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Digital Market Perfection

Rory Van Loo
Boston Univeristy School of Law

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Google's, Apple's, and other companies' automated assistants are increasingly serving as personal shoppers. These digital intermediaries will save us time by purchasing grocery items, transferring bank accounts, and subscribing to cable. The literature has only begun to hint at the paradigm shift needed to navigate the legal risks and rewards of this coming era of automated commerce. This Article begins to fill that gap by surveying legal battles related to contract exit, data access, and deception that will determine the extent to which automated assistants are able to help consumers to search and switch, potentially bringing tremendous societal benefits. Whereas observers have largely focused on protecting consumers and sellers from digital intermediaries' market power, sellers like Amazon, Comcast, and Wells Fargo can also harm consumers by obstructing automated assistants. Advancing consumer welfare in the automated era requires not just consumer protection, but digital intermediary protection.

The Article also shows the unpredictable side of eliminating switching costs. If digital assistants become pervasive, they could gain the ability to rapidly direct millions of consumers to new purchases whenever a lower price or new innovation becomes available. Significantly accelerated consumer switching—what I call hyperswitching—does not inevitably harm society. But in the extreme it could make some large markets more volatile, raising unemployment costs or financial stability concerns as more firms fail. This new kind of disruption could pose challenges for commercial and banking regulators akin to those familiar to securities regulators, who deploy idiosyncratic tools such as a pause button for the stock market. Even if sellers prevent extreme hyperswitching, managers may strategically prepare for hyperswitching with economically costly behavior such as hoarding liquid assets or forming conglomerates to provide insurance against a sudden exodus of customers. The transaction-cost-focused literature has missed macro-level drawbacks.

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The regulatory architecture reflects these scholarly gaps. One set of agencies regulates automated assistants for consumer protection and antitrust violations but does not go beyond those microeconomic inquiries. Nor do they prioritize strengthening digital intermediaries. Regulators with more macroeconomic missions lack jurisdiction over automated assistants. The intellectual framework and regulatory architecture should expand to encompass both the upsides and downsides of digital consumer sovereignty.

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INTRODUCTION

The world's largest companies, including Apple, Google, and Microsoft, are racing to develop artificially intelligent butlers (AIs). They aim to allow consumers to outsource the tasks of opening a new bank account, locating cheaper laundry detergent, and finding the highest quality groceries.[1] By way of illustration, a consumer might at any moment receive a phone alert from her AI. The subsequent conversation could unfold as follows:

> SIRI. As part of my regular monitoring of your spending, I have located an opportunity to save money on your phone bill and on your grocery bill each month. Would you like to hear more?
>
> CONSUMER. Tell me about the phone bill.
>
> SIRI. Based on your monthly data usage and the performance of the networks where you spend most of your time, you can receive comparable service through Sprint at $140 less per year. Let me know if you want to hear more. Or, if you would like me to switch your account, place your thumbprint on the phone.

The imminent technological possibility that machines could take over most of the consumer's purchase process calls for a reexamination of the framework for market intervention. This Article expands on the literature beginning that undertaking in three main ways. The first is to show the broader legal reforms and intellectual shifts that would help AIs to reduce transaction costs.[2] Today, even when competing products are available at the

1. Jack Nicas & Laura Stevens, *Wal-Mart and Google Team Up to Challenge Amazon*, WALL STREET J. (Aug. 23, 2017, 2:09 AM), https://www.wsj.com/articles/wal-mart-and-google-partner-to-challenge-amazon-1503460861 (on file with the *Michigan Law Review*).

2. Scholars have begun to consider implications for a narrower set of implicated laws and markets. *See* Tom Baker & Benedict Dellaert, *Regulating Robo Advice Across the Financial Services Industry*, 103 IOWA L. REV. 713 (2018) (focusing on insurance, mortgage, and investment robo advisers); Michal S. Gal & Niva Elkin-Koren, *Algorithmic Consumers*, 30 HARV. J.L. & TECH. 309 (2017) (focusing largely on the implications of algorithmic consumers for anti-

click of a button, shoppers regularly fail to locate the best deal.[3] People simply may not want to spend the time clicking on various sites and calculating the differences. Sellers also make shopping more difficult by burying the lowest price option in the second page of search results, where few look, or by hiding costs through fees or add-on products, such as expensive printer ink.[4] The recent scholarship on digital intermediaries has largely focused on preventing technology firms from adding harm—which they might do by directly manipulating users or indirectly exercising market power over sellers.[5] Consumer harms from sellers' behavior toward AIs have received less attention.[6] But consumers are also harmed when, for instance, sellers deceive the AI into giving bad advice to the consumer or prevent AIs from having full access to market data. Counterintuitively, consumer welfare may depend on even powerful technology companies benefitting from the types of laws traditionally deployed to protect consumers.

Part of the challenge in seeing the need for such policies may be a limited sense of the potential magnitude of efficiency gains.[7] Before Ronald Coase's contributions to law and economics, models assumed an absence of

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trust law); Rory Van Loo, *Making Innovation More Competitive: The Case of Fintech*, 65 UCLA L. REV. 232 (2018) (focusing on automated advisers for consumer finance).

3. For a review of the theory and empirics of this phenomenon, see, for example, Michael D. Grubb, *Failing to Choose the Best Price: Theory, Evidence, and Policy*, 47 REV. INDUS. ORG. 303, 311–12 (2015).

4. *See, e.g.*, *id.*

5. *See, e.g.*, Frank Pasquale, *Privacy, Antitrust, and Power*, 20 GEO. MASON L. REV. 1009 (2013) (discussing privacy and antitrust harms to consumers); Rory Van Loo, *Rise of the Digital Regulator*, 66 DUKE L.J. 1267 (2017) [hereinafter Van Loo, *Rise of the Digital Regulator*] (analyzing harms by digital intermediaries to both consumers and end sellers but also discussing legal reforms that would be needed for digital intermediaries to help consumers); *see also* Ryan Calo & Alex Rosenblat, Essay, *The Taking Economy: Uber, Information, and Power*, 117 COLUM. L. REV. 1623 (2017) (detailing power asymmetries). As electronic commerce was emerging, some observers were enthusiastic about frictionless commerce and digital agents such as "infomediaries." While that literature is insightful and relevant, it largely dealt with a prior generation of digital intermediaries that would provide the information to consumers, rather than the focus of this Article—automated assistants that can take over the entire purchase process. *See, e.g.*, Eric Goldman, *A Coasean Analysis of Marketing*, 2006 WIS. L. REV. 1151, 1156, 1199 (summarizing early proposals for infomediaries and seeing promise in emerging technologies that would ensure the marketing that reached people matched their preferences).

6. The main exception is awareness of the need for legal reforms to provide digital intermediaries with data access. *See, e.g.*, Rory Van Loo, *Helping Buyers Beware: The Need for Supervision of Big Retail*, 163 U. PA. L. REV. 1311, 1345–47 (2015) (proposing legal rules requiring big retailers to disclose product data). For an analysis of data access barriers in relation to antitrust law, *see* Gal & Elkin-Koren, *supra* note 2, at 342–43.

7. To be clear, scholars have embraced the potential for digital intermediaries to make markets more efficient. *See, e.g.*, Benjamin G. Edelman & Damien Geradin, *Efficiencies and Regulatory Shortcuts: How Should We Regulate Companies like Airbnb and Uber?*, 19 STAN. TECH. L. REV. 293, 295 (2016).

transaction costs.[8] The modern high-transaction-cost paradigm results from generations of Nobel Prize–winning work by Coase and others showing that real-world markets instead face high transaction costs that impede switching, including from information asymmetries and behavioral biases.[9] Those intellectual contributions have made models more accurate but have also normalized high transaction costs because it has proven difficult to improve markets meaningfully as long as consumers still play an active role.[10] Through that lens, an observer would see the opportunity for significant market improvements but would not be surprised by markets with minimal searching and switching. With an alternative baseline of automated markets, minimal searching and switching should prompt inquiry into potential AI barriers. In other words, the intellectual framework for automated commerce should recognize that through AI protection laws, real markets can move closer to those in discarded pre-Coasian models.

The Article's second contribution is to expand upon the downsides associated with AIs, and with hyperswitching in particular. Once they take hold, AIs could potentially constitute a new form of disruption by collapsing firms more quickly, reaching a larger portion of the economy, and extending uncertainty longer. Assume, for instance, that the above digital advice to switch cell phone carriers was given by Apple's Siri, which operates about 54% of mobile operating systems.[11] If a quarter of Siri's customers were to switch cell phone carriers upon locating savings, this would amount to a mass exodus of customers from several large Fortune 500 companies, such as Verizon and AT&T. But the cell phone carrier benefitting from that advice could lose in the next round of advice. Mass departures are more likely if the AI market follows that of other highly concentrated digital markets such as

8. *See* R.H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON., Oct. 1960, at 1, 1–3; Thomas W. Merrill & Henry E. Smith, Essay, *What Happened to Property in Law and Economics?*, 111 YALE L.J. 357, 366 n.41, 398 (2001) ("The influence of *The Problem of Social Cost* is hard to overstate. It is almost certainly the most-cited article in law and possibly in economics . . . .").

9. Nobel Prizes in this area include those to Ronald Coase (1991) and Douglas North (1993) for transaction cost developments; to George Akerlof, Michael Spence, and Joseph E. Stiglitz (2001) for information asymmetries; and to Daniel Kahneman (2002) and Richard Thaler (2017) for behavioral economics. *See All Prizes in Economic Sciences*, NOBEL PRIZE, https://www.nobelprize.org/prizes/uncategorized/all-prizes-in-economic-sciences/ [https://perma.cc/9SZ4-BQNT]. Each of these three strands of research has had profound, and long-lasting, influence on legal scholarship and policy. *See infra* Sections I.B, II.A.

10. *Cf.* Omri Ben-Shahar & Carl E. Schneider, *The Failure of Mandated Disclosure*, 159 U. PA. L. REV. 647 (2011) (concluding that disclosures directed at consumers have limited effects); Ryan Bubb & Richard H. Pildes, *How Behavioral Economics Trims Its Sails and Why*, 127 HARV. L. REV. 1593, 1595–97 (2014) (arguing that choice-preserving interventions are unlikely to have a major impact because they preserve choice).

11. Greg Ip, *The Antitrust Case Against Facebook, Google and Amazon*, WALL STREET J. (Jan. 16, 2018, 11:52 AM), https://www.wsj.com/articles/the-antitrust-case-against-facebook-google-amazon-and-apple-1516121561 (on file with the *Michigan Law Review*).

smartphones, in which Apple and Google together provide 99% of mobile operating systems.[12]

To be clear, extreme hyperswitching may never occur in many industries. Besides the possibility that entrenched firms will strive to prevent it, markets also have some inherent limits, such as capacity constraints on sellers' ability to service large numbers of new customers on short notice.[13] But given the stakes, as AIs gain influence, other companies like Citibank, AT&T, and Clorox may need to prepare strategically for the possibility of hyperswitching—and some have already begun to do so.[14] Predictable moves include forming conglomerates to diversify revenues; hoarding cash or other liquid assets to provide insurance in case revenues drop; and colluding with other firms on price so that AIs have little basis to redirect consumers. Those changes are important to consider because they implicate policy decisions, and they could significantly lessen the efficiency gains that motivate regulators and scholars to design laws empowering digital intermediaries.[15] Thus, even if hyperswitching never arrives, large companies' fears of it could reshape industrial organization, capital markets, and the economy.

Another set of downsides relates to the volatility that could result if extreme hyperswitching materializes. Numerous scholars have concluded that financial technology innovation poses a threat to economic stability.[16] That literature has extensively analyzed automated stock trading but has yet to explore the related risks of consumer AIs in any sustained manner.[17] Yet byproducts of consumer financial activity, like stock market volatility, have contributed to the nation's largest financial crises. By many accounts, mortgages (and the financial instruments derived from them) triggered the Great Recession.[18] Also, "[b]ank runs are the Achilles' heel of banking,"[19] and as

12. *See id.*

13. *See infra* Sections II.B, III.D.

14. Interview with a Former Bank Executive (July 2018) ("We have been talking about what you are describing as 'hyperswitching' for a while.").

15. For examples of such policy proposals, see *infra* Section II.B.

16. *See, e.g.*, Chris Brummer, *Disruptive Technology and Securities Regulation*, 84 FORDHAM L. REV. 977, 1038 (2015); Tom C.W. Lin, *The New Investor*, 60 UCLA L. REV. 678, 680, 711 (2013); William Magnuson, *Regulating Fintech*, 71 VAND. L. REV. 1167 (2018); Saule T. Omarova, *Wall Street as Community of Fate: Toward Financial Industry Self-Regulation*, 159 U. PA. L. REV. 411, 430 (2011); Nizan Geslevich Packin, *Too-Big-to-Fail 2.0? Digital Service Providers as Cyber-Social Systems*, 93 IND. L.J. (forthcoming 2019), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2988284 [https://perma.cc/8BBT-9SK2].

17. The potential systemic risk of AIs' consumer financial advice has been alluded to only in passing. *See, e.g.*, Van Loo, *supra* note 2.

18. *See, e.g.*, Ryan Bubb & Prasad Krishnamurthy, *Regulating Against Bubbles: How Mortgage Regulation Can Keep Main Street and Wall Street Safe—From Themselves*, 163 U. PA. L. REV. 1539, 1555–61 (2015); Jonathan Macey et. al., *Helping Law Catch Up to Markets: Applying Broker-Dealer Law to Subprime Mortgages*, 34 J. CORP. L. 789, 806 (2009) ("The role of subprime mortgage lending in the current crisis was played by stock speculation and bank runs during the Great Depression . . . ."); Steven L. Schwarcz, Essay, *Markets, Systemic Risk, and the Subprime Mortgage Crisis*, 61 SMU L. REV. 209, 210 (2008) (identifying the mortgage crisis as a

the Great Depression loomed, customers panicked that their money would disappear, causing them to try to withdraw their funds.[20] AIs create the possibility of a new type of bank run—one that is technologically coordinated rather than driven by panic—if they were to direct millions of consumers to switch banks in pursuit of higher interest rates or a better smartphone interface.

Outside of finance, business failures can signal beneficial competition. If business distress is widespread enough, however, hyperswitching could produce sizeable costs, such as unemployment expenditures. Additionally, taxpayers have spent billions of dollars bailing out distressed industries, such as automobile manufacturers.[21] Although the merits of such bailouts can be debated, since the Great Recession scholars have increasingly concluded that events in the real economy have a stronger link to financial crises than was previously understood. The costs of government expenditures on industry volatility, and the risks of broader crises, are currently omitted from policy analyses of AIs.

None of this should be taken to predict any particular sequence of events or to estimate the magnitude of hyperswitching. The task of financial stability regulators and scholars is not necessarily to predict the next crisis, or even to make the case that any trigger is likely to cause a crisis. Although there is little doubt that "there will be another crisis,"[22] it is impossible to know beforehand the chance that any particular innovation will serve as the trigger, and many identified risks will never materialize.[23] Instead, the task is to improve risk monitoring, which includes minimizing theoretical blind spots. The brightest scholars and most revered financial regulators have too often resisted close examination of new triggers that (inevitably) appeared unlikely and unfamiliar until they caused a crisis.[24] Hyperswitching shares sufficient

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trigger in the 2008 financial crisis). The causes of the crisis were multitudinous and are still debated. *See, e.g.*, Adam J. Levitin, *The Politics of Financial Regulation and the Regulation of Financial Politics: A Review Essay*, 127 HARV. L. REV. 1991, 1991–95 (2014) (book review).

19. *See* JONATHAN MCMILLAN, THE END OF BANKING: MONEY, CREDIT, AND THE DIGITAL REVOLUTION 38 (2014); *infra* Section III.C

20. Gary Richardson, *Banking Panics of 1930–31*, FED. RES. HIST. (Nov. 22, 2013), https://www.federalreservehistory.org/essays/banking_panics_1930_31 [https://perma.cc/7BD8-EWQQ].

21. *See infra* Section III.C.3.

22. JAMIE DIMON, DEAR FELLOW SHAREHOLDERS 32 (2015), https://www.jpmorganchase.com/corporate/investor-relations/document/JPMC-AR2014-LetterToShareholders.pdf [https://perma.cc/VVF3-QZVV].

23. Terje Aven & Ortwin Renn, *On Risk Defined As an Event Where the Outcome Is Uncertain*, 12 J. RISK RES. 1, 9 (2009); Patricia A. McCoy, *Knightian Uncertainty, Systemic Risk Regulation, and the Limits of Judicial Review*, SSRN 28 (2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2944297 [https://perma.cc/C85E-XVNP].

24. *See, e.g.,* Geoffrey M. Hodgson, *The Great Crash of 2008 and the Reform of Economics*, 33 CAMBRIDGE J. ECON. 1205, 1206–07 (2009) ("On 7 September 2006, Nouriel Roubini, an economics professor at New York University, told International Monetary Fund economists that the USA was facing a collapse in housing prices, sharply declining consumer confidence

characteristics with past crises to, at least, merit consideration in a regulatory framework necessarily invested in identifying speculative threats to financial stability.[25]

This discussion of downsides reveals a paradox: regulatory failures to help automate markets could have unintended stability benefits. If so, one response could simply be to do nothing and thereby allow sellers and misguided laws to stifle AIs. Although that path forward cannot be ruled out as the best option, it also has risks. Without legal reforms, AIs would be more dependent on working with sellers, which would facilitate the cooptation of potential consumer allies into agents for rent maximization. In the alternative, the absence of a deliberate and informed AI policy enables AIs to shape the law to their preference. In theory, by helping people make better decisions, AIs bring markets closer to "perfect competition," an influential law and economics concept that motivates many laws.[26] When policymakers have acted deliberately based on those models, they have supported digital intermediaries, such as by seeking the disclosure of machine-readable data from both private entities and public agencies.[27] Moreover, several of the ten richest U.S. companies also have the motivation and capabilities to lobby for pro-AI policies.[28] Thus, policymakers are unlikely to prevent AIs' ascendancy simply by ignoring them because AI developers can make a strong intellectual and political case for their importance. Instead, it makes sense from both a theoretical and practical standpoint to develop more accurate models for understanding the direction in which powerful forces are moving markets. If nonaction is to be the policy choice, it should be deliberate and informed.

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and a recession. Homeowners would default on mortgages, the mortgage-backed securities market would unravel and the global financial system would seize up. . . . Economist Anirvan Banerji responded that Roubini's predictions did not make use of mathematical models and dismissed his warnings . . . ."). In 2002, Kathleen Engel and Patricia McCoy had identified widespread mortgage market problems, but their work was largely ignored until the subprime mortgage crisis had materialized, even though the subprime mortgage dynamics they identified ultimately contributed to the Great Recession of the late 2000s. *See* Kathleen C. Engel & Patricia A. McCoy, *A Tale of Three Markets: The Law and Economics of Predatory Lending*, 80 TEX. L. REV. 1255, 1286 (2002).

25. *See infra* Section III.C.

26. *See, e.g.*, Morgan Ricks, *Money as Infrastructure* 68 (Vanderbilt Law Sch., Research Paper No. 63, 2018), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3070270 [https://perma.cc/RA6D-R8A3] (describing rate regulation as an instance of experts seeking to make markets "mimic the pricing structure and efficient resource allocation that would prevail under perfect competition").

27. *See infra* Section II.B.

28. Kenneth Kiesnoski, *The Top 10 U.S. Companies by Market Capitalization*, CNBC (Mar. 8, 2017, 7:53 AM), https://www.cnbc.com/2017/03/08/the-top-10-us-companies-by-market-capitalization.html#slide=2 [https://perma.cc/4HKP-9J6C]; Maggie McGrath, *A Peek Inside Apple, Google and Amazon's New Capitol Hill Lobbying Coalition*, FORBES (Nov. 9, 2015, 5:50 PM), http://www.forbes.com/sites/maggiemcgrath/2015/11/09/a-peek-inside-apple-google-and-amazons-new-capitol-hill-lobbying-coalition [https://perma.cc/2XMV-UXRT].

The Article's final contribution is to show that the regulatory framework could be updated for a more comprehensive treatment of automated commerce. Coase's objects of analysis, like the objects of many who succeeded him, were largely microeconomic and largely in the real economy, such as the appropriate location of a factory or the function of individual cattle and crop markets.[29] Those concerns have largely remained intellectually disconnected from the more macroeconomic and institutional downsides identified in this Article, such as contributors to recessions, managerial decisions about corporate finance, the speed of market intermediaries, and the volatility of firm failures—issues that are more the purview of financial regulation.[30] Financial regulation and its macroeconomic concerns have long stood separated from other areas of legal scholarship,[31] while law and economics has mostly focused on microeconomic topics.[32]

The regulatory framework reflects this academic separation. The primary regulator of AIs and the real economy, the Federal Trade Commission (FTC), is charged with consumer protection and antitrust but does not have a macroeconomic stability or significant financial regulation mandate.[33] Unlike trade regulators, financial regulators pay great attention to the speed of the stock market and the asset structure of firms, due in part to the belief that when one large bank fails, "the world's financial system can collapse like a row of dominoes."[34] The oversight of AIs is, in short, hindered by regulatory and analytic paradigms that have yet to adjust to modern markets that are far more technologically and financially intermediated than at the time of Coase.[35]

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29. *See* Coase, *supra* note 8, at 5–6, 41–42. Subsequent generations of scholars applied the law and economics analysis to financial products such as mortgages and credit cards. *See, e.g.*, OREN BAR-GILL, SEDUCTION BY CONTRACT: LAW, ECONOMICS, AND PSYCHOLOGY IN CONSUMER MARKETS (2012).

30. *See, e.g.*, sources cited *supra* note 29.

31. Gillian E. Metzger, *Through the Looking Glass to a Shared Reflection: The Evolving Relationship Between Administrative Law and Financial Regulation*, 78 L. & CONTEMP. PROBS. 129, 130, 156 (2015) ("[I]n many ways administrative law and financial regulation now stand poles apart.").

32. Yair Listokin, *Law and Macroeconomics: The Law and Economics of Recessions* 1, 7–8 (Yale Law Sch., Pub. Law Research Paper No. 576, Yale Law & Econ. Research Paper No. 559, 2016), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2828352 [https://perma.cc/EAG6-8D9K] (observing that "law and economics" would be more aptly named "law and microeconomics").

33. Federal Trade Commission Act, Pub. L. No. 63-203, § 6, 38 Stat. 717, 721–22 (1914) (codified as amended at 15 U.S.C. § 46 (2012 & Supp. V 2018)). The FTC does play a minor role in consumer protection in finance, but primary authority was transferred to the CFPB. Dodd-Frank Wall Street Reform and Consumer Protection Act, 12 U.S.C. §§ 5321, 5322(a)(2), 5491(a) (2012 & Supp. V 2018).

34. *See* Steven L. Schwarcz, *Systemic Risk*, 97 GEO. L.J. 193, 193 (2008).

35. *Cf.* Kathryn Judge, *Intermediary Influence*, 82 U. CHI. L. REV. 573, 630 (2015) (arguing that intermediaries' institutional arrangements are inconsistent with Coase's transaction cost assumptions).

The Article is structured as follows. Part I provides an overview of AIs and distinguishes between marketplace AIs such as Amazon, which double as sellers of consumer products, and informer AIs such as Google, which may solely provide information. Part II considers how firms might prevent AIs from taking hold and the laws that can block that behavior. A range of behavior by incumbents—including colluding on prices, excluding AIs from crucial data, and making it more difficult for consumers to exit—might undermine consumer switching.

Part III then discusses the possibility that AIs, when widely adopted, might produce significant macroeconomic costs and risks. The inquiry looks at both the financial economy and the real economy, drawing on historical turbulence of the Great Depression, the Great Recession, stock market flash crashes, and the high-profile bankruptcies in brick-and-mortar retail. Part IV concludes by considering the implications. Market analyses should assume that welfare-enhancing hyperswitching is possible and use slow switching as a signal of possible barriers to more efficient markets. Greater accuracy could also be obtained by factoring in the costs from either hyperswitching volatility or the inefficient managerial moves that such a possibility will cause. From a policy perspective, there is a need to bring more micro, real-economy factors into financial regulators' systemic risk analyses. There is a corresponding benefit from bringing more macro and financial factors into trade regulators' transactional analyses. Specific tools, such as prudential stress tests of hyperswitching disruption, regulatory monitoring of AIs, and a stock-market style pause button for AI mass advice are also considered. A more complete diagnosis of AI commerce points to concrete reforms of the regulatory state that could safeguard an economy increasingly steered by automated processes.

I. AN OVERVIEW OF AUTOMATED COMMERCE MARKET DYNAMICS

The market foundations are in place for AIs to take over significant portions of consumer switching. Scholars predict that soon AIs will "us[e] data to predict consumers' preferences, choosing the products or services to purchase, negotiating and executing the transaction, and even automatically forming coalitions of buyers to secure optimal terms and conditions. Human decisionmaking could be completely bypassed."[36] Already, internet intermediaries' convenience has proved alluring, despite shortcomings. Millions of Americans shop online through Amazon despite the fact that they could save money by combing through other websites' options or visiting stores in person.[37] Paypal holds over $13 billion in customers' accounts, including in the money-transfer app Venmo, despite the fact that those deposits would not be

36. Gal & Elkin-Koren, *supra* note 2, at 310, 312.

37. Julia Angwin & Surya Mattu, *Amazon Says It Puts Customers First. But Its Pricing Algorithm Doesn't*, PROPUBLICA (Sept. 20, 2016, 8:00 AM), https://www.propublica.org/article/amazon-says-it-puts-customers-first-but-its-pricing-algorithm-doesnt [https://perma.cc/AGH2-X627].

insured if Paypal were to fail.[38] People are delegating ever more personal tasks to algorithms, such as finding the best driving path[39] and deciding which Facebook post to view.[40] Robo-advisers are investing billions of dollars on behalf of consumers through automated trading.[41]

This Part provides a taxonomy of the two basic types of AIs—informers, like Google, and marketplaces, like Amazon. Both categories will generally be marked by a common set of traits: continual searching, delegated automation, network effects, and scientific personalization.

A. *The AI Business Model*

Given that data is now one of the most valuable assets in the world, AIs could make money solely by collecting, analyzing, and selling the data they collect from transactions. There are two main models likely to unfold: the informer model of Google, Microsoft, and Apple, and the seller-adviser model of Amazon. The key difference is that Google, Apple, and Microsoft do not sell most end goods or services apart from some core subset of technology products. To be clear, Google, Apple, and Microsoft are not completely neutral parties. European antitrust officials have ruled, for instance, that Google crushed direct competitors—other information websites—by essentially erasing them from search results.[42] Classification as an informer does not mean that an AI is completely neutral and unbiased in the information it provides, nor that it will always serve consumers' best interests.

But Google does not earn a cut of the price paid when a consumer ultimately purchases a product after using a Google search, and it does not receive direct payment for placing certain search results above others (unless clearly marked as advertisements). Google can earn considerable revenues solely through collecting data and selling advertisements. Additionally, many consumers will continue to make decisions for some product categories.[43] For those remaining human-driven purchases, which will inevitably amount to a substantial portion of the economy, Google's AI will be able to use a model analogous to its search: return the AI's recommended short list of

38. Telis Demos, *PayPal Isn't a Bank, but It May Be the New Face of Banking*, WALL STREET J. (June 1, 2016, 5:08 PM), https://www.wsj.com/articles/as-banking-evolves-fintech-emerges-from-the-branch-1464806411 (on file with the *Michigan Law Review*).

39. Noam Bardin, *Keeping Cities Moving—How Waze Works*, MEDIUM (Apr. 12, 2018), https://medium.com/@noambardin/keeping-cities-moving-how-waze-works-4aad066c7bfa [https://perma.cc/8HAE-CRTQ].

40. AJ Agrawal, *What Do Social Media Algorithms Mean for You?*, FORBES (Apr. 20, 2016, 6:22 PM), https://www.forbes.com/sites/ajagrawal/2016/04/20/what-do-social-media-algorithms-mean-for-you/#7962a3aa5152 [https://perma.cc/6RM8-J7GT].

41. *See* Benjamin P. Edwards, *The Rise of Automated Investment Advice: Can Robo-Advisers Rescue the Retail Market?*, 93 CHI.-KENT L. REV. 97, 98–99, 106–07 (2018).

42. *See* Mark Scott, *Google Fined Record $2.7 Billion in E.U. Antitrust Ruling*, N.Y. TIMES (June 27, 2017), https://www.nytimes.com/2017/06/27/technology/eu-google-fine.html (on file with the *Michigan Law Review*).

43. *See infra* Section III.B.3.

product options and then include a clearly marked "advertisement" product listing alongside. Concerns will arise about informers skewing seemingly objective digital advice to favor advertisers.[44] But informers could deploy a business model that does not immediately benefit from prioritizing one seller over another or from influencing the consumer to pay a higher price.[45]

Amazon, in contrast, is more of a marketplace in that it has taken steps to sell an array of goods and services to consumers. It can also earn money from data, like Google. But unlike Google, it gets a cut of the consumer's ultimate purchase on items sold by third parties and all of the purchase price on its own goods. As a result, it has a direct monetary incentive to ensure that the consumer pays a higher price, especially on the products it owns and the services it provides.[46] It also has an incentive to direct consumers away from products sold outside the Amazon marketplace, such as those exclusively sold at Walmart or independent manufacturers. Google is far more disinterested than Amazon, from a direct revenue perspective, as to whether consumers go to Walmart, Amazon, or some other seller to purchase a given item or service.

Both models have competitive advantages. Amazon may undermine informer AIs by refusing to sell its goods to them or using laws to block access to its prices.[47] But AIs' success will depend on being seen as neutral, which favors informers. It is possible that one of these models will win out or that both will operate in substantial coexistence.

B. *Common Features*

AIs will continuously monitor for better deals, autonomously spend on behalf of consumers, widely leverage network effects, and scientifically tailor advice. An AI's success in pursuing these features will help determine its ultimate market share, societal benefits, and need for regulation.

Continuous help. AIs will offer the option of monitoring market developments continuously. Some digital intermediaries today provide a version of this service. Google Flights, for instance, offers to "track prices" for a specific itinerary, sending emails when prices drop.[48] Eventually, AI customers should be able to choose whether to enable a similar feature for many other categories of spending. The AI then will look for new products and market developments nonstop. The customer will be able to decide how often to re-

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44. *See, e.g.,* Van Loo, *Rise of the Digital Regulator*, *supra* note 5, at 1290–93.

45. Informers' market power could instead raise advertising costs that sellers pass on to consumers.

46. Of course, Amazon must weigh the risk of losing customers by charging too high of a price. But retail customers weigh other considerations and often do not compare prices. *See* Van Loo, *supra* note 6, at 1345–47.

47. *See infra* Section II.B.

48. *See Track Flights and Prices*, GOOGLE: TRAVEL HELP, https://support.google.com/travel/answer/6235879?hl=en&ref_topic=2475360 [https://perma.cc/8UAV-LMML].

ceive alerts. This feature can save consumers considerable time searching, as it would otherwise be necessary to regularly check thousands of sites to find the best option.

Delegated automation. Even if consumers know there are better market options, they may not switch due to the burden of decisionmaking or the time it takes to change their behavior—such as opening and closing accounts.[49] For many transactions, AIs will enable consumers to delegate the ultimate decision and switching to the assistant. This delegation makes it more likely that they will benefit from the market's best offerings.

For a large portion of consumers, convenience is one of the most important factors in shopping, and consumers are willing to rely on automated transactions to advance convenience. Automated renewals have long existed for subscriptions, a practice that has moved from print magazines to various online services, such as Netflix and Apple Music.[50] Physical-goods subscriptions are also proliferating, led by Amazon's "Subscribe & Save" service, which sends a set quantity of household goods at regular intervals.[51] Such services are a growing part of Amazon's sales, and other companies are rolling out similar functions.[52]

A key part of this feature will be the ability to open and close new accounts. Online companies like BillFixers and JustOnePay already offer similar account management services, including handling excess fees, payments, new account openings, and cancellations.[53] Those services, however, still rely on human help.[54] The next step will be for the AI to take over the entire purchase process on an ongoing basis in categories where the consumer delegates authority, such as keeping the food supply stocked. The AI will decide where to buy the products, evaluate their price and quality, and update the consumer along the way or give preapproval notifications if preferred. As the "tectonic plates underpinning the business world [shift] from the transactional economy to the subscription economy,"[55] consumers will become

49. *See infra* Section II.B.2.

50. John Warrillow, *5 Giants Adopt the Subscription Model to Keep Ahead of Upstart Rivals*, FORBES (Feb. 26, 2015, 4:29 PM), https://www.forbes.com/sites/onmarketing/2015/02/26/5-giants-adopt-the-subscription-model-to-keep-ahead-of-upstart-rivals/#30baff89a790 [https://perma.cc/5N6X-284J].

51. Brian X. Chen, *Subscribe and Save on Amazon? Don't Count on It*, N.Y. TIMES (Aug. 24, 2016), https://www.nytimes.com/2016/08/25/technology/personaltech/subscribe-and-save-on-amazon-dont-count-on-it.html (on file with the *Michigan Law Review*).

52. Eugene Kim, *Amazon Jumps After Smashing Earnings*, CNBC (Apr. 26, 2018, 3:26 PM), https://www.cnbc.com/2018/04/26/amazon-earnings-q1-2018.html [https://perma.cc/6KHF-G8BJ]; Warrillow, *supra* note 50.

53. Kelli B. Grant, *These Start-Ups Let You Skip Customer Service Woes*, CNBC (May 4, 2016, 10:38 AM), https://www.cnbc.com/2016/05/04/outsource-bill-negotiations-and-customers-service-woes.html [https://perma.cc/ZK8F-3YVQ].

54. *See id.*

55. *See* Warrillow, *supra* note 50.

more accustomed to being less actively involved in more of their expenditures.

Network effects. In most digital markets, the more people use a product, the more valuable it becomes—a dynamic known as a network effect.[56] Facebook, for instance, is far less attractive if almost nobody you know uses it, but once your friends and family participate, the site has much more to offer. In a weaker kind of network effect, shopping assistants will benefit from having more people using them. More people will provide more data to analyze and will hone predictions. It will also increase the algorithm's ability to identify similar consumer patterns in subsets of its customers, thereby providing better advice.[57]

Network effects will shape AIs' development in important ways. The AI landscape is likely to mimic other digital markets' extremely high concentration, in which as few as two or three companies capture the bulk of the market. Google drives 89% of internet searches, Facebook reaches 95% of young internet users through its various products, Amazon has 75% of book sales, and Microsoft and Apple supply 95% of desktop operating systems.[58]

This expected AI concentration could, in theory, be market specific. A number of digital intermediaries currently focus on a specific market, such as travel or finance.[59] It is possible that an AI dominating finance, such as NerdWallet or Mint, could be different from an AI capturing the market for retail goods and other products.

A more likely possibility is that a small number of AIs will reach cross-market dominance. As Google CEO Sundar Pichai wrote recently, describing a cross-market model, "Your phone should proactively bring up the right documents, schedule and map your meetings, let people know if you are late, suggest responses to messages, handle your payments and expenses, etc."[60]

Moreover, the big technology companies already have a head start that would be difficult for smaller companies to overcome. Hundreds of millions of iPhones have Apple's AI, Siri, which is regularly used for basic tasks like setting appointments or reminders.[61] Amazon's Alexa can already order pizza or an Uber by voice command.[62] These and other AIs are already sitting

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56. *See generally* ROMAN BECK, *Network Effect Theory*, *in* THE NETWORK(ED) ECONOMY 41 (2006).

57. *See infra* notes 64–67 and accompanying text.

58. Ip, *supra* note 11.

59. *See* Van Loo, *Rise of the Digital Regulator*, *supra* note 5, at 1278.

60. *Google CEO Pichai Sees the End of Computers as Physical Devices*, ECON. TIMES (Apr. 29, 2016, 3:58 PM), http://economictimes.indiatimes.com/tech/internet/google-ceo-pichai-sees-the-end-of-computers-as-physical-devices/articleshow/52040890.cms [https://perma.cc/CVX2-VBG4].

61. *See* John Weaver, *Siri Is My Client: A First Look at Artificial Intelligence and Legal Issues*, N.H. B.J., Winter 2012, at 6, 6.

62. Jenna Wortham, *How Alexa Fits into Amazon's Prime Directive*, N.Y. TIMES MAG. (Jan. 24, 2017), https://www.nytimes.com/2017/01/24/magazine/how-alexa-fits-into-amazons-prime-directive.html (on file with the *Michigan Law Review*).

on troves of data relevant to consumer spending. Due to network and winner-take-all market advantages that this data will provide, the convenience of dealing with a single AI, and the ease with which large tech companies can make acquisitions of any startup competitors, it would not be surprising if two or three of the existing big tech companies ultimately direct the future of automated commerce.

Scientific personalization. After consumers voluntarily provide AIs with passwords to their various online accounts, and after serving a given consumer for long enough, AIs can access extensive personal data, including past transactions, web searches, and social networks. Many consumers will also consciously help the assistants improve by providing input, whether through a five-star rating system or spoken reactions like, "Siri, next time I buy hand soap remind me to choose one that has moisturizer."

With these rich personal data points, the assistant will then scan millions of other customers' purchases and reviews, including those available online, which would take too long for a human to peruse. The extensive personal data will enable the AI to prioritize the reviews and habits of consumers with similar profiles. Already, many companies successfully use similar tools to heavily customize recommendations. Facebook leverages extensive knowledge about our networks and prior clicks to display news tailored to our interests.[63] Services such as Pandora and Netflix receive subscribers' input and use it to make future recommendations.[64]

The AI will also learn over time through experience by training on the vast data repositories of consumers' personal transactional histories.[65] For instance, machines might analyze only the first five years of a consumer's purchases in a ten-year database to predict what happened in the last five years. If a given prediction is incorrect, it can be adjusted and tried again millions of times, until the algorithm learns the predictors of changed behavior for that consumer.

The AI can then test such algorithms on small subsets of their millions of consumers, who become regular participants in real-world experiments. Moving forward, consumers would be able to benefit not only from their own past mistakes remembered by their AI but also from those of other consumers with similar tastes.[66] People have always looked to others for ideas on

63. Ken Goldberg, Opinion, *The Robot-Human Alliance*, WALL STREET J. (June 11, 2017, 4:39 PM), https://www.wsj.com/articles/the-robot-human-alliance-1497213576 (on file with the *Michigan Law Review*).

64. Amadou Diallo, *Pandora Radio's Dominance Built on Big Data Edge*, FORBES (Oct. 6, 2013, 10:06 AM), https://www.forbes.com/sites/amadoudiallo/2013/10/06/pandora-radios-dominance-built-on-big-data-edge/#46426d2d5b59 [https://perma.cc/6P79-S3FP]; Goldberg, *supra* note 63.

65. *Cf.* Andrew Lowenthal, *Beyond Robo-Advisers—Thinking About the Next Wave of Artificial Advisers*, FINTECH L. REP., Nov./Dec. 2016, at 1, 1.

66. *See* Maurice E. Stucke & Ariel Ezrachi, *How Digital Assistants Can Harm Our Economy, Privacy, and Democracy*, 32 BERKELEY TECH. L.J. 1239, 1246–49 (2017).

what to buy and how to find the best deals, and AIs make it possible to leverage millions of consumers rather than two or three friends.

Shopping assistants thereby combine the wisdom of crowds, the power of information technology, and the precision of scientific methods into an iterative learning process. As a senior Google executive described it, the company's algorithms "should know what you want and tell it to you before you ask the question."[67] Once an AI becomes capable of saving people time and money, in addition to knowing what they want to buy better than the individual, it could gain enough broad appeal to drive large portions of annual national consumer spending.

II. THE UPSIDES OF AI PROTECTION

Laws will influence the extent to which consumers delegate spending to AIs and how much that delegation improves consumer welfare. Since the consumer-related literature has focused on the regulation of digital intermediaries, this Part considers how the law can support AIs in the face of resistance from current product market leaders.[68] Such AI protection, which can be situated within the dominant paradigm for market regulation, will also influence whether the informer AI business model exemplified by Google wins out over the marketplace model of Amazon.

A. *The Theory Supporting Digitally Perfected Competition*

From a policy perspective, AIs' appeal lies in their potential to reduce barriers to perfect competition. In so doing, they could save consumers considerable time and money, as well as boost the economy. Because the transactional efficiency gains would be enormous, it would make sense for policymakers to support laws that strengthen AIs.[69]

1. The Policy Push Toward Perfect Competition

Few ideas have had greater influence on the law than Coase's observations about transaction costs. Transaction costs lack a universally supported definition, but I use them here to refer to the time and resources needed to find and execute a purchase.[70] As a simple example, consumers spend both

67. Hal R. Varian, *Beyond Big Data*, 49 BUS. ECON. 27, 28 (2014).

68. Those with lower shares of the market will likely work with AIs, since they will see an opportunity to gain market share from entrenched leaders.

69. Of course, politicians balance other concerns, such as re-election.

70. *Cf.* Coase, *supra* note 8, at 15 ("[T]o carry out a market transaction it is necessary to discover who it is that one wishes to deal with, to inform people that one wishes to deal and on what terms, to conduct negotiations leading up to a bargain, to draw up the contract, to undertake the inspection needed to make sure that the terms of the contract are being observed, and so on."); Carl J. Dahlman, *The Problem of Externality*, 22 J.L. & ECON. 141, 148 (1979) ("These, then, represent the first approximation to a workable concept of transaction costs: search and information costs, bargaining and decision costs, policing and enforcement costs."); Jeremy

time and money just to visit grocery stores to learn which products and prices are available.

In the 1960s, Coase pointed out what is now broadly understood to be correct, that pervasively adopted analytic models were flawed because they assumed zero transaction costs.[71] In the real world, transaction costs are substantial.[72] Moreover, he argued that this mistaken assumption of no transaction costs had led to incorrect legal analysis.[73] Since this revelation, generations of scholars have emphasized the lowering of transaction costs as the highest priority in designing legal rules.[74] Removing transaction costs benefits society by increasing efficiency.[75]

The Coasian paradigm shift forms part of a larger series of law and economics developments. An assumption of zero transaction costs is one of the features of perfect competition, an early theoretical market structure that has heavily influenced economic modeling.[76] By adopting laws that reduce transaction costs, policymakers move real-world markets closer to the hypothetical model of perfect competition. Neoclassical economists believed that

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Kidd, *Kindergarten Coase*, 17 GREEN BAG 2D 141, 144 (2014) (defining transaction costs as "a comprehensive list of anything and everything that could make it harder for two or more people to negotiate"); Jeff Sovern, *Toward a New Model of Consumer Protection: The Problem of Inflated Transaction Costs*, 47 WM. & MARY L. REV. 1635, 1645 (2006) (defining transaction costs as including "the costs and time devoted to making the purchase decision and the time needed to read small print").

71. Coase, *supra* note 8, at 1–3.

72. *See id.* at 15.

73. *See id.*

74. A world of zero transaction costs is generally recognized as unattainable, but nonetheless serves as the starting point for key economic analyses that inform laws and economic policy. *See, e.g.*, R.H. COASE, THE FIRM, THE MARKET, AND THE LAW 15 (1988) ("The world of zero transaction costs, to which the Coase Theorem applies, is the world of modern economic analysis, and economists therefore feel quite comfortable handling the intellectual problems it poses, remote from the real world though they may be."); Niva Elkin-Koren & Eli M. Salzberger, *Law and Economics in Cyberspace*, 19 INT'L REV. L. & ECON. 553, 554 (1999) ("The heart of transaction cost analysis is the Coase theorem . . . . Coase's analysis points at transaction cost as the sole factor that diverts the market from efficiency and, thus, the sole factor to take on board when legal rules are considered."); Pierre Schlag, *The Problem of Transaction Costs*, 62 S. CAL. L. REV. 1661, 1663 (1989) (observing that legal scholars adopting a market-based approach "have an uncannily keen drive to economize, eliminate, and circumvent transaction costs, and to prescribe the results a market would have produced (had a market been possible)").

75. *See, e.g.*, Schlag, *supra* note 74, at 1662 (noting that the predominant market-based approach so familiar to legal academics holds that efficiency can be maximized by "minimizing transaction costs"). Building on Coase's work, Douglass North won a Nobel Prize in part for indicating that transaction cost-reducing laws can drive economic performance. *See, e.g.*, DOUGLASS C. NORTH, TRANSACTION COSTS, INSTITUTIONS, AND ECONOMIC PERFORMANCE (1992) (describing how North built off Ronald Coase's work); *All Prizes in Economic Sciences*, *supra* note 9 (mentioning North's Nobel Prize for the link between transaction costs and economic performance).

76. *See generally* Harold Demsetz, *R. H. Coase and the Neoclassical Model of the Economic System*, 54 J.L. ECON. S7 (2011).

perfect competition was better for consumers, because they pay the lowest prices and benefit from maximal choice among attractive products, and better for society, due to improved economic welfare from market efficiency.[77]

Subsequent work illustrated and expanded the extent of the gap between real markets and perfect competition. Perfect competition also assumed that markets supplied sufficient information for consumers to make effective decisions. George Akerlof, among others, challenged this assumption by pointing out that in the used-car market buyers know that lemons exist, but many are unable to tell which cars are the lemons due to information asymmetries.[78] Consequently, the market fails to adequately reward those who sell higher-quality cars, making buyers and sellers worse off.[79] These developments contributed strong law and economics support for the view that regulation may be warranted when "imperfect information has produced noncompetitive prices and terms."[80]

Behavioral economics research challenged a different longstanding assumption: rationality. Traditional law and economics theory assumed that consumers make rational decisions, roughly meaning decisions that advance consumers' interests given the options available. In recent decades, building upon the work of psychologists Daniel Kahneman and Amos Tversky, researchers have shown that people instead make systematic errors.[81] In one influential experiment that implicates switching, Kahneman and Tversky created a laboratory setting with zero transaction costs and randomly assigned participants to have either mugs or money with which they could purchase mugs.[82] Whether the participants started with the mug had a heavy influence on the price at which they were willing to transact. Whereas the Coase theorem would have predicted that about 50% of the participants would trade, only 10% did so.[83] While the precise reasons for people's ac-

77. *See id.* at S11.

78. George A. Akerlof, *The Market for "Lemons": Quality Uncertainty and the Market Mechanism*, 84 Q.J. ECON. 488, 489–90 (1970). Markets develop responses to the lemons, without completely solving it, such as warranties and "certified pre–owned" programs. *See, e.g.*, Stephanie Plamondon Bair, *Innovation Inc.*, 32 BERKELEY TECH. L.J. 713, 756 (2017).

79. *See* Akerlof, *supra* note 78.

80. Alan Schwartz & Louis L. Wilde, *Intervening in Markets on the Basis of Imperfect Information: A Legal and Economic Analysis*, 127 U. PA. L. REV. 630, 631 (1979).

81. *See* Christine Jolls, Cass R. Sunstein & Richard Thaler, *A Behavioral Approach to Law and Economics*, 50 STAN. L. REV. 1471, 1477 (1998). *See generally* NICK WILKINSON & MATTHIAS KLAES, AN INTRODUCTION TO BEHAVIORAL ECONOMICS (3d ed. 2018).

82. *See* Daniel Kahneman et al., *Experimental Tests of the Endowment Effect and the Coase Theorem*, 98 J. POL. ECON. 1325, 1326, 1329–31 (1990).

83. *See id.*, at 1325, 1322 tbl.2. Moreover, those who were randomly assigned mugs wanted more than twice the price to sell the mugs than those who were not assigned mugs were willing to pay for them. *See id.* at 1338; *cf.* Christine Jolls, *Behavioral Economics Analysis of Redistributive Legal Rules*, 51 VAND. L. REV. 1653, 1659 (1998).

tions are often unclear and behavioral economics is still developing,[84] psychologists have begun to show how people tend to estimate poorly, have excess confidence in their decisions, and face difficulties processing even basic numerical decisions.[85] These diverse human decisionmaking shortcomings can prevent transactions that would not only be in those decisionmakers' best interests but could also increase efficiency. A range of scholars have, as a result, offered the law as a means to lessen the harms from irrationality.[86]

2. AIs as Agents of Perfect Competition

Although the prospect of moving toward perfect competition has animated policy reform for decades, the results have been disappointing. Despite prices and products available at the click of a button in the information age, the evidence suggests that "[c]onsumers often fail to choose the best price because they search too little, become confused comparing prices, and/or show excessive inertia through too little switching away from past choices or default options."[87] Although information technologies lowered some types of transaction costs and information asymmetries,[88] there is little evidence that these pro-consumer innovations have kept up with firms' ability to strategically profit from exploiting switching costs, information asymmetries, and decision biases.[89] As a result, even if the decision not to search may be rational for any given consumer, consumers often pay considerably more than they would if markets were closer to perfect competition. Various studies have estimated that consequently consumers pay 8% more on cell phones,[90] almost 40% more on credit cards,[91] and 22% more even on basic goods such as aspirin.[92]

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84. *See, e.g.*, Gregory Klass & Kathryn Zeiler, *Against Endowment Theory: Experimental Economics and Legal Scholarship*, 61 UCLA L. REV. 2 (2013) (explaining how endowment theory has gained popularity but lacks empirical support).

85. *See* Jolls, *supra* note 83, at 1659; Jolls, Sunstein & Thaler, *supra* note 81.

86. *See, e.g.*, Kathryn Zeiler, Mistaken About Mistakes, EUR. J.L. & ECON. (forthcoming 2019) (manuscript at 12–13), https://link.springer.com/article/10.1007%2Fs10657-018-9596-5 [https://perma.cc/7EGB-RM67] (reviewing proposals and cautioning against assuming behavioral economics research findings imply irrationality).

87. *See* Grubb, *supra* note 3, at 311–12, 335 (reviewing the empirical literature).

88. *See* Edelman & Geradin, *supra* note 7, at 297 (summarizing transaction cost gains).

89. *See generally* Stefano DellaVigna & Ulrike Malmendier, *Contract Design and Self-Control: Theory and Evidence*, 119 Q.J. ECON. 353, 353, 381–93 (2004) (studying "the empirical contract design in the credit card, gambling, health club, life insurance, mail order, mobile phone, and vacation time-sharing industries" and concluding that "for all types of goods firms introduce switching costs and charge back-loaded fees").

90. Oren Bar-Gill & Rebecca Stone, *Pricing Misperceptions: Explaining Pricing Structure in the Cell Phone Service Market*, 9 J. EMPIRICAL LEGAL STUD. 430, 454 (2012).

91. *See* Lawrence M. Ausubel, *The Failure of Competition in the Credit Card Market*, 81 AM. ECON. REV. 50, 73 (1991) (concluding that credit card companies exploit consumer decision shortcomings to charge 37% more than the competitive price). *See generally* Victor Stango & Jonathan Zinman, *Borrowing High Versus Borrowing Higher: Price Dispersion and Shopping*

Part of the problem is that it still takes considerable quantitative skills and time to visit various websites, locate the right product at each website, and create mathematical equations to compare complex pricing packages.[93] Amazon does not allow users to sort by the price per unit, instead requiring people to look through hundreds of items to find the best unit price.[94] One study found that in highly commodified electronic parts markets in which alternative prices were a click away, consumers paid 6–9% higher prices because sellers were able to make product comparison difficult by including longer descriptions and requiring extra clicks to determine shipping fees.[95] Companies have also continued to find ways to hide costs, such as airlines charging for carry-on luggage or manufacturers lowering the price of a printer while charging more for ink cartridges.[96] By making it more difficult to compare the overall price, such as the lifetime cost of purchasing a given printer, sellers are able to make consumers less attuned to the full price they pay.[97] Overall, the time and energy needed to find the best deal still discourage comparison and switching even in the information age.

Legal interventions aimed at providing people with the information they need, or behaviorally nudging them toward better decisions, have often failed.[98] This is at least partly because consumers tend not to use this new information or respond to this behavioral nudge as policymakers might expect.[99] Legislators are also reluctant to intervene in ways that reduce choice, out of concern that doing so would infringe on consumers' liberty interests.[100]

Given the failure of past technological and policy interventions, why would AIs be any different? It is by no means certain that they will be. But as I argue below, the law has held back digital intermediaries' ability to help

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Behavior in the U.S. Credit Card Market, 29 REV. FIN. STUD. 979, 981 (2016) ("[T]he estimated partial equilibrium savings from imposing even moderately more intense shopping on all U.S. credit card borrowers would be $36 billion per annum.").

92. Bart J. Bronnenberg et al., *Do Pharmacists Buy Bayer? Informed Shoppers and the Brand Premium*, 130 Q.J. ECON. 1669, 1684 (2015). For a broader review of this literature on overcharge, see Grubb, *supra* note 3, at 311–12.

93. Laura Stevens, *Amazon Snips Prices on Other Sellers' Items Ahead of Holiday Onslaught*, WALL STREET J. (Nov. 5, 2017, 7:00 AM), https://www.wsj.com/articles/amazon-snips-prices-on-other-sellers-items-ahead-of-holiday-onslaught-1509883201 (on file with the *Michigan Law Review*); Brad Tuttle, *What's Wrong with Online Shopping*, TIME (May 4, 2010), http://business.time.com/2010/05/04/whats-wrong-with-online-shopping [https://perma.cc/USK7-DAML].

94. *See* Van Loo, *supra* note 6, at 1345–47.

95. Glenn Ellison & Sara Fisher Ellison, *Search, Obfuscation, and Price Elasticities on the Internet*, 77 ECONOMETRICA 427, 428–29 (2009).

96. Xavier Gabaix & David Laibson, *Shrouded Attributes, Consumer Myopia, and Information Suppression in Competitive Markets*, 121 Q.J. ECON. 505, 506 (2006).

97. *See, e.g.*, *id.*

98. *See, e.g.*, Ben-Shahar & Schneider, *supra* note 10.

99. *See id.* at 705.

100. *See, e.g.*, Bubb & Pildes, *supra* note 10.

consumers. Thus, with the right legal framework in place, AIs could very well adapt to fast-moving sales strategies at a speed that bureaucrats or lawmakers cannot. Additionally, by allowing the consumer to opt out of most of the decisionmaking and transaction processes, AIs could remove many of the barriers left in place by prior generations of digital intermediaries.

To see further why significant AI benefits are a theoretical possibility, it helps to understand more about how AIs would interact with some key current barriers to perfect competition. A diligent consumer might look at five products on average before making a purchase, but AIs could look at thousands. Unlike the consumer, the AI would easily factor in a reasonable estimate of future costs of the ink cartridges, durability, and repair expenses, drawing on data from millions of other consumers who have made printer and ink purchases in the past to provide this consumer with a sophisticated, full comparison of different printers over the course of a consumer's life. A manufacturer whose products have consistently proven more expensive despite a lower initial printer purchase price would see sales plummet once the AIs came to that conclusion. The possibility of losing future sales could then deter such practices.

AIs could help even with traditionally sticky products. Getting a mortgage quote and applying for a credit card have historically meant filling out large volumes of paperwork. More than two-thirds of credit card applications are denied, which discourages applications.[101] These time investments for uncertain results help explain why consumers often take out credit cards with an initial offer of a low teaser rate, intending to switch later but ultimately staying put even when they could save considerably by moving to a credit card with lower rates and fees.[102] The burden of research, application, and analysis helps explain why almost half of prospective home buyers get only one mortgage quote and why most are slow to refinance, potentially costing them tens of thousands of dollars in higher rates.[103] Due to various fees for early termination and installation, the costs of switching Internet Service Providers (ISPs) can be in the hundreds of dollars, not to mention the considerable time that would need to be spent to switch.[104]

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101. *See* Brett King, *Finish Rich & Credit Karma*, BREAKING BANKS 23:30–23:45, 29:00–29:20 (Dec. 31, 2015), https://www.breakingbanks.com/finish-rich-credit-karma [https://perma.cc/SMC5-M86P].

102. *See* Oren Bar-Gill & Ryan Bubb, *Credit Card Pricing: The CARD Act and Beyond*, 97 CORNELL L. REV. 967, 999–1000, 1006–07 (2012) (summarizing research finding that "most customers . . . do not switch out of the contract after the expiration of the teaser rate even when they are carrying a balance").

103. CONSUMER FIN. PROT. BUREAU, CONSUMERS' MORTGAGE SHOPPING EXPERIENCE 10 (2015), https://files.consumerfinance.gov/f/201501_cfpb_consumers-mortgage-shopping-experience.pdf [https://perma.cc/E9ZP-7Q8B]; Yoon-Ho Alex Lee & K. Jeremy Ko, *Consumer Mistakes in the Mortgage Market: Choosing Unwisely Versus Not Switching Wisely*, 14 U. PA. J. BUS. L. 417, 426 (2012).

104. Barbara van Schewick, *Network Neutrality and Quality of Service: What a Nondiscrimination Rule Should Look Like*, 67 STAN. L. REV. 1, 92–94 (2015) (reviewing the literature and concluding that "[s]witching costs in the market for Internet services are substantial").

Market-specific digital intermediaries like Credit Karma have stated their intention to use their knowledge of an individual consumer's credit score, income, and other information to predict with close to 100% accuracy whether a credit card company or lender will accept a given application.[105] As Quicken Loans put it in a recent Super Bowl ad, the company seeks to do for loans what "the Internet did for buying music and plane tickets and shoes . . . PUSH BUTTON GET MORTGAGE."[106]

Perhaps most important of all is that AIs can remove the need for consumers to do anything other than say "yes." Research suggests that a small amount of time needed to transfer an account can serve as an unexpectedly high barrier for consumer switching even when the consumer may have a strong preference for a different product.[107] By all but removing the need to think or act, AIs will raise consumer protection questions to ensure that the consumer is not being misled by the intermediary.[108] Assuming the downsides are managed, however, the consumer welfare and efficiency advances are potentially enormous.[109] The dominant legal paradigm today—which prioritizes reducing transaction costs—would, in theory, support legal reforms that make those AI advances possible.

B. *Legal and Market Battlegrounds*

The law of automated commerce is relatively new, evolving, and undertheorized. It is uncertain the extent to which the intellectual framework supporting AIs will translate into real-world policies. Early signs have been mixed, with key U.S. policymakers showing support for AIs but advancing the law more slowly than their counterparts in other countries.[110] The laws governing four types of business behavior will have especially great influence on AIs' ability to reduce transaction costs: data access, customer exit, obfuscation, and collusion.

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105. *See* King, *supra* note 101, at 24:56–25:08.

106. News, *Quicken Loans Ask 'What We Were Thinking' in Super Bowl Ad*, YOUTUBE (Feb. 8, 2016), https://www.youtube.com/watch?v=2yhxRIh3i2I.

107. van Schewick, *supra* note 104, at 95 (reviewing the literature).

108. *See* Van Loo, *Rise of the Digital Regulator*, *supra* note 5, at 1289–93 (discussing consumer protection challenges raised by digital intermediaries).

109. *See* Gal & Elkin-Koren, *supra* note 2, at 318–21.

110. *E.g.*, THE ECONOMIST INTELLIGENCE UNIT, THE AUTOMATION READINESS INDEX: WHO IS READY FOR THE COMING WAVE OF AUTOMATION? 10 (2018), http://www.automationreadiness.eiu.com/static/download/PDF.pdf [https://perma.cc/4VRL-E7AN]; Alan Boyle, *Policymakers Admit They Need to Get More Intelligent About Artificial Intelligence*, GEEKWIRE (Mar. 20, 2018, 10:40 AM), https://www.geekwire.com/2018/policymakers-acknowledge-need-get-intelligent-ai/ [https://perma.cc/9XPK-CJZZ].

1. Data Obstruction

Access to data is crucial for AIs to help consumers shop, but sellers can block digital intermediaries from obtaining data. The law can help in different ways, depending on whether the data in question is general (product-specific) or personal (customer-specific).

Product information. Counterintuitively in the information age, businesses can block access to market information that exists openly on the web, such as Amazon's or airlines' prices. To give up-to-date advice, AIs would need to monitor price and product changes on various websites, a process called scraping.[111] Online sellers have used the Computer Fraud and Abuse Act (CFAA) and other laws to forbid third parties from digitally collecting such information.[112] Autoslash, for instance, is a third-party service that reportedly helped lower rental car prices by about 25% by alerting customers when prices were lowered.[113] Two of the leading rental car agencies, Enterprise and Avis, concluded that the service was harmful to their business and refused to let Autoslash show their car availability.[114] The information is freely available on the web, but without approval, Autoslash—a small startup—risks getting sued by large corporations.

The laws used to block access to information were not intended to do so. Instead, lawmakers adopted the CFAA, for example, to deter website hackers.[115] As a result, the use of such laws to deter AIs rests on shaky legal and intellectual grounds.[116] Some of the more recent cases suggest that courts are becoming more skeptical of companies, such as Ticketmaster, Oracle, and LinkedIn, which are blocking third-party access that might help consumers.[117]

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111. *See supra* Section I.A; *see also Data Scraping*, TECHNOPEDIA, https://www.techopedia.com/definition/33132/data-scraping [https://perma.cc/H83H-7EE3].

112. James Grimmelmann, *The Structure of Search Engine Law*, 93 IOWA L. REV. 1, 24–25 (2007); Orin S. Kerr, Essay, *Norms of Computer Trespass*, 116 COLUM. L. REV. 1143 (2016); Maureen A. O'Rourke, *Shaping Competition on the Internet: Who Owns Product and Pricing Information?*, 53 VAND. L. REV. 1965, 1972–76 (2000). Other laws include the Digital Millennium Copyright Act. *See, e.g.*, O'Rourke, *supra* at 1989.

113. Ron Lieber, *A Rate Sleuth Making Rental Car Companies Squirm*, N.Y. TIMES: YOUR MONEY (Feb. 17, 2012), https://www.nytimes.com/2012/02/18/your-money/autoslash-a-rate-sleuth-makes-rental-car-companies-squirm-your-money.html (on file with the *Michigan Law Review*).

114. *See id.*

115. *See* O'Rourke, *supra* note 112, at 1989, 1991.

116. For instance, courts are divided on how to define unauthorized access. *See* Kerr, *supra* note 112, at 1143.

117. Oracle USA, Inc. v. Rimini St., Inc., 879 F.3d 948 (9th Cir. 2018), *cert. granted sub nom.* Rimini St., Inc. v. Oracle USA, Inc. 139 S. Ct. 52 (2018) (mem.) (reversing a permanent injunction against a web scraper and holding that the scraper did not violate the law when it scraped Oracle's website contrary to Oracle's terms of use); Ticketmaster L.L.C. v. Prestige Entm't, Inc., 306 F. Supp. 3d 1164 (C.D. Cal. 2018) (granting in part a motion to dismiss Ticketmaster's claim against the defendant for use of bots to purchase mass quantities of tickets); hiQ Labs, Inc. v. LinkedIn Corp., 273 F. Supp. 3d 1099 (N.D. Cal. 2017), *appeal docketed*,

Additionally, large companies won the early, prominent data-restriction cases mostly against resource-deprived startups, like eBay's victory against the now-defunct Bidder's Edge.[118] If a larger company desired data access, the result could be different. Amazon reportedly regularly scrapes competitors' prices without court challenge.[119] It is possible that more deep-pocketed informer AIs could overcome the remaining shaky legal barriers to data access.

It is also worth noting that the law is not AIs' last option. Consumer participation may provide an avenue outside the legal process to obtain data. Millions of consumers send real-time prices to GasBuddy, which then helps drivers across the nation know which nearby gas station offers the best deal.[120] Microsoft, Apple, or Google could require users to share purchase information as it passes through phones or computers as an alternative means of AI access.

Despite these possible technology- and market-driven developments, AIs' surest path to data independence would be through courts refusing to continue to allow misappropriated laws to block access and through legislatures passing new laws to promote access. Pre–digital era disclosures are common. For instance, many states have laws requiring stores such as Target and Walmart to post price per unit on the shelves to make it easier to compare differently sized items.[121] Laws compelling sellers to provide data to AIs would advance related goals of facilitating price and product comparison.

Personal data. Customer-specific data will be crucial to tailoring advice and will drive consumers to give AIs access to online accounts. For instance, millions of customers at Citibank, Bank of America, and JPMorgan Chase have given AI financial assistants like NerdWallet their passwords so that automated bots can log in and collect bank transaction records.[122] Banks re-

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No. 17-16783 (9th Cir. Sept. 6, 2017) (granting preliminary injunction against blocking petitioner's ability to scrape otherwise publicly available data).

118. eBay, Inc. v. Bidder's Edge, Inc., 100 F. Supp. 2d 1058 (N.D. Cal. 2000); *see also* Ryan T. Holte, *The Misinterpretation of* eBay v. MercExchange *and Why: An Analysis of the Case History, Precedent, and Parties*, 18 CHAP. L. REV. 677, 706 (2015).

119. Stevens, *supra* note 93.

120. Federico Rossi & Pradeep K. Chintagunta, *Price Transparency and Retail Prices: Evidence from Fuel Price Signs in the Italian Highway System*, 53 J. MARKETING RES. 407 (2016); *GasBuddy.com Teams Up with Pricelock to Add Fuel-Price Protection Option for Businesses*, BUS. WIRE (Apr. 14, 2011, 8:00 AM), https://www.businesswire.com/news/home/20110414005276/en/GasBuddy.com-Teams-Pricelock-Add-Fuel-Price-Protection-Option [https://perma.cc/QG7G-MPCL].

121. *See A Guide to U.S. Retail Pricing Laws and Regulations*, NAT'L INST. STANDARDS & TECH. (Aug. 25, 2016), https://www.nist.gov/pml/weights-and-measures/laws-and-regulations/retail-and-unit-pricing-laws [https://perma.cc/MRK9-ZVJX].

122. *See* Jessica Silver-Greenberg & Mary Pilon, *The Great Customer Courtship*, WALL STREET J. (Feb. 12, 2011, 12:01 AM), https://www.wsj.com/articles/SB10001424052748703313304576132593769879956 (on file with the *Michigan Law Review*); *About Us*, NERDWALLET, https://www.nerdwallet.com/about-

sponded by adapting their account systems to block the bots.[123] Airlines similarly denied online account entry to startups that wanted to help consumers manage their airline rewards programs.[124] The companies cited privacy concerns, or accidental blocking due to internal systems updates,[125] but those explanations must be viewed with some skepticism because the intermediaries pose a competitive threat.

Scholars have identified the need to address this personal data inaccessibility without regard to automated commerce. In response to consumers' difficulty in selecting the best cell phone plan available, Professors Bar-Gill and Stone suggest that cell phone carriers be required to give consumers their usage data in spreadsheet form so that third parties could advise on the plan of best fit.[126] The United States has mostly declined to compel businesses to share personal account data with third parties when consumers request such access. Congress tasked the Consumer Financial Protection Bureau (CFPB) with studying whether to compel banks to provide such information, but the CFPB decided not to do so.[127] It instead issued voluntary "principles" for sharing such data.[128] Those guidelines could exert soft influence, but they leave banks with great leeway to thwart intermediary access.

Other countries have taken a more active role in providing consumer intermediaries with personal account access. In the United Kingdom, some grocery stores give consumers access to their spending habits from rewards program databases.[129] Europe recently passed sweeping privacy legislation, the European General Data Protection Regulation (GDPR), that requires companies across the economy to share such information with consumers when asked.[130] Personal and general information laws may prove determina-

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us/?trk=nw_gf_5.0 [https://perma.cc/8JS8-5MWU]; *How It Works*, MINT, https://www.mint.com/how-mint-works [https://perma.cc/S3ZK-233V].

123. *See* Daniel Huang & Peter Rudegeair, *Bank of America Cut Off Finance Sites from Its Data,* WALL STREET J. (Nov. 9, 2015, 7:47 PM), https://www.wsj.com/articles/bank-of-america-cut-off-financesites-from-its-data-1447115089 (on file with the *Michigan Law Review*).

124. Ron Lieber, *Swatting Down Start-Ups That Help Consumers*, N.Y. TIMES: YOUR MONEY (Apr. 6, 2012), https://www.nytimes.com/2012/04/07/your-money/swattingdown-start-ups-with-consumer-friendly-ideas.html (on file with the *Michigan Law Review*).

125. *E.g.*, Huang & Rudegeair, *supra* note 123 (mentioning the privacy explanation); Mary Wisniewski, *Fintechs' Vulnerability Apparent in Capital One Data-Access Flap*, AM. BANKER (June 29, 2018, 12:12 PM), https://www.americanbanker.com/opinion/fintechs-vulnerability-apparent-in-capital-one-data-access-flap [https://perma.cc/V8UJ-D3V5].

126. Bar-Gill & Stone, *supra* note 90, at 454–55.

127. *See* CONSUMER FIN. PROT. BUREAU, CONSUMER PROTECTION PRINCIPLES: CONSUMER-AUTHORIZED FINANCIAL DATA SHARING AND AGGREGATION (2017), http://files.consumerfinance.gov/f/documents/cfpb_consumer-protection-principles_data-aggregation.pdf [https://perma.cc/RU68-96MY].

128. *See id.* at 3–5.

129. Richard H. Thaler & Will Tucker, *Smarter Information, Smarter Consumers*, HARV. BUS. REV., Jan.–Feb. 2013, https://hbr.org/2013/01/smarter-information-smarter-consumers [https://perma.cc/4FCX-A3QC].

130. Commission Regulation 2016/679, 2016 O.J. (L 119) 43.

tive of AIs' ability to help consumers by making it less likely that informer AIs either lose out to marketplace AIs like Amazon or are coopted by sellers to gain data access.

2. Exit Prevention

Companies might also undermine AIs by making it harder for AIs to automate consumers' departure to another company. Common past mechanisms for discouraging exit include contractual termination fees, obstinate customer service, and rewards programs.[131] In their early years, industry leaders such as Verizon, AT&T, and Sprint locked consumers into multiyear contracts by imposing penalty clauses of $99 to $200 for exiting early.[132] AIs in such an industry could still dominate the choices made whenever contracts expire or a new consumer enters. But high termination fees can deter otherwise rational switching out of bad contracts—if the market fails to provide alternatives to those high fees.[133]

Companies have leveraged customer service to inflate the time and energy needed to cancel. Subscription-based services, including gym memberships and internet access, sometimes require customers to show up in person, wait on the phone for hours, or plead with an insistent employee to be able to cancel.[134] Comcast, one of the most notorious practitioners of this approach, went so far as to refuse to let a man cancel his subscription through four calls after his house had burnt down.[135]

Customer service barriers are challenging for AIs. It is likely that AIs will be able to make the phone call and wait on hold, thereby minimizing the amount of time the consumer needs to spend in exiting. But as long as a human is required to invest time to exit, such as through a contractual requirement, sellers would still be able to greatly hinder AI-driven exit, since "research in behavioral economics indicates that even very small switching costs may prevent customers from switching."[136]

Rewards programs also lock consumers in, with over 2.5 billion individual program memberships existing in 2012.[137] They raise the costs of comparing various products with multidimensional rewards programs. Scholars

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131. *See, e.g.*, Oren Bar-Gill & Omri Ben-Shahar, *Exit from Contract*, 6 J. LEGAL ANALYSIS 151 (2014); van Schewick, *supra* note 104, at 92–96 (discussing switching costs in internet services).

132. Larson v. AT&T Mobility LLC, 687 F.3d 109, 113 (3d Cir. 2012); Schneider v. Verizon Internet Servs., Inc., 400 F. App'x 136, 137 (9th Cir. 2010).

133. Such market failures are more likely in concentrated markets. *See infra* Section II.B.4.

134. *See* DellaVigna & Malmendier, *supra* note 89.

135. Jay Hathaway, *Comcast Reluctantly Lets Man Cancel Service After His House Burns Down*, GAWKER (Apr. 10, 2015, 9:10 AM), http://gawker.com/comcast-reluctantly-lets-man-cancel-service-after-his-h-1696970880 [https://perma.cc/9RBT-H8VA].

136. van Schewick, *supra* note 104, at 95 (reviewing the literature).

137. Bar-Gill & Ben-Shahar, *supra* note 131, at 159.

have concluded that these practices exploit decision biases to "hurt consumers and reduce social welfare."[138] The law is unlikely to restrict rewards programs, but with data access the AI should be able to analyze which credit card rewards program will ultimately save consumers the most money—the one with the $100 annual fee but a generous cash-back program, or the one without an annual fee but that offers frequent flyer miles that can be redeemed for airline tickets. To the extent consumers irrationally stay in a current account because they believe the rewards program is more valuable than it is, AIs may make rewards programs less sticky by helping consumers easily determine which program is truly in their best interests.

The law has intervened in various ways to promote customer exit. Courts have struck down excessive cell phone termination fees, and the Federal Communications Commission ultimately passed a rule to crack down on such practices.[139] At the state level, the New York Attorney General fined America Online, an ISP, $1.25 million for making it hard to switch "by either making the cancellation process so painful for the customers that they could not bear to continue, or by simply ignoring their requests."[140] California requires an online cancellation option for any consumer who accepts an automatic or continuous service offer online.[141] Comcast now allows customers to cancel online nationwide.[142]

Thus, seller blocking of exit faces an uphill battle. But it may still be possible, at least in some industries and jurisdictions, for companies to insist contractually that only a human being can cancel. The legal system has yet to finish adapting customer-exit doctrine to automated commerce.

3. Obfuscation

Many sellers will presumably adopt misperception tactics against AIs similar to those they deploy for consumers. Instead of manipulating the human brain, they will seek to manipulate AI algorithms. Sellers may, for instance, rely on subtle changes in name or product across time or stores. If manufacturers were to use different names or valueless design changes for essentially the same products at Walmart and Target, it would be harder for

138. *See id.* at 172, 181.

139. Business Data Services in an Internet Protocol Environment, 82 Fed. Reg. 25,660 (June 1, 2017) (to be codified at 47 C.F.R. pts. 0, 1, 61, 63, & 69). Market forces also have discouraged this behavior. For example, when faced with two otherwise similar products, consumers typically prefer not to be locked into a long-term contract. Bar-Gill & Ben-Shahar, *supra* note 131, at 178–79.

140. Randall Stross, *Why Time Warner Has Fallen in Love with AOL, Again*, N.Y. TIMES (Sept. 25, 2005), https://www.nytimes.com/2005/09/25/business/why-time-warnerhas-fallen-in-love-with-aol-again.html (on file with the *Michigan Law Review*).

141. CAL. BUS & PROF. CODE § 17602(c) (Deering 2018).

142. *How to Change, Move or Cancel Your Xfinity Services*, XFINITY, https://www.xfinity.com/support/articles/cancel-myxfinity-services (on file with the *Michigan Law Review*).

the AI to know which store has the best deal.[143] Another related technique would be to continually introduce new product lines that reflect little if any improvement but create the perception that previous versions are now inferior.[144] Continual updates would lessen AIs' ability to use data on prior product lines to advise consumers.

It is unclear how well these strategies will work in markets with consumers relying on AI. To benefit consumers, the AIs need only improve upon consumers' ability to compare. They need not perfect the comparison process. Many consumers might outsource purchases even to confused AIs if the AIs are less confused than the consumer would be when faced with the same set of choices. The more that businesses make their products difficult to compare, the more consumers may realize they need help from AIs. In other words, business efforts to cause AI misperception by making the marketplace more confusing may accelerate consumers' reliance on AIs.

Additionally, AIs may become widespread even if they do not help consumers pay lower prices or find better products. They might instead become popular because of the convenience they provide. Or they might themselves benefit from consumers' mistaken perceptions that the AIs gave better advice. In that sense, AIs can engage in a digital version of the "seduction by contract" that has allowed credit card and mortgage companies to charge higher prices through complex choice architecture.[145] Choosing the right AI, and understanding its full implications, can be analogized to choosing the right mortgage or other complex product—thus allowing opportunities for overestimating the benefits to the consumer.[146] Therefore, sellers' obfuscation tactics alone will not necessarily block AI adoption, because such obfuscation will make it (1) easier for AIs to convince consumers that they need help, (2) more likely that consumers need help, and (3) more difficult for the consumer to tell whether the AIs' advice is, in fact, helpful.

Market forces aside, policymakers have generally sought to improve consumer clarity. Behavioral research spawned a multitude of policies aimed at nudging consumers to make better choices, but those policies have often been unsuccessful because sellers adjust practices quickly and consumers may not use disclosed information as intended.[147] Unlike with consumers, however, the tech companies that offer AIs will be better suited to identify the practices that are aimed at undermining AIs and articulating how they need policymakers to respond. With AIs as the target for disclosures and

143. *See* Glenn Ellison, *Bounded Rationality in Industrial Organization*, *in* 2 ADVANCES IN ECONOMICS AND ECONOMETRICS 142, 157 (Richard Blundell et al. eds., 2006).

144. *See, e.g.*, Gregory S. Carpenter et al., *Market-Driving Strategies: Toward a New Concept of Competitive Advantage*, *in* KELLOGG ON MARKETING 103, 125 (Dawn Iacobucci ed., 2001).

145. BAR-GILL, *supra* note 29, at 7–23, 51–52, 116–17.

146. For a more extended discussion of this topic, see Van Loo, *Rise of the Digital Regulator*, *supra* note 5, at 1289–93.

147. *See generally* Ben-Shahar & Schneider, *supra* note 10; Bubb & Pildes, *supra* note 10.

large tech companies as partners in identifying sellers' latest obfuscation strategies, the law may have a better chance at reducing obfuscation.

4. Collusion

Scholars have explored the antitrust implications of two or three AIs controlling the market, with the concern being that AIs might abuse their dominance.[148] Scholars have paid less attention to sellers colluding to prevent AIs from functioning. More specifically, by colluding to limit choice, sellers can impede AIs' ability to help consumers.[149] If all prices for paper towels are the same, for instance, AIs have less of a basis for recommending one product over another. Several factors would influence whether such an arrangement might come to pass.

First, more concentrated industries facilitate collusion, and industries are overall becoming far more concentrated, with over 75% experiencing an increase in concentration over the past twenty years.[150] The types of industries potentially susceptible to digital switching—banking, telecommunications, and retail—are increasingly dominated by a few large companies.[151] Second, when it is hard to start a company in a given industry, existing players can collude with less fear that a new entrant will break up their arrangement. Entry barriers have risen in diverse industries for multiple reasons, including greater market consolidation[152] and the technological investments

148. *See* Gal & Elkin-Koren, *supra* note 2; Stucke & Ezrachi, *supra* note 66.

149. *Cf.* ALBERT O. HIRSCHMAN, EXIT, VOICE, AND LOYALTY: RESPONSES TO DECLINE IN FIRMS, ORGANIZATIONS, AND STATES 55–62 (1970) (positing that customers are less likely to switch companies in concentrated industries).

150. Gustavo Grullon et al., *Are U.S. Industries Becoming More Concentrated?* 2 (June 2018), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2612047 [https://perma.cc/PE24-HBY9].

151. Fidel Ezeala-Harrison & John Baffoe-Bonnie, *Market Concentration in the Grocery Retail Industry: Application of the Basic Prisoners' Dilemma Model*, 6 ADVANCES MGMT. & APPLIED ECON. 47, 48 (2016) (stating that only four retailers account for 55% of the grocery industry in 2014); Rhys Grossman, *The Industries That Are Being Disrupted the Most by Digital*, HARV. BUS. REV. (Mar. 21, 2016), https://hbr.org/2016/03/the-industries-that-are-being-disruptedthe-most-by-digital [https://perma.cc/NLK3-USCG]; Jonathan R. Macey & James P. Holdcroft, Jr., *Failure Is an Option: An Ersatz-Antitrust Approach to Financial Regulation*, 120 YALE L.J. 1368, 1391 (2011) (explaining how the largest five banks consolidated to control 42% of all assets); Tom Wheeler, Chairman, Fed. Commc'ns Comm'n, The Facts and Future of Broadband Competition 4 (Sept. 4, 2014) (concluding that most consumers have only two choices for internet or cable) (transcript available for download online), https://apps.fcc.gov/edocs_public/attachmatch/DOC-329161A1.pdf [https://perma.cc/DS9A-GRYU].

152. Concentrated industries can deter new entrants, as the existing competitors have deeper pockets and the ability to reduce prices swiftly to retain existing customers. Niraj Dawar & Jason Stornelli, *Rebuilding the Relationship Between Manufacturers and Retailers*, MIT SLOAN MGMT. REV., Winter 2013, at 83, 83–84.

required to compete.[153] Third, the growing use of algorithms by sellers has created new mechanisms for collusion. While the Department of Justice has prosecuted coconspirators who intentionally used algorithms to fix the price of posters sold on Amazon,[154] self-learning algorithms instructed to set prices at the most profitable level could on their own deduce that collusion with competitors yields the highest profits.[155] The algorithms may do so indirectly, such as by fixing their price on an external variable that coincides with competitors' prices.[156]

Scholars have proposed updates to address new forms of sellers' algorithmic collusion.[157] But competition law has been slow to adjust to the digital era.[158] Besides the general inertia of the law, antitrust authorities are particularly reluctant to intervene in new industries out of a fear of harming innovation.[159] Those consumer-focused reforms may prove more important if sellers become extra motivated to collude out of a desire to undermine AIs. Given that AIs will closely track market prices and would arguably be harmed by seller price collusion, it is worth considering more closely how to bring AIs into the antitrust framework—not just as the targets of enforcement but as potential informants and plaintiffs.

C. *Summary*

Established businesses may impede AIs' benefits to consumers through a number of strategic moves. It is also possible that AIs take hold of markets solely out of consumers' desire for convenience and without actually benefitting consumers in other ways or moving markets toward the basic economic model of perfect competition. But with the right legal framework in place, AIs could significantly reduce transaction costs by eliminating searching and switching costs in some contexts. Most of the business responses discussed above are, by traditional economic accounts, inefficient: reducing information available, blocking exit, restraining competition, and engaging in

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153. *See, e.g.*, Daniel L. Rubinfeld & Michael S. Gal, *Access Barriers to Big Data*, 59 ARIZ. L. REV. 339 (2017).

154. Press Release, Dep't of Justice, Former E-Commerce Executive Charged with Price Fixing in the Antitrust Division's First Online Marketplace Prosecution Apr. 6, 2015), https://www.justice.gov/opa/pr/former-e-commerce-executive-charged-price-fixing-antitrust-divisions-first-online-marketplace [https://perma.cc/LN4P-662B].

155. The related literature on digital intermediaries and automated business decisions, follows a similar microeconomic focus. *See, e.g.*, Ariel Ezrachi & Maurice E. Stucke, *Artificial Intelligence & Collusion: When Computers Inhibit Competition*, 2017 U. ILL. L. REV. 1775 (articulating antitrust concerns).

156. *See id.* at 1791–92.

157. *See, e.g.*, Michal Gal, *Algorithms as Illegal Agreements*, 33 BERKELEY TECH. L.J. (forthcoming 2019) https://ssrn.com/abstract=3171977 [https://perma.cc/ZAC5-9XVX].

158. *See, e.g.*, John M. Newman, *Antitrust in Zero-Price Markets: Foundations*, 164 U. PA. L. REV. 149, 153, 192–93 (2015).

159. *See* David McGowan, *Innovation, Uncertainty, and Stability in Antitrust Law*, 16 BERKELEY TECH. L.J. 729, 765–70 (2001).

wasteful product differentiation.[160] Because these activities are inefficient, the intellectual paradigm that dominates regulatory policy would support deterring as many of them as possible—assuming a viable intervention existed.[161] But even arguably the most powerful and motivated consumer protection agency, the CFPB, failed to act consistent with an intermediary protection paradigm when tasked by Congress with making a decision on the matter. In short, while the law is entirely unsettled, influential political and intellectual forces could enable AIs to bring massive reductions in transaction costs to many markets, and thereby tremendous gains to society. Those beneficial results and the path to them become clearer through a lens of AI protection.

III. THE RISKS OF HYPERSWITCHING

> We often decide that an outcome is extremely unlikely or impossible, because we are unable to imagine any chain of events that could cause it to occur. The defect, often, is in our imagination.
>
> – Daniel Kahneman and Amos Tversky[162]

The discussion so far has addressed the underappreciated intellectual and legal shifts that would improve AIs' ability to become widely adopted. This Part turns to the downsides of AIs once they are adopted. The literature has focused on the concerns that dominant digital intermediaries might exercise monopoly power or threaten consumer protection—harms addressed by more micro-level governance of AIs. But a broader set of costs and risks, many of which require a more macro-level perspective, could result from how AIs transform the structure of markets and businesses. The goal of this discussion is neither to predict the future nor to estimate the likelihood and extent of automated consumer switching. Instead, the goal is to illuminate a set of underappreciated dynamics in the coming automation of markets.[163]

A. *Hyperswitching as a New Form of Disruption*

To understand why AIs might lead to unfamiliar downsides, it is instructive to consider how AIs will introduce new types of change into markets. Assume that a large portion of consumer spending is either heavily influenced by, or directly outsourced to, AIs. Assume also that almost all

160. Companies' misuse of laws to exclude data would also violate the basic precepts of competition. *See supra* Section IV.A.

161. As North explained, "Essential to efficiency over time are institutions that provide economic and political flexibility to adapt to new opportunities." NORTH, *supra* note 75, at 9.

162. MICHAEL LEWIS, THE UNDOING PROJECT 194 (2016) (quoting a summarization by psychologists Daniel Kahneman and Amos Tversky of their article, Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, 185 SCIENCE 1124 (1974)).

163. Part IV considers how the existing regulatory and intellectual framework could be better set up to account for these possibilities.

customers use Google and Apple AIs,[164] mirroring the markets for cell phone operating systems and matching scholars' predictions that such digital intermediaries will be highly concentrated.[165] One of the potential results is that AIs would have the ability to cause hyperswitching, that is the exit of consumers from existing sellers in a significantly faster manner than had happened in a pre-AI world.

For instance, sixty million users might receive an AI alert on their phones that a new bank is now paying a higher interest rate, with the AI offering to transfer the users' funds from their current bank to the new one. Or the next time anyone purchases a blender, the AI might reveal that one company has significantly higher satisfaction from users for the same cost. The banks holding existing funds could within a few weeks see millions of customers withdraw funds. Major manufacturers of blenders could see sales plummet.

AIs might suddenly advise a large number of consumers to move to a new purchaser for three main reasons. The first is a better price. Competitors could always try to match price decreases, and many sellers' first response would be to give up any current supracompetitive markups, thus driving down profits. Once a given market reaches something close to marginal cost pricing, however, any seller with a higher cost structure should prove unable to follow the price cuts for long without going out of business. Many industries have divergent cost structures,[166] meaning that a move to marginal cost pricing could still result in price-driven switching.

A second potential driver of customer flight is a more appealing product. Prominent examples of broadly attractive product innovations include Netflix offering streaming video or cell phones replacing landlines. Innovation can, however, come in small increments and subtler changes, such as creating a battery that lasts longer.

Finally, it is possible that an AI might have some self-interest in directing consumers to a new product. When two leading travel search engines, Orbitz and Expedia, delisted American Airlines from online searches over a dispute about increased commissions, the airline lost the equivalent of over $100 million annually and quickly caved to the search engines' demands to

164. This assumption is not necessary for hyperswitching to occur but makes it more likely. *See infra* notes 179–180 and accompanying text (describing how even fragmented AIs might cause coordinated market movements).

165. *See* Stucke & Ezrachi, *supra* note 66, at 69; *supra* note 11 and accompanying text.

166. *See* Christopher R. Leslie, *Conspiracy to Arbitrate*, 96 N.C. L. REV. 381, 422 (2018) ("[F]irms may have different cost structures, and more efficient firms may maximize profits at a lower cartel price than firms with higher costs." (citing HERBERT HOVENKAMP, FEDERAL ANTITRUST POLICY: THE LAW OF COMPETITION AND ITS PRACTICE § 4.1, at 193–94 (5th ed. 2016), and James M. Griffin, *Previous Cartel Experience: Any Lessons for OPEC?*, in ECONOMICS IN THEORY AND PRACTICE: AN ECLECTIC APPROACH 179 (Lawrence R. Klein & Jaime Marquez eds., 1989)); Jonathan S. Masur & Eric A. Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 689 (2010) ("Any industry can be subdivided indefinitely. In our Industry 1, closer examination might reveal that some firms paint cars and boats, while other firms paint only cars. The firms in each subindustry could have different cost structures . . . .").

pay higher commissions.[167] Self-interested AI advice would run the risk of undermining users' trust, but cannot be ruled out.[168]

In theory, for these and other reasons, AIs might cause hyperswitching. Since the stakes are high, the looming threat of hyperswitching alone could change markets and industrial organization. At least one large bank has already begun emphasizing rewards programs to prevent hyperswitching.[169]

Past disruptions and industry turmoil have not generally been seen as economically problematic, and indeed are fairly common. The airline and auto industries have, for instance, witnessed the bankruptcies of several of their largest companies during short timespans.[170] The disruption most similar to AI advisers was the development of electronic commerce. Due partly to online competition from the likes of Amazon and Netflix, the retail industry has witnessed considerable institutional failures.[171] Several once-ubiquitous national retailers folded in the 1990s and 2000s, including Circuit City in electronics, Borders in books, and Blockbuster in video rental.[172] In 2017 alone, Toys "R" Us, Radio Shack, and Payless Shoes filed for bankruptcy.[173]

If the lack of concern about such past disruption is well-founded, it is necessary to consider how a shift to automated markets would differ from prior industry disruption. Several main differences are worth noting.

1. Lasting Disruption

The familiar disruptive innovation model, exemplified by internet retail, involved sellers deploying a new technology to lure customers away from ex-

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167. Volodymyr Bilotkach, Nicholas Rupp & Vivek Pai, *Value of a Platform to a Seller: Case of American Airlines and Online Travel Agencies*, SSRN (Dec. 19, 2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2321767%20 [https://perma.cc/U2KB-MGA4].

168. Among other reasons, consumers may tolerate self-interest for the sake of convenience, and may not be able to compare the extent of self-interest across AIs. *See supra* Part II.B.3.

169. *See* Interview with Former Bank Executive, *supra* note 14 (mentioning that rewards programs were seen as providing insulation from hyperswitching).

170. Michael Huemer, *Bailouts in Context: The True Costs of Government Bailouts*, 11 GEO. J.L. & PUB. POL'Y 335, 335, 336, 344 (2013).

171. Ali Hortaçsu & Chad Syverson, *The Ongoing Evolution of US Retail: A Format Tug-of-War*, 29 J. ECON. PERSP., Fall 2015, at 89, 89.

172. Al Lewis, *Info-Age Shoplifting*, WALL STREET J. (Dec. 18, 2011), https://www.wsj.com/articles/SB10001424052970204026804577100820161580882 (on file with the *Michigan Law Review*).

173. Frank J. Cavaliere, *The Web-Wise Lawyer—Retail Recession: What Does It Portend for Retail Law?*, PRAC. LAW., Aug. 2017, at 7, 7; Robert Mclean, *Toys 'R' Us Files for Bankruptcy*, CNN MONEY (Sept. 19, 2017, 9:20 AM), https://money.cnn.com/2017/09/19/news/companies/toys-r-us-bankruptcy-chapter-11/index.html [https://perma.cc/M87Y-2B85].

isting firms.[174] Amazon and Netflix needed to take customers away from established retailers to earn revenues and deliver their core services—selling goods or renting videos.[175]

In contrast, replacement of existing sellers or manufacturers is not a necessary part of the AI business plan. Google's Assistant and Apple's Siri can leave all manufacturers and sellers of paper towels in place, for instance, while still inserting themselves into every U.S. transaction for paper towels. Indeed, in theory, if Google and Siri are the two dominant AIs, they could leave Amazon intact as a thriving online marketplace if they simply direct customers to purchase from Amazon whenever it offers the best option for a given end product.

Amazon may or may not be able to block Google and Apple AIs from knowing its paper towel prices or completing a transaction on Amazon. The outcome of that battle depends on legal, technological, and market issues that have yet to be resolved.[176] But for the present purpose of exploring the law and economics analysis of innovation, it suffices to recognize that AIs can layer onto an existing marketplace, and thereby help sellers with better prices or products disrupt that marketplace.

The nature of the AI disruption is thus fundamentally different from prominent previous disruptions. Past disruptions have typically involved taking market share from previously dominant firms and then leaving a stable set of players intact who control the once-disruptive technology. With AIs, holding a market leadership position would become far less certain on an ongoing basis, in part because AI advisers could rapidly redirect large portions of the market toward that newly preferable business based on small variations in price, product, or other advantages. Currently, small price advantages might not be sizeable enough to be noticed by most consumers, given information asymmetries and decisionmaking limitations.[177] Even if consumers today noticed, high switching costs may deter them from acting.[178] In a hyperswitching market, the leading firms' market shares could become regularly volatile, leaving them in a state of continual vulnerability as AIs transform small competitive advantages into major disruptions.

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174. Clayton M. Christensen et al., *What Is Disruptive Innovation?*, HARV. BUS. REV., Dec. 2015, at 44, 46.

175. *Id.* at 48–49; Lindsay Deutsch, *20 Years of Amazon, 20 Years of Major Disruptions*, USA TODAY (July 14, 2015, 11:07 AM), https://www.usatoday.com/story/news/nation-now/2015/07/14/working---amazon-disruptions-timeline/30083935/ [https://perma.cc/YPE4-5GC5].

176. *See supra* Part II.

177. *See supra* Part II.A.2.

178. *See* Richard Briesch et al., *How Does Assortment Affect Grocery Store Choice?*, 46 J. MARKETING RES. 176 (2009).

2. Faster Disruption

By speeding up the rate of customer switching, AIs could produce a high-speed version of the basic model for perfect competition used by generations of economists. In that model, when a firm offers a better product, consumers flock to the product. Other firms are forced to adapt their products by innovating in some way or dropping their prices. If they cannot, they go out of business.

Large increases in the speed of customer switching are easier to imagine if an AI were to capture 60% to 80% of the market share, in accordance with market dynamics and the shares of leaders in many digital services.[179] But a higher customer churn and synced advice are possible even if the AI industry were highly fragmented. If a new bank account pays higher rates than all others, presumably even ten competent and independent AIs would respond by sending their rate-focused consumers to that new bank. The bank offering the new and better account surely would not want to hide its benefits from the AIs. Already, different companies' price-setting algorithms have demonstrated an ability to sync by using the same (or an interconnected) external reference point. In one instance, the price of a book, *The Making of a Fly* by Peter Lawrence, ballooned on Amazon from a few dollars to over twenty-three million dollars because each of two sellers of the item had algorithmically set its price in relation to the other.[180]

For hyperswitching to accelerate disruption, large numbers of consumers must receive similar advice—if not all of them directed to the same product, then at least to different products at a new seller or group of sellers. That assumption requires examination given the modern trend toward firms personalizing products. Would advice given necessarily be the same to millions of users? The answer will likely differ by type of product.[181] But algorithms have for years openly used the purchases of similarly situated consumers to make recommendations, with Amazon telling shoppers, "Customers who bought this item also bought . . . ."[182] On a subtler level, a recent Facebook experiment showed how social networks' algorithmic decisions can influence feelings—producing "massive-scale emotional contagion."[183]

If AIs were to give similar shopping assistance to a substantial portion of a given market, hyperswitching could cause firms to fail at a faster rate than prior industry disruptions. The retail industry transformation as a result of e-commerce occurred in a relatively gradual manner for individual compa-

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179. *See supra* note 58 and accompanying text (listing shares); *supra* Section I.A (network effects).

180. Ezrachi & Stucke, *supra* note 155, at 1780–81.

181. *See infra* Section III.A.5 (discussing how hyperswitching differs by market).

182. Shep Hyken, *Recommended Just for You: The Power of Personalization*, FORBES (May 13, 2017, 9:12 AM), https://www.forbes.com/sites/shephyken/2017/05/13/recommended-just-for-you-the-power-of-personalization/#460209796087 [https://perma.cc/5M4Q-8SZ6].

183. Adam D.I. Kramer et al., *Experimental Evidence of Massive-Scale Emotional Contagion Through Social Networks*, 111 PROC. NAT'L ACAD. SCI. 8788, 8788–90 (2014).

nies. Borders's and Blockbuster's difficulties, for instance, occurred over more than a decade. During this time, the companies launched their own online services and filed for Chapter 11 bankruptcy (reorganization) before resorting to Chapter 7 (liquidation).[184] The decline also was incremental in the sense that different retailers closed at different times and often began by closing some subset of stores each year. The cumulative job losses were substantial, but the economy absorbed the turmoil of any given retailer failing in a more isolated manner.[185] Creditors and investors could also adjust and limit their exposure as firms slowly lost customers.[186]

In contrast, in the face of hyperswitching, firms might lose large portions of their consumers not over the course of many years but over the course of months, weeks, or even days. To be clear, any given market's transition to faster switching would happen gradually, as consumers slowly adopted AIs.[187] But once a critical mass of consumers were following AI advice in a given industry, without changes to the basic capital structure that most firms adopt today, firms could rapidly become unable to pay their bills and struggle to stay in business.[188] Insolvency will be even more likely if AIs succeed in driving prices closer to marginal cost, as would be expected if they remove existing sources of overcharge from switching hassles, information asymmetries, and behavioral limitations.[189]

Some consumer product markets could thereby become more like stocks, in the sense of being subject to sudden sizeable market swings.[190] Of course, unlike with stocks, some firms gaining sales might struggle to ac-

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184. *See generally* Ruth Sarah Lee, *Corporate Reorganization as Corporate Reinvention: Borders and Blockbuster in Chapter 11*, 1 HARV. BUS. L. REV. ONLINE 53 (2011), http://www.hblr.org/wp-content/uploads/2011/03/Ruth_Lee-Online_Commentary_EIC_Review4.pdf [https://perma.cc/2AG5-PGWX]; Nick Brown, *Borders Liquidation Approved by Bankruptcy Judge*, REUTERS (July 21, 2011, 7:02 PM), http://www.reuters.com/article/us-borders/borders-liquidation-approved-by-bankruptcy-judge-idUSTRE76K7LK20110721 [https://perma.cc/VWU6-U8KZ]; Marc Graser, *Blockbuster to Stop Movie Rentals Saturday*, VARIETY (Nov. 8, 2013, 6:05 PM), http://variety.com/2013/biz/news/blockbuster-to-stop-movie-rentals-saturday-1200810578/ [https://perma.cc/6VUA-MLTZ].

185. *See* sources cited *supra* note 184.

186. *See* Adam J. Levitin, *In Defense of Bailouts*, 99 GEO. L.J. 435, 485 (2011).

187. Consumers will likely adopt AIs over time, with younger generations participating first. Janet Guyon, *Hey Siri. More than 60 Million Americans Talk to Inanimate Voices on Their Cellphones*, QUARTZ (May 9, 2017), https://qz.com/978577 [https://perma.cc/LJ3F-U6MC]. Those who do adopt them will have varying degrees of acceptance of the recommendations, with many potentially remaining reluctant to delegate too much research and decisionmaking.

188. The resulting competitive prices would leave the firm with less cushion on any remaining sales than exists today. The possibility of capital structure changes is discussed below. *See infra* Section IV.B.

189. For instance, the primary driver of store choice is convenience, and thus a store offering slightly lower prices would not necessarily win over new customers even if consumers were aware of those savings. *See supra* Section I.B.

190. *See supra Section* II.A.

commodate too large an influx of customers on shorter notice.[191] But AIs would be expected to accelerate switching, and the possibility cannot be ruled out that they will do so to an extreme that causes firms to fail far more rapidly than in prior disruptions.

3. Larger-Scale Disruption

Precisely which industries will be vulnerable is difficult to know in advance, but clearly not all markets would be equally subject to hyperswitching. Several major categories of consumer expenditures are inherently more resistant to hyperswitching, regardless of how incumbents respond to the competitive threat. For example, the time and energy needed to move apartments likely insulates rental expenditures—about $600 billion—from drastic increases in switching.[192] Similarly, much of the $2.27 trillion in private sector healthcare expenditures is less likely to be subject to hyperswitching anytime soon, due to institutional barriers such as insurer limits on which doctors a patient can choose and employer limits on sponsored insurance plans.[193]

Broadly speaking, consumers are more likely to delegate spending to AIs for more fungible and less branded products. But fungibility is a nuanced and dynamic concept.[194] Financial services, paper, rice, and internet access are each highly fungible in the sense that the basic product is not particularly differentiated. If the download speeds for two companies are comparable and sufficient to stream movies and conduct video calls, a user is unlikely to be able to distinguish between two ISPs other than on price.[195]

With respect to brands, AIs are unlikely to sway consumers away from emotional attachments. But even within branded industries, some portion of the market will likely view the product as somewhat fungible. Some people care little about who cuts their hair or which manufacturer makes their jeans and socks. Others are greatly attached to a particular stylist or logo.

Further complicating the matter is that consumers often infer product quality from brands, and do so poorly. People pay over 50% more for Energizer batteries that in laboratory tests last only as long as obscure brands.[196] The typical consumer will spend three times as much for Bayer headache re-

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191. *See infra Section* III.A.5.

192. *National Data*, BUREAU ECON. ANALYSIS tbl.2.4.5 (updated July 31, 2018), https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=2#reqid=19&step=2&isuri=1&1921=survey (on file with the *Michigan Law Review*).

193. *See id.*

194. A. Peter McGraw et al., *The Limits of Fungibility: Relational Schemata and the Value of Things*, 30 J. CONSUMER RES. 219, 219–20 (2003).

195. Of course, other factors such as customer service could play in, but the basic product being offered—internet access—may be identical.

196. Mitch Lipka, *Test Results That Will Change the Way You Buy Batteries Forever*, DEALNEWS (July 3, 2014), https://www.dealnews.com/features/Test-Results-That-Will-Change-the-Way-You-Buy-Batteries-Forever/449005.html [https://perma.cc/JB78-AQ4C].

lief than the chemically identical store brand, even though pharmacists and healthcare professionals buy the latter for themselves.[197] Electronic commerce has already created "markets . . . with less consumer loyalty to a specific firm, perhaps due to better access to information or the reduction of other search costs."[198] AIs should further erode loyalty and profit in many categories by more comprehensively identifying which brands actually convey meaningful quality differences.

The discussion of brands illustrates how AIs' disruption can reach a broader array of firms, not only horizontally across industries but also vertically within a given industry. The consumer goods industry, for instance, can be divided vertically into the retailers that sell products and the manufacturers that produce them. The first generation of disruptive e-commerce companies, like Amazon, mostly lured customers away from retailers to purchase the same basic products as before.[199] AIs could do more of the same, significantly lowering online and offline retailers' profits on a sustained basis by making it easier to compare prices within and across stores.[200] Where AIs differ is in their greater potential to destabilize manufacturers, like Bayer and Energizer, by helping consumers to see that a better option is available.

Reaching manufacturing, rather than just retail, would mean AIs would have a much larger impact on the retail-goods economy. Most of the large-firm profit in the consumer sector is not in the resale of others' products but in manufacturing. Many of the retailers that folded were large and nationwide, but in 1990—before email was popular—Blockbuster and Circuit City were outside the top 100 most profitable companies in the United States.[201] More numerous in the list of the largest companies by value were manufacturers—led by Coca-Cola, Procter & Gamble, and Johnson & Johnson.[202] Those companies made the transition to e-commerce, as they now simply sell their products through new online channels.[203] Additionally, some of manufacturers' profits have gradually shifted to the largest retailers, including Amazon and Walmart, which earn a considerable and increasing portion of their profits from manufacturing their own products.[204]

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197. *See, e.g.*, Bronnenberg et al., *supra* note 92, at 1669, 1690.

198. Paul J. Irvine & Jeffrey Pontiff, *Idiosyncratic Return Volatility, Cash Flows, and Product Market Competition*, 22 REV. FIN. STUD. 1149, 1150 (2009).

199. *See* Alyssa Newcomb, *20 Years After Its IPO, How Amazon Changed the Way We Shop*, NBC NEWS (May 15, 2017, 5:01 PM), https://www.nbcnews.com/tech/tech-news/20-years-after-its-ipo-how-amazon-changed-way-we-n759546 [https://perma.cc/4VSQ-X2KQ].

200. *See supra* Section I.B.

201. *See, e.g.*, *1990 Full List*, FORTUNE 500, http://archive.fortune.com/magazines/fortune/fortune500_archive/full/1990/ [https://perma.cc/MGJ8-DG4J] (listing the top 100 companies in the United States, which did not include Borders, Circuit City, Payless Shoes, Blockbuster, or Radio Shack).

202. *See id.* (listing these companies as among the 60 most profitable in 1990).

203. *See, e.g.*, Hortaçsu & Syverson, *supra* note 171, at 89–90, 97–100.

204. Chris Doyle & Richard Murgatroyd, *The Role of Private Labels in Antitrust*, 7 J. COMPETITION L. & ECON. 631, 632–33 (2011).

In terms of revenues, financial services account for roughly 7% of GDP, or $679.7 billion.[205] Retail goods, telecommunications, travel, and other potentially switchable services constitute another five trillion dollars.[206] It is also possible that trillions of dollars in business expenditures could become automated, particularly the portion controlled by small businesses.[207] AIs could destabilize on a scale unlike anything seen before.

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The conclusion that AIs bring about a new kind of disruption does not, by itself, mean that AIs pose a problem. For now, the main point is that AIs have the potential to create a significantly more enduring, faster, and larger scale disruption than anything seen before. These differences make past lessons and models less relevant.

Among the considerations omitted from current analyses of automated commerce, the rest of this Part focuses on two main categories: large-scale inefficiencies and market volatility. It also explores some of the competitor responses, market adjustments, and laws that could limit hyperswitching, even in an economy driven by AIs.

B. *Managerial Responses*

Many plausible responses by sellers to AIs would lead to costs overlooked in current discussions. These theoretical costs would not necessarily increase inefficiency. But if they materialize, they would at least mean that automated commerce would prove less efficient than expected, even if hyperswitching made those markets appear closer to the basic model of perfect competition. Several of these costs are briefly examined here.

1. Capitalization

Market uncertainty causes real firms to "hoard cash and cut debt to hedge against future shocks, further reducing investment and hiring."[208] Reasons for creating these asset buffers include the anticipation of creditors

205. *See National Data*, *supra* note 192, at tbl.2.4.5.

206. *Id.* Other services include "Professional and other services" at $193 billion and "Personal care and clothing services" (such as dry cleaning) at $156 billion, in 2017 expenditures. *See id.*

207. Beyond personal consumption expenditures, about $1.9 trillion is spent on equipment and intellectual property products alone. *See id.* at tbl.5.2.5.

208. Ivan Alfaro et al., *The Finance-Uncertainty Multiplier* 1–2 (Soc'y for Econ. Dynamics, Meeting Paper No. 887, 2017), https://ideas.repec.org/p/red/sed017/887.html [https://perma.cc/7X57-W658]; *see also* Stijn Claessens, *Capital and Liquidity Requirements: A Review of the Issues and Literature*, 31 YALE J. ON REG. 735 (2014).

freezing them out or of sudden market shifts.[209] Increasing cash or other liquid assets would be a potentially effective defense against hyperswitching because it would enable firms to cover their day-to-day expenses for an extended period while revenues declined, thus buying time to develop new revenue-generating or cost-cutting strategies. A related alternative would be to purchase some kind of financial instrument, such as insurance, that essentially serves the same purpose of providing access to funds in the face of sudden customer exodus.

Since 2000, real economy firms have begun storing funds at unprecedented levels, with Google able to buy American Express outright and General Motors holding liquid assets equivalent to half of its overall worth.[210] Many companies surely hold excess liquidity out of a desire to purchase upstart competitors or make strategic investments. Observers have also posited that a substantial portion of this asset accumulation comes out of caution in the face of competitive threats.[211] In a hyperswitching economy, holding greater reserves or having better access to emergency funding might become even more of a competitive advantage, since reserves could defend against or fund more destructive price wars that drive less well-capitalized competitors out of business.[212]

Purchasing instability insurance or hoarding liquid assets may be a rational strategy for the firm and its executives who want to keep their jobs in the face of hyperswitching. But hoarding assets can be harmful to the economy. The more capital a firm is simply saving, the less capital is being put to productive use. Depending on the macroeconomic context, a widespread hoarding increase by firms in response to hyperswitching could be a meaningful drag on the economy.[213]

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209. *See, e.g.*, Alfaro, *supra* note 208, at 2; Ben Casselman & Justin Lahart, *Companies Shun Investment, Hoard Cash*, WALL STREET J. (Sept. 17, 2011), https://www.wsj.com/articles/SB10001424053111903927204576574720017009568 (on file with the *Michigan Law Review*).

210. Milton Harris & Artur Raviv, *Why Do Firms Sit on Cash?: An Asymmetric Information Approach*, SSRN (June 9, 2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2984276 [https://perma.cc/L4GZ-XXDK]; Ben Casselman, *Cautious Companies Stockpile Cash*, WALL STREET J. (Dec. 6, 2012, 6:48 PM), https://www.wsj.com/articles/SB10001424127887323316804578163394088244224 (on file with the *Michigan Law Review*); Adam Davidson, *Why Are Corporations Hoarding Trillions?*, N.Y. TIMES MAG. (Jan. 20, 2016), https://www.nytimes.com/2016/01/24/magazine/why-are-corporations-hoarding-trillions.html (on file with the *Michigan Law Review*).

211. *See* Casselman, *supra* note 210. Some firms hoard cash opportunistically, based on a desire to purchase startups. *See* Harris & Raviv, *supra* note 210, at 2–3.

212. Price wars could implicate predatory pricing enforcement and influence the firm's motivation to collude. *See supra* Part II.B.4, *infra* Part III.B.3.

213. *Cf.* Cristina Arellano et al., *Financial Frictions and Fluctuations in Volatility* 2–3 (Nat'l Bureau of Econ. Research, Working Paper No. 22990, 2016), http://www.nber.org/papers/w22990 [https://perma.cc/JS6F-CJDN].

2. Conglomeration

Another possible business response to AI disruption would be for firms to diversify their operations. As an example of one company holding a diversified portfolio, General Electric grew beyond its original power generation activities into areas such as healthcare, media, and finance.[214] The leading explanations for why businesses diversify are to gain strategic advantage and to manage risk.[215]

Diversification could be particularly effective in defending against hyperswitching. A firm that sells paper towels would be less likely to fail in the face of paper towel hyperswitching if that firm had many different products—such as food and mattresses. For conglomeration to provide insurance against AI disruption, competitors' product improvements must occur at different times across the conglomerate's product portfolio. The more the products are different, the more likely any disruptions would occur at different times. Conglomeration would provide additional insulation from hyperswitching if some of the firm's products had less susceptibility to AI disruption, such as due to brand loyalty.[216]

If AIs lead to such conglomeration, it could increase business costs. Excess corporate diversification is "widely believed to be inefficient,"[217] although the reasons for that consensus are diverse and the support for it far from decisive. Some have found that research and development expenditures and overall innovation are lower in conglomerates, but the evidence is more suggestive than conclusive.[218]

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214. Colleen V. Chien, *Of Trolls, Davids, Goliaths, and Kings: Narratives and Evidence in the Litigation of High-Tech Patents*, 87 N.C. L. REV. 1571, 1594 (2009).

215. Alan A. Fisher & Robert H. Lande, *Efficiency Considerations in Merger Enforcement*, 71 CALIF. L. REV. 1580, 1602 n.100 (1983) ("Diversification may lower the variance of a firm's overall level of profits, thereby decreasing the risk of bankruptcy and any attendant costs."); Harold S. Geneen, *Conglomerates: A Businessman's View*, 44 ST. JOHN'S L. REV. (SPECIAL EDITION) 723, 725 (1970) ("Diversification provides a form of security and insurance, as well as a method of adapting to the quickening tempo of change . . . ."); Martin Reeves et al., *The Biology of Corporate Survival*, HARV. BUS. REV., Jan.–Feb. 2016, at 46, https://hbr.org/2016/01/the-biology-of-corporate-survival [https://perma.cc/HZ5YTPJG] (arguing that corporate leaders must diversify endeavors to withstand rapidly changing markets); Schwarcz, *supra* note 34, at 201 (noting the role of diversification of assets).

216. *See supra* Section III.A.3 (discussing which markets are more susceptible to hyperswitching).

217. John G. Matsusaka, *Corporate Diversification, Value Maximization, and Organizational Capabilities*, 74 J. BUS. 409, 409 (2001); Reeves et al., *supra* note 215, at 6–7 (noting that diversifying business endeavors "may come at the cost of short-term efficiency" and that "[b]usiness heterogeneity is often punished by markets through the 'conglomerate discount'—a markdown on the stock price relative to pure-play competitors").

218. Peter G. Klein & Robert Wuebker, *Corporate Diversification and Innovation: Managerial Myopia or Inefficient Internal Capital Markets?*, SSRN 5 & n.4 (Apr. 11, 2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2951411 [https://perma.cc/68P4-69C9] ("[I]ndustry-adjusted R&D is negative. . . . consistent with the hypothesis that diversification reduces innovation by discouraging R&D investment.").

Perhaps the clearest explanation for why conglomeration would be inefficient is the lack of specialization and increased managerial costs of running a sprawling organization whose lines of business have limited synergies. It is worth noting that the particular type of conglomeration sought in response to AIs may be even more inefficient than other types of conglomeration, in that hyperswitching firms would (a) pursue conglomeration for defensive rather than revenue-growing reasons and (b) emphasize product differences to lessen the chance of multiple products facing similar customer flight. Both motives would decrease a company's specialization more than diversification undertaken for growth and synergies in related product categories.

The strategy of diversification may make economic sense for the firm while still imposing significant costs on the economy if many managers correctly believed diversification was necessary to survive, and if the hypotheses about diversification being inefficient are correct. An efficient market in the era of AIs may thus involve higher costs from conglomeration alongside lower transaction costs due to consumer automation. If so, the standard policy analysis focused on transaction costs would omit a potentially significant variable, since it does not consider conglomeration.

3. Consolidation and Collusion

Part II discussed how collusion offers incumbents a way to block AIs from taking hold, because if all sellers offer the same price, the AIs become less helpful to consumers.[219] The incentive to collude persists once AIs dominate a market. Indeed, the incentive to collude would presumably be even greater in extreme hyperswitching markets, because price coordination would prevent an imminent threat—the potentially devastating sudden mass departure of customers—rather than a more speculative rise of AIs.

The protection that collusion affords from hyperswitching could distort markets by giving firms heightened incentives to merge. This added incentive comes from the greater ease of collusion in concentrated industries.[220] As the incentives to collude rise, the incentives to consolidate an industry would also rise.

Moreover, firms might more easily acquire competitors in AI markets: once it became clear that a seller was vulnerable to lost revenues from hyperswitching, that seller's market value would drop, making it a cheaper target. AIs thus might accelerate industry consolidation, which can undermine competition in light of antitrust regulators' difficulty in identifying

219. *See supra* Section II.B.4.

220. Albert Hirschman long ago posited that consumers in more competitive industries are more likely to exit. *See* HIRSCHMAN, *supra* note 149, at 55–62. Subsequent empirical research has supported the proposition that in markets with a greater number of competitors consumers switch more readily. T. Randolph Beard et al., *"Can You Hear Me Now?" Exit, Voice, and Loyalty Under Increasing Competition*, 58 J.L. & ECON. 717, 719 (2015).

harmful mergers.[221] Any increase in collusion or anticompetitive mergers and acquisitions resulting from hyperswitching would need to be added to the costs of AIs.[222]

C. *Market Volatility*

Some types of market volatility can impose costs on the economy, which means that incorporating those costs makes economic models of future markets more accurate. This Section considers the potential instability implications of automated markets. The inquiry begins with finance because much of our regulatory conception of harmful instability comes from financial crises, which have been a regular and destructive part of the U.S. economy since its inception.[223] The insights into systemic risk from finance will prove instructive as the discussion turns to AIs in other industries. Indeed, as the discussion will show, even if hyperswitching never causes a crisis, it could still cause volatility costs worthy of attention.

To be clear, an AI-driven future financial crisis might appear today to be highly unlikely. But the same would have been true for the major crises of the last 150 years—the Great Depression, the Great Recession, and the Flash Crash—if their particular triggers were analyzed even a few years in advance.[224] These crises each had new triggers, and as even the CEO of the largest U.S. bank recognizes, "The trigger to the next crisis will not be the same as the trigger to the last one—but there will be another crisis."[225] The discussion in this Section is animated by a recognition that a key task of financial regulation is to move "unknown risks" to "known risks,"[226] and that

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221. A consensus has emerged that the antitrust analysis involves sufficient uncertainty to make it difficult to know in advance whether any given merger will harm markets. *See, e.g.*, JOHN KWOKA, MERGERS, MERGER CONTROL, AND REMEDIES (2015) (reviewing widespread harmful mergers approved); Orley Ashenfelter et al., *Did Robert Bork Understate the Competitive Impact of Mergers? Evidence from Consummated Mergers*, 57 J.L. & ECON. S67, S79 (2014) (conducting a broad review of merger analyses and concluding many allowed mergers harmed markets). It follows that an increase in the motivation to merge would lead to a higher number of mergers attempted, which would overall increase the number of mergers mistakenly allowed.

222. Antitrust scholars have observed complex relationships between innovation and incentives to collude. Keith N. Hylton & Haizhen Lin, *Optimal Antitrust Enforcement, Dynamic Competition, and Changing Economic Conditions*, 77 ANTITRUST L.J. 247, 272 (2010) (describing as "plausible story of collusion" "a scenario in which all of the firms in an industry innovate and then attempt to collude in order to secure a positive return on the innovation").

223. MICHAEL S. BARR ET AL., FINANCIAL REGULATION: LAW AND POLICY (2016) (providing a history of financial regulation); Glenn Hoggarth et al., *Costs of Banking System Instability: Some Empirical Evidence*, 26 J. BANKING & FIN. 825, 825 (2002) ("We find that the cumulative output losses incurred during crisis periods are large, roughly 15–20%, on average, of annual GDP.").

224. *See* McCoy, *supra* note 23, at 4–7 (describing financial crises as "unknowables").

225. *See* DIMON, *supra* note 22, at 32.

226. Richard J. Herring, Essay, *The Known, the Unknown, and the Unknowable in Financial Policy: An Application to the Subprime Crisis*, 26 YALE J. ON REG. 391, 402–03 (2009) (iden-

observers have in the past often missed the *possibility* of known market changes triggering financial crises. The purpose is thus to broaden the currently narrow set of theoretical factors weighed in developing regulatory policy as commercial transactions become more automated—and in many regards more like finance.

1. The Structure of Past Financial Instability

Financial stability predictions are informed by a risk factor analysis, drawing on historical experience.[227] Even decades after a crisis, experts often disagree about the precise triggers and how much they mattered. But three major features of past financial crises have particular relevance to AIs: (1) a massive flight from large financial institutions, (2) product innovation, and (3) a link between finance and the real economy.[228] All these features were apparent in the most recent crisis, the Great Recession, and some of them contributed to the Great Depression and the "Flash Crash" of 2010.

(a) The Great Depression. Between 1929 and 1932, the value of stocks listed in the New York Stock Exchange dropped by 83%, and the United States plunged into a devastating depression that left a quarter of the workforce unemployed.[229] The Great Depression witnessed the "classic example of systemic risk," the bank run.[230] Millions of people panicked about the safety of their money held by banks, which caused them to withdraw deposits.[231]

These withdrawals triggered a chain reaction of bank failures.[232] A sudden, unexpected mass departure of business from a bank is immediately problematic because banks normally only have a small amount of liquid reserves on hand, historically less than 5% of what they owe to customers.[233] Banks invest the rest to earn revenue, such as by making loans. If too many customers seek to withdraw money the bank does not have, the bank may

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tifying important questions for financial regulators for purposes of converting "unknown" risks to "known" risks in the context of market crisis management).

227. *See* McCoy, *supra* note 23, at 36.

228. Although the discussion below focuses on banks, which are the most familiar institution, similar dynamics can occur with a variety of systemically important financial institutions that are highly leveraged and increasingly important to systemic risk in a disintermediated financial system. *See* Schwarcz, *supra* note 34 (arguing for a broader conception of systemically important institutions).

229. JOEL SELIGMAN, THE TRANSFORMATION OF WALL STREET 1, 11 (Aspen Publishers 3d ed. 2003) (1982).

230. Schwarcz, *supra* note 34, at 199; BARR ET AL., *supra* note 223, at 48.

231. BARR ET AL., *supra* note 223, at 48.

232. *Id.* A bank's failure is all the more problematic because banks "lend to and borrow from each other, hold deposit balances with each other, and make payments through the interbank clearing system." Schwarcz, *supra* note 34, at 199.

233. *See* R.W. HAFER, THE FEDERAL RESERVE SYSTEM 145 (2005).

fail.[234] Bank runs in the Great Depression illustrate the danger of contagion, a consistent theme in major financial crises. Contagion can be defined as "an indiscriminate run by short-term creditors of financial institutions that can render otherwise solvent institutions insolvent."[235]

Another contributor to the Great Depression was money scarcity resulting from both bank runs and the stock market crash. People refused to lend, invest, or deposit because they trusted neither banks nor businesses in the real economy to stay afloat.[236] Since so much of the business world depends on access to funding, this hesitation deprived society of a vital resource, deepening and extending the economic harm.[237]

(b) The Great Recession. The financial crisis of the late 2000s, also known as the Great Recession, "crushed the real economy and cost countless people their jobs, homes, and businesses."[238] Real estate played a similar role in this episode to bank runs and stock speculation in the Great Depression.[239] Over the several years leading up to the crisis, millions of Americans bought houses that they could ultimately only afford as long as real estate prices continued to rise.[240] When real estate prices dropped, homeowners began to default in record numbers, and individual banks proceeded to lose tens of billions of dollars in mortgage-related financial instruments.[241]

By 2008, the typical large bank owed money to many different institutional customers, including other banks and hedge funds.[242] As it became clear that large investment banks like Bear Stearns and Lehman Brothers would suffer considerable losses as a result of toxic mortgage securities, hedge funds and other large institutions began withdrawing billions of dollars from those banks to avoid the risk of losing their money if the banks

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234. Of course, the bank can seek other sources of money, such as loans, but in a time of panic they may not be able to obtain credit because potential lenders are worried about never being repaid if the bank fails.

235. HAL S. SCOTT, CONNECTEDNESS AND CONTAGION: PROTECTING THE FINANCIAL SYSTEM FROM PANICS xv (2016).

236. BARR ET AL., *supra* note 223, at 47–49. Whether the crash was a cause or a symptom of the Great Depression is debated, but stock market activity undoubtedly contributed to economic woes. *See, e.g.*, Macey et al., *supra* note 18, at 806.

237. Schwarcz, *supra* note 34, at 198.

238. BARR ET AL., *supra* note 223, at 3 ("The aftermath has been a period of slow growth in the global economy.").

239. *See supra* note 18.

240. *See* Engel & McCoy, *supra* note 24, at 1289 & n.146; Stefania Albanesi et al., *Credit Growth and the Financial Crisis: A New Narrative* (Nat'l Bureau of Econ. Research, Working Paper No. 23740, 2017), http://www.nber.org/papers/w23740.pdf [https://perma.cc/BS9A-VSHM] (finding that "[t]he rise in mortgage defaults during the crisis was concentrated in the middle of the credit score distribution, and mostly attributable to real estate investors").

241. *See, e.g.*, SCOTT PATTERSON, THE QUANTS: HOW A NEW BREED OF MATH WHIZZES CONQUERED WALL STREET AND NEARLY DESTROYED IT 243 (2010) (mentioning how HSBC lost $41 billion in assets).

242. *See, e.g.*, Schwarcz, *supra* note 34, at 199 (discussing the interconnectedness of banks).

failed.[243] Investors also became concerned that banks would fail and bring down investment funds with them. Investors thus began to pull out their money from a diverse set of institutions, leading not only to a stock market crash but a freeze in the supply of credit.[244] A massive government bailout likely prevented a depression, but the collective losses were substantial.[245]

Product innovations laid the foundations for the subprime mortgage meltdown and its subsequent effect on the financial system. Subprime loans often involved payment schemes that started at a reasonable rate and then after a few years ballooned to a level that the borrower could not afford.[246] Additionally, financial institutions transformed the mortgages into diverse financial products by dividing up their payment streams and repackaging them into various new forms of securities. As U.S. Comptroller of the Currency John Hawke described it in 2004, "Derivatives trading, hedging, securitization, credit scoring, and structured finance, which are all routine parts of banking today, were exotic or nonexistent 30 years ago."[247] These new products, which originated in consumer spending, increased systemic risk.[248]

(c) Flash Crashes. Technological innovations over the past several decades have increasingly contributed to stock market crashes.[249] Automated trading has accelerated in recent years, fueled by algorithms that buy and sell stocks or other securities in a billionth of a second, without any human involvement.[250] These algorithms, also called robo-investors, can scan news re-

243. *See, e.g.*, PATTERSON, *supra* note 241, at 239, 242–52 (chronicling the failure of banks during the 2008 financial crisis, the withdrawal of deposits by hedge funds, and the banks' inability to obtain alternative sources of capital).

244. For a detailed discussion of the sequence of events before and after the crash, see Steven M. Davidoff & David Zaring, *Regulation by Deal: The Government's Response to the Financial Crisis*, 61 ADMIN. L. REV. 463, 471–74 (2009). On the problem of insufficient liquidity and potential solutions, see Kathryn Judge, Essay, *The First Year: The Role of a Modern Lender of Last Resort*, 116 COLUM. L. REV. 843 (2016).

245. *See* Levitin, *supra* note 18.

246. *See, e.g.*, Engel & McCoy, *supra* note 24.

247. John D. Hawke, Jr., Comptroller of the Currency, Remarks Before a Conference on Credit Rating and Scoring Models (May 17, 2004), https://www.occ.gov/news-issuances/speeches/2004/pub-speech-2004-36.pdf [https://perma.cc/7U5S-9FRX].

248. *See id.* at 6–8.

249. A contributor to the 1987 stock market crash was that "financial markets had seen an increase in the use of 'program trading' strategies, where computers were set up to quickly trade particular amounts of a large number of stocks, such as those in a particular stock index, when certain conditions were met." Mark Carlson, *A Brief History of the 1987 Stock Market Crash with a Discussion of the Federal Reserve Response* 4–5 (Fin. & Econ. Discussion Series, Working Paper No. 2007-13, 2007), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=982615 [https://perma.cc/BXT6-YHC2].

250. *See, e.g.*, E.S. Browning & Scott Patterson, *Market Size + Complex Systems = More Glitches*, WALL STREET J. (Aug. 22, 2013, 10:49 PM), https://www.wsj.com/articles/market-size-complex-systems-more-glitches-1377226151 (on file with the *Michigan Law Review*).

leases and make trades in a split second, before a human could begin to read.[251]

The most dramatic technology-driven stock market swing came in May 2010, when the Dow Jones Industrial Average plummeted 1,000 points in a few minutes, wiping away almost a trillion dollars in value.[252] Perhaps more alarming, it was not clear for months that the cause was the interplay of large investment funds' trading algorithms.[253] The spark was a single firm that had made the highly unusual decision to sell off a large position—$4.1 billion in futures contracts—as fast as possible.[254] Even a few years earlier, that selloff would have taken hours if not days to complete, but in 2010 it was executed in minutes.[255] As the selloff began and triggered a drop in the price of the futures contracts, other robo-investors saw opportunity and bought.[256] Because the selloff was larger than expected, however, the price kept dropping, which caused a computerized panic in which the algorithms believed they were taking on too much risk and sought to sell.[257] That massive selloff, through tens of thousands of moves within minutes, created a downward spiral of stock prices that became known as the Flash Crash.[258]

One key feature of the Flash Crash was the increase in systemic risk due to the interplay of many different firms' algorithms, each of which shared some basic decisionmaking criteria.[259] It was only when an automatic five-second pause was imposed that the trading began to stabilize.[260] Numerous other flash crashes, including one that led the Nasdaq to suspend trading for three hours, have occurred in recent years, and by some accounts crisis has

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251. *See* Penny Crosman, *Beyond Robo-Advisers: How AI Could Rewire Wealth Management*, AM. BANKER (Jan. 5, 2017, 1:10 PM), https://www.americanbanker.com/news/beyond-robo-advisers-how-ai-could-rewire-wealth-management [https://perma.cc/PK35-ZABN].

252. *See, e.g.*, U.S. COMMODITY FUTURES TRADING COMM'N & SEC, FINDINGS REGARDING THE MARKET EVENTS OF MAY 6, 2010, at 1–6 (2010), http://www.sec.gov/news/studies/2010/marketevents-report.pdf [https://perma.cc/E9K5-6T35]; Janet Whitman, *The Markets' Wild Ride*, MONTREAL GAZETTE (May 7, 2010), http://www.montrealgazette.com/business/fp/markets+wild+ride/2994890/story.html (on file with the *Michigan Law Review*).

253. *Compare* Whitman, *supra* note 252 (suggesting a typing error as the cause of the crash), *with* Mark Buchanan, *Trading at the Speed of Light*, 518 NATURE 161, 162 (identifying algorithm interplay as the cause).

254. Andrei Kirilenko et al., *The Flash Crash: High-Frequency Trading in an Electronic Market*, 72 J. FIN. 967, 967–69 (2017).

255. *See* PATTERSON, *supra* note 241.

256. *See* Buchanan, *supra* note 253.

257. *See id.*

258. *See* U.S. COMMODITY FUTURES TRADING COMM'N & SEC, *supra* note 252 (sharing findings of a large-scale government inquiry into the causes of the Flash Crash).

259. Buchanan, *supra* note 253, at 162.

260. *See* U.S. COMMODITY FUTURES TRADING COMM'N & SEC, *supra* note 252, at 4.

been averted only through interventions.[261] Flash crashes illustrate how the convergence of finance, technology, and fragmented actors can increase systemic risk, leaving regulators lost as to how to respond.[262]

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Despite variation in and debates about the causes of financial instability, several basic observations can be distilled from these three historical examples. Financial institutions risk failing if they rely on volatile resources to remain solvent. The failure of large financial institutions can cause a domino effect that takes down the economy. Furthermore, markets—rather than merely institutions—play a key role in systemic risk.[263]

More concretely, history shows the dangers of regulators missing how microeconomic developments can trigger macroeconomic crises. Financial regulators failed to foresee microeconomic consumer behavioral dynamics that could cause large shifts in financial markets, such as panicked withdrawals of funds even from solvent banks and problematic mortgages. Financial regulators also failed to monitor nonfinancial changes such as real estate prices and algorithms used in trading.

2. Financial Product Instability

This account of past financial instability is relevant to AIs because they are a microeconomic, consumer-level, technological development originating outside of finance with the potential to shift a large amount of funds within the financial system. AIs promise to expand access to a consumer financial innovation—automated advice on everyday transactions—in a manner analogous to how innovative mortgages and their derivatives became far more widely available leading up to the Great Recession.[264] Before the latest wave of digital intermediaries, financial advice was limited to a higher-income portion of the population that could afford it.[265] AIs aim to extend

261. *See, e.g.*, Browning & Patterson, *supra* note 250 (discussing the systems failures and mini-crashes resulting from increased high-velocity technological trades); PATTERSON, *supra* note 241, at 241 (recounting interventions).

262. *See* PATTERSON, *supra* note 241, at 238–41 (discussing the role of algorithms); Yesha Yadav, *Oversight Failures in Securities Markets*, 104 CORNELL L. REV. (forthcoming 2019), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2754786 [https://perma.cc/4LTP-ZXBM] (explaining how increased fragmentation is undermining financial oversight).

263. Schwarcz, *supra* note 34, at 199–200 (analyzing bank runs as the original source of systemic risk).

264. In particular, mortgages became more available to lower-income borrowers and house flippers, among others. *See* Engel & McCoy, *supra* note 24. This growth was fueled by new forms of subprime loans and an insatiable global demand for investing in the relatively new financial instruments securitized by mortgages, thought to be among the most reliable of investments. *See id.*; Levitin, *supra* note 18.

265. *See* Baker & Dellaert, *supra* note 2, at 714–15.

that financial advice to anyone with internet access.[266] The innovation of automated advice is layered onto an array of end product fintech innovations for borrowing, holding, and transferring money.[267] Moreover, unlike twenty years ago, consumers today can widely open, use, and close financial accounts online.[268]

Widespread automated advice, along with the new possibility of opening and closing accounts online, provide the foundations for AIs to produce mass withdrawals of funds from large financial institutions like those seen in the Great Depression and Great Recession. The motivation for the withdrawal of funds would be different—in a hyperswitching context, more informed and rational customers could exit in pursuit of product features, such as higher interest rates, rather than the fear that their bank could collapse. But the effect could be similar, since banks today still have only a small portion of liquid assets on hand to pay depositor demands. Regulators have not needed to worry about such sudden withdrawals because since the Great Depression, retail deposits have been marked by an absence of switching, thanks in part to the federal government's guarantee on deposits.[269]

The scale of potential bank withdrawals is relevant to systemic risk. Consumers and small businesses—the prime customers for AI advisers—account for 46% of banks' profits.[270] For some of the largest banks, like Citigroup, well over 60% of revenues come from consumer banking and credit cards—sectors that could be subject to digital switching.[271] Thus, a large portion of big banks' profits, not to mention funds that they have lent out that may not be immediately available, are at risk of flight.

The more difficult question is what portion of those deposits AIs might drive elsewhere in a short amount of time. Some consumers would presumably not delegate to AIs the ability to change bank accounts. Also, banks are attempting to make their services sticky through automated payments and reward programs. But unlike many other products and services, money is more fungible and thus more difficult for any financial institution to personalize. People might have different preferences with respect to whether they receive higher interest rates rather than lower monthly fees. But given the basic fungibility of credit, a subset of financial institutions—whether fintechs

266. Emerson Dameron, *44 Fintech Startups in NYC That Are Shaking Up Finance*, BUILT IN NYC (July 16, 2016), http://www.builtinnyc.com/blog/fintech-startups-nyc [https://perma.cc/58LW-KSMW].

267. *See, e.g.*, Van Loo, *supra* note 2, at 238–40 (providing an overview of fintech products).

268. *See, e.g.*, *id.* at 252.

269. The lack of switching has to do with both the stickiness of financial products and FDIC insurance. *See supra* notes 101–104 and accompanying text.

270. *See* Demos, *supra* note 38.

271. *See, e.g.*, Stephen Gandel, *Here's How Citigroup Is Embracing the 'Fintech' Revolution*, FORTUNE (June 27, 2016, 6:00 AM), http://fortune.com/citigroup-fintech/ [https://perma.cc/D3Q9-LNDM] (reporting that 51% of Citigroup's revenue comes from consumer banking, and another 11% from credit cards).

or recent entrants into retail banking such as Goldman Sachs—could attract large portions of the market if they have lower cost structures or other competitive advantages, such as innovative apps or higher yields earned by investing deposits.

Although such scenarios are unlikely and unpredictable, so are the scenarios that financial regulators routinely analyze to prevent crises. The Federal Reserve regularly conducts stress tests, or modeling exercises of doomsday scenarios, as part of systemic risk regulation. These tests provide another perspective on the relevance of hyperswitching. A recent test indicated that the largest U.S. banks are sound because during a prolonged recession they would lose on the order of $526 billion in revenues over several years.[272] That figure is considerably less than the $4.7 trillion dollars in annual revenues that Goldman Sachs estimated are vulnerable to financial technology challengers—known as fintechs—stealing clients by offering more innovative products and mobile banking services.[273]

Moreover, the Fed stress test typically assumes that large banks essentially retain their basic consumer market shares, meaning that they regain prior revenue levels as the economy recovers.[274] The tests do not simulate the sudden loss of many customers who may never return. If hyperswitching hit a single large bank particularly hard, rather than being generally distributed across the industry as in the Federal Reserve's stress tests,[275] investors and creditors would be expected to withdraw funds and raise the bank's cost of capital.[276] Broader liquidity constraints could follow. The loss of direct customers and concern by other financial actors could collapse one or more systemically important financial institutions, threatening the financial system through a consumer algorithmic contagion not currently factored into stress

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272. *See* BD. OF GOVERNORS OF THE FED. RESERVE SYS., DODD-FRANK ACT STRESS TEST 2016: SUPERVISORY STRESS TEST METHODOLOGY AND RESULTS 1 (2016), https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20160623a1.pdf [https://perma.cc/SWB3-AA6G] (testing the implications of a recession marked by negative interest rates and sustained unemployment).

273. GOLDMAN SACHS GLOB. INV. RESEARCH, THE FUTURE OF FINANCE PART 3: THE SOCIALIZATION OF FINANCE 3–4 (2015); *see also* Wayne Busch & Juan Pedro Moreno, *Banks' New Competitors: Starbucks, Google, and Alibaba*, HARV. BUS. REV. (Feb. 20, 2014), https://hbr.org/2014/02/banks-new-competitors-starbucks-google-and-alibaba [https://perma.cc/49WD-CFFT] (citing an Accenture study as estimating that banks would lose a third of their revenues to technological companies by 2020).

274. *See* BD. OF GOVERNORS OF THE FED. RESERVE SYS., *supra* note 272, at 3, 16–17.

275. *See id.*

276. Robert J. Shiller, *From Efficient Markets Theory to Behavioral Finance*, J. ECON. PERSPECTIVES, Winter 2003, at 83, 91–92 (2003); Mohamed Zouaoui et al., *How Does Investor Sentiment Affect Stock Market Crises? Evidence from Panel Data*, 46 FIN. REV. 723, 745 (2011). Governmental lending to distressed banks creates its own challenges. *See generally* Judge, *supra* note 244.

tests that are intended to model speculative and dangerous future scenarios.[277]

3. Real Economy Turbulence

What might be the implications of extreme hyperswitching in the real economy? A risk analysis of large firm failures leading to harmful turbulence is a familiar part of the financial regulatory framework but absent from market regulatory analyses of the real economy.[278] As demonstrated by the case of retail disruption in the face of e-commerce, the real economy can undergo widespread firm failures and upheaval without prompting crises. It is nonetheless worth examining hyperswitching's volatility implications even in markets outside finance, given that AIs are disruptive in new, far-reaching ways that intersect with past crises and recent scholarship.

Although an increase in firm failures can signal robust competition that brings social benefits, the turnover can bring social costs. As a concrete example, the government spends hundreds of billions of dollars as a result of unemployment.[279] If hyperswitching causes more rapid business failures, any additional equilibrium unemployment costs would add currently overlooked inefficiencies.[280]

Bailouts are another governmental expenditure that could result from real markets in turmoil. Most recently, starting in 2008, Congress extended a bailout package of about $80 billion to General Motors (GM) and Chrysler, two of the "big three" U.S. automakers.[281] Economist Jeffrey Sachs supported the automakers' requests for a bailout in front of Congress by testifying, "Lehman Brothers triggered the biggest worldwide crisis in generations. Don't do it again with this industry."[282] Despite failing to prevent reorganization bankruptcy, the bailout may have shielded the economy from greater volatility. GM and Chrysler successfully emerged from bankruptcy as profitable businesses, which some scholars believe prevented greater economic harm.[283] Regardless of the merits of Sachs's crisis argument, the fact that a

277. For further discussion of the current financial regulatory approach, see *infra* Section IV.B.

278. *See supra* Section II.A.

279. *See* Zachary Liscow, *Counter-Cyclical Bankruptcy Law: An Efficiency Argument for Employment-Preserving Bankruptcy Rules*, 116 COLUM. L. REV. 1461, 1463 (2016) (analyzing government unemployment expenditures in the context of bankruptcy law).

280. Of course, even with accelerated firm failures, AIs could overall reduce unemployment costs.

281. Michael Huemer, *The True Costs of Government Bailouts*, 11 GEO. J.L. & PUB POL'Y 335, 335–36 (2013).

282. *Stabilizing the Financial Condition of the American Automobile Industry: Hearing Before the H. Comm. On Fin. Serv.*, 110th Cong. 88 (2008) (statement of Jeffrey Sachs, Professor, Columbia University).

283. Adam J. Levitin, *supra* note 186, at 485–86 (2011) (arguing the government bailout may have rightly protected the economy from harm); Mark J. Roe & David Skeel, *Assessing the*

combination of political and intellectual forces can bring about a large taxpayer bailout for the real economy means that extreme hyperswitching could lead to costly bailouts. Again, these theoretical costs—along with any from hoarding liquid assets, conglomeration, collusion, and other sources—do not necessarily outweigh the theoretical benefits of lowering transaction costs. But they are potentially sizeable enough to factor into the cost-benefit analysis of pro-AI policies.

Might there be legitimate financial stability implications of real economy firms failing due to AI-driven demand volatility? Recent research has given greater reason to believe that the real economy implicates financial instability. Before the Great Recession, local real estate market prices were viewed as sufficiently uncorrelated to minimize the risk of a national housing bubble, and mortgage markets were not seen as subject to contagion.[284] The crisis revealed that various financial innovations linked these markets in destabilizing ways, prompting scholars to undertake broader studies of the interplay between the real economy and economic downturns. For instance, economists have found that uncertainty in the real economy can drive economic downturns.[285] Investors and creditors may respond to real economy uncertainty by freezing up the flow of money available to real economy firms out of concern that it is too difficult to know which will fail.[286]

If hyperswitching created an inability to predict future profit per sale and total sales in some markets,[287] it could create uncertainty about which real firms would fail. Real economy hyperswitching is not tied to financial markets in the same way that housing is—through mortgages. But most large firms are intricately linked to financial markets through various loans and securities. Just as investors were overly optimistic about the houses underlying mortgage-backed securities leading up to the Great Recession, many believe that excess optimism fuels investors' high valuations of the stock

Chrysler Bankruptcy, 108 MICH. L. REV. 727, 728 (2010) (explaining how the governmental lending to Chrysler helped prevent failure and preserve employees' and retirees' interests).

284. *See* McCoy, *supra* note 23, at 4 (observing that through mortgages and real estate markets, in the Great Recession "crisis erupted in corners of the financial industry that had not been regarded as prone to contagion"); Schwarcz, *supra* note 34.

285. *See* CRISTINA ARELLANO ET AL., FINANCIAL FRICTIONS AND FLUCTUATIONS IN VOLATILITY abstract (2016) (finding that "increased volatility of firm level productivity shocks generates a downturn and worsened credit conditions"); Arellano et al., *supra* note 213, at 2–3 (finding that "an increase in the volatility of firm-level idiosyncratic productivity shocks" can lead to downturns); Nicholas Bloom et al., *Really Uncertain Business Cycles*, 86 ECONOMETRICA 1031, 1031 (2018) (describing the increase in studies of the link between microeconomic factors and recessions in recent years, demonstrating that "microeconomic uncertainty rises sharply during recessions" and that these "uncertainty shocks can generate drops in GDP of around 2.5%").

286. *See* sources cited *supra* note 285; *supra* Section II.B.

287. *See supra* Section III.C.

market today.[288] Stocks are securities whose underlying asset is a business, analogous to how mortgage-backed securities are based on houses.

A sudden dissipation of large amounts of firms' revenues due to hyperswitching could prompt a loss of investor confidence. If that loss of confidence spread widely enough across capital markets, it would lead to a credit freeze, or reluctance to lend money, which has had destructive effects on the economy and exacerbated past economic downturns.[289] As a theoretical matter, a hyperswitching economy could cause instability and a drop in the value of firms in ways analogous to how the fall of housing prices and surprising unpredictability of payments on mortgages destabilized financial markets in the Great Recession.

Hyperswitching in the real economy has other similarities to past financial crisis triggers. The acceleration of purchase decisions is one. By way of illustration, between 2000 and the Flash Crash of 2010, the average length of time that stocks were held fell from eight months to under a minute.[290] Unlike stocks, most goods and services in the real economy cannot practically shift in microseconds. But large companies with a steady stream of purchases nationwide could within seconds see their sales fall drastically. More to the point, once markets learned of a pending hyperswitch going against a given company, that company's valuation could instantly plummet. By speeding up the pace of commerce, AIs may directionally transform the real economy in ways similar to how algorithmic trading has already altered stock markets: by injecting extra volatility and decreasing the amount of time that regulators have to respond.

AIs also make real product markets more like financial markets by increasing the chances of "herd behavior."[291] Bank runs and stock market panics have exhibited asset withdrawal contagion, in which the acts of some subset of the population heavily influence those of many others.[292] AIs can more closely link consumer choices by, for instance, passing a deal discovered by one consumer on to millions of others.[293]

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288. James Mackintosh, *This Crazy, Expensive Stock Market Is for Speculators, Not Investors*, WALL STREET J. (Mar. 9, 2017, 4:38 PM), https://www.wsj.com/articles/this-crazy-expensive-stock-market-is-for-speculators-notinvestors-1489078334 (on file with the *Michigan Law Review*).

289. Shlomit Azgad-Tromer, *Too Important to Fail: Bankruptcy Versus Bailout of Socially Important Non-Financial Institutions*, 7 HARV. BUS. L. REV. 159, 173–74 (2017) ("The common factor in systemic risk evaluations seems to be the loss of public confidence . . . .").

290. SCOTT PATTERSON, DARK POOLS: HIGH-SPEED TRADERS, AI BANDITS, AND THE THREAT TO THE GLOBAL FINANCIAL SYSTEM 46 (2012).

291. *See* Marcel Kahan & Michael Klausner, *Path Dependence in Corporate Contracting: Increasing Returns, Herd Behavior and Cognitive Biases*, 74 WASH. U. L.Q. 347, 356 (1996); David S. Scharfstein & Jeremy C. Stein, *Herd Behavior and Investment*, 80 AM. ECON. REV. 465 (1990).

292. *See supra* notes 230–240 and accompanying text (discussing contagion and bank runs).

293. *See supra* Section I.A.

A key consideration in gauging the instability risks of real economy hyperswitching is the potential scale. The larger the pool of volatile assets in the economy, the greater the potential risks of a crisis.[294] As noted above, trillions of dollars annually are potentially vulnerable to some level of hyperswitching—amounts that exceed annual real estate expenditures.[295] Which of these markets will reach a level of problematic volatility, rather than beneficial turbulence, is unknowable at this point. Given the many ways that markets will respond, and the heterogeneity of markets, the chances of some kind of a real economy-wide AI contagion sparking a crisis should be assumed to be extremely low—as should be assumed for an AI-driven bank run.

But highly unlikely risks animate economic stability regulation. Accordingly, scholars have produced a chorus of generalized warnings since 2008 that the financial system has become far more dangerous, akin to a tinderbox in danger of being lit.[296] They point to the increased risk from faster financial transactions, steady financial complexification from innovation, growing potential for financial contagion, and greater interconnectedness among financial institutions.[297] Those discussions seldom mention specific triggers, and when they do they hem more closely to recent crises by, for instance, focusing on the expansion of automated financial trading or new types of mortgage securitization. As a result, the literature rarely challenges deeply embedded assumptions on market activities thought to be safe, such as bank accounts or everyday consumer spending. That literature nonetheless provides the foundations for understanding why hyperswitching, if it were to materialize, could provide a spark to a precariously interconnected financial system that has left regulators behind.

Unlike more micro-oriented consumer protection and antitrust regulation, financial stability regulation cannot wait for a clear problem before beginning preparation. Most specific forecasts will be wrong, and the correct ones will almost always appear wrong in advance. Nearly all experts, if asked in 1920 about the likelihood of widespread bank runs, or in 2005 about the likelihood of a mortgage crisis, would have dismissed any such concerns as

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294. Timothy F. Geithner, *Are We Safe Yet? How to Manage Financial Crises*, FOREIGN AFF., Jan./Feb. 2017, at 54, 56.

295. *National Data*, *supra* note 192, at tbl.2.4.5; *see supra* Section III.A.3.

296. *See, e.g.*, Judge, *supra* note 35, at 630 ("The rents captured by the financial industry have contributed to . . . undermining systemic stability. The lengthening of intermediation chains increases systemic risk through multiple mechanisms."); Steven L. Schwarcz, *Regulating Complexity in Financial Markets*, 87 WASH. U. L. REV. 211, 215 (2009) ("The failures have characteristics similar to those that engineers have long faced when working with complex systems . . . . financial markets evolve so rapidly and often in such unexpected ways that prescriptive regulation can never address all potential failures."); Hal S. Scott, *The Reduction of Systemic Risk in the United States Financial System*, 33 HARV. J.L. & PUB. POL'Y 671, 673 (2010).

297. *See* sources *supra* notes 16 and 296.

speculative—and indeed, some did.[298] Despite great uncertainty about how it will unfold, the concept of hyperswitching merits attention in instability conversations because it sits at the intersection of real-world market developments, broad scholarly warnings, and historical crisis lessons.

D. *Limits to Hyperswitching*

Interspersed throughout this Part and Part II have been a number of obstacles that might prevent hyperswitching from ever occurring. Sellers have many tools to prevent hyperswitching or mitigate its effects. Some of these tools are potentially procompetitive, such as product customization, which could bring consumers better products but makes it less likely that a large portion of the market will receive the same advice at the same time to leave a given seller. Other tools are more clearly anticompetitive, such as all sellers colluding to set a common price above marginal cost or blocking data access through misguided laws. Many responses would simply add to the overall cost of doing business, such as forming conglomerates or purchasing disruption insurance.

Additionally, markets have inherent limits on the magnitude of hyperswitching. Any one company favored by the AI might, for instance, have a difficult time accommodating a sudden large increase in customers. An inability to ramp up manufacturing fast enough could mean turning away many potential customers, who might then stay with incumbents. Some service industries would also be particularly difficult to ramp up, since airlines would be slow to acquire new airport gate access and restaurants can only seat so many people during the dinner rush. Sellers might respond to that scarcity by increasing short-term prices, which could lower demand.

Just as these obstacles to hyperswitching are numerous, so are the many ways that AIs and markets might respond to them. Even in an industry with highly customized products, a single, large company could offer the full array of customized choices and thus rapidly capture the market due to a lower cost structure or better customer service as determined by the AI.[299] Moreover, consumers may rely more on AIs as deciding among a larger number of customized products becomes increasingly difficult and time intensive. Thus, sellers may be limited in their ability to hold on to customers through customization—and may accelerate the influence of AIs by doing so.

As for sellers' ability to accommodate sudden influxes of customers, challengers will seek new ways to increase their capacities quickly. Most industries are shifting to a rapid order fulfillment model.[300] The rise of automation and part-time, on-demand workers is making it more feasible for a

298. *See, e.g.*, *supra* note 24.

299. On how businesses leverage customer service for competitive advantage, see, e.g., Rory Van Loo, *The Corporation as Courthouse*, 33 YALE J. ON REG. 547, 555–60 (2016).

300. Russ Meller, *Order Fulfillment as a Competitive Advantage*, SUPPLYCHAIN247 (Mar. 5, 2015), https://www.supplychain247.com/article/order_fulfillment_as_a_competitive_advantage [https://perma.cc/7UNZ-KCTJ].

company to fulfill large increases in demand, since the company can obtain the modular labor that competitors no longer need.[301] Incumbents could reverse that labor trend by, for example, locking suppliers or workers into longer term contracts to limit challengers' ability to ramp up capacity. But those moves risk increasing costs overall and could accelerate the incumbent's collapse by making it more difficult to match AI-driven drops in customers with decreases in costs.

Additionally, the seller might digitally provide the AI with the number of new customers that can be accommodated over a specific period of time, such as 10 million new customers every quarter, as capacity is ramped up. At that point, hyperswitching would become a race between the challenger's speed at growing capacity and the incumbent's speed at convincing the AI to change its advice. In the meantime, however, capital markets will be assessing the likely winners of that race, and investors' judgement could be swift and devastating for the loser.

E. *Summary*

Space constraints do not allow for a full treatment of these and the many other market dynamics that will influence the development of hyperswitching and result in changes to demand curves and capital markets. But the discussion above began to sketch a set of relevant factors. These include the level of concentration among AIs, consumers' reliance on AIs for making decisions, the AIs' ability to execute the switch from one seller to another, the fungibility of sellers' products, the variation in cost structure among businesses, and the feasibility of quickly ramping up manufacturing or services. As more of these are present in a given product market, AIs' will have greater power to direct a large number of consumers toward new businesses.

If extreme hyperswitching occurs, a separate set of factors will determine the extent of its downsides. The threat of hyperswitching could impose nonsalient costs on the economy if businesses respond by holding more liquid assets, forming inefficient conglomerates, pursuing excess mergers, colluding, or closing often enough to increase unemployment expenditures. The chances of hyperswitching encouraging a crisis or recession would be influenced by the size of the revenue stream that companies might lose, the speed of that loss, the links with the financial system, and the level of investor and creditor panic.

To reiterate, hyperswitching is not inherently problematic. The benefits are more concrete than the downsides. And even if major downsides materialize, the economic magnitude of the benefits may still outweigh them. But analysis of AIs is not a simple binary question of good or bad. From a policy perspective, the best path forward may be to embrace hyperswitching, but with an eye toward monitoring risks and minimizing costs. For that to happen, it is not enough to simply assume that markets will take care of the

301. *See id.*

problem—the responses will be too dynamic on both sides to rest assured of any particular outcome. As a result, analytic models and the regulatory architecture should be updated to minimize automated commerce blind spots—tasks taken up in the next Part.

IV. IMPLICATIONS

The great uncertainty surrounding AIs' future means that little can be said with great confidence about the need for any particular intervention today. It is nonetheless clear that the law and economics paradigm requires expansion to include the full set of factors relevant to developing policy. Even with a more comprehensive view of the downsides, policies strengthening AI informers, such as legislation granting data access and preserving exit, appear promising. It is also clear that the regulatory architecture is in need of adjustments, as the current disconnect between macro- and micro-focused authority will weaken oversight of automated markets.

A. *Shifting the Paradigm for Consumer Switching*

To prescribe market interventions correctly, it is necessary to recognize the full benefits and costs of adopting any particular policy. The current paradigm makes it harder to identify interventions that may increase the benefits and decrease the costs of automated markets.

1. Recognizing the Upsides of Automated Switching

We should expect powerful consumer-enhancing AIs to exist. The technological capabilities are arriving for AIs to guide us through shopping like they already do for driving and to execute the transaction should we wish. There is also widespread embrace of the idea that the law should reduce transaction costs, and law and economics scholars have sometimes referred in passing to the possibility that the previous generation of digital intermediaries can help.[302] The intellectual and real-world foundations are thus in place for a shift toward embracing a pro-AI paradigm.

Despite these foundations, strong intellectual currents run counter to AIs. Besides general concerns about the influence of big technology firms, decades of influential scholars—including Coase, Danny Kahneman, and Amos Tversky—exposed the law and economics paradigm as greatly underestimating various transaction costs in the real world. More recently, legal scholars have persuasively demonstrated the persistent failures of mandated disclosures and other behavioral law and economics interventions.[303] Against the backdrop of these important intellectual contributions, the idea of elimi-

302. *See, e.g.*, Ben-Shahar & Schneider, *supra* note 10, at 746 (listing online recommendation sites as potentially helpful to consumers); Bar-Gill & Stone, *supra* note 90, at 455 ("An even better solution would utilize the emerging market for 'comparison-shopping services.' ").

303. *See* Ben-Shahar & Schneider, *supra* note 10; Bubb & Pildes, *supra* note 10.

nating significant categories of transaction costs is arguably now a fanciful and outdated concept—akin to discredited paradigms such as the Ptolemaic placement of the Earth as the center of the universe.[304]

As paradigm shifts often do, the recognition of transaction costs as a core aspect of markets may have gone too far. Ironically, as scholars have over decades gradually adopted the more realistic high-transaction cost assumption, technological developments have made it more relevant to study the absence of some categories of transaction costs. What may be needed to understand the potential impact of broad pro-AI policies is a model close to those used before Coase—albeit updated for the many economic insights since then.

These refinements would need to be incorporated into formal, product-specific, and in-depth modeling of hypothetical market interventions. Part II indicated several categories of promising laws. The most immediately appealing of these to explore are laws that ensure AIs can access the general product- and customer-specific data they need to help consumers. Sellers' current use of the law to freeze the flow of readily available data runs counter to the longstanding consensus in law and economics that good legal interventions should generally remove market information asymmetries, not create them.[305] Sellers have managed to keep transaction costs high in part by blocking intermediaries' access to such information. A straightforward first step would be for judges to end the current practice of allowing sellers—such as large banks, rental car companies, and Amazon—to misappropriate laws, such as the CFAA to block digital intermediaries from accessing data freely available online.[306]

Laws mandating that sellers release product data, such as machine-readable pricing, also appear to offer benefits. Such laws are unnecessary for many online sellers that already post such information online. But it is cost-prohibitive for digital intermediaries to collect price and product information from brick-and-mortar sellers.

There is some empirical evidence that law and economics theory applied to digital intermediaries can produce meaningful real-world results. Several years ago, I drew on basic concepts of market imperfections to make the case for regulation requiring large retailers to make information available in digital form.[307] Although the argument was at the time theoretical and lacked real-world evidence, Israel passed such a law requiring grocery stores to make price data digitally available. A recent study found that prices dropped

304. *See generally* THOMAS KUHN, THE STRUCTURE OF SCIENTIFIC REVOLUTIONS (1962) (describing the pendulum shifts resulting from paradigm shifts).

305. *See supra* notes 78–80 and accompanying text. Exceptions to this general principle include trade secret law, which is less relevant to data currently readily shared outside the firm.

306. *See supra* Section II.B.1 (discussing ways that companies block data access). A chorus of scholars have called on U.S. courts to stop misinterpreting the CFAA and other laws as blocking data access for different reasons. *See, e.g.*, Kerr, *supra* note 112 (arguing for access based on trespass norms).

307. *See, e.g.*, Van Loo, *supra* note 6, at 1387–88.

as more consumers used comparison websites powered by that data, with the law ultimately saving shoppers 4% to 5% on average.[308] Given those findings, and the theoretical foundations, it is worth at least experimenting with information access laws in the United States.

The final category of data access laws needed for AIs relate to personal account data. Europe passed such laws on the basis of a consumer right to that access.[309] But scholars have proposed similar laws based on law and economics analyses.[310] Assuming these laws would not discourage otherwise valuable information collection, U.S. lawmakers and regulators should consider taking similar action. Some consumer protection agencies, such as the CFPB, have the ability to pass relevant rules in their regulated industries but have yet to act.[311] Despite embracing the role of digital intermediaries, regulators have remained more focused on regulating consumer businesses than supporting consumer intermediaries.

Another set of high-stakes laws involves customer exit. Economic theory provides support for preserving AIs' ability to cancel accounts if a consumer has delegated such authority. This inference flows from the importance of exit in markets.[312] Nationwide legislation like that in California, requiring an online cancellation for services allowing online subscription, also seems sensible.[313]

More important than any particular proposal is updating the intellectual framework so that observers are more likely to identify market problems that AIs could solve. If the default assumption is that high switching costs are inevitable even after "significant" reductions, then evidence of current high transaction costs is nothing surprising—and nothing that should prompt reform: it would be expected that consumers remain tied to Amazon for ordering products online and rarely switch bank accounts.

On the other hand, if the default assumption is instead, as it should be, that virtual assistants could considerably lower switching costs, regulators would view minimal switching from Amazon or Citibank as worthy of attention. That reaction would prompt them to analyze more closely the dynamics that inhibit switching. While the lack of switching could be due to benign factors such as affection for the brand, the analysis could identify the set of court challenges, anticompetitive practices, and technological barriers that firms deploy to thwart or capture digital intermediaries.

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308. Itai Ater & Oren Rigbi, *The Effects of Mandatory Disclosure of Supermarket Prices*, SSRN 1 (Oct. 2, 2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3046703 [https://perma.cc/SHH4-CXRS].

309. *See supra* note 130 and accompanying text.

310. *See, e.g.*, Bar-Gill & Stone, *supra* note 90, at 455.

311. *See* Rory Van Loo, *Technology Regulation by Default: Platforms, Privacy, and the CFPB*, 2 GEO. L. TECH. REV. 531, 541–44 (2018) (discussing the CFPB's decision).

312. *See, e.g.*, Bar-Gill & Ben-Shahar, *supra* note 131.

313. *See supra* Section II.B.2.

Ultimately, policymakers that take AIs seriously would be animated by a set of top-level inquiries: Why is there no service that allows people to compare prices across online and brick-and-mortar retailers—a kind of Google Maps for shopping that would tell us how we can save the most money and spend the least amount of time? Why are digital intermediaries unable to close accounts on our behalf if we so choose? More importantly, what policies will move us toward such services?

Pro-AI policies would be difficult and complex, requiring a host of other laws overseeing AIs—including antitrust and consumer protection. But the current default assumptions about markets obscure awareness of overlooked anticompetitive dynamics that merit analysis and intervention.

2. Recognizing the Full Downsides of Automated Commerce

The previous Section's emphasis on the full upsides of AIs is relevant to reforms that would bring more immediate societal benefits. This Section's discussion is more relevant to future stages of automated markets, the seeds of which are being planted today. The animating concern here is that dispersed legal actors might promote pro-AI policies to an extreme or that powerful firms such as Amazon might technologically build automated markets that suit their interests, without policymakers understanding the full costs and risks. Algorithms' ability to speed up consumer decisionmaking is, for instance, correctly viewed as their "most basic advantage."[314] But it is also important to recognize the potential for that speed to create risks of market volatility and to prompt inefficient managerial responses. Even if pro-AI policies are still warranted, the failure to factor the downsides into any policy analyses makes it less likely reforms will include safeguards such as mechanisms for monitoring market volatility.

How necessary is it to consider the downsides given the unpredictability of how automated commerce will develop and the many ways that markets might mitigate hyperswitching? Oddly, this is one area where policy incompetence could bring unintended benefits. There are many reasons why the law may inadvertently prevent extremes of automated commerce. Lobbying efforts by sellers or gridlock in Congress could help prevent pro-AI policies, or at least policies that would help AIs to act in consumers' best interests. Although such a policy "failure" (from the typical transaction cost perspective) may reduce consumer welfare in the short term, it would have an unintended upside of lessening the risks associated with hyperswitching. AIs coopted by the leading sellers would, after all, be less likely to shake up the industry by recommending that consumers move to an innovating start-up seller.

A problem with this unintentional insurance is that it is unreliable. The stability of the financial system should not rest on the expectation that poli-

314. *See* Gal & Elkin-Koren, *supra* note 2, at 318 ("The most basic advantage of algorithms is that they enable a speedier decision.").

cymakers will be too ineffective to take action in accordance with the existing paradigm emphasizing competition. Google, Apple, and other informer AIs may win over politicians and consumers.

Thus, AIs will arrive, in one form or another, even without deliberate government policies. It is preferable to inform those developments with an expanded law and economics framework for perfect competition. The hypothetical gains from extreme consumer sovereignty must be weighed against the broader costs of the seller behavior that will seek to undermine it.[315] The concept of hyperswitching should be added to models as a theoretical outcome of a policy trajectory toward perfect competition in the automated era.

B. *Redesigning the Regulatory Structure*

Regulators have an important role to play in managing the benefits and costs related to digital market acceleration. Across the Bill Clinton and George W. Bush presidencies, it was widely assumed that banks would manage their excess risks because they would be the ones to suffer from any collapse.[316] After the financial crisis of 2008, however, that reasoning was widely recognized as flawed. Former Federal Reserve Chair Alan Greenspan, previously viewed as "Superman" and god-like for his market intervention abilities,[317] admitted in 2008, "Those of us who have looked to the self-interest of lending institutions to protect shareholder's equity (myself especially) are in a state of shocked disbelief."[318]

The regulatory framework currently depends greatly on AIs' self-interest to determine the trajectory they will follow. Governance of AIs mostly rests with the FTC and (in consumer finance) with the CFPB.[319] Those agencies have a more micro-level focus on markets and individual transactions, but no stability mission.[320] Banking regulators do not have jurisdiction over AIs, but they do have jurisdiction over relevant issues such as the capital structure of firms and macroeconomic conditions.[321] As a result, no regulator is well situated to either understand or manage AIs' broader implications. Adjustments to both trade and bank regulators are needed as AIs blur micro and macro boundaries.

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315. *See supra* Part III (outlining the inefficiency and instability costs of automated markets).

316. Kara Scannell & Sudeep Reddy, *Greenspan Admits Errors to Hostile House Panel*, WALL STREET J. (Oct. 24, 2008, 12:01 AM), https://www.wsj.com/articles/SB122476545437862295 (on file with the *Michigan Law Review*).

317. *See* Henry T.C. Hu, *Faith and Magic: Investor Beliefs and Government Neutrality*, 78 TEX. L. REV. 777, 865 (2000).

318. Scannell & Reddy, *supra* note 316. Bank executives' assumptions that there would be a bailout may have increased some of the risky behavior.

319. *Supra* note 33 and accompanying text.

320. *Supra* note 33 and accompanying text.

321. *Supra* note 34 and accompanying text.

1. Adding More Micro to Financial Regulation

Bank regulators and scholars have begun to intensely study and warn of the systemic risks posed by technologies.[322] Regulators are also aware of history's painful lessons that "extraordinary fluctuations have to be expected and guarded against."[323] However, they have paid little attention to the systemic risks of AIs outside of automated trading and robo-investment advisers. Since this inattention partially reflects an outdated regulatory structure, understanding the causes of the inattention helps indicate ways to address it.

Explanations for the lack of awareness. Financial regulators' inattention to AIs is a problem, and one reminiscent of past inability to identify crisis triggers. Prudential regulators such as the FDIC and Federal Reserve are charged with duties aimed at preventing a financial crisis, such as keeping large banks from failing, but they are not expected to predict the precise nature and timing of a crisis.[324] They have an impossible task of preparing for the unknowable. But prudential regulators have some tools to mitigate the impact of digital switching—tools that function most effectively when risks are identified in advance. For instance, prudential regulators can require banks to increase their capital on hand.[325] To best deploy those preventive measures or develop new tools, regulators must spot the risk beforehand, even if that simply means lightly monitoring its development.

There are three main explanations for the lack of prudential regulatory attention to AIs. One is that prudential regulators operate in the Coasian paradigm of assuming high transaction costs. Retail businesses—such as consumer banking accounts and credit cards—are typically among banks' most steadily profitable, "safe and boring" businesses that help balance out riskier commercial activities.[326] The federal government's promise to reimburse depositors up to $250,000 in the case of bank failure, through FDIC

322. FIN. STABILITY OVERSIGHT COUNCIL, 2016 ANNUAL REPORT 6 (2016), https://www.treasury.gov/initiatives/fsoc/studies-reports/Documents/FSOC%202016%20Annual%20Report.pdf [https://perma.cc/6ZLZ-PRFD] (acknowledging that "risks embedded in new products and practices may be difficult to foresee" and urging financial regulators "to continue to be vigilant in monitoring new and rapidly growing financial products"); OFFICE OF THE COMPTROLLER OF THE CURRENCY, SUPPORTING RESPONSIBLE INNOVATION IN THE FEDERAL BANKING SYSTEM: AN OCC PERSPECTIVE 6 (2016).

323. Daniel A. Farber, *Uncertainty*, 99 GEO. L.J. 901, 957 (2011).

324. Brief of Professors Viral V. Acharya et al. as *Amici Curiae* in Support of Appellant at 24, MetLife, Inc. v. Fin. Stability Oversight Council, 177 F. Supp. 3d 219 (D.D.C. 2016) (No. 15-0045 (RMC)) ("All we can say in advance is that there is *some* risk of a systemic crisis (we know from history that such crises do occur). We cannot say how likely a crisis is at any given point or how one will likely occur.").

325. *See* BARR ET AL., *supra* note 223, at 261–63.

326. *See, e.g.*, Reeves et al., *supra* note 215, at 51 (observing that one of the reasons Canadian banks "emerged from the [2008] crisis largely unscathed" is that they "had a higher ratio of retail deposits, which are generally more dependable than other sources of funding").

insurance, makes panicky bank runs of the traditional sense unimaginable.[327] Thus, banking regulators have had little direct reason to become concerned about the speed of customer switching in consumer finance.

Unlike prudential regulators, the SEC pays attention to the speed of retail-level transactions. The SEC governs stock market trading, which is not officially consumer finance.[328] The SEC initially lauded the advent of automated trading, until a series of flash crashes raised alarms.[329] The agency has since adjusted, and the New York Stock Exchange has paused trading to give authorities and private parties the time to course correct.[330] Unlike the SEC, the banking regulators have not had the same recent experiences in credit card and bank account markets. An inference can thus be made that financial regulators—banking and otherwise—have generally embraced technological advances that speed up transactions and reduce transaction costs, until a crisis demonstrated otherwise.[331]

A second explanation for prudential regulators' omission of digital switching lies in the disconnect between financial and nonfinancial markets. As mentioned above, the interplay between nonfinancial markets, such as real estate, and financial institutions has contributed to past crises.[332] Scholars have observed that post-crisis regulations have not gone far enough in recognizing the connection between mortgages and real estate.[333] If even that direct reflection of an immediately preceding crisis failed to sufficiently broaden regulators' nonfinancial lens, other areas outside finance like AIs would presumably face an even higher likelihood of inattention.

Third, prudential regulators pay insufficient attention to consumer transactions. This has long been the case and is a major reason why the CFPB exists. Before the financial crisis of 2008, prudential regulators also led analysis of consumer protection. But they were seen as having failed in that mission, focusing too much on preventing bank failures and not enough on consumer issues such as subprime loans.[334] The creation of the CFPB addressed the inattention to consumer protection but also institutionally sepa-

327. Anthony J. Casey & Eric A. Posner, *A Framework for Bailout Regulation*, 91 NOTRE DAME L. REV. 479, 489 (2015).

328. *What We Do*, SEC, https://www.sec.gov/Article/whatwedo.html [https://perma.cc/A3Y8-Q3EK]. The CFPB does not, for instance, cover retail stock market trading. 12 U.S.C. §§ 5321, 5322(a)(2), 5491(a) (2012).

329. *See* PATTERSON, *supra* note 241, at 201, 239, 242–45.

330. *See, e.g.*, Lin, *supra* note 16, at 705.

331. Yesha Yadav has questioned common assumptions about how algorithmic trading contributes to efficient markets. Yesha Yadav, *How Algorithmic Trading Undermines Efficiency in Capital Markets*, 68 VAND. L. REV. 1607, 1612–17 (2015) (discussing the problem as a problem in allocative efficiency as opposed to information efficiency).

332. *See supra* Section III.E.1.

333. Bubb & Krishnamurthy, *supra* note 18, at 1540.

334. *See, e.g.*, Van Loo, *supra* note 2 (summarizing the reasons for the CFPB).

rated the regulatory state's consumer-level expertise from bank-stability expertise.[335]

Finally, bank regulators lack the ability to collect information from AIs. The CFPB's authorizing statute sets it up to potentially collect nonpublic information from AIs giving consumer financial advice, but the CFPB does not have a larger systemic risk mission.[336] Consequently, regulators charged with stability are currently mostly limited to publicly available information to understand AIs' stability implications. This runs counter to financial regulation's foundational principle of obtaining information that the public does not have in order to guard against risks that private actors cannot sufficiently police.[337]

Institutional reforms to gain better understanding. The most straightforward organizational vehicle for rectifying the conceptual and jurisdictional gaps would be the Federal Stability Oversight Council (FSOC), which Congress created at the same time as the CFPB.[338] FSOC has broad monitoring capabilities and is charged with identifying "potential emerging threats to the financial stability of the United States."[339] FSOC could use its authority to study the development of AIs.

One advantage to FSOC monitoring of AIs is that it operates through existing financial regulators, the heads of which are voting members of FSOC.[340] Those members include the CFPB and bank regulators, which analyze financial institutions' capital structure and the implications of macroeconomic downturns. The collective expertise of the council thus bridges some of the problematic expertise silos that may impede broad understanding of AIs.[341]

FSOC monitoring of AIs has limits, however. Since the CFPB only has the ability to collect information related to financial advice, any AI that does not provide such advice would be off limits. Additionally, the CFPB could only access financially related information, and in theory only information related to consumer protection. Thus, as long as the AI were helping its customers with its advice, the agency would have limited ability to obtain data relevant to broader stability concerns. Nor could the CFPB collect information from an AI that did not provide financial advice, or from the part of the AI's business that dealt with nonfinancial considerations.

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335. *See id.* at 237.

336. Rory Van Loo, *Regulatory Monitors*, 118 COLUM. L. REV. (forthcoming 2019) (manuscript at 3), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3168798 [https://perma.cc/7MRA-YPJY].

337. *Id.*

338. *See* Dodd-Frank Wall Street Reform and Consumer Protection Act, 12 U.S.C. § 5322(a)(1)(C) (2012).

339. *Id.* § 5322(a)(2)(N)(iii). FSOC has an Office of Financial Research to aid in such monitoring. *Id.* § 5322(a)(2)(A).

340. *Id.* § 5321(b)(1).

341. *See supra* notes 324–337 and accompanying text (discussing expertise silos).

To address those regulatory information limits, it may at some point make sense for some regulator with a broader stability mandate to have the authority to collect relevant information even from nonfinancial AIs. Such authority would ensure the financial regulatory structure did not have a blind spot regarding AIs. The case for such a reform is less compelling until AIs begin to take hold of more consumer spending. The risk with waiting to pursue such authority, however, is that reforms may take too long at that point.

The stress test provides another tool for bringing AI awareness into the existing financial regulatory structure. Prudential regulators routinely conduct such tests, but at the time of this Article's writing had yet to model AI-driven disruptions.[342] Financial regulators could immediately fill that gap by making the internal policy decision to begin occasionally estimating the effect of hyperswitching when modeling doomsday scenarios.

Institutional reforms for taking action. Even with perfect regulatory information, the harder question is what should be done with any regulatory knowledge indicating that AIs pose risks. FSOC does not itself enforce or write laws but instead relies on its members to act. None of the members of the council have clear rulemaking or enforcement powers over AIs outside finance.[343]

Nor is the path to taking action clear within consumer finance. The regulators with a stability mandate lack jurisdiction over virtual financial assistants that might redirect consumers. The CFPB has some rulemaking and enforcement authority over AIs giving consumer financial advice, but only for consumer protection goals—not to lessen stability risks. Thus, regulators are largely limited to exercising their authority to require large financial institutions to increase liquid reserves.

Depending on how AIs evolve, regulators may need more than this. One example would be to give regulators a slow-down mechanism, or pause button, if advice given to tens of millions of consumers were to begin to destabilize the economy—something like the SEC's ability to halt trading on stock exchanges.[344] Or AIs might be required to build a slowdown mechanism into their recommendations under certain conditions. Even if these particular devices are not the answer, they demonstrate the kind of stopgap measures that could be adapted to AI oversight. It would be necessary, of course, to constrain the use of such tools to extreme circumstances. The NYSE's pause

342. *See supra* Part III.C.2. Stress testing more broadly offers a tool for understanding banks' susceptibility to unidentified risks. Christina Parajon Skinner, *Misconduct Risk*, 84 FORDHAM L. REV. 1559, 1598–603 (2016).

343. *See* 12 U.S.C. § 5322(1)–(2) (2012).

344. The SEC can more broadly impose temporary cease-and-desist orders on regulated entities when an alleged violation may cause substantial harm to the public interest. 15 U.S.C. § 78u-3(c)(1) (2012); 17 C.F.R. § 201.512(a) (2010).

feature has been used rarely, giving some comfort that such awesome power in the hands of regulators can be used judiciously.[345]

2. Adding More Macro to Trade Regulation

Although the main trade regulator, the FTC, would have reason to adopt more accurate economic models for automated markets, structural changes to the agency are not justified solely on what is known about automated markets. Unlike financial regulators, trade regulators are not tasked with identifying and managing improbable future risks to the economy. Nor are they necessarily expected to protect AIs, outside of antitrust concerns, although an argument could be made that they should do so.[346] This Section nonetheless considers what eventual trade regulatory architecture might be needed in an era of automated markets.

One way to conceptualize the impact of automated markets is that they may eventually make some real economy markets more like financial markets, in the sense of moving massive revenues around suddenly. Real firms may also become more like financial firms in their behavior and risk profile. One clear example of this financialization is firms' holding of large cash reserves, or other liquid assets, to guard against risk.[347] Federal regulation has for over a century required banks to have such liquid resources on hand to weather depositor defaults or recessions. Another example of potential convergence would be trade firms' diversification of product lines to prevent failure. Although trade firms may utilize diversification in other ways, the more they seek to diversify their core products sold due to trade volatility, the more their business model begins to approach that of financial firms, such as fund managers' diversification of portfolios to manage risk.[348]

The legal institutions for the real economy, such as bankruptcy law, are not set up for the type of challenges faced in finance.[349] The FTC has mostly consumer protection and antitrust authority.[350] Unlike bank regulators, the

345. JAMES J. ANGEL, LIMIT UP – LIMIT DOWN OPERATING COMM., LIMIT UP – LIMIT DOWN: NATIONAL MARKET SYSTEM PLAN ASSESSMENT TO ADDRESS EXTRAORDINARY MARKET VOLATILITY 3 (2015), http://www.luldplan.com/studies.html [https://perma.cc/8KMN-L9E4].

346. *See supra* Part IV.A.I (proposing a more AI-supportive approach by regulators).

347. *See supra* Section III.D.1.

348. *See, e.g.*, Schwarcz, *supra* note 34, at 201 (noting that a diversified hedging strategy is inherently protective).

349. Bankruptcy law is currently the main legal institution dealing with the implications of faltering non-financial firms. Additionally, it provides the closest mechanism to a stock exchange pause button for the real economy, as filing a bankruptcy petition begins an automatic stay that halts creditor claims. Bankruptcy law does not, however, provide a means to prevent consumers from switching. Nor does it have the speed and flexibility required in the event of markets facing a systemic risk trigger. Edward R. Morrison, *Is the Bankruptcy Code an Adequate Mechanism for Resolving the Distress of Systemically Important Institutions?*, 82 TEMP. L. REV. 449, 462 (2009).

350. Federal Trade Commission Act, Pub. L. No. 63-203, § 6, 38 Stat. 717, 721–22 (1914) (codified as amended at 15 U.S.C. § 46 (2012 & Supp. V 2018)).

FTC does not (1) seek to ensure economic stability; (2) regularly collect nonpublic information about regulated firms' internally risky behavior;[351] or (3) consider whether the firms it regulates have adequate capital reserves to withstand market turmoil, or related devices such as "living wills" to unwind smoothly in the case of failure so as to minimize the chance of requiring a taxpayer bailout.[352]

If real firms become more like financial institutions in terms of their economic-stability implications, financial regulation may offer a blueprint for reform. The FTC could adopt some version of these various tools—stress tests, monitoring, capital requirements, and so on—albeit scaled down due to the lesser risks posed by real economy firms. For instance, if mandatory capital requirements were seen as necessary for real firms to guard against stability, regulators could conduct some kind of stress test analysis for crucial sectors of the real economy, akin to those conducted for big banks. The actual levels of capital required would presumably be significantly lower for real firms, and most would presumably not require any as long as their failure would have limited repercussions.

Since each of these oversight mechanisms is a routine part of the financial regulatory framework but foreign to the trade regulatory framework, an alternative to expanding the FTC's tools would be to expand the jurisdiction of financial regulators to cover nonfinancial firms. Greater coordination across trade and financial regulators is needed, in any case, because the real economy and financial economy are increasingly intertwined in influencing stability.[353] Expanding prudential regulators' authority to cover AIs for stability purposes and macroeconomic efficiency analyses may provide a superior regulatory option in the face of extreme hyperswitching.

The choice between financial and trade regulators should consider whether AIs ultimately advise on both financial and nonfinancial matters, as would be more likely, or are compartmentalized. Assuming companies' AIs, such as Siri and Alexa, did become trusted advisers for all consumer transactions, it may make sense for financial regulators to lead any stability-related oversight of such companies. After all, the lead regulator would need to understand the implications of financial recommendations for large banks. Once financial regulators were conducting some kind of AI monitoring for stability, known as an "examination" in banking, it would be ideal not to have multiple regulators duplicating the difficult task of understanding

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351. *See* C. Scott Hemphill, *An Aggregate Approach to Antitrust: Using New Data and Rulemaking to Preserve Drug Competition*, 109 COLUM. L. REV. 629, 644 (2009) (arguing that the FTC should use its data collection authority more in antitrust).

352. Under Dodd-Frank, many financial institutions must submit plans for unwinding if they become insolvent. Dodd-Frank Wall Street Reform and Consumer Protection Act § 165 (d)(1), 12 U.S.C. § 5365 (2012). The Act also establishes a mechanism for unwinding systemically important financial institutions in a more measured manner. *Id.* §§ 5381–94. Dodd-Frank thus seeks to avoid both the use of the Bankruptcy Code and bailouts to handle systemic risk.

353. *See supra* Section III.E.

complex algorithms and multiplying the burden to businesses of explaining those algorithms and handing over information.

Another consideration would be how to coordinate diverse regulators' activities related to AIs. Again, the most plausible existing body is FSOC. FSOC's composition could be expanded to provide more of a link between financial stability and the real economy. Currently, FSOC's nine regulatory members consist only of financial regulators.[354] A trade regulator, most sensibly the FTC, could be added.

FSOC is ultimately an unsatisfying coordinator for AI oversight, however, since it is so focused on stability and finance. Ideally, a single entity would both promote pro-AI policies and manage AI risks. I have previously proposed a technology meta-regulator for reasons outside of automated commerce, including consumer protection and antitrust governance, but a technology meta-agency could perform a broader risk-regulation mission—in addition to governing the host of privacy, information access, and other threats that scholars have identified.[355] Even before any inflection point arrives justifying regulatory restructuring, regulators would ideally leverage existing authority, and an expanded analytic framework, to begin studying the issue so as to lay the knowledge foundations for high-stakes decisions to come.

CONCLUSION

Expanding the intellectual paradigm to consider the possibility of hyperswitching would continue an ongoing law and economics project. The Coase theorem, information economics, and behavioral economics helped develop more accurate models for designing the legal system in light of how markets actually work.[356] In at least one regard, however, automated commerce reverses the narrative. Embedded in these past paradigmatic refinements was a (correct) criticism that models had unrealistically assumed some feature of perfect competition.[357]

This Article has shown that the opposite assumption may make more sense in some contexts. Markets will remain imperfect in some ways, such as the number of competitors, but it is becoming more realistic to assume markets can move closer to the perfect-competition economic model through minimal switching costs. Once that possibility is recognized, it becomes instructive to understand why high transaction costs nonetheless persist and to

354. 12 U.S.C. § 5321(b) (2012).

355. Various scholars have proposed a new technology-focused regulator. *See* Van Loo, *Rise of the Digital Regulator*, *supra* note 5 (proposing a technology meta-regulator and mentioning others who have made related proposals for robotics and search commissions).

356. Ronald Coase, *The New Institutional Economics*, 88 AM. ECON. REV. (SPECIAL ISSUE) 72, 73 (1998) ("Mainstream economics . . . is in fact little concerned with what happens in the real world.").

357. *See supra* Section II.A.

recognize the full societal gains and losses that would result from laws that help automate consumer transactions.

A decision on whether the law should influence AIs' trajectory has already been made. Some laws have unintentionally held AIs back, thereby preventing both theoretical market volatility and more tangible large-scale social welfare gains. More recent laws aimed at helping consumers, such as those mandating online cancellation options, may unintentionally benefit AIs.

The important question moving forward is whether the law of automated switching will continue to develop in a piecemeal manner. A long-term regulatory vision should begin with deliberately pro-AI legal reforms, such as mandating data access and preserving automated contractual exit. If commercial markets become more like stock markets, it will be important to monitor a broader set of costs and risks. Regulatory tools may also converge, with hyperswitching possibly making an SEC-style stock market pause function and the Federal Reserve's bank stress tests relevant outside of finance. Regardless, bridging the current intellectual silos separating micro from macro concerns, and the financial from the real economy, will better situate the regulatory framework to design a comprehensive law of automated markets.