Can Experience Sampling Restore Invariance in Financial Market Expectations?

Zwetelina Iliewa\textsuperscript{a} Martin Weber\textsuperscript{b}

Extended Abstract

Prices and returns are alternative ways to present the performance of financial assets. Although charts of prices and returns convey the same information, they induce different expectations, which is a violation of the description invariance assumption of normative decision theory. For instance, a fund that aims to increase the optimism of its investors or draw their attention to the most recent performance, can do so by displaying a price chart rather than a return chart. This result was shown by Glaser et al. (2018). The objective of this paper is to learn how to reduce investors’ susceptibility to format changes. To this end, we propose to use experience sampling.

Experience sampling has been applied in previous literature to improve subjects’ understanding of the distribution of a risky asset (e.g., Hogarth and Soyer, 2015) and to increase financial risk taking (e.g., Kaufmann et al., 2013). Instead of learning about the properties of the probability distribution from description, subjects ”experience” the distribution by sampling from it, such that they can see the distribution be revealed in front of their eyes. In this paper, we transfer the experience sampling approach to the presentation of time-series chart. In particular, we propose that subjects sample a time-series chart by moving period by period along it. In each period, a tooltip pops up which contains the exact numerical value of the price or the return respectively. The rest of the chart is revealed at all times. Our application of experience sampling for time-series charts closely resembles a widely used design of interactive charts on financial websites and trading platforms (e.g., YAHOO! Finance, Google Finance, onvista etc.) In contrast to financial websites, in our experimental setting subjects cannot choose for themselves which periods to sample and in which order. The exogenous sampling size and order allows us to isolate the impact of potential differences in the salience and investors’ attention eventually resulting from the formats of prices and returns. Understanding how to use interactive charts to improve subjective expectations is of utmost importance against the backdrop of the rising importance of automated robo advisors. As robo advisors only ”communicate” with their clients by means of quantitative and graphical information, understanding how to reduce the impact of format changes on their clients’ perception of the information is crucial for the success of their advice.

We conduct two experiments - a laboratory experiment and an online experiment. The laboratory experiment is conducted in March 2017 with 197 subjects at the mLab laboratory at the University of Mannheim. The online experiment is conducted in December 2017 with 550 broad-population participants from Amazon Mechanical Turk. In both experiments subjects are provided with a sequence of 10 charts, each of them displaying the performance of one financial assets over a period of one year. In a between-subject design we vary the chart format — price versus return charts. For every financial asset, we ask subjects to forecast the next period (i.e., next month) by reporting the median of their subjective probability distribution. The remuneration is fixed at 12 euros (mLab experiment) and 4 dollars (MTurk experiment) respectively. We use fixed remuneration in both studies because a previous study by Glaser et al. (2018) shows that the main effect that we study - the effect of price and return

\textsuperscript{a}Max Planck Institute for Research in Collective Goods, Experimental Economics Group, Kurt-Schumacher-Str. 10, 53113 Bonn, E-mail: iliewa@coll.mpg.de

\textsuperscript{b}University of Mannheim, Department of Banking and Finance, L5.2, 68161 Mannheim, Centre for European Economic Research (ZEW), L7.1, 68161 Mannheim, and the Centre for Economic Policy Research, London EC1V 0DX, E-mail: weber@bank.bwl.uni-mannheim.de
charts on expectations - does not change when performance-based incentives are introduced. To isolate the impact of random patterns in the data as well as the potential impact of confounding factors, we follow the design by Glaser et al. (2018). To learn how experience sampling influences the effect of price and return charts on subjective expectations, in the mLab experiment we use a $2 \times 2$ between-subject design, varying the display of the charts (static versus experience sampling) and their format (prices versus returns). It should be noted, that our proposed application of experience sampling for time-series charts (i) exposes subjects to more numbers and (ii) requires them to spend more time viewing the chart than in the baseline static display. To disentangle the effect of these factors from the actual effect of experience sampling, in the subsequent MTurk experiment we further introduce purely graphical experience sampling charts and static charts with numbers in a $2 \times 2 \times 2$ design (format $\times$ display $\times$ numbers). In the purely graphical experience sampling treatment, we replace the appearing tooltip with an appearing marker in price (line) charts and shading in return (bar) charts.

Our main results can be summarized as follows. In line with Glaser et al. (2018), we find that static price and return charts result in different subjective expectations. The chart format has an overall weaker influence on expectation when experience sampling is used, although some subjects benefit from experience sampling more than others. In particularly, we find that the effect of experience sampling on the subjects’ susceptibility to format changes is mediated by their Bias Blind Spot for framing effects, Faith in Intuition and Preference for Numerical Information. Furthermore, we find that the effect of experience sampling is not driven merely by the exposure to numerical information. Static price and return charts, containing the numerical observations for every period, affect expectations to the same extent as static price and return charts that do not contain the numerical observations for every period. Moreover, the effect of experience sampling is not driven by the longer viewing time. Purely graphical experience sampling does not have any effect on the subjects’ susceptibility to format changes. Last but not least, we show that experience sampling also reduces the recency bias in subjective expectations by drawing attention to the early observations and away from the most recent observations.

Taken together, we conclude that experience sampling has a potential to reduce the impact of price-return format differences and changes to which investors are exposed in financial markets. Further research should be devoted to examining which applications of experiences sampling to time-series charts are most effective in this regard. Experience sampling is one example how robo advisors can use interactive charts when "communicating" with their clients. However, experience sampling is not a one-size-fits-all solution. Further research should be devoted to examining for whom and under what conditions it is effective.

References

