

Research Report

Is Human-AI Advice Better than Human or AI Advice?

BUSINESS PRACTITIONERS INCREASINGLY USE ARTIFICIAL INTELLIGENCE (AI) APPLICATIONS TO ASSIST CUSTOMERS IN MAKING DECISIONS DUE TO THEIR HIGHER PREDICTION QUALITY. YET, CUSTOMERS ARE FREQUENTLY RELUCTANT TO RELY ON ADVICE GENERATED FROM MACHINES, ESPECIALLY WHEN THEIR DECISION IS AT STAKE. OUR STUDY PROPOSES A SOLUTION, WHICH IS TO BRING A HUMAN EXPERT IN THE LOOP OF MACHINE ADVICE. WE EMPIRICALLY TEST WHETHER CUSTOMERS ARE MORE ACCEPTING EXPERT-AI COLLABORATIVE ADVICE THAN EXPERT OR AI ADVICE.

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Introduction

Intelligent machines' support of human decisions is increasingly at the center of corporate strategies, especially in the financial services sector (Gunaratne et al., 2018). Although it is regularly argued that the use of intelligent machines leads to increases in productivity and quality (Rahwan et al., 2019), it is inconclusive whether and how human decision-makers – laypeople and experts alike – internalize advice from machines. The potential downstream consequences are farfetched. There has been a long tradition that customers rely on expert advice when making a

purchase or investment decision. With the increasing use of machines in customers' decision-making process, little is known about (i) whether and when customers are more accepting of advice from a machine than an expert, and (ii) whether customers feel more assured of the expert advice when knowing the advice is an outcome of a human-AI collaboration. Against this background, we aim to understand whether bringing humans into the loop of algorithmic decision-making will potentially benefit customers by increasing the accountability of algorithmic recommendations.

Experimental Design

We conducted an empirical study of the customers of a German savings bank to answer the abovementioned questions regarding private investments in personal loans. To generate AI advice, we trained a state-of-the-art machine-learning model to predict the riskiness and chance of default of individual loan requests from LendingClub, one of the largest peer-to-peer lending platforms in the world. To generate expert-AI collaborative advice, we conducted a study with bank advisors by asking them to make risk assessments and default predictions for their customers on some selected personal loans with the help of machine predictions.

After collecting the advice of the bankers as an outcome of expert-AI collaboration, we conducted a second study with 137 customers who visited the bank store, where advisors work, between October 2021 and December 2021. Each customer who participated in the study was endowed with EUR 1,000 to make ten investment decisions on personal loan requests (i.e., EUR 100 of endowment per investment) with a chance to realize the investment decision by the end of the experiment. In this manner, the participants in the experiment had strong incentives to behave as they would in a real investment decision because their decision would have an influence on the payout.

For each loan request, participants were instructed to make two rounds of risk assessment and investment decision, once before and once after receiving advice, along with seven pieces of information about the loan (i.e., the loan amount, term, purpose, annual percentage rate, monthly installment payment, borrower's current occupation, and annual income). Upon participating in the survey, we randomly assigned each customer to one of the three experimental conditions where the advice source came from an AI, a human bank advisor, or the human-AI collaboration. To account for individual differences in the investment preferences, we also asked each participant about their risk-taking tendency, investment experience, and other demographic information.

Results

We measured the influence of the advice source on customers' investment decisions in multiple ways: (i) the extent to which customers follow the investment recommendation; (ii) the extent to which customers follow the risk assessment; (iii) the final accuracy in predicting a loan's default; (iv) the payoff in EUR value if an investment decision is realized. We show the results in Table 1, benchmarking the results with the AI advisor condition. We find that customers are more likely to follow a banker's than a machine's

	(1)	(2)	(3)	(4)
	Alignment in Final and Advised Investment Decision	Gap in Final and Advised Risk	Investment Prediction Accuracy	Payoff
Expert	0.478**	-0.348***	0.545***	0.058***
	(0.232)	(0.110)	(0.202)	(0.020)
Expert-AI	0.179	-0.253**	0.584***	0.066***
	(0.234)	(0.106)	(0.211)	(0.020)
Observations	1,369	1,369	1,369	1,369
Investor-Investment Time-Varying Controls, Investor-Level Controls, Initial Risk Assessment Fixed-Effects, Advice Risk Fixed-Effects, Investment Fixed-Effects, Date Fixed-Effects, Branch Fixed-Effects	Yes	Yes	Yes	Yes

Table 1: Customers Are More Likely to Follow Advice from Expert than Machine Even If Machine Influences Expert Advice

investment and risk assessment advice. Additionally, we see that customers tend to follow the expert-AI collaborative advice in investment and risk assessment more than the machine advice. Consequently, customers make more accurate default predictions and receive a higher monetary payoff if the investment decision is realized under the condition that the advice is from an expert or expert-AI collaboration.

While it is not surprising that customers rely on expert advice to a greater extent than on

a machine due to the high-stake decision, we find that customers are not deterred from following expert advice knowing it is influenced by a machine. This trend is evident especially when the investment risk and, therefore, the possible return is high (see column 1 of Table 2), and the customer did actually not plan to invest in the first place (see column 3 of Table 2).

Conclusion

Business practitioners increasingly use AI systems to assist customers in making deci-

	(1)	(2)	(3)	(4)
	High-Risk Investment	Low-Risk Investment	High-Risk Investment	
			No Initial Investment	Initial Investment
Expert	1.878***	0.475	6.146***	0.863
	(0.462)	(0.334)	(1.212)	(0.531)
Expert-AI	1.423***	0.347	5.020***	0.386
	(0.413)	(0.330)	(1.231)	(0.483)
Observations	730	639	433	289
Investor-Investment Time-Varying Controls, Investor-Level Controls, Initial Risk Assessment Fixed-Effects, Advice Risk Fixed-Effects, Investment Fixed-Effects, Date Fixed-Effects, Branch Fixed-Effects	Yes	Yes	Yes	Yes

Table 2: Customers Are More Likely to Follow Expert-AI Collaborative Advice When Investment Is Riskier and When They Initially Decided Not to Invest

sions due to their capability to arrive at higher prediction qualities. Yet, customers might be reluctant to rely on advice from machines, possibly because of a lack of trust. In this study, we find that bringing human components into the advice loop could mitigate the reluctance of customers to rely on machine advice. This human factor reassures customers when they feel the decision is more uncertain. We plan to conduct additional laboratory studies to bring further insights into understanding the psychological mechanism underlying our findings.

References

Gunaratne, J.; Zalmanson, L.; Nov, O.: The Persuasive Power of Algorithmic and Crowdsourced Advice. In: Journal of Management Information Systems, 35 (2018) 4, pp. 1092–1120.

Rahwan, I.; Cebrian, M.; Obradovich, N.; Bongard, J.; Bonnefon, J.-F.; et al.: Machine Behaviour. In: Nature, 568 (2019) 7753, pp. 477–486.