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Prospect Theory and market quality

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Abstract

We study equilibrium trading strategies and market quality in an economy in which speculators display preferences consistent with Prospect Theory (Kahneman and Tversky, [39]; Tversky and Kahneman, [63]), i.e., loss aversion and mild risk seeking in losses. Loss aversion (risk seeking in losses) induces speculators to trade less (more), and less cautiously (more aggressively), with their private information – but also makes them less (more) inclined to purchase private information when it is costly – in order to mitigate (enhance) their perceived risk of a trading loss. We demonstrate that these forces have novel, nontrivial, state-dependent effects on equilibrium market liquidity, price volatility, trading volume, market efficiency, and information production.

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1. Introduction

Over the past two decades, a large and long-standing body of experimental evidence on human behavior has provided support to the notion, first formulated by Kahneman and Tversky [39] as *Prospect Theory*, that the decision-making process of *any* economic agent may depart from the predictions of standard expected utility theory. In Tversky and Kahneman's [63] version, Prospect Theory postulates that economic agents assess gambles with a value function defined over gains and losses relative to a reference point (instead of the absolute level of financial wealth or consumption), concave over gains (*risk aversion*), but convex (*risk seeking*) and steeper (*loss aversion*) over losses. Recent work employs modified versions of this theory to interpret the behavior of financial investors and study the pricing of financial securities. Prospect Theory arguments have been proposed to explain such known asset pricing puzzles as the magnitude of the equity premium, excess stock return volatility, momentum and the disposition effect, the value premium, or stock return predictability and its implications for portfolio selection.²

The past two decades have also been characterized by an increasing interest in the study of the process of price formation in financial markets. Market microstructure research has studied (both theoretically and empirically) such issues as the mechanisms through which private information is acquired, utilized, and impounded into prices, agents' reasons for trade and optimal trading strategies, and the implications for liquidity and volatility.³ Yet, to our knowledge, this literature has not examined any of these issues when investors make decisions according to Prospect Theory.

The main objective of this paper is to investigate the effects of Prospect Theory on market quality. Our theoretical analysis makes two related contributions to the literature. First, its predictions are novel and indicate that these effects are nontrivial and may play an important role in explaining financial market quality. Second, its predictions are testable, thus possibly refutable rather than aimed at matching extant features of the data. As such, they provide an unbiased, albeit more challenging opportunity to assess the empirical relevance of unconventional utility models.

Our theory is based on a one-period model of sequential trading in the spirit of Grossman and Stiglitz [29], Kyle [45], and Vives [67]. The model is populated by a continuum of informed traders (competitive, price-taking speculators endowed with a noisy signal of the asset payoff) submitting demand schedules (i.e., generalized limit orders), noise traders submitting market orders, and competitive, risk-neutral market makers (MM). If a speculator's preferences are described by an exponential utility function (MV speculation), the model's implications for trading strategies, market depth (the inverse of Kyle's [45] "lambda," or price impact of noise trading), price volatility, informed trading volume, and price informativeness are well-known in the literature (e.g., Vives [68]). We depart from this standard setting by assuming that (PT) speculators display preferences capturing parsimoniously *all* of the aforementioned main features of Kahneman and Tversky's [39] Prospect Theory – as well as their *relative* importance (as assessed by Tversky and Kahneman [63]).⁴

² E.g., Benartzi and Thaler [10], Ait-Sahalia and Brandt [2], Barberis, Huang, and Santos [6], Barberis and Huang [4], Berkelaar, Kouwenberg, and Post [11], Gomes [25], Grinblatt and Han [28], Barberis, Huang, and Thaler [7], Kyle, Ou-Yang, and Xiong [46], Barberis and Huang [5], Barberis and Xiong [9], and Li and Yang [52].

³ E.g., see the surveys in O'Hara [57], Hasbrouck [30], and Vives [68].

⁴ More precisely, we assume that a PT speculator makes trading decisions maximizing a tractable piecewise *value function* nesting the mean-variance value function of a risk-averse (MV) speculator. This assumption allows us to char-

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