

BROOKINGS

Report

Robo-advice: An effective tool to reduce inequalities?

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When it comes to financial choices, households face complex decisions. Choosing how much to save or consume out of a monthly income in a way that is optimal over working life and retirement is the fundamental issue in personal finance. This decision has significant repercussions on a household's well-being and the well-being of their offspring because even slight differences in monthly saving rates can amount to substantial variation in long-term wealth accumulation. But the choice of how much to consume and save at each point in time is only the first of a series of intertwined decisions households face. For instance, households also need to decide whether they should invest their savings in stocks, bonds, housing, or other assets, all of which have very different risk-return profiles. Also, households need to choose how to finance their consumption, especially for durable goods such as cars, housing, or academic degrees. Financing choices have enormous consequences on financial and mental well-being, especially for individuals at the beginning of their careers and with lower-paying jobs who face the challenge of attempting to reduce their student and credit-card debt balances.^[1]

Virtually every household around the globe faces these personal finance decisions on a daily basis, but very few of them are equipped to understand the trade-offs and make sound choices. Historically, human financial advisors and financial planners have provided support. However, due to the opportunity cost of time, financial advisors find it economically profitable to cater to wealthy individuals, who paradoxically are better equipped to make these decisions relative to vulnerable households in the first place.^[2] Differential access to financial advice has likely contributed to the growing wealth inequality documented in the U.S. and abroad over the last few decades.^[3]

How can we ensure that sound financial advice is available to all households, especially the most vulnerable ones? Over the past decade, we have experienced a revolution in personal finance with the introduction of robo-advisors embedded in financial technology (fintech) applications (apps). Robo-advisors collect and analyze large amounts of transactional data and provide individuals with suggestions on how to improve their choices. Depending on the soundness and appropriateness of the algorithms they employ, robo-advisors have the potential to improve households' decisionmaking considerably. In what follows, we describe the nature and scope of robo-advisors in financial decisionmaking and discuss a few examples of robo-advice designs that have delivered mixed success. Finally, we discuss some of the most critical policy debates around robo-advisors.

WHAT IS ROBO-ADVICE?

Robo-advice is any financial advice provided in an automated fashion. The first and most well-known application of robo-advice was in the space of investment portfolio decisions, with now-established brand names such as Betterment, Vanguard, and Wealthfront. However, robo-advice has been quickly expanding to myriad personal finance choices individuals face every day, such as how much to spend or save on a daily basis (Status Money and Mint.com being well-known examples), how to minimize credit card debt (Tally, for example), and how to minimize tax payments (Turbo Tax).^[5]

Depending on their level of sophistication, robo-advisors use different amounts of individual information to formulate their suggestions. Relative to human financial advisors, robo-advisors have several potential advantages. First, being fully (or partially) automated and easily scalable, robo-advisors can offer financial advice at substantially lower fees than humans, which allows them to cater their services to individuals of all socioeconomic statuses, including vulnerable groups. Second, robo-advisors are based on algorithms that can be evaluated and improved over time, rather than on rules of thumb that can only be passed from one human advisor to another with loss of information. Third, because robo-advisors' decisions are hardwired, in principle they are easier to assess on the part of regulators, although assessment requires a set of skills in understanding and interpreting codes and algorithms that regulators are still developing. At the same time,

human financial advisors exert a degree of judgment in their advice based on soft information that is difficult to track and quantify—and hence, to replicate—with robo-advisors.

Not all robo-advisors are created equal, however. Robo-advisors differ in at least three dimensions. Personalization of the advice they provide is an important feature. At one end of the spectrum, some robo-advisors do not incorporate virtually any of the investors' characteristics and provide all individuals with the same advice. At the other end of the spectrum, some robo-advisors personalize advice based on individuals' past financial and consumption decisions as well as their preferences and beliefs, which they elicit directly from the individual.

A second key feature is the extent to which investors are free to deviate from the plan the robo-advisor proposes, which is more common in apps that provide budgeting decisions, as opposed to robo-advisors that optimize investors' portfolio allocation or minimize tax liabilities.

Finally, a crucial distinction among robo-advisors is the presence of a human component. Hybrid robo-advisors allow individuals to follow automated choices but also access a human advisor that explains what the algorithm does and who might help the investor make auxiliary decisions, such as whether to open retirement-saving accounts or college-saving accounts. Robo-advisors for tax management have recently introduced the option of human interaction via chat or video conference services.^[6] All these additional services are meant to attract individuals who still lack enough trust in algorithms to rely purely on automation when making consequential financial choices.

ARE ROBO-ADVISORS EFFECTIVE?

A nascent academic literature has been studying the viability and effectiveness of various forms of robo-advice.^[7] Establishing the causal impact of robo-advice on individual outcomes rests on the difficulty of conducting randomized control trials (RCTs) in this space along the lines of the ones used when assessing new vaccines and drugs. Moreover,

even when RCTs can be implemented, robo-advisors mean to improve individuals' outcomes over the course of decades, whereas current data on individuals' choices and outcomes is often limited to a few years or even months.

Some studies show that robo-advising improves portfolio allocations,^[8] reduces excessive consumption,^[9] and allows individuals to improve their debt management and reduce interest and fee payments on their outstanding debt accounts.^[10] Robo-advisors have the potential to level the playing field between wealthy and vulnerable households in personal finance, especially when it comes to individuals with low levels of financial literacy.^[11]

At the same time, the positive effects are by no means unambiguous and universal. Certain robo-advisors for investment decisions have been found to stimulate too much trading on the part of the investors.^[12] Others are too expensive relative to the benefits they provide to their users. It appears that the effectiveness of different robo-advisors, similarly to that of human financial advisors, rests on the details of their implementation. Broadly speaking, the academic literature shows that the most successful robo-advisors formulate a plan that is agreed upon by the investor and is subsequently implemented in an automated fashion. The instances of robo-advice that require continuous effort by the users have proven to be less effective because individuals, especially when not financially literate, tend to lose interest and pay less and less attention to advice over time, which dissipates the initial positive effects. Of course, full automation without regular involvement of the individual opens important issues in terms of freedom of choice and consent.

THE FUTURE OF ROBO-ADVISING

A broader question is whether it is even possible to evaluate the performance of a robo-advisor for, say, debt-management or investment decisions, without observing the totality of individuals' consumption decisions, preferences, income streams, family situation, etc. Saving, investments, and consumption decisions are inherently intertwined, so showing that a certain robo-advisor provides effective portfolio allocations may actually make

investors worse off if it pushes them to reduce their saving rates. By the same token, a robo-advisor that helps investors save more may be detrimental if it reduces disposable income while the savings are invested poorly.

In this respect, the robo-advising industry so far has taken the piecemeal approach of solving one problem at a time, with little emphasis on building a unified, holistic robo-advisor that can solve most personal-finance problems at once—from investors' consumption and saving decisions to their choice of how to finance such consumption and how to invest the savings—in one single platform. Building such a robo-advisor is a major aspiration of this industry. Whether holistic robo-advisors are going to become reality and, more broadly, whether robo-advisors are going to become more widespread in the future depends on the stars aligning along two key dimensions.

The first is merely computational. Building a holistic robo-advisor requires that app developers construct models of optimal consumption, saving, tax, and investment behavior that jointly consider all possible decisions investors should make across all realms. This is still beyond reach of the current tools commonly used in economics and decisionmaking sciences. Relatedly, holistic robo-advisors require the collection of the complete financial picture of individual investors. Even in the context of safe data sharing technologies, data privacy concerns might hinder potential users from adopting holistic forms of robo-advice.

The second dimension is not so much related to the supply side and feasibility of robo-advising services but to the demand side. It is still unclear to what extent investors are willing to trust algorithms when it comes to their finances. Recent work in robo-advising shows that hybrid forms of robo-advice (where a human augments the algorithm) can be important in reducing algorithmic aversion.^[13] The success of hybrid forms of robo-advice is an indication that the speed at which robo-advising is going to disseminate is always going to be capped by the availability of humans complementing the advice of the robot, reducing some of the concerns raised by politicians and the popular media that, in a world dominated by algorithms, there will be a lack of employment opportunities for humans.^[14] At the same time, trust in algorithms is likely to increase over time, particularly because younger generations have been accustomed to using hand-held devices and apps since a

young age. Algorithmic aversion could thus be a temporary friction in the diffusion of robo-advice—there is no compelling argument for why this friction would still be important once digitally-native generations become the majority of financial decisionmakers in the economy.

POLICY IMPLICATIONS

On the policy side, the biggest open question is the definition of ethical and legal standards for robo-advisors. For example, how can regulators detect potential biases and discrimination in robo-advisors? In particular, how can regulators such as the Securities and Exchange Commission (SEC) or lawmakers in Congress implement their assessments of whether robo-advisor recommendations are well-suited for all potential customers when the technology generating the advice is far outside the expertise of legal practitioners? New professional types are needed such as regulator/computer scientists who can bring together a strong legal background with an understanding of the mechanics of complex algorithms.

On the user side, understanding which personal data robo-advisors can access and analyze, and hence to what extent access to robo-advice violates data privacy, is of utmost importance. In this context, data privacy regulation that has been developed for other purposes could be extended to the case of robo-advice quite easily. For instance, recent regulation on disclosure requirements and consent elicitation by smartphone application providers implemented in the U.S. and Europe is an obvious model for regulating data privacy in robo-advice.^[15]

The diffusion of robo-advice also has important implications for society as a whole. The jury is still out regarding whether automation is going to democratize financial advice or exacerbate inequalities. The dominant narrative is that automation, by decreasing the costs of financial advice, may create a more equal society because many households that were not wealthy enough to afford financial advice will access it in the future.^[16] In this respect, robo-advising might induce spillover effects, whereby households who lack

financial literacy obtain valuable information and rules of thumb in one realm that they could apply to other personal finance decisionmaking problems they face for which robo-advice does not yet exist.

On the other hand, low-income households, who often barely have access to financial institutions, who finance their spending with high-interest borrowing such as payday loans, and who make financial mistakes due to the lack of financial literacy, are perhaps the category that would need financial advice the most. And yet existing robo-advisors do not cater to this segment because they lack savings and if anything would need help in reducing their debt levels.^[17]

The lack of products catering to low-income households has two important implications. First, if anything, robo-advising might increase wealth inequality in the broader population, as robo-advisors will help middle-income households to increase their wealth (and wealthy households to increase it by even more), whereas low-income households who are not served by robo-advisers will be left behind. Second, the question of who should provide robo-advising services to low-income households becomes prominent: Is there a viable business model that might allow private providers to target this population? Otherwise, should the public sector provide robo-advising for low-income households? This solution might be efficient and effective especially if robo-advising for low-income households, for which the cost of provision is minimal, could partially replace government subsidies and transfers targeted to financially vulnerable households.

Robo-advisors are here to stay and will continue to evolve. However, we still have a limited understanding of how they should be designed, their effects on society, how they should be regulated, and what data they should have access to. We believe that research efforts and policy task forces that bring together experts across economics, computer science, and legal fields will be instrumental in filling this knowledge gap. Such a multi-disciplinary effort can help ensure that these new technologies improve all households' wealth management and contribute to reducing societal inequalities.

Footnotes

1. ¹ Sweet, Elizabeth, Arijit Nandi, Emma K. Adam, and Thomas W. McDade. "The High Price of Debt: Household Financial Debt and Its Impact on Mental and Physical Health." *Social Science & Medicine* 91

(May 16, 2013): 94–100. <https://doi.org/10.1016/j.socscimed.2013.05.009>.

2. 2

“How Much Money Do I Need To Hire A Wealth Manager?” Cooke Financial Group, May 18, 2021. <https://www.cookefg.com/blog/how-much-money-do-i-need-to-hire-a-wealth-manager>.

3. 3

Epperson, Sharon. “Financial Advisors Help Close the Wealth Gap.” CNBC, February 26, 2016. <https://www.cnbc.com/2016/02/23/financial-advisors-help-close-the-wealth-gap.html>.

4. 4 Francesco D’Acunto and Alberto G. Rossi, “Robo-Advising,” in *The Palgrave Handbook of Technological Finance*, ed. Raghavendra Rau, Robert Wardrop, and Luigi Zingales (Cham: Springer International Publishing, 2021), 725–49, https://doi.org/10.1007/978-3-030-65117-6_26.

5. 5 Francesco D’Acunto and Alberto G. Rossi, “New Frontiers of Robo-Advising: Consumption, Saving, Debt Management, and Taxes,” *SSRN Electronic Journal*, 2021, <https://doi.org/10.2139/ssrn.3778244>.

6. 6

TurboTax. “TurboTax Live.” TurboTax. Intuit. Accessed September 29, 2022. <https://turbotax.intuit.com/personal-taxes/online/live/>.

7. 7 Francesco D’Acunto and Alberto G. Rossi, “IT Meets Finance: Financial Decision Making in the Digital Era,” *SSRN Electronic Journal*, July 8, 2022, <https://doi.org/10.2139/ssrn.4100784>.

8. 8 Alberto G. Rossi and Stephen P. Utkus, “Who Benefits from Robo-Advising? Evidence from Machine Learning,” *SSRN Electronic Journal*, 2020, <https://doi.org/10.2139/ssrn.3552671>.

9. 9 Francesco D’Acunto, Alberto Rossi, and Michael Weber, “Peer Effects in Consumption: The Role of Information,” *SSRN Electronic Journal*, February 2, 2022, <https://doi.org/10.2139/ssrn.3339335>.

10. 10

Chak, Ida, Karen Croxson, Francesco D’Acunto, Jonathan Reuter, Alberto Rossi, and Jonathan Shaw. “Robo-Advice for Borrower Repayment Decisions.” *Financial Conduct Authority Occasional Papers*, no. 61 (August 30, 2022). <https://www.fca.org.uk/publications/occasional-papers/occasional-paper-no-61-robo-advice-borrower-repayment-decisions>.

11. 11 Michael Reher and Stanislav Sokolinski, “Automation and Inequality in Wealth Management,” *SSRN Electronic Journal*, September 1, 2021, <https://doi.org/10.2139/ssrn.3515707>.

12. 12 Francesco D’Acunto, Nagpurnanand Prabhala, and Alberto G Rossi, “The Promises and Pitfalls of Robo-Advising,” *The Review of Financial Studies* 32, no. 5 (May 1, 2019): 1983–2020, <https://doi.org/10.1093/rfs/hhz014>.

13. 13 Alberto G. Rossi and Stephen P. Utkus, “The Needs and Wants in Financial Advice: Human versus Robo-Advising,” *SSRN Electronic Journal*, 2020, <https://doi.org/10.2139/ssrn.3759041>.

14. 14

Casey, Marcus, and Sarah Nzau. “Robots Kill Jobs. but They Create Jobs, Too.” The Brookings Institution, March 18, 2019. <https://www.brookings.edu/blog/up-front/2019/03/18/robots-kill-jobs-but-they-create-jobs-too/>.

15. 15 Bo Bian, Xinchun Ma, and Huan Tang, “The Supply and Demand for Data Privacy: Evidence from Mobile Apps,” *SSRN Electronic Journal*, 2021, <https://doi.org/10.2139/ssrn.3987541>.

16. 16 Michael Reher and Stanislav Sokolinski, “Automation and Inequality in Wealth Management,” *SSRN Electronic Journal*, September 1, 2021, <https://doi.org/10.2139/ssrn.3515707>.

17. 17 Chak, Ida, Karen Croxson, Francesco D’Acunto, Jonathan Reuter, Alberto Rossi, and Jonathan Shaw. “Robo-Advice for Borrower Repayment Decisions.” *Financial Conduct Authority Occasional Papers*, no. 61 (August 30, 2022). <https://www.fca.org.uk/publications/occasional-papers/occasional-paper-no-61-robo-advice-borrower-repayment-decisions>.