Stefan Luckner / Jan Schröder
Christian Slamka et al.

Prediction Markets

Fundamentals, Designs,
and Applications

Stefan Luckner / Jan Schröder / Christian Slamka et al.

Prediction Markets

GABLER RESEARCH

Stefan Luckner / Jan Schröder
Christian Slamka / Markus Franke
Andreas Geyer-Schulz / Bernd Skiera
Martin Spann / Christof Weinhardt

Prediction Markets

Fundamentals, Designs,
and Applications

GABLER

1st Edition 2012

Editorial Office: Ute Wrasmann | Nicole Schweitzer

Gabler Verlag is a brand of Springer Fachmedien.
Springer Fachmedien is part of Springer Science+Business Media.
www.gabler.de

Cover design: KünkelLopka Medienentwicklung, Heidelberg
Printed on acid-free paper
Printed in Germany

Preface

Accurate predictions are essential in many areas such as corporate decision making, weather forecasting and technology forecasting. Prediction markets are a promising approach for predicting uncertain future events and developments. They have done well in every known comparison with other forecasting methods. Prediction markets help to aggregate information and gain a better understanding of the future by collecting knowledge of as many people as possible. In prediction markets contracts whose payoff depends on uncertain future events are traded. Traders buy and sell contracts based on their expectations regarding the likelihood of future events. Trading prices thus reflect the traders' aggregated expectations on the outcome of uncertain future events and can be used to predict the likelihood of these events.

This book demonstrates that markets are accurate predictors beyond the field of political stock markets. Results from several empirical studies reported in this work demonstrate the importance of designing such markets properly in order to derive valuable predictions. Therefore, our findings are valuable for designing future prediction markets.

The authors

Table of Contents

List of Figures

List of Abbreviations

CA	Call auction
CDA	Continuous Double Auction
DPM	Dynamic pari-mutuel market
DV	Deposit value
FIFA	Fédération Internationale de Football Association
FP	Fixed payment
GDP	Gross Domestic Product
HP	Hewlett-Packard
HSX	Hollywood Stock Exchange
IEM	Iowa Electronic Markets
MM	Market maker
MSR	Market scoring rule
PSM	Political Stock Market
RO	Rank-order tournament
UBC	University of British Columbia

List of Tables

1. Introduction

Uncertainty and doubt are seen to be major challenges for management in the 21st century (Nohria and Stewart, 2006). Considering the environment in which organizations are acting today, this is not surprising: Increasing speed of innovation and thus shorter product life cycles as well as the globalization of markets make our world increasingly complex and unpredictable. Hence, for organizations it is more important than ever to develop foresight capabilities to better foresee future developments, trends, potentials, challenges, and risks (van Bruggen et al., 2006).

Predicting the future is an integral part of corporate decision making. Inaccurate or delayed predictions can result in substantial costs for a company. Improving foresight capabilities, on the other hand, helps to strengthen the position of a company in global competition. Most business challenges related to, for example, demand forecasting and new product development require information which is dispersed among many people (Soukhoroukova et al., 2010). However, these people cannot be easily identified in most cases. But more and more companies recognize the potential of collective intelligence and try to leverage the *wisdom of crowds*[1] through technologies such as wikis, blogs, or reputational systems. All of these technologies help to aggregate information and gain a better understanding of the future by collecting knowledge of as many people as possible.

1.1. Motivation

Over the last couple of years, interest in prediction markets, also called information markets (Hahn and Tetlock, 2006) or virtual stock markets (Spann and Skiera, 2003) as a forecasting method has continuously increased in the scientific world and in industry. With regard to information *markets* play a triple role: they provide incentives for information revelation, and the market mechanism provides ways for information revelation and aggregation So far, prediction markets have done well in every known comparison with other forecasting methods (Hanson, 2006). Racetrack odds beat horse experts consistently (Figlewski, 1979), orange juice futures have proven more accurate than the National Weather Service of the US Department of Commerce (Roll, 1984), and stock prices determined the company responsible for the explosion of the Challenger

---

[1] Surowiecki (2004) created public interest in collective intelligence with his bestselling book "The Wisdom of Crowds".

spacecraft within 13 minutes – four months before a panel of experts published its official report (Maloney and Mulherin, 2003). Whereas information aggregation is only a byproduct of most traditional markets, prediction markets are set up with the explicit purpose of soliciting information. Engineered carefully, prediction markets can directly guide decision making.

The basic idea of prediction markets is to trade contracts whose payoff depends on the outcome of uncertain future events. Although the final payoffs of the contracts are unknown during the trading period, rational traders should sell contracts if they consider them to be overvalued and buy contracts if they consider them to be undervalued (Glosten and Milgrom, 1985). Until the outcome is finally known, the trading prices reflect the traders' aggregated beliefs about the likelihood of the future events (Spann and Skiera, 2003). In efficient markets, all the available information is reflected in the trading prices at any time (Fama, 1970a, Fama, 1991).

Examples of prediction markets that are open to the public include the Iowa Electronic Markets[2], the Political Stock Market PSM[3], TradeSports[4], the Hollywood Stock Exchange[5], and STOCCER[6]. Several major companies such as Hewlett-Packard, Google, or Microsoft are also using internal prediction markets for company-specific predictions. The results of recent studies on these prediction markets are encouraging. One of the main reasons for their dissemination is that they have shown a high prediction accuracy compared to traditional forecasting methods such as polls, expert predictions, or surveys (Berg et al., 2001, Servan-Schreiber et al., 2004, Spann and Skiera, 2003). Good performance has also been demonstrated in corporate environments (Chen and Plott, 2002, Ortner, 2000, Plott, 2000). Beyond prediction accuracy, markets also provide considerable advantages in terms of continuous forecasting, participation, and cost efficiency compared to other widespread forecasting methods.

Continuous scanning of ongoing developments as an input to strategic planning may be difficult to implement with traditional forecasting methods such as brainstorming techniques, expert groups, Delphi studies, and scenario workshops. The results of such approaches usually have to be manually analyzed, evaluated, and summarized. All of this

---

[2] http://www.biz.uiowa.edu/iem
[3] http://psm.em.uni-karlsruhe.de
[4] http://www.tradesports.com
[5] http://www.hsx.com
[6] http://www.stoccer.com

has to be performed at a certain point in time. In contrast, all the traders' information is aggregated by the price mechanism of a prediction market. This has two positive effects: First, the information aggregation by the price mechanism reduces the workload compared to traditional forecasting methods. Second, the price mechanism ensures that trading prices continuously reflect the totality of previously revealed knowledge and immediately respond to new information (Hanson, 1999). This means that information aggregated via prediction markets is available in the market and always up-to-date (Berg et al., 2003).

Concerning participation in foresight studies, it is a well-known problem that people generally refuse to participate or drop out early due to other commitments they consider more important (Cuhls, 2003). Therefore, it makes sense to provide incentives for participation. With proper incentive schemes traders do not necessarily state their individual preferences but their true beliefs (van Bruggen et al., 2006). Prediction markets allow for rather sophisticated incentive schemes as traders can be rewarded based on their performance, i.e. the quality of their contributions. This can happen in different ways. The market operator can for instance award prizes or money to the best traders or traders can be asked for investing some of their own money in a market. Yet, it is sometimes not even essential to provide monetary incentives or prizes to motivate participation. Prediction markets have also shown to perform well without providing any monetary incentives, e.g. by publicly announcing a ranking based on the traders' success in the market (Christiansen, 2007).

The implementation of a foresight activity is often restricted due to tight budget constraints and other resource limitations (Salo and Cuhls, 2003, Clar, 2003). As described above, the information aggregation process in prediction markets is carried out via the price mechanism and does not require any manual intervention. Prediction markets are highly scalable as the workload of the operators is almost independent from the number of traders and the time horizon (Chan et al., 2002). Furthermore, the hardware costs for running a market are negligible once the market platform has been designed and developed (Spann et al., 2009).

To sum up, evidence so far suggests that prediction markets are at least as accurate as traditional forecasting methods. Furthermore, they provide considerable advantages in terms of continuous forecasting, participation and information revelation as well as