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Written evidence submitted by Prof. Simon Weidenholzer

I am a Professor of Economics at the University of Essex. Within the remit of a recent ESRC grant on *Investor Behaviour in the age of Fintech,* I have conducted a study (together with Marco Lambrecht from the University of Stavanger and Jörg Oechssler from the University of Heidelberg) to examine the implications of Robo-Advice in financial decision making. I am submitting evidence to the treasury committee to advice on the benefits and risks that could be associated with robo-advice in financial services.

Summary

This submission draws on recent experimental research on robo-advisors in financial services.[1] Robo-advisors are novel digital tools in financial markets that offer low-cost financial advice, usually tailored to individual characteristics like risk preferences. Some platforms use artificial intelligence to adapt to patterns in user behaviour or market trends, while others are based on fixed rules drawn from established financial theory. We study the benefits of robo-advice in a portfolio choice experiment running over ten weeks. Depending on treatment, investors either receive robo-advice, have a robo-advisor implementing recommendations by default, or have to invest on their own. Our findings can be summarized as follows:

- While we observe no effect of robo-advice on initial market participation, we do find positive effects on continued market participation.
- Robo advisors help investors avoid mistakes, make rebalancing more frequent, and overall yield portfolios much closer to the utility maximizing ones.
- Robo-advisors that implement the recommendations by default do significantly better than those that just give advice.

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1. Robo-advisors in financial service industries

1.1. Robo-advisors are financial tools that utilize algorithms to offer financial advice and automated trading tailored to investors' needs and preferences.

1.2. As they only require minimal human intervention, they are inexpensive in comparison to traditional financial advice given by human experts. For this reason, they have also been praised for making financial advice available to subgroups of investors for whom human advice is prohibitively expensive, thus having the potential to increase financial market participation.[2]

1.3. Despite the market for robo-advice being in its infancy, providers already have more than two trillion USD assets under management.[3] Moreover, the industry has consistently featured robust growth rates and is expected to continue this growth path.

1.4. Robo-advisors differ from existing investment platforms and online brokers with respect to both customer assessment and customer portfolio management.[4]

1.5. Recent robo-advisors build on data gathered from investors to perform so called risk profiling, such as surveys to elicit investment objectives, financial situation, and attitude towards risk.[5] They then suggest or implement investment strategies that are the same for individuals who fall in the same category.[6]

1.6. Depending on the specific robo-advisor either a portfolio is suggested or is automatically implemented.

1.7. Robo-advisors then typically rebalance the portfolio to keep the asset mix close to the optimum.[7]

1.8. The precise internal workings of robo-advisors are usually proprietary and stay opaque.

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2. Experiment on Robo-advice

2.1. Given the increased usage of robo-advisors, we are interested in whether and if so how they can help investors make better decisions and whether they consequently have the potential to increase financial market participation.

2.2. In order to study these questions we have conducted a large scale, 10-week long, experiment.

2.3. The experimental approach is particularly suited to our research question as it allows i) to exogenously vary whether subjects have access to robo-advice or not and change key properties of robo-advice, ii) to measure individual risk attitudes of financial market participants (but also of non-participants) and based on these iii) to derive benchmarks for optimal behaviour. Most of this would be difficult if not impossible with field data.[8]

2.4. Our experiment features two parts. In the first part, we elicit risk preferences and key demographics from all subjects. Furthermore, we provide information about the second part, a financial market that subjects can choose to participate in. Depending on the treatment, subjects are also told that i) in that financial market they would receive advice by an algorithm fine-tuned to their risk preferences (treatment SOFT-ROBO), ii) an algorithm would implement their optimal investment decisions but they would retain the opportunity to overrule its choice (treatment HARD-ROBO), or iii) they would make decisions without the aid of an algorithm, and are not informed about its existence or usage by other participants (treatment CONTROL).

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3. Key Findings

3.1. In the context of our experiment, we find that the presence of robo-advice does not influence subjects' decision to participate in our experimental financial market. In each of our treatments almost 80% of the invited participants joined our follow-up study.

3.2. We do however observe significant effects in terms of continued participation in financial markets. In particular, we find that the share of investors depositing all of their money in a safe, cash-like asset in the final round is surprisingly high (around 38%) in the control treatment. It is significantly lower (around 25%) in SOFT-ROBO and close to zero in HARD-ROBO (0.4%).

3.3. Our experiment allows us to measure the usefulness of robo-trading compared to investing without assistance across several dimensions. We find that robo-advisors lead to i) significantly more optimal rebalancing of assets, ii) significantly more optimal hedging, and iii) a significant reduction in funds invested in the dominated assets. In all but the last dimension hard robos significantly outperform soft robos, which is in line with the power of default settings.[9]

3.4. We develop a methodology to quantify (in terms of differences in certainty equivalents) how much investors benefit in our experiment from the robo and find that in treatment HARD-ROBO investors gain significantly in comparison to the control treatment.

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4. Conclusions/Policy Implications

4.1. Our research shows that robo-advisors can assist consumers in making better investment decisions. Robo-advisors offer significant benefits to investors in terms of matching portfolios to risk preferences, hedging risk, and portfolio rebalancing.

4.2. Given the affordability of robo-advice, particularly in comparison to more traditional forms of financial advice, robo-advisors may have the potential to increase financial market participation especially among lower-wealth investors and demographics with traditionally low participation in financial markets. Whilst our experiment point towards no effects in terms of initial participation, there are significant effects in terms of continued participation. In light of their potential and benefits, policy makers may want to explore what can be done to increase (initial) uptake of robo-advice.

4.3. Robo-advice has the potential to supplant advice given by humans. In this light it appears important to understand the implications for jobs and employment in the financial services industry and how human advice and robo-advice may potentially interact in a meaningful way.

4.4. A possible downside of robo-advice is the lack of transparency. Many robo-advisors operate as 'black boxes,' making it difficult for consumers and regulators to understand how

decisions are made. Regulation should thus be aimed at increasing transparency which may also ease investor scepticism towards this new technology.

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[1] See Lambrecht, M., Oechssler, J., and Weidenholzer, S. (2023). *On the benefits of robo-advice in financial markets*. No. 734. AWI Discussion Paper Series.

[2] See e.g. Lieber, R. (2014). *Financial advice for people who aren't rich*. The New York Times, April 12, 2014:B1.

[3] See Statista (2023). *Assets under management of robo-advisors worldwide from 2018 to 2027*. https://www.statista.com/forecasts/1262614/robo-advisors-managing-assets-worldwide. Accessed on July 4, 2023.

[4] Jung, D., Dorner, V., Glaser, F., and Morana, S. (2018). *Robo-advisory: digitalization and automation of financial advisory*. Business & Information Systems Engineering, 60:81.86.

[5] Bhatia, A., Chandani, A., and Chhateja, J. (2020). *Robo advisory and its potential in addressing the behavioral biases of investors - A qualitative study in Indian context*. Journal of Behavioral and Experimental Finance, 25:100281.

[6] See D.Acunto, F. and Rossi, A. G. (2019). *Robo-advising*. The Palgrave Handbook of Technological Finance, pages 725.749.

[7] See e.g. D.Hondt, C., De Winne, R., Ghysels, E., and Raymond, S. (2020). *Artificial intelligence alter egos: Who might benefit from robo-investing?* Journal of Empirical Finance, 59:278.299.

[8] See e.g. D.Acunto, F., Prabhala, N., and Rossi, A. G. (2019). *The promises and pitfalls of robo-advising*. The Review of Financial Studies, 32(5):1983.2020 and Rossi, A. G. and Utkus, S. (2024). *The diversification and welfare effects of robo-advising*. Journal of Financial Economics, 157:103869.

[9] See Choi, J. J., Laibson, D., Madrian, B. C., and Metrick, A. (2004). *For better or for worse: Default effects and 401 (k) savings behavior.* In Perspectives on the Economics of Aging, pages 81.126. University of Chicago Press.