

A Primer on Information Markets*

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1. Introduction

In 1988, the US Commodity Futures Trading Commission gave permission for the University of Iowa to begin operating the Iowa Electronic Market (IEM), thus ushering in the world's first *information market* (sometimes called a prediction market). Similar markets have subsequently appeared at the University of British Columbia and Vienna University of Technology. Outside the education sector, firms such as Trade Exchange Network (tradesports.com) and a joint venture between Goldman Sachs and Deutsche Bank (economicderivatives.com) have set up public information markets, while other firms such as Hewlett-Packard, Lilly, and Siemens have used information markets for internal purposes.¹

Information markets are similar to standard derivatives markets in that they provide a mechanism for trading financial claims to future contingencies. However, they differ in that, first, they are more accessible to small investors, and, second, they offer markets on a wider range of events, including politics, sports, legal, weather, business, and entertainment.²

The increasing popularity of information markets reflects several factors. The university-based markets were initially designed to serve primarily as teaching and research tools by providing students and staff with the opportunity to study a trading environment that is more realistic than the typical laboratory setting, but without the scale, complexity and noise of real-world markets. More recently, based on the proven ability of markets to gather and assimilate dispersed information, the potential forecasting power of information markets has generated most interest.

In this paper, we describe the structure of some existing information markets, outline their key features, explain what they can be used for, and assess their predictive ability.³ Finally, we consider the possible advantages of setting up of an information market in New Zealand.

¹ For forecasting printer sales (Hewlett-Packard), which drug would be successful (Lilly) and whether or not a software project would deliver on time (Siemens).

² Examples include: the 2004 best actor Oscar, moviebox office receipts, the 2000 US presidential election, the 2004 Super Bowl, and the outcome of the 2005 Michael Jackson trial.

³ Our objective is only to provide an introductory summary. Readers interested in obtaining more details about the operation, success, and possible usages of information markets should consult Wolfer and Zitzewitz (2004) and Hahn (2004).

2. Trading in information markets

The most common contract traded on information markets is one that yields a fixed payoff if and only if a certain event occurs. For example, suppose there is a market on who the New Zealand prime minister will be on 31 October 2005. Three contracts are on offer: Helen Clarke, Don Brash, and Other, each of which pays \$1 if the corresponding individual becomes prime minister and zero otherwise. In this case, the price of each contract represents the market's estimate of the probability of each being prime minister on 31/10/05.⁴ For example, if the Clarke contract is trading at \$0.51, then the market believes she has a 51% chance of winning the election.

Contracts that offer a variable payout provide different information. For example, suppose there is a contract that pays \$0.01 for every percentage point of Parliament seats won by the National Party in the 2005 election, i.e., \$0.20 if they win 20% of the seats, \$0.50 if they win 50%, and so on. In this case, the contract price reveals the outcome expected by the market. That is, if the price is \$0.55, then the market expects National to win 55% of the seats.

Contracts can even be used to discover an entire probability distribution. For example, the price of a contract that pays \$1 if the Green Party wins at least 10 seats in parliament tells us the market's estimate of the probability of that party winning at least 10 seats. A similar contract with a threshold of at least 20 seats reveals the market's estimate of the probability of the party winning at least 20 seats. By offering many such contracts we can learn the market's beliefs about the entire distribution.

3. Information markets around the world: two examples

(i) *The IEM*

The IEM is operated by faculty at the University of Iowa's Henry B. Tippie College of Business on a non-profit basis. Trading is conducted via the IEM's website, <http://www.biz.uiowa.edu/iem/> and the maximum trading position allowed is \$500. Participants must deposit account funds by cheque and are charged a \$5

⁴ Strictly speaking, this is only approximately true unless both the riskless interest rate and the contract risk premium are exactly zero. However, both these conditions are more-or-less satisfied for most information market contracts, so the level of approximation is likely to be very small.

administration fee. Both fixed and variable payoff contracts are offered. No short selling is allowed.

The focus of the IEM is on political and economic events such as national elections and stock prices of leading US companies. Most of these markets are open to public participation, but some are restricted to specific courses or universities affiliated with the University of Iowa.

(ii) TradeSports

TradeSports is an Irish-based commercial entity that offers trading via its website www.tradesports.com. Unlike the IEM, TradeSports places no restriction on the value of a trader's position, requiring only that clients have sufficient cash in their TradeSports account, and allows short selling. Margin trading operates - short-term contracts require "worst case scenario" margin to be posted, but longer term contracts have much lower initial requirements, with margin calls then made as required.

A much wider range of contracts are offered by TradeSports than IEM, on events related to economics, entertainment, politics, and weather. For example, it currently offers contracts on whether Osama Bin Laden will be captured by certain dates. It also recently offered a contract on whether Yasser Arafat would cease residing in Palestine, which expired when Arafat died as at that point he no longer lived there.

4. What do information markets offer?

(i) Teaching Tool

Many university teachers around the world have used the IEM for the purpose of helping students to learn about the mechanisms and complexities of financial markets, and to provide hands-on insight into aspects of finance theory. For example, pure securities and state prices are integral, but abstract, parts of modern asset pricing theory that are made concrete by the fixed-price contracts described in section 2.

The diverse events on which the contracts are written mean the usefulness of information markets as a pedagogical device is not simply limited to finance, but is also extremely relevant for courses in accounting, macroeconomics, microeconomics, and political science. This encourages students to think about interrelationships

between different subjects, thereby fostering an interdisciplinary approach that is helpful in understanding traditional financial markets.

(i) Research Resource

Information markets allow researchers access to data that is less artificial than those generated by laboratory markets, but in more manageable quantities than is available from traditional markets; in the case of the IEM, they also provide a wider range of trader-specific information. These desirable features have prompted studies of individual trader behaviour, psychological biases, and price dynamics.⁵

Most studies, however, have focused on the predictive power of information markets, particularly in comparison with more traditional approaches like opinion polls and expert analysis. Overall, these suggest that information markets provide predictions of future events that are least as accurate as the more traditional methods.

For example, Berg et al. (2003) examine the accuracy of prices in the IEM political markets and find that the market outperformed polls in 9 out of 15 national elections. Across all elections, the average poll error was 1.91% while the average market error was 1.49%. Thus relative to polls, information markets seem to be superior at predicting election results.

Similarly, Forsythe et al. (1992) discuss the results of the 1988 US presidential election, the first event on which the IEM offered a market. Even with a relatively small number of traders (192) in a non-traditional field, the market predictions proved superior to 6 polls taken around election time. This suggests that the well-known advantages of markets can eventuate even when traders know little about the environment or other traders.

Wolfer and Zitzewitz (2004) consider the accuracy of prediction markets across a wider range of events, and conclude that these markets generally perform better than opinion polls and do at least as well as expert opinions and other standard barometers. They also find that, despite the presence of some behavioural biases, information markets have thus far offered little in the way of arbitrage opportunities and been largely immune to manipulation.

(iii) Policy Instrument

⁵ A list of some the research undertaken using information market data appears at the end of this paper.

The success of information markets in predicting future outcomes has focussed attention on their potential value as a policy tool. Private sector firms have already begun to utilise these opportunities via the establishment of internal information markets. For example, Siemens recently found that such a market predicted it would be unable to complete a software project by a particular date, while standard processes suggested the opposite. In this case, the market prediction turned out to be the correct one. At Hewlett-Packard, an internal information market proved to be a better forecaster of future sales than more traditional methods. More such applications seem likely in the future - information markets could play a significant role in gauging customer interest, determining organisational challenges, forecasting earnings, and exploiting potential markets.

In the government sector, Hahn (2004) points out that the prices provided by information markets could be used to inform public policy across a range of issues, particularly in aiding assessment of initiatives that have high costs and uncertain benefits. For example, the potential uptake of a subsidised vaccination programme could be estimated using an information market. An innovative, and ultimately controversial, use of information markets for public policy purposes surfaced in 2003 when the US Defense Advanced Research Projects Agency suggested the creation of a market specialising in various geopolitical contracts, with the aim of predicting the likelihood of a terrorist attack. However, the potential for terrorists to profit from such a market raised a furore and the proposal was dropped.

5. Conclusion: The case for a NZ information market

For the reasons cited above - teaching tool, research resource, policy instrument - an information market focusing on NZ events has obvious benefits. Students would have the opportunity to obtain first-hand experience with market operations, thereby facilitating their movement into the industry; NZ researchers would have ready access to data that would enable them to contribute to the body of knowledge in a topical and growing area of research; policy-makers would obtain the advantages of market-based predictions about uncertain future events. The establishment of a public information market in New Zealand could also raise awareness of the potential benefits of such markets in the New Zealand business community, which in turn may lead to the increased use of internal markets in New

Zealand organizations, a development that has the potential for improved decision making and increased productivity.

Of course, some of these benefits could be obtained by contracting the IEM to run NZ-event markets. However, the IEM requirement for account deposits to be made in the form of USD cheques is likely to significantly deter NZ participation, and hence the level of informed information incorporated in prices. Moreover, the range of possible events would be more constrained than in a NZ-based market. To achieve the full benefits of an information market, a NZ-based organisation seems essential. However, establishing and running such a market is costly, requiring the creation and ongoing maintenance of a new trading platform, while having only limited capacity to recoup many of these costs from participants in a small market. Corporate, educational and government support is likely to be essential.

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