NEW FUNDS, FAMILIAR FEARS: DO EXCHANGE TRADED FUNDS MAKE MARKETS LESS STABLE? PART I, LIQUIDITY ILLUSIONS

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Abstract

Since the 2008 global financial crisis, Exchange Traded Funds (ETFs) have exploded in popularity. An ETF is an investment product that tracks an underlying index or basket of assets, such as securities, bonds, or commodities. However, unlike other types of popular investment products—like mutual funds—ETFs trade like stock. Thus, many view ETFs as superior to mutual funds because they give average investors instant, low-cost diversification in a product that can be bought or sold throughout the trading day on a national exchange.

ETFs will likely house a sizeable share of American retirement savings in the future as they become the preferred investment vehicle for institutions, high frequency traders, and wealth managers. This shift, however, could also present a worrisome risk. While ETFs appear to offer the benefits of lower transaction costs and the ability to buy or sell quickly, this near-perfect liquidity could prove illusory when it matters most: during a market crash or a full-blown financial crisis. This two-part study investigates interaction risks in the ETF market. This Article shows how ETFs can create liquidity risk by operating in a complex ecosystem that is dependent on the discretionary behaviors of financial institutions. Case studies on portfolio insurance in the 1980's and the auction rate securities market failure in 2008 also illustrate how reliance on discretionary actors to provide liquidity and perform arbitrage in a crisis can be illusory and fragile.

It is impossible to predict exactly how or when a new crisis will arrive. Yet, the popularity of ETFs as an asset class, the increased connection between Main Street and Wall Street, the potential liquidity risks, and the long-term uncertainty about the effects of passive investment practices on the economy make ETFs a prime candidate for heightened consumer financial protection, regulatory action, and academic attention.

I. INTRODUCTION

The 2008 global financial crisis (GFC) made Americans "deeply distrustful of Wall Street."[1] Many Americans were struggling, and the growing disconnect between Main Street and Wall Street had fueled a sense of disillusionment.[2] This changed dramatically, however, in the period following the GFC.[3] A relatively new financial product, the Exchange Traded Fund (ETF), became a popular choice for Main Street, Wall Street, and institutional investors; ETFs created a common bond between these investors by allowing average individuals to easily trade and invest alongside sophisticated funds and wealth managers like never before.[4]

ETFs are investment products that trade on national exchanges like traditional stocks and securities, but ETFs track an underlying index or basket of assets, such as securities, bonds, or commodities.[5] This gives investors instant, low-cost diversification through a product that can also be bought or sold throughout the day on a national stock exchange like the New York Stock Exchange (NYSE).[6] While mutual funds have historically been an important investment vehicle in U.S. markets, mutual funds also provide exposure for passive indexes and diversified assets. However, ETFs are widely seen as superior to mutual funds since ETFs offer secondary market, intra-day trading at lower fees, as well as certain tax advantages.[7]

Given these benefits,[8] the post-GFC ETF market has experienced remarkable growth.[9] Recent estimates now value the U.S. ETF market at $3.4 trillion—an increase of more than $500 billion from pre-GFC

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1. Quentin Fottrell, *10 Years After Lehman Brothers Collapse, People Are 'Deeply Distrustful' of Wall Street,* MARKETWATCH (Sept. 23, 2018, 9:10 AM), https://www.marketwatch.com/story/10-years-after-lehman-brothers-collapse-are-people-smarter-with-their-money-2018-09-17.

2. Heesun Wee, *The Problem With Wall Street Greed 5 Years After the Crash*, CNBC (Sept. 13, 2013, 1:50 PM), https://www.cnbc.com/id/101022751 (discussing the "Main Street-Wall Street disconnect . . . fuel[ing] disillusionment among pockets of Americans.").

3. *See* Rachel Evans & Carolina Wilson, *How ETFs Became the Market*, BLOOMBERG (Sept. 13, 2018), https://www.bloomberg.com/graphics/2018-growing-etf-market/?srnd=etfs ("The reality is that if your grandma owns an emerging-market ETF, she's sitting alongside the likes of Bridgewater Associates and a Singaporean sovereign wealth fund.").

4. *Id.*

5. James Chen, *Exchange Traded Fund (ETF)*, INVESTOPEDIA, https://www.investopedia.com/terms/e/etf.asp (last updated Jan. 16, 2019).

6. *Id.*

7. ETF Guide, *Why ETFs Are Beating Mutual Funds*, SEEKING ALPHA (July 13, 2018, 4:53 AM), https://seekingalpha.com/article/4187043-etfs-beating-mutual-funds.

8. *See* discussion *infra* Section II(iii).

9. *See generally Development of assets of global Exchange Traded Funds (ETFs) from 2003 to 2018*, STATISTA, https://www.statista.com/statistics/224579/worldwide-etf-assets-under-management-since-1997/ (last modified July 22, 2019) (analyzing the growth in the ETF market from 2003 to 2018).

levels.[10] The menu of available ETFs has also surged worldwide, increasing from 1,622 funds in 2008 to 6,478 funds in 2018.[11] These products are expected to house a sizeable share of Americans' retirement savings in the foreseeable future.[12] ETFs have also become a preferred habitat for institutional investors, high-frequency trading programs (HF trading), and algorithmic wealth managers (robo-advisors).[13]

Yet, despite this growing market share, ETFs present a potentially worrisome paradox.[14] On the surface, it can be argued that ETFs have the appearance of nearly perfect liquidity—the ability to buy or sell instantly with very low transaction costs. This liquidity, however, could prove both illusory and fragile when it matters most, like during a stock market crash or a full-blown financial crisis, because it relies on the discretionary behaviors of intermediating financial institutions in a complex operational ecosystem.

In the U.S., for example, ETFs lack a unified regulatory framework and naming convention and are often conflated with more complex Exchange Traded Products (ETPs).[15] ETFs have also stimulated a host of concerns, such as complexity, opacity, and contagion risk,[16]

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10. *See* EVA SU, CONGRESSIONAL RESEARCH SERV., EXCHANGE TRADED FUNDS (ETFS): ISSUES FOR CONGRESS, R45318 (2018), https://fas.org/sgp/crs/misc/R45318.pdf.

11. *Number of Exchange-Traded Funds (ETFs) Worldwide From 2003 to 2018*, STATISTA, *https://www.statista.com/statistics/278249/global-number-of-etfs/*(last visited May 31, 2019).

12. *See* SU, *supra* note 10.

13. *See* Dominic Litz, *Risk, Reward, Robo-Advisers: Are Automated Investment Platforms Acting in your Best Interest?*, 18 J. HIGH TECH. L. 367 (2018).

14. *See* Rachel Evans, *The Debate Over Bond ETFs Rages on the Sidelines at Milken*, BLOOMBERG (May 1, 2018), https://www.bloomberg.com/news/articles/2018-05-01/-hero-or-villain-bond-etf-debate-rages-on-the-milken-sidelines; *see also* Noah Smith, *It's Smart To Worry About ETFs*, BLOOMBERG OP. (June 5, 2017), https://www.bloomberg.com/opinion/articles/2017-06-05/it-s-smart-to-worry-about-etfs; Henry T.C. Hu & John Morley, *The SEC and Regulation of Exchange-Traded Funds: A Commendable Start and a Welcome Invitation*, 92 S. CAL. L. REV. 1155 (2019) [hereinafter *The SEC and Regulation of ETFs*] (identifying the challenges of relying on the discretionary actions of authorized participants to maintain the integrity and stability of the ETF ecosystem and advocating for a bespoke regulatory framework organized around the ETF "arbitrage mechanism").

15. *See* Martin Small, *Don't Confuse ETFs With ETPs*, BUS. INSIDER (Feb. 11, 2018), https://www.businessinsider.com/dont-confuse-etfs-with-etps-2018-2. The regulatory framework for ETFs has recently been described by Professors Henry T.C. Hu and John D. Morley as comprising a series of independent cubbyholes. *See* Henry T.C. Hu & John Morley, *A Regulatory Framework for Exchange Traded Funds*, 91 S. CAL. L. REV. 839 (2018) [hereinafter *A Regulatory Framework for ETFs*] (proposing the first unified ETF regulatory framework for products that exhibit an "arbitrage function" between a secondary and primary market). The U.S. Securities & Exchange Commission has also recently proposed a simplified approval process for certain classifications of new ETFs. *See* Press Release, *SEC Proposes New Approval Process for Certain Exchange-Traded Funds* (June 28, 2018) (available at https://www.sec.gov/news/press-release/2018-118).

16. *See* DEPOSITORY TRUST & CLEARING CORPORATION, *The Next Crisis Will Be Different: Opportunities to Continue Enhancing Financial Stability 10 Years After Lehman's Insolvency*, INDUS. WHITE PAPER, Sept. 2018, at 13–14 [hereinafter DTCC].

counterparty and collateral risk for synthetic ETFs,[17] and price and information inefficiencies for underlying assets.[18] Moreover, ETFs may also increase systemic risk because they extend the financial intermediation chain.[19] This view is supported by the peculiar behavior of the ETF market during periods of volatility in 2010, 2015, and 2018.[20]

Critics also argue that ETFs present a concentration risk.[21] For example, three ETF sponsors—Blackrock, Vanguard, and State Street—account for over 83% of the U.S. ETF market, and these firms' sponsorship roles could become systemically important in the future.[22] The ETF concentration risk is amplified by an ongoing "shift to passive investing from active management," which is evidenced by the passive investment ownership of U.S. equities approaching the 50% threshold.[23] ETFs might also be facilitating increased speculative market trading activity.[24]

Additionally, active arbitragers are needed to buy undervalued assets during a selloff—a move that has historically helped to mitigate potential crises.[25] Moreover, the Depository Trust & Clearing

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17. *See* CENTRAL BANK OF IRELAND, EXCHANGE TRADED FUNDS DISCUSSION PAPER 41–51 (2017), https://www.centralbank.ie/docs/default-source/publications/discussion-papers/discussion-paper-6/discussion-paper-6---exchange-traded-funds.pdf.

18. *See* Doron Israeli, Charles M.C. Lee & Suhas A. Sridharan, *Is There a Dark Side to Exchange Traded Funds? An Information Perspective*, 22 REV. OF ACCT. STUD. 1048, 1048–50 (2017).

19. *See* Kathryn Judge, *Fragmentation Nodes: A Study in Financial Innovation, Complexity, and Systemic Risk*, 64 STAN. L. REV. 657 (2012); *see also* Stefano Battiston et al., *The Price of Complexity in Financial Markets*, 113(36) PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA, PNAS 10031, 10031–36 (Sept. 2016), https://doi.org/10.1073/pnas.1521573113. *See generally* Srichander Ramaswamy, *Market Structures and Systemic Risks of Exchange Traded Funds* (Bank for International Settlements, Working Paper No. 343, Apr. 2011), https://www.bis.org/publ/work343.pdf.

20. *See* SU, *supra* note 10, at 17–20.

21. *Id.* at 17–20.

22. *See* Owen Walker, *Funds 'Snowball' Means Big Firms Can Only Get Bigger*, FIN. TIMES (June 9, 2018), https://www.ft.com/content/1611bea8-68d3-11e8-b6eb-4acfcfb08c11 (stating "the biggest products are growing rapidly as assets are increasingly concentrated in the megafunds.").

23. Erin Arvedlund, *John Bogle Pens WSJ Op-Ed Warning Index Funds Becoming Too Big*, THE PHILA. INQUIRER (Nov. 29, 2018), http://www2.philly.com/philly/business/john-bogle-vanguard-wsj-index-funds-blackrock-state-street-fidelity-20181129.html.

24. *See* William A. Birdthistle, *The Fortunes and Foibles of Exchange Traded Funds: A Positive Market Response to the Problems of Mutual Funds*, 33 DEL. J. CORP. L. 69, 94–95 (2008); *see also* Ricardo Crisostomo & Jorge Medina, *ETFs and Financial Stability; A Compendium of Possible Risk Sources*, CNMV BULLETIN QUARTER IV, 71, 75 (2018) ("[S]tudies suggest that investors who acquire shares in ETFs hold them for a shorter period . . . Low transaction costs and their continuous trading may make ETFs (i) more liquid . . . and (ii) more attractive . . . therefore attract[ing] short-term investors and high-frequency traders (HFTs) to a greater extent.").

25. Joanna Ossinger, *JPMorgan Sees 'Violent' Markets on Volatility-Liquidity Loop*, BLOOMBERG (Apr. 8, 2019 3:53 AM), https://www.bloomberg.com/news/articles/2019-04-08/jpmorgan-blames-violent-markets-on-volatility-liquidity-loop; *see* John Gittelsohn, *The $1.9 Trillion Fund Giant With a Crazy Idea About Investing*, BLOOMBERG (May 14, 2019), https://www.bloomberg.com/news/features/2019-05-14/the-1-9-trillion-fund-giant-with-a-crazy-idea-about-investing (discussing a passive money-management firm).

Corporation, America's largest post-trade infrastructure provider,[26] has described growth and liquidity uncertainties in the ETF market as "two of the most significant post-crisis evolutions that could be potential sources of systemic market-related risks."[27] Concerns have also been cited about the potential conflicts of interest inherent in ETFs' use of collateral and leverage.[28] An in-depth analysis of every ETF concern is beyond the scope of this Article but they are worthy of individual academic consideration.

Even Vanguard's late founder, John Bogle, became a strong critic of index funds.[29] Prior to his death, Bogle became concerned that ETFs and increased passive investment might create a tragedy of the commons since what is rational for individual investors (e.g., diversification or low-fee investing) could weaken the market as a whole.[30] Bogle predicted increased volatility and impaired price discovery through the decline of active investing, with fewer investors wanting to beat the market and more individuals wanting to own a piece of it.[31] He also noted the momentum effects of a market dominated by trend traders, such as "algorithmic or programmatic trading systems," which could move in coordinated herds within the ETF ecosystem.[32]

Despite its importance in both consumer finance and financial regulation, the ETF market is vastly understudied. In a recent article proposing the U.S.'s first unified regulation framework for ETFs, Professors Henry T.C. Hu and John D. Morley called the market a "regulatory and academic backwater,"[33] noting that "ETF regulation has also suffered from academic neglect."[34] Since 2009, only seven U.S. law review articles have directly broached the subject while a small handful

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26. *See generally* DEPOSITORY TRUST & CLEARING CORPORATION, http://www.dtcc.com (last visited Nov. 29, 2018).

27. DTCC, *supra* note 16, at 13–14.

28. *See* Crisostomo & Medina, *supra* note 24, at 77–79.

29. *See* John C. Bogle, *Bogle Sounds A Warning on Index Funds*, WALL ST. J. (Nov. 29, 2018), https://www.wsj.com/articles/bogle-sounds-a-warning-on-index-funds-1543504551?mod=trending_now_4 (noting that concentration of stock ownership in "big three" firms is not in the national interest).

30. Conrad de Aenlle, *Opinion: John Bogle Has a Warning for Index Fund Investors*, MARKETWATCH (June 1, 2017) https://www.marketwatch.com/story/john-bogle-has-a-warning-for-index-fund-investors-2017-06-01 ("As with any tragedy of the commons, indexing is the sensible thing for each individual to do, but . . . [w]hen the stock market turns down again, index fund owners will have to become their own active manager and make sure they're well diversified, with limited exposure to risk . . . and catastrophe.").

31. *Id.*

32. *Id.*

33. Hu & Morley, *A Regulatory Framework for ETFs*, *supra* note 15, at 844.

34. *Id.* at 847.

of others only tangentially address ETFs as part of other concerns,[35] which highlights the post-GFC paucity of attention in this area.[36]

This two-part study investigates interaction risks in the ETF market. This Article, Part I, will evaluate the potential for ETF liquidity illusions in a crisis. It will also illuminate both sides of the ETF debate by illustrating the complexities that drive conflict in the ETF operational structure. The ETF industry maintains that these products (and the ETF operating ecosystem) are stable,[37] yet many critics remain unpersuaded.[38] They argue that ETF liquidity in a sustained crisis is uncertain because such liquidity is dependent on the behavior of discretionary actors, which can prove fragile, unpredictable, and illusory in a crisis.[39] Part II will investigate other interaction risks and how those risks manifest investor herding and information inefficiencies.

This Article will proceed by recounting the industry's history, identifying ETF market growth figures and demand drivers, and

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35. *See* Bret E. Strzelczyk, *Rise of the Machines: The Legal Implications for Investor Protection With the Rise of Robo-Advisors,* 16 DEPAUL BUS. & COM. L.J. 55 (2017); Benjamin P. Edwards, *The Rise of Automated Investment Advice: Can Robo-Advisers Rescue the Retail Market?* 93 CHI.-KENT L. REV. 97 (2018); Litz, *supra* note 13 (discussing ETFs as used by algorithmic wealth management platforms); *see also* Scot Hirst, *The Case for Investor Ordering,* 8 HARV. BUS. L. REV. 227, 255 (2018) (discussing ETFs in relation to "investor ordering" proposals as an alternative to mandatory rules); Paul H. Edelman, Randall S. Thomas & Robert B. Thompson, *Shareholder Voting in an Age of Intermediary Capitalism,* 87 S. CAL. L. REV. 1359 (2014); Dorothy S. Lund, *The Case Against Passive Shareholder Voting,* 43 J. CORP. L. 493 (2018); Giovanni Strampelli, *Are Passive Index Funds Active Owners? Corporate Governance Consequences of Passive Investing,* 55 SAN DIEGO L. REV. 803 (2018) (discussing ETFs in relation to issues in corporate governance and shareholder voting given the rise of passive investment); John Morley, *The Separation of Funds and Managers: A Theory of Investment Fund Structure and Regulation,* 123 YALE L.J. 1228 (2014) (discussing ETFs in conjunction with other funds vs. organizational business structures); Michael C. Macchiarola & Daniel Prezioso, *Expanding Alternatives: From Structured Notes to Structured Funds,* 19 U. PA. J. BUS. L. 405 (2017) (discussing ETFs in contrast to Unit Investment Trusts). *See generally* Gabriel Rauterberg & Andrew Verstein, *Index Theory: The Law, Promise and Failure of Financial Indices,* 30 YALE J. ON REG. 1, 7 (2013) (discussing ETFs briefly in a critique on financial indexes).

36. *See* William M. Humphries, *Leveraged ETFs: The Trojan Horse Has Passed the Margin Rule Gates,* 34 SEATTLE U. L. REV. 299 (2010); Kathryn Judge, *Investor-Driven Financial Innovation,* 8 HARV. BUS. L. REV. 291 (2018) [hereinafter *Investor-Driven*]; Jill E. Fisch, *Rethinking the Regulation of Securities Intermediaries,* 158 U. PA. L. REV. 1961 (2010); Garrett M. Fischer, *New Twists on an Old Plot: Investors Look to Avoid the Wash Sale Rule by Harvesting Tax Losses With Exchange Traded Funds,* 88 WASH. U. L. REV. 229 (2010); John Yoder & Bo J. Howell, *Actively Managed ETFs: The Past, Present, and Future,* 13 J. BUS. & SEC. L. 231 (2013). *See generally* Hu & Morley, *A Regulatory Framework for ETFs*, *supra* note 15. Hu & Morley's proposal is one of six U.S. law review articles on ETF regulation. *See id.*

37. *See infra* Section III(vi).

38. *See infra* Section III(i)–(v).

39. One of the most famous pronouncements of the fickle promise of liquidity was made by economist John Maynard Keynes when he remarked "of the maxims of orthodox finance, none, surely is more antisocial than the fetish of liquidity. . . . It forgets that there is no such thing as liquidity of investment for the community as a whole." BRUCE I. JACOBS, TOO SMART FOR OUR OWN GOOD: INGENIOUS INVESTMENT STRATEGIES, ILLUSIONS OF SAFETY, AND MARKET CRASHES 93 (1st ed. 2018) (quoting JOHN M. KEYNES, THE GENERAL THEORY OF EMPLOYMENT, INTEREST, AND MONEY (1st ed. 1936)).

explaining both the ETF ecosystem's key participants and operational mechanics. It will also introduce the concept of liquidity illusion and show that ETF liquidity is contingent on the discretionary actions of intermediaries. The liquidity illusion debate has strong arguments on both sides, with each side relying on their own assumptions about the behaviors of intermediaries under stress. However, how these ETF ecosystem participants will act in a true sustained crisis is unknown.[40]

This Article will then turn to case studies on portfolio insurance in the 1980s and the auction rate securities market in 2008 to show that arbitrageurs can be absent in a crisis, when they are needed most, which can cause discretionary liquidity to fail. The case studies also highlight how Wall Street has a habit of creating investment products similar to ETFs that either promise perpetual liquidity or that combine leverage, complexity, and structural opacity, which can decrease financial stability.[41] The question that lingers is whether ETFs are another iteration of this trend. It is impossible to predict how or when a new crisis will materialize, yet the ETFs are a vastly understudied segment of consumer finance and financial regulation. However, ETFs are worthy of heightened attention from academics, market participants, and market regulators due to the popularity of ETFs as an asset class, their increased connection with Main Street and Wall Street, their intrinsic potential risks, and the long-term economic uncertainty that passive investing is creating on the market as a whole.

This Article summarizes the incentives and fragilities of participants in the ETF ecosystem and provides a curated menu of contemporary empirical research and theoretical viewpoints on the liquidity illusion debate. It also documents the by-products of market complexity, including the possibility of financial intermediary rent-seeking,[42] as well as other non-productive economic behaviors by market participants.[43] This Article complements previous works already published that investigate the risks and impacts of economic financialization.[44] Finally, this Article also evaluates supply-side

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40. *See* DEUTSCHE BUNDESBANK, THE GROWING IMPORTANCE OF EXCHANGE TRADED FUNDS IN THE FINANCIAL MARKETS, MONTHLY REPORT 79 (Oct. 2018) (Ger.), https://www.bundesbank.de/resource/blob/766600/2fd3ae4f0593fb2ce465c092ce40888b/mL/2018-10-exchange-traded-funds-data.pdf.

41. *See generally* JACOBS, *supra* note 39.

42. *See* Anne O. Kreuger, *The Political Economy of the Rent Seeking Society*, 64 AM. ECON. REV. 291, 291–92 (1974) (defining rent-seeking).

43. *See* JOHN KAY, OTHER PEOPLE'S MONEY: THE REAL BUSINESS OF FINANCE (1st ed. 2015) (discussing externalities in the modern financial system, including non-productive intermediation); *see also* Robert C. Hockett & Saule T. Omarova, *The Finance Franchise*, 102 CORNELL L. REV. 1143, 1201–10 (2017).

44. For critiques of the modern financialization of the real economy, *see* Bruce Bartlett, *"Financialization" as a Cause of Economic Malaise*, N.Y. TIMES (June 11, 2013), https://economix.blogs.nytimes.com/2013/06/11/financialization-as-a-cause-of-economic-malaise/; Michael Collins, *Wall Street and The Financialization Of The Economy*, FORBES (Feb. 4,

financial product innovation,[45] and whether this process is driven by investors demanding more complete markets combined with the simultaneous allocation of financial risk to those most capable of bearing it.[46]

II. THE EXCHANGE TRADED FUND ECOSYSTEM & THE VALUE OF LIQUIDITY

This section introduces the liquidity illusion debate by describing how an ETF works. It will address the intermediaries, their roles and incentives in the ETF ecosystem, and post-GFC demand drivers of ETF market growth. It also will also briefly introduce the concept of liquidity and describe why it is important in financial products.

2015), https://www.forbes.com/sites/mikecollins/2015/02/04/wall-street-and-the-financialization-of-the-economy/#4f6e026d5783; *see also* Christine Emba, *Has Our Economy Become Too 'Financialized,'* WASH. POST (Apr. 18, 2016), https://www.washingtonpost.com/news/in-theory/wp/2016/04/18/has-our-economy-become-too-financialized/?noredirect=on&utm_term=.58e2b4e180b8; Apostolos Fasianos, Diego Guevara, & Christos Pierros, *Have We Been Here Before? Phases of Financialization Within the 20th Century in the United States* (Levy Econ. Inst. Bard C., Working Paper No. 869, 2016), available at https://ssrn.com/abstract=2801088; RANA FOROOHAR, MAKERS AND TAKERS: THE RISE OF FINANCE AND THE FALL OF AM. BUSINESSES (1st ed. 2016); Robin Greenwood & David Scharfstein, *The Growth of Finance*, 27(2) J. OF ECON. PERSPECTIVES 3 (2013); Jeremy Greenwood, Juan Sanchez & Chen Wang, *Financing Development: The Role of Information Costs*, 100(4) AM. ECON. REV. 1875 (2010); Eckhard Hein, *Finance-Dominated Capitalism and Redistribution of Income: A Kaleckian Perspective*, (Levy Econ. Inst. Bard C., Working Paper No. 746, 2013), available at https://ssrn.com/abstract=2198919; Mike Konczal & Neil Abernathy, *Defining Financialization*, ROOSEVELT INST. (July 27, 2015), http://rooseveltinstitute.org/defining-financialization/; Greta R. Krippner, *The Financialization of the American Economy*, 3 SOCIO-ECONOMIC REV. 173 (2005); Lawrence E. Mitchell, *Financialism A (Very) Brief History*, 43 CREIGHTON L. REV. 323 (2010); Ratna Sahay et al., *Rethinking Financial Deepening: Stability and Growth in Emerging Markets,* IMF STAFF DISCUSSION NOTE (May 2015); Lord Adair Turner, *What Do Banks Do, What Should They Do and What Public Policies Are Needed to Ensure Best Results for the Real Economy?* SPEECH TO CASS BUSINESS SCHOOL (Mar. 17, 2010); Lord Adair Turner et al., *The Future of Finance: The LSE Report*, LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE (2010); Charles J. Whalen, *Understanding Financialization: Standing on the Shoulders of Minsky*, (Levy Econ. Inst. Bard C., Working Paper No. 892, 2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2991096.

45. *See generally* Dan Awrey, *Toward a Supply-Side Theory of Financial Innovation*, 41 J. OF COMP. ECON. 401, 410 (2013) [hereinafter *Supply-Side Theory*] (discussing why financial intermediaries innovate and methods in which financial intermediaries innovate).

46. *See* Anastasia Nesvetailova, *The Crisis of Invented Money: Liquidity Illusion and the Global Credit Meltdown*, 11 THEORETICAL INQUIRIES L. 125, 132–33 (2010). *Compare* Saule T. Omarova, *New Tech v. New Deal: Fintech as a Systemic Phenomenon*, 36 YALE J. ON REG. 735 (2019) (discussing supply side innovation), *with* Judge, *Investor-Driven, supra* note 36, at 300 (discussing demand factors in financial innovation, including the influence of regulation on financial product innovation).

A. *Exchange Traded Funds: A Brief History*

Although closed-end funds and pooled investing originate from Dutch merchants in the late eighteenth century,[47] the modern ETF finds its origins in Canada, first trading on the Toronto Stock exchange in 1990.[48] Its American counterpart was launched soon thereafter by State Street Global Investors in 1993 under the ticker "SPDR" (popularly called the Spider) and was tracked by the S&P 500.[49]

The idea of index investing (the foundation of ETFs) actually emerged two decades before the first official EFT was created, when index mutual funds were first launched by Wells Fargo and the American National Bank.[50] Building on this idea, Vanguard founder John Bogle created the First Index Investment Trust, which, like the SPDR, also traded on the S&P 500.[51] Additionally, "[i]n 1989, the American Stock Exchange and the Philadelphia Stock Exchange began trading Index Participation Shares," which are synthetic investment products similar to futures contracts that replicate S&P 500 performance.[52]

B. *ETF Operational Ecosystem, Participant Incentives, & Market Concentration*

ETFs generally take one of two forms: (i) a physical replication of a benchmark of securities or (ii) a synthetic replication through derivatives based on swap transactions between an authorized participant and ETF plan sponsor.[53] Physical replication is the most common structure in the U.S,[54] and can be accomplished either through "full replication … by holding the exact same underlying securities," or through a sampling of securities.[55] Sampling is the most popular method in the U.S. by far, and it can be an optimal choice when the ETF is characterized by a vast number of underlying securities, many of which

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47. *See What is the History of ETFs?*, VANGUARD, https://www.advisors.vanguard.com/VGApp/iip/site/advisor/etfcenter/article/ETF_HistoryOfETFs (last visited June 1, 2019).

48. Stephen D. Simpson, *A Brief History of Exchange Traded Funds*, INVESTOPEDIA, https://www.investopedia.com/articles/exchangetradedfunds/12/brief-history-exchange-traded-funds.asp (explaining that the Toronto 35 Index Participation Unit was an early form of the ETF that tracked the Toronto Stock Exchange 35 Index) (last updated June 25, 2019).

49. *Id.*

50. *Id.*

51. *Id.*

52. Laurent Deville, *Exchange Traded Funds: History, Trading and Research*, *in* HANDBOOK OF FINANCIAL ENGINEERING 4 (C. Zopounidis et al. eds., 2008) ("These synthetic instruments were aimed at replicating the performance of the S&P 500 index . . . but they had characteristics similar to those of futures contracts. . . . As futures contracts, IPS had to be traded on a futures exchange regulated by the CFTC.").

53. *See* DEUTSCHE BUNDESBANK, *supra* note 40, at 83.

54. *Id.* at 84.

55. *Id.* at 83.

are considered illiquid holdings. A simple, "plain vanilla" ETF is created when an authorized participant (AP),[56] which is typically a financial institution or market specialist (market maker),[57] transfers a basket of securities, in-kind, to an ETF sponsor, such as BlackRock or Vanguard. In exchange, the AP receives "creation units" from the ETF sponsor, which are typically blocks of 50,000 or more new ETF shares.[58] The ETF share basket is published each trading day by the ETF sponsor.[59] APs and ETF sponsors are the only participants in this primary market where the share basket is assembled, which is characterized by a flexible number of ETF shares that are created and redeemed by the AP depending on market factors and conditions.[60]

Once in possession of new ETF shares, APs sell the shares to market makers and through exchanges (i.e. the secondary market), where the ETF shares are traded by individuals (retail investors) and institutional investors throughout the day.[61] It is estimated that 90% of daily trading activity in ETFs takes place in the secondary market.[62] Because ETFs trade on secondary markets like stocks, they can be purchased through commissioned brokers. ETFs are also traded long or short, purchased with margin, and executed using a variety of methods including limit, stop, and market orders.[63] Institutional investors can also trade ETFs via alternative trading systems and dark pools, and they have become a preferred vehicle for HF trading and robo-advisors.[64]

The secondary market for ETFs functions differently than the primary market. Supply and demand for new ETF creations or redemptions in the primary market originate from market maker requests to address buy/sell order imbalances in the secondary market.[65] To address these imbalances, APs are incentivized to transact

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56. *See* BLACKROCK, A PRIMER ON ETF PRIMARY TRADING AND THE ROLE OF AUTHORIZED PARTICIPANTS 3, 3 ex. 2 (Mar. ed. 2017) [hereinafter BLACKROCK, A PRIMER], https://www.blackrock.com/corporate/literature/whitepaper/viewpoint-etf-primary-trading-role-of-authorized-participants-march-2017.pdf (listing Bank of America Merrill Lynch, Citigroup, Credit Suisse, Deutsche Bank, Goldman Sachs & Co., Jeffries, JP Morgan, KCG, Morgan Stanley, UBS Securities, Virtu as "[e]xamples of [c]ommon US APs").

57. *See* ROCHELLE ANTONIEWICZ & JANE HEINRICHS, INV. CO. INST., THE ROLE AND ACTIVITIES OF AUTHORIZED PARTICIPANTS OF EXCHANGE TRADED FUNDS 1 (Mar. ed. 2015), https://www.ici.org/pdf/ppr_15_aps_etfs.pdf ("APs are U.S. registered self-clearing broker-dealers that can process all required trade submission, clearance, and settlement transactions on their own account, as well as full participating members of the National Securities Clearing Corporation and Depository Trust Company.").

58. *See* SU, *supra* note 10, at 4–5.

59. *Id.* at 5.

60. *Id.*

61. *Id.* at 4–6.

62. BLACKROCK, A PRIMER, *supra* note 56, at 7.

63. *See* Ramaswamy, *supra* note 19, at 2.

64. *See* Drew Voros, *High-Frequency Trading Key to ETFs*, ETF.COM (Sept. 25, 2013), https://www.etf.com/sections/features/19955-high-frequency-trading-key-to-etfs.html.

65. BLACKROCK, A PRIMER, *supra* note 56, at 2.

with ETF sponsors through arbitrage opportunities, which simultaneously aligns the ETF share price and the underlying asset value.[66] APs may also create ETF shares directly for institutional investors and market makers to meet these investors' demands for a large number of specific ETF shares.[67] To facilitate this process, the investor will send either cash or securities to the AP, who then delivers a basket of securities to the ETF sponsor in exchange for new ETF shares, which are transferred back to the investor. ETF redemptions, on the other hand, occur in a reverse process: APs purchase ETF shares from institutional investors or market makers and then transfer those shares to the ETF sponsors in exchange for the underlying basket of securities or cash if the ETF is cash redeemable.[68]

It is important to note that ETF sponsors interact exclusively with APs regarding ETF creation and redemption.[69] This right is granted when an AP enters into an Authorized Participant Agreement (APA) with a fund sponsor, which endows a right but not an obligation, for the AP to create or redeem shares in the primary market.[70] The APA is either overarching, allowing for rights to any fund the ETF sponsor offers, or the APA is limited to a particular fund series or trust.[71] In this regard, APs have been described as important technology providers for the creation and redemption of ETF shares.[72]

ETFs are different from mutual funds because of the arbitrage opportunities that exist between the primary and secondary market.[73] However, the ability to profit from arbitrage ensures that ETF prices in the secondary market align with the net asset value of the underlying basket of securities held by the ETF sponsor.[74] For example, if a particular ETF's shares are trading at a discount in the secondary market relative to their net asset value, then APs have an incentive to redeem those shares for the more valuable basket of securities held by the ETF sponsor.[75] In this way, effective arbitrage relies on the voluntary actions of APs and is a crucial mechanism for ensuring ETF pricing is accurate.

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66. *See id.*; *see also infra* notes 80–84 and accompanying text for further explanation.

67. BLACKROCK, A PRIMER, *supra* note 56, at 3.

68. *Id.* at 3 ex. 4.

69. *See* ANTONIEWICZ & HEINRICHS, *supra* note 57, at 1 (explaining how APs are the only participants in the ETF ecosystem to interact directly with funds).

70. *Id.; see* Hu & Morley, *The SEC and Regulation of ETFs*, *supra* note 14, at 1196.

71. ANTONIEWICZ & HEINRICHS, *supra* note 57, at 2.

72. BLACKROCK, A PRIMER, *supra* note 56, at 2.

73. *See* SU, *supra* note 10, at 6.

74. Hu & Morley, *A Regulatory Framework for ETFs*, *supra* note 15, at 851 (stating that the NAV of an ETF is "generated at the end of the trading day"); *see* DEUTSCHE BUNDESBANK, *supra* note 40, at 82.

75. Hu & Morley, *A Regulatory Framework for ETFs*, *supra* note 15, at 852.

Effective Arbitrage is also a fundamental regulatory consideration in the SEC's approval process for ETFs.[76] Professors Henry T. C. Hu and John D. Morley, who recently proposed the first unified regulatory framework for the U.S. ETF market, have called this arbitrage process a "novel, theory-driven device" and also the "defining characteristic" of the ETF since this dynamic "is absent from the market microstructure of all other traded securities and from the ETF's closest cousins, the mutual fund and the closed-end fund."[77]

C. Post-Crisis Growth in the ETF Market Size & Expanding Product Variety

Demand for ETFs has progressively increased over the past decade, and an expanding number of institutional investors now hold ETFs.[78] The variety and complexity of available products has also grown dramatically and the range of ETF products seems virtually unlimited.[79] New products cover nearly every sector, with firms frequently replicating innovations and experiments that have produced significant profits in other sectors.[80]

Recently, ETFs have been created that follow and track newly commercialized industries, ideas, or strategies. For example, product variety now extends beyond traditional indices to include novel concepts like women in leadership,[81] video-gaming and e-sports,[82] consumer discretionary products,[83] and commodity factoring.[84] Other

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76. *See* SEC, Investment Control Act Proposed Rule 6c-11, 83 Fed. Reg. 37332 (proposed June 28, 2018) (to be codified at 17 C.F.R. pts. 239, 270, and 274), https://www.sec.gov/rules/proposed/2018/33-10515.pdf.

77. Hu & Morley, *A Regulatory Framework for ETFs*, *supra* note 15, at 843.

78. *See* Max Chen, *Institutional ETF Ownership Steadily on the Rise*, ETF TRENDS (Aug. 2, 2018), https://www.etftrends.com/smart-beta-channel/institutional-etf-ownership-steadily-on-rise/.

79. *See* VANGUARD, *supra* note 47.

80. *See generally* ECONOMIST, EXCHANGE TRADED FUNDS: FROM VANILLA TO ROCKY ROAD, *in* SPECIAL REPORT: FINANCIAL INNOVATION 6–8 (Feb. 25, 2012), https://www.economist.com/special-report/2012/02/25/from-vanilla-to-rocky-road (describing the financial product innovation process and illustrating how SEC disclosure requirements enable competing firms to copy new, profitable financial products quickly after being introduced to the market).

81. *See, e.g.*, *Barclays Women in Leadership Total Return Index – ETF Tracker*, *in* ETFdb.com, http://etfdb.com/index/barclays-women-in-leadership-total-return-index/ (last accessed Aug. 30, 2019).

82. *See* Emily Zulz, *VanEck Launches ETF Focused on Video Gaming, Esports: Portfolio Products*, THINKADVISOR (Oct. 22, 2018), https://www.thinkadvisor.com/2018/10/22/vaneck-launches-etf-focused-on-video-gaming-esport/.

83. *See* ZACKS.COM, *Should You Invest in the First Trust Consumer Discretionary AlphaDEX Fund (FXD)?*, NASDAQ (Nov. 8, 2018, 6:37 AM), https://www.nasdaq.com/article/should-you-invest-in-the-first-trust-consumer-discretionary-alphadex-fund-fxd-cm1052437.

84. *See* Ed Sweeney, *BlackRock Intends to Launch Factor-Based Commodities Exchange Traded Products*, BUS. WIRE (Nov. 2, 2018, 10:30 AM), https://www.businesswire.com/news/home/20181102005352/en/BlackRock-Intends-Launch-Factor-based-Commodities-Exchange-Traded-Products.

product offerings include trading or operational strategies like leveraged products,[85] synthetics,[86] and directional inverse funds.[87] As such, the number of available products has grown exponentially,[88] and potential ETF offerings appear to be limited only by the creator's imagination.

Some commentators have even argued that "[a]ll new fund launches in [fifteen] year[s] will be . . . ETFs"—effectively eliminating the mutual fund structure.[89] A recent estimate supports this view, noting that there has been a sixty-one-fold increase since 2000 in ETP growth, of which ETFs comprise the vast majority.[90] Bloomberg has also reported that the worldwide ETF market is worth over $5.3 trillion (up from $700 billion pre-GFC), with the U.S. accounting for nearly 70% of its size.[91] The German Central Bank notes that, as of mid-2018, the total capitalization of all worldwide investment funds was over $37 trillion, including mutual and other open-end fund structures, which currently make up the largest share.[92]

ETF growth is fueled by the diverse advantages that are particular to ETFs, such as lower fees, intra-day trading through the secondary market, the potential for short and margin trades,[93] enhanced liquidity compared to mutual funds,[94] instant diversification,[95] operational

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85. *See* Kate Stalter, *Why That Leveraged ETF Is a Bad Idea,* FORBES (Jan. 23, 2017, 4:38 AM), https://www.forbes.com/sites/katestalter/2017/01/23/why-that-leveraged-etf-is-a-bad-idea/#452495e66ed2.

86. *See* Sirio Aramonte, et al., *Synthetic ETFs,* FED. RES.: FEDS NOTES (Aug. 10, 2017), https://doi.org/10.17016/2380-7172.2028.

87. *See* Rachel Evans & Carolina Wilson, *Is This the Markets Latest Problem Child?*, BLOOMBERG (Feb. 8, 2018, 10:38 AM), https://www.bloomberg.com/news/articles/2018-02-08/spotlight-turns-to-etf-problem-children-after-volatility-blow-up.

88. *See id.*; *see also* SEC, REQUEST FOR COMMENT ON EXCHANGE-TRADED PRODUCTS, 80 Fed. Reg. 34729 ("From 2006 to 2013, the total number of ETPs listed and traded as of year-end rose by an average of 160 per year . . . By comparison, from 1993 to 2005, the . . . number . . . rose by an average of just [seventeen] per year.").

89. Yoosof Farah, *Just How Dominant Will ETFs Be in 15 Years*, CITYWIRE (Sept. 26, 2018), https://citywire.co.uk/wealth-manager/news/just-how-dominant-will-etfs-be-in-15-years/a1158758.

90. SU, *supra* note 10, at 1.

91. Evans & Wilson, *How ETFs Became the Market*, supra note 3.

92. DEUTSCHE BUNDESBANK, *supra* note 40, at 80.

93. *See* Troy Segal, *Advantages and Disadvantages of ETFs,* INVESTOPEDIA (May 1, 2019), https://www.investopedia.com/articles/exchangetradedfunds/11/advantages-disadvantages-etfs.asp.

94. *See* Judge, *Investor-Driven*, *supra* note 36, at 328.

95. *See* BLACKROCK, INDEX INVESTING AND COMMON OWNERSHIP THEORIES, VIEWPOINT 4 (Mar. 2017), [hereinafter BLACKROCK, INDEX INVESTING] https://www.blackrock.com/corporate/literature/whitepaper/viewpoint-index-investing-and-common-ownership-theories-eng-march.pdf (noting the benefits of portfolio diversification in ETFs can be derived from the establishment of "Modern Portfolio Theory" by Harry Markowitz, Merton Miller and William Sharpe).

simplicity,[96] and various tax advantages.[97] Moreover, studies have shown that, net of fees, passive funds routinely outperform actively managed funds over a ten-year time period.[98] Thus, ETFs are largely an upgrade from mutual funds.[99]

It has also been suggested that banks may have also contributed to ETF market growth by complying with post-GFC regulations that required banks to "shed large inventories to bolster their balance sheets."[100] Some commenters have noted that the growth has also been fueled by the ability to execute hedges and speculative trades with little friction, including reduced exposure to illiquid underlying assets.[101] Also contributing to ETF growth is the viral replication potential for profitable structures.[102] Additionally, ETFs can act as an alternative to futures trading and still generate similar benefits.[103] Moreover, ETFs can provide inverse and leveraged exposure, as well as low-cost access to otherwise thin, or illiquid, markets such as commodities, precious metals, and higher-yield fixed-income products.[104] Given their popularity and rapid, post-GFC growth,[105] ETF trading is an important market segment that requires closer scrutiny.

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96. *Id.* at 5.

97. *See* BARRON'S, *"What Makes ETFs Tax Efficient?"* (Apr. 27, 2017), https://www.barrons.com/articles/sponsored/what-makes-etfs-tax-efficient-1493223526; *see also* ETF.com, *Why Are ETFs So Tax Efficient?* https://www.etf.com/etf-education-center/21017-why-are-etfs-transparent-and-tax-efficient.html.

98. *See* Tom Anderson, *Investors Say 'Forget It' to Active Funds*, CNBC (Aug. 29, 2016, 12:55 PM), https://www.cnbc.com/2016/08/29/investors-say-forget-it-to-active-funds.html.

99. *See* Ryan Vlastelica, *ETFs Shattered Their Growth Records in 2017*, MARKETWATCH (Jan. 3, 2018, 1:25 PM), https://www.marketwatch.com/story/etfs-shattered-their-growth-records-in-2017-2017-12-11.

100. Evans & Wilson, *How ETFs Became the Market*, supra note 3.

101. *Id.*

102. *See generally Exchange-Traded Funds Become Too Specialized*, ECONOMIST (Apr. 27, 2017), https://www.economist.com/finance-and-economics/2017/04/27/exchange-traded-funds-become-too-specialised (describing the development of different exchange-traded financial products).

103. Nancy B. Nichols et al., *Taxing Implications of Exchange Traded Funds*, 85 PRACTICAL TAX STRATEGIES 109, 110 (2010).

104. *See id.* at 110–14.

105. *See id.* ("However, its growth momentum has been particularly pronounced in recent years. For instance, ETFs accounted for a mere US$0.7 trillion (5.4%) of the assets managed by all types of investment funds back in early 2009. Since then, its share of all fund products has increased significantly, which is attributable to considerably higher growth rates for ETFs compared to those for open-end investment funds (and other investment funds) over the past few years.").

D. Why Liquidity Matters in Investment Products

Liquidity captures the ease at which an asset can be converted into cash and thereby facilitate a consumption activity.[106] Moreover, liquidity measures the extent that a security can be traded without affecting its price.[107] Analysts have noted that liquidity costs are often both underestimated and underappreciated.[108]

Liquidity in ETFs is relevant at varying levels of the market: (i) in the secondary market, where it is sometimes referred to as displayed liquidity, (ii) for market maker inventory, often referred to as "non-displayed secondary market liquidity," (iii) in the ETF primary market, where APs are transacting with ETF sponsors through redemptions and creations, and (iv) in the actual underlying assets.[109] Another measure of market liquidity is the bid-ask spread.[110] Recent empirical studies undertaken by the Central Bank of Germany have noted that for certain market segments, like widely-held equities, tighter bid-asks for ETFs over their underlying securities suggests that ETFs are more liquid than their underlying holdings.[111] However, this is not the case for ETFs holding bonds and other fixed-income products.[112]

As witnessed in the GFC, liquidity shortages can be devastating.[113] The riskiness of an ETF refers not only to the economic risk associated with the underlying assets, but also to the liquidity risk from the interactions of intermediaries within the ETF trading ecosystem.[114] Liquidity is also important for retail investors in the context of flash crashes or investor herds, because retail investors do not have the resources to otherwise "absorb such sudden shocks" and volatility in the market.[115]

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106. Aleksander Berentsen et al., *Free-Riding on Liquidity* 2 (Univ. of Zurich, Working Paper No. 32, 2011).

107. *See* James Chen, *Liquidity*, INVESTOPEDIA, https://www.investopedia.com/terms/l/liquidity.asp (last updated Jan. 29, 2020).

108. *See* Dean Stewart, *The Value of Liquidity, Implications for Global Debt Instruments*, MACQUARIE INV. PERSPECTIVES (Aug. 2014) 2; *see also id.* at 5 ("Because liquidity is highly skewed, liquidity costs at any point in time other than during a crisis are likely to be lower than long term averages. This will bias investors to underestimate liquidity costs."); *id.* at 6 ("Investors usually carefully analyze the credit quality of their portfolio, but usually pay less attention to the liquidity of their portfolio, or the liquidity management credentials of their managers. If anything, it should be the other way around.").

109. *See* SU, *supra* note 10, at 4–5.

110. DEUTSCHE BUNDESBANK, *supra* note 40, at 89–91.

111. *Id.*

112. *See id.* at 90.

113. *See* SU, *supra* note 10, at 4–5.

114. *Id.*

115. Riza Demirer et al., *Herding and Flash Events: Evidence From the 2010 Flash Crash* 3 (Fin. Res. Letters, Working Paper, Dec. 26, 2018), https://ssrn.com/abstract=3263881.

III. DO ETFS CREATE LIQUIDITY ILLUSIONS?

This section introduces the notion of ETF liquidity illusions and illustrates how a breakdown in the ETF arbitrage mechanism could create a scenario where liquidity in the ETF market proves to be illusory—or at least very costly—when it is needed most: during a crisis. This section also explores how fears of liquidity illusions are primarily present in fixed-income ETFs, although not exclusively. Industry-advocating, pro-liquidity counterarguments will also be identified. Finally, this section canvasses the impact of robo-advisors and HF trading on liquidity illusions.

A. Liquidity Illusions & the ETF Arbitrage Mechanism

The foundational fear behind the liquidity illusion concern is that ETF shares are not as liquid as they are purported to be. Although some fund managers have started devising option strategies to profit from flash crashes specifically caused by ETF liquidity shortages,[116] most market participants are unprepared for a crisis scenario caused by a lack of liquidity in ETFs, which could foster pro-cyclical developments such as investor herding and contagion selling.[117] Liquidity illusion concerns are highlighted in a variety of reports, including those from the International Monetary Fund (IMF),[118] the Financial Stability Board (FSB),[119] and the Central Bank of Germany (Deutsche Bundesbank).[120] There are also reports that some hedge funds have been "borrowing shares and stockpiling bearish options" under a theory that ETFs, especially leveraged ETFs, are ticking time bombs.[121]

Liquidity illusion concerns stem from uncertainties about how ETF ecosystem participants, particularly APs and market makers, will act in

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116. *See* Cecile Gutscher & Yakob Peterseil, *The Liquidity 'Illusion' Has These Funds Making Plans for a Stock Doomsday*, BLOOMBERG (Apr. 10, 2019, 11:11 AM), https://www.bloomberg.com/news/articles/2019-04-10/liquidity-illusion-has-these-funds-making-stock-doomsday-plans.

117. *See* DEUTSCHE BUNDESBANK, *supra* note 40, at 93–97.

118. *See* INT'L MONETARY FUND, GLOBAL FIN. STABILITY REPORT: VULNERABILITIES IN A MATURING CREDIT CYCLE 50 (Apr. 2019), https://www.imf.org/en/Publications/GFSR/Issues/2019/03/27/Global-Financial-Stability-Report-April-2019.

119. *See* FIN. STABILITY BD., POLICY RECOMMENDATIONS TO ADDRESS STRUCTURAL VULNERABILITIES FROM ASSET MANAGEMENT ACTIVITIES 11–24 (Jan. 2017), https://www.fsb.org/wp-content/uploads/FSB-Policy-Recommendations-on-Asset-Management-Structural-Vulnerabilities.pdf.

120. *See generally* DEUTSCHE BUNDESBANK, *supra* note 40.

121. Natasha Doff, *Hedge Fund Manager Stakes Own Cash on a Bet Against Credit ETFs*, BLOOMBERG (Nov. 5, 2018, 11:54 AM), https://www.bloomberg.com/news/articles/2018-11-05/hedge-fund-manager-stakes-own-cash-betting-credit-etfs-crumble.

a crisis.[122] For example, if the value of an ETF's underlying securities becomes questionable, APs may respond by halting ETF redemptions, causing the ETF to trade at a discount to its net asset value. This, in turn, could cause a spill-over effect to panicked selling in other asset classes when it becomes either economically infeasible or impossible for investors to sell their ETF shares.[123] Market makers and APs might also "widen their bid-ask spreads to compensate for market volatility and pricing errors."[124] In this way, a cascading event could further spread the liquidity pressure as the selloff intensifies, generating a feedback loop as continued and substantial selling drives prices downward in both the ETF secondary and underlying asset markets.[125] Some fear that this could generate a self-fulfilling prophecy if enough investors believe that an AP withdrawal is inevitable and collectively short the declining ETFs in response.[126]

These liquidity concerns are based on a belief that the ETF arbitrage mechanism was not "designed for a large market sell-off."[127] The theory is that APs will not want to redeem ETF shares in an underlying asset sell-off because the APs would receive in-kind, illiquid, and quickly devaluating securities in exchange. In response, APs might simply withdraw from the primary market redemption process altogether, creating an ETF death spiral and leading to a corresponding ETF fire sale in the secondary market, which would further intensify a liquidity shortage.[128]

If APs completely withdraw from the market, ETFs would trade like closed-end funds and widen the spread between ETF share prices and their net asset values, which would exacerbate a liquidity shortage

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122. *See* Vesna Poljak, *Fund Managers Believe Exchange Traded Funds Will Have A Role in the Next Crisis,* FIN. REV. (Oct. 22, 2017, 11:00 PM), https://www.afr.com/markets/fund-managers-believe-etfs-will-have-a-role-in-the-next-crisis-20171021-gz5oay.

123. *Id.*

124. FIN. STABILITY OVERSIGHT COUNCIL, UPDATE ON REVIEW OF ASSET MANAGEMENT PRODUCTS AND ACTIVITIES (2016), https://www.treasury.gov/initiatives/fsoc/news/Documents/FSOC%20Update%20on%20Review%20of%20Asset%20Management%20Products%20and%20Activities.pdf.

125. *See* Ian Foucher & Kyle Gray, *Exchange-Traded Funds: Evolution of Benefits, Vulnerabilities and Risks*, BANK OF CAN. FIN. SYS. REV., Dec. 2014, at 42 ("APs can also transmit liquidity shocks from the ETF to the underlying assets (and vice versa). As ETFs and the underlying market become more interconnected, a small liquidity shock originating in either the ETF or the underlying securities could be amplified through a feedback loop (via APs). This could result in a large liquidity shock and a reduction in price informativeness for both the ETF and the underlying market.").

126. Joanna Ossinger, *JPMorgan Says ETFs Won't Be the Biggest Victims If Credit Blows Up*, BLOOMBERG (Nov. 9, 2018, 10:40 AM), https://www.bloomberg.com/news/articles/2018-11-09/jpmorgan-says-etfs-won-t-be-biggest-victims-if-credit-blows-up.

127. Doff, *supra* note 121.

128. *Id.*

crisis.[129] Concurrently, market makers and other secondary market liquidity providers could abandon the market, essentially leaving ETF retail investors with illiquid securities.[130] On the other hand, HF traders and other "short-term [ETF] investors . . . would [likely] be among the biggest and fastest sellers" to liquidate their initial positions, further exposing less sophisticated investors to significant losses.[131]

This is the essence of the liquidity illusion; ETFs are often comprised of underlying securities that can become less liquid depending on the behavior of market participants.[132] Liquidity in an ETF is contingent on an "intervening mechanism that allows [APs] to arb[itrage] away disconnects."[133] However, the arbitrage mechanism is discretionary and driven by market incentives for APs and market makers. As Part IV will show, reliance on this discretionary arbitrage mechanism can prove fragile in a liquidity crisis.[134]

B. Fixed-Income ETFs: The Center of the Liquidity Illusion Controversy

Although the Bank for International Settlements cites the issue of liquidity mismatch as a concern in emerging market equities, these warning calls resound most loudly for the fixed-income and loan ETF markets.[135] Fixed-income ETFs are popular because they give investors instant access to a market in which it is otherwise difficult to gain exposure.[136] Retail investors are also attracted to fixed-income ETFs because of the secondary market liquidity for an underlying asset class that is generally illiquid.[137] Thus, a primary driver for growth in this market is the desire for exposure to over-the-counter traded loans and

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129. *See* Mike Bird, *Could ETFs Fall Into a Liquidity Jam?* WALL ST. J. (Mar. 21, 2018, 11:33 AM), https://www.wsj.com/articles/return-of-volatility-raises-liquidity-question-for-etfs-1521627574.

130. *Cf.* Joseph N. DiStefano, *Will ETFs, Their Prices Dependent on Hedge Fund Billions, Stay Aligned in the Next Market Panic?*, PHILA. INQUIRER (Nov. 28, 2018, 5:17 AM), https://www.inquirer.com/philly/blogs/inq-phillydeals/etfs-vanguard-blackrock-state-street-prices-hedge-fund-billions-market-panic-20181128.html.

131. David Thorpe, *ETF Investors 'Must Accept' Liquidity Risk*, FT ADVISOR (Nov. 8, 2018), https://www.ftadviser.com/investments/2018/11/08/etf-investors-must-accept-liquidity-risk/.

132. David Tuckwell, *Junk Bond ETFs Are Being Sold Short en Masse*, ETF STREAM (Feb. 19, 2018), http://www.etfstream.com/data-snapshot/2955_junk-bond-etfs-are-being-short-sold-en-masse.

133. THE HEISENBERG, *Presenting: The 'New' Doom Loop*, SEEKING ALPHA (Feb. 20, 2018, 8:52 AM), https://seekingalpha.com/article/4148271-presenting-new-doom-loop.

134. *See* discussion *infra* Part IV.

135. *See* Ramaswamy, *supra* note 19, at 1.

136. *See* Chris Flood, *'Big Ticket' Trades Made Possible by Bond ETF Liquidity*, FIN. TIMES (June 17, 2018), https://www.ft.com/content/b5e0bb88-5865-11e8-806a-808d194ffb75.

137. *See* Daniel Zwirn et al., *This Time Is Different, but It Will End the Same Way: Unrecognized Secular Changes in the Bond Market Since the 2008 Crisis That May Precipitate the Next Crisis* (Apr. 29, 2019) (unpublished manuscript) (on file with authors), https://ssrn.com/abstract=3379979.

fixed-income products, which are otherwise illiquid, because of the yield these products can produce.[138] The market could grow even larger; "mortgage-backed securities [are] ripe for transformation" and some see the ETF structure as the vehicle for that change.[139] Furthermore, recent reports estimate that the value of the bond ETF market is expected to surpass $1 trillion by the end of 2019.[140]

The most concerning ETFs under the liquidity illusion framework are corporate and high-yield bond funds.[141] The increasing size and institutional exposure of individual bonds creates "challenges in trading, liquidity and security sourcing," especially considering the fact that fixed-income ETFs are seen as frictionless substitutes for otherwise illiquid fixed-income products.[142] An environment where low interest rates are sustained has also facilitated a surge in post-GFC corporate debt, with recent reports estimating the value of corporate debt to be over $9 trillion, which is about 64% higher than in 2009.[143] Correspondingly, the market for fixed-income ETFs has exploded, with over $97 billion new assets traded in 2018.[144]

The issue with underlying corporate bond ETFs are similar for ETFs that invest in leveraged loans and mortgages.[145] The idea of transforming something that is fundamentally illiquid, like a mortgage, into something liquid, like an ETF that represents mortgage securities, "create[s] a liquidity mismatch" and evokes concerns that are reminiscent of mortgage-backed securities and their contribution to the GFC.[146] According to one market participant: "In 2007, the lie was that

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138. *See* Stephen Gandel, *There's a Time Bomb That's Bigger Than the VIX in the Market*, BLOOMBERG BUSINESSWEEK (Feb. 7, 2018, 2:11 PM), https://www.bloomberg.com/news/articles/2018-02-07/there-s-a-time-bomb-bigger-than-the-vix-in-the-market.

139. Matt Levine, *CEOs Still Don't Like Short-Termism*, BLOOMBERG OP. (June 7, 2018, 11:01 AM), https://www.bloomberg.com/opinion/articles/2018-06-07/ceos-still-don-t-like-short-termism (discussing that while some worry about the liquidity of an MBS ETF, BlackRock predicts growth).

140. Bailey McCann, *Bond ETFs Are On Track to Reach $1 Trillion Mark By the End of the Year*, WALL ST. J. (May 1, 2019, 12:02 PM), https://www.wsj.com/articles/bond-etfs-are-on-track-to-reach-1-trillion-mark-by-the-end-of-the-year-11556726577/.

141. *See* Wolf Richter, *Treacherous Times for Bond Funds Ahead*, WOLF ST. (Nov. 29, 2018), https://wolfstreet.com/2018/11/29/potentially-treacherous-times-for-bond-funds-ahead/.

142. Lee Barney, *Fixed-Income ETFs Used To Address Bond Market Issues*, PLANSPONSOR (Sept. 19, 2018), https://www.plansponsor.com/fixed-income-etfs-used-address-bond-market-issues/.

143. *See* Jeff Cox, *Gundlach's Warning on 'Ocean of Debt' Adds to Worries Over Corporate Bonds*, CNBC (Jan. 14, 2019, 11:26 AM), https://www.cnbc.com/2019/01/14/gundlachs-warning-on-ocean-of-debt-adds-to-worries-over-corporate-bonds.html.

144. *See* ETF PROFESSOR, *Fixed Income ETF Volume Surged in 2018*, MARKETWATCH (Jan. 15, 2019, 12:17 PM), https://www.marketwatch.com/story/fixed-income-etf-volume-surged-in-2018-2019-01-15-12461728.

145. *See* Colby Smith, *Who's Buying Leveraged Loans Anyways?*, FIN. TIMES (Nov. 20, 2018, 3:28 AM), https://ftalphaville.ft.com/2018/11/20/1542706123000/Who-s-buying-leveraged-loans-anyways-/.

146. Levine, *supra* note 139, at 5.

you could take a cornucopia of crap, package it together, and somehow make it AAA. This time, the lie is that you can take a bunch of bonds that trade by appointment, lump them together in an ETF, and magically make them liquid."[147]

ETF liquidity relies on the assumption that market makers and APs will act based on market incentives, despite the lack of contractual obligation to provide liquidity. For instance, the APA that an AP enters into with an ETF sponsor does not provide compensation to the AP directly.[148] APs derive profit from other sources: (i) by acting as dealers; (ii) by earning the bid-ask spread as market makers in the secondary market and profiting off arbitrage opportunities; or (iii) by taking fees as clearing brokers, where APs are paid for "processing creations and redemptions as agents for various market participants," such as investment advisers, hedge funds, proprietary trading firms, and other market makers.[149] Most importantly, an AP does not have a legal obligation to create or redeem ETF shares;[150] an individual sponsor of the ETF will enter into many APAs with different APs with the largest amount of funding in place.[151]

C. Liquidity Wrappers & Market Completion Theory

Liquidity in the ETF secondary market is considered an additive, or enhancement, because it does not require trading in the underlying securities.[152] Therefore, an ETF is essentially a liquidity wrapper for otherwise illiquid underlying assets.[153] This paints ETFs as a favorable by-product of financial innovation, driven by a response to imperfections in the market.[154] Another view of financial innovation is that it originates from financial intermediaries seeking to capture profits by converting risky claims into "safe assets."[155] This conduct is

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147. Randall W. Forsyth, *Corporate Credit Could Be the Next Bubble to Burst*, BARRON'S (Feb. 15, 2019, 11:42 AM), https://www.barrons.com/articles/debt-be-not-proud-danger-in-the-complacency-about-corporate-credit-51550248974.

148. Mara Shreck & Shelly Antoniewicz, *ETF Basics: The Creation and Redemption Process and Why It Matters*, ICI VIEWPOINT (Jan. 19, 2012), https://www.ici.org/viewpoints/view_12_etfbasics_creation.

149. *See* ANTONIEWICZ & HEINRICHS, *supra* note 57, at 1.

150. *See* Hu & Morley, *A Regulatory Framework for ETFs*, *supra* note 15, at 853.

151. *See* ANTONIEWICZ & HEINRICHS, *supra* note 57, at 2–4.

152. *See* SU, *supra* note 10, at 5–6.

153. *See id.* at 10.

154. For a discussion of investor demand factors in financial product innovation, *see* Dan Awrey, *Complexity, Innovation, and the Regulation of Modern Financial Markets,* 2 HARV. BUS. L. REV. 235, 260–67 (2012).

155. *See* Anna Gelpern & Erik F. Gerding, *Inside Safe Assets*, 33 YALE J. ON REG. 363, 363 (2016). Reviewed in depth by Professors Anna Gelpern and Erik F. Gerding, the concept of "safe assets" is a "catch-all term to describe financial contracts that market participants treat as if they were risk free." *Id.* "These may include government debt, bank deposits, and asset-backed securities, among others." *Id.* The Professors argue that despite these assets' perception as safe, there are embedded

commonly called supply-side financial innovation,[156] and it mirrors Hyman Minsky's "financial instability hypothesis," whereby financial firms use innovation to pursue profit opportunities.[157] As illustrated in Minsky's model, which has gained prominence since the GFC,[158] when financial innovation results from financial institutions' focus on profit, markets endogenously destabilize over extended periods of economic tranquility.[159]

Liquidity enhancement as a justification for financial innovation is derived from the market completion theory,[160] which contends that economic risk is managed through the creation of financial products that are optimally distributed to capable risk bearers.[161] Under this theory, Professor Anastasia Nesvetailova has argued that the GFC fostered liquidity illusions and drove investor behavior, contributing more to the crisis beyond the structural and cyclical economic causes that are commonly cited.[162] Relying on Minsky, Nesvetailova posits that liquidity is contingent on the characteristics of tradeable assets,[163] and economic tranquility facilitates instability by fostering a "complex hierarchy of financial commitments."[164] During periods of prosperity, these factors allow risks to be underestimated when financial institutions create and trade financial products.[165] With financial product innovation, "liquidity [is] assumed but never guaranteed," which is illustrated by the GFC and the market's prevalent use of mortgage-backed securities leading up to the crisis.[166]

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sources of instability and distortion because of the legal architecture and political commitments inherent in these assets. *See id.* at 406–10. As a result, they argue there is "no such thing as a risk-free financial contract" and it is only the intervention of the state that allows people to act as if these assets are truly safe. *Id.* at 465.

156. *See* Awrey, *Supply-Side Theory*, *supra* note 45, at 402, 409–10.

157. *See* Hyman P. Minsky, *The Financial Instability Hypothesis* 6 (Levy Econ. Inst. Bard C., Working Paper No. 74, 1992), http://www.levyinstitute.org/pubs/wp74.pdf.

158. *See* Eugenio Caverzasi, *Minsky and the Subprime Mortgage Crisis: The Financial Instability Hypothesis in the Era of Financialization* 3, 15 (Levy Econ. Inst. Bard C., Working Paper No. 796, 2014), https://ssrn.com/abstract=2430259.

159. Minsky, *supra* note 157, at 6; *see also* Nesvetailova, *supra* note 46, at 127.

160. *See* Kenneth J. Arrow, *The Role of Securities in the Optimal Allocation of Riskbearing*, 31 REV. ECON. STUD. 91, 91–96 (1964); Kenneth J. Arrow & Gerard Debreu, *Existence of an Equilibrium for a Competitive Economy*, 22 ECONOMETRICA 265, 265–66 (1954); Robert C. Merton, *Financial Innovation and Economic Performance*, J. APPLIED CORP. FIN. (1992). *See generally* Nesvetailova, *supra* note 46.

161. *See* Nesvetailova, *supra* note 46, at 132.

162. *Id.*

163. *Id.*

164. *Id.* at 136.

165. *Id.*

166. *Id.* at 138.

The seemingly endless possibilities of ETF innovation cause one to wonder whether markets will ever be fully "complete."[167] A recent study by Professors Kevin Pan and Yao Zeng cast additional doubt on the proposition that ETFs are a demand-side "market completion" response.[168] Accordingly, the liquidity mismatch dynamic can lead to "persistent relative mispricing and potential market fragility" between ETFs and underlying bond assets when financial intermediaries act dually as both bond dealers and ETF arbitrageurs.[169] The study notes: "AP arbitrage indeed becomes less effective or even fragile when liquidity mismatch becomes more significant."[170] Further, when acting in dual roles, ETF arbitragers can use primary market redemptions and creations to "unwind their bond inventory imbalances."[171]

The intermediation layers in the ETF ecosystem, and the ETF arbitrage mechanism specifically, may be adding new market inefficiencies, such as relative mispricing, reduced liquidity, and market fragility. It may also generate conflicts of interest for ecosystem participants to potentially withdraw from arbitrage activities.[172] For example, when an AP is acting as both a dealer market maker and an arbitrageur during a time of crisis, there is an inherent conflict that could lead to APs "front running" their own trades when exercising strategic discretion in their own best interests.[173] A May 2019 research report by Moody's Investor Service stressed how important market makers were to ETF investors in providing liquidity in the ETF ecosystem.[174] The report notes that "tech-enabled trading firms dominate the ETF market making space" and if these firms disappeared from the market making environment, it could magnify systemic risk.[175]

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167. *See generally* Alan Greenspan, Chairman, Fed. Res. Bd., Remarks at the Conference on Bank Structure and Competition: Corporate Governance (May 8, 2003) (transcript available at the Bd of Governors Fed. Res. Sys. Archives) (discussing how transparent corporate governance can improve the financial market).

168. *See* Kevin Pan & Yao Zeng, *ETF Arbitrage Under Liquidity Mismatch* 2 (European Systemic Risk Board Working Paper No. 59, 2017), https://EconPapers.repec.org/RePEc:srk:srkwps:201759.

169. *Id.*

170. *Id.* at 50.

171. *Id.*

172. *See id.* at 1.

173. *See* SU, *supra* note 10, at 22; *see also* Hu & Morley, *The SEC and Regulation of ETFs*, *supra* note 14, at 1195 ("Some APs also act as registered market makers, who assume a two-sided obligation to buy and sell ETF shares on a particular exchange. The effectiveness of the arbitrage mechanism in narrowing deviations from NAV depends on such purely voluntary decisions of APs, as well as the activities of market makers and others in the secondary market.").

174. *See* Faid Abdel Massih & Ana Arsov, *Financial Institutions—Global: ETFs Track Liquidity Risk on Top of Asset Performance*, MOODY'S INV. SERV. RES. REP. (May 9, 2019), https://www.moodys.com/research/Moodys-ETFs-ability-to-weather-liquidity-risk-governed-by-its--PBC_1174986.

175. *See id; see also* Rachel Evans, *ETFs Threaten to 'Amplify' Systemic Risk When Liquidity Dries Up*, BLOOMBERG (May 9, 2019) [hereinafter *When Liquidity Dries Up*],

This abandonment will also have a particularly perilous effect on investors who embrace the liquidity wrapper theory and "believe an ETF is more liquid than its holdings."[176] In these conflict scenarios, it is very important to consider these new market inefficiencies when critically assessing the value-add of liquidity wrappers under a market completion theory.[177]

Given the potential conflicts of interest and systemic risks emanating from their role as an intermediary in the ETF ecosystem, it is only natural to wonder whether some type of duty or positive obligation to provide liquidity support should be imposed on APs and other large market makers. Similar duties are already imposed on other market participants; mutual fund investors have federally-protected redemption rights in their shares pursuant to sections 2(a)(32) and 5(a)(1) of the Investment Company Act.[178] The Investment Company Act governs "open-end" management investment companies and establishes that investors in ordinary mutual funds can redeem their shares directly with the fund at net asset value.[179] This provides some protections to retail investors who are least capable of bearing risk.

Historically, money market mutual funds were redeemable at a "stable" net asset value of $1.00 per share.[180] However, to mitigate runs on money-market mutual funds, Post-GFC rules have introduced new floating net asset values for money market mutual funds that invest in corporate debt, which reflect the underlying securities' daily prices

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https://www.bloomberg.com/news/articles/2019-05-09/etfs-threaten-to-amplify-systemic-risk-when-liquidity-dries-up ("Declining bond inventories at the banks has increased the liquidity risk in corporate debt and associated ETFs, 'and is further amplified because the majority of the market making is handles by new entrants with rapidly turning balance sheets.'").

176. Evans, *When Liquidity Dries Up*, *supra* note 175.

177. *See id.* at 3 ("ETF arbitrage may go in the opposite direction than what would be implied by the initial relative mispricing. Specifically, APs may choose to create (redeem) more ETF shares where they have extremely positive (negative) bond inventory imbalances, regardless of the initial price discrepancy. Surprisingly, the model suggests that APs do even more ETF creations and redemptions when bond volatility increases or as the market becomes more illiquid. Intuitively, APs strategically use ETF creations and redemptions not to correct relative mispricings but to unwind bond imbalances, reduce existing inventory risks and facilitate future market-making in their role as bond dealers. In this sense the ETF arbitrage mechanism becomes distorted—creations and redemptions are disconnected from fundamentals (and/or arbitrage opportunities) and gives rise to the possibility of larger relative mispricings. More precisely, the ETF arbitrage is distorted not because APs fail to fully optimize. Instead, APs do optimize, choosing to use creations and redemptions strategically on account of their existing illiquid bond inventory imbalances, thereby potentially violating the designed intention of the ETF arbitrage mechanism.").

178. 15 U.S.C. §§ 80a-2(a)(32), 5(a)(1) (2012).

179. *See* John Morley, *The Separation of Funds and Managers: A Theory of Investment Fund Structure and Regulation*, 123 YALE L. J. 1228 (2013).

180. Kuhu Parasrampuria, *SEC's New Money Market Rules*, 36 REV. BANKING & FIN. L. 2, 2–3 (2016).

rather than a $1.00 stable price.[181] Could imposing a similar, steady redemption value for ETFs and a corresponding duty on these designated APs to provide liquidity support in the secondary market under certain circumstances be warranted? At the very least, this is a question should be investigated by regulators. The subject of market maker fiduciary duty will be explored in the next subsection; this inquiry is one for regulators to be mindful of as the market grows and alarm bells (like the *Moody's* report) continue to sound regarding the importance of APs and market makers to secondary market ETF investors.

D. Discretionary Market Makers or Noise Traders? Algorithmic & High Frequency Trading

The argument that ETF liquidity illusions are overblown (or even non-existent) rests on the assumption that market makers and APs will step in to provide liquidity support during a crisis. The incentives for market makers and APs to provide liquidity support are market-based and there are several approaches they could take. One such approach comes in the form of capturing bid-ask spreads and receiving liquidity rebates from exchanges.[182] Market makers in the ETF market primarily use a maker-taker compensation model where liquidity "makers" are compensated, and liquidity "takers," usually hedge funds or other large block sellers, are charged for reducing it.[183] Maker rebates are then increased for lead market makers who take on additional quoting obligations.[184]

Market makers can also provide secondary market liquidity to ETF investors through conventional trades like limit orders, and for more sophisticated investors, through "step-away" trading off-exchange.[185] The NYSE Arca is currently the top U.S. exchange for ETF trading, with

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181. *Id.* (stating that, in addition to the "floating NAV," the reforms "also impose fees and redemption gates, which temporarily prohibit investors from withdrawing their investments in MMFs.").

182. Stanislav Dolgopolov, *A Two-Sided Loyalty? Exploring the Boundaries of Fiduciary Duties of Market Makers*, 12 U.C. DAVIS BUS. L. J. 31, 32 (2011) [hereinafter *Two-Sided Loyalty*].

183. Andrew Bloomenthal, *What Maker-Taker Fees Mean for You,* INVESTOPEDIA, https://www.investopedia.com/articles/active-trading/042414/what-makertaker-fees-mean-you.asp (last updated Mar. 1, 2018).

184. *See* Phil Bak, *The Big Systemic Market Structure ETF Risk That No One Is Talking About,* THINKADVISOR (Mar. 30, 2018), https://www.thinkadvisor.com/2018/03/30/the-big-systemic-market-structure-etf-risk-that-no-one-is-talking-about/?slreturn=20190106213320; *see also* NYSE ARCA, *Market Making*, https://www.nyse.com/publicdocs/nyse/markets/liquidity-programs/arca_mm_orientation.pdf (last visited Feb. 7, 2019) ("In return for meeting enhanced quoting obligations, LMMs have a fee structure superior to other market participants trading on NYSE Arca.").

185. *Who Are Market Makers and What Is Step-Away Trading?*, ETF.COM, https://www.etf.com/etf-education-center/21020-who-are-market-makers-and-what-is-step-away-trading.html (last visited Aug. 10, 2019).

over a twenty percent market share in U.S. trading volume.[186] ETFs also trade on alternative trading systems, though at a reduced volume.[187] This type of support, however, may not be enough; the traditional market maker industry has lost much its influence in recent years due to the emergence of digital HF trading algorithms,[188] which are often called informal liquidity providers.[189] HF trading is a major player in providing liquidity for ETFs,[190] and the rise of HF trading as a primary market maker has been lamented as facilitating duty-free liquidity.[191] Critics argue that HF trading incurs benefits but not obligations because HF trading "only provide[s] liquidity when the algorithms that they employ determine that the risk reward ratio is tipped in their favor."[192]

However, the ability of HF trading to provide robust ETF liquidity during a crisis is uncertain.[193] For one, it is unclear exactly how HF traders will interact with other market makers during a prolonged ETF liquidity crisis. It is also unclear how the associated costs will impact traditional liquidity providers who may be trading on long-term information.[194] Moreover, HF trading has been criticized as disrupting the price discovery function and reducing the incentives of informed traders because of HF trading's ability to co-locate,[195] subscribe to

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186. *See* Kristen Kaus, *NYSE Arca Remains Leading Exchange for ETFs in 2017*, BUSINESSWIRE (Jan. 10, 2018, 9:00 AM), https://www.businesswire.com/news/home/20180110005309/en/.

187. *See* Laura Tuttle, DIV. ECON. & RISK ANALYSIS, Memorandum on Alternative Trading Systems: Description of ATS Trading in National Market System Stocks 1–2 (Oct. 2013), https://www.sec.gov/marketstructure/research/alternative-trading-systems-march-2014.pdf.

188. *See* Stanislav Dolgopolov, *Regulating Merchants of Liquidity: Market Making From Crowded Floors to High Frequency Trading*, 18 U. PA. J. BUS. L. 651, 658 (2016) [hereinafter *Regulating Merchants*].

189. *Id.* at 659, 663–64.

190. *See* Larry Swedroe, *High Frequency Trading's Impact*, ETF (Feb. 24, 2016), https://www.etf.com/sections/index-investor-corner/swedroe-high-frequency-tradings-impact?nopaging=1.

191. Jennifer Victoria Christine Dean, *Paradigm Shifts & Unintended Consequences: The Death of the Specialists, The Rise of High Frequency Trading & the Problem of Duty-Free Liquidity in Equity Markets*, 8 FIU L. REV. 217, 261 (2012).

192. *Id.*

193. *See* Dolgopolov, *Regulating Merchants*, *supra* note 188, at 693 (discussing the many questions currently existing in the electronic marketplace); *see also* Vikas Raman et al., *Electronic Market Makers, Trader Anonymity and Market Fragility* (Dec. 1, 2012), http://ssrn.com/abstract=2445223.

194. *See id.* at 678, 699.

195. *See* Joseph E. Stiglitz, *Tapping the Brakes: Are Less Active Markets Safer and Better for the Economy?*, 7 (Apr. 2014) (unpublished manuscript) (on file with the Fed. Res. Bank of Atlanta), http://www.frbatlanta.org/documents/news/conferences/14fmc/Stiglitz.pdf; *see also* Andrew Haldane, Speech at the Oxford China Business Forum: Patience and Finance (Sept. 9, 2010), http://www.bis.org/review/r100909e.pdf; Robert A. Jarrow & Philip Protter, *A Dysfunctional Role of High Frequency Trading in Electronic Markets*, 4 (Johnson Sch. Res. Paper Series, No. 08-201, 2011), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1781124; Markus Baldauf & Joshua Mollner, *High-Frequency Trade and Market Performance* 3–4 (Stan. Inst. Econ. Pol'y Res., Working Paper No. 15-017, 2017), https://siepr.stanford.edu/sites/default/files/publications/15-017_0.pdf; Jasmin Gider et al., *High-Frequency Trading and Fundamental Price Efficiency* 7–8, 26–

market data-feeds, and obtain "early access to inside information and trading data."[196] For the ETF market in particular, the primary concern for HF trading acting as a liquidity provider is whether, as the SEC has inquired, HF traders provide "phantom liquidity that disappears when it is most needed by long term investors and other market participants."[197]

Professor Stanislav Dolgopolov has also noted that federal courts have not historically imposed broad fiduciary requirements on market makers to provide liquidity to retail investors.[198] This could change, however, if courts begin recognizing that market makers actually play multiple roles in the market;[199] in addition to acting as a principal on their own account, market makers can also act as underwriters, placement agents, or broker-dealers.[200] Dolgopolov states that federal courts are likely to find an increased duty for market makers in cases where "personalized relationships and relatively illiquid / custom-made securities trade in an informal market."[201] Market makers are also not immune to private rights of action, which is a factor that supports requiring market makers to step up and provide liquidity to the ETF market in a time of crisis.[202]

Market makers are also continually exposed to the risk of "pick-off," which includes the risk of "entering into an unfavorable transaction with a counterparty with superior information."[203] However, this risk is mitigated by the micro time horizons associated with HF trading.[204] Again, market makers will only provide liquidity if it is in their economic best interest to do so, and even if market makers remain in the market during a crisis scenario, they may trade at "inflated [or] grossly

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27 (FIN. RES. NETWORK, WORKING PAPER, 2016) http://firn.org.au/wp-content/uploads/2016/05/High-frequency-trading-adn-fundamentalprice-efficiency-Gider-Schmickler-Westeide.pdf.

196. Gaia Balp & Giovanni Strampelli, *Preserving Capital Markets Efficiency in the High Frequency Trading Era*, 2018 U. ILL. J.L. TECH. & POL'Y 349, 372 (2018).

197. *See* SEC, RELEASE, No. 34-61358, REQUEST FOR COMMENT: EQUITY MARKET STRUCTURE REVIEW, 75 Fed. Reg. 3594, 3608 (Jan. 21, 2010); Paul G. Mahoney & Gabriel Rauterberg, *The Regulation of Trading Markets: A Survey and Evaluation*, 39 (Va. L. & Econ. Res. Paper Ser., No. 2017-07, 2017), https://ssrn.com/abstract=2955112 ("The SEC required the traditional exchanges to open up their quotations to the public, but traders still hide their trading interest using dark trading venues and non-displayed order types.").

198. *See* Dolgopolov, *Two-Sided Loyalty*, *supra* note 182, at 35–36.

199. *Id.*

200. *Id.* at 33–34.

201. *Id.* at 63–64.

202. *See* Stanislav Dolgopolov, *Providing Liquidity in A High-Frequency World: Trading Obligations and Privileges of Market Makers and A Private Right of Action*, 7 BROOK. J. CORP. FIN. & COM. L. 303, 358–59 (2013).

203. Dolgopolov, *Regulating Merchants*, *supra* note 188, at 677–78.

204. *Id.* at 679.

exaggerated prices," similar to what happened with equity index options on Black Monday in 1987.[205]

A recent study using a rational expectations equilibrium model showed that HF traders and other discretionary liquidity traders increase the amount of noise trading—trading with no valuable informational content in valuing the asset.[206] Noise trading causes price inefficiency and a loss of information aggregation,[207] which are exacerbated by publicly available information. This attracts more uninformed noise traders to the market and prevents other valuable, private information from entering the market.[208]

Price, or market, efficiency is the notion that all information about an asset and its underlying, fundamental value is transmitted through the asset's trading price, including the asset's liquidity risk.[209] Thus, as HF trading begins dominating ETF liquidity provisions, one must question the efficacy of ETF prices as a legitimate conveyor of full information, including risk.[210] Further, there is evidence that HF traders and other algorithmic traders use trading strategies that are highly correlated.[211] Therefore, HF traders acting as ETF market makers could generate herding risks,[212] which would only further exacerbate a crisis situation.

E. Liquidity Shortages & Participant Concentration in the Market Maker Ecosystem

Another problem in the modern ETF ecosystem is market concentration. It has been recently estimated that "[e]ighty-seven percent of all allocated ETFs on the [NYSE] are spread out among only five different market making firms."[213] Therefore, a strategic exit or any rogue behavior by a dominant market maker in the ETF market could

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205. Dolgopolov, *Two-Sided Loyalty*, *supra* note 182, at 35 (quotations omitted) ("Black Monday" refers to "when several market makers in equity index options did not trade but allegedly should have or allegedly traded at inflated and grossly exaggerated prices.").

206. Bing Han et al., *Public Information and Uninformed Trading: Implications for Market Liquidity and Price Efficiency*, 163 J. ECON. THEORY 604, 605 (2016) ("Rational expectations equilibrium (REE) models have been the workbench for analyzing financial markets . . . . These models typically introduce 'noise trading' or 'liquidity trading' to prevent the market price from fully revealing private information and to circumvent the 'no trade' problem.").

207. *Id.* at 607.

208. *Id.* at 606.

209. *Id.*

210. *See id.* ("In turn, better liquidity lowers the expected loss of discretionary noise traders thereby attracting more traders to the market and leading to more non-informational trading in the market.").

211. Alain P. Chaboud et al., *Rise of the Machines: Algorithmic Trading in the Foreign Exchange Market,* 69 J. FIN. 2045, 2045 (2014).

212. *See* discussion *supra* Part II on the interaction risk HF trading market makers in ETFs generate.

213. Bak, *supra* note 184.

cause significant disruption.[214] Critics have expressed similar concerns about the role of APs,[215] which perform a dual role in the marketplace by acting as both creator and redeemer in the primary market and as a market maker in the secondary market. This is problematic, critics argue, because AP withdrawal during a crisis would essentially eliminate all of these functions.[216] APs frequently trade in the primary market with many different funds, and their active participation is critical to the market at large.[217] The Bank of France estimates that the number of APs for any given fund is often five or less, which reinforces the importance of an AP's role as an intermediary and validates the concerns relating to market concentration.[218]

Liquidity shortages via concentration risk are a relevant consideration for APs, non-AP market makers, and ETF fund sponsors because an idiosyncratic event for a prominent ETF ecosystem intermediary could trigger a contagion across the market.[219] Relatedly, liquidity concerns increase for the underlying assets' true floating rates as passive ETF funds, and the ecosystem participants who trade and manage them, continue to grow in size.[220]

F. The ETF "Pro-Liquidity" Industry Counterarguments

ETF liquidity illusions are hotly contested and are far from a settled proposition.[221] Industry participants say they trust the market and argue that other APs will replace those who withdraw during a crisis.[222] BlackRock, a firm that naturally benefits from a stable market perception, is adamant that these purported risks are either overblown or non-existent.[223] However, liquidity illusions have been identified as

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214. *Id.*

215. *See* DEUTSCHE BUNDESBANK, *supra* note 40, at 93; *see also* Hu & Morley, *The SEC and Regulation of ETFs*, *supra* note 14, at 1196.

216. *Id.*

217. *Id.* at 94.

218. *See id.*; *see also* GRANT TURNER & VLADYSLAV SUSHKO, WHAT RISKS DO EXCHANGE-TRADED FUNDS POSE?, FIN. STABILITY REV. 133, 138 fig.C4(b), 139 (22nd ed. 2018) (Fr.), https://publications.banque-france.fr/en/financial-stability-review/april-2018.

219. DEUTSCHE BUNDESBANK, *supra* note 40, at 93; 13D RESEARCH, *The ETF Liquidity Question,* MEDIUM: WHAT I LEARNED THIS WEEK (Dec. 13, 2018), https://latest.13d.com/etf-market-crisis-qe-liquidity-passive-investing-6af295f4e667.

220. 13D RESEARCH, *supra* note 219.

221. *See* Trevor Hunnicutt, *Fund Industry Defends Bond ETFs to U.S. Regulators*, REUTERS (Apr. 9, 2018, 3:11 PM), https://www.reuters.com/article/us-usa-sec-bonds/fund-industry-defends-bond-etfs-to-u-s-regulators-idUSKBN1HG2YZ.

222. *See* CENT. BANK OF IR., FEEDBACK STATEMENT ON DP6—EXCHANGE TRADED FUNDS 11 (2018) (Ir.), https://www.centralbank.ie/docs/default-source/publications/discussion-papers/discussion-paper-6/feedback-statement-on-exchange-traded-funds---discussion-paper-6.pdf?sfvrsn=2.

223. *See* BLACKROCK, FEB. 2018 CASE STUDY: ETF TRADING IN A HIGH VELOCITY MARKET 3 (Mar. ed. 2018) [hereinafter BLACKROCK, ETF CASE STUDY]; *see also* BLACKROCK, INDEX INVESTING, *supra* note 95, at 4–5.

potentially forming in equity ETFs;[224] Societe Generale SA recently disclosed results from a liquidity fragility stress test of 16,000 stocks and suggests that several ETFs were exposed to secondary market liquidity risks due to large holdings of particularly vulnerable equities.[225]

BlackRock refutes this study, stating that it uses assumptions "that don't reflect the historic behavior of investors or ETFs."[226] BlackRock also suggests that rampant AP pullout is highly unlikely because other APs would scoop up the arbitrage profit opportunity.[227] This trust placed in APs to mitigate a liquidity crisis has also been cited by other industry participants.[228] In the past, when APs briefly stopped providing liquidity alternative APs and market makers responded.[229] BlackRock also notes that secondary market trading volume in a given fund's underlying securities is much greater than primary market trading volume,[230] an observation in line with the liquidity enhancement argument.[231] Some supporters argue further that the increasing standardization for fixed-income ETFs' underlying bond portfolios serves as an additional safeguard.[232]

The Financial Stability Board also notes that ETF sponsors can rely on credit lines or use cash in a crisis to cover redemptions until the panic has subsided.[233] However, using leverage to subside a panic is a risky

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224. *See* Tautvydas Marciulaitis, *ETF Liquidity Trap Will Get You*, SEEKING ALPHA (July 26, 2017, 12:52 PM), https://seekingalpha.com/article/4090736-etf-liquidity-trap-will-get?page=2; *see also* Sonali Basak & Lananh Nguyen, *Guggenheim's Anne Walsh Sees Liquidity Mismatch in Passive Bond Funds*, BLOOMBERG (Jan. 30, 2018, 12:00 PM), https://www.bloomberg.com/news/articles/2018-01-30/guggenheim-s-walsh-sees-liquidity-mismatch-in-passive-bond-funds.

225. *See* Yakob Peterseil, *BlackRock Hits Back at SocGen's Warning About the ETF Market*, BLOOMBERG (Sept. 11, 2018, 9:24 AM), https://www.bloomberg.com/news/articles/2018-09-11/blackrock-hits-back-at-socgen-alarm-over-etf-market-fragility.

226. *Id.*

227. *See* BLACKROCK, ETF CASE STUDY, *supra* note 223, at 5–6.

228. *See* Scott Longley, *Addressing ETF Liquidity Concerns*, ETF STREAM (Apr. 4, 2019), https://www.etfstream.com/feature/7093_addressing-etf-liquidity-concerns/.

229. *See* ANTONIEWICZ & HEINRICHS, *supra* note 57, at 8, 11; *see also* U.S. DEP'T OF TREASURY, OFFICE OF FIN. RES., ASSET MANAGEMENT AND FINANCIAL STABILITY 11–12 (Sept. 2013), https://www.financialresearch.gov/reports/files/ofr_asset_management_and_financial_stability.pdf.

230. *See* BLACKROCK, ETF CASE STUDY, *supra* note 223, at 1, 6.

231. *See supra* notes 165–71 and accompanying text.

232. *See* Garth Friesen, *ETFs Won't Cause the Next Wave of Panic Selling in the Bond Market*, FORBES (Aug. 14, 2018), https://www.forbes.com/sites/garthfriesen/2018/08/14/etfs-wont-cause-the-next-wave-of-panic-selling-in-the-bond-market/#56e4b86e5ce6.

233. *See* FIN. STABILITY BD, POLICY RECOMMENDATIONS TO ADDRESS STRUCTURAL VULNERABILITIES FROM ASSET MANAGEMENT ACTIVITIES 13–14 (Jan. 12, 2017), http://www.fsb.org/wp-content/uploads/FSB-Policy-Recommendations-on-Asset-Management-Structural-Vulnerabilities.pdf.; *see also* Ashley Lau & Michael Flaherty, *ETF Companies Boost Bank Credit Lines Amid Liquidity Concern*, REUTERS (May 13, 2015, 12:10 AM), https://www.reuters.com/article/us-etfs-credit-expansion-insight/etf-companies-boost-bank-credit-lines-amid-liquidity-concern-idUSKBN0NY0A720150513.

proposition.[234] Additionally, most ETFs are not cash redeemable because only the underlying securities are transferred to the AP in exchange.[235] It is also theoretically possible that investors can self-manage risk exposures by closely scrutinizing the liquidity of the underlying securities prior to investing in an ETF.[236] A recent survey undertaken by the International Organization of Securities Commissions (IOSCO) suggests that industry participants generally consider ETFs to be safer than mutual funds because of secondary market trading options and the in-kind redemption mechanism.[237] IOSCO also points out that the ability to prevent a liquidity mismatch depends on the ETF sponsor establishing prudent liquidity management tools and practices.[238]

Another supporting point of view that ETFs provide an additional layer of liquidity is that the underlying assets are only lightly traded, or not traded at all in some cases.[239] In such an instance, the value of the underlying asset is the trading signal not the price. ETF supporters further argue that ETFs are superior investment vehicles for underlying illiquid assets due to the additional layer of liquidity and price discovery function provided through ETF secondary market trading.[240] For example, when the Greek stock market fell twenty-three percent during a five-week closure in 2015 due to political and regional uncertainty, a specialized U.S. ETF tracking the Greek market (Global X's GREK ETF) continued trading.[241] When the Greek market reopened, the prices of its market and stock were still in line with the GREK ETF price.[242]

Regarding the fixed-income ETF market, one portfolio manager argues that bond ETFs are safer than bond mutual funds because "[i]f liquidity of the underlying asset class was a concern and you wished to exit a traditional bond fund, your redemption would be at the discretion

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234. *See* Bird, *supra* note 129.

235. Jennifer Ryan Woods, *Experts Say Bond ETF Liquidity Concerns Are Overblown*, FORBES (May 18, 2015), https://www.forbes.com/sites/jenniferwoods/2015/05/18/experts-say-bond-etf-liquidity-concerns-are-overblown/#38a2baa26091.

236. *See* RISK.NET, INSTITUTIONAL ETF TRADING: LIQUIDITY IMPROVING, TRADE SIZES GROWING 5 (Q4 ed. 2018), https://www.janestreet.com/static/pdfs/JaneStreet_Inst_ETF_Trading_Survey_2018.pdf?utm_source=website&utm_medium=download_button&utm_campaign=trading-survey-2018; *see also* John Manganaro, *ETF Costs, Liquidity in Focus for Institutional Investors,* PLANSPONSOR (Oct. 12, 2018), https://www.plansponsor.com/etf-costs-liquidity-focus-institutional-investors/.

237. *See* BD. OF THE INT'L ORG. OF SEC. COMM'NS, RECOMMENDATIONS FOR LIQUIDITY RISK MANAGEMENT FOR COLLECTIVE INVESTMENT SCHEMES: FINAL REPORT 23–24 (Feb. 2018), http://www.iosco.org/library/pubdocs/pdf/IOSCOPD590.pdf.

238. *Id.* at 23.

239. Corey Hoffstein, *Making the Case for Using ETFs to Track Illiquid Markets*, FORBES (Oct. 6, 2016, 10:30 AM), https://www.forbes.com/sites/greatspeculations/2016/10/06/making-the-case-for-using-etfs-to-track-illiquid-markets/#1fa3bbce7f85.

240. *Id.*

241. *Id.*

242. *See id.*

of the fund provider and in extremis, you may find yourself gated."[243] With an ETF, investors can at least sell on the secondary market and they are not stuck to only dealing with the ETF sponsor or AP.[244] Further, the "gradual electronification of fixed-income trading" has been cited as a factor that will improve liquidity for both bonds and fixed-income ETFs, thereby reducing liquidity illusion risks.[245]

IV. CASE STUDIES: ABSENT ARBITRAGEURS & DISCRETIONARY LIQUIDITY FAILURE

History has a habit of repeating itself, and as philosopher George Santayana famously remarked: "[T]hose who cannot remember the past are condemned to repeat it."[246] Two financial market episodes are worthy of investigation when assessing interaction effects, liquidity illusions, and reliance on discretionary actors for ETF investment and trading: the impact of portfolio insurance products during the Black Monday crash of October 1987 and the market failure for auction rate securities (ARS) during the GFC. Several parallels can be drawn between these two episodes and growing concerns in the ETF market; discretionary liquidity is fragile in a crisis because intermediaries do not have redemption obligations and arbitrageurs are unreliable.

A. Black Monday & the Failure of Portfolio Insurance

The event that is now referred to as "Black Monday" by market historians occurred on Monday, October 19, 1987.[247] On Black Monday, investors saw the Dow Jones Industrial Average (DJIA) lose over twenty percent of its value—the largest single day decline in U.S. history.[248] Various theories have attempted to explain what caused Black Monday, with many pointing to the impact of globalization.[249] The Federal Reserve Bank of Chicago stated that "international investors had become increasingly active in US markets, accounting for some of the rapid pre-crisis appreciation in stock prices."[250] Other theories include:

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243. Henry Cobbe, *Concerned About Liquidity? Stick to Bond ETFs*, SEEKING ALPHA (May 5, 2019, 3:03 PM), https://seekingalpha.com/article/4260276-concerned-liquidity-stick-bond-etfs.

244. *Id.*

245. Evans, *When Liquidity Dries Up*, *supra* note 175.

246. *See* Matthew Caleb Flamm, *George Santayana (1863-1952)*, INTERNET ENCYCLOPEDIA OF PHIL., https://www.iep.utm.edu/santayan/ (last visited Aug. 12, 2019).

247. *See* Lewis D. Solomon & Howard B. Dicker, *The Crash of 1987: A Legal and Public Policy Analysis*, 57 FORDHAM L. REV. 191 (1988).

248. *See* Troy Segal, *What Causes Black Monday: The Stock Market Crash of 1987?*, INVESTOPEDIA (Mar. 20, 2019), https://www.investopedia.com/ask/answers/042115/what-caused-black-monday-stock-market-crash-1987.asp.

249. *Id.*

250. Donald Bernhardt & Marshall Eckblad, *Stock Market Crash of 1987*, FED. RES. HIST. (Nov. 22, 2019), https://www.federalreservehistory.org/essays/stock_market_crash_of_1987#what.

a record number of margin calls;[251] trading system issues;[252] and "difficulty gathering information in the rapidly changing and chaotic environment."[253] In the seven months preceding the crash, global investment in U.S. markets caused the DJIA to appreciate forty-four percent, evoking "concerns of an asset bubble."[254] The fallout was exacerbated by certain structural flaws, including trade-clearing protocols in both securities and derivatives markets, which were later subject to regulatory overhaul.[255]

Another factor that likely amplified the Black Monday crisis was an innovative product called portfolio insurance, which was designed to insulate investors from a market crash.[256] In order to offset the declining value of their portfolios, those who purchased portfolio insurance, which were primarily insurance companies and mutual and pension funds, agreed to "short S&P 500 futures if the stock market fell by a certain amount."[257] The 1988 Presidential Task Force on Market Mechanisms suggested that this concerted effort, stemming from portfolio insurance strategies, facilitated the crisis and "ignited mechanical, price-insensitive selling by a number of institutions . . . and mutual fund groups."[258]

Portfolio insurance was designed to mirror a put option, thereby allowing investors to "preserve upside gains but limit downside risk."[259] It was strategically enacted through computer modeling programs that calculated "optimal stock-to-cash ratios at various market prices."[260]

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251. Mark Carlson, FED. RES. BD., 2007-13, A BRIEF HISTORY OF THE 1987 STOCK MARKET CRASH WITH A DISCUSSION OF THE FEDERAL RESERVE RESPONSE *in* FINANCE AND ECON. DISCUSSION SERIES, DIV. OF RES. STAT. & MONETARY AFFAIRS (Nov. 2006), at 11–12.

252. *See id.*

253. *See id.* at 2.

254. Bernhardt & Eckblad, *supra* note 250.

255. *Id.* ("At the time of the crisis, stock, options, and futures markets used different timelines for the clearing and settlements of trades, creating the potential for negative trading account balances and, by extension, forced liquidations. Additionally, securities exchanges had been powerless to intervene in the face of large-volume selling and rapid market declines. After Black Monday, regulators overhauled trade-clearing protocols to bring uniformity to all prominent market products. They also developed new rules, known as circuit breakers, allowing exchanges to halt trading temporarily in instances of exceptionally large price declines."); *see* Jerry W. Markham & Rita McCloy Stephanz, *The Stock Market Crash of 1987—The United States Looks at New Recommendations*, 76 GEO. L. J. 1993; Lawrence Harris, *The Dangers of Regulatory Overreaction to the October 1987 Crash*, 74 CORNELL L. REV. 927 (1989).

256. *See* Anora M. Gaudiano, *Here's One Factor that Amplified the 1987 Stock-Market Crash*, MARKETWATCH (Oct. 19, 2017, 7:01 AM), https://www.marketwatch.com/story/heres-one-key-factor-that-amplified-the-1987-stock-market-crash-2017-10-16.

257. Matt Maley, *The Real Reason for the 1987 Crash, as Told by a Salomon Brothers Veteran*, CNBC (Oct. 16, 2017, 4:19 PM), https://www.cnbc.com/2017/10/16/cause-of-black-monday-in-1987-as-told-by-a-trader-who-lived-through-it.html.

258. *See* NICHOLAS F. BRADY, CHAIRMAN, GPO-1988-199-302, PRESIDENTIAL TASK FORCE ON MARKET MECHANISMS: REPORT (1988), at 15 [hereinafter BRADY COMMISSION].

259. Carlson, *supra* note 251, at 4.

260. *Id.*

Most portfolio insurers adjusted ratios through a process called "dynamic hedging," where, as stock prices fell, an increasing number of futures-contracts were sold to offset portfolio losses.[261] Model recalculation and portfolio adjustment were costly, so models were updated periodically and trading took place in batches.[262] Futures were traded instead because they were cheaper than stock trading, and the institutions that provided the portfolio insurance did not have the ability or authority to trade their clients' portfolios.[263] Further, during Black Monday, the simultaneous use of portfolio insurance by investors, who were among the day's largest sellers, interacted with other market participants to accelerate the price decline and increase downward selling pressure.[264]

A related concern was cited by the SEC in its Black Monday investigative report: non-portfolio insured investors had difficulty ascertaining how much selling was related to portfolio insurance and how much was from other market participants, and this opacity made corrective arbitrage difficult to execute.[265] Another problem with portfolio insurance was that futures contract buyers reacted by demanding deep discounts and, concurrently, "[hedging] their positions by selling the underlying stocks."[266] The combination of these situations contributed to pro-cyclical downward pressure on the market.

Adding to the interaction fall-out were large institutions who, anticipating a portfolio insurance sell-off and a surge in mutual fund redemptions, acted quickly to try and pre-empt the market sell-off.[267] This created a cascade effect,[268] as well as a downward feedback loop; portfolio insurers were motivated to sell because other participants were selling, which prompted more selling by portfolio insurers.[269] Ironically, it appears that a financial innovation that was designed to

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261. *See* Floyd Norris, *A Computer Lesson Still Unlearned*, N.Y. TIMES (Oct. 18, 2012), https://www.nytimes.com/2012/10/19/business/a-computer-lesson-from-1987-still-unlearned-by-wall-street.html.

262. *See* Beatrice Garcia, *An Appraisal: Portfolio Insurance Could Fuel Stocks' Fall, Critics Say,* WALL ST. J., Oct. 12, 1987, at 43.

263. Carlson, *supra* note 251, at 4.

264. *Id.* at 15–16.

265. *See* David S. Ruder, Chairman, SEC, Remarks before Keidanren: The October 1987 Market Break 3-14 to 3-16 (Feb. 18, 1988) (transcript available at https://www.sec.gov/news/speech/1988/021888ruder.pdf).

266. Norris, *supra* note 261.

267. *See* BRADY COMMISSION, *supra* note 258, at 29.

268. 3 ROBERT SCHILLER, PORTFOLIO INSURANCE AND OTHER INVESTOR FASHIONS AS FACTORS IN THE 1987 STOCK MARKET CRASH *in* NBER MACROECONOMICS ANNUAL 288 (Stanley Fischer ed., 1988) ("The mechanism they referred to has been called a 'cascade effect.' An initial price decline starts a vicious circle by causing portfolio insurers to sell, causing further price declines, causing portfolio insurers to sell again, and so on.").

269. Carlson, *supra* note 251, at 15. *Compare* the feedback loop created by portfolio insurance *with* the feedback loop created by ETF liquidity illusions *supra* Part III(i).

mitigate risk actually exacerbated a crisis instead. Those fearing ETF liquidity death spirals see an analogous application; a financial instrument that is designed to provide liquidity could in fact amplify a run on liquidity and create a pro-cyclical sell-off for both the ETF and the underlying assets, which could cascade to other asset classes as well.

Another parallel between ETFs and portfolio insurance that has proven to be a fallacy is the generally accepted belief that if futures selling drives too steep, discount arbitrageurs would step in and purchase the clearly undervalued stocks.[270] Participants who know the true value of underlying assets should be able to step in but, in 1987, there was an uncertainty about what the true value was and market participants were not active when they are were needed.[271]

Additionally, opacity abetted the portfolio insurance crisis, as many investors did not fully comprehend the large number of assets that were potentially affected.[272] Financial market opacity emanates from many sources including a lack of knowledge on the part of participants, complex products and strategies, and "complexity in the network of actors involved in the strategy."[273] Like portfolio insurance, ETFs could also be affected by information opacity regarding the complexity of the product, the participant network that sustains it, noise generated by HF trading, and difficulty ascertaining signals in a pro-cyclical crisis.

As previously mentioned, many industry participants believe that AP withdrawal in an ETF liquidity crunch will be met with new AP entrants who seek to profit from the arbitrage opportunity.[274] However, if the history of portfolio insurance is a guide, then this is not a certain proposition. Moreover, the ETF market has the same potential for over-reliance on program trading,[275] and uncertainties linger about the extent to which we can truly rely on risk modelling during a crisis.[276] Quant-trading strategies and algorithmic trading reliance, especially

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270. *See* Norris, *supra* note 261.

271. *See* Carlson *supra* note 251, at 11 ("Usually, index arbitragers would use this as an opportunity to buy in the futures market and sell in the cash market, which would mitigate pressure in the futures market. However, index arbitrage traders were not active, due, in part, to the NYSE's restrictions regarding use of the DOT system. This unusual pattern served to partly decouple prices in the futures and cash market.").

272. *See* JACOBS, *supra* note 39, at 270–71.

273. *Id.* at 270.

274. *See* BLACKROCK, ETF CASE STUDY, *supra* note 223.

275. *See* Norris, *supra* note 261; *see also* Carlson, *supra* note 251, at 15–16.

276. *See* Erik F. Gerding, *The Dangers of Delegating Financial Regulation to Risk Models*, 29 No. 4 BANKING & FIN. SERVICES POL'Y REP. 1 (2010).

when coupled with volatile ETF varieties (like those using leverage) continue to be a cited concern for many.[277]

A 2013 report from the Federal Reserve Board has identified additional parallels between portfolio insurance and leveraged and inverse ETF trading that could lead to destabilization and cascade market pressure during periods of volatility.[278] This is a result of the procyclical, daily rebalancing of stock-to-cash ratios and directional "selling in a declining market and buying in a rising market" for these products.[279] Further, like portfolio insurance, the rebalancing of portfolios in ETFs is mechanical and attracts anticipatory trading by traders looking to pre-empt orders.[280]

B. Auction Rate Securities & the Global Financial Crisis

The GFC highlights how reliance on intermediated discretionary liquidity providers can be risky in a crisis because market discipline can fail when it is most needed.[281] This occurred in the ARS failure.[282] The comparison between ETF liquidity illusions and the failure of the ARS market was first noted in 2015 by investment manager Howard Marks.[283] An ARS is a bond that has a periodically adjustable interest rate and is issued through a Dutch auction by municipalities and corporations.[284]

Prior to the GFC, ARSs offered issuers long-term borrowing at short-term floating rates,[285] and they were attractive to investors

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277. Doug Kass, *Financial Weapons of Mass Destruction Are Increase*, REAL MONEY (Feb. 23, 2019, 12:00 PM), https://realmoney.thestreet.com/investing/stocks/kass-financial-weapons-of-mass-destruction-are-increasing-14875209.

278. *See* Tugkan Tuzun, *Are Leveraged and Inverse ETFs the New Portfolio Insurers?*, FED. RESERVE BD. (June 13, 2013), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2340616.

279. *Id.*

280. *Id.* at 2.

281. *See* Daniel K. Tarullo, Governor, Bd. Of Governors Fed. Res. Sys., Opening Remarks at The Center for American Progress and Americans for Financial Reform Conference (July 12, 2016) (transcript available at https://www.federalreserve.gov/newsevents/speech/tarullo20160712a.htm); *see also* David Min, *Understanding the Failures of Market Discipline*, 92 WASH. U. L. REV. 1421, 1444–68 (2015).

282. *Id.*

283. *See* Memorandum from Howard Marks on Liquidity to Oaktree Capital Management, L.P. 8–11 (Mar. 25, 2015) (on file with Oaktree Capital Management, L.P.), https://www.oaktreecapital.com/docs/default-source/memos/2015-03-25-liquidity.pdf?sfvrsn=2; *see also* Joe Prendergast, Craig McCann & Eddie O'Neal, *Auction Rate Securities*, 16 No. 4 PIABA B.J. 383 (2009); Stephen Foley, *The Alchemy of ETF Liquidity Is an Illusory Promise*, FIN. TIMES (Apr. 4, 2015), https://www.ft.com/content/cc44cd76-d918-11e4-b907-00144feab7de; James Chen, *Auction Rate Security (ARS)*, INVESTOPEDIA, https://www.investopedia.com/terms/a/auction-rate-security.asp (last updated Apr. 9, 2019).

284. Chen, *supra* note 283.

285. Marc L. Ross, *The ARS Debacle: The Forgotten Crisis of 2008*, CFA INST.: ENTERPRISING INV. (Jan. 31, 2017), https://blogs.cfainstitute.org/investor/2017/01/31/the-ars-debacle-the-forgotten-crisis-of-2008/.

because they were considered "liquid, short-term, cash-equivalent" investments (like commercial paper) despite actually being floating-rate, fixed-income securities.[286] Sellers brought their ARSs to auction, where prospective purchasers looking to ARSs as money market substitutes supplied competitive bids.[287] ARS buyers would indicate their desired purchase price and the lowest acceptable interest rate they would pay.[288] At the close of the auction, the clearing rate was set, which determined the rate all investors would receive until the next auction,[289] and all investor bids placed above the clearing rate were not filled.[290] If the clearing rate was higher than the maximum issuer contractual rate, then the auction failed, the coupon rate defaulted to the maximum rate in the issuer's prospectus, and the investors held on to their securities.[291]

Prior to the GFC, major financial institutions ran the ARS auctions and were relied on to provide liquidity support. ARS liquidity was "entirely dependent on the presence of sufficient orders to buy outstanding ARS," all of which was contingent on a contractual ceiling that the issuer was required to pay.[292] Thus, investors had no put option available to sell their securities, and the short-term nature of the investment required the "continual success of the period auction."[293] However, the financial institutions withdrew during the GFC and ARS auctions subsequently failed.[294] An ARS auction failure meant there were "insufficient bidders to cover the number of securities offered for sale,"[295] leaving a wide supply of nearly-worthless ARSs.[296]

It was previously believed that broker-dealer auction sponsors would step in and provide a backstop for auctions in the event of failure by placing bids just below the contractual maximum and allowing auctions to clear.[297] Instead, auction sponsors withdrew from the

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286. *See* Prendergast et al., *supra* note 283, at 383.

287. *See* Jacqueline Doherty, *Auction-Rate Securities: Still Frozen in Time*, BARRON'S (Mar. 28, 2015), https://www.barrons.com/articles/auction-rate-securities-still-frozen-in-time-1427505026.

288. *See* Adrian D'Silva et al., *Explaining the Decline in the Auction Rate Securities Market*, 256 CHI. FED LETTER, Nov. 2008, at 2.

289. *Id.* at 2.

290. *Id.*

291. Prendergast et al., *supra* note 283, at 383.

292. *Id.*

293. *Id.*

294. *See* Brendan P. Tracy, *If It's Broken, Sometimes It Can't Be Fixed: Why the Auction Rate Securities Market Was Faulty From Its Inception and How Broker-Dealers Caused Its Downfall*, 4 BROOK. J. CORP. FIN. & COM. L. 297, 307 (2010).

295. D'Silva et al., *supra* note 288, at 2.

296. *See* Gerald J. Russello, *The Rise of the Financial Economy*, 2 AM. AFF. J. (2018), https://americanaffairsjournal.org/2018/08/the-rise-of-the-financial-economy/.

297. *Id.*

market during the crisis,[298] thus failing to make good on their implicit guarantee that they would intervene to ensure auction success. This subjected issuers to penalties for the inability to reset rates.[299] Banks also withdrew from the ARS market because they were exposed to significant credit losses and mortgage write-downs at the time and were thus "less willing to commit their money to supporting auctions in danger of failing."[300] These reactions left investors holding illiquid and devalued securities they once thought were like cash.[301] As such, the ARS failure resulted in settlements of over $50 billion to aggrieved investors who alleged the products and liquidity risks were misleading or not adequately described.[302]

The ETF market echoes some of the follies of the ARS failure.[303] First, there was a perception that ARS would be liquid, which later proved illusory when the intermediaries who were relied on to support the auction withdrew from the process. Because intermediaries only supported the auction when it was in their best interest to do so, ARSs turned out to be a case of *discretionary* liquidity. This is similar to some of the expressed fears with ETFs—that the APs and other market makers, particularly those run by computer algorithms, will stop providing liquidity support to retail investors in the secondary market, thus backing out of the ETF market and redemption process when it is in their best economic interest to do so.

V. CONCLUSION

This Article has shown that ETFs have significant potential to destabilize markets, despite their benefits. As the case studies show, Wall Street will occasionally create new financial products that rely on discretionary actors in intermediated structures to provide perpetual liquidity. These products may combine leverage, complexity, and structural opacity to further decrease financial stability,[304] while simultaneously generating pro-cyclical market accelerations because of the complex interactions of market participants in a crisis. Despite the calming voices from the ETF industry, history illustrates that ETFs are likely not immune to this phenomenon; discretionary liquidity and arbitrage reliance is not always there when you need it.

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298. *See* Amod Choudhary, *Auction Rate Securities = Auction Risky Securities*, 11 DUQ. BUS. L. J. 23, 31 (2008).

299. D'Silva et al., *supra* note 288, at 2.

300. *Id.*

301. *See* Ross, *supra* note 285.

302. *See* Press Release, SEC, Auction Rate Securities (July 1, 2011), https://www.sec.gov/investor/ars.htm.

303. *See* Foley, *supra* note 283.

304. *See* JACOBS, *supra* note 39, at 4–5, 270–71.

Hyman Minsky and others have prominently argued that financial innovation itself can facilitate future market crises.[305] From portfolio insurance and dynamic hedging in 1987, to securitizations and collateralized debt obligations in the GFC, financial product innovation seems to consistently show up as a central factor in a crisis, driving market instability while fostering more complex intermediary connection points.[306] When assessing financial technology and innovation, it is worthwhile for lawmakers and regulators to consider the impact of deepening complexity in oversight structures.

Bank of England Chief Economist Andrew Haldane, in his well-known "dog and the frisbee" speech, makes a strong case that the most appropriate regulatory response to financial complexity is not more complexity but rather to "simplify and streamline the control framework."[307] When it comes to ETF risk disclosure, perhaps more *isn't* more; instead we should heed Haldane's advice and look to "cutting back the thicket, re-sizing the haystack."[308] One of the ways to simplify the ETF regulatory framework and clarify its unique risks is to heed Professors Hu and Morley's proposal of a comprehensive approach to ETF regulation that focuses on the arbitrage mechanism.[309]

Similarly, regulatory regimes can facilitate what Professor Richard Epstein describes as uncertain "cumulative and interactive effects."[310] Any attempt at regulatory simplicity begs an inquiry into the purpose of governing legislation for a given domain. To this end, financial regulation has been advocated as increasingly requiring systemic considerations.[311] The history of financial product innovation has historically shown that this necessitates a public goods analysis since actions rationally undertaken by individuals can facilitate collective

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305. *See* HYMAN MINSKY, CAN "IT" HAPPEN AGAIN? ESSAYS ON INSTABILITY AND FINANCE (1ST ed. 1982); *see also* HYMAN MINSKY, STABILIZING AN UNSTABLE ECONOMY (1ST ed. 1986); Hyman Minsky, *Financial Instability Revisited: The Economics of Disaster*, 3 REAPPRAISAL OF THE FED. RES. DISCOUNT MECHANISM 97 (1972); Randall L. Wray, *Global Financial Crisis: A Minskyan Interpretation of the Causes, the Fed's Bailout, and the Future,* (Levy Econ. Inst. Bard C., Working Paper No. 711, Mar. 30, 2012), https://ssrn.com/abstract=2031721.

306. *See* Satyajit Das, *WMD Old and New Primed for Next Financial Crisis*, BLOOMBERG OP. (May 8, 2018), https://www.bloomberg.com/opinion/articles/2018-05-09/wmd-old-and-new-primed-for-a-market-meltdown.

307. *See* Andrew G. Haldane & Vasileios Madouros, Speech at the Federal Reserve Bank of Kansas City's 366th Economic Policy Symposium: The Changing Policy Landscape (Aug. 31, 2012) (transcript available at https://www.bis.org/review/r120905a.pdf).

308. *Id.*

309. *See* Hu & Morley, *The SEC and Regulation of ETFs*, *supra* note 14; *see also* Hu & Morley, *A Regulatory Framework for ETFs*, *supra* note 15.

310. RICHARD A. EPSTEIN, SIMPLE RULES FOR A COMPLEX WORLD 3 (1st ed. 1995).

311. *See* STEPHEN MORRIS & HYUN SONG SHIN, FINANCIAL REGULATION IN A SYSTEM CONTEXT *in* BROOKINGS PAPERS ON ECON. ACTIVITY 229 (Brookings Inst. Press et al. eds., 2008).

instability.[312] ETFs are no different, and this can and should be addressed before it is too late.

There are good reasons to avoid an overly burdensome response to market complexity with heightened regulatory complexity, particularly when regulation itself could induce nonlinear effects or facilitate economic rent seeking,[313] and thus exacerbate a future crisis.[314] As Professor Epstein has documented, "there has been a massive increase in the frequency and complexity of the legal rules that govern society" and this is "neither inevitable nor desirable."[315] Unfortunately, regulatory complexity has certainly increased in financial markets, bringing with it a greater potential for unintended consequences.[316] For example, the SEC's recent transaction fee pilot program for national market system stocks,[317] which includes ETFs, has attracted recent criticism and litigation from several exchanges. The transaction fee pilot program imposes temporary pricing restrictions on exchanges and ARSs with the goal of "improving pricing, liquidity, and trade execution quality."[318]

Another idea, proposed by Professor Steven Schwarcz, is whether a government "market liquidity provider of last resort" could be established.[319] Such a mechanism might reduce the consequences of failure associated with temporary market panics by providing "functional modularity" to the crisis episode and preventing spillover

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312. *Id.* at 232.

313. *See* Cheng-Yun Tsang, *The Seven Deadly Sins of the Contemporary Financial System*, 37 REV. BANKING & FIN. L. 359, 360–61 (2017) ("Modern financial markets operate like a complex adaptive ecosystem. Moreover, like an ecosystem, policy or regulatory change is often influenced by complexity science elements, such as nonlinearity or emergence. This means that regulatory efforts intended to affect market actors' behaviors may lead to an unexpected outcome, or steer them in an unintended direction.").

314. *See* Wallace C. Turbeville, *A New Perspective on the Costs and Benefits of Financial Regulation: Inefficiency of Capital Intermediation in a Deregulated System*, 72 MD. L. REV. 1173, 1174, 1203 (2013) ("Modern capital and derivatives markets are exceedingly complex and involve multiple methods for extraction of value by the financial sector that must be paid for by the productive economy. . . . [T]he amount extracted is demonstrably far higher than historic data or reasoned analysis suggests could possibly be reasonable. Therefore, the rents extracted by the financial sector for intermediating capital investment are inefficiently high.").

315. EPSTEIN, *supra* note 310, at 21.

316. *See* Steven L. Schwarcz, *Regulating Complexity in Financial Markets,* 87 WASH. U. L. REV. 211, 265 (2009).

317. *See* Transaction Fee Pilot for NMS Stocks, 83 Fed. Reg. 13008 (proposed Mar. 14, 2018) (to be codified at 17 C.F.R. pt. 200, 242).

318. *See* Bibb Strench, *SEC's NMS Pilot Program of Vital Interest to ETFs*, THOMPSON HINE: ETF UPDATE (May 10, 2018), https://www.thompsonhine.com/publications/secs-nms-pilot-program-of-vital-interest-to-etfs ("Data from the Pilot will be used to inform the SEC, market participants and the industry about the effects of transaction-based fees and rebates under the three models. . . . The Pilot also will require the national securities exchanges to prepare and post on their websites public and downloadable data including aggregated and anonymized order routing data (updated monthly), and an XML dataset of standardized information on their transaction fees and rebates.").

319. *See* Schwarcz, *supra* note 316, at 247–50.

effects to other financial systems.[320] There are many considerations before resorting to such a measure, such as whether APs and market makers should be required to provide liquidity support, and to what extent ETF ecosystem participants should pay fees to the government entity providing liquidity.[321]

Professor Schwarcz maintains that the cost of this liquidity provider would be minimal when compared to the lender-of-last-resort function of the Federal Reserve during the GFC. Had such an entity been in existence before the GFC, much of the damage of the subprime crisis could have been "restricted in scope and lessened in impact."[322] A market liquidity provider of last resort would theoretically provide modularity and a floor to the short-term panicked market by investing in securities of panicked markets in contexts where the value of these securities deviate drastically from the intrinsic value of the underlying assets.[323] This would provide a floor to the short-term panicked market.[324]

Professor Schwarcz also suggests that concerns of taxpayer burden and moral hazard are effectively mitigated because a market liquidity provider of last resort will only intervene when it sees a profit opportunity.[325] One naturally wonders why private entities would not undertake the same arbitrage activity, given the obvious profit potential. But, as this Article has shown, the behavior of private intermediaries in a crisis is unpredictable. Black Monday showed that arbitrageurs are sometimes nowhere to be found when a perfect storm crystalizes around panicked selling, interaction risks, contagion, information cascades, and asymmetry. Further, the costs of acting during a panic are both financial and reputational.[326] At the same time, there is no certainty that the government will be right in its interventional timing either.

New financial products can be beneficial, but they can also destabilize markets. The benefits of ETFs have facilitated a massive

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320. *See id.* at 215–16; *see also id.* at 247–48 ("One such possible approach is to establish a governmental entity to act, if needed, as a market liquidity provider of last resort . . . in order to more loosely couple the feedback effects. This approach takes inspiration from chaos theory, which recognizes that failures are almost inevitable in complex systems, and that successful systems are those in which the consequences of a failure are limited. . . . A market liquidity provider would work in much this same way, providing functional 'modularity' to limit the consequences of financial-market failure by directly investing in securities of panicked markets. Financial markets rely critically on the supply of liquidity in the form of credit. If a failure deprives a particular market of liquidity, a market liquidity provider can restore liquidity before that market collapses and endangers other financial markets.").

321. *See id.* at 216.

322. *Id.*

323. *Id.* at 248–49.

324. *Id.* at 252.

325. *Id.*

326. *Id.* at 255.

post-GFC surge in market capitalization. Given this trend, ETFs could likely house a sizeable share of American retirement savings in the future and continue as a preferred vehicle for institutional investors, such as HF traders and robo-advisors. How ETF liquidity will play out in a full-blown future crisis is unknown. The arguments advocated by BlackRock and other industry participants may prove prescient, but this will only be known over time.

It is impossible to predict how or when a new crisis will happen. Today, ETFs are a critical, yet significantly understudied, segment of consumer finance that deserves closer academic and regulatory scrutiny due to the growth in size and importance of ETFs as an asset class; how they connect retail investors, pension funds and Wall Street; the potential instabilities ETFs could create; and the long-term uncertainty that passive investing will have on the economy. Importantly, ETFs have not undergone a true liquidity test. Part II of this study, forthcoming, will continue an investigation into ETF market instabilities by introducing other interaction risks that are manifested by the potential for investor herding and the transmission of informational inefficiencies throughout the ETF operational ecosystem.