Adverse selection and reputation in a world of cheap talk

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ABSTRACT

Internet message boards are inherently a world of cheap talk due to the anonymity of message authors. This paper investigates whether a pecuniary reputation system influences the adverse selection problem endemic to message boards. First, we find evidence that authors with high reputation scores are less likely to voluntarily offer a buy–hold–sell sentiment in a particular message. Second, we find that authors with no reputation at stake tend to be more bearish with their sentiment but, after controlling for selection, authors with more reputation at stake tend to be bullish in their sentiment. Third, we find that high-reputation authors tend to offer more accurate sentiments on the day their message was posted, which suggests day-trading behavior by authors, but that higher-reputation authors are no more accurate than others after the day of posting. Our results suggest that reputation, coupled with a small pecuniary reward system, can materially influence the adverse selection problem in a world of cheap talk.

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1. Introduction

The Internet has dramatically altered the way information is disseminated. For example, the website *ratemyprofessor.com* allows students to offer opinions and ratings of professors, often to the chagrin or dismay of those being reviewed. Other websites allow individuals to offer opinions about all forms of consumer products and services. These websites are characterized by economies of scale that make it possible for information posted by one person in one place to be accessed by people located in far-flung areas. However, opinion-based websites suffer from adverse selection problems because the opinions offered are most-often unsolicited and anonymous. Anonymity provides a level of security behind which an individual can offer factually incorrect opinions and information with seeming impunity.

Notwithstanding this problem, opinion-based Internet websites continue to persist. How can the adverse selection problem be overcome in these contexts? One approach is to provide a moderator to screen opinions and comments for obviously misleading or inappropriate content. However, this approach requires considerable resources and introduces a potential moral hazard problem

if the moderator has an agenda at odds with end users.[2] An alternative is to allow those who consume the information to identify and reward authors for quality information. Reputation systems have been implemented in a wide range of online applications, including auction sites such as *eBay.com* and reseller sites such as *Amazon.com*. However, the vast majority of reputation systems do not directly entail a pecuniary reward; rather, high-reputation only provides indirect benefits, perhaps through higher closing prices in auctions or more frequent sales by resellers.

This paper investigates a financial message board on which authors can voluntarily offer a buy–hold–sell sentiment (hereafter *sentiment*) that accompanies their posted message. Offering a buy–hold–sell sentiment on an Internet message board would seem a quintessential form of "cheap talk." However, the message board we investigate has two aspects that might mitigate the adverse selection problem. First, readers can add an author to their "watch list," after which all messages by that author are highlighted to the reader. We interpret the number of watch lists to which an author has been added as a non-monetary reputation measure. As the message board indicates the number of watch lists to which each author belongs, this simple index of popularity might alter the frequency and quality of sentiments provided by the author.

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[2] One could imagine a moderator of a financial opinion web-site filtering information to favor their position in an asset, notwithstanding the low theoretical probability that such filtering would provide abnormal returns.

A second attribute is that readers can purchase (through Paypal or a personal credit/debit card) credits with which to reward authors. Accumulated credits can be used by authors to reward other authors or to purchase goods and services from the message board (these electronic credits cannot be withdrawn or converted to real money). Each author's aggregated reward is also public information and might mitigate the adverse selection problem by changing the incentives to offer misleading or inaccurate information. We investigate whether such a reward system sufficiently alters incentives to encourage more truthfulness in an otherwise anonymous setting.

Our empirical model is guided by the literature investigating the buy–hold–sell sentiments offered by professional stock analysts. We relate any sentiment offered on a particular message to characteristics of the author at the time the message was posted, characteristics of the firm to which the message refers, and characteristics of the message itself. We address the obvious problem of sample selection by allowing the reputation of the author to influence whether a sentiment is offered.

The empirical analysis addresses three questions. First, does reputation influence the probability that an author offers a buy–hold–sell sentiment? Second, does reputation influence an author's buy–hold–sell sentiment, given that she offers a sentiment? Third, does reputation correlate with more accurate sentiment, given that a sentiment is offered?

2. The literature of online message boards

This paper draws together two distinct strands of literature. The first focuses on the impact of message board activity on asset prices, that is, whether explicit or implicit buy–hold–sell sentiments conveyed through messages posted on various Internet sites have any statistical relationship with asset price movements. The second strand of literature focuses on explaining the patterns of explicit buy–hold-sentiments by stock analysts and others, and whether the accuracy of sentiment is related to the reputation of the analyst.

Focusing on the first strand, online message boards are often filled with strong opinions and commentary. However, these opinions are thought to convey little useful information to investors primarily because of the anonymity of the authors and the extremely small amount of constructive information included in any particular message (Sabherwal, Sarkar, & Zhang, 2008). Furthermore, unlike professional journalism articles or financial reports, posted messages are often short and written in an informal, dialogue-like format (Admati & Pfleiderer, 2001). Thus it would seem unlikely that the material content of messages posted online would have any relationship with the prices of the assets to which the messages refer.

However, several studies, such as Tumarkin and Whitelaw (2001), Tumarkin (2002), Antweiler and Frank (2004), Das and Chen (2007), Gu, Konana, Liu, Rajagopalan, and Ghosh (2007) and Koski, Rice, and Tarhouni (2007), provide evidence that the general aggregate sentiment offered on Internet message boards is contemporaneously correlated with short-term abnormal returns, trading volume, and price volatility. However, a limitation of these studies is that often the buy–hold–sell sentiment of a message's author is not explicitly stated, either through statements in the body of the message or through an independent buy–hold–sell sentiment indicator.

Because not all message boards provide a separate buy–hold–sell sentiment indicator, several studies focus only on messages that explicitly indicate a buy–hold–sell sentiment in the body of the message, treating messages that do not reveal explicit sentiment as noise (see, for example, Gu et al., 2007; Tumarkin & Whitelaw, 2001). One downside to this approach is that potentially valuable information is discarded from the analysis.

In response, other researchers have developed techniques which utilize all messages, regardless of whether sentiment was offered, so to retain potentially useful information. One approach is to analyze the words included in the body of the message, gauge whether the message is relatively positive or negative, and generate a "perceived sentiment" score (for example, Antweiler & Frank, 2004; Das & Chen, 2007). While this approach allows all messages to contribute to a proxy for consensus sentiment it is clearly a second-best approach; the algorithm used to detect perceived sentiment might be mistaken. When analyzing a message board with a separate buy–hold–sell sentiment indicator these issues are avoided.

A second strand of literature related to the current study focuses on how sentiment is related to various aspects of the analyst, the firm involved, and other macro-level variables. Several suggest that stock analysts are generally overly optimistic when providing stock recommendations, partly because of conflicts of interest; see Jegadeesh, Kim, Krische, and Lee (2004), Carleton, Chen, and Steiner (1998), Michaely and Womack (1999), Barber, Lehavy, McNichols, and Trueman (2006), and Jackson (2005). Nonetheless, Stickel (1992), Park and Stice (2000), and Fang and Yasuda (2005) show that high-reputation stock analysts, so-called all-star analysts, have greater influence on stock prices and are more accurate in earnings forecasts than those with low or no reputation. Recently, Jackson (2005) found that high-reputation analysts generate more trades for their brokerage firms and more accurate analysts, in turn, have higher reputations.

A related strand of literature looks at the sentiment of those who post to message boards. Antweiler and Frank (2004), Tumarkin and Whitelaw (2001), Tumarkin (2002), Sabherwal et al. (2008) and Zhang and Swanson (2009), all show that online traders are consistently bullish or buy-side biased and that their aggregated sentiments can be interpreted as a bullishness index.

Whether online reputation systems offer useful information to users is an empirical question. The majority of the literature focusing on this area uses data from online auction sites to test for whether better seller reputation corresponds with higher closing prices, less time on market, and a greater probability of a successful auction. Three representative analyses, each of which focus on the reputation system used by the online auction site *eBay*, include Resnick and Zeckhauser (2002), Houser and Wooders (2006) and Depken and Gregorius (2010). These studies find that seller reputation has a positive correlation with the odds of a successful auction and, given a successful auction, with closing prices of various products.

3. Testable hypotheses

The popular stock message board *Thelion.com* provides a reputation system with which readers can not only provide a reputation score for each message author but the reputation score itself can be used for pecuniary gain. This reputation system mitigates the incentive for authors to post under different usernames, might reduce the incentive to "pump and dump" particular stocks, and might increase the incentives to offer accurate information. However, the questions addressed here is how the reader-financed reputation system influences the probability that an author will offer a buy–hold–sell sentiment on a given post, whether reputation influences the type of sentiment offered, and whether reputation correlates with the accuracy of any sentiment offered.