Do Robo-Advisors Make Us Better Investors?

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Abstract

- Investors increasingly face assistance from **robo-advisors**
- Robo-advisors are often imbued with anthropomorphic design elements such as an avatar or a name (e.g., the Bank of America name Erica)
- We study whether and how robo-advisors reduce the **disposition effect (DE)**, a well-documented and economically costly behavioral bias
- Findings from two induced-value laboratory experiments:
  1. Investment advice from robo-advisor (upon request) reduces the DE
  2. Evidence for two mediators: (i) socialness perceptions, and (ii) number of advice requests
  3. Use of anthropomorphic design elements increase socialness perceptions but reduces the number of advice requests

Background

- The DE describes investors' tendency to sell winning assets too early and to sell losing assets too late (Shefrin & Statman, 1985)
- Draw on **cognitive dissonance theory** (Festinger, 1957), whereby investors avoid realizing losses to avoid admitting that past purchases were mistakes
- Examine effect of robo-advisor by disentangling two separate **characteristics** of robo-advisors:

(1) Provision of unbiased investment advice

(2) Perceptions of socialness toward the robo-advisor

- Invest in assets B and C
- Sell asset D

→ **Advice effect**:
Receiving advice facilitates decision to sell at a loss

→ **Agency effect:**
Perceptions of socialness facilitate assigning blame to the advisor after a loss

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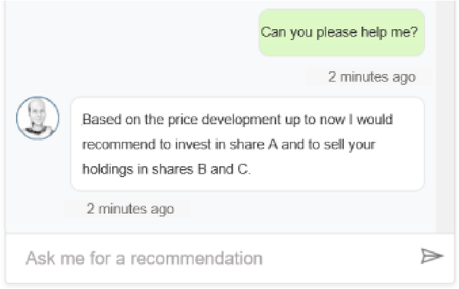
Method

- Two **induced-value laboratory experiments**, student subject pool from two large German universities (n_1=195, n_2=259)
- General design (trading game) based on Weber & Camerer (1998)
  - Six tradeable assets varying in their probability to increase
  - Participants are aware of probability distributions but exact allocation of assets is unknown
- **Manipulations**:
  - Robo-advisor vs no robo-advisor (control) → **study 1**
  - Anthropomorphic robo-advisor vs non-anthropomorphic robo-advisor (i.e., recommendation algorithm) → **study 2**

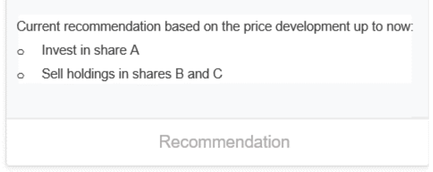
Robo-advisor



- ✓ investment advice
- ✓ visual cues
- ✓ verbal cues
- ✓ natural language processing

Advisor interface in robo-advisor group

Recommendation algorithm



- ✓ investment advice

Advisor interface in recommendation algorithm group

Main Results

1. Lower DE (measured as in Odean, 1998) in the robo-advisor group compared to control group (Wilcoxon signed rank test, p = 0.003)
   - Economic significance: robo-advisor increases portfolio performance by 2.7% in line with previous research
2. Evidence for **parallel mediation** over number of advice requests and socialness perceptions following a product of coefficients approach (O'Rourke & Vazquez, 2019)
   - Significant **indirect effect over socialness perceptions** (bootstraped confidence interval with 1000 iterations: -0.050, -0.001)
   - Significant (conditional) **indirect effect over advice requests** (bootstraped confidence interval with 1000 iterations: -3.308, -0.695)
   - Regressions control for risk aversion, loss aversion, disposition to trust, sociability, financial sophistication, experience, gender, age, number of trades, duration
3. Lower perceptions of socialness (Mann-Whitney test, p = 0.014) and higher number of advice requests (Chi-square test, p = 0.007) in the recommendation algorithm group compared to the robo-advisor group, evidence for **opposing mediation**

Discussion

- Provision of investment advice from robo-advisor as a **debiasing feature**
- Support for cognitive dissonance as a **belief-based explanation** for the DE
- Anthropomorphism may hinder investors to actively seek advice, due to **trade-off** between desire to increase accuracy and maintain autonomy (Dalal & Bonaccio, 2010)
- **Implications** for the design of digital advisory services:
  i. Optimize level of anthropomorphism by maximizing debiasing effect of blaming someone else (agency effect), and simultaneously
  ii. Increase perceptions of autonomy and control retention (e.g., by providing alternative forms of advice)

Limitations and Future Research

- University student sample
- Single industry

→ Extend results to other demographic groups as well as to other relevant settings such as advisory services in the insurance or healthcare domain

References

- Dalal, R. S., & Bonaccio, S. (2010). What types of advice do decision-makers prefer? *Organizational Behavior and Human Decision Processes*, 112(1), 11–23.
- Festinger, L. (1957). *A theory of cognitive dissonance*: Stanford university press.
- O'Rourke, H. P., & Vazquez, E. (2019). Mediation analysis with zero-inflated substance use outcomes: Challenges and recommendations. *Addictive Behaviors*, 94, 16–25.
- Odean, T. (1998). Are investors reluctant to realize their losses? *The Journal of Finance*, 53(5), 1775–1798.
- Shefrin, H., & Statman, M. (1985). The disposition to sell winners too early and ride losers too long: Theory and evidence. *The Journal of Finance*, *40*(3), 777–790.
- Weber, M., & Camerer, C. F. (1998). The disposition effect in securities trading: An experimental analysis. *Journal of Economic Behavior & Organization*, 33(2), 167–184.

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