



# Nominal price illusion<sup>☆</sup>

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## ABSTRACT

We explore the psychology of stock price levels and provide evidence that investors suffer from a nominal price illusion in which they overestimate the room to grow for low-priced stocks relative to high-priced stocks. While it has become increasingly clear that nominal price levels influence investor behavior, why prices matter to investors is a question that as of yet has gone unanswered. We find widespread evidence that investors systematically overestimate the skewness of low-priced stocks. In the broad cross-section of stocks, we find that investors substantially overweight the importance of price when forming skewness expectations. Asset pricing implications of our findings are borne out in the options market. A zero-cost option portfolio strategy that exploits investor overestimation of skewness for low-priced stocks generates significant abnormal returns. Finally, investor expectations of future skewness increase drastically on days that a stock undergoes a split to a lower nominal price. Empirically, however, future physical skewness decreases following splits.

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## 1. Introduction

The level of a firm's stock price is arbitrary as it can be manipulated by the firm via altering the number of shares outstanding. Nevertheless, nominal prices clearly influence investor behavior. For example, individuals tend to hold lower-priced stocks than institutions.<sup>1</sup> Schultz (2000) finds additional evidence of investor price-level preferences, showing an increase in the number of small shareholders following a split to a lower price level. Fernando, Krishnamurthy, and Spindt (2004) find that IPO offer price plays a strong role in determining investor composition. Finally, Green and Hwang (2009) find particularly strong evidence that investors categorize stocks based on price. They show that similarly priced stocks move together; after a stock split, splitting stocks experience increased comovement

<sup>1</sup> See Gompers and Metrick (2001), Dyl and Elliot (2006), Kumar and Lee (2006), and Kumar (2009).

with low-priced stocks and decreased comovement with high-priced stocks.

Firms appear to be well aware of the important role that nominal prices play in influencing investor perceptions, as they frequently engage in the active management of share price levels in an apparent effort to cater to investor demand. For instance, despite the lack of a rational explanation, firms have proactively managed share prices to stay in a relatively constant nominal range since the Great Depression (Weld, Michaely, Thaler, and Benartzi, 2009). Baker, Greenwood, and Wurgler (2009) find that investors have time-varying preferences for stocks of different nominal price levels and that firms actively manage their share price levels to maximize firm value by catering to these time-varying investor preferences. Dyl and Elliot (2006) also find evidence that firms manage share prices to appeal to their investor base in an effort to increase the value of the firms. The rationale for investors' focus on nominal prices is not well understood, as past work has focused on the implications of these preferences while only hypothesizing about the potential underlying drivers. In short, while past research shows that nominal prices clearly influence the behavior of investors, why prices matter to investors is an as of yet unanswered question.

The lack of empirical evidence has not dissuaded speculation as to why investors are influenced by nominal prices. For example, Kumar (2009, p. 1890) states that “as with lotteries, if investors are searching for ‘cheap bets’, they are likely to find low-priced stocks attractive”. Green and Hwang (2009, p. 38) hypothesize that “investors may perceive low-priced stocks as being closer to zero and farther from infinity, thus having more upside potential”. While Baker, Greenwood, and Wurgler (2009, p. 2562) state that “One question that the results raise, and that we leave to future work, is why nominal share prices matter to investors...Perhaps some investors suffer from a nominal illusion in which they perceive that a stock is cheaper after a split, has more ‘room to grow,’ or has ‘less to lose’”.

A great deal of anecdotal evidence also exists that investors believe low-priced stocks have more room to grow. For example, a number of mutual fund families offer low-priced stock funds that primarily invest in stocks trading below a specified price per share (the cutoff for meeting the low-priced definition varies by fund, but it is typically in the \$15–\$35 range).<sup>2</sup> This is often viewed as a marketing gimmick designed to appeal to investor psychology.<sup>3</sup> The notion that low-priced stocks have more upside potential is often reinforced by the funds themselves.

<sup>2</sup> Fidelity's Low-Priced Stock Fund has operated since 1989, with an explicit strategy of investing in stocks priced below \$35 per share. Royce's Low-Price Fund has been in operation since 1993, with the strategy of investing in stocks priced below \$25. A now defunct low-priced fund was launched by Robertson Stephens in 1995. Perritt launched its own version in 2012, with a strategy of investing in stocks priced below \$15.

<sup>3</sup> Media sources that have referred to low-priced funds as gimmicks are too plentiful to cite, but they include the *New York Times*, the *Washington Post*, Mutual Fund Observer, Morningstar, Motley Fool, and even the manager of Fidelity's Low-Priced Fund (Schiffres, 2002, p. 64): “I was an analyst at Fidelity when everyone was asked for ideas for new funds...They accepted this one and added the low-price provision. It's a bit of a gimmick.”

The long-time manager of Fidelity's Low-Priced Stock Fund argues that “it's easier for a \$4 stock to go to \$8 than for a \$40 stock to go to \$80”.<sup>4</sup> And the Perritt Low Priced Stock Fund claims that stocks priced under \$15 have “plenty of room to move”.<sup>5</sup>

In this paper, we provide evidence that investors exhibit a psychological bias in the manner in which they relate nominal prices to expectations of future return patterns. We find evidence that investors suffer from the illusion that low price stocks have more upside potential. In doing so, we identify one potential driver of investor demand shifts that have been shown to lead to supply responses from corporations.

In attempting to assess expectations of upside potential, the natural variable to focus on is skewness. We rely empirically on the options market to extract investor skewness expectations. A key insight of our analysis is the use of option-implied risk-neutral skewness (*RNSkew*), which is a market-based ex-ante measure of investors' expectations. By utilizing risk-neutral skewness extracted from option prices, we are able to circumvent the need for a long time series of returns to estimate skewness. Instead, we can assess how market expectations of an asset's future skewness change on a daily basis. In doing so, we follow a number of recent papers in inferring investor expectations from option-implied skew.<sup>6</sup> Importantly, in our analyses we either hold constant the firm and examine high-frequency (day-over-day) changes in *RNSkew* or hold time constant and examine differences in option-implied skew in the cross-section of firms.

Our empirical analysis consists of three tests, each of which provides independent evidence that investors overestimate the skewness of low-priced stocks. First, examining the entire cross-section of stocks, we find that when forming skewness expectations, investors substantially overweight the importance of price relative to its true observed relation with physical skewness. Second, we show mispricing in option portfolios that is consistent with investor overestimation of skewness for low-priced stocks. Third, we find that investor expectations of skewness drastically increase (decrease) on the date of a stock split (reverse split) to a lower (higher) price. We also present evidence that the findings are driven by investor expectational errors regarding the upside, but not the downside, potential of low-priced stocks. Next, we discuss the findings in more detail.

Our initial analysis focuses on the cross-section of all stocks. While a relatively strong univariate inverse relation exists between price and physical skewness, this relation is driven by the correlation of price with other firm characteristics. After controlling for firm characteristics such as size, no significant relation remains between price and physical skewness. However, a quite strong inverse relation remains between price and *RNSkew*, even after

<sup>4</sup> See Schiffres (2002, p. 64).

<sup>5</sup> <http://www.prnewswire.com/news-releases/perritt-capital-management-launches-perritt-low-priced-stock-fund-plox-24854011.html>.

<sup>6</sup> See Dennis and Mayhew (2002), Han (2008), Bali and Murray (2013), and Conrad, Dittmar, and Ghysels (2013), among others.

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