ABSTRACT

Many social interactions (examples are market overreactions, high rates of acquisitions, strikes, wars) are the result of agents’ overconfidence. Agents are in particular overconfident for difficult tasks. This paper analyzes overconfidence in the context of a statistical estimation problem. The authors find that it is rational to (i) be overconfident and (ii) to be notably overconfident if the task is difficult. The counterintuitive finding that uninformed agents which should be the least confident ones show the highest degree of overconfidence can be explained as a rational behavior.

Keywords: Belief Elicitation, Hard-Easy Effect, Overconfidence, Probability Assessment, Shrinking

INTRODUCTION

Lichtenstein and Fischhoff (1977) showed that agents are overconfident in their answers. Agents overestimate the chance of stating the correct answer compared to their empirical frequency. Literature found that overconfidence is a robust and pervasive phenomenon to all kind of measures (Lichtenstein et al., 1982; McClelland & Bolger, 1994; Weinstein, 1980; Taylor & Brown, 1988). Overconfidence can be found in all kinds of human interactions (see e.g. overconfidence in driving (Svenson, 1981), mergers (Malmendier & Tate, 2005), trading (Odean, 1998), strikes (Neale & Bazerman, 1985) among others). Considering only economics overconfidence results in high rates of business failure (March & Shapira, 1987), overestimation of returns (Heaton, 2002), overinvestments in own company (Malmendier & Tate, 2005), excessively high rates of stock trading (Statman et al., 2006) and market overreaction (Daniel et al., 1998). The phenomenon we regard is called overprecision by Moore & Healy (2008) to distinct it from other similar effects such as overplacement and overestimating own performance. The most prominent method to study confidence are sets of two-choice questions, such as “Which of these nations has higher life expectancy, averaged across men and women: (A) Argentina, or (B) Canada?”. Participants choose what they believe to be the correct answer and then are directed to specify their degree of confidence \( p \in [0.5, 1] \) that their answer is correct. After the participants answer many questions of this kind, the re-
responses are grouped in distinct classes of confidence. The relative frequencies of correct answers in each confidence category are calculated. Plotting the empirical frequency against the level of confidence, results in the so called calibration curves. They have been found with a similar pattern - robust to the questions asked. Agents are underconfident for low confidence levels and overconfident for high level of confidence (Gigerenzer et al., 1991; Juslin et al., 1997). Broadly there are three types of explanations. Agents may be not able to solve the cognitive processing (Sniezek et al., 1990). They may suffer of a bias and underestimate counterevidence (Koriat et al., 1980; Griffin & Tversky, 1992). Finally they might overweight the supporting evidence on purpose for e.g. self-motivational reasons (Taylor & Brown, 1988).

Besides overconfidence a second effect is the hard-easy effect (von Winterfeldt & Edwards, 1986). Agents are overconfident for hard tasks but underconfident for easy tasks. It has been also argued that it is less the difficulty of the task but rather the individual performance of the agent which drives the level of confidence (Kruger & Dunning, 1999). Klayman et al. (1999) find stable individual difference in agent’s confidence which indicates that the agent’s background, e.g. knowledge and experience influences his confidence. The hard-easy effect is either explained by confirmation biases from the agent itself (Bjoerckman, 1994). Or by biases induced by the experimenter who creates a laboratory setting which is unrepresentative of natural ecology (Gigerenzer et al., 1991).

We argue that the overconfident effect as well as the hard easy effect can be rationally explained. Considering estimation risk the agent might perform better by being biased towards overconfidence (underconfidence) for high (low, resp.) level of confidence. The bias however reduces his estimation noise. We perform a simple shrinking method with two targets. One target accounts for complete uncertainty \( s = 0.5 \), while the other accounts for complete knowledge \( s = 1 \). Assuming the agent minimizes his MSE we find that his best choice is surprisingly close to the calibration curves found in literature (Klayman et al., 1999; Juslin et al., 2000). Agents are overconfident for high level of confidence and vice versa. Also the hard-easy effect can be explained by our shrinking procedure. As the task becomes easier and estimation risk is reduced the agent becomes more calibrated or even underconfident. Our paper contributes to the field of multi criteria decision analysis (Sodenkamp & Suhl, 2012; Jajimogga et al., 2011; Das et al., 2012).

The remainder of this paper is structured as follows: The introduction is followed by a section where we define overconfidence and underconfidence. We present propositions to show when it is rewarding to be misspecified and in which direction the misspecification goes. We then model the agent’s decision process by a simple framework. We can explicitly account for his level of knowledge to model the hard-easy effect. Followed by a section where we compare the results of our model to empirical findings. Further we discuss some assumptions and consequences of our model. We state our conclusions in the last section.

**SETUP**

To analyze agents’ judgment typically binary questions such as “Are Potatoes native to Peru or Ireland?” are asked. Additionally to the answer the subject has to state his confidence in his answer. The overconfidence phenomenon refers to the observation that the average subjective probability \( \bar{p} \) assigned to the correctness of the answers tends to exceed the proportion \( p \) of correct answers (Lichtenstein et al., 1982; Fischhoff et al., 1977). The hard-easy effect refers to the correlation between overconfidence and the task difficulty. Overconfidence is found to be more common for hard questions whereas underconfidence appears more in underconfidence tasks (Lichtenstein & Fischhoff, 1977; Klayman et al., 1999). The aim of this paper is first to understand why agents tend to be overconfident. Second, why they are more overconfident for difficult tasks. We argue that for hard
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