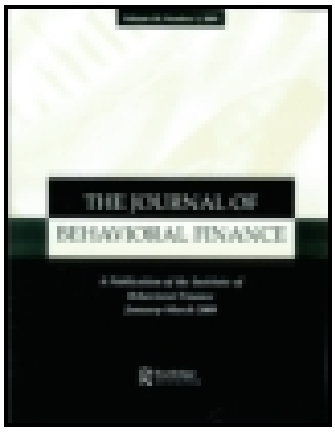

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# Prediction Markets and the Financial "Wisdom of Crowds"

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# EDITORIAL

## Prediction Markets and the Financial "Wisdom of Crowds"

**Russ Ray**

*This paper examines a new genre of behavioral markets—"prediction" markets—and their remarkable ability to flush out and thereafter aggregate inside and expert information regarding interest rates, exchange rates, inflation rates, stock prices, commodity prices, and many other economic and financial variables. Comprehensive studies of these markets have found that these markets have "proven to be uncannily accurate in predicting all types of events." Existing in cyberspace and being unregulated, these markets are, arguably, the most efficient financial markets in history.*

Financial and other behavioral analysts routinely forecast corporate earnings, cash flows, interest rates, inflation rates, exchange rates, stock prices, commodity prices, GDPs, and many other economic and financial variables. In making such predictions, inside and expert information regarding the variables being forecasted would be highly valuable, to say the least. This brief article examines a new genre of behavioral markets—"prediction markets"—and their remarkable ability to aggregate inside and expert information from around the world in order to accurately predict all types of economic and financial variables.

### The Evolution of Prediction Markets

Prediction markets—also known as "decision markets"—are online betting markets which have evolved since the inception of the first prediction market, the Iowa Electronic Market, in 1988. It's well known that this market has correctly predicted the winner of every presidential election since its inception. Moreover, it has predicted the percentages of votes garnered by presidential candidates more accurately than any other forecasting method, including exit polls and expert opinion. Anyone in the world can bet up to $500 in real cash in this market, which now accepts betting in stock prices and U.S. monetary policy.

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The Iowa Electronic Market has been so successful in its predictions that, in the past several years, it has been cloned repeatedly into other prediction markets which now accept real-cash betting in financial, economic, political, cultural, social, scientific, catastrophic, and virtually every other behavioral category conceivable. Table 1 lists a few of the world's major prediction markets, and the types of betting conducted in these markets. The web sites of these markets can be easily accessed by putting their names into an online search engine such as Google. Other prediction markets can also be accessed by inserting search terms such as "prediction markets" or "decision markets" into an online search engine. Table 2 lists some of the many financial variables predicted by the betting in these markets. All of these markets have easy-to-follow tutorials on how their real-cash, real-time trading is conducted. In most prediction markets, bettors are allowed to bet any amount of money.

These markets have become so successful that Microsoft, Hewlett-Packard, Eli Lilly, and other major firms now use such behavioral markets to forecast sales, earnings, product success, and myriad other financial variables. (Pethokoukis, 2004.) Economic Derivatives, a prediction market jointly operated by Deutsche Bank and Goldman Sachs, regularly turns over hundreds of millions of dollars in real-cash betting on a single event, such whether or not the U.S. Federal Reserve will raise the fed-funds rate and, if so, by how much. (Wolfers and Zitzewitz, 2004.) News Futures, one of the world's major prediction markets, will design and thereafter operate a prediction market in any behavioral category for any organization willing to pay its consulting fee. (Pethokoukis, 2004.)

**Table 1.** *Selected Prediction Markets*

| Market | Predictions |
|---|---|
| Iowa Electronic Markets | Elections, monetary policy |
| Economic Derivatives | Financial and economic events |
| Long Bets | Long-term predictions |
| Wahl$treet | German politics/economy |
| TradeSports | Sports, current events |
| | Financial and economic events |
| NewFutures | Current events |
| | Financial and economic events |

**Table 2.** *Selected Financial Predictions*

Iowa Electronic Markets
- U.S. monetary policy
- Selected industry returns
- Selected stock prices

EconomicDerivatives
- Major economic announcements
- Financial/economic variables of all types

TradeSports Exchange
- Exchange rates
- Commodity prices
- Major economic announcements

NewsFutures Exchange
- Global stock indices
- Exchange rates

## Empirical Evidence Regarding Prediction Markets

In a comprehensive study of prediction markets, Credit Suisse First Boston concluded that these markets have "proven to be uncannily accurate in predicting all types of events." (*Wall Street Journal*, July 30, 2003, p. C1.) In an empirical study of the predictive ability of these markets, Pennock, et al, (2001) reported that, "We find that [prediction market] prices [i.e., forecasts] strongly correlate with observed outcome frequencies." Wolfers and Zitzewitz (2004) report numerous anecdotal examples attesting to the remarkable ability of prediction markets to forecast all types of financial and economic variables. Additional anecdotal evidence comes from Berg and Rietz (2003), and Servan-Schreiber, et al, (2004). For an historical review of the *Wisdom of Crowds*, see Surowiecki (2004).

## The Mechanics of Prediction Markets

Being unregulated, prediction markets are highly effective at flushing out and thereafter aggregating relevant information—including inside and expert information—regarding a particular event, globally extracting such information from savvy bettors who are eager to profit from their inside and expert information. Arguably, prediction markets are the most efficient markets in history, since they continually exhibit all three forms of market efficiency (weak, semi-strong, and strong), in contrast to regulated markets, which strictly prohibit trading on inside information.

(This ability to quickly flush out and aggregate information—including inside information—from all over the world was the reason why the U.S. Pentagon created the Terrorism Futures Market in 2003. By design, this market's ability to flush out information regarding potential acts of terrorism would have enabled the Pentagon to preclude or, at least, hedge against such acts. Not surprisingly, this market was immediately terminated when an angry Congress, not understanding the potential of this market, expressed outrage at the concept of trading in terrorism futures.)

Prediction markets operate on the same principle as pari-mutuel horse racing. Anyone can enter a "claim" (also called a "contract," analogous to a futures contract) in these markets, and other bettors will thereafter bet for or against this claim. A claim is simply a statement that some event will happen by a specific future date. For example, a typical prediction-market claim might state that the U.S. federal funds rate will be at or above a given percentage rate on a specific future date. Other typical claims might state that the U.S. dollar will trade at or below a certain exchange rate on a particular future date, or that the S&P 500 will close at or above a given level on a specific future date, and so on.

A winning claim in a futures market pays $1.00 (or some multiple of a dollar), while a losing claim pays nothing. For example, as of this writing, a claim that the Dow Jones Industrial Average will close at or above 12,000 on December 30, 2005 is currently trading in the TradeSports prediction market at a spread of 14/18. This spread means that the marginal buyer in this market is willing to pay 14 points to buy this claim, while the marginal seller wants 18 points. Each point in the TradeSports markets is worth $.10, so the spread in this market for this claim is actually $1.40/$1.80.

If the Dow did, in fact, subsequently close above 12,000 on December 30, 2005, then the buyer of this claim would be paid $10.00, thus earning the bettor $8.20 in profit. If the Dow closes *below* 12,000 on December 30, 2005, then this bettor loses $1.80, the price paid for his claim. Typically, there is no limit on the number of contracts that a bettor can buy on any given claim, thus allowing the bettor to monetarily bet as much as he/she desires. Not surprisingly, some betters wager many thousands of dollars on almost every financial event conceivable (interest-rate swaps, etc.).

The price of the claim in a prediction market is actually the market's consensus probability that an event will, in fact, occur by the claim date. Since a $1.00 payoff represents 100% probability, and a $0.00 payoff

represents 0% probability, then it follows that the intervening values are the market's consensus probabilities of a claim occurring. Thus, in the above example, the $.16 price of the claim (using the midpoint of the spread) mathematically implies that the market's consensus probability of this claim coming true is 16%.

In a recent statistical study of prediction markets, Wolfers and Zitzewitz (2004) concluded that, "Prediction markets are extremely useful for estimating the market's expectations of certain [statistical] moments. Simple market designs can elicit expected means or probabilities, more complex market designs can elicit variances, and contingent [prediction] markets can be used to elicit the market's expectations of covariances and correlations." (p. 23.) In other words, prediction markets are behavioral markets with powerful statistical properties capable of predicting the most likely values of future financial variables, the variances around such values, and their correlations with other future financial variables.

## Conditions Required for the "Wisdom of Crowds"

The conditions required for the "Wisdom of Crowds" to accurately predict financial variables are few and always in existence. First, a diversity of opinion must exist regarding the future values of various financial variables (interest rates, exchange rates, commodity prices, etc. This condition is always the case.

Secondly, a mechanism must exist whereby opinion providers can express their opinions individually and without deference to or influence by the majority (i.e., no "herding" allowed). Prediction markets are structured so that each participant can buy whatever claim(s) he wants, without regard to what others—even the majority—are betting. Moreover, if "minority" opinion holders bet against the majority and their claim comes true, they profit handsomely.

Third, market participants must be able to easily utilize their specialized knowledge (inside and/or expert) regarding various financial variables. By their structure, prediction markets automatically allow such participants to bet as much money as they desire, using their specialized information, in the hopes of profiting from such knowledge.

Finally, the interesting question arises, Can the claims in prediction markets become self-fulfilling prophecies? The answer is no. Even if all bettors in a market for a certain claim suddenly developed the same exact opinion regarding a given claim (an unlikely scenario), the result would be that the claim price would quickly rise (to $.99, or very near $.99), but the price of this claim would still have no influence on whether or not the actual event subsequently happened. For example, if all market participants suddenly expected the Federal Reserve to raise the fed funds rate at its next meeting, it does not follow that the Fed will and must raise the fed funds rate. It may, or it may not, i.e., a prediction market's expectations are not self-fulfilling.

## Conclusion

Prediction markets are a new genre of behavioral markets that continually reveal the thinking of savvy insiders by inducing them to profit from their inside and expert information. A large body of anecdotal evidence, coupled with a smaller body of statistical studies, corroborates the impressive ability of these markets to predict financial events of all types. Historically, the "wisdom of crowds" continues to prevail, especially in the world's financial markets. The demonstrated accuracy of the predictions in these markets can be of significant utility to traders, speculators, regulators, policy makers, financial analysts, behavioral analysts, and many others who routinely forecast and analyze financial variables of all types.

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