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Can anchoring explain biased forecasts? Experimental evidence

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ABSTRACT

Biased forecasts, particularly the inadequate adjustment from current values and excessive clustering, are increasingly explained as resulting from anchoring. However, experiments presented in support of this interpretation lack economic conditions, particularly monetary incentives, feedback for learning effects and an optimal strategy of unbiased predictions. In a novel forecasting experiment, we find monetary incentives to reduce anchoring for simple forecasting tasks only, while higher task complexity and risk increase the bias in spite of incentives for accuracy. Anchors ubiquitously reduce the forecasts' variance, while individual cognitive abilities and learning effects show debiasing effects only in some conditions. Our results emphasize that biased forecasts and their specific variance can result from anchoring.

1. Introduction

The anchoring heuristic (Tversky and Kahneman, 1974) is increasingly considered to explain biased forecasts with examples including as diverse as financial forecasts (Fujiwara et al., 2013), real estate price forecasts (Northcraft and Neale, 1987; Bucchianeri and Minson, 2013), sports betting (Johnson et al., 2009; McAlvanah and Moul, 2013), earnings forecasts (Cen et al., 2013), macroeconomic forecasts (Nordhaus, 1987; Frankel and Froot, 1987; Bofinger and Schmidt, 2003; Campbell and Sharpe, 2009; Hess and Orbe, forthcoming) or sales forecasting (Lawrence and O'Connor, 2000). The findings point to two core empirical patterns: an excessive influence of current values and a clustering of forecasts, reflected in a low overall variance. The underlying mechanism is typically described as in Harvey (2007, p. 17), who states that forecasters tend to "*use the last data point in the series as a mental anchor and then adjust away from that anchor to take account of the major feature(s) of the series. However, as adjustment is typically insufficient, their forecasts are biased*". Given that almost 40 years of psychological studies show the robustness of anchoring (cp. Furnham and Boo, 2011 for a review), it provides a reasonable explanation for biased individual forecasts.[1]

There is, however, substantiated criticism concerning the immediate applicability of psychological evidence to explain economic data. On a general level, markets are expected to rule out behavioral biases as individuals gain expertise and face real financial stakes (Levitt and List, 2007; List and Millimet, 2008). Persistent biases subsequently result from specific laboratory conditions and experimenter demand effects, and ultimately hold little relevance outside the lab (Zizzo, 2010). In the specific case of anchoring, this is suggested in the field experiments of Alevy et al. (2010) and Fudenberg et al. (2012), who show only minor anchoring effects on subjects' willingness-to-pay/-accept. Their results resonate well with Clark and Friesen's (2009) criticism of economists' tendency to adopt psychological biases as stylized facts without

[1] Another prominent explanation of systematically biased forecasts points to reputational concerns of forecasters trying to strategically conceal their inability to predict future values. This results in strong incentives for herding behavior among forecasters. For this approach, see e.g. Ottaviani and Sørensen (2006) or Lamont (2002) and the experimental study by Ackert et al. (2008).

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supportive experimental studies that implement economic conditions. Consider the classic psychological studies cited in support of anchoring in forecasting, in which subjects take uninformed and non-incentivized guesses (''How many African countries in the UN?''). In these settings, anchoring ultimately cannot be seen as a deviation from the rational strategy. By contrast, anchoring might actually increase – if only slightly – the likelihood of a correct guess when subjects lack task specific knowledge and are not provided any information. While the applicability of these results to economic domains might still hold for situations of purely intuitive decision-making, it is insufficient proof for forecasting settings where distinctly non-intuitive decision processes and strong incentives for correct predictions prevail.

Accordingly, controlled laboratory studies are needed to systematically assess the robustness of anchoring in forecasting settings. This includes timely feedback to enable learning effects, a chance of correct predictions by providing an optimal strategy of avoiding the anchor, a non-intuitive high cognitive effort task and finally monetary incentives. Our experimental design implements these factors. We thus close the gap between economic empirical studies on anchoring and the respective psychological lab-based studies in order to enable the application of anchoring to economical domains. We introduce a simple numerical forecasting task that distinctly facilitates unbiased decisions as the rational strategy. The respective last values of the time series serve as anchors and thus have a dual function: they reveal the previous periods' correct value to enable learning effects, as well as provide the anchor value for the current period. In this setting, we investigate the influence of monetary incentives, cognitive abilities, task-specific risk and task complexity on the extent of the anchoring bias. In contrast to previous forecasting experiments (see Leitner and Leopold-Wildburger, 2011 for a review), a correct prediction is considerably easy to achieve.[2] Unlike regular anchoring experiments, we facilitate the optimal strategy to test for anchoring under conditions that offer an easily accessible strategy of unbiased forecasts. While this evidently contradicts the complexities of actual forecasting, we argue that a test of anchoring in forecasting should implement a low-complexity task. If anchoring occurs when avoiding it is simple and incentivized, we assume that its impact on actual forecasts in a complex environment is even more relevant.

In the following, the respective literature is reviewed to deduct our behavioral hypotheses. Tversky and Kahneman's (1974) seminal paper presented the 'anchoring-and-adjustment' heuristic, from which numerous studies have evolved that show a pervasive influence of anchoring in decision-making. The aspects tested are diverse and range from factual knowledge (Blankenship et al., 2008; Wegener et al., 2001) to probability calculations (Chapman and Johnson, 1999) to price estimations after monetary reforms (Amado et al., 2007). Task-specific expertise is shown to be irrelevant for the anchoring bias, as in Englich and Soder (2009), for a judicial context supporting the assumption that forecasting experts may be equally susceptible to anchor heuristics. Overall, the influence of the anchoring heuristic proved to be ''*exceptionally robust, pervasive and ubiquitous*'' (Furnham and Boo, 2011, p. 41) regarding experimental variations.

There are only two experimental study of anchoring in forecasting contexts so far. Critcher and Gilovich (2008), investigated the influence of incidental anchors in real life; e.g. by attempting to forecast the capabilities of athletes with high and low shirt numbers. They find that subjects are subconsciously biased by the closest incidental anchor in their environment for their estimations. Meub and Proeger (2015) test the influence of endogenous, socially derived anchors and find that forecasters are more strongly biased towards such anchors than to neutral, experimenter-given anchor values.

Regarding incentives for accurate predictions, Tversky and Kahneman (1974), Wilson et al. (1996) and Epley and Gilovich (2005) offer prizes as rewards for the most accurate, unbiased estimations but find only minor effects of such an incentive. Chapman and Johnson (2002) summarize these findings, concluding that ''*incentives reduce anchoring very little if at all*'' (p. 125). Wright and Anderson (1989) find a reduction in the bias using performance-related financial incentives, if subjects are familiar with the tasks. Simmons et al. (2010) show that incentives for accuracy work, once subjects are given certainty about the correct direction of adjustment for their initial predictions. We interpret these contradictory findings as resulting from a varying availability of strategies for solving the given tasks and the information at hand. Once participants are given the realistic chance of issuing more accurate predictions, monetary incentives are able to reduce anchoring effects. This is in line with standard assumptions concerning the introduction of monetary incentives in economic experiments (see e.g. Smith and Walker, 1993), which are expected to induce more rational behavior.

There are two contradictory results concerning the role of cognitive abilities in anchoring. Stanovich and West (2008) do not find a correlation between the susceptibility to anchoring and higher cognitive abilities, based upon individually stated SAT results. Oechssler et al. (2009) come to the same conclusion using the cognitive reflection test (Frederick, 2005). Using a corporate cognitive ability test, Bergman et al. (2010) find a significant reduction of anchoring in subjects with higher cognitive abilities. Similar to Oechssler et al. (2009), we choose to draw on the CR-test, as it can be completed in a short period of time and has been shown to be a good predicator of cognitive abilities, particularly regarding mathematical abilities (Frederick, 2005).

Blankenship et al. (2008) examine the effect of increased cognitive load, i.e. a systematic mental overload of subjects and find significant anchoring effects, which supports (Wegener et al., 2001, 2010) who argue that different levels of cognitive effort can induce anchoring, albeit due to different mechanisms. On the one hand, in simple tasks, the anchor is used intuitively as a cue to the correct answer; on the other, the anchor works in the framework of a more complex thinking process by activating anchor-consistent knowledge. Therefore, anchor biases can occur in the context of intuitive decisions and analytically challenging tasks. While the observable result is identical, the cognitive processes that elicit anchoring need to be differentiated in respect of the context investigated (Crusius et al., 2012). Consequently, a valid test of anchoring in forecasting has to implement high-cognitive-effort tasks that more closely resemble the actual cognitive processes of forecasting, in contrast to the classical anchoring studies that mostly induce intuitive responses. Accordingly, the anchoring task has to foster non-intuitive decisions, yet provide a fairly simple rational strategy of unbiased decisions.

We contribute to the literature reviewed above by presenting new evidence on the influence of monetary incentives for unbiased predictions, cognitive abilities, task complexity and learning effects in the context of anchoring. Despite the deliberately

[2] There are many time series forecasting experiments investigating individual prediction behavior (see Harvey, 2007 for a literature review). However, these studies are not designed to capture anchoring itself. While they point to anchoring as a potential explanation of behavior, the designs do not give specific evidence comparable to previous research on anchoring. They are also defined by excessive complexity of the forecasting tasks and varying sources of information. As we are not interested in these aspects, but rather the anchoring effect itself, we refrain from basing our setting on the classic forecasting experiments. For examples of time series forecasting experiments, see e.g. Bolger and Harvey (1993), Lawrence and O'Connor (1995), Becker et al. (2005, 2007, 2009), Leitner and Schmidt (2006) and Reimers and Harvey (2011).