

Aggregation and Manipulation in Prediction Markets: Effects of Trading Mechanism and Information Distribution

[Extended Abstract] *

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ABSTRACT

We conduct laboratory experiments on variants of market scoring rule prediction markets, under different information distribution patterns, in order to evaluate the efficiency and speed of information aggregation, as well as test recent theoretical results on manipulative behavior by traders. We find that markets structured to have a fixed sequence of trades exhibit greater accuracy of information aggregation than the typical form that has unstructured trades. Prior theoretical predictions of differing strategic behavior under complementary information distributions and substitute information distributions are confirmed when the trading order is structured, but not in markets with an unstructured trading order. In the case of the markets with a structured order, we find that the information aggregation is consequently slower when information is complementary, as traders more frequently engage in bluffing and delaying strategies. In comparing two commonly used mechanisms, we find no significant difference between the performance of the direct probability-report form and the indirect security-trading form of the market scoring rule.

Categories and Subject Descriptors

J.4 [Computer Applications]: Social and Behavioral Sciences—*Economics*

General Terms

Economics, Experimentation

Keywords

prediction markets, experiments, market scoring rule

1. EXTENDED ABSTRACT

Prediction markets are markets designed to aggregate traders' information and to forecast future events. Recently, a new market form for prediction markets, the market scoring rule

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(MSR) [2], has become popular. In this paper, we use human-subject laboratory experiments to study the speed and efficiency of information aggregation in MSR markets, while varying the mechanism form, constraints on trade timing, and information distribution pattern.

The first dimension of variation is in comparing two commonly used forms of the MSR mechanism: a direct mechanism in which traders report their beliefs as probabilities, and an indirect mechanism in which traders reveal their beliefs through buying and selling securities. There is an active debate about which interface is more effective; our laboratory experiments provide insight into this question.

MSR markets have a myopic honesty property: A trader trading only once maximizes her expected profit by reporting her true beliefs [2]. However, for traders using non-myopic strategies over multiple trades, the theoretical results show a sharp distinction based on the pattern of information distribution. Roughly, when signals are substitutes honest reporting of beliefs is optimal even in a non-myopic sense; when signals are complements honest reporting is not a sequential equilibrium [1]. This motivates the second dimension along which we vary our experimental design: We study market performance under a complementary signal structure, and under a substitute signal structure.

The third variation we study is in providing the structure of a fixed sequence of trade opportunities, or an unstructured market in which traders choose when to trade.

We conducted two-trader market trading experiments for each of the 8 treatments generated by a factorial exploration, with the following results: First, we find that structured markets aggregate information more efficiently than unstructured markets. Second, in the first experimental comparison between the direct and indirect MSR forms, we find no significant difference in performance. Third, in testing the theoretical results on the effect of information distribution on manipulative strategies, we find that they are borne out for the structured market but not for the unstructured markets. This suggests that the timing of trades is an important feature to include in future theoretical research.

2. REFERENCES

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