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# Judgmental overconfidence and trading activity☆

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ABSTRACT

We investigate the theoretically proposed link between judgmental overconfidence and trading activity. In addition to applying classical measures of miscalibration, we introduce a measure to capture misperception of signal reliability, which is the relevant bias in the theoretical overconfidence literature. We relate the obtained overconfidence measures to trading activity in call and continuous experimental asset markets. Our results confirm prior findings that classical miscalibration measures are not related to trading activity. Misperception of signal reliability is positively related to trading volume in the continuous market for one of two treatments. In the other one, no relation is found except that highly overconfident subjects trade less. In addition, we find that men trade more than women at high levels of risk aversion, but the gender trading gap vanishes as risk aversion lessens. The reason is that the trading activity of women seems to be more sensitive to risk attitudes than that of men.



## 1. Introduction

Trading activity on financial markets appears to be extraordinarily high. De Bondt and Thaler (1995) claim that the observed level of trading "is perhaps the single most embarrassing fact to the standard finance paradigm" (p. 392). This motivated several researchers in behavioral finance to extend traditional market models by plausible psychological biases, among which overconfidence is often viewed as the most promising to explain the "trading puzzle" (see, e.g., De Bondt and Thaler, 1995). The recent psychological literature distinguishes between three distinct types of overconfidence: (i) judgmental overconfidence (i.e., overestimating the precision of one's judgment), (ii) self-enhancement biases (i.e., positive self-illusions such as the better-than-average effect and illusions of control), and (iii) optimism with respect to societal risks (e.g., Hilton et al., 2011).[1] Overconfidence in the theoretical finance literature revolves around the first type as it is exclusively modeled as a biased belief about the precision of private information (e.g., Odean, 1998; Kyle and Wang, 1997; Benos, 1998; Caballé and Sákovics, 2003). An overconfident investor overestimates the precision of her private information, therefore overweights this information when she updates her beliefs, and, as a consequence, ends up with a biased posterior belief about the value of an asset. Ultimately, this will lead to more trade.

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[1] For a slightly different categorization and terminology, see Moore and Healy (2008).

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Several empirical studies investigate the link between overconfidence and trading volume. However, most of these studies do not measure overconfidence directly and therefore need to rely on proxies of overconfidence such as gender or past trading success (see, e.g., Barber and Odean, 2001; Chuang and Lee, 2006; Statman et al., 2006). In addition, it often remains unclear which facet of overconfidence these studies actually address. Thus, most existing empirical results provide at best suggestive evidence for the modeled effects of judgmental overconfidence on trading since they depend on certain auxiliary assumptions.

Only a few studies test the overconfidence-trading hypothesis directly (Biais et al., 2005; Glaser and Weber, 2007; Deaves et al., 2009). To assess judgmental overconfidence, these studies utilize a well-established method from cognitive psychology and employ so-called interval production tasks with respect to general knowledge: individuals have to state confidence intervals for numerical answers to several knowledge questions.[2] The common result of such tasks is that individuals' confidence intervals are too narrow. This indicates that individuals overestimate the precision of their knowledge, a phenomenon that is usually called "miscalibration."

However, it appears that miscalibration does not trigger increased trading volume. Biais et al. (2005) find no relation between miscalibration scores and trading activity in a series of experimental asset markets. Glaser and Weber (2007) confirm this finding. In their study, they combine real trading data from investors of a German online broker with individual miscalibration scores, which they obtained through an Internet survey. In addition to miscalibration with respect to general knowledge, they obtained miscalibration regarding volatility estimates in stock market forecasting. However, neither of their measures predicts trading activity and they conclude that "[m]easures of miscalibration are, contrary to predictions of overconfidence models, unrelated to measures of trading volume" (p. 32).[3]

A different result is reported in a study by Deaves et al. (2009). In a series of experimental asset markets, they find that higher levels of miscalibration indeed predict higher levels of trading volume. However, by design, their measure of miscalibration is confounded with the better-than-average effect, which clearly is a different type of overconfidence from that modeled in the finance literature. Consequently, one cannot interpret their findings as confirming evidence in favor of the overconfidence models.[4]

As it stands, the existing evidence speaks against the theoretically derived link between judgmental overconfidence and trading volume. Does this mean that models invoking judgmental overconfidence as a reason for high trading volume have to be rejected? We argue that the lack of empirical support for the overconfidence effect on trading may be rooted in a discrepancy between modeling and measuring overconfidence (see Fellner and Krügel, 2012). Whereas the theoretical overconfidence literature models the perception of signal reliability, the measurement of overconfidence in empirical studies relies on calibration scores with respect to the misperception of own knowledge and/or time series volatility. In line with some other studies (e.g., Glaser and Weber, 2007), Fellner and Krügel (2012) find that miscalibration in a knowledge task is associated with miscalibration in a time series forecasting task, suggesting that both tasks expose the same underlying judgmental bias. However, misperception of signal reliability seems to be a distinct bias.

In the present study, we build on these results and undertake a new test of the predictions of the overconfidence models. In addition to the usual measures of miscalibration used in previous empirical studies, we also capture individuals' perception of signal reliability. To this end, a prediction task is used in which subjects have to forecast the realization of a random variable based on a noisy signal over many rounds. Subjects know that the underlying distribution of the noise term is kept constant across rounds and that the *a priori* signal quality is therefore the same in each round. For each subject we then regress the predictions on the corresponding signals. By this procedure, we obtain an individual measure of the weighting of information which captures the perception of signal reliability.

This proposed measure of overconfidence has several advantages over the miscalibration measures used so far in empirical tests of the overconfidence hypothesis. First, it captures the judgmental bias incorporated in the overconfidence trading models most closely. Second, the underlying task can be easily incentivized and the overconfidence measure does not rely on pure survey questions. Third, the proposed measure is inferred from actual behavior and "it is quite possible that while individuals are not able to *communicate* probabilistic assessments well, they are able to *incorporate* them into their decisions" (Kogan, 2009, p.1893).

Our paper makes another important contribution to the existing literature by investigating the link between overconfidence and trading volume while additionally controlling for risk attitudes and gender effects. Men have frequently been found to be more overconfident than women, although this effect seems to be task dependent (Lundeberg et al., 1994). Still, higher overconfidence is assumed to account for higher trading activity by men (see Barber and Odean, 2001) when, in fact, it is possible that this effect is driven by gender differences in risk attitudes (Fellner and Maciejovsky, 2007). Surprisingly, previous studies on overconfidence and trading have largely neglected the possible interaction of these aspects.

Uncovering the potential link between overconfidence and trading is not only interesting in light of testing the predictions of finance models, it also relates to the more fundamental debate on whether and which psychological biases affect economic behavior. This debate is far from being settled in the literature yet (see also Glaser and Weber, 2007) and it is important to

[2] Note that the interval production method can hardly be incentivized.

[3] While miscalibration does not predict trading activity, it is related to other economically relevant behavior, like managers' use of debt financing or certain investment strategies (e.g., Ben-David et al., 2013).

[4] Glaser and Weber (2007) also make this point. See their footnote 45.