



User participation in a corporate prediction market

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ABSTRACT

Corporate prediction markets allow companies to use external market concepts to facilitate and support corporate decision making. Recently, Google, Microsoft, GE, Best Buy, and other firms have generated and used prediction markets as a means of gathering the “collective” intelligence of their employees. Since these markets capture and aggregate information from employees and ultimately provide information for decision making, some researchers have referred to them as decision support systems or group decision support systems.

Unfortunately, there has been limited theory development and empirical investigation of participation in corporate prediction markets. Accordingly, the purpose of this paper is to use theory generated about external investment markets to investigate participation behavior in an internal corporate market.

Analysis of the number of unique traders by date and market leads to a number of findings, including that market traders apparently trade on specific information, there is a day-of-the-week effect of their participation, and participation is decreasing over time. Understanding the existence of such effects is important because they can influence the ability of the market to provide sufficient, timely, and quality decision support information.

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1. Introduction

Prediction markets bring concepts of investment markets into corporations to gather information from employees to price potential events, resulting in a market for predictions. As a result, prediction markets are one approach that has been promoted as being used by companies (Dvorak [17]) to gather the “wisdom of the crowd” (Surowiecki [41]). A number of leading edge technology firms have made use of prediction markets internally, including Google (Cowgill et al. [13]), Microsoft (Berg [3]), and GE (Spears et al. [38]). Further, McKinsey held a forum to study the promise of prediction markets (Dye [16]). As a result, it is not surprising that prediction markets have been featured in key publications including *The New York Times* (Lohr [27]) and *The Wall Street Journal* (Dvorak [17]).

More recently, Rydholm [37] noted that prediction markets are among the top 5 “newer techniques” that have potential to add value for corporate marketing objectives by solving business problems. In that survey, prediction markets ranked above other emerging technologies such as crowd sourcing, gamification, biometrics, and facial coding. Prediction markets were grouped with social media, big data analytics, and text analytics as providing particularly high potential.

Prediction markets, generally accepted as part of so-called “web 2.0” (e.g., Chui et al. [9] and Consensus Point [12]), introduce “stock markets” into corporations in an effort to gather and aggregate knowledge and information from participants, typically, employees. Stocks, such as

“project X will be completed by June 1” are traded among participants in order to gather data from throughout the company as to estimates of the probability of such events. Thus, prediction markets are run in order to make predictions about future events (e.g., Berg and Reitz [4]) to provide information to support decisions (e.g., Hanson [22], Berg and Reitz [4] and Sprenger et al. [39]). As a result, prediction markets provide an organizational decision support system that depends on participation from a range of employees and groups within the organization.

1.1. User participation in markets—The human side of prediction markets

Unfortunately, there has been limited analysis of the “human side” of these markets. In particular, there has been limited empirical research into participation patterns by employees in these markets. If a prediction market is to serve as a decision support system, then it is important that the system consistently provides sufficient, timely, and quality information.

Participation is critical for the generation of sufficient information for the system. First, if there are few traders rather than more traders, then there is less likely to be the sufficient or timely information flows to the system to support decision making. For example, in the firm analyzed, there are days where there are zero traders and stocks with as few as three total traders, indicating limited information flows in such settings. Second, if there are more traders rather than few traders then market prices become more informative because the price is averaging more predictions (Grossman and Stiglitz [20]). Accordingly, prediction markets generally work “better” with more participants rather than fewer.

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Further, it is important that the prediction market process gathers quality information from the crowd and embeds that information in the price of the different events. Unfortunately, apparently some tactics used by traders in prediction markets try to mislead the market rather than trading on information and building that information into the price. Other traders take approaches, such as assuming that projects will always be late, and always betting against projects finishing by their deadline. As a result, it is important to determine if there is evidence that internal traders trade on information.

Finally, the long-run viability of such systems is dependent on sufficient and continued participation from employees. As a result, it is critical to investigate apparent participation patterns in order to determine the extent to which participation in such markets continues to persist over time.

1.2. Purpose of this paper

Although prediction markets have been around for a number of years, the actual use of prediction markets internally for business decision making has been a relatively recent and apparently limited phenomena in corporate environments (Nocera [31]). As a result, there has been limited analysis of actual corporate markets and limited access to actual corporate data use from prediction markets. Accordingly, there has been limited theoretical development and limited analysis of their actual use in corporate settings. As a result, Rieg and Schroder ([35], p. 35) note that there have been "... hardly a handful of cases published."

Although some companies may generate and analyze such data internally, unfortunately, data such as these generally are not made publicly available to academics. However, this paper uses access to actual corporate prediction data, in order to begin to address some of the unique issues associated with such markets in corporations. Specifically, this paper investigates some characteristics of corporate prediction markets drawing on actual participation data derived from a well-known company that has used prediction markets, Best Buy.

Accordingly, the purpose of this paper is to analyze the trader participation of two different employee groups ("corporate" and "retail") on two different types of prediction market problems (corporate and retail), given that traders can trade on any of the stocks in the market. This analysis provides a number of findings from this data, including evidence that, as in external financial markets,

- Although traders might use multiple approaches as the basis of their trades, more corporate (retail) traders apparently trade on corporate (retail) information available to them, thus suggesting that markets are a good approach to gather decision support information about events from knowledgeable participants.
- There are "day-of-the-week" effects associated with the number of unique traders in this corporate prediction market, suggesting that such effects need to be considered when using markets to generate information or predictions within companies, particularly as a decision support system.
- There is a "beginning of the month" effect with a differential number of unique traders in the beginning of the month compared to the markets at the end of the month, suggesting that market designers consider this as they generate prediction markets for decision support.
- There is a "monthly" effect with differential numbers of unique traders involved in the markets during different months suggesting that market designers take this into account as they implement prediction markets for decision support systems.

In addition, in this corporate prediction market,

- The number of unique (daily) traders rapidly decreases over time but the rate of those decreases differs between the two groups of employees (corporate and retail). Unfortunately, the decreasing rate of participation ultimately could jeopardize the use of prediction

markets as decision support systems as the number of participants drops.

In developing these findings, this paper employs theory that has been developed in finance for investment markets and uses that theory to better understand a decision support technology that is "part markets and part technology." Further, this paper applies that theory to this context of corporate prediction markets, facilitating an understanding of such internal markets in terms of previously developed theories.

1.3. Outline of this paper

Section 1 of this paper has briefly introduced the notion of prediction markets, motivated the paper and discussed the purpose of the paper. Section 2 analyzes some previous research involving corporate prediction markets. Section 3 summarizes the available data and discusses the background of the company, Best Buy. Section 4 establishes expectations regarding the potential findings in the data, while section 5 examines the findings from analyzing the data. Section 6 examines some of the business implications of these markets, while Section 7 briefly summarizes the paper, its contributions and provides some extensions.

2. Background: Markets, open prediction markets, and corporate prediction markets

This section provides a brief summary of prediction markets and some of their characteristics, with a focus on corporate prediction markets. Corporate prediction markets differ from traditional approaches that focus on gathering knowledge and information from corporate experts, and instead make use of the so-called "wisdom of the crowds" (Surowiecki [41]), gathering knowledge that is broadly distributed among the employees. This approach is consistent with economic theory. For example, as noted by Hayek [24] "...knowledge (is) not given to anyone in its totality. Instead "...the knowledge of the circumstances of which we must make use never exists in concentrated or integrated form, but solely as the dispersed bit of incomplete and frequently contradictory knowledge which all the separate individuals possess." As a result, it is critical for prediction markets to be able to consistently draw on broad-based participation of employees.

2.1. Markets: Prediction vs. investment and open vs. closed

Fig. 1 illustrates two key characteristics associated with corporate prediction market use. First, prediction markets are in contrast to investment markets, such as the New York Stock Exchange. Investment markets focus on pricing assets, whereas prediction markets focus on

Predict	Hollywood Stock Exchange	Best Buy's Tag Trade
Invest	New York Stock Exchange	Corporate Investments
	Open	Closed

Fig. 1. Typology of market types.

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