to DeFi activities no less than to centralized crypto activities and traditional finance, DeFi protocols may present novel challenges that may require adapting existing approaches.”).

<sup>231</sup> ARAMONTE, DOERR, HUANG & SCHRIMPF, *supra* note 81, at 2.

<sup>232</sup> See *id.* at 1. DeFi requires all loans to be collateralized because lenders cannot assess a borrower’s credit risk due to the anonymity risk. *Id.* at 2. This limits financial inclusion because those seeking to access DeFi lending are precluded from doing so unless they can provide sufficient collateral for a potential loan. *Id.* at 1–2.

<sup>233</sup> Massari & Catalini, *supra* note 88.

<sup>234</sup> CAROLINE A. CRENSHAW, COMM’R, U.S. SEC. & EXCH. COMM’N, STATEMENT ON DEFI RISKS, REGULATIONS, AND OPPORTUNITIES (Nov. 9, 2021), in 1 INT’L J. BLOCKCHAIN L. 1, 3 (2021).

<sup>235</sup> Lindsay Choo, *DeFi Hacks Aren’t Going Away*, PROTOCOL (July 14, 2022), <https://www.protocol.com/newsletters/protocol-fintech/defi-hacks-crypto> [<https://perma.cc/MX4L-GTZR>].

<sup>236</sup> See TOKENISATION OF ASSETS, *supra* note 62, at 21 (explaining that the lack of regulation means “participants can artificially affect the price of a digital asset”).

<sup>237</sup> ARAMONTE, DOERR, HUANG & SCHRIMPF, *supra* note 81, at 6 n.6.

<sup>238</sup> *Id.*

smart contract that requires the loan to be fully collateralized, an oracle would need to confirm that the proposed collateral is worth at least \$10,000.<sup>239</sup> In the event the collateral's value drops below the minimum threshold, an oracle would also need to mark-to-market the value of the collateral to impose relevant penalties when the smart contract's terms are breached.<sup>240</sup> Without this information being verified and passed-through a trusted oracle on a real-time basis, smart contracts may not be workable.<sup>241</sup> Smart contracts therefore are subject, at least in theory, to oracle risk.

These market and other risks expose regulatory gaps that need to be addressed for the development of fractionalized securities markets. Part V next examines how to fill these regulatory gaps.

## V. REGULATING FRACTIONALIZED SECURITIES

This Part analyzes how fractionalized securities should be regulated. Subpart A examines and critiques the regulation that currently would apply to fractionalized securities and the exchanges that would issue them. Subpart B then analyzes what new regulation is needed.

### A. Examining and Critiquing Existing Regulation

As discussed, liquidity risk is the most significant risk needing regulation.<sup>242</sup> Certain other risks of fractionalized securities arise out of those securities being tokenized and traded through smart contracts on DeFi platforms. Still other risks of fractionalization arise out of the low-tech sales of undivided fractional interests.<sup>243</sup> These last risks have been extensively analyzed elsewhere,<sup>244</sup> and need not be repeated in this Article. This Part V

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<sup>239</sup> See *id.*

<sup>240</sup> Cf. *id.* (explaining that oracles are “the mediators that communicate real-world information to blockchain-based DeFi applications”).

<sup>241</sup> See Lawrence Wintermeyer, *Oracles: The Invisible Backbone of DeFi and Applied Blockchain Apps*, FORBES (Oct. 14, 2021), <https://www.forbes.com/sites/lawrencewintermeyer/2021/10/14/cryptohacks-oraclesthe-invisible-backbone-of-defi-and-applied-blockchain-apps> [https://perma.cc/R7WU-JGY9] (explaining how oracles are necessary filters of information provided to blockchains).

<sup>242</sup> See *supra* notes 189–193 and accompanying text (describing this as the risk that an investor might be unable to realize a bargained-for return on her investment).

<sup>243</sup> As discussed, for example, conventional brokerages like Schwab and other firms have been actively engaging in low-tech fractionalization (not utilizing blockchain technologies) by buying whole securities and selling undivided fractional interests therein to their customers and maintaining separate accounts to record each customer's purchased fractional interests. See *supra* notes 42–47 and accompanying text.

<sup>244</sup> See, e.g., *Intermediary Risk*, *supra* note 30, at 1544; *Next-Generation Securitization*, *supra* note 38 (manuscript at 8); cf. *Fractional Share Investing*, *supra* note 205 (observing that, generally, the SEC oversees non-FinTech enabled fractionalization, which is unlikely to need additional regulation).

therefore focuses on liquidity risk and the other risks—namely, principal-agent risk, anonymity and fraud risk, oracle risk, and intermediary risk—of fractionalized securities arising out of their being tokenized and traded through smart contracts on DeFi platforms.

The fractionalization of securities is currently only regulated through securities law.<sup>245</sup> Although securities law would require disclosure of the aforesaid risks, it does not substantively regulate them.<sup>246</sup>

Securities law would apply because fractionalized securities are clearly securities. For example, U.S. securities law defines securities as including “any certificate of interest or participation in” debt or equity securities.<sup>247</sup> Similarly, under the *Howey* test governing what constitutes a security, fractionalized interests in debt or equity securities should be securities regardless of whether they are tokenized or not.<sup>248</sup> The four prongs of the *Howey* test explain that an investment contract exists when there is the (1) investment of money in a (2) common enterprise with a (3) reasonable expectation of profits (4) to be derived from the efforts of others.<sup>249</sup> A fractionalized debt or equity security contains all of these prongs: an investor will be investing its money in a common enterprise through commonality,<sup>250</sup> expecting profits through either interest payments or equity appreciation, and relying on the issuer of the fractionalized security for the returns.<sup>251</sup>

In the EU, the European Securities and Markets Authority (“ESMA”) defines securities as including equity shares in companies and bonds, along with “[a]ny other securities giving the right to acquire or sell any such transferable securities.”<sup>252</sup> This would include fractionalized securities

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<sup>245</sup> See 15 U.S.C. § 77b(a)(1) (2012).

<sup>246</sup> See 17 C.F.R. § 229.105 (2020).

<sup>247</sup> 15 U.S.C. § 77b(a)(1) (2012). Even if issued as a tokenized security, the fractionalized interest should fall under the SEC’s purview based on its framework for whether digital assets are securities. See *Framework for “Investment Contract” Analysis of Digital Assets*, U.S. SEC. & EXCH. COMM’N, <https://www.sec.gov/corpfin/framework-investment-contract-analysis-digital-assets> [<https://perma.cc/XTM2-TUCV>] (explaining how the SEC will analyze initial coin offerings and other digital assets under existing securities laws, specifically noting that stocks and bonds are included in the definition of a security); cf. 17 C.F.R. § 230.152a (2019) (governing the issuance of fractional shares).

<sup>248</sup> See generally *SEC v. W.J. Howey Co.*, 328 U.S. 293 (1946).

<sup>249</sup> See *id.* at 298–99 (describing an investment contract); see also *Framework for “Investment Contract” Analysis of Digital Assets*, *supra* note 247 (explaining how the *Howey* test will be applied to digital assets).

<sup>250</sup> See *Framework for “Investment Contract” Analysis of Digital Assets*, *supra* note 247 (describing the two different types of commonality used by federal courts to find whether a common enterprise exists under the *Howey* test).

<sup>251</sup> *Id.*

<sup>252</sup> PRACTICAL LAW CORPORATE, EU PROSPECTUS REGULATION, Westlaw Prac. L. (database updated Dec. 2022), <https://uk.practicallaw.thomsonreuters.com/6-619-3947> [<https://perma.cc/R2WD-4LY8>]; see also Directive 2014/65/EU, of the European Parliament and of the Council of 15 May 2014 on Markets in Financial Instruments and

because they would either be equity or debt interests, both of which could be sold.<sup>253</sup> The UK's FCA defines tokenized securities as those “that grant holders some, or all, of the rights conferred on shareholders or debt-holders.”<sup>254</sup> Fractionalized equity or debt securities would meet this framework, because they will likely be designed to confer rights to resale, dividends, and interest to the investor, just as a few examples.

Regulatory frameworks in securities markets tend to focus on disclosure to eliminate the information asymmetry<sup>255</sup> between the issuer, which has more information about its company or product, and the investor, who is reliant on disclosed information to determine whether a security is worth an investment.<sup>256</sup> Here, while fractionalized securities will provide new investors with the chance to invest, they offer similar returns as whole securities in the form of appreciation and possibly dividends in the case of equity securities or principal and interest payments in the case of debt securities.<sup>257</sup>

Under securities laws, firms generally would have to register their issuance of fractionalized securities—usually an expensive task<sup>258</sup>—unless an exemption is obtained.<sup>259</sup> Determining relevant exemptions will be crucial to make fractionalization cost-effective for SMEs and many other businesses. In the United States, for example, the SEC Regulation A exemption, which exempts securities offerings by smaller companies from registration, has seen limited use.<sup>260</sup> Regulation A's amendment in 2015 created two tiers of

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Amending Directive 2002/92/EC and Directive 2011/61/EU, 2014 O.J. (L 173) 349, 385 (defining transferable securities in the EU). South Korea recently issued guidance on fractional investments and explained that when an investor carries no additional payment duties beyond the initial purchase, the fractional investment will likely be a security. Press Release, Fin. Servs. Comm'n, FSC Unveils Guideline on Securities Businesses Dealing with Fractional Investment (May 2, 2022) (on file with the *Ohio State Law Journal*).

<sup>253</sup> See PRACTICAL LAW CORPORATE, *supra* note 252.

<sup>254</sup> FIN. CONDUCT AUTH., GUIDANCE ON CRYPTOASSETS: FEEDBACK AND FINAL GUIDANCE TO CP 19/3, at 23 (July 2019), <https://www.fca.org.uk/publication/policy/ps19-22.pdf> (on file with the *Ohio State Law Journal*).

<sup>255</sup> WILLIAM HINMAN, DIR., U.S. SEC. & EXCH COMM'N DIV. OF CORP. FIN., REMARKS AT THE 18<sup>TH</sup> ANNUAL INSTITUTE ON SECURITIES REGULATION IN EUROPE, APPLYING A PRINCIPLES-BASED APPROACH TO DISCLOSING COMPLEX, UNCERTAIN AND EVOLVING RISKS (Mar. 15, 2019).

<sup>256</sup> See *id.* (explaining that “disclosure requirements are intended to provide investors with the material information they need about companies and their securities offerings to make informed investment and voting decisions”).

<sup>257</sup> See THE FUTURE OF CAPITAL MARKETS, *supra* note 121, at 23.

<sup>258</sup> The typical cost of an Initial Public Offering (“IPO”) under U.S. securities law often exceeds \$4 million. BONNIE, KENNEDY & PACHECO, *supra* note 130, at 101, 104. Once a company is public, there are also ongoing costs associated with the need for better accounting, legal, and auditing services, as well as directors' fees. *Id.*

<sup>259</sup> See, e.g., ANZHELA KNYAZEVA, U.S. SEC. & EXCH. COMM'N, REGULATION A+: WHAT DO WE KNOW SO FAR? 1 (Nov. 2016), [https://www.sec.gov/files/Knyazeva\\_RegulationA%20.pdf](https://www.sec.gov/files/Knyazeva_RegulationA%20.pdf) [<https://perma.cc/6Y24-Z48L>].

<sup>260</sup> *Id.*

offerings: Tier 1, which allows a company to raise up to \$20 million as long as its offering documents are filed and qualified by both the SEC and relevant state regulators and the company provides financial statements that do not have to be audited,<sup>261</sup> and Tier 2, which allows a company to raise up to \$75 million as long as its offering documents are qualified by the SEC and the company provides audited financial statements.<sup>262</sup> Under Tier 1, however, an issuer is not subject to ongoing reporting requirements, whereas under Tier 2, an issuer is responsible for filing annual, semiannual, and current reports.<sup>263</sup>

There is precedent for FinTech firms to sell fractionalized assets to investors using the Regulation A exemption. Fundrise used this exemption, for example, to exempt its fractionalized real estate securities offerings.<sup>264</sup> Royalty Exchange also utilized this exemption to sell fractionalized interests in royalty payments to investors.<sup>265</sup> Even with this exemption, issuers must disclose the material risks to investors, and misrepresentation would be subject to the antifraud provisions of securities laws, like SEC Rule 10b-5.<sup>266</sup> When issuing fractionalized securities, the disclosure of liquidity risk should certainly appear to be material. The SEC has indeed warned that securities issued through a Regulation A exemption are often both speculative and illiquid.<sup>267</sup>

EU securities regulation is similar to U.S. regulation insofar as it exempts relatively small issuances of securities from registration<sup>268</sup> and provides SMEs

<sup>261</sup> *Updated Investor Bulletin: Regulation A*, U.S. SEC. & EXCH. COMM'N, [https://www.sec.gov/oiea/investor-alerts-bulletins/ib\\_regulationa.html](https://www.sec.gov/oiea/investor-alerts-bulletins/ib_regulationa.html) [https://perma.cc/N4QN-M45L].

<sup>262</sup> *Id.*

<sup>263</sup> *Regulation A*, INVESTOR.GOV, <https://www.investor.gov/introduction-investing/investing-basics/glossary/regulation> [https://perma.cc/Y7EX-MR53].

<sup>264</sup> *See generally Offering Circulars*, FUNDRISE, <https://fundrise.com/oc> [https://perma.cc/9TYK-U5GD].

<sup>265</sup> U.S. SEC. & EXCH. COMM'N, HOW TO INVEST IN THE EMINEM ROYALTIES WITH ROYALTY FLOW 6 (Feb. 2018), [https://www.sec.gov/Archives/edgar/data/1709847/000147793218000818/royalty\\_ex132.htm](https://www.sec.gov/Archives/edgar/data/1709847/000147793218000818/royalty_ex132.htm) [https://perma.cc/3V6G-WZHQ]; *see also* Royalty Flow Inc., Preliminary Offering Circular (Form 1A) (Sept. 25, 2017), [https://www.sec.gov/Archives/edgar/data/1709847/000147793217004698/royalty\\_1a.htm](https://www.sec.gov/Archives/edgar/data/1709847/000147793217004698/royalty_1a.htm) (on file with the *Ohio State Law Journal*).

<sup>266</sup> *Frequently Asked Questions About Exempt Offerings*, U.S. SEC. & EXCH. COMM'N, <https://www.sec.gov/education/smallbusiness/exemptofferings/faq> [perma.cc/P74W-WUW6]. Rule 10b-5 is just one example of U.S. antifraud laws in the context of securities and requires intent. *See generally The Guide to Securities Fraud Elements and SEC Rule 10b-5*, BNS&K, <https://bnsklaw.com/the-guide-to-securities-fraud-elements-and-sec-rule-10b-5/> [https://perma.cc/WX3R-YYK9]. Exchange Act Section 17(a)(2), by comparison, requires a finding of negligence in the securities fraud context. *Id.*

<sup>267</sup> *Updated Investor Bulletin: Regulation A*, *supra* note 261.

<sup>268</sup> For example, any offering over a period of 12 months that is worth less, in the aggregate, than one million Euros is exempt from the obligation to file a prospectus. PRACTICAL LAW CORPORATE, *supra* note 252. The EU also has a similar crowdfunding

with various exemptions from registration.<sup>269</sup> The EU's Markets Abuse Regulation is also similar to the U.S. antifraud provisions, and the regulation covers financial instruments traded on nonregulated markets "in order to avoid potential regulatory arbitrage."<sup>270</sup>

At least in the United States, these securities-law exemptions have largely failed so far to enable SMEs to cost-effectively raise capital. Studies show "the transaction cost related to raising \$30,000 under Regulation [Crowdfunding] is approximately \$5,000 and 75 hours of internal document preparation."<sup>271</sup> Other costs associated with document preparation and payments to intermediaries can drive the total costs to over half the amount raised from the securities issuance.<sup>272</sup> One study found that U.K. crowdfunding has seen slightly more success because the "FCA requires much less disclosure," resulting in typical transaction costs being much lower.<sup>273</sup>

Because fractionalized securities could be issued on exchanges, an analysis of exchange-level regulation is also necessary. Crowdfunding regulations in the United States and Europe allow eligible businesses to raise capital by selling limited amounts of securities through approved exchanges.<sup>274</sup> To be approved in the United States, these exchanges must be registered with the SEC and also be a registered member of the Financial Industry Regulatory Authority or "FINRA."<sup>275</sup> Registration requires the

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exemption to the US, and provides relief from the obligation to file a prospectus for any business that raises less than 5 million Euros through a 12-month period and utilizes a crowdfunding service provider that has registered with its relevant jurisdictional regulator. *EU Crowdfunding Regulation: Applicable From 10 November*, LOYENS & LOEFF (Dec. 11, 2021), <https://www.loyensloeff.com/insights/news--events/news/eu-crowdfunding-regulation-applicable-from-10-november/> [<https://perma.cc/965H-N3R4>].

<sup>269</sup> See Stephan Däschler, *Market Abuse Regulation (MAR) — The Facts at a Glance*, EQS GRP., <https://www.eqs.com/compliance-blog/eu-market-abuse-regulation-mar> [<https://perma.cc/6FYV-5WCS>] (discussing various changes to the EU's Market Abuse Regulation that should make it easier for SMEs to comply).

<sup>270</sup> *Market Integrity*, EUR. SEC. & MKTS. AUTH., <https://www.esma.europa.eu/esmas-activities/markets-and-infrastructure/market-integrity> [<https://perma.cc/G686-H3U9>] (discussing Regulation No 596/2014 on market abuse).

<sup>271</sup> Won, *supra* note 227, at 1411. Crowdfunding refers to funding a project or venture by raising money from many people, each donating a small amount; crowdfunding often occurs via the Internet. *Id.* at 1399.

<sup>272</sup> *Id.* at 1411.

<sup>273</sup> *Id.* at 1406.

<sup>274</sup> *Regulation Crowdfunding*, U.S. SEC. & EXCH. COMM'N, <https://www.sec.gov/education/smallbusiness/exemptofferings/regcrowdfunding> [<https://perma.cc/98NA-6DF6>]; *EU Crowdfunding Regulation*, NORTON ROSE FULBRIGHT (May 2021), <https://www.nortonrosefulbright.com/en/knowledge/publications/97e1caa6/eu-crowdfunding-regulation> [<https://perma.cc/WBX8-ZAJA>].

<sup>275</sup> *Updated Investor Bulletin: Regulation Crowdfunding for Investors*, U.S. SEC. & EXCH. COMM'N (Oct. 14, 2022) [hereinafter *Updated Investor Bulletin: Regulation*

exchanges to implement policies and procedures designed to ensure compliance with federal securities laws.<sup>276</sup> To be approved in the EU, exchanges must register with their relevant jurisdiction's securities authority and also must disclose relevant information to potential investors.<sup>277</sup> Providing relevant financial information would help address the credit risk associated with SME securities. Current U.S. and EU regulation also help to address the potential principal-agent problem, requiring businesses to disclose their proposed use of proceeds.<sup>278</sup>

The EU is also experimenting with "SME Growth Markets" exchanges as part of its CMU to create centralized exchanges specifically for SME securities.<sup>279</sup> These exchanges, created by the EU as part of its Second Markets in Financial Instruments Directive ("MiFID II"), aim "to facilitate access to capital for [SMEs.]"<sup>280</sup> SMEs seeking to issue securities on these exchanges have tailored prospectus disclosure and regulatory requirements aimed at driving down the cost associated with issuing securities.<sup>281</sup>

U.S. and EU securities regulation currently extends to exchanges that trade fractionalized securities through intermediaries.<sup>282</sup> Such regulation does not clearly apply, however, to DeFi exchanges that rely exclusively on smart contracts to facilitate trading in fractionalized securities.<sup>283</sup> Even the EU's

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*Crowdfunding*], [https://www.sec.gov/oiea/investor-alerts-bulletins/ib\\_crowdfunding.html](https://www.sec.gov/oiea/investor-alerts-bulletins/ib_crowdfunding.html) [<https://perma.cc/45NS-5VCW>].

<sup>276</sup> See generally 17 C.F.R. § 227.403–04 (2017).

<sup>277</sup> *EU Crowdfunding Regulation*, *supra* note 274.

<sup>278</sup> See 17 C.F.R. § 227.201(i) (2021) (requiring an issuer under Regulation Crowdfunding to include "[a] description of the purpose and intended use of the offering proceeds").

<sup>279</sup> *ESMA Publishes Final Report on SME Growth Markets*, EUR. SEC. & MKTS. AUTH. (Apr. 7, 2021), <https://www.esma.europa.eu/press-news/esma-news/esma-publishes-final-report-sme-growth-markets> [<https://perma.cc/SM62-QLEC>].

<sup>280</sup> EUR. SEC. & MKTS. AUTH., *MiFID II REVIEW REPORT ON THE FUNCTIONING OF THE REGIME FOR SME GROWTH MARKETS* 7 n.6 (Mar. 2021) [hereinafter *MiFID II REVIEW REPORT*], [https://www.esma.europa.eu/sites/default/files/library/final\\_report\\_on\\_sme\\_gms\\_-\\_mifid\\_ii.pdf](https://www.esma.europa.eu/sites/default/files/library/final_report_on_sme_gms_-_mifid_ii.pdf) [<https://perma.cc/BP4Z-L4RU>].

<sup>281</sup> See *id.* at 4, 7–8 (describing that the SME Growth Markets are "aiming at simplifying investors' access to information and promoting concentration of liquidity [of SME securities]").

<sup>282</sup> See *Fractional Share Investing*, *supra* note 205 (explaining how brokerage firms in the US allow fractional share lending); see also *ESMA Publishes Guidance on Fractional Shares*, EUR. SEC. & MKTS. AUTH. (Mar. 28, 2023), <https://www.esma.europa.eu/press-news/esma-news/esma-publishes-guidance-fractional-shares> [<https://perma.cc/PN9H-2UL4>].

<sup>283</sup> See Benedict George & Toby Bochan, *Centralized Exchange (CEX) vs. Decentralized Exchange (DEX): What's the Difference?*, COINDESK (Nov. 15, 2022), <https://www.coindesk.com/learn/centralized-exchange-cex-vs-decentralized-exchange-dex-whats-the-difference/> [<https://perma.cc/F3GZ-KTCJ>] (explaining the difference between a centralized exchange and a DeFi exchange).

recently adopted Market in Crypto-Assets Regulation (MiCA) would exempt DeFi platforms that offer “fully decentralized” services—although there is no elaboration of what fully decentralized means.<sup>284</sup>

Current securities laws do not adequately describe what information would need to be disclosed for tokenized fractionalized securities. Current regulation does not make it clear, for example, whether items such as the source code, the economics of the tokenized fractionalized security, or verifying a blockchain’s transaction history would be considered material to a relevant investor.<sup>285</sup> Nor is it clear whether anonymity and fraud risks, or the risks associated with oracles, must be disclosed.<sup>286</sup> Professor Chris Brummer notes, for example, that traditional disclosure forms, like the SEC’s form S-1, do not adequately reflect the disclosure obligations one would expect for tokenized fractionalized securities.<sup>287</sup>

The lack of international harmonization of securities laws also poses problems for issuers of Fintech-enabled fractionalized securities. Because different countries have varying requirements for issuing securities (as described above in the U.S.-EU context), issuers may have to comply with numerous securities regimes to ensure they remain compliant.<sup>288</sup> These are known as “cross-border” trading costs and will likely impair an issuer’s ability to create a global fractionalized securities market through a DeFi platform.<sup>289</sup> Without international commonality in fractionalized securities regulation,

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<sup>284</sup> AZAD ALI & PIETRO PIAZZI, SKADDEN, ARPS, SLATE, MEAGHER & FLOM LLP, EU’S PROPOSED LEGISLATION REGULATING CRYPTOASSETS, MiCA, HERALDS NEW ERA OF REGULATORY SCRUTINY 1–2 (Nov. 2022), [https://www.skadden.com/-/media/files/publications/2022/11/eus\\_proposed\\_legislation\\_regulating\\_cryptoassets\\_mica\\_heralds\\_new\\_era\\_of\\_regulatory\\_scrutiny.pdf?rev=f6095d3fe5264a7c8cdfd35bef1e8942](https://www.skadden.com/-/media/files/publications/2022/11/eus_proposed_legislation_regulating_cryptoassets_mica_heralds_new_era_of_regulatory_scrutiny.pdf?rev=f6095d3fe5264a7c8cdfd35bef1e8942) [<https://perma.cc/QG5E-8UZF>]. At the time of writing, MiCA is on the path to regulatory approval. *Id.* at 8.

<sup>285</sup> See Statement, Hester M. Peirce, Comm’r, U.S. Sec. & Exch. Comm’n, Token Safe Harbor Proposal 2.0 (Apr. 13, 2021), <https://www.sec.gov/news/public-statement/peirce-statement-token-safe-harbor-proposal-2.0> [<https://perma.cc/GC6M-V8VX>] (discussing a safe harbor proposal that would adequately clarify disclosure requirements for tokenized securities issuances).

<sup>286</sup> See *infra* Part V.B.5.

<sup>287</sup> Chris Brummer, *Disclosure, Dapps and DeFi*, 5 STAN. J. BLOCKCHAIN L. & POL’Y 137, 147 (2022). For example, it may be necessary to describe how changes would be made to a smart contract to facilitate trading in a fractionalized security. See *id.* at 158. However, because DeFi is inherently decentralized, it may be difficult to describe who would even be responsible for such a change. See *id.*

<sup>288</sup> See René M. Stulz, *Securities Laws, Disclosure, and National Capital Markets in the Age of Financial Globalization*, 47 J. ACCT. RSCH. 349, 351 (2009).

<sup>289</sup> *Id.* at 357 (discussing how cross-listing securities on various exchanges worldwide imposes additional costs most issuers are not willing to bear because of varying securities laws).

cross-border trading costs could impair financial inclusion, as issuers and investors would be limited to offerings in their home jurisdiction.<sup>290</sup>

Even in its limited goal of mandating disclosure to reduce information asymmetry, current securities regulation does not adequately require disclosure of the liquidity risk, principal-agent risk, anonymity/fraud risk, oracle risk, and potential intermediary risk associated with the FinTech-enabled fractionalization of investment securities.<sup>291</sup> Furthermore, securities regulation cannot substantively protect against those risks. For these reasons, the existing regulation of fractionalized securities is insufficient.

### B. *Proposing New Regulation*

New regulation is needed for the Fintech-enabled fractionalization of securities. Such regulation would help to create the “regulatory certainty [that] is always important for entrepreneurs and investors who wish to decide whether and how to participate in new technologies.”<sup>292</sup> This subpart B proposes the following possible new regulation: tailored disclosures and exemptions for fractionalized securities, allowing centralized exchanges to trade fractionalized securities, requiring DeFi platforms to adhere to “Know Your Customer” (“KYC”) and “Anti-Money Laundering” (“AML”) standards,<sup>293</sup> investment limitations for retail investors, making DeFi platforms and oracles register with relevant securities regulators, and international harmonization of the regulation for Fintech-enabled fractionalization of securities.

Any proposed regulation should also be subject to scrutiny to ensure that its protections are cost-effective. That means the benefits of implementing that regulation should be likely to exceed its costs.<sup>294</sup> Each subsection will analyze the costs and benefits associated with the proposed regulation.

#### 1. *Tailored Disclosures and Exemptions for Fractionalized Securities*

This subsection discusses proposals to make the process of issuing fractionalized securities less costly by tailoring the disclosures that issuers will need to provide to regulators and investors and by providing tailored exemptions from registration.

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<sup>290</sup> See *id.* (explaining that securities are likely to trade in an issuer’s home jurisdiction as a result of cross-border trading costs).

<sup>291</sup> See *infra* Part V.B. (explaining why new regulation is needed).

<sup>292</sup> Makarov & Schoar, *supra* note 90, at 188.

<sup>293</sup> *Id.* at 175.

<sup>294</sup> Maeve P. Carey, Cong. Rsch. Serv., R41974, Cost-Benefit and Other Analysis Requirements in the Rulemaking Process 1 (2014).

Proposals to amend Regulation Crowdfunding provide helpful guidance for filling in current securities law's antifraud and disclosure gaps while making it cost-effective for SMEs and other business to issue securities. One proposal suggests that SMEs should only be required to provide information that is similar to the information they would provide to a bank when attempting to borrow.<sup>295</sup> This requirement would cover a wide range of information that would be material to investors.<sup>296</sup> A standardized disclosure form could also help drive down costs while still informing investors of material investment information. For example, the SEC mandates disclosure under Regulation S-K of "significant factors that make an investment in the registrant or offering speculative or risky."<sup>297</sup> It also subjects issuers to ongoing reporting requirements to ensure investors are aware of any new material information.<sup>298</sup>

An issuer that is utilizing a DeFi platform to offer its tokenized fractionalized securities should have additional tailored disclosure requirements. An issuer's information package should include financial and risk information relevant in the DeFi context to address the previously discussed disclosure gaps in current securities law.<sup>299</sup> Responses to the EU's DLT pilot regime emphasized that tokenized securities, which would include fractionalized securities, should be subject to the same transparency requirements as traditional securities.<sup>300</sup> As Professor Brummer explains, risk disclosures should include those relevant to potential investors, like circumstances that could result in the failure of the fractionalized security and how a smart contract could be altered through the relevant DeFi exchange.<sup>301</sup> An issuer should clearly describe the fractionalized securities' liquidity and market risks, while also explaining to potential investors how it plans to provide a secondary trading market for its securities (especially in the case of

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<sup>295</sup> Won, *supra* note 227, at 1412.

<sup>296</sup> *Id.* (explaining that this information could include "business and personal credit scores; relevant business documents including, but not limited to: 1) personal and business tax returns, 2) income statement, 3) profit & loss statement, 4) bank statements, 5) payroll records, and 6) business organization documents; personal and business background statements; business plan; and financial statements").

<sup>297</sup> See generally 17 C.F.R. § 229.105 (2020). In the context of fractionalized securities, an additional disclosure explaining the risks associated with the issuer's fractionalized security, such as the lack of voting rights, would likely be necessary.

<sup>298</sup> See *supra* Part V.A. In addition, this would likely help mitigate the principal-agent problem, as issuers would be aware they must disclose how they used proceeds from a fractional investment issuance to the investors who provided the capital financing.

<sup>299</sup> See *supra* notes 285–287 and accompanying text.

<sup>300</sup> EUR. SEC. & MKTS. AUTH., REPORT ON THE DLT PILOT REGIME 64 (Sept. 2022) [hereinafter DLT PILOT REGIME REPORT], [https://www.esma.europa.eu/sites/default/files/library/esma70-460-111\\_report\\_on\\_the\\_dlt\\_pilot\\_regime.pdf](https://www.esma.europa.eu/sites/default/files/library/esma70-460-111_report_on_the_dlt_pilot_regime.pdf) [https://perma.cc/8ZHT-JSG5].

<sup>301</sup> See Brummer, *supra* note 287, at 154–55 (describing a list of risk disclosures that could be applied to any tokenized security offering).

fractionalized equity securities).<sup>302</sup> This recommendation is similar to the SEC's requirement for Regulation S-K, which mandates disclosure of "significant factors that make an investment in the registrant or offering speculative or risky,"<sup>303</sup> and will likely help investors more clearly understand the risks associated with this new type of financial technology.

Tailored disclosure would present certain risks while offering clear cost-saving benefits. Generally, laws that mandate some forms of basic disclosure are positively associated with the development of capital markets.<sup>304</sup> As mentioned, Regulation Crowdfunding has largely failed to become a viable way for SMEs to raise funds because of its cost and overburdensome disclosures.<sup>305</sup> By tailoring disclosures to allow SMEs and other business to issue fractionalized securities, regulators could address this problem. For example, the SME Growth Markets regulatory framework in the EU recently reduced reporting requirements for SMEs while providing a standard disclosure template to lower costs (by reducing the time needed to prepare documents related to issuing securities).<sup>306</sup>

Tailoring and standardizing disclosures for SMEs could also help address the difficulty of assessing SME credit risk.<sup>307</sup> An OECD report describes how Banque de France collects credit data for French SMEs and makes that data available to investors in a transparent and standardized manner.<sup>308</sup> This mirrors the updated EU requirements that require crowdfunding platforms that operate as exchanges to verify an issuer has complied with relevant information disclosures.<sup>309</sup> Similar centralized data collection and publication by an intermediary could be developed for retail investors seeking to invest in an SME's fractionalized securities to help them analyze an SME's credit risk and address potential disclosure gaps.

Although reduced reporting may appear to reduce transparency, the intention should be to require the disclosure of all relevant material information. The trick, of course, is to design tailored disclosure that ensures that investors are adequately informed while still being cost-effective. Such tailored disclosure, coupled with standard disclosure templates and clear guidance from regulators on what will be considered material information in the context of fractionalized securities, should enable SMEs to affordably access capital-market financing without increasing investor risk.

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<sup>302</sup> *Id.*

<sup>303</sup> 17 C.F.R. § 229.105 (2020).

<sup>304</sup> Stulz, *supra* note 288, at 351.

<sup>305</sup> *See supra* notes 271–272 and accompanying text.

<sup>306</sup> *Market Abuse Changes – Effective 1 January 2021*, SIMMONS & SIMMONS (Nov. 13, 2020), <https://www.simmons-simmons.com/en/publications/ckhf1r5wfl1e730944zkvpyuie/market-abuse-changes---effective-1-january-2021> [https://perma.cc/B57E-7TUM].

<sup>307</sup> *See supra* notes 215–216 and accompanying text.

<sup>308</sup> Nassr & Wehinger, *supra* note 29, at 92.

<sup>309</sup> *EU Crowdfunding Regulation*, *supra* note 274.

In addition, regulators should consider implementing a tailored exemption from registration for fractionalized securities to further enable SMEs to affordably access capital-market financing. Even a relatively small exemption, such as \$250,000, would help to alleviate most SME funding concerns.<sup>310</sup>

The EU is also experimenting with a digital ledger technology pilot program to help facilitate trading and settlement in tokenized securities through DeFi exchanges.<sup>311</sup> The pilot program requires blockchain-based exchanges to get regulatory approval, with limited exemptions from specific regulatory requirements, provided the exchange sponsor remains in compliance.<sup>312</sup> Of particular interest, the ESMA mandates that any blockchain-based exchange must provide its regulator with “a clearly defined and publicly available strategy for transitioning out of or winding down its infrastructure” in the event of failure,<sup>313</sup> thereby attempting to mitigate intermediary risk. This is similar to the U.S. requirement for certain large banks and other systemically important financial institutions to have a “living will,” which “must describe the company’s strategy for rapid and orderly resolution in the event of material financial distress or failure of the company.”<sup>314</sup>

## 2. Allowing Centralized Exchanges to Trade Fractionalized Securities

This subsection explains how centralized exchanges could bolster liquidity for fractionalized securities, and then discusses the need to permit fractionalized securities trading on centralized exchanges. In this Article’s context, centralized exchanges would be platforms that facilitate the trading (that is, the buying and selling) of fractionalized investment securities. In contrast to a DeFi platform,<sup>315</sup> in which buying and selling would be controlled through smart contracts, centralized exchanges would be run by

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<sup>310</sup> See *supra* note 136 and accompanying text.

<sup>311</sup> See generally DLT PILOT REGIME REPORT, *supra* note 300.

<sup>312</sup> *Id.* at 10. The program provides for issuers to access these platforms for equity issuances as long as their market capitalization is below 500 million Euros, and bond issuances as long as the bond is below 1 billion Euros, well above the financing requirements for SMEs and the cost of fractionalized shares or bonds. *Id.* at 11.

<sup>313</sup> *Id.*

<sup>314</sup> *Living Wills (or Resolution Plans)*, FED. RESRV. SYS., <https://www.federalreserve.gov/supervisionreg/resolution-plans.htm> [<https://perma.cc/TED4-7WE7>].

<sup>315</sup> *Cf.* Raval & Knight, *supra* note 82 and accompanying text (describing a DeFi platform). The level of centralization of a DeFi platform can also vary, with some platforms having more centralized aspects while others attempt to remain truly decentralized. See Carapella, Dumas, Gerszten, Swem & Wall, *supra* note 164, at 21–22 (describing how DeFi platforms vary). For the purposes of this Article, we assume that centralized exchanges are not utilizing smart contracts to facilitate trading in fractionalized securities.

trusted intermediaries that would handle and verify the trades. The most efficient centralized exchanges would have FinTech capacity to quickly match the orders of buyers and sellers and effectuate the relevant trades.

Centralized exchanges could help to provide a base of liquidity for fractionalized securities. An OECD study explains that “[s]econdary market trading for [securities], once tokenized, is vital for liquidity while it also assists in price discovery and promotes further capital formation.”<sup>316</sup> For example, WiseAlpha, a FinTech company based in the UK,<sup>317</sup> operates a regulated centralized exchange for investors to trade fractionalized bonds.<sup>318</sup> Centralized cryptocurrency exchange Binance recently allowed for tokenized stock trading for its users, and total daily trading volume grew from nothing to over \$4 million within one month.<sup>319</sup> FinTech-enabled fractionalization could also help to create liquidity on centralized exchanges.<sup>320</sup>

To reduce liquidity risk, securities regulators should consider allowing pre-approved centralized exchanges to trade fractionalized securities.<sup>321</sup> 24X National Exchange LLC recently filed an application, for example, to become the first SEC-authorized exchange to trade in fractionalized securities.<sup>322</sup> As discussed, other countries like the UK and Singapore already permit some

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<sup>316</sup> TOKENISATION OF ASSETS, *supra* note 62, at 28.

<sup>317</sup> See Edward Sheldon, *WiseAlpha Review: Buy Bonds You Can't Afford with Fractional Bond Notes*, GOOD MONEY GUIDE (Mar. 20, 2021), <https://goodmoneyguide.com/review/wisealpha/> [https://perma.cc/X4FC-GLKM] (explaining that WiseAlpha received authorization to operate from the UK's FCA in 2016 and has over 7,000 customers).

<sup>318</sup> WiseAlpha is registered with the UK's Financial Conduct Authority. See Omar Faridi, *UK's WiseAlpha, A Digital Bond Market, Teams Up with Fintech Fortu Wealth*, (Jan. 25, 2022), <https://www.crowdfundinsider.com/2022/01/186028-uks-wisealpha-a-digital-bond-market-teams-up-with-fintech-fortu-wealth> [https://perma.cc/5JWL-AF79] (explaining that WiseAlpha offers over 100 fractional bonds and operates as an exchange).

<sup>319</sup> HAYS ET AL., *supra* note 161, at 12.

<sup>320</sup> TOKENISATION OF ASSETS, *supra* note 62, at 30–31 (“An important benefit of improved transparency is a reduction in information asymmetries, and this, in turn, has the potential to improve the price discovery mechanism, providing investors with incentives to increase their participation and bring additional liquidity in the market.”). Current centralized crypto-asset exchanges have already grown in daily trading volume over \$20 billion. See *Top Cryptocurrency Spot Exchanges*, COINMARKETCAP, <https://coinmarketcap.com/rankings/exchanges/> [https://perma.cc/ZZE5-8RDH] (combining the daily trading volume of the top five centralized crypto-asset exchanges).

<sup>321</sup> Without fractionalized trading on centralized exchanges, fractionalized securities present liquidity risks because brokers must aggregate orders before trades are executed. See *supra* notes 46–48 and accompanying text (describing how brokers aggregate fractionalized securities traders by their clients into whole shares before executing trades).

<sup>322</sup> 24X National Exchange LLC; Notice of Filing of Application for Registration as a National Securities Exchange Under Section 6 of the Securities Exchange Act of 1934, Exchange Act Release No. 34-95007, 87 Fed. Reg. 34333, 34333 (May 31, 2022) [hereinafter 24X National Exchange Filing].

forms of fractionalized securities trading.<sup>323</sup> 24X's platform would be a fully automated electronic trading platform granting users access to fractionalized shares of U.S. listed equities.<sup>324</sup> Because multiple SEC rules would be implicated by allowing a centralized exchange to trade fractional securities,<sup>325</sup> and because such trading could impact securities markets in novel ways, the SEC is carefully reviewing 24X's application.<sup>326</sup> To maximize liquidity, regulators also should consider allowing other exchanges, such as the EU's SME Growth Markets, to trade in fractionalized securities.<sup>327</sup>

Although allowing centralized exchanges to trade fractionalized securities would reduce liquidity risk, it could impose certain costs, including the need to update and address exchange-level regulation.<sup>328</sup> Responses to 24X's SEC application to trade fractionalized securities note that such trading could disrupt existing securities-trading markets.<sup>329</sup> Such trading could impact market pricing because equity securities, for example, currently only trade as whole shares.<sup>330</sup> Nonetheless, the UK and Singapore have found ways to allow fractionalized securities trading on centralized exchanges without costly disruptions.<sup>331</sup>

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<sup>323</sup> See *supra* notes 96, 320 (discussing how the UK and Singapore allow FinTech companies to operate fractionalized securities exchanges in some form).

<sup>324</sup> 24X National Exchange Filing, *supra* note 322, at 34,334.

<sup>325</sup> See NASDAQ, Comment Letter Re: 24X National Exchange LLC Notice of Filing of Application for Registration as a National Securities Exchange Under Section 6 of the Securities Exchange Act of 1934 (July 21, 2022) [hereinafter Nasdaq Comment Letter], <https://www.sec.gov/comments/10-239/10239-20134564-304956.pdf> [<https://perma.cc/5XUL-PXCE>] (exploring the various Exchange Act rules that 24X would have to comply with should it allow fractional shares trading and how those rules would be impacted by such trading).

<sup>326</sup> Notice of Designation of a Longer Period for Commission Action on Proceedings To Determine Whether To Grant or Deny an Application for Registration as a National Securities Exchange Under Section 6 of the Securities Exchange Act of 1934, Exchange Act Release No. 34-96364, 87 Fed. Reg. 72553, 72553 (Nov. 25, 2022). As of March 2023, 24X withdrew their application with the SEC. See 24X National Exchange LLC; Notice of Withdrawal of Application for Registration as a National Securities Exchange under Section 6 of the Securities Exchange Act of 1934, Exchange Act Release No. 34-97043, 88 Fed. Reg. 14663, 14663 (Mar. 3, 2023).

<sup>327</sup> This approach might also be used for non-FinTech enabled fractionalization.

<sup>328</sup> See Nasdaq Comment Letter, *supra* note 325 (discussing various market regulations that would be implicated by fractionalized securities trading).

<sup>329</sup> See *id.*

<sup>330</sup> *Id.*

<sup>331</sup> See *supra* notes 98, 319–20 and accompanying text (explaining how other centralized exchanges have been approved by relevant securities regulators or been exempted from certain exchange-level regulation).

### 3. Requiring KYC and AML Compliance for DeFi Platforms

This subsection examines who could be responsible for KYC/AML checks for DeFi platforms, the necessity of KYC/AML checks for both issuers and investors in the DeFi context to address anonymity and fraud risk, and how these checks could be done cost-effectively.

DeFi platforms have relevant actors who could be responsible for assuring that such platforms comply with KYC/AML policies to combat money laundering and terrorist financing.<sup>332</sup> The Financial Action Task Force (“FATF”), an intergovernmental G-7-sponsored organization that recommends those policies, explains that its AML policies should apply to persons or entities that maintain control or sufficient influence over a DeFi protocol: “even where projects publicly brand themselves as ‘DeFi,’” there are often persons and centralized aspects of the protocols that should be obligated to comply with those policies.<sup>333</sup> Having a clear regulatory understanding of who should be responsible would help to address the fraud and anonymity risks currently associated with DeFi.

Even though DeFi is considered anonymous,<sup>334</sup> KYC and AML compliance should require everyone who accesses a DeFi platform to submit identifying information and make their identity known to the platform before being allowed to trade fractionalized securities. Applying the “same risk, same function, same regulation” concept, regulators in almost all jurisdictions require conventional brokerages and trading platforms to conduct KYC/AML checks.<sup>335</sup> To protect against money laundering and terrorist financing, DeFi platforms should be subject to the same requirement. The FATF describes how DeFi platforms are generally regarded as Virtual Asset Service Providers, or

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<sup>332</sup> Recall that KYC refers to Know Your Customer and AML refers to Anti-Money Laundering. *See supra* note 292 and accompanying text.

<sup>333</sup> FIN. ACTION TASK FORCE, TARGETED UPDATE ON IMPLEMENTATION OF THE FATF STANDARDS ON VIRTUAL ASSETS AND VIRTUAL ASSET SERVICE PROVIDERS 19–20 (June 2022), <https://www.fatf-gafi.org/content/dam/fatf-gafi/guidance/Targeted-Update-Implementation-FATF%20Standards-Virtual%20Assets-VASPs.pdf.coredownload.pdf> [https://perma.cc/4R9R-2SXA]; *History of the FATF*, FIN. ACTION TASK FORCE, <https://www.fatf-gafi.org/en/the-fatf/history-of-the-fatf.html> [https://perma.cc/XQ2C-PE2S].

<sup>334</sup> *See supra* notes 231–232 and accompanying text.

<sup>335</sup> Richard Marley, *KYC Compliance – Identity Verification for Brokerage Companies & Trading Platforms*, SHUFTIPRO (Aug. 2, 2022), <https://shuftipro.com/blog/kyc-compliance-identity-verification-for-brokerage-companies-trading-platforms/> [https://perma.cc/VH62-GF8W]; *see also Anti-Money Laundering (AML) Source Tool for Broker-Dealers*, U.S. SEC. & EXCH. COMM’N, <https://www.sec.gov/about/offices/ocie/amlsourcetool> [https://perma.cc/2TM3-YWHK] (describing the various KYC/AML requirements that apply to broker-dealers in the United States); *infra* notes 382–383 and accompanying text.

“VASPs.”<sup>336</sup> Updated FATF recommendations define a VASP to include “any natural or legal person . . . [that] as a business conducts one or more of the following activities or operations for or on behalf of another natural or legal person . . . [p]articipation in and provision of financial services related to an issuer’s offer and/or sale of a virtual asset.”<sup>337</sup> Because tokenized securities would involve an issuer’s offer and sale of a virtual asset, DeFi platforms would be considered VASPs that would need to comply with KYC/AML obligations under FATF recommendations.<sup>338</sup>

The FATF’s recommended KYC/AML policies are not enforceable in a jurisdiction until it adopts them as law.<sup>339</sup> Each nation must decide whether those policies would apply to DeFi platforms and, if so, who would be responsible for compliance.

To address anonymity risk, we propose that KYC/AML checks should be mandatory for investors using a DeFi platform. An example of this process from the investor side could involve four steps: categorization, AML checks, wallet screening, and risk assessment.<sup>340</sup> First, the investor would submit its information and be categorized as either an institutional/accredited investor or an individual/retail investor. An investor’s profile would be screened against global watchlists. Thereafter, the investor would be approved either automatically or after review by the DeFi platform.<sup>341</sup> This is known as “permissioning”: everyone who wants to use the platform must be approved before they gain access.<sup>342</sup> In this way, any market manipulation could be traced back to an investor who would be subject to the relevant jurisdiction’s

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<sup>336</sup> FIN. ACTION TASK FORCE, VIRTUAL ASSETS AND VIRTUAL ASSET SERVICE PROVIDERS 27 (Oct. 2021), <https://www.fatf-gafi.org/media/fatf/documents/recommendations/Updated-Guidance-VA-VASP.pdf> [<https://perma.cc/S9XK-8MGK>].

<sup>337</sup> *Id.* at 22.

<sup>338</sup> *Id.* at 27.

<sup>339</sup> *DeFi Regulations and Compliance Ramp-Up in 2023*, INNREG, <https://www.innreg.com/blog/defi-regulation-and-compliance> [<https://perma.cc/75C8-XJL4>].

<sup>340</sup> See *KYC for DeFi Platforms*, KYC-CHAIN (Feb. 11, 2022), <https://kyc-chain.com/kyc-for-defi-platforms/> [<https://perma.cc/ZN3A-FBFS>] (describing an automatic onboarding process for DeFi platforms that could be instituted to ensure KYC checks are completed).

<sup>341</sup> See, e.g., Yogita Khatri, *Aave Launches Permissioned Defi Platform Aave Arc, Fireblocks Becomes First Whitelister*, BLOCK (Jan. 5, 2022), <https://www.theblock.co/post/129277/aave-arc-permissioned-defi-platform-fireblocks-first-whitelister> [<https://perma.cc/BE8S-PNT5>] (discussing the case of Aave Arc).

<sup>342</sup> *DeFi Platforms Tighten AML to Court Institutional Investors*, PYMNTS (Aug. 18, 2022), <https://www.pymnts.com/cryptocurrency/2022/defi-platforms-tighten-aml-to-court-institutional-investors/> [<https://perma.cc/QL7Y-8NJF>].

antifraud laws. Having clear legal recourse in the event of fraud helps to solve one of the main issues associated with DeFi's anonymity risk.<sup>343</sup>

Another option for KYC/AML checks would be to mandate a form of digital identity verification which issuers (and investors) could present to various DeFi platforms. Professor Chris Brummer has proposed a system of "Decentralized Identifiers" or "DIDs" to facilitate DeFi compliance with KYC/AML regulations.<sup>344</sup> Brummer explains how "a credential could be minted by a validating site or network," which would enable an individual's identity to be found in the event of fraud or other illegal activity.<sup>345</sup> The credential would serve as an individual's entry point into various DeFi platforms to ensure trustworthy transactions, while also allowing the platforms to comply with KYC/AML regulations.

Addressing the anonymity and fraud risks of DeFi by regulating DeFi platforms should help FinTech-enabled fractionalization to reach its full potential.<sup>346</sup> Multiple DeFi platforms are already utilizing various forms of KYC/AML checks to reach new investors and build trust in their products.<sup>347</sup> To further reduce KYC/AML compliance costs,<sup>348</sup> numerous firms are in the process of developing ways to automate KYC/AML checks for DeFi platforms, which should enable DeFi platforms to comply even more cost-effectively.<sup>349</sup>

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<sup>343</sup> See Raphael Auer, *Embedded Supervision: How to Build Regulation into Decentralised Finance* 1, 4 (Bank for Int'l Settlements, Working Paper No. 811, 2022) (discussing the necessity of the legal system in the context of DeFi).

<sup>344</sup> Brummer, *supra* note 287, at 172.

<sup>345</sup> *Id.*

<sup>346</sup> A major criticism of DeFi is that it does not currently finance real economic growth. See ARAMONTE, DOERR, HUANG & SCHRIMPF, *supra* note 81, at 3 ("As DeFi loans are disbursed in cryptoassets and secured by crypto collateral, they do not currently finance real economy activities."). By having a regulated market for fractional investment securities, DeFi could help ensure the growth of the real economy. See *id.* at 2 ("Looking ahead, the ability of DeFi lending to serve the real economy appears tied to better representation of real-world assets on the blockchain (tokenisation) . . .").

<sup>347</sup> See *supra* notes 342–44 and accompanying text.

<sup>348</sup> Cf. Bence Jendruszak, *Cost of KYC: How Much It Is and How to Reduce It*, SEON, <https://seon.io/resources/cost-of-kyc/> [<https://perma.cc/6LQB-SDXL>] (explaining the various costs associated with KYC/AML as including software, staff, and other various expenses).

<sup>349</sup> See *id.* (describing how Seon's tool cuts costs for KYC/AML); see also Elizabeth Napolitano, *DeFi-Focused Startup Blue Comes Out of Stealth with \$3.2M Raise*, COINDESK, (Jan. 18, 2023) <https://www.coindesk.com/business/2023/01/18/defi-focused-startup-blue-comes-out-of-stealth-with-32m-raise/> [<https://perma.cc/MST9-3PQ7>] (explaining how Blue "has already begun working on several proof-of-concept projects with major DeFi protocols" in the context of KYC/AML).

#### 4. Investment Limitations for Retail Investors

This subpart examines retail investor restrictions or requirements for centralized exchanges and DeFi platforms. The goal is to maximize financial inclusion while providing investment limits to protect retail investors, which requires securities law and consumer protection goals to overlap.

Centralized exchange regulation could be changed to allow all investors, even retail investors, to invest in fractionalized investment securities. UK regulation is currently restrictive.<sup>350</sup> For example, WiseAlpha's fractionalized bond platform is only available to sophisticated, high net-worth, and institutional investors.<sup>351</sup> Similarly, Funding Circle, a Financial Conduct Authority regulated entity, only offers fractionalized bond investing to accredited investors.<sup>352</sup> In contrast, Regulation A in the United States allows Tier 1 offerings to be sold to any investor, regardless of sophistication status.<sup>353</sup> Tokenized securities, on the other hand, can typically only be purchased in the United States by accredited or experienced investors.<sup>354</sup> Changing current regulations to make fractionalized securities available to all investors would democratize markets and also should help to increase liquidity by increasing the scale of investment: "Sufficient scale would help to ensure the full reali[z]ation of benefits [of fractionalized securities] such as increased liquidity."<sup>355</sup>

However, at least until there is greater liquidity for fractionalized securities, a purchase limit should be imposed to help protect retail investors from risk. For example, Regulation Crowdfunding in the United States currently imposes a yearly limit on investments by individual retail investors and is similar in nature because it is primarily used by smaller businesses seeking to issue small equity stakes.<sup>356</sup> Under Regulation Crowdfunding, if an investor's annual income or net worth is less than \$124,000, then during any 12-month period, the investor can invest in crowdfunding projects up to the greater of either \$2,500 or 5% of the greater of their annual income or net

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<sup>350</sup> See *infra* notes 353–57 and accompanying text.

<sup>351</sup> See Mykyta Pavlushyn, *Who Can Invest?*, WISEALPHA, <https://support.wisealpha.com/en/articles/3619788-who-can-invest> [<https://perma.cc/7X35-4LJ>] (explaining the various requirements to be considered a sophisticated, high-net worth, or institutional investor).

<sup>352</sup> Nicholas Pell, *Peer-to-Peer Lender Funding Circle Now Offers Fractional Investment*, THESTREET (Apr. 29, 2015), <https://www.thestreet.com/personal-finance/peer-to-peer-lender-funding-circle-now-offers-fractional-investment-13097737> [<https://perma.cc/X8JW-U79E>].

<sup>353</sup> See *Updated Investor Bulletin: Regulation A*, *supra* note 261.

<sup>354</sup> Thomas Lambert, Daniel Liebau & Peter Roosenboom, *Security Token Offerings*, 59 SMALL BUS. ECON. 299, 303 (2021). *But cf. supra* notes 264–267 and accompanying text (discussing fractionalized interests that could be purchased by retail investors).

<sup>355</sup> TOKENISATION OF ASSETS, *supra* note 62, at 38.

<sup>356</sup> *Updated Investor Bulletin: Regulation Crowdfunding*, *supra* note 275.

worth.<sup>357</sup> If an investor's annual income *and* net worth are both equal to or more than \$124,000, then the investor can invest up to 10% of the greater of annual income or net worth during any 12 month period, with a limit of \$124,000.<sup>358</sup> Regulation could limit purchases of fractionalized securities in a similar manner based on the investor's income and net worth. This would give hypothetical investor Jones the opportunity to create a diversified portfolio of fractionalized bonds and stocks without unduly jeopardizing her economic independence.<sup>359</sup>

To help develop a more liquid market, we propose allowing unrestricted resales of fractionalized securities. This would contrast with U.S. crowdfunding rules, which restrict re-selling an investment for 12 months after purchase.<sup>360</sup> That restriction has two rationales: to enable SMEs to avoid having to coordinate voting rights among rapidly changing shareholders, and also to protect them “from investor backlash if things don't go entirely as planned.”<sup>361</sup> The first rationale is irrelevant to fractionalized securities, which typically lack voting rights.<sup>362</sup> The second rationale should be less relevant to fractionalized securities because this Article's updated disclosure regime should enable investors more accurately to assess SME credit risk, thereby more effectively protecting their expectations.<sup>363</sup>

Regulating investing in fractionalized securities through DeFi protocols presents a greater challenge than investing through centralized exchanges because of DeFi's stated promise of open accessibility.<sup>364</sup> Some have suggested that access to DeFi should similarly be restricted through an investor “suitability” test.<sup>365</sup> One proposal, which called for a “licensing system for websites that interact with DeFi and other crypto protocols, and an automatic blacklist to keep sanctioned players from using centralized

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<sup>357</sup> *Id.*

<sup>358</sup> *Id.*

<sup>359</sup> Allowing investors to test the market for fractionalized securities should also address potential liquidity risks while encouraging the development of FinTech-enabled fractionalization. *Cf.* TOKENISATION OF ASSETS, *supra* note 62, at 38 (discussing that at the initial stage of market development, allowing investors to “test the capabilities of DLTs and enjoy some of its benefits” should help ensure adequate liquidity).

<sup>360</sup> 17 C.F.R. § 227.501 (2020).

<sup>361</sup> Won, *supra* note 227, at 1422–23.

<sup>362</sup> *Id.* at 1422; *see also supra* note 299 and accompanying text.

<sup>363</sup> *Cf.* Won, *supra* note 227, at 1417 (explaining that investors typically direct funds towards crowdfunding projects with the most potential based on provided disclosures).

<sup>364</sup> *See* Amanda Blanco, *In Crypto, “DeFi” Could Offer 24/7 Access to Financial Services. But Could It Disrupt the Economy?*, FED. RES. BANK OF BOS. (Oct. 31, 2022), <https://www.bostonfed.org/news-and-events/news/2022/10/in-crypto-defi-could-offer-24-7-access-to-financial-services-but-could-it-disrupt-the-economy> [<https://perma.cc/XR7W-UKPC>].

<sup>365</sup> Daniel Kuhn, *Is SBF Right About DeFi Regulation?*, COINDESK (Oct. 25, 2022), <https://www.coindesk.com/layer2/2022/10/25/is-sbf-right-about-defi-regulation/> [<https://perma.cc/9EFQ-6U4L>].

services,”<sup>366</sup> was immediately met with severe backlash from the crypto community.<sup>367</sup> As discussed, the main additional risk investors currently face when utilizing DeFi platforms is that the platforms are not subject to oversight, meaning investors bear the risk of fraud and market manipulation.<sup>368</sup> The framework we propose, however, addresses fraud risk by requiring DeFi platforms to be subject to regulation. Given that regulation (and consistent with our proposal for investing through centralized exchanges), even retail investors should be allowed to invest in tokenized fractionalized securities, subject to purchase limit restrictions. That, in turn, would increase both financial inclusion and liquidity while protecting investors.<sup>369</sup>

Regulators should be able to feasibly monitor investment limitations because DeFi platforms already use smart contracts to limit borrowing.<sup>370</sup> Investors “can also be provided with private keys based on their characteristics, such as financial wealth or sophistication.”<sup>371</sup> Smart contracts thus could be programmed to restrict investors, based on their private keys, to regulatory mandated limits on their investments in fractionalized securities.<sup>372</sup>

Investment restrictions would have a cost-benefit tradeoff. Restricting a retail investor’s holding of fractionalized securities could impair the investor’s ability to diversify her portfolio.<sup>373</sup> Other things being equal, it would also limit market liquidity.<sup>374</sup> On the other hand, restrictions not only would protect the economic viability of retail investors but also could force them more closely to analyze their investment options, thereby directing capital towards its best available use.<sup>375</sup>

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<sup>366</sup> *Id.*

<sup>367</sup> *Id.*

<sup>368</sup> See CRENSHAW, *supra* note 234 (“If DeFi has ambitions of reaching a broad investing pool, it should not assume a significant portion of that population can or wants to run their own testnet to understand the risks associated with the code on which their investment prospects rely.”).

<sup>369</sup> DeFi’s promise specifically addresses liquidity risk, because its markets for fractionalized securities could be open round-the-clock and be accessible across the globe. See DEFI: BEYOND THE HYPE, *supra* note 91, at 5–7 (describing DeFi’s potential to increase liquidity).

<sup>370</sup> Carapella, Dumas, Gerszten, Swem & Wall, *supra* note 164, at 8 (“DeFi lending platforms generally allow users to borrow up to a limit determined by the quantity and type of collateral provided . . .”).

<sup>371</sup> Makarov & Schoar, *supra* note 90, at 189.

<sup>372</sup> *Cf.* DEFI: BEYOND THE HYPE, *supra* note 91, at 5–7 (explaining that the utilization of DeFi can help increase liquidity generally).

<sup>373</sup> See *supra* notes 17, 116–19, 160 and accompanying text (discussing the benefits of increased diversification).

<sup>374</sup> See *supra* notes 360–363 (describing this resale restriction and its rationales).

<sup>375</sup> See Won, *supra* note 227, at 1417 (describing that retail investors were generally as selective with where to direct their investments in the crowdfunding context as accredited investors, which showcased a reluctance to put capital towards bad investments).

### 5. Regulating DeFi Platforms and Oracles

As the market develops for tokenized fractionalized securities traded on DeFi platforms, regulation will be needed to ensure liquidity for these securities and to address current legal gaps regarding fraud, anonymity, and oracle risks. An OECD study explains that “[tokenization] of securities may benefit from a relatively clear regulatory and supervisory framework . . . allowing for better regulatory compliance by its users.”<sup>376</sup> This discussion will first explain the need for some form of trusted centralization in DeFi, then describe how to potentially regulate DeFi platforms, and finally discuss how to regulate validators and oracles.

Even DeFi platforms need some form of trusted intermediary for regulators to target in the event a smart contract, or its operation, violates law.<sup>377</sup> Who should be that intermediary is a difficult question because smart contracts process transactions automatically, with no obvious “person” in charge. To answer this question, regulators should focus on the role of the person that creates and implements the smart contract or the validators of transactions that occur on the relevant DeFi protocol. As Federal Reserve Vice Chair Lael Brainard explains, although the dispersion of control in DeFi makes it more difficult to hold a potential DeFi intermediary accountable,<sup>378</sup> some form of an intermediary must bear the costs of keeping a relevant financial system safe. She suggests that smart-contract protocol developers and transaction validators should be accountable for ensuring the securities offered are both safe and compliant with relevant laws.<sup>379</sup>

DeFi’s promise of decentralization is somewhat of a myth, at least in the context of trading fractionalized securities. Rather than providing a completely disintermediated system, DeFi’s promise should more accurately be described as reducing the cost of traditional financial intermediation.<sup>380</sup> SEC Chairman Gary Gensler believes that many crypto-intermediaries are effectively functioning as securities exchanges and thus must register with the SEC.<sup>381</sup> The common regulatory concept of “same function, same risks, same regulation”<sup>382</sup> will be helpful in analyzing the regulation that should apply to

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<sup>376</sup> TOKENISATION OF ASSETS, *supra* note 62, at 17.

<sup>377</sup> See BRAINARD, *supra* note 229.

<sup>378</sup> *Id.*

<sup>379</sup> *Id.*

<sup>380</sup> Grassi, Lanfranchi, Faes & Renga, *supra* note 165, at 341.

<sup>381</sup> GARY GENSLER, CHAIRMAN, U.S. SEC. & EXCH. COMM’N, REMARKS AT SEC SPEAKS KENNEDY AND CRYPTO (Sept. 8, 2022).

<sup>382</sup> Cf. FIN. STABILITY BD., REGULATION, SUPERVISION AND OVERSIGHT OF “GLOBAL STABLECOIN” ARRANGEMENTS 7, 17 (Oct. 2020), <https://www.fsb.org/wp-content/uploads/P131020-3.pdf> (on file with the *Ohio State Law Journal*) (observing that stablecoin regulation should start by “identify[ing] the activity performed by a stablecoin arrangement and the participants involved, and apply[ing] the relevant existing regulation

fractionalized securities exchanges. The former General Manager of the Bank for International Settlements explains that “[w]hen banks and fintech firms vie for the same customers with similar services and by taking similar risks, they should be similarly regulated: ‘same risk, same regulation.’”<sup>383</sup> SEC Commissioner Caroline Crenshaw emphasizes that DeFi is “fundamentally about investing,”<sup>384</sup> and Federal Reserve Vice-Chair Lael Brainard adds that DeFi platforms and activities should be considered within the regulatory framework.<sup>385</sup>

A normative regulatory framework could mandate exchange registration for DeFi platforms trading fractionalized securities to fill in the antifraud gaps in current securities law. Relevant jurisdictional regulators could issue disclosure and record-keeping requirements for exchanges in the context of fractionalized securities. Centralized exchanges that trade tokenized fractionalized securities would “match orders in [securities] of multiple buyers and sellers,” which may meet the regulatory criteria for being an exchange under the SEC’s jurisdiction.<sup>386</sup> Regulators could also expand the definitions of exchange or dealer in their regulatory frameworks. The SEC, for example, recently proposed changes to broaden its rules that define what constitutes an “exchange” and that provide the relevant regulatory obligations for exchanges.<sup>387</sup> While not specifically mentioning tokenized fractionalized securities, the SEC’s proposal would bring DeFi platforms within the

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to that activity or entity according to the ‘*same-business, same-risks, same-rules*’ principle) (hyphenation added).

<sup>383</sup> AGUSTÍN CARSTENS, GEN. MANAGER, BANK FOR INT’L SETTLEMENTS, KEYNOTE ADDRESS AT THE INSTITUTE OF INTERNATIONAL FINANCE BOARD OF DIRECTORS DINNER: A LEVEL PLAYING FIELD IN BANKING (Jan. 21, 2018). For example, the multibillion-dollar cryptocurrency exchange FTX recently collapsed because of bad management practices and a lack of internal controls and regulatory oversight. Peter Whoriskey & Dalton Bennett, *Crypto’s Free-Wheeling Firms Lured Millions. FTX Revealed the Dangers*, WASH. POST (Nov. 16, 2022), <https://www.washingtonpost.com/business/2022/11/16/ftx-collapse-crypto-exchanges-regulation/> [<https://perma.cc/XG47-V685>]. FTX had branded itself as an exchange, luring investors into thinking it was safe and trustworthy like the New York Stock Exchange or NASDAQ. Joe Rennison, *A Traditional Exchange? FTX Was Anything But.*, N.Y. TIMES (Dec. 16, 2022), <https://www.nytimes.com/2022/12/16/business/ftx-exchange.html> [<https://perma.cc/3D6X-F47Y>]. Unlike traditional stock exchanges, however, FTX was not subject to exchange-imposed rules or regulatory oversight. *Id.*

<sup>384</sup> CRENSHAW, *supra* note 234.

<sup>385</sup> See BRAINARD, *supra* note 229.

<sup>386</sup> GENSLER, *supra* note 381.

<sup>387</sup> Britt Whitesell Biles & William Curtis, *SEC Proposes to Redefine “Exchange” – New Definition Could Subject Blockchain Crypto Platforms to SEC Regulation*, WOMBLE BOND DICKINSON (Mar. 10, 2022), <https://www.womblebonddickinson.com/us/insights/alerts/sec-proposes-redefine-exchange-new-definition-could-subject-blockchain-crypto> [<https://perma.cc/58Q6-JYZA>].

definition of an exchange, which would require them to register as an exchange and become subject to ongoing reporting requirements.<sup>388</sup>

The Blockchain Association pushed back on the SEC's proposed changes by focusing on the cost of regulation to DeFi protocols.<sup>389</sup> The Association noted:

It may simply be infeasible to cause Decentralized Protocols, persons such as software developers who write the code underlying Decentralized Protocols, maintainers of websites that provide access to Decentralized Protocols, and other participants in the decentralized finance ecosystem to register as broker-dealers or alternative trading systems and comply with the relevant regulations in relation thereto.<sup>390</sup>

However, SEC Chairman Gensler and SEC Commissioner Hester Peirce have both emphasized that tailored regulations for FinTech and crypto companies are possible.<sup>391</sup>

On April 14<sup>th</sup>, 2023, the SEC re-opened the comment period and provided updated guidance for proposed amendments to Exchange Act Rule 3b-16.<sup>392</sup> The SEC highlighted that simply using new technology like smart contracts does not alter the analysis for whether a DeFi platform is operating as an exchange.<sup>393</sup> Whether persons or groups of persons would be considered to

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<sup>388</sup> *See id.*

<sup>389</sup> Blockchain Ass'n, Comment Letter on Proposed Amendments to Exchange Act Rule 3b-16 Regarding the Definition of "Exchange" 8 (Apr. 18, 2022) [hereinafter Blockchain Comment Letter], <https://www.sec.gov/comments/s7-02-22/s70222-20124039-280165.pdf> [<https://perma.cc/T8DY-RBLA>].

<sup>390</sup> *Id.*

<sup>391</sup> Oluwapelumi Adejumo, *Gensler Says SEC Can Consider Tailoring Rules for Crypto Industry Compliance*, CRYPTOSLATE (July 15, 2022), <https://cryptoslate.com/gensler-says-sec-can-consider-tailoring-rules-for-crypto-industry-compliance/> [<https://perma.cc/GPB2-78B6>]; Hester M. Peirce, Comm'r, U.S. Sec. & Exch. Comm'n, Outdated: Remarks Before the Digital Assets at Duke Conference (Jan. 20, 2023).

<sup>392</sup> Press Release, U.S. Sec. & Exch. Comm'n, SEC Reopens Comment Period for Proposed Amendments to Exchange Act Rule 3b-16 and Provides Supplemental Information (Apr. 14, 2023) (on file with the *Ohio State Law Journal*).

<sup>393</sup> *See* Supplemental Information and Reopening of Comment Period for Amendments Regarding the Definition of "Exchange," Exchange Act Release No. 34-97309, 88 Fed. Reg. 29448, 29452–53 (proposed May 5, 2023), <https://www.sec.gov/rules/proposed/2023/34-97309.pdf> [<https://perma.cc/5BSW-VF6K>]. The SEC's guidance specifically stated that any:

organization, association, or group of persons that uses any form or forms of technology (e.g., [Distributed Ledger Technology ("DLT")], including technologies used by so-called "DeFi" trading systems . . . ) that constitutes, maintains, or provides a market place for bringing together purchasers and sellers of securities, including crypto asset securities . . . would be required to register as a national securities exchange or comply with the conditions of Regulation ATS.

maintain control over a DeFi platform is subject to numerous factors, such as ownership of the DeFi platform and “the extent to which a person acts with an agreement (formal or informal) to constitute, maintain, or provide a market place.”<sup>394</sup>

Ideally, DeFi platforms operating as exchanges for fractionalized securities should have tailored requirements that regulate trading with limited compliance costs.<sup>395</sup> As the SEC’s guidance highlights, there are parties to which regulation could be applied in the context of DeFi protocols, but what remains difficult is doing so without imposing overly burdensome costs.<sup>396</sup> For example, the Sarbanes-Oxley Act of 2002 (“SOX”) “mandate[s] that senior corporate officers personally certify in writing that the company’s financial statements comply with SEC disclosure requirements”<sup>397</sup> could be applied to the protocol developers that create smart contracts that allow fractionalized securities trading. SOX Section 404 requires management to have internal controls and reporting methods, which could be tailored for DeFi exchanges to ensure these controls are cost-effective.<sup>398</sup> Similarly, SOX Section 802 outlines what records a company needs to keep, which could be applied to the developers of a DeFi protocol by requiring them to retain trading information for their specific smart contract.<sup>399</sup>

Regulation also should be applied to DeFi platforms at the validator level. Validators are individuals or groups that utilize their computing power to confirm the legitimacy of transactions that occur on DeFi platforms.<sup>400</sup> One proposal explains—

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*Id.*

<sup>394</sup>*Id.* at 29454. The SEC explains that the group of persons which “constitutes, maintains, or provides a market place or facilities for bringing together buyers and sellers of securities or performs with respect to securities the functions commonly performed by a stock exchange, and is thus an exchange, would collectively have the responsibility for compliance with federal securities laws.” *Id.* at 29455. Essentially, just because groups of persons may be decentralized does not mean they will not be subject to the Exchange Act.

<sup>395</sup>*See supra* notes 260–65 (describing how market operators for blockchain-based fractionalized securities have been given exemptions from certain laws).

<sup>396</sup>Identifying these individuals may be difficult. One study warns that “[t]he dispersal of effective control over DeFi protocols also raises concerns about who the supervisors could talk with and, if necessary, act against if they have prudential concerns about the [protocol]. If control is widely dispersed, the supervisors may not find anyone who they feel can remedy regulatory concerns.” Carapella, Dumas, Gerszten, Swem & Wall, *supra* note 164, at 22. Investors would thus need to be aware whether the DeFi exchange they use is approved by their jurisdictional securities regulator.

<sup>397</sup>Will Kenton, *Sarbanes-Oxley Act: What It Does to Protect Investors*, INVESTOPEDIA, <https://www.investopedia.com/terms/s/sarbanesoxleyact.asp> [<https://perma.cc/FY3G-EGEM>].

<sup>398</sup>*Id.*

<sup>399</sup>*Id.*

<sup>400</sup>*See supra* note 72 and accompanying text.

A natural place for regulatory oversight in this [DeFi] ecosystem is at the level of developers and validators, who in turn control the network protocol. Once this level of regulatory compliance is established, many other functions can be built. In particular, separate entities can be established that would be responsible for verifying the identities and certifying that crypto addresses belong to confirmed users. These entities should be subject to regular audits. The protocols can be adjusted so that validators can check if a particular address belongs to a certified entity, and validators would be charged with only processing transactions that involve certified addresses.<sup>401</sup>

The network of validators is relatively concentrated into groups of individuals,<sup>402</sup> making it easier to apply regulation to a few large groups of validators rather than regulating dispersed individuals. By regulating validators, investors in fractionalized securities could trust that all their relevant transactions have some form of oversight.

Oracles are also currently unregulated.<sup>403</sup> Oracles that provide blockchains with information should be required to register with their relevant jurisdiction's securities regulator to prevent fraud.<sup>404</sup> Regulators could require an oracle to register and specify which DeFi exchanges to which they would be providing information. Regulators also could require oracle to provide ongoing reporting, including changes in contact information and in who controls or designs the oracle, where and how it gets its data, and the frequency it updates information to the blockchain.<sup>405</sup> To further prevent fraud, each DeFi exchange should be required to disclose the oracles on which it relies.

There are various costs and benefits associated with regulating DeFi platforms. DeFi's promise of disintermediation, and its resulting cost efficiencies, could decrease if subject to forms of regulatory oversight.<sup>406</sup> DeFi

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<sup>401</sup> Makarov & Schoar, *supra* note 90, at 189.

<sup>402</sup> See *id.* at 145–54 (describing how in both PoW and PoS models, incentive structures lead to pooling of resources by various validators, resulting in concentration). Concentration is significant in both PoW and PoS models, demonstrating that regulation could be realistically applied to these groups. *Id.* at 153 (“[M]ining in PoW blockchains is dominated by pools . . . [and a] similar force is at play in PoS blockchains. Since the probability of being chosen and collecting the reward depends on the amount of coins a validator is staking, investors have incentives to pool their stakes together . . .”).

<sup>403</sup> ARAMONTE, DOERR, HUANG & SCHRIMPF, *supra* note 84, at 6 n.6.

<sup>404</sup> Auer, *supra* note 343, at 10 (arguing that having legal backing for an oracle is necessary to build trust in a DeFi ecosystem). A negligence standard could also be applied in the event of fraud under Exchange Act 17(a)(2). See *The Guide to Securities Fraud Elements and SEC Rule 10b-5*, *supra* note 266.

<sup>405</sup> See Bowen Liu, Pawel Szalachowski & Jianying Zhou, *A First Look into DeFi Oracles*, in 2021 IEEE INT’L CONF. ON DECENTRALIZED APPLICATIONS & INFRASTRUCTURES (DAPPS) 39, 46–47 (2021) (discussing various recommendations for regulators to make DeFi oracles more trustworthy).

<sup>406</sup> See *supra* notes 391–93 and accompanying text (discussing backlash from the DeFi community about being subject to regulation because of its costs).

platforms that allowed trading in tokenized fractionalized securities would be required to begin collecting customer information, register with their relevant jurisdiction's regulator, and ensure compliance for fractionalized securities offerings on the exchange.<sup>407</sup> This would inevitably result in costs associated with data collection and periodic reporting.<sup>408</sup>

Liquidity concerns are likely to be addressed in the DeFi context with relevant regulation. IX Swap, a DeFi platform, provides an example of how liquidity could be created for tokenized stocks.<sup>409</sup> The platform utilizes an Automated Market Maker (“AMM”), which is an algorithm that prices securities on smart contracts.<sup>410</sup> Essentially, an AMM utilizes mathematical equations to price securities based on availability and demand.<sup>411</sup> AMMs increased the total volume on DeFi exchanges from under \$40 million in January 2020 to over \$43.5 billion in 2021, representing an increase of over 110,100% in liquidity.<sup>412</sup>

However, there is a risk that liquidity for individual fractionalized securities could become divided between centralized exchanges and DeFi platforms.<sup>413</sup> An SME issuer, for example, may have to decide whether to trade its fractionalized securities on a DeFi exchange or a centralized exchange.<sup>414</sup> To avoid having to make this choice (thereby dividing liquidity), harmonization of regulatory frameworks could help ensure that exchanges develop some form of trading interoperability.<sup>415</sup> For example, firms could

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<sup>407</sup> See Mat Di Salvo, *SEC's Hester Peirce Says Gensler's Plan to Target DeFi Undermines First Amendment*, DECRYPT (Apr. 14, 2023), <https://decrypt.co/136812/sec-hester-peirce-gary-genser-defi/> [<https://perma.cc/G96U-R8B3>] (describing how SEC Chairman Gensler believes DeFi exchanges must register and comply with US securities laws); cf. PWC, *WHEN DEFI MEETS SECURITIES LAWS – A REGULATORY DEEP DIVE* (Apr. 2022), <https://www.pwchk.com/en/financial-services/publications/when-defi-meets-securities-laws-apr2022.pdf> [<https://perma.cc/G96U-R8B3>] (describing how DeFi could be subject to Hong Kong's securities regulation).

<sup>408</sup> See generally Blockchain Comment Letter, *supra* note 389.

<sup>409</sup> *What is IX Swap?*, IX SWAP, <https://ixswap.io/about/> [<https://perma.cc/73XV-F93P>].

<sup>410</sup> THE UNISWAP FOR SECURITY TOKENS, *supra* note 209, at 7. An AMM is a “protocol [that] pools liquidity into smart contracts. In essence, users are not technically trading against counterparties – instead, they are trading against the liquidity locked inside smart contracts. These smart contracts are often called liquidity pools.” Andrey Sergeenkov, *What Is an Automated Market Maker?*, COINDESK, <https://www.coindesk.com/learn/what-is-an-automated-market-maker/> [[perma.cc/YLB5-TB58](https://perma.cc/YLB5-TB58)].

<sup>411</sup> See Sergeenkov, *supra* note 410.

<sup>412</sup> Kira Belova, *Liquidity Mining: Explanation, Application, and Benefits*, PIXELPLEX (May 9, 2021), <https://pixelplex.io/blog/what-is-liquidity-mining/> [<https://perma.cc/KU37-SWFG>].

<sup>413</sup> TOKENISATION OF ASSETS, *supra* note 62, at 40.

<sup>414</sup> *Cf. id.* at 29.

<sup>415</sup> *Id.* at 40–41 (describing how to address potential bifurcation of liquidity).

issue their fractionalized securities on centralized exchanges, but those securities could be resold on DeFi exchanges—and vice versa.<sup>416</sup>

Mandating regulation for DeFi exchanges would likely reduce principal-agent costs. As one study explains, the “transparency and accountability of smart contracts and blockchain hinder opportunistic behavior by either the principal or agent” because “[e]very transaction is observable in real-time” on blockchain.<sup>417</sup> Regulation would also help to ensure that investors are protected in the event a smart contract fails, since a smart contract cannot be written to contemplate every possible situation or outcome.<sup>418</sup> Because the operator of the DeFi platform and relevant smart contract would be registered with their jurisdictional regulator, investors would have a responsible party to sue.<sup>419</sup> Also, because oracles would be subject to oversight, issuers and investors would be able to operate in a more trusted environment.<sup>420</sup>

The above-proposed regulation would bring accountability to DeFi protocols and provide for orderly and liquid trading markets for fractionalized securities.

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<sup>416</sup>Blockchains can become interoperable, allowing them to exchange data with other blockchains. *Cf. What Is Blockchain Interoperability: A Beginner’s Guide to Cross-Chain Technology*, COINTELEGRAPH, <https://cointelegraph.com/blockchain-for-beginners/what-is-blockchain-interoperability-a-beginners-guide-to-cross-chain-technology> [<https://perma.cc/6YVE-BP7A>]; Benedikt Schuppli, *How Blockchain Bonds Can Transform SME Financing*, NASDAQ (Mar. 8, 2023), <https://www.nasdaq.com/articles/how-blockchain-bonds-can-transform-sme-financing> [<https://perma.cc/GU79-ZHJM>] (“Combining the efficiencies and accessibility of DeFi with the regulatory clarity and trust of [traditional finance], on-chain bonds have the potential to transform how companies raise funds and administer liquidity.”).

<sup>417</sup>Ruo-Ting Sun, Aravinda Garimella, Wencui Han, Hsin-Lu Chang & Michael J. Shaw, *Transformation of the Transaction Cost and the Agency Cost in an Organization and the Applicability of Blockchain—A Case Study of Peer-to-Peer Insurance*, 3 FRONTIERS BLOCKCHAIN 1, 6 (2020).

<sup>418</sup>*See, e.g.,* Sirio Aramonte, Wenqian Huang & Andreas Schrimpf, *DeFi Risks and the Decentralization Illusion*, BANK FOR INT’L SETTLEMENTS Q. REV. 21, 27 (Dec. 2021), [https://www.bis.org/publ/qtrpdf/r\\_qt2112b.pdf](https://www.bis.org/publ/qtrpdf/r_qt2112b.pdf) [<https://perma.cc/QY8P-AN23>] (“A key tenet of economic analysis is that enterprises are unable to devise contracts that cover all possible eventualities . . . [i]n DeFi, the equivalent concept is ‘algorithm incompleteness’, whereby it is impossible to write code spelling out what actions to take in all contingencies.”).

<sup>419</sup>*See* Makarov & Schoar, *supra* note 90, at 156, 159 (describing how in their current form, “smart contracts do not provide sufficient safeguards for financially less informed or more fragile customers”).

<sup>420</sup>*See* Sun, Garimella, Han, Chang & Shaw, *supra* note 417, at 6 (explaining that agents are less concerned with monitoring the principal and instead focus on the oracle’s ability to provide accurate data in the context of blockchain).

### 6. *International Harmonization of Laws Applicable to Fractionalized Securities*

This subpart will analyze areas where international harmonization of securities laws would provide the most benefit to issuers of fractionalized securities, explain how this harmonization offers lessons beyond Fintech-enabled fractionalization, and also explore the potential drawbacks of internationally harmonized regulation.

International harmonization of securities laws could be beneficial. In the context of securities disclosures, for example, the EU's ESMA notes that standardization of the financial information that an SME must disclose would ultimately decrease reporting costs.<sup>421</sup> For DeFi, international adoption of the FATF's KYC/AML recommendations should reduce compliance costs by standardizing the type of information DeFi platforms would need to collect, thereby cost-effectively addressing anonymity and fraud risks.<sup>422</sup>

International regulators are also considering other DeFi regulations that could be adopted worldwide.<sup>423</sup> Standardizing how FinTech-enabled fractionalized securities should be issued through DeFi platforms would likely help to address the cross-border trading costs that issuers would otherwise face, thereby facilitating a more global, and hence more liquid, market for their securities.<sup>424</sup> The EU's adoption of MiCA in April 2023 is intended to promote this potential benefit.<sup>425</sup> Under that landmark crypto legislation, "the EU will have a unified approach to crypto asset regulation across all 27 member states, making it possible for firms approved in one country to 'passport' their business into others with minimal additional paperwork."<sup>426</sup> Many major companies within the cryptocurrency community applauded that MiCA provides clear guidance for registration while limiting costs to operate within the EU.<sup>427</sup> The elimination of anonymity risk could also allow for the

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<sup>421</sup> MiFID II REVIEW REPORT, *supra* note 280, at 27.

<sup>422</sup> See FIN. ACTION TASK FORCE, CROSS-BORDER PAYMENTS: SURVEY RESULTS ON IMPLEMENTATION OF THE FATF STANDARDS 4 (Oct. 2021), <https://www.fatf-gafi.org/content/dam/fatf-gafi/reports/Cross-Border-Payments-Survey-Results.pdf> [<https://perma.cc/YHB6-62VH>] ("Raising costs seems to be the main consequence of divergent implementation [of KYC/AML standards], followed by reduced speed, access and inconsistent levels of transparency.").

<sup>423</sup> See, e.g., INT'L ORG. OF SEC. COMM'NS, IOSCO CRYPTO-ASSET ROADMAP FOR 2022–2023, at 1, 3 (July 2022), <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD705.pdf> [<https://perma.cc/7YUV-V45K>].

<sup>424</sup> See *supra* notes 288–290 (discussing the problems associated with cross-border trading costs).

<sup>425</sup> Alys Key, *EU Lauds 'Comprehensive Regulation' as MiCA Crypto Law Passes*, DECRYPT (Apr. 20, 2023), <https://decrypt.co/137339/european-parliament-approves-mica-law> [<https://perma.cc/344F-L6RJ>].

<sup>426</sup> *Id.*

<sup>427</sup> See, e.g., *id.*

growth of fractionalized securities issuances and trading on a global scale that may well outweigh any associated costs.<sup>428</sup> The EU also recently adopted a new regulation requiring crypto companies “to identify customers in a bid to curb money laundering,”<sup>429</sup> further building legitimacy for an EU-based Fintech industry.

International harmonization would have the added benefit of showcasing how FinTech could be effectively regulated beyond fractionalized securities. The “same risk, same function, same regulation” principle would help protect users of FinTech while providing a cost-effective regulatory scheme that innovators could follow.<sup>430</sup> As a former General Manager of the Bank for International Settlements explains, “[r]egulators have a difficult role to play [with regard to FinTech], as they have to provide a level playing field for all participants . . . while at the same time fostering an innovative, secure and competitive financial market.”<sup>431</sup> Because fractionalized securities, and particularly smart contracts and DeFi platforms, present issues that apply globally rather than to a single jurisdiction, harmonizing regulation could help ensure international cooperation increases for other new financial technologies that also have a potentially global impact.

Notwithstanding these potential benefits, regulators should be cautious to avoid overly correlating the regulation of FinTech-enabled fractionalization.<sup>432</sup> Besides potentially decreasing the flexibility and resilience of the financial system, globally correlated regulation is risky because of the “very real danger,” in this area of rapid financial and technological change, that “the wrong rules will be” coordinated.<sup>433</sup>

Some argue, for example, that the Basel II capital requirements contributed to the 2008 financial crisis by globally correlating faulty rules.<sup>434</sup> Basel II mandated lower capital requirements for mortgage-backed securities

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<sup>428</sup> See Auer, *supra* note 343, at 10, 20 (suggesting that a globally coordinated KYC system could ensure illegal activity is effectively kept out of DeFi and explaining how “[w]ith [KYC/AML regulation], the advantages of a contestable financial system that is open to novel innovators might be realised, also contributing to a diversified and resilient financial ecosystem”).

<sup>429</sup> Key, *supra* note 425.

<sup>430</sup> See *supra* notes 384–85 and accompanying text.

<sup>431</sup> CARSTENS, *supra* note 383.

<sup>432</sup> Cf. Roberta Romano, *Pitfalls of Global Harmonization of Systemic Risk Regulation in a World of Financial Innovation*, in SYSTEMIC RISK IN THE FINANCIAL SECTOR: TEN YEARS AFTER THE GREAT CRASH 197, 198–200 (Douglas W. Arner, Emilios Avgouleas, Danny Busch & Steven L. Schwarcz eds., 2019) (exploring the concept that harmonizing international financial regulation may amplify systemic risk effects and contain major gaps that could be exploited by FinTech).

<sup>433</sup> RICHARD J. HERRING & ROBERT E. LITAN, FINANCIAL REGULATION IN THE GLOBAL ECONOMY 134–35 (1995); see also Roberta Romano, *For Diversity in the International Regulation of Financial Institutions: Critiquing and Recalibrating the Basel Architecture*, 31 YALE J. ON REG. 1, 5–7 (2014).

<sup>434</sup> See generally Romano, *supra* note 432, at 198–206.

(“MBS”) than for other types of investments, thereby incentivizing banks worldwide to invest heavily in MBS.<sup>435</sup> That not only concentrated investment in, but also increased demand for, MBS.<sup>436</sup> Regulatory harmonization also, paradoxically, can invalidate existing risk-management strategies that are premised on randomness and independent action.<sup>437</sup> For example, the value-at-risk (VaR) model presumes that portfolio managers act independently of each other.<sup>438</sup> Incorporating VaR into regulation, however, can incentivize managers to act more uniformly, thereby undermining VaR’s utility as a risk-management tool.<sup>439</sup>

## VI. CONCLUSION

The fractionalization of shares of stock, bonds, and other investment securities can fundamentally expand financial inclusion both for businesses and for investors. This has particular significance for small and medium-sized enterprises (SMEs). Although they comprise 90% of worldwide businesses and create 50% of worldwide employment<sup>440</sup> and they also can increase economic dynamism by spurring market competition and innovation,<sup>441</sup> SMEs currently have little choice but to rely on bank-intermediated lending.<sup>442</sup> This forced reliance creates critical funding shortages and unnecessarily raises costs.<sup>443</sup> Firms whose debt securities are not highly rated—which represent a large sector of businesses in America and worldwide—also suffer similar costs and funding restrictions.<sup>444</sup>

Recent innovations in financial technology, or FinTech, are beginning to make fractionalization more widely available.<sup>445</sup> This should allow SMEs and other businesses to obtain sufficient and low-cost financing by issuing fractionalized securities directly to investors. These FinTech-enabled transactions, which are governed by mathematical algorithms under so-called smart contracts, epitomize decentralized finance (DeFi).

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<sup>435</sup> *Id.* at 204–05.

<sup>436</sup> *Id.* at 199.

<sup>437</sup> Charles K. Whitehead, *Destructive Coordination*, 96 CORNELL L. REV. 323, 347 (2011).

<sup>438</sup> *Id.* at 341.

<sup>439</sup> *Id.* at 347–51; see also INT’L MONETARY FUND, GLOBAL FINANCIAL STABILITY REPORT: FINANCIAL MARKET TURBULENCE: CAUSES, CONSEQUENCES, AND POLICIES 62 (Oct. 2007) (finding that having institutions employing the same risk model has destabilizing effects).

<sup>440</sup> *Small and Medium Enterprises (SMEs) Finance*, *supra* note 25.

<sup>441</sup> Wiens & Jackson, *supra* note 23.

<sup>442</sup> See Mills & McCarthy, *supra* note 24, at 38.

<sup>443</sup> See *supra* note 30 and accompanying text.

<sup>444</sup> See *supra* note 142 and accompanying text.

<sup>445</sup> See *supra* note 42 and accompanying text.

There are widespread perceptions that DeFi transactions should not need regulation because mathematical algorithms replace human-managed intermediaries, virtually eliminating error.<sup>446</sup> We explain why those perceptions are flawed. Humans design the algorithms, and thus the risk of error remains.<sup>447</sup> We analyze how these transactions should be regulated. We also explain how that analysis extends beyond fractionalization to more generally inform FinTech regulation.

Finally, we show that fractionalizing securities creates a range of risks, of which liquidity risk is the most serious.<sup>448</sup> We analyze how fractionalization should be regulated to control these risks without unduly constraining its benefits of expanding financial inclusion.

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<sup>446</sup> *See supra* note 41 and accompanying text.

<sup>447</sup> *Supra* note 106 and accompanying text.

<sup>448</sup> *Supra* note 189 and accompanying text.