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**Regulating Robo Advice
Across the Financial Services Industry**

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REGULATING ROBO ADVICE ACROSS THE FINANCIAL SERVICES INDUSTRY

Tom Baker & Benedict Dellaert¹

Automated financial product advisors – “robo advisors” – are emerging across the financial services industry, helping consumers choose investments, banking products, and insurance policies. Robo advisors have the potential to lower the cost and increase the quality and transparency of financial advice for consumers. But they also pose significant new challenges for regulators who are accustomed to assessing human intermediaries. A well-designed robo advisor will be honest and competent, and it will recommend only suitable products. Because humans design and implement robo advisors, however, honesty, competence, and suitability cannot simply be assumed. Moreover, robo advisors pose new scale risks that are different in kind from the risks involved in assessing the conduct of thousands of individual actors. This essay identifies the core components of robo advisors, key questions that regulators need to be able to answer about them, and the capacities that regulators need to develop in order to answer those questions. The benefits to developing these capacities almost certainly exceed the costs, because the same returns to scale that make an automated advisor so cost-effective lead to similar returns to scale in assessing the quality of automated advisors.

The growth of investment robo-advisors, web-based insurance exchanges, on-line credit comparison sites, and automated personal financial management services creates significant opportunities and risks that regulators across the financial services spectrum have yet even to systematically assess, let alone address. Because of the scale that automation makes possible, these services have the potential to provide quality financial advice to more people at lower cost than humans,² and to do so with greater transparency.³ But the fact that this potential exists hardly guarantees that it will be realized.

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² Abhijeet Sinha, *White Paper: Increasing the Efficiency and Effectiveness of Financial Advice with Robo-Advisors*, INFOSYS (2016), <https://www.infosys.com/industries/financial-services/white-papers/Documents/trend-financial-advisors-industry.pdf> (demonstrating that investors can gain advice from robo-advisors at much cheaper costs than the fees charged by human advisors).

³ See Part III, *infra*. See Financial Conduct Authority, *Financial Advice Market Review* at 39 (March 2016) (encouraging UK financial services regulators to take steps to promote the development of automated financial

People design, model, program, implement, and market these automated advisors, and many automated advisors operate behind the scenes, assisting people who interact with clients and customers. The history of people taking advantage of consumers in the financial services industry is not a pretty one.⁴ Even setting fraud and other unsavory activities to the side, the riches to be won by those who succeed in disrupting the financial services industry provide more than enough incentive to rush technology to market.⁵ In addition, there are concerns that automation may entrench historical unfairness⁶ and promote a financial services monoculture with new kinds of unfairness and a greater vulnerability to catastrophic failure than the less coordinated actions of humans working without automated advice.⁷

For these and other reasons, automated advice poses significant challenges for regulators seeking to preserve the integrity of financial markets. Along with the well-known privacy and security challenges that accompany the digitization of personal financial data,⁸ there are new regulatory challenges that are more specific to automated advice. These include developing the capacities to assess: the algorithms and data incorporated in the automated advisors; the choice

advice to increase access to financial advice). Cf. FINRA, *supra* note 6 at 8-9 (listing many good governance practices for FINRA members to employ in relation to digital investment advisors). All or most of the governance practices FINRA describes could also form the basis for external evaluation.

⁴ See, e.g., Neil Fligstein & Alexander F. Roehrkasse, *The Causes of Fraud in the Financial Crisis of 2007 to 2009: Evidence from the Mortgage-Backed Securities Industry*, 81 AM SOC. REV. 617 (2016); Michael Corkery, *Wells Fargo Fined \$185 Million for Fraudulently Opening Accounts*, N.Y. TIMES (Sept. 8, 2016),

http://www.nytimes.com/2016/09/09/business/dealbook/wells-fargo-fined-for-years-of-harm-to-customers.html?_r=0;

Daniel Fischel, *The Law and Economics of Vanishing Premium Insurance*, 22 Delaware Journal of Corporate Law 1, 1-3 (1997) (describing the vanishing premium scandal in the life insurance industry in the early 1990s); Matthias Rieker, *Broker Ordered to Pay More Than \$1 Million in Churning Case*, WSJ (Oct. 13, 2014), <http://www.wsj.com/articles/broker-ordered-to-pay-more-than-1-million-in-churning-case-1413231863>.

⁵ See Thomas Philippon, *The FinTech Opportunity* 14 (CEPR, Discussion Paper No. DP1409, 2016), <http://pages.stern.nyu.edu/~tphilipp/papers/FinTech.pdf> (discussing disruptive innovations of Fintech startups).

⁶ See, e.g., Kate Crawford, *Artificial Intelligence's White Guy Problem*, N.Y. TIMES (June 25, 2016), <http://www.nytimes.com/2016/06/26/opinion/sunday/artificial-intelligences-white-guy-problem.html> (“Sexism, racism and other forms of discrimination are being built into the machine-learning algorithms that underlie the technology behind many ‘intelligent’ systems...”); Joshua A. Kroll et al., *supra* note 3; Barocas & Selbst, *supra* note 3; WALLACH & ALLEN, *supra* note 3.

⁷ See, e.g., CATHY O'NEIL, WEAPONS OF MATH DESTRUCTION: HOW BIG DATA INCREASES INEQUALITY AND THREATENS DEMOCRACY (2016) (outlining dangers of relying on data analytics); Dario Amodè et al., *Concrete Problems in AI Safety*, arXiv:1606.06565 (July 25, 2016), <https://arxiv.org/pdf/1606.06565v2.pdf> (discussing “accident risk” that may emerge from the poor design of the real-world AI systems). For an effort by the tech industry to address some of these challenges, see www.partnershiponai.org.

⁸ See, e.g., *Governor Cuomo Announces Proposal of First-in-the-Nation Cybersecurity Regulation to Protect Consumers and Financial Institutions*, N.Y. DEP'T OF FIN. SERV. (Sept. 13, 2016), <http://www.dfs.ny.gov/about/press/pr1609131.htm>; Rick Swedloff, *Risk Classification's Big Data (R)evolution*, 21 CONN. INS. L. J. 339, 339 (2014) (noting that big data raises novel privacy concerns).

architecture through which the advice is presented and acted upon; the underlying information technology infrastructure; and the downside risk from the scale that automation makes possible. Developing these capacities will require financial service authorities – the paradigmatic expert administrative agencies – to invest in new kinds of expertise. Our research and experience suggests that this includes data science, computer science, behavioral economics, and psychology, but there undoubtedly are others as well.⁹

As we will discuss, the benefits to developing these capacities almost certainly exceed the costs, because the same returns to scale that make an automated advisor so cost-effective lead to similar returns to scale in assessing the quality of automated advisors. An expert administrative agency is well situated to realize those returns to scale. Moreover, the potential solvency and systemic risks posed by hundreds of thousands, or even millions, of consumers choosing their financial products based on the same or similar models are sufficiently large and different in kind from those traditionally posed by consumer financial product intermediaries that some regulatory attention is justified on those grounds alone.¹⁰

At the same time, however, it is important not to over-react and not to set a higher bar for automated advisors than for human advisors. For now, the standard against which automated advisors should be compared is that of humans, whom we know are much less than perfect. Although a large body of research in diverse fields demonstrates that even simple algorithms regularly outperform humans in the kinds of tasks that robo advisors perform,¹¹ and, thus, it may

⁹ See, e.g., Eric Johnson et al., *Can Consumers Make Affordable Care Affordable? The Value of Choice Architecture*, 8 PLOS ONE e81521 (2013) (studying impact of variations in choice architecture on health insurance choice); Dellaert, Baker, Johnson (same). Dellaert, Benedict G.C. and Gerald Häubl, 2012, “Searching in Choice Mode: Consumer Decision Processes in Product Search with Recommendations,” *Journal of Marketing Research*, 49 (2), 277–288.

¹⁰ See part xxx, *infra*.

¹¹ See, e.g., Berkeley J. Dietvorst et al., *Algorithm Aversion: People Erroneously Avoid Algorithms After Seeing Them Err*, 144 J. EXP. PSYCHOL.-GEN. (forthcoming) (manuscript at 5), <http://ssrn.com/abstract=2466040> (showing that algorithms outperform human in future predictions); William M. Grove et al., *Clinical Versus Mechanical Prediction: A Meta-Analysis*, 12 PSYCHOL. ASSESSMENT 19, 25 (2000) (noting that mechanical prediction is as accurate or more accurate than the clinical prediction); William M. Grove & Paul E. Meehl, *Comparative Efficiency of Informal (Subjective, Impressionistic) and Formal (Mechanical, Algorithmic) Prediction Procedures: The Clinical-Statistical Controversy*, 2 PSYCHOL., PUB. POL’Y., & L. 293 (responding to commonly held objections to algorithmic procedures).

be appropriate to hold automated advisors to a super-human standard *someday*, their market share is too small and regulators have too much to learn to do so today.

Our goal in this Essay is to open a discussion within legal and financial services scholarship that invites the participation of those with expertise in other relevant disciplines. As automated advisors grow in scale, protecting the integrity of financial markets will require the kind of cross disciplinary cooperation that regularly occurs in the domains of health and environmental regulation. The lawyers, economists, and behavioral scientists already involved in financial services regulation will need to understand enough about computer and data science to craft and apply new regulatory strategies; and the computer and data scientists at the forefront of the innovation will need to understand enough about legal structures and ways of thinking to help make the new regulatory strategies sensible.

This assessment is a pressing need for the financial services authorities themselves, but it is also an opportunity to explore the challenges and opportunities that automated advice presents more broadly.¹² This opportunity arises from the fact that financial services regulators already have substantial legal authority, well-developed economic and historical justifications to guide their actions, and a diversity of regulatory tools to employ.¹³ Thus, automated consumer financial product advice provides a good case study as automation extends into consumer markets. Not everything that we can learn from this case study will also apply to automated advice about cars, homes, and vacations, for example, but there are similar opportunities to take advantage of consumers in these and other markets for complex goods and services and, thus, consumer protection techniques that work for financial products are worth considering in other contexts.

In the body of this Essay we first identify the aspects of current financial services regulation that apply most directly to robo advice: the regulation of intermediaries such as

¹² See, e.g., WENDELL WALLACH & COLIN ALLEN, *MORAL MACHINES: THE ETHICAL AND SOCIAL IMPLICATIONS OF ROBOTICS* 55-56 (Oxford University Press 2008) (advocating to ensure that autonomous artificial agents are created with morality); Joshua A. Kroll et al., *Accountable Algorithms*, 165 *UNIV. PA. L. REV.* (forthcoming 2017) (noting the challenges algorithms pose for procedural); Solon Barocas & Andrew Selbst, *Big Data's Disparate Impact*, 104 *CALIF. L. REV.* 671, 677 (2016) (describing discriminatory effects of data mining).

¹³ See generally, MICHAEL S. BARR, HOWELL E. JACKSON, MARGARET E. TAHYAR, *FINANCIAL REGULATION LAW AND POLICY* (2016).

securities brokers, insurance agents, and mortgage brokers.¹⁴ We set out the traditional goals of that regulation: promoting *competence* (to provide appropriate advice and associated services), *honesty* (of that advice and associated services), and *suitability* (of the financial products sold to, or recommended for, the specific consumer).¹⁵ We then explain why any well-designed robo advisor should meet those goals at least as well as a typical human advisor, most likely better, with the emphasis appropriately placed on the caveat, “well designed.” At the same time, however, robo advice raises new challenges for regulators, most immediately to develop the expertise to assess whether robo advisors in fact are well designed.

In beginning with these traditional goals, we have two objectives: first, to review why robo advisors are at least potentially superior to unassisted humans on these dimensions for most consumers; and, second, to create a conceptual link between existing regulatory goals and the new regulatory concerns. That conceptual link supports regulators’ efforts to proceed under their existing legal authority to develop the capacities they need to address these new concerns, recognizing that they will need to operationalize this authority in new ways.¹⁶

We then identify the core technical components of robo advisors that regulators need to understand and develop procedures to assess: the algorithms and processes that generate personalized rankings of financial products for consumers; the consumer and financial product data that the algorithms ingest; the choice architecture through which that advice is delivered; and the associated information technology infrastructure. Our objective is to sketch the early

¹⁴ See Section I.A. *infra*.

¹⁵ See Section I.B. *infra*. Note that this description of the three goals is a conceptual one that does not map perfectly on the diversity of financial services regulations. Cf. Howell E. Jackson, The Trilateral Dilemma in Financial Regulation, in Anna Marial Lusardi, ed., *Improving the Effectiveness of Financial Education and Savings Programs* (2008) (observing that “generalizations are tricky given the range of legal regimes”).

¹⁶ See, e.g., SEC Commissioner Kara Stein, *Surfing the Wave: Technology, Innovation, Competition* (Nov. 9, 2015) (available at <https://www.sec.gov/news/speech/stein-2015-remarks-harvard-law-school.html>):

The Commission is now challenged with thinking through what it means to regulate a robo advisor. This concept did not even exist when most of the laws applicable to investment advisers were drafted. Most of these laws are based on the idea of a human investment adviser on the other end of the phone or sitting across the table from you. ...

Clearly, if we want our markets to remain at the top, we need to embrace innovation. And FinTech clearly promises some exciting advances. But, we also need to be prepared to anticipate and ideally prevent problems before they arise. Remaining competitive requires both market participants and regulators to thoughtfully evolve with innovation, not react to it way after the fact.

stages of a regulatory trajectory that regulators can follow as robo advisors develop in sophistication and scale.

Our analysis is conceptual and not specific to any specific governmental agency, private regulatory organization, or ex post liability regime; nor is it specific to any sector of the financial services market. At a conceptual level, our analysis applies to most, if not all, consumer financial products (if not now, then in the future) and to all the regulators of these products in all financial services sectors. Accordingly, we advocate an inter-governmental, inter-agency dialog, with experts from inside and outside the financial services industry to share information, to identify ways to make the necessary human capital available to regulators, and to develop an approach to regulating robo advisors that increases the likelihood that they are honest and competent. Some agencies have taken preliminary steps to learn about robo advice as part of their larger efforts to engage with “FinTech,” but to date they have done so largely within their own regulatory silos and within their own countries.¹⁷ There is no formal inter-agency coordination in the U.S., only modest informal efforts; and international coordination is even less well developed.¹⁸ While there is no evidence that this lack of oversight and coordination has yet caused harm, it almost certainly will in the future, as the market simply cannot be counted upon to be self-correcting when robo advisors grow in scale to the point that they reshape financial product markets.

In concluding, we explore steps that authorities might take beyond demanding a minimum level of competence and honesty. We present some provisional ideas about how financial services regulation could facilitate quality-based competition and diversity among robo advisors, so that the performance of intermediaries who use robo advisors increasingly exceeds that of their unassisted competitors. In addition, as regulators gain confidence in their capacity to assess, monitor, and hold robo advisors accountable, and as robo advisors become a major force

¹⁷ See, e.g. FINRA, FTC hearings, CFPB attendance at ML conferences, MA, NY, FCA supra note __ (recommending that Regulatory Sandbox concept be extended to automated financial advice); SEC, Investor Alert: Automated Investment Tools May 8, 2015 (available at: <https://www.sec.gov/oiea/investor-alerts-bulletins/autolistingtoolshstm.html>); SEC FinTech Forum, November 14, 2016 (transcript available at <https://www.sec.gov/spotlight/fintech/transcript-111416.pdf> (we note that the SEC forum included a state government official from Vermont)).

¹⁸ The U.S. CFPB has been closely following the “Project Innovate” of the U.K. FCA, but to our knowledge there have not been systematic efforts to share information in both directions.

in the market, there may be less need for direct regulation of the forms and features of consumer financial products, as long as robo advisors have access needed to the data needed to adequately incorporate innovations in those forms and features into their personalized evaluation and ranking systems. Of course, these regulatory benefits cannot be counted upon to appear automatically. As any robo advisor entrepreneur can attest, innovation takes work: understanding, assessment, coordination, feedback.

I. Robo Advisors and Financial Product Intermediary Regulation

In the popular press, a “robo advisor” is an automated investment service, most likely based in San Francisco, which competes with financial advisors by claiming to offer equally good (if not better) advice and service at a lower price.¹⁹ We use the terms “robo advice” and “robo advisor” more broadly to include the similar services emerging in other sectors of the financial services industry, most significantly in insurance, but also in consumer credit.²⁰ We do this to emphasize the technological and other similarities of these automated advisors and to support our claim that regulators from the securities, banking, and insurance sectors need to work together to assess them. The investment-focused robo advisors have drawn the most attention from regulators,²¹ but the promises and regulatory concerns raised by investment robo advisors also apply to their insurance and banking counterparts.²²

¹⁹ See, e.g., Rob Berger, *7 Robo Advisors That Make Investing Effortless*, Forbes (Feb. 5, 2015), <http://www.forbes.com/sites/robertberger/2015/02/05/7-robo-advisors-that-make-investing-effortless/#5d5af7377e48> (discussing several popular robo advisors and their key features); Arielle O’Shea, *Best Robo-Advisors: 2016 Top Picks*, NERDWALLET (March 14, 2016) <https://www.nerdwallet.com/blog/investing/best-robo-advisors/> (defining a robo-advisor and its features).

²⁰ Insurance robo advisors include Healthcare.gov (health insurance) and Coverhound.com (auto and homeowners insurance). While we have not found any true robo advisors in the banking context, Zillow’s mortgage comparison tools and NerdWallet’s credit card comparison tools are a step in that direction.

²¹ See, e.g., *Report on Digital Investment Advice*, FINRA (March 2016), <http://www.finra.org/sites/default/files/digital-investment-advice-report.pdf>; *Policy Statement Robo-Advisors and State Investment Adviser Registration*, MASS. SEC. DIV. (Apr. 1, 2016), <http://www.sec.state.ma.us/sct/sctpdf/Policy-Statement--Robo-Advisors-and-State-Investment-Adviser-Registration.pdf>; Cf. *Digital Investment Advice: Robo Advisors Come of Age*, BLACKROCK (Sept. 2016), <http://www.blackrock.com/corporate/en-lm/literature/whitepaper/viewpoint-digital-investment-advice-september-2016.pdf>.

²² See, e.g., *Processes and Guidelines for Becoming a Web-broker in the Federally-facilitated Marketplace*, CMS (Sept. 30, 2015), <https://www.cms.gov/CCIIO/Programs-and-Initiatives/Health-Insurance-Marketplaces/Downloads/AB-Task-23-Draft-Web-broker-101-Webinar-Slide-Deck-09-30-15.pdf>; *Role of Agents, Brokers, and Web-brokers in Health Insurance Marketplaces*, CMS (Jan. 8, 2016), https://www.cms.gov/CCIIO/Programs-and-Initiatives/Health-Insurance-Marketplaces/Downloads/Role-of-ABs-in-Marketplace-1_6_16.pdf.

Accordingly, we use the term “robo advisor” broadly to refer to any automated service that ranks, or matches consumers to, financial products on a personalized basis.²³ Typically, the firms that provide these tools to consumers also sell the recommended financial products to consumers, but advertising funded “lead generation” services also can provide them. The consumer products that could be the subject of such robo advice include: deposit accounts, home mortgages, and other forms of consumer credit from the banking sector; all of the personal lines of insurance (auto, life, disability, health, homeowners, and annuities); and, from the securities sector, mutual fund shares and other savings products regulated as securities, such as certain kinds of annuities.²⁴

Our definition of “robo advisor” is closely aligned with what the Financial Industry Regulatory Authority (FINRA) calls a “digital investment advisor,” which includes automated investment analysis and recommendation services sold to traditional financial advisors.²⁵ This broader definition includes both “hybrid robos,” which place a human interface on top of what is primarily an automated process, and automated portfolio selection and management tools sold to more traditional financial advisors who provide services that retain even more of a human touch.²⁶ Like FINRA we mean to emphasize the continuities between the new, consumer-facing automated intermediaries and the kinds of automated services that have for some time now been available to traditional intermediaries.²⁷ We expand the term “robo advisor” even further,

²³ Although it is more traditional in the legal literature to refer to mutual fund shares, bank accounts, and insurance policies as financial services, rather than products, people in the industry use the term “product,” and related terms like manufacturer, distributor, retailer, and designer, because those terms allow for more precise description and analysis than the broader and conceptually vague term “financial service.” See, e.g., Ernst & Young, US Fund Distribution 2014: Sea of Change on the Horizon, available at: [http://www.ey.com/Publication/vwLUAssets/ey-the-state-of-us-fund-distribution-in-2014/\\$File/ey-us-fund-distribution-report.pdf](http://www.ey.com/Publication/vwLUAssets/ey-the-state-of-us-fund-distribution-in-2014/$File/ey-us-fund-distribution-report.pdf) at p. 3 (referring to manufacturers, distributors, and retailers of mutual funds).

²⁴ Securities issued by operating companies are not consumer financial products in the sense in which we are using that term. If a financial product intermediary developed and mass marketed a service that created individualized securities portfolios, we would regard those portfolios as the consumer product, not the securities in the portfolios, unless consumer financial product companies started creating securities designed to be included in those portfolios.

²⁵ FINRA, *supra* note 6 (dividing digital investment advice tools into two groups: “financial professional-facing” tools and “client-facing” tools).

²⁶ See, e.g., Francis M. Kinnery, Jr. et al., *Putting A Value on Your Value: Quantifying Vanguard Advisor’s Alpha*, VANGUARD 4, 16 (March 2014), <http://www.vanguard.com/pdf/ISGAA.pdf> (noting the benefits that the Vanguard Advisor’s Alpha framework can provide for traditional financial advisors); Efi Pylarinou, *SigFig Advises Hundreds of Billions and Pivots from B2C to B2B*, BANK INNOVATION (Aug. 17, 2015), <http://bankinnovation.net/2015/08/sigfig-advises-hundreds-of-billions-and-pivots-from-b2c-to-b2b/> (discussing the success of a SigFig tool designed to provide advice for independent brokers).

²⁷ See FINRA, *supra* note xx (describing history of digital investment advice); Barr, Jackson, Thahyer at 471 (automated investment services have been “used for many years by financial professional to develop a customer’s

however, to include comparably automated services in the insurance and banking sectors. We do this to emphasize the technological and regulatory continuities across the financial services industry. Also, the term “robo advisor” too nicely evokes the hype and anxiety of automation to grant a monopoly on that term to the investment sector.

A. Policy justifications and regulatory objectives

In a nutshell, the primary justifications for all forms of consumer financial services regulation are: providing some absolute degree of protection for consumers regarding the safety of their financial products; protecting society from the negative consequences of the failure of financial product providers; and protecting consumers from being exploited due to their relative lack of knowledge about financial products and their dependence on the product providers they select.²⁸ In addition, some financial services regulation aims to ameliorate inequality, for example by limiting the ability of insurance companies to charge prices based on risk or requiring banks to provide services within low income communities, and some financial services regulation aims to further broader political economy goals, such as anti-trust regulation, money laundering regulation, and regulations that discourage financial companies from amassing too much political power.²⁹

The financial services industry and its associated regulatory bodies are traditionally divided into three major sectors: securities, banking, and insurance.³⁰ The relative importance of the policy justifications just described differs across these sectors. For example, banking regulation attempts to make ordinary consumer bank deposits completely safe through a

trading portfolio”); SEC Commissioner Michael S. Piowar, Statement at Financial Technology Forum (Nov. 14, 2016) (available at <https://www.sec.gov/news/statement/piowar-statement-financial-technology-forum-111416.html>) (“FinTech is frequently lauded as a disruptive force that is transforming the financial services industry.”).

²⁸ See Howell Jackson, *Regulation in a Multisectoral Financial Services Industry: An Exploratory Essay*, 77 Wash U. L.Q. 319, 334-36 (1999) (hereinafter Jackson, *Multi-Sectoral*). Note that we have simplified Jackson’s framework in light of our focus on robo advisors. For example, we do not separately identify the objective of protecting consumers from a financial services provider changing its risk profile after purchase.

²⁹ Id. at 337. Cf. Mark Roe, *Foundations of Corporate Finance: The 1906 Pacification of the Insurance Industry*, 93 COLUM. L. REV. 639 (1993). DFS Issues Final Anti-Terrorism Transaction Monitoring and Filtering Program Regulation (June 30, 2016), available at: <http://www.dfs.ny.gov/about/press/pr1606301.htm> (noting that the announcement of the anti-money laundering regulation by the New York State Department of Financial Services).

³⁰ Jackson, *Multi-Sectoral*, supra note xx. Jackson identifies futures trading and pensions as distinct from ordinary securities transactions. E.g., id at 362. We ignore futures trading and defined benefit pensions, and we treat defined contribution pensions as securities transactions with an employment law overlay.

combination of solvency regulation and deposit insurance,³¹ and insurance regulation attempts to make most kinds of consumer insurance almost as completely safe through solvency regulation and guaranty funds.³² By contrast, securities regulators do not attempt to make mutual funds or other securities completely safe. They focus instead on increasing the transparency of securities markets, preventing fraud, and promoting education and research that helps consumers manage investment risk.³³

Financial services regulation addresses many aspects of the financial services industry, including solvency, entity organization and licensing, market conduct, and, in some cases, product approval.³⁴ The aspects of financial services regulation most likely to apply to robo advisors are those directed at consumer product intermediaries.³⁵ These regulations apply directly to the companies that create robo advisors when those companies also function as consumer product intermediaries themselves, and indirectly when they sell their robo advisor services to consumer product intermediaries.³⁶ Within the schema of the policy justifications set out above, the one most relevant to intermediaries is that of protecting consumers from being taken advantage of due to their relative lack of knowledge about financial products. This justification is very important across all three major sectors of the financial services industry.

Intermediaries like securities brokers, mortgage brokers, and insurance agents and brokers all have the potential to help consumers make better sense of the financial services

³¹ Id at 20.

³² Note that in the insurance sector completely safe means only that the insurance company has the financial capacity to pay claims, not that the insurance company will have a perfect record in paying claims.

³³ Jackson *Multi-Sectored*, at 345-46; *Investor Alert: Automated Investment Tools*, SEC & FINRA (May 8, 2015) <https://www.sec.gov/oiea/investor-alerts-bulletins/autolistingtoolshtm.html> (general overview of automated investment tools for investors); Toni Williams, *Empowerment of Whom and for What? Financial Literacy Education and the New Regulation of Consumer Financial Services*, 29 LAW & POL'Y 226, 233 (2007), <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.463.8369&rep=rep1&type=pdf> (noting that national regulators in UK and Canada represent financial education as empowering consumers to manage investment risks).

³⁴ See generally, BARR, JACKSON, TAHYER, *supra* note xx.

³⁵ Note that different strands of academic literature use the term “intermediary” differently. For example, in the financial services literature the term is used to refer to banks, insurance companies, and mutual fund companies. See, e.g., Jackson. By contrast, the insurance and industrial organization literatures use the term to refer to middlemen. See, e.g., Gary Giglaizer, James W. Friedman, *Middlemen as Guarantors of Quality*, 12 Int'l J. of Ind. Org. 509 (1994). We use the term to refer to middlemen and to the retail sales aspects of banks, insurance companies and mutual fund companies. For a survey of regulatory strategies directed at the retail sales and advising function, see Jackson, *Trilateral Dilemma*, *supra* note xx (cataloging circumstances in which consumers rely on financial advisors to recommend products or services and regulatory approaches to addressing the problem of steering based on side payments to the advisors).

³⁶ See, e.g., FINRA, *supra* note 6.

available to them and, accordingly, to ameliorate the information imbalance between consumers and the producers of financial products.³⁷ But there are significant challenges to reaching this potential.³⁸ Consumers are almost as poorly equipped to identify the quality of an intermediary as they are to evaluate the quality of the financial products. For example, because they need the help of the intermediary to evaluate those products, they cannot evaluate the quality of the intermediary by evaluating the quality of the intermediary's recommendations. Moreover, the prevailing commission-based compensation for intermediaries creates significant conflicts of interests that lead to biased advice.³⁹ Finally, the diversity and complexity of financial products makes it difficult to be sufficiently expert to consistently offer good advice, especially across the range of financial services.

Financial services regulation addresses these challenges using three main sets of regulatory tools: licensing and education requirements designed to ensure that an intermediary has at least a minimum level of competence regarding the products that the intermediary is licensed to sell; disclosure requirements and antifraud rules that require intermediaries to be honest with their customers; and standards of conduct, such as the fiduciary standard, designed to encourage intermediaries to match their customers with suitable financial services.⁴⁰ These regulatory tools already apply to robo advisors indirectly, when regulated entities provide robo advice. It is appropriate to consider whether regulators can and should apply any of these tools

³⁷ See, e.g., David Cummins & Neil Doherty, *The Economics of Insurance Intermediaries*, 73 J. RISK & INS. 359, 386 (identifying the role of insurance agents and brokers as information intermediaries in reducing adverse selection); Daniel Schwarcz & Peter Siegelman, *Insurance Agents in the 21st Century: The Problem of Biased Advice*, in RESEARCH HANDBOOK IN THE LAW & ECONOMICS OF INSURANCE 36, [page] (Daniel Schwarcz & Peter Siegelman eds., 2015) (reviewing research on other kinds of intermediaries, such as financial advisors).

³⁸ Jackson, *Trilateral Dilemma*, *supra* note xx.

³⁹ See, e.g., COUNCIL OF ECON. ADVISERS, THE EFFECTS OF CONFLICTED INVESTMENT ADVICE ON RETIREMENT SAVINGS 13, 15-16 (Feb. 2015), https://www.whitehouse.gov/sites/default/files/docs/cea_coi_report_final.pdf (identifying several ways in which conflict of interests affects the quality of advice and the subsequent investment performance); Schwarcz & Siegelman, *supra* note XX (describing the effect of intermediaries' commission-based compensation);

⁴⁰ See Schwarcz & Siegelman, *supra* note 32, at [page] (describing licensing requirements); *Revisions and Clarifications to the Uniform Licensing Standards*, NAIC (Apr. 2011), http://www.naic.org/documents/committees_ex_pltf_producer_licensing_ul_standards_revised.pdf (describing education requirements); Jackson, *Multi-Sectoral*, *supra* note --, at 344-45 (describing disclosure and anti-fraud rules); 349-51 (describing standards of conduct). Note that we simplify Jackson's more detailed list of regulatory strategies set out in *Trilateral Dilemma*, at XX (noting that "generalizations are tricky given the range of legal regimes"). For present purposes we include price controls and prohibitions on certain conduct within the general category of standards of conduct.

directly to the robo advisors themselves, and not just to the currently licensed and regulated entities that use them.

B. Robo advisors: competence, honesty, and suitability

We contend that, at least for mass-market consumer financial products, a well-designed robo advisor will outperform most humans in terms of competence and suitability, while being as honest as the most honest humans. We recognize that, by specifying that the advisor be *well designed*, we are stacking the deck in favor of robo advisors. At this point, our goal is simply to demonstrate why it is plausible that a robo advisor could be well designed. We will do so by working through some examples to lay the groundwork for our subsequent exploration of what is involved in assessing whether a robo advisor in fact is well-designed.

(1) A health insurance robo advisor

Our first example is the one with which we have the most experience: health insurance robo advisors. In this context, competence means the ability to help consumers select a health insurance plan that provides appropriate coverage at a reasonable cost as compared to the other plans that are available, taking into account such relevant considerations as consumers' risk aversion with regard to out of pocket payments and their preferences about qualitative differences among the plans, such as the network of health care providers and the extent of the health plans' involvement in managing care.⁴¹

Honesty is somewhat less straightforward to define in this and other contexts. Honesty includes making only true statements about the health plans, the intermediary's compensation, and the purchase process. In addition, honesty should include accurately describing the basis for any recommendations, making any disclosures that might be needed to correct a misimpression that the advisor is considering all of the plans in the market if the advisor is not doing so,

⁴¹ See, e.g., Aon Retiree Health Exchange, available at: <https://retiree.aon.com/>. For recent evidence that consumers need this kind of advice even to pick among a small set of options, see Lowenstein [forwarded to Jonah]. If the company that creates the robo advisor also functions as an insurance broker, the company will also need to be competent at brokers' other functions, such as making sure that the insurance policy is issued in a timely manner and that consumers' ongoing customer service needs are met. These latter functions are obviously very important to consumers, but they are not part of the "robo advice" we are exploring in this essay, nor do they lie at the core of the comparative advantage of health insurance robo advisors. Accordingly, we will set them aside for present purposes.

disclosing any compensation or other arrangements that might have the potential to bias the advice adverse to the consumer's interests, and providing advice that is not in fact biased in that manner.

A well-designed health insurance robo advisor should provide advice that is superior to humans working without automated assistance in terms of both competence and honesty. A human advisor can at best offer rules of thumb based on the choice patterns that the advisor has observed or learned about. For example, an experienced broker could offer advice such as the following: when choosing among the four plans typically offered at a major U.S. university, the expensive, low-deductible, broad-network plan is the one preferred by the professors and the doctors at the university hospital; and the cheaper HMO plan is preferred by the staff and the healthy young assistant professors. Even when such rules of thumb are right on average, however, they will provide the wrong guidance for some people,⁴² and they are quite unlikely to be helpful when the choice set expands beyond a small number of options.⁴³

Health insurance robo advisors can offer richer, more personalized advice. With access to the right data and the ability to ask a few questions of the consumer, they can develop reliable predictions of the likely range of costs under all of the available plans; they can create personalized rankings that use survey data, expert assessments and other techniques to take into account both price and non-price features of the plans; they can customize these rankings based on the risk aversion and other expressed preferences of individual consumers; and they can do all of this instantaneously with choice sets of any size.⁴⁴

⁴² In our university example, there will be some senior faculty who would be well served by a high deductible plan with an HSA or an HMO, and who would appreciate having a few thousand more dollars each year to spend on other things and there also are likely to be some staff and healthy junior faculty whose preferences for freedom to choose doctors and distaste for both deductibles and HMOs are sufficient to justify paying the higher price for the low deductible, broad network plan. See Pavel D. Atanasov & Tom Baker, *Putting Health Back into Health Insurance Choice*, 71 MED. CARE RES. & REV. 337 (2014),

⁴³ BARRY SCHWARTZ, *THE PARADOX OF CHOICE: WHY MORE IS LESS 2* (2004) (“[A]s the number of choices keeps growing, negative aspects of having a multitude of options begin to appear. As the number of choices grows further, the negatives escalate until we become overloaded.”)

⁴⁴ See Ben Handel & Jonathan Kolstad, *Getting the Most from Marketplaces: Smart Policies on Health Insurance Choice*, THE HAMILTON PROJECT (Oct. 2015) 12, http://www.hamiltonproject.org/assets/files/smart_policies_on_health_insurance_choice_final_proposal.pdf.

In terms of honesty, a robo advisor will always provide the advice that it is programmed to provide, and it can be programmed in a way that meets a demanding standard of honesty: making only true statements, disclosing the methods for providing the advice, and providing advice that takes into account only factors that are consistent with the consumer's interests (insofar as it is possible to know those interests). Indeed, this more demanding honesty standard should be considered an aspect of what it means to be well-designed. While human advisors of course can endeavor to meet this same standard of honesty, common sense and psychological research both make it hard to imagine people always meeting that standard when they are rewarded in ways that are not fully aligned with consumer interests.⁴⁵

Finally, the assessment of the competence of a robo advisor and the suitability of the products it recommends go hand in hand. By definition, a competent robo advisor will only recommend suitable products. Indeed, using difficult test cases to evaluate whether a robo advisor consistently recommends suitable products is one of the ways to evaluate whether the robo advisor is well-designed. Humans are different: even competent humans make mistakes; and even competent humans can be biased or dishonest.⁴⁶ Indeed, it is for this reason that financial services regulators developed suitability and other conduct standards that permit an after-the-fact assessment of whether intermediaries gave good advice.⁴⁷

(2) A home mortgage robo advisor

Our second example is a home mortgage robo advisor.⁴⁸ In this context, competence means the ability to help consumers select the right kind of mortgage, at the best rate available.

⁴⁵ See, e.g., [JDM literature on Cognitive dissonance, motivated reasoning.]

⁴⁶ On competent humans making mistakes, see, e.g., COMMITTEE ON QUALITY OF HEALTH CARE IN AMERICA, INSTITUTE OF MEDICINE, *TO ERR IS HUMAN: BUILDING A SAFER HEALTH SYSTEM* (Linda T. Krohn et al. eds., 2000) (documenting the extent of medical malpractice and attempting to de-politicize that issue by emphasizing that humans in all walks of life make mistakes). On competent humans being biased, see, e.g., Sendhil Mullainathan et al., *The Market for Financial Advice: An Audit Study*, (NAT'L BUREAU ECON. RES., Working Paper No. 17929, 2012) (noting that financial advisers tend not to de-bias their clients and instead often reinforce biases that are in their interests). On competent humans being dishonest, see e.g., Mazar, Nina, On Amir, and Dan Ariely. *The dishonesty of honest people: A theory of self-concept maintenance*. 45 *Journal of marketing research* 633 (2008).

⁴⁷ Robert H. Mundheim, *Professional Responsibilities of Broker-Dealers: The Suitability Doctrine*, 1965 *Duke. L. J.* 445, 44X (1965) (noting that the suitability standard developed because educational, credentialing, and disclosure requirements were not adequate by themselves).

⁴⁸ We have been unable to find any mortgage robo advisors. The closest service we have found is Zillow's mortgage rate comparison feature, which is an advertising and lead generation tool that does not attempt to match the mortgage types to the consumer's needs. See: <https://www.zillow.com/mortgage-rates/>

Doing this competently requires taking into account the relevant details of the consumers' financial situation (such as likely size and variability of household income over time, and amount and timing of other household financial obligations), risk factors associated with the kind of mortgage in question, the likely length of time before sale of the home, the consumer's credit rating, and other factors that people with more domain expertise than we can identify. As with health insurance, helping consumers choose the best mortgage is a complicated matching problem that a well-designed algorithm could execute on a more personalized, consistently accurate basis than even a competent, honest, and unbiased human.⁴⁹ Also as with health insurance, the assessment of competence and suitability go hand in hand, as a competent mortgage robo advisor will only recommend suitable mortgages.⁵⁰

In the mortgage context, honesty includes making only true statements about mortgages rates and features, the intermediary's compensation, and anything else that is relevant to the mortgage search, application, and closing process. It should also include accurately describing the basis for any recommendations, disclosing the risks associated with taking out mortgages in amounts or types that will be difficult for the consumer to afford, making any common sense disclosures that might be needed to correct a misimpression that the advisor is considering all of the plans in the market if the advisor is not doing so, disclosing the existence of any compensation or other arrangements that have the potential to bias the advice in a way that is not consistent with the consumer's interests, and providing advice that is not in fact biased in that

⁴⁹ Cf., Laurie Burlingame and Howell E. Jackson, *Kickbacks or Compensation: The Case of Yield Spread Premiums*, 12 Stan. J. L., Bus. & Fin. 289 (2007) (demonstrating that when human mortgage brokers are compensated through yield spread premiums they steer consumers to mortgages with higher interest rates than optimal for consumers). A mortgage robo advisor could be programmed to prevent this kind of mismatching.

⁵⁰ If the company that creates the robo advisor also functions as a mortgage broker, it would need to be competent at making sure that the mortgage is issued in a timely manner. The full automation of that task is much more difficult – but also potentially much more valuable – than fully automating the sale of insurance primarily because of the greater risk inherent in issuing a mortgage. An insurance policy only obligates the insurer to pay costs in the future, providing insurers the opportunity to police fraud in the sales process after the fact. By contrast, a mortgage company gives the consumer the money up front in return for the consumer's promise to repay the money in the future. Automating that process would be valuable, and potentially part of the comparative advantage of the kind of company that would create a home mortgage robo advisor. Nevertheless, we will not address it further, except to make two quick observations. First, because a mortgage issuer gives the consumer the money up front, mortgage issuers will not agree to issue mortgages on an automated basis at scale without verifying the competence of that automation. Thus, the potential need for regulatory oversight of this aspect of automation is less acute than that of the product matching function. Second the immediate beneficiaries of fully automated mortgage sales platforms are likely to be consumers with stable relationships with banks, credit cards, employers and other large institutions. Thus, full automation has the potential to raise concerns about the inequality reproducing aspects of the financial services industry.

manner. As with health insurance, a robo advisor can be programmed to meet this demanding standard of honesty, and doing so should be considered an aspect of what it means to be well-designed.

(3) An investment robo advisor

We consider investment robo advisors last, despite the fact that arguably they are the most fully developed of the financial services robo advisors currently in the market.⁵¹ We leave them for last because it is most obvious to us that the human advisors they are assisting or replacing need to be competent at many things other than simply matching consumers to products. By contrast, matching consumers to the relevant financial products is the core function of insurance and mortgage brokers. Thus, as consumers come to trust the speed and reliability of robo advisors' ranking and matching algorithms and the "always on" nature of automated services, and as the logistical difficulties of automating the mortgage underwriting process are overcome, it is easy to imagine automated systems, supplemented perhaps by call centers, gradually replacing many of the human insurance and mortgage brokers in the consumer market, as has already happened to travel agents.⁵²

By contrast, matching consumers to financial products is just part of what a financial advisor can do for clients. A financial advisor can help people decide how much and how best to save, and, when the time comes, how much can safely be spent from those savings. Financial advisors can help clients create plans; they can set up structures and processes for implementing and sticking to plans; they can counsel clients who do not stick to the plans; and they can help clients adjust plans when circumstances change. These are in addition to the more readily automated tasks such as helping consumers decide how much they should be saving for retirement in light of relevant considerations regarding their financial situation, providing good advice about how and when to change or rebalance their investments over time, and providing

⁵¹ For examples of investment robo advisors see the sources listed in note 4, *supra*.

⁵² We distinguish between forms of insurance that, because of legal or contractual requirements, are not optional for consumers (e.g. auto and homeowners) and forms of insurance that are optional (e.g., life and disability insurance). For the latter forms of insurance, persuading people to buy them is also a core function, one that we expect will increasingly be the province of general purpose financial advisors and subject to automation through that channel.

projections to guide the retirement and decumulation process, once again in light of relevant considerations regarding clients' financial situation over time.

The fact that so many people who call themselves financial advisors focus their efforts on selling financial products that generate commissions and fees, rather than on planning and coaching, helps explain why regulators and others have focused on the incentives that can distort the matching function of financial advisors.⁵³ Yet planning and coaching can be more important than matching customers to products. For example, a financial advisor who exclusively recommends financial products that spin off high fees and commissions, but is good at getting her clients to adopt routines that allow them to live within their means and save and, consequently, to feel financially secure, may be helping her clients more than the financial advisor who scrupulously recommends optimal investments but is hopeless at helping clients to save and live within their means.

As existing investment robo advisors demonstrate, the product matching function can easily be automated for investors who are prepared to adopt the passive investing strategy recommended by disinterested finance researchers,⁵⁴ as can some other aspects of investing, such as rebalancing.⁵⁵ Relationship management and other, more difficult to model aspects of the work of financial advisors are harder to automate. Accordingly, the robo advisors with the largest and fastest growing market shares sell their services through or to human financial advisors.⁵⁶ For example, the two largest sellers of passive investment funds in the U.S. – Vanguard and BlackRock – both now offer “hybrid robo” services that place a human relationship layer on top of a highly automated process, for which consumers pay a management

⁵³ COUNCIL OF ECON. ADVISERS, *supra* note XX.

⁵⁴ See, e.g., BURTON G. MALKIEL, *A RANDOM WALK DOWN WALL STREET: THE TIME-TESTED STRATEGY FOR SUCCESSFUL INVESTING* [page] (9th ed. 2007) ().

⁵⁵ Passive investing refers to investing in funds that attempt simply to match the performance of the class of securities to which the fund is indexed. Robo advisors typically employ algorithms to match consumers to a mix of exchange traded (index) funds based on the consumers' age, risk tolerance, and time horizon, among other factors. Rebalancing is the process of periodically adjusting the mix of investments so that differences in the relative performance of the investments do not lead the investor's portfolio to shift away from the preferred mix. For a description of what it would mean for an investment robo advisor to be well designed, see FINRA, *supra* note xx.

⁵⁶ Margaret Collins & Charles Stein, *The Vanguard Cyborg Takeover*, BLOOMBERG (March 24, 2016), <http://www.bloomberg.com/news/articles/2016-03-24/the-vanguard-cyborg-takeover> (noting that the Vanguard Group's hybrid robo-advisor has surpassed standalone robo-advisors); *Vanguard and Schwab Hybrids Trump Pure Robos in Assets*, FINANCIAL ADVISOR (Mar. 29, 2012), <https://financialadvisoriq.com/c/1323523/147603> (discussing the success of Vanguard Group's and Schwab's hybrid models over the standalone robo-advisors).

fee that is somewhat higher than the fee for the fully automated robo advisors, but much less than half of the fee of traditional financial advisors.⁵⁷ As robo advisors gradually replace the product matching function and other functions that are easily automated, it is possible that in the retail consumer market, financial advisors will largely replace stock brokers and that financial advisors increasingly will compete on the basis of their ability to do more of the planning and coaching aspects of their job.⁵⁸ We would applaud such a result, and we are sufficiently confident that it will take place that we have begun advising undergraduates who express an interest in helping professions such as nursing and social work to also consider careers in financial planning.

As in the health insurance context, there are different potential standards of honesty. At a minimum, honesty means making only true statements about the products, the advisor's compensation, and anything else that is relevant to the products, the advice, and the purchase process. Once again, we think that honesty should also include accurately describing the basis for any recommendations, making any common sense disclosures that might be needed to correct a misimpression that the advisor is considering all of the products in the market if the advisor is not doing so, disclosing the existence of any compensation or other arrangements that might have the potential to bias the advice in a way that is not consistent with consumer's interests, and providing advice that is not in fact biased in that manner.

II. Robo Advisors: New Regulatory Challenges

The discussion so far suggests that a *well-designed* robo advisor will be competent and honest, and it will recommend to a consumer only financial products that are suitable for that consumer. Of course, as we've emphasized, by specifying that the robo advisors will be "well

⁵⁷ Clint Boulton, *Roboadvisors Stand at the Vanguard of Human-Machine Collaboration*, CIO (March 25, 2016), <http://www.cio.com/article/3048318/vertical-industries/roboadvisors-stand-at-the-vanguard-of-human-machine-collaboration.html> (Vanguard Group's hybrid services); *With Future Advisor, BlackRock Seeks to Compete With Schwab, Vanguard*, THINKADVISOR (June 14, 2016), <http://www.thinkadvisor.com/2016/06/14/with-futureadvisor-blackrock-seeks-to-compete-with> (noting that BlackRock acquired FutureAdvisor to develop its hybrid services).

⁵⁸ Dubofsky, David, and Lyle Sussman. *The changing role of the financial planner part 1: From financial analytics to coaching and life planning*, 22 *Journal of Financial Planning* 48 (2009). See Remarks of Bo Lu, founder of BlackRock Investor Advisor at the SEC FinTech Forum 2016 at 12 ("digital allows you to scale the service model of the existing financial advisory ecosystem by taking some of the workload off of financial advisors so they can focus on the unique differentiation and unique value added in terms of coaching, relationship building with their clients") (available at: <https://www.sec.gov/spotlight/fintech/transcript-111416.pdf>)

designed,” we have stacked the deck in their favor. This is not because we believe that robo advisors necessarily will be well designed. Indeed, we believe the contrary.⁵⁹

While robo advisors have the potential to outperform humans in matching consumers to mass market financial products, they are not inherently immune from the misalignment of incentives that has historically affected financial product intermediaries.⁶⁰ A robo advisor can be designed to ignore those incentives, but most robo advisors are developed or purchased by consumer financial product intermediaries who are subject to those incentives. It would be naïve to simply assume that intermediaries will always choose the algorithms and choice architecture that are best for consumers, rather than those that are best for the intermediaries.

In our view this means that regulators should take a more active role in assessing robo advisors, increasingly so as robo advisors grow in scale. Indeed, the same returns to scale that make a robo advisor so cost-effective lead to similar returns to scale in assessing the quality of a robo advisor. An expert administrative agency is well situated to realize those returns to scale. Moreover, the potential solvency and systemic risks posed by hundreds of thousands, or even millions, of consumers choosing their financial products based on the same or similar models are sufficiently large and different in kind from those traditionally posed by consumer financial product intermediaries that some regulatory attention is justified on those grounds alone.⁶¹

The smart thing for regulators to do is to start developing the necessary capacities now, when the stakes are smaller, and when consumers are still sufficiently uncertain about robo advisors that some firms may actually welcome the legitimation that could accompany

⁵⁹ For example, our research and that of our collaborator Eric Johnson demonstrate how simple choice architecture techniques can be used to mislead consumers, especially when combined with a biased or inaccurate ranking algorithm. See Dellaert, Baker, Johnson, Sorted Partitioned Sets as Personalized Choice Architecture, [under review at Journal of Marketing Research] (presenting results of experiment in which changing the order of the presentation of plans changed consumer choices). Peter A. Ubel, David A. Comerford, and Eric J. Johnson, *Healthcare.gov 3.0 – Behavioral Economics and Insurance Exchanges*, 372 New Eng. J. Med. 695 (2015) (presenting a results of an experiment in which switching the metals assigned to plans changed consumer choices). See also Harris Meyer, *Copycat Enrollment Websites Hamper ACA Sign-up Efforts*, MODERN HEALTHCARE (Oct. 25, 2016), <http://www.modernhealthcare.com/article/20161025/NEWS/161029946/copycat-enrollment-websites-hamper-aca-sign-up-efforts>.

⁶⁰ See, e.g. *id.*; Schwarcz & Siegelman, *supra* note XX; Fligstein & Roehrkasse, *supra* note XX.

⁶¹ See part xxx, *infra*.

independent certification of the quality of robo advice.⁶² Indeed, we predict that at least some powerful actors in the financial services sector will decide to support such regulatory initiatives in order to be in a position to shape them in a manner that they believe is sensible, as the largest asset management company in the U.S. has already signaled that it is prepared to do.⁶³

Toward that same end we offer two sets of conceptually framing ideas. First, based on our investigation of existing robo advisors across the three main sectors of the financial services industry, we have identified four core components of robo advisors that require distinct capacities to assess: (1) the ranking or matching algorithms and related processes, (2) the customer and financial product data to which the algorithms or other matching processes are applied, (3) the choice architecture through which the advice is delivered, and (4) the information technology infrastructure. Second, because there is so little research and analysis available to guide the regulation of robo advisors today and because the need for and corresponding returns to regulatory oversight will increase as the scale of robo advice increases, we propose a regulatory *trajectory*, rather than a regulatory agenda, that starts by building the necessary human capital and only then will move to setting an agenda.

A. Components of Robo Advisors that Pose Regulatory Challenges

In discussing these core components of robo advisors, our goal is to provide a basic introduction and some examples of the issues that can arise in assessing competence, honesty and suitability. To make these assessments, regulatory agencies will need to develop the appropriate, domain-specific scientific and engineering expertise to go beyond our generalizations. Until they do so, robo advisors will be “regulated” only by their contracting partners and through the application of more general legal requirements such as those governing privacy, data security, and unfair and deceptive trade practices.⁶⁴ While those existing safeguards and requirements provide some protection for consumers, they are unlikely to be enough once robo advisors reach mass market scale. Even if market forces and existing

⁶² See SEC Commissioner Stein, *supra* note xx (“Clearly, if we want our markets to remain at the top, we need to embrace innovation. And FinTech clearly promises some exciting advances. But, we also need to be prepared to anticipate and ideally prevent problems before they arise. Remaining competitive requires both market participants and regulators to thoughtfully evolve with innovation, not react to it way after the fact.”).

⁶³ See, BLACKROCK, *supra* note XX.

⁶⁴ Cite to HIPAA privacy provisions; a data security requirement, and the UDTPA.

safeguards somehow manage to ensure that robo advisors are honest and competent from the perspective of individual consumers, they cannot address the problems of scale. As we discuss in greater detail below, the problems of scale are classic collective action problems, in which the combination of individually rational actions produces a collectively irrational result.⁶⁵

1. Ranking or matching algorithms and processes.

An algorithm is a formula, or formal statement of rules, that guides a process.⁶⁶ For robo advisors the key algorithms are those that rank the financial products for eventual selection by consumers or, if the robo advisor makes the selection, the algorithm that matches consumers with products. Each algorithm is embodied in software code that is based on a model of how to optimize the fit between the attributes of the financial products under consideration and the attributes of the consumers who are using the robo advisor.

Traditionally, analysts and developers that create matching and ranking algorithms have an explicit, articulable model, based on ideas about which kinds of product attributes are desirable to people with which kinds of attributes. For example, an investment robo advisor might be programmed to recommend that the mix of bond and stock funds in a consumer's retirement savings portfolio gradually shift over time so that the portfolio becomes more heavily weighted with bond funds as the consumer ages. A mortgage robo advisor might be programmed so that the ranking of the mortgages presented to a consumer is negatively correlated with the estimated risk of default for the type of mortgage. And a health insurance robo advisor might be programmed so that the ranking of health plans is a function of the total cost of the health plans (including expected out of pocket costs) for the individual consumer or a function of a set of cost and quality factors.⁶⁷

⁶⁵ Garret Hardin, *The Tragedy of the Commons*, 162 *Science* 1243–1248 (1968).

⁶⁶ See Kroll et al, *supra* note 2. See also Mike Ananny, *Toward an Ethics of Algorithms: Convening, Observation, Probability and Timeliness*, 41 *Science, Tech & Hum. Values* 93, 97 (2015) (“Computer science defines an algorithm as a ‘description of the method by which a task is to be performed’”).

⁶⁷ See, e.g., Dellaert, Baker & Johnson (under review) (reporting how consumer selections changed when a leading private health insurance exchange shifted from a pure cost-based ranking to a cost/quality based ranking); Wong et al (reporting on variations in total cost calculators among different health insurance exchanges). For an example of a sophisticated health insurance robo advisor that considers both cost and quality in the U.S. context, see the Aon Retirement Exchange, which is powered by Picwell.

Our sense is that most or all of the robo advisors presently in operation primarily use algorithms of this sort, meaning that they are designed according to a logic that can be explained and interrogated (in contrast to machine learning algorithms, which raise additional complications addressed in the margin).⁶⁸ To assess the competence of these algorithms, some of the information that regulators could require from the consumer product intermediaries include:

- explanations of the models and the data upon which the models are based,
- with regard to the data upon which the models are based, evidence regarding the appropriateness of that data for the purpose (including the kinds of data-related problems described in relation to customer and product data below),
- explanations of the outcomes that the algorithms are seeking,
- evidence that the algorithms in fact perform in the way that they are designed (for example by requiring the robo advisor to respond to difficult test cases),
- evidence of how the creators of the robo advisor are measuring whether the algorithm is succeeding and what they are doing in response,
- explanations of what other alternatives the robo advisor creators considered and rejected, and
- other kinds of evidence and explanations that people with more specific domain knowledge can suggest.⁶⁹

Of course, gathering all this information is just a start. Then the regulator needs to exercise good judgment based on this evidence, informed by domain-specific expertise.

⁶⁸ In many other areas, and even for some aspects of some robo advisors today, software developers use “machine learning” algorithms, which are quite different. Machine learning algorithms are created by software programs that search for patterns in “big data.” Algorithms created by machine learning programs identify predictive, not causal, relationships between variables, and they are often not intelligible to humans, including their creators. Thus they present a greater challenge to transparency than the kinds of algorithms we describe in the main text. See generally Cary Coglianese & David Lehr, *Regulating by Robot: Administrative Decision-Making in the Machine-Learning Era*, GEO. L. J. (forthcoming 2016) (exploring whether administrative law restricts government agencies from using machine learning algorithms). For an example of a health insurance robo advisor using machine learning techniques to build a component of the model, see Picwell, *How We Do What We Do* (explaining that Picwell uses health insurance claims data and machine learning techniques to identify the “people like me” aspect of the Picwell cost prediction algorithm).

⁶⁹ See, e.g., FINRA, *supra* note 6. We have been unable to find any examples of banking or insurance regulators producing similar reports or guidance.

To assess the honesty of the algorithms, regulators will need to review for accuracy the descriptions of the algorithms provided to consumers as compared to the information about the algorithms provided to the regulators (including the output of the algorithms when run through test cases); and they will need demonstrations that the algorithms do not take into account – directly or indirectly – factors that would bias the outcomes in a way that is harmful for consumers. For example, it would be improper for a matching algorithm to take into account either the size of the commission paid to the financial product intermediary or a proxy for that commission. Indeed, the fact that it is possible to prevent algorithms from taking such factors into account represents a significant improvement over a human-based system, as it has been notoriously difficult to police the practice of steering clients and customers to the products that provide the best benefits to the intermediaries, not to the customers.⁷⁰

In the securities context, the 2016 FINRA report on digital investment advice provides more detailed, domain specific descriptions of “effective practices” for FINRA-registered firms to use to assess the algorithms in investment robo advisors.⁷¹ These practices could provide the basis for the development of disclosure requirements, and it is likely that parties who believe that they have been injured by robo advisors will attempt to use these practices as standards of conduct in the litigation context. This is the kind of early effort that would be appropriate for the National Association of Insurance Commissioners, or one of the active state insurance departments, to take in the context of the emerging insurance web brokers that employ simple recommendation tools and that Consumer Financial Protection Bureau should consider taking in the context of the emerging on line tools for comparing mortgages and credit cards.

2. Customer and product data.

A high-quality ranking or matching algorithm will guide consumers to high-quality decisions only in combination with adequate data of two types: (1) the relevant attributes of the

⁷⁰ In our experience studying and working in and around the financial services industry for decades, we have yet to meet anyone in the industry who believes that human consumer product intermediaries compensated on commission are consistently able to resist steering their customers to products that pay higher commissions. For research on this topic see, Schwarcz & Siegelman, *supra* note XX; Mullainathan et al., *supra* note XX. Cf., COUNCIL OF ECON. ADVISERS, *supra* note XX.

⁷¹ See FINRA, *supra* note 6 at 3-6. It is interesting to observe the degree of variation in the investment algorithms employed by the (anonymous) firms that FINRA used as the basis for the report.

products in the set under consideration, which set must include an adequate representation of the variety of potentially suitable products available in the market in order to provide meaningful choice, and (2) the relevant attributes of the consumers for whom the algorithm is ranking or matching the products. There are two distinct categories of problems related to both of these data types: access and quality.

Data Access. With the notable exception of publicly traded securities⁷² and some types of health insurance,⁷³ there are no public repositories of the kind of detailed financial product attribute data that a robo advisor needs in order to function. Absent robustly enforced legal requirements obligating product suppliers to provide such data to public repositories, robo advisors' only source of financial product data is from the product suppliers (or their agents). These suppliers may be reluctant to provide these data for any number of reasons. A supplier may not maintain electronic records of their products that include all of the attributes employed in the robo advisors' algorithms; the supplier may update the price or other attributes of its products more frequently and dynamically than the robo advisor is able to accommodate; a supplier may believe that its product data records contain valuable proprietary pricing or underwriting information that cannot be trusted with the robo advisor; a supplier may believe that its products will not show well in comparison to other products; or a supplier may not wish to sell their products through the channels served by the robo advisor. Undoubtedly there are other good business reasons why a supplier would be reluctant to provide data. Even if suppliers are obligated to provide some information about their products to regulators, the data may not be adequate for robo advisors because of problems such as: the regulator may not make the data publicly available, the data may not be in machine readable form, the data may not include all of the relevant product attributes, or the data may not be publicly released in time for the robo advisor to use it.

⁷² The easy access to comprehensive, public securities data may be the reason that investment robo advisors are more developed than others robo. It is interesting to note that the FINRA report does not mention access to product data, perhaps because of the assumption that member firms already have access to all of the relevant securities data. With regard to customer data, FINRA emphasizes only that for at least some kinds of investment advice it is important to obtain a full description of the customer's portfolio. See FINRA, *supra* note 6 at 11.

⁷³ THE CTR. FOR CONSUMER INFO. & INS. OVERSIGHT, Health Insurance Marketplace Public Use Files (Marketplace PUFs) (available at: <https://www.cms.gov/cciiio/resources/data-resources/marketplace-puf.html>).

Customer data can of course be collected directly from customers as part of providing the robo advice to consumers. But that can be burdensome for the customers, and they may not in fact possess, or have easy access to, the data that the robo advisor needs (e.g. medical utilization records needed for a health insurance robo advisor, detailed income or expense records needed for a mortgage robo advisor, and detailed asset/investment records needed for an investment robo advisor). Thus, the more efficient and accurate approach in many cases would be to collect consumer data from third parties,⁷⁴ but those third parties may not maintain the information in a format that is accessible or they may not be willing to provide the information, whether because of concerns about fraud, legal constraints on providing the data, or other reasons.⁷⁵

With regard to access to data, regulators should be asking three kinds of questions. First, has the robo advisor obtained access to reasonable sources of data, and are there any concerns that inability to obtain data, particularly regarding products, will bias the rankings and matching in a way that disadvantages consumers in relation to intermediaries and sellers? Second, where there are gaps in data, what are the strategies that the robo advisor considered to address those gaps, why did the robo advisor choose the strategy(ies) that it employed, and was that choice reasonable? Third, does the regulator have the authority, whether formal or informal, to increase access to data and thereby improve the quality of the robo advice?⁷⁶

Data quality. Even assuming the data are available, there will be significant problems regarding the completeness and accuracy of the data, particularly in the early stages of the development of robo advisors.⁷⁷ In our interactions in and around the financial services field, we have found that there is an inverse relationship between people's experience working with data

⁷⁴ PWC, Third Party Vendor Risk Management, 8 (2015), <https://www.pwc.com/us/en/financial-services/publications/viewpoints/assets/pwc-third-party-vendor-risk-management.pdf> (showing that 57% of survey respondents have an accurate inventory of all third parties that handle sensitive firm, employee, and customer data).

⁷⁵ FFIEC, *IT Examination Handbook, Vendor and Third-party Management*, available at: <http://ithandbook.ffiec.gov/it-booklets/retail-payment-systems/retail-payment-systems-risk-management/operational-risk/vendor-and-third-party-management.aspx> (providing guidelines for third-party data risk management); PWC, *supra* note xx, 1 (noting that third parties have created problems for financial services institutions by mishandling consumer data).

⁷⁶ The CFPB's recent focus on encouraging banks to provide access to personal financial management software services is encouraging, as those services are likely to be an important provide of robo advice. See CFPB, Request for Information Regarding Consumer Access to Financial Records, 81 Fed. Reg. 83806 (November 22, 2016).

⁷⁷ See, e.g., *Policy Statement Robo-Advisers and State Investment Adviser Registration*, MASS. SEC. DIV. (Apr. 1, 2016), <http://www.sec.state.ma.us/sct/sctpdf/Policy-Statement--Robo-Advisers-and-State-Investment-Adviser-Registration.pdf> (noting that one of the problem of robo-advisor is data inaccuracy).

and their expectations regarding the completeness and accuracy of data. People who work with data always expect to find problems with data; people who do not work with data tend to overestimate the completeness and accuracy of data. To the extent that regulators lack experience, they may be over-trusting of assurances from robo advisors, and less demanding of evidence that the robo advisors have adequately tested the accuracy and completeness of the data and that they have developed reasonable strategies to deal with missing or obviously incorrect data. Thus, regulators need to develop the capacity to ask hard, domain-specific questions about data quality and to evaluate the responses.

3. Choice architecture.

Robo advisors typically use automated processes to communicate their advice, whether directly to consumers in the case of a consumer facing robo advisor or to a human intermediary in the case of more traditional automated tools. In the case of a consumer facing robo advisor there may also be the option, or even a requirement, of closing the sale with human assistance, through a call center or a chat function. In all these cases the robo advice is embodied in a ranked set of alternatives and information about those alternatives. Behavioral science research demonstrates the very large effects that choice architecture – the organization of the context in which people make decisions – can have on decisions.⁷⁸ For example, the order in which options are presented, the number of options that are presented, the attributes of the options that are presented (and in which order), the framing of options (e.g., gain versus loss), all have major impacts.⁷⁹ This means that the way that robo advice is presented can have a profound effect on whether and how consumers use that advice.⁸⁰ Thus, as in the case of ranking or matching algorithms, there may be a role for regulators in assessing the competence and honesty of the choice architecture and the suitability of the products that it favors.

⁷⁸ Thaler and Sunstein coined the term “choice architecture” in *Nudge* (date). The literature is vast and growing. For a recent review see, Eric J. Johnson, Suzanne B. Shu, Benedict G.C. Dellaert, Craig Fox, Daniel P. Goldstein, Gerald Haubl, Richard P. Larrick, John W. Payne, Ellen Peters, David Schkade, Brian Wansink, Elke U. Weber, *Beyond Nudges: Tools of a Choice Architecture*, 23 *Marketing Letters* 487 (2012).

⁷⁹ *Id.* at Table 1.

⁸⁰ See, e.g. Johnson et al, *supra* note xx (demonstrating that pre-checking the best value plan and providing a simple demonstration of how the best value plan was selected substantially increased the percentage of consumers that choice the best value plan as compared to simply showing the consumers the value of the plans).

As Richard Thaler is fond of saying, salesmen have always intuitively understood the power of choice architecture.⁸¹ What we gain from systematic research on choice architecture is a vocabulary and set of assessment tools. The challenge for financial services regulators is to gather and extend the domain specific research that is relevant for their purposes. The goal should be developing the capacity to evaluate whether robo advisors' choice architecture is appropriate and does not undermine the quality of the ranking or matching algorithms. Incompetent choice architecture may lead consumers away from the best ranked products, or it may prevent them from buying altogether, for example by presenting the products in an overly complex fashion. Regulators should also be looking out for choice architectures techniques that steer consumers in a manner that benefits the intermediary notwithstanding a neutral, merits-based ranking or matching algorithm.

There is too much learning from the choice architecture research, so much of which depends on context, to meaningfully summarize it here. What we can do is to note that behavioral scientists are developing ideas about best practices that will be useful both to robo advisors and to the regulators who are learning how to assess robo advisors.⁸² For example, robo advisors could assist consumers by making it easy to access their personally highest ranked products in the market – even if those products are not the most profitable for the intermediary to sell or they could update consumers on a yearly basis if it would be beneficial for them to switch to a more fitting product. Robo advisors can also design ranked sets of products in a format that facilitates easy decision making and comparison by consumers and provide assistance in making a decision.⁸³ Finally, rigorous experimental testing is an important best practice that also provides a record that could be made available for regulators to review in order to assess whether the robo advisors have engaged in a meaningful and empirically informed choice architecture effort.

⁸¹ See Richard Thaler, *The Behavioral Economics of Swindling and Selling: A Lecture in Honor of Arthur Leff*, 2010 Yale Law School Raben Lecture. Available at: <https://www.law.yale.edu/yls-today/news/chicago-prof-richard-thaler-discusses-behavioral-economics-swindling-and-selling-raben-lecture>

⁸² See, e.g. Implementation Guidance Regarding Executive Order 13707 (September 15, 2016) (providing best practices guidance for agencies seeking to apply behavioral science insights to federal programs).

⁸³ *Id.* at p. 2, 6.

Experimental testing (and verification that the testing occurred and that the choice architecture that is best for consumers was implemented) is easiest to do when the choice environment is fully automated.⁸⁴ To our knowledge there has not yet been research on “hybrid robo” environments, such as (a) a consumer financial product intermediary that uses robo advisors behind the scenes and humans to interact with customers, or (b) a web-based intermediary that encourages or requires customers to make a phone call or use the chat function to ask questions and close the deal. Our intuition is that the human/machine handoff provides significant opportunities to take advantage of consumers, for example through a “bait and switch” in which the offers additional options or points out features that were not emphasized in the robo advice. To evaluate these risks, regulators could require the intermediary to track the robo advice that was provided in each case and the products that the consumer purchased so that the regulator could evaluate whether there are any systematic patterns to the cases in which the consumers didn’t follow the robo advice and, if so, require the intermediary to explain those patterns and, possibly, demonstrate that the patterns are in the consumers’ best interests. The intermediary should already be collecting and analyzing that information for its own purposes. Thus, requiring that information should not impose an unreasonable burden.

Of note, the 2016 FINRA report that is so noteworthy in relation to the identification of effective practices regarding algorithms and, to a lesser extent, customer data, is silent on the topic of choice architecture.⁸⁵ Especially because of the consumer exploitation risks in the machine/human interface, that is an unfortunate missing dimension in an otherwise forward-thinking report.

4. Information technology infrastructure.

Assessing the security and stability of information technology architecture is an increasingly important aspect of financial services regulation that extends well beyond robo advisors.⁸⁶ Financial services regulators already appear to recognize the need to enhance their

⁸⁴ Hauser, John R., Glen L. Urban, Guilherme Liberali, and Michael Braun. *Website morphing*. 28 *Marketing Science* 202 (2009).

⁸⁵ See FINRA, *supra* note 6. Perhaps for this reason the September 2016 BlackRock white paper on digital investment advice does not address choice architecture, either. See BlackRock, *supra* note 6.

⁸⁶ See, e.g. New York Dep’t of Financial Services, *supra* note ; BlackRock, *supra* note 6..

capacities in this area,⁸⁷ and the technical aspects of this lie far from our comparative advantage. Accordingly, we will not address this topic further, other than to offer two related observations. First, IT infrastructure requirements that are too demanding could serve as barriers to entry for innovative new enterprises. Second, regulators could address this concern by developing a strategy for new market entrants that increases the level of scrutiny along with the scale of the enterprise, and they might consider forgoing such scrutiny altogether for early stage robo advisors and those with small market share, provided that they only sell their services to businesses that have significant incentive to ensure that the IT infrastructure will be adequate.⁸⁸

B. Scale and the concept of a regulatory trajectory.

At a general level, the benefits of closer regulation of consumer financial product advice depend on the amount of harm that the advice could cause to consumers. Conceptually, the amount of this harm is a function of three factors: (1) the number of consumers affected by the potentially harmful action; (2) the probability of the harmful action occurring in the market, and (3) the severity of the consequence of the harmful action to the consumer. When more consumers are affected, when the harmful action is easy to introduce into the market, and when the severity of harm from the action is high, the need for regulation is greater.

All three factors have the potential to increase along with the market share of robo advisors. First, a successful robo-advisor has the capacity to reach many more consumers than any single human advisor. Second, as the market share of robo advisors increases, there will be greater opportunities for robo-advisors to fail. Third, because robo-advisors may in the future give more comprehensive and detailed advice than any single human advisor (e.g., based on more advanced personalized projections of future income streams or spending patterns and considering a broader portfolio of financial products), the potential harmful consequences of the robo-advice to the individual consumer may be larger than that of a human advisor who operates within a narrower domain. Fourth, if one robo advisor gains truly massive market share, or if the

⁸⁷ See, e.g., New York Dep't of Financial Services, *supra* note

⁸⁸ For examples of regulators attempting to be more accessible and flexible for emerging businesses see, CFPB, Project Catalyst Report: Promoting Consumer Friendly Innovation, October 24, 2016, available at: <http://www.consumerfinance.gov/data-research/research-reports/project-catalyst-report-promoting-consumer-friendly-innovation/>; Financial Conduct Authority, Regulatory Sandbox, November 15, 2015, available at <https://www.fca.org.uk/firms/project-innovate-innovation-hub/regulatory-sandbox>

models underlying competing robo advisors are sufficiently alike, there is a risk of highly correlated losses that could even pose systemic risk.⁸⁹ Finally, as robo advisors gain scale, there may be collective action problems that arise from ranking and matching services that are individually rational but have perverse consequences for financial product markets.

To further illustrate this line of reasoning, consider the impact of Google (or Yelp) on tourists' search for a restaurant in a new town as compared to the traditional approach of asking the hotel concierge for a restaurant recommendation. Google's scale compared to the concierge is tremendous. It provides access to restaurant information to all tourists in all towns, and it is easily accessible to everyone. If it gives systematically bad restaurant advice, the impact will be much greater than bad advice given by any individual concierge. Even if the advice given by hotel concierges is on average just as bad, the advice given by many individual concierges would be bad in many different ways. Of course, the consequences of providing poor restaurant advice even on a large scale seem sufficiently small that regulating Google's or Yelp's restaurant reviews seems unlikely to be necessary. But the consequences of poor financial advice can be severe even in an individual instance, and potentially catastrophic on a large scale.

The potential collective action problems are more difficult to predict. One potential example relates to a familiar problem in machine learning: the trade-off between exploitation and exploration in learning algorithms.⁹⁰ If an algorithm is to learn, it must sometimes make a choice that is less than optimal, based on current information. It must explore, rather than exploit. It can't always be greedy. Yet, when the algorithm is part of a robo advisor, each individual consumer would prefer that the algorithm exploit, just as each individual user of the navigation app, Waze,⁹¹ would prefer that Waze provide the shortest route based on known information, and not send the user on an exploratory route.

Continuing to use Waze as an analogy, there is a second potential collective action problem that results from the game theoretic nature of driving. My travel time is a function not

⁸⁹ See O'NEIL, *supra* note XX. Cf., CHARLES PERROW, *NORMAL ACCIDENTS: LIVING WITH HIGH RISK TECHNOLOGIES* (1984).

⁹⁰ See generally John Lanford et al., *Competitive Analysis of the Explore/Exploit Tradeoff*, available at: https://www.cs.cmu.edu/~jcl/papers/exp_exp_icml/icml_final.pdf (investigating the explore/exploit trade-off in reinforcement learning using learning algorithms).

⁹¹ <https://www.waze.com/en-GB/>

only of the distance between point A and point B but also of who else is on the road, and I can only control my own driving. If Waze employs an individually rational (greedy) algorithm, it will always give me the best route in light of what everyone else is doing. Yet, as the famous Braess's paradox shows, individually rational driving behavior can lead to slower traffic overall, as everyone competes for the best route.⁹² Thus, widespread adoption of a greedy Waze program could lead to longer drives for everyone. There are solutions, but those solutions require Waze to maximize the collective good, which means being less greedy for some drivers than others. Algorithms that favor some people over others should of course raise red flags.

Financial services also have a game theoretic structure. The cost of my insurance is a function not only of my risk but also of the risk of the other people in my pool. Similarly, the cost of my credit is a function not only of my credit risk but also the credit risk of the other people who are in my pool. Finally, the returns on my portfolio depend not only on the underlying businesses whose shares and bonds are in the portfolio but also the investing behavior of other people. At sufficient scale, robo advice can shape insurance and credit pools and even move investment markets. For example, the tsunami of index investing that is currently reshaping the mutual fund industry is the result of a distributed kind of robo-advice in which algorithms supplant individual fund managers. There is surely much more to come.

At this point, all such risk assessments can only be conceptual and speculative. Since robo-advice is still not widely adopted in the market, the current lack of more broad based regulatory capacity seems unlikely to have done much harm – yet.⁹³ The time has come for the financial services authorities to develop the capacity to engage in a more systematic risk assessment.

In that effort, it makes most sense to think of financial services regulation following a dynamic regulatory *trajectory*. The first step is gathering information to assess what capacities

⁹² Braess's paradox demonstrates mathematically how the introduction of a new, hyperfast link between two points can paradoxically reduce the mean driving time, despite the introduction of new road capacity.

⁹³ Note that, although we are not proposing application of the precautionary principle here (because the small market share of robo advisors reduces the concerns), we expect that other commentators may do so. *Cf.*, Cass R. Sunstein, *Beyond the Precautionary Principle*, 151 U. Pa. L. Rev. 1003 (2003) (noting the strength of the precautionary principle "in legal systems all over the world").

the agencies need to develop, as some regulators have begun to do.⁹⁴ One useful model for this step is the market review commonly undertaken by the Financial Conduct Authority in the U.K. as an early step in their regulatory process.⁹⁵ For example, the FCA conducted a broad Financial Advice Market Review that produced a final report in March 2016 that addressed automated financial advice as a potential solution to the problem of a lack of broad access to financial advice.⁹⁶ While that report did not address the kinds of regulatory challenges that we have identified, automated advice was not the central focus of the review. Now that automated financial advice has received such positive attention, the logical next step for the FCA and other regulators is to consider the challenges involved in ensuring that automated advice lives up to its potential.

After the market review and associated assessment of regulatory capacity, the next step is developing the necessary regulatory capacities. In that regard, regulatory authorities will not be starting from ground zero, as the large financial services organizations that are purchasing robo advice services are already developing methods for assessing the quality of those services.⁹⁷ Thus, the regulatory agencies will simply need to address a “make or buy” decision about the necessary expertise.

Only then will regulators be equipped to formulate a strategy that addresses the challenges involved in adapting to the scale and consequences of robo-advice in the market in a manner that promotes both effective innovation, on the one hand, and honest and competent robo-advisors in the market, on the other. We predict that, over time, financial services regulators will take an increasingly strict approach toward safeguarding the competence and honesty of robo advisors and the suitability of their advice, but we are also hopeful that much of this oversight can itself be accomplished on an automated basis and, as we discuss next, that it will reflect and encourage the current dynamism in the broader financial technology market.

⁹⁴ See, e.g. FINRA, *supra* note 6; New York Dep’t of Financial Services; SEC, *supra* note xx

⁹⁵ See, e.g. FCA Market Review on add-on insurance.

⁹⁶ See FCA, *supra* note xx

⁹⁷ See FINRA, *supra* note xx (identifying best practices that assume the availability of services to evaluate the competence and honesty of digital investment advisors).

Of course these are broad generalizations. But, that is all that is possible before the financial services authorities engage in the kind of systematic, interdisciplinary assessment that we advocate in this Essay.

III. Conclusion: Beyond Honesty and Basic Competence

Both robo advisor technology and the regulatory environment have some ways to go before robo advisors begin to reach their potential of delivering high quality advice to a mass consumer market across the broad range of financial services.⁹⁸ Nevertheless, it is not too early to begin thinking about what comes next. For that purpose, it is useful to assume that regulators will develop the capacity to confirm that robo advisors in fact do what their creators and operators say, based on access to data of adequate quality, and that regulators will gain the authority and will to kick out of the market robo advisors who cannot or will not prove what they can do to the regulators' reasonable satisfaction.⁹⁹ If so, that means that in the very near future consumers will have access to well-designed robo advisors that honestly and competently recommend suitable financial products for consumers across the entire spectrum of financial products, employing appropriate choice architecture and reliable IT infrastructure.

If we assume this basic competence and honesty for the moment, we can look ahead to other challenges and opportunities. In this concluding section we will sketch one such challenge and two opportunities. The challenge is fostering a market in which an evolving diversity of robo advisors and consumer financial product intermediaries compete based on the *measurable* quality of their advice and related services for consumers. The opportunities are a leap forward in the ability to hold consumer financial product intermediaries accountable and a new approach

⁹⁸ See, e.g. *Digital Investment Advice: Robo Advisors Come of Age*, BLACKROCK, 1 (Sept. 2016) <https://www.blackrock.com/corporate/en-mx/literature/whitepaper/viewpoint-digital-investment-advice-september-2016.pdf> (“While digital advisors represent a very small segment relative to more traditional financial advice providers, their recent rapid growth suggests a need for a focused analysis of the business and activities of these advisors.”).

⁹⁹ See, e.g., *Policy Statement: Robo-Advisers and State Investment Adviser Registration*, MASS. SEC. DIV. (Apr. 1, 2016), <http://www.sec.state.ma.us/sct/sctpdf/Policy-Statement--Robo-Advisers-and-State-Investment-Adviser-Registration.pdf>; *Policy Statement: State-Registered Investment Adviser's Use of Third-Party Robo-Advisers* (July 14, 2016), <https://www.sec.state.ma.us/sct/sctpdf/Policy-Statement-State-Registered-Investment-Advisers-Use-of-Third-Party-Robo-Advisers.pdf>; *Report on the IOSCO Social Media and Automation of Advice Tools Surveys*, IOSCO (July 2014), available at <http://www.iosco.org/library/pubdocs/pdf/IOSCOPD445.pdf>.

to consumer financial product regulation that fosters more diversity in the forms and features of consumer financial products to better match the heterogeneity of consumers.

The challenge. While some regulatory oversight of the core components of robo advisors seems necessary to ensure basic competence and honesty, there is a risk that regulatory oversight will be watered down in the face of pressure by powerful financial services enterprises that have thrived in the past.¹⁰⁰ In addition, regulatory oversight poses the risk of discouraging innovation by serving as a barrier to entry into the market for robo advisors. Moreover, as regulators develop preferences about robo advisor design, and as regulated entities come to understand those preferences, oversight may lead to a model convergence that increases the risk of catastrophic failure.¹⁰¹

To counter these risks, we propose that, in addition to their oversight activities, regulatory agencies also develop contests of contests, in which the agencies provide substantial cash prizes to organizations that develop contests in which robo advisors compete based on measurable differences in the quality of their components – especially the ranking and matching algorithms, choice architecture, and data access and efficiency – as well as their overall performance. A contest of contests promotes a diversity of ways of measuring success and innovation in measuring success. That diversity and innovation in measuring success should in turn promote diversity among and innovation by robo advisors and, because the contests will themselves change over time, there will be less risk that all robo advisors will be tuned to any single way of measuring success.

The accountability opportunity. The automated nature of robo advisors means that the inputs and outputs of the robo advice, the algorithms, and much of the choice architecture exists and can be stored in digital form, and, thus, can be analyzed using digital tools. Indeed, it should be possible to store the customer and product inputs, advice algorithm, choice interface, market conditions, and outcome for every individual customer interaction and to link all of the

¹⁰⁰ See BARR, JACKSON, THAHYER *supra* note xx at xx (noting objections to adopting the fiduciary standard for all investment advisors, including traditional stock brokers, on the grounds that trying to apply that standard to stock brokers will water down the standard rather than improve consumer protection.).

¹⁰¹ See FCA, *supra* note xx (noting the concern that robo advisors may stop innovating if the government becomes too actively involved, but not making the point about catastrophic risk).

interactions of the firm with that customer over time, creating the robo advisor analog to the “black boxes” proposed for self-driving cars.¹⁰²

Whether financial services regulators presently have the legal authority to require firms to retain these data and make them available for analysis is a domain-specific legal question that lies beyond the scope of our analysis.¹⁰³ Our point here is that these data could lead to a leap forward in our ability to hold consumer product intermediaries accountable for providing misleading, incomplete or otherwise inadequate advice. Like the black boxes in self-driving cars, these data would provide a record for analysis if the consumer has an “accident” – meaning in this context that the consumer suffers a financial misfortune related to a consumer financial product – making it possible to evaluate the role of the intermediary and to determine whether to hold the intermediary accountable in some way.

The diversity opportunity. From a consumer protection standpoint, the history of financial services innovation has not been kind to advocates of complexity and choice. Across all three of the major financial services sectors, consumer product intermediaries have used complexity and choice to take advantage of consumers, particularly those who are less sophisticated.¹⁰⁴ The days are gone in which policymakers believe that a minority of well-informed and careful shoppers – Thaler and Sunstein’s “Econs” – can make a market fair when that market is structured to exploit fallible humans.¹⁰⁵ In response, consumer protection advocates have called for a return to “plain vanilla” financial products.¹⁰⁶ This is not because

¹⁰² See, e.g., <https://techcrunch.com/2016/07/18/germany-wants-a-black-box-in-any-car-with-self-driving-features/>.

¹⁰³ The transparency complications raised by the use of machine learning algorithms is also outside the scope of our analysis for two reasons. First, our understanding is that machine learning algorithms are not presently used by robo advisors to any significant extent. Moreover, the issues are presently under close investigation in relation to the government’s use of machine learning algorithms. See, e.g., Coglianese, *supra* note xx. Financial services regulators will be able to “piggy back” on the results of those investigations if and when machine learning algorithms become important in the robo advisor context.

¹⁰⁴ See, e.g., recent NYT stories about annuities in teacher pension plans; Burlingame & Jackson *supra* note xx (on yield spread premiums and steering).

¹⁰⁵ See, e.g., Tom Baker and Peter Siegelman, “*You Want Insurance with That?*” *Using Behavioral Economics to Protect Consumers from Add-On Insurance Products*, 20 CONN. INS. L. J. 1 (2013) (reviewing prior economic literature and summarizing behavioral economics research demonstrating that a small number of informed shoppers cannot prevent sellers from taking advantage of others).

¹⁰⁶ See, e.g. Michael S. Barr et al., New Am. Found., *Behaviorally Informed Financial Services Regulation*, 1, 9-10 (2008), available at: <http://repository.law.umich.edu/cgi/viewcontent.cgi?article=1028&context=other> (suggesting that a plain vanilla set of default mortgages would be easier to compare across mortgage offers); Elizabeth Warren, Three Myths about the Consumer Financial Product Agency, Baseline Scenario (July 21, 2009, 6:00 AM),

they believe that vanilla is best for everyone, but rather because the evidence shows that choice and complexity lead to exploitation and regressive cross subsidies.¹⁰⁷ They believe, with some reason, that vanilla (perhaps plus chocolate, and maybe even strawberry, but definitely not raspberry coconut fudge) is good enough for most people.¹⁰⁸

Once consumers have – and use – easy access to robo advisors, that analysis could well change. A good robo advisor gives an unsophisticated consumer more processing power than even the most sophisticated consumer working on her own. That could lead to a fundamental shift in regulatory strategy: from regulating the content of consumer financial products to (a) facilitating access to the data needed to make robo advisors work and (b) taking appropriate measures to verify the quality of the robo advisors and the public access to them. This is a disclosure-based regulatory strategy with a twist: electronic disclosure of product attributes to robo advisors; an easy procedure for consumers to authorize electronic disclosure to robo advisors of their own relevant financial or other relevant data; and disclosure by robo advisors to the appropriate regulatory body of the data needed to verify their competence and honesty.

* * * *

Our goal in this Essay has been to open a discussion within legal and financial services scholarship that invites the participation of those with expertise in other relevant disciplines. In keeping with this goal, we have raised more questions than we have answered, and we have barely sketched the outlines of even the best of our ideas. But that is appropriate at this stage of the regulatory trajectory.

As robo advisors grow in scale, protecting the integrity of financial markets will require the kind of cross disciplinary cooperation that regularly occurs in the domains of health and environmental regulation. The lawyers, economists, and behavioral scientists already involved in financial services regulation will need to understand enough about computer and data science

<http://baselinescenario.com/2009/07/21/three-myths-about-the-consumer-financial-product-agency> (noting that the promotion of “plain vanilla” contracts is CFPB’s real regulatory break-through).

¹⁰⁷ Michael S. Barr et al., *Behaviorally Informed Home Mortgage Credit Regulation*, HARV. UNIV. JOINT CTR. FOR HOUS. STUD. 20 (2008), available at: (noting that market in some case would like to exploit or exaggerate consumer fallibility).

¹⁰⁸ Warren, *supra* note xx (noting that “vanilla plain” contracts would meet the needs of about 95% customers).

to craft and apply new regulatory strategies; and the computer and data scientists at the forefront of the innovation will need to understand enough about legal structures and ways of thinking to help make the new regulatory strategies sensible. The benefits from these efforts almost certainly will exceed the costs, because the very same returns to scale that make robo advisors so cost-effective lead to similar returns to scale in assessing their quality. Coordinating that effort is a logical and important role for our expert financial services regulators. It is time for them to develop the necessary expertise.