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## MARKETS FOR MARKETS: ORIGINS AND SUBJECTS OF INFORMATION MARKETS

*Miriam A. Cherry\***Robert L. Rogers\*\**

### I. INTRODUCTION

After the death of Pope John Paul II, a papal conclave convened to elect his successor. The media speculated that certain candidates were the “frontrunners” to watch.<sup>1</sup> At the same time, pools formed on web sites to predict the outcome of the conclave, either for fun (using

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1. John Tierney, *The Smart Money*, N.Y. TIMES, April 12, 2005, at A21 (discussing favorites in the media and claiming that the online speculating would soon overtake media pundits in predicting future events).

virtual money) or for profit.<sup>2</sup> Throughout the days that the conclave met in April of 2005, trading continued, and ultimately the various markets predicted both that Cardinal Joseph Ratzinger would emerge as the next pope<sup>3</sup> and that he would choose the name Benedict XVI.<sup>4</sup> After the white smoke signifying a new pope had cleared, the online traders had accurately predicted the outcome of the conclave when the new Pope, the former Cardinal Ratzinger, emerged to give his first official speech from the Vatican balcony.<sup>5</sup>

Similar pools appeared around the trial of celebrity Michael Jackson in 2005 on various child molestation charges.<sup>6</sup> During the course of the trial, several online markets emerged to trade on the outcome. The public had always expressed an intense interest in Jackson's personal life, and the latest controversy provoked further speculation. Although trading shifted during the presentation of evidence by the prosecution, ultimately the market strongly predicted Jackson's acquittal.<sup>7</sup> When the verdict was read by the jury, Jackson had been acquitted of all charges.<sup>8</sup>

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2. Stephanie McCrummen, *Pope Pick Fair Game for Gamblers: Internet Bettors Wager on New Pontiff, Name He'll Use*, WASH. POST, April 5, 2005, at B1, available at <http://www.washingtonpost.com/wp-dyn/articles/A26353-2005Apr4.html>.

3. Matt Crenson, *Bettors Gambling on Germany's Cardinal Ratzinger*, GUELPH MERCURY, April 16, 2005, at A7 ("[A]mong those speculating about who the next pope will be, the big money – literally – is on Joseph Cardinal Ratzinger, who delivered a stirring homily at the late Pope's funeral. . . . As of yesterday, most gambling sites gave Ratzinger . . . the best odds, with a host of second-tier candidates not far behind."); *Gamblers Betting on German*, TORONTO SUN, April 18, 2005, at 6; see also *Papal Election*, <http://www.popebetting.com> (web site on pope bets that is part of Paddy Power, [www.paddypower.com](http://www.paddypower.com), the Irish gaming web site) (beginning with odds of 12/1 on Cardinal Ratzinger, then reducing his odds to make him the favorite at 3/1, with competition from Francis Arinze of Nigeria and two Italian candidates); Jeffrey Fleishman, *Who the Next Pope Will Be is Up For Speculation*, L.A. TIMES, April 13, 2005, at A3 (quoting British gambling service William Hill as stating that Cardinal Arinze was the favorite, with Archbishop Tettamanzi, Cardinal Ratzinger and Cardinal Hummes as others to watch); *Bookies Like Ratzinger*, TORONTO SUN, April 16, 2005, at 12 (quoting British gambling service William Hill as stating that they were slashing the odds on Cardinal Ratzinger, making him the favorite).

4. Frank Delaney, *Holy Rollers and Papal Perfectas*, N.Y. TIMES, April 18, 2005, at A19 (listing Benedict as the favorite); Tom Heneghan, *New Pope's First Message? 'A Name is a Sign'*, *boston.com*, April 15, 2005, [http://www.boston.com/news/world/europe/articles/2005/04/14/new\\_popes\\_first\\_message\\_a\\_name\\_is\\_a\\_sign](http://www.boston.com/news/world/europe/articles/2005/04/14/new_popes_first_message_a_name_is_a_sign).

5. Stephen Evans, *Futures Market Right on New Pope*, BBC NEWS, April 19, 2005, <http://news.bbc.co.uk/1/hi/business/4457715.stm>.

6. Kelefa Sanneh, *The Whispering Pop Star Who's So Hard to Love, and So Hard to Hate*, N.Y. TIMES, June 15, 2005 at E1.

7. *Smart Money on Acquittal in Jackson Case: Online Betting Sites Offering Odds on Outcoming [sic] of Trial*, MSNBC, May 24, 2005, <http://msnbc.msn.com/id/7965657>.

8. Jonathan D. Glater, *Weighing Celebrity Justice: Blind or Biased?*, N.Y. TIMES, June 15, 2005 at A14; Michael J. Lewis, *Pleasure Domes for Millionaires, and Other Lost Boys*, N.Y. TIMES, June 19, 2005, § 9, at 10.

With both the papal conclave and Michael Jackson verdict, the various pools attracted a large number of participants and ultimately predicted the outcomes accurately. In both instances, these pools acted as information markets, also known as “prediction markets” and “idea futures.”<sup>9</sup> As we have written elsewhere,<sup>10</sup> information markets are an emerging economic field in which individuals are provided incentives to trade on their knowledge and in the process produce predictions.<sup>11</sup> The economic literature has defined an information market as a setting where “participants trade in contracts whose payoff depends on unknown future events.”<sup>12</sup> The point of a particular information market, however, is not to provide financial or reputational gain to the participants or to raise capital.<sup>13</sup>

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9. Information markets are also known in the economic literature as “prediction markets,” “artificial markets,” or “idea futures.” ROBIN HANSON, IMPOLITE INNOVATION: THE TECHNOLOGY AND POLITICS OF ‘TERRORISM FUTURES’ AND OTHER DECISION MARKETS 4 (July 2005) (on file with authors and at <http://hanson.gmu.edu/impolite.pdf>) [hereinafter HANSON, IMPOLITE INNOVATION].

10. Miriam A. Cherry & Robert L. Rogers, *Tiresias and the Justices: Using Information Markets to Predict Supreme Court Decisions*, 100 NW. U. L. REV. — (forthcoming 2006) (manuscript at 4, on file with authors).

11. HANSON, IMPOLITE INNOVATION, *supra* note 9, at 4 (“Orange Juice futures improve on National Weather Service forecasts, horse race markets beat horse race experts, Academy Award markets beat columnist forecasts, gas demand markets beat gas demand experts, stock markets beat the official NASA panel at fingering the guilty company in the Challenger accident, election markets beat national opinion polls, and corporate sales markets beat official corporate forecasts.”).

12. Justin Wolfers & Eric Zitzewitz, *Prediction Markets 2* (AEI-Brookings Joint Ctr. for Regulatory Studies 2004), available at <http://www.aei-brookings.org/admin/authorpdfs/page.php?id=1027>. This article was also published in *The Journal of Economic Perspectives*, Vol. 18, No. 2, 2004. Note that the term “information market” has had a wide variety of meanings among various legal commentators. Until recently, this term was used in legal settings to denote a number of different concepts. The term was used to describe new types of financial opportunities that the advent of the internet created. *See, e.g.*, Ruth L. Okediji, *Trading Posts in Cyberspace: Information Markets and the Construction of Proprietary Rights*, 44 B.C. L. REV. 545, 547 (2003). The term has also been used to describe the practices of companies that collect information about individuals surfing the internet and then resell that information. *See, e.g.*, Paul M. Schwartz, *Property, Privacy, and Personal Data*, 117 HARV. L. REV. 2055, 2082 (2004) (using “information market” in the context of personal data). Interesting as these concepts and areas are, they are not the same type of “information market” described and analyzed herein.

13. To say that there is an overarching “point” to a market beyond gains or losses of individual traders is not a novel concept. After all, the justification for stock markets is that they readily raise capital for business and thereby fund all sorts of technological innovation. *See, e.g.*, Claudio Michelacci & Javier Suarez, *Business Creation and the Stock Market*, 71 REV. ECON. STUD. 459, 459 (2004) (discussing how the stock market encourages “business creation, [innovation,] and growth” by allowing “the recycling of informed capital”).

Rather, the organizers structure the market to gather information that will aid in determining the outcome of a future event.<sup>14</sup>

This Article focuses on why information markets have covered certain subject areas, sometimes of minor importance, while neglecting other subject areas of greater significance. To put it another way, why do information markets exist to predict the outcome of the papal conclave and the Michael Jackson trial, but no information markets exist to predict government policy conclusions, Supreme Court decisions, or the rulings in Delaware corporate law cases? Arguably, from either a dollar value or a social utility perspective, these areas of law and business would be more important than the outcome of, say, the Jackson trial. Why, then, do these “frivolous” markets on celebrities like Michael Jackson thrive, while others with more serious aims have yet to be started?

In attempting to answer this question, we first wish to give the reader a more detailed explanation of information markets and how they work. Section II therefore recounts the predictive successes of information markets in everything from presidential elections to the television game show “*Who Wants to Be a Millionaire?*.” Then we present data from interviews with market founders about their motivations in starting various information markets. In Section III, we insert the empirical data into an analytical framework, exploring where markets exist, where they do not, and some of the reasons, including legal considerations and business models, that affect the subjects that information markets cover. In particular, the laws about gambling seem to have had a significant impact on the development of information markets.

In Section IV, we suggest that, despite a trend toward information markets in entertainment and politics, the emergence of an information market in any particular subject area is at least partially the product of a random walk, meaning that it cannot be predicted in advance from past data.<sup>15</sup> Finally, in the last part of our Article, we contemplate whether information markets must endure the vagaries of the random walk or whether they could develop in a

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14. It is the deliberate structure, the intention to capture information, that differentiates information markets from typical capital markets. Capital markets also generate a level of prediction through the process of price discovery, but this is a secondary effect, not the primary goal of such markets. *See generally* Michael T. Chng, *A Model of Price Discovery and Market Design: Theory and Empirical Evidence*, 24 J. FUTURE MARKETS 1107, 1108-09 (2004) (describing price discovery function performed by derivatives markets).

15. *See* BURTON G. MALKIEL, *A RANDOM WALK DOWN WALL STREET* 24 (8th ed. 2003) (defining random walk as “one “in which future steps or directions cannot be predicted on the basis of past actions.”). Greater detail about the meaning of a random walk in the context of the emergence of information markets is provided below.

more organized and systematic way, either through private institutions or through government action. The answers have implications for the possibility of government sponsorship, the development of these markets, and, perhaps more broadly, the growth of any new field that individual entrepreneurs develop.

We think this topic worth exploring — despite the early stage of this field — because of the importance of information markets and how they develop. Yet we quickly confess that the newness of this area makes any analysis difficult and subject to later revision. The data we have are preliminary, and further developments may undermine or refute any current explanation offered. We nonetheless hope that our current explorations will provide material for consideration. Although that goal is modest, we think it worth attempting in light of the great potential of information markets.

## II. ORIGINS OF INFORMATION MARKETS

### A. *How Information Markets Work*

In this first section, we provide a brief description of how information markets work. Information markets organize and aggregate individual knowledge into a collective judgment. Although information markets are a new idea, their central insight — that the collective judgment of the many can be wiser than the conclusion of one person — are embedded in many of our legal institutions. From the jury system to multi-member courts, the legal system frequently entrusts determinations of guilt, innocence, and liability to collectives.<sup>16</sup> Information markets take the idea of group decisionmaking far further, greatly expanding the number of participants.<sup>17</sup> Instead of a twelve-member jury or a three-judge

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16. See, e.g., U.S. CONST. amend. VI. The jury's role is, at least in part, premised on the idea that a group will be able to assess facts more accurately than an individual fact-finder. The premise has mathematical support; the Condorcet Jury Theorem suggests that when choosing between two alternatives, one of which is correct, juries will reach the correct result more often than a single fact-finder. See Richard A. Posner, *An Economic Approach to the Law of Evidence*, 51 STAN. L. REV. 1477, 1498 (1999) (listing Condorcet Jury Theorem as one factor that improves a jury's ability to assess facts with accuracy); Jonathan Remy Nash, *A Context-Sensitive Voting Protocol Paradigm for Multimember Courts*, 56 STAN. L. REV. 75, 76-77 (2003) (discussing voting patterns on multimember courts as well as game theory and the doctrinal paradoxes that can accompany voting on such courts); Michael Abramowicz, *En Banc Revisited*, 100 COLUM. L. REV. 1600, 1602, 1632 (2000) [hereinafter Abramowicz, *En Banc*] (proposing, innovatively, use of visiting panels from across circuits to sit *en banc*, and basing this proposal in part on Condorcet Jury Theorem).

17. Juries and multi-member courts engage in a deliberative function, which is valued as helping to achieve more accurate outcomes as well as for process reasons. Information markets, however, are not deliberative, and information markets employ incentives for correct predictions. Although there are these significant differences, we

panel evaluating and weighing a factual assessment about a past event, in an information market, thousands of people can join together to predict events, such as the outcome of a presidential election.<sup>18</sup>

Each trader in the information market acts to maximize his or her own reward. At the same time, the organizers of the market aggregate the results and harvest the valuable information that individuals have generated. The theory behind information markets is loosely related to the semi-strong version of the efficient market hypothesis (EMH), which holds that, in a properly functioning capital market, the prices of securities will reflect all relevant publicly available information.<sup>19</sup> The price of a security on the market encodes a significant amount of information, including beliefs about the efficacy of management, the potential for future products, and possible market expansions.<sup>20</sup> In other words, most markets have a “price discovery” function, aggregating information and predictions into the current price of that security.<sup>21</sup> In traditional capital markets, however, the information-seeking aspects are, to a certain degree, by-products of trading and raising capital. In contrast, this information-seeking is the sole reason for the information market’s existence.

In his recent popular book, *The Wisdom of Crowds*, James Surowiecki explains numerous ways in which such collective knowledge can be employed.<sup>22</sup> Surowiecki describes an experiment in which individuals tried to guess the correct number of jelly beans in a jar, for which they would win a prize.<sup>23</sup> The experimenter took the individual guesses and averaged them, resulting in a number only a few away from the actual number of jelly beans.<sup>24</sup> The average of all

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mention juries and multimember courts to emphasize that group decisionmaking is commonly accepted in our legal system.

18. See *infra* notes 31-35 and accompanying text (discussing how Iowa Electronic Markets have been predicting the outcomes of elections since 1988).

19. Eugene F. Fama, *Efficient Capital Markets: A Review of Theory and Empirical Work*, 25 J. FIN. 383, 383 (1970); Ronald J. Gilson & Reinier H. Kraakman, *The Mechanisms of Market Efficiency*, 70 VA. L. REV. 549, 552-53 (1984).

20. See Fama, *supra* note 19.

21. See generally Cass Sunstein, *Group Judgments: Statistical Means, Deliberation, and Information Markets*, 80 N.Y.U. L. REV. 962, 1023 (2005) (explaining how information markets can improve group decisionmaking processes and mentioning price discovery function).

22. JAMES SUROWIECKI, *THE WISDOM OF CROWDS*, at xiv, 3-4 (2004).

23. *Id.* at 5; Jack L. Treynor, *Market Efficiency and the Bean Jar Experiment*, FIN. ANALYSTS J., May-Jun. 1987, at 50.

24. *Id.*

the guesses was extremely accurate.<sup>25</sup> Whether individuals are asked to estimate the location of a sunken submarine,<sup>26</sup> to guess the weight of an ox,<sup>27</sup> or to help a contestant on the game show “*Who Wants to Be a Millionaire*,”<sup>28</sup> groups provide accurate answers to questions that most individuals would not be able to answer on their own.

At present, there are twenty-one information markets open to the general public,<sup>29</sup> and approximately one to two dozen internal, company, or private information markets that operate to make predictions.<sup>30</sup> For example, during the past two hotly contested presidential elections, participants voted in the Iowa Electronic Markets (“IEM”).<sup>31</sup> The IEM, started in 1988 by academics at the University of Iowa Business School, has been operating since that time to predict the outcomes of various elections.<sup>32</sup> An individual trader is limited to a \$500 investment, so although the financial stake of any one person in the outcome is modest, each still has a financial incentive for making a correct prediction.<sup>33</sup>

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25. In Treynor’s experiment, the jar had 850 jelly beans. The average of the group’s guesses was 871, and of the fifty-six who made guesses, only one was more accurate than the group average. *Id.*

26. SUROWIECKI, *supra* note 22, at xx-xxi.

27. *Id.* at xi-xiii.

28. On the television program “*Who Wants to Be a Millionaire*” contestants had to answer trivia questions in multiple-choice format. Each contestant had several “lifelines” that they could use, including narrowing the options, telephoning a friend, and polling the audience. Although the first two options were often helpful, the audience for the television program was the most helpful of all, achieving a 91 percent success rate. *Cf.* Saul Levmore, *Conjunction and Aggregation*, 99 MICH. L. REV. 723, 734 n.22 (2001) (providing “*Who Wants to Be a Millionaire*” poll of the audience as illustration of the Condorcet Jury Theorem).

29. *See infra* App. A.

30. The estimate about the number of private markets is from an interview with Robin Hanson, who estimates there are between one and two dozen internal private markets. Telephone Interview with Robin Hanson, Associate Professor of Economics, George Mason University (Aug. 18, 2005) [hereinafter Hanson Interview].

31. *See, e.g.*, Jordan Erin, *Iowa Electronic Markets Yield Near-Accurate Result*, DES MOINES REG., Nov. 10, 2004, at 5b, available at 2004 WLNR 15070349. The IEM trades at <http://www.biz.uiowa.edu/iem>.

32. JOYCE BERG ET AL., C. BUS. ADMIN. U. IOWA, RESULTS FROM A DOZEN YEARS OF ELECTION FUTURES MARKETS RESEARCH, 1 (Nov. 2000), available at [http://www.biz.uiowa.edu/iem/archive/BFNR\\_2000.pdf](http://www.biz.uiowa.edu/iem/archive/BFNR_2000.pdf) [hereinafter BERG, ET AL., RESULTS]. The IEM has also expanded into predictions further afield from its base of political predictions. *See, e.g., id.* at 7 n.10; Jordan Erin, *U of I Markets Tapped to Predict Flu Activity*, DES MOINES REG., Nov. 22, 2004, at 1B.

33. *See* Saul Levmore, *Simply Efficient Markets and the Role of Regulation: Lessons from the Iowa Electronic Markets and the Hollywood Stock Exchange*, 28 J. CORP. L. 589, 593 (2003) [hereinafter Levmore, *Simply Efficient Markets*].



The IEM has predicted the outcomes of elections more accurately than polls have, beating the polls seventy-six percent of the time.<sup>34</sup> This accuracy occurs despite the fact that researchers at the University of Iowa have concluded that many of the market participants exhibit a strong bias toward particular candidates.<sup>35</sup> Apparently, the market is able to correct for these biases through arbitrage.<sup>36</sup> Sensing an opportunity for profit, arbitrageurs temper the ideological biases that some of the participants bring with them when they make their initial investment in the IEM.<sup>37</sup>

Another successfully functioning information market is the Hollywood Stock Exchange (HSX), which has “approximately 400,000 registered accounts.”<sup>38</sup> The HSX is a “fantasy stock market,” allowing trades in “virtual” money, and is successful in predicting which movies will be blockbusters and which will be box office bombs.<sup>39</sup> Although traders set the market price for shares of a movie’s stock, the price is tied to the movie’s financial performance.<sup>40</sup> Once the film

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34. Joyce Berg et al., Accuracy and Forecast Standard Error of Prediction Markets 12-13, 33 (July 2003) (unpublished manuscript on file with U. of Iowa, Dep’t of Acct., Econ., & Fin.), available at <http://www.biz.uiowa.edu/iem/archive/forecasting.pdf> [hereinafter Berg et al., Accuracy].

35. See BERG ET AL., RESULTS, *supra* note 32, at 5. The average trader is younger, more likely to be a white male, Republican, and of a higher socio-economic status than the average voter. Berg et al., Accuracy, *supra* note 34, at 10.

36. See, e.g., Donald C. Langevoort, *Taming the Animal Spirits of the Stock Markets: A Behavioral Approach to Securities Regulation*, 97 NW. U. L. REV. 135, 140 n.15 (2002) (defining arbitrage as “the process by which informed traders buy or sell in such a way as to eliminate any mispricing caused by uninformed trading. For example, when a stock becomes overvalued because uninformed traders are bidding it up, informed traders would sell, hence moving the price back to its rational expectations equilibrium.”).

37. See BERG ET AL., RESULTS, *supra* note 32, at 6.

38. See DAVID M. PENNOCK ET AL., THE POWER OF PLAY: EFFICIENCY AND FORECAST ACCURACY IN WEB MARKET GAMES 5 (NEC RESEARCH INST. 2001), available at <http://artificialmarkets.com/am/pennock-neci-tr-2000-168.pdf>. The Hollywood Stock Exchange has its web site and trading market at <http://www.hsx.com>.

39. See Norm Alster, *It’s Just a Game, but Hollywood is Paying Attention*, N. Y. TIMES, Nov. 23, 2003, §3 at 4, available at 2003 WLNR 5231448; Jack M. Balkin, *Virtual Liberty: Freedom to Design and Freedom to Play in Virtual Worlds*, 90 VA. L. REV. 2043, 2070 (2004) (discussing the creation of “virtual” property in online games). See also Levmore, *Simply Efficient Markets*, *supra* note 33, at 593 (“HSX offers good predictions of a film’s gross receipts before release and, relatively speaking, even better predictions after opening weekend — when a large number of traders have some information in the form of (or at least the possibility of) observing the finished film on screen, along with audience reactions. Apparently, studios have begun relying on these estimates to structure the distribution of their films.”); Russ Ray, *Prediction Markets: Betting on Risk Management*, RISK MGMT., Apr. 1, 2004, at 58, available at 2004 WLNR 11238320.

40. PENNOCK ET AL., *supra* note 38, at 6. See Hollywood Stock Exchange Homepage, <http://www.hsx.com>.

has been in release for a month, the stock “delists” and the shareholders are cashed out.<sup>41</sup> Shareholders receive an amount of virtual money pegged to the amount of real money that the movie made during that period.<sup>42</sup> Traders may also sell their stocks short if they believe that a movie’s stock values are overpriced.<sup>43</sup> In addition, the HSX allows traders to guess the outcomes of the Academy Awards, and these aggregated predictions have proved to be startlingly accurate.<sup>44</sup>

Other successful information markets are smaller and private, limiting participation to the members of a particular organization. For example, Hewlett Packard (HP) used an internal information market to predict monthly sales volumes.<sup>45</sup> The information market in this case was thin, that is, it encompassed a relatively small number — twenty to thirty — of participants.<sup>46</sup> The market had participants from various corporate departments, who remained anonymous.<sup>47</sup> Despite the small numbers of participants, the information market produced more accurate forecasts than those that the company had put forward officially.<sup>48</sup> In addition to the IEM,

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41. PENNOCK ET AL., *supra* note 38, at 6.

42. *Id.*

43. *Id.* In traditional financial markets, a short sale is defined as: the sale of borrowed shares by an investor who expects the stock’s price to decline. If it does, the investor profits on the difference between the amount realized when the shares were sold and the lower price paid to ‘cover’ the short position. If, however, the stock goes up, the investor’s loss is limited only by how quickly the short sale is covered.

Priscilla Ann Smith, *OTC Focus - Short-Sale Data Can Signal More Than Pessimism*, WALL ST. J., Dec. 17, 1986. For further discussion of short-selling as well as financial derivatives, and their importance for the study of corporate law, see Frank Partnoy, *Adding Derivatives to the Corporate Law Mix*, 34 GA. L. REV. 599, 604-605 (2000).

44. See Levmore, *Simply Efficient Markets*, *supra* note 33, at 594. In a widely publicized story in 2000, *The Wall Street Journal* queried members of the academy in order to formulate predictions and publish a story touting the winners in advance of the awards show. Despite obtaining this inside information, the newspaper underperformed against the HSX, which predicted more accurately which nominees would win academy awards. See *id.*; Lisa Gubernick, *And the Winner Is*, WALL ST. J., Mar. 24, 2000, at W1; see also Justin Lahart, *Trading the Oscars*, CNN/MONEY, Mar. 11, 2003, [http://www.hsx.com/about/press/030311\\_1.htm](http://www.hsx.com/about/press/030311_1.htm).

45. KAY-YUT CHEN & CHARLES R. PLOTT, DIVISION OF THE HUMAN & SOC. SCI., CAL. INST. OF TECH., INFORMATION AGGREGATION MECHANISMS: CONCEPT, DESIGN AND IMPLEMENTATION FOR A SALES FORECASTING PROBLEM 6, (2002), available at [http://www.hpl.hp.com/personal/Kay-Yut\\_Chen/paper/ms020408.pdf](http://www.hpl.hp.com/personal/Kay-Yut_Chen/paper/ms020408.pdf).

46. *Id.* at 5, 10.

47. See *id.* at 10.

48. *Id.* at 12-15. Part of this difference might be explained by a failure of individuals to share information across departments, but this also might be the result of incentives that skew official sales predictions. For example, there might be extreme pressure from top management to reach a particular sales goal; at the same time,

HSX, and the internal HP market, there are currently numerous other information markets that are successfully functioning.<sup>49</sup>

*B. Interviews with Market Founders*

Having set forth an overview of current information markets, we turn to what some of the founders have said about the origins of their markets. Here, our research objectives were more journalistic than empirical. In other words, while we tried to interview as many founders who we could reach and who were willing,<sup>50</sup> we do not pretend that we conducted an empirical survey. Rather, our hope was to add color and factual detail to what might otherwise be purely an intellectual analysis. We found the results interesting and suggestive of broader themes explored below regarding randomness in the origin of information markets.

One of the leaders in the field of information markets is Robin D. Hanson, an economics professor at George Mason University. He has been involved in founding two information markets and worked to found another one (which fell victim to political controversy). Hanson was first involved in creating an information market in 1989-1990 with internal information at Xanadu Inc., a computer company attempting to forecast whether they would deliver their product.<sup>51</sup> Why did they pick this subject for one of the early information markets? Essentially, it was a subject that the company's employees were "very interested in."<sup>52</sup> The employees at Xanadu recognized that they had a tendency to fool themselves about when they might be able to complete a product, and the information market was a way to impose discipline on their predictions.<sup>53</sup>

The second information market in which Hanson was involved was the Foresight Exchange, which began in September 1994.<sup>54</sup> Most of the early predictions involved science-related topics such as cold

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individual salespeople might have incentives to underestimate goals so that they can later "look good" when they exceed the sales quota. Cf. Gary F. Goldring, *Mandatory Disclosure of Corporate Projections and the Goals of Securities Regulation*, 81 COLUM. L. REV. 1525, 1535 (1981) (discussing underestimation in corporate projections); William S. Laufer, *Corporate Liability, Risk Shifting and the Paradox of Compliance*, 52 VAND. L. REV. 1343, 1413, 1413 n.295 (1999) (discussing pressure on employees to meet sales goals).

49. See *infra* App. A.

50. Not all of the market founders were able to be reached, and not everyone we reached participated in the interviews. Nevertheless, we were struck by the eagerness of some who did respond, and we think their sharing of their experiences contributes to a better understanding of the emergence of these new economic instruments.

51. Hanson Interview, *supra* note 30, at 2.

52. *Id.* at 3.

53. *Id.*

54. *Id.*

fusion or global warming.<sup>55</sup> This was a response to Hanson's suggestion to attract participants to bet on science-related topics.<sup>56</sup> Why did this suggestion arise? Hanson had a long-standing interest in the philosophy of science, stretching from his academic work as an undergraduate and master's student.<sup>57</sup>

Finally, Hanson may be best known for his work with the Policy Analysis Market ("PAM"), a proposed information market about political instability in the Middle East sponsored by the Defense Advanced Research Projects Agency ("DARPA"), an agency of the Department of Defense.<sup>58</sup> Why was this subject area chosen? Initially, Hanson was looking for the subject of the "most dollar value to the Department of Defense" and thought political instability in the Middle East was the most likely subject.<sup>59</sup>

PAM did not have a happy future. Two U.S. senators criticized the project, the Defense Department withdrew its sponsorship, and its supervisor resigned.<sup>60</sup> Hanson observes that this outcome was shaped by factors that had nothing to do with the merits of PAM. In the political context, DARPA administrator John Poindexter (who to Hanson's knowledge had no direct involvement with PAM) was politically controversial, and his political opponents, according to Hanson, were "looking for something to get him."<sup>61</sup> Hanson also notes that Democrats are prone to attack Republicans for being too friendly toward markets, and he notes, "If [Albert] Gore was elected, we'd still be going."<sup>62</sup>

Other founders of information markets were influenced more by the business potential than science or politics. Emile Servan-Schreiber, the chief executive officer of NewsFutures, Inc., runs three public information markets: a current events market called NewsFutures, a market in technology and business called Innovation Futures, and a Tech Buzz Game about information technology.<sup>63</sup>

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55. *Id.*

56. *Id.*

57. Hanson Interview, *supra* note 30, at 3.

58. *Id.* at 4-5. This project has sometimes been characterized as involving "terrorism futures." Hanson rejects this characterization as inaccurate and notes that global deaths from terrorism were merely one of many global parameters to be explored in the market. *Id.*

59. *Id.* at 6.

60. See ROBIN D. HANSON, THE INFORMED PRESS FAVORED THE POLICY ANALYSIS MARKET 2 (2005), <http://hanson.gmu.edu/vita.html>.

61. Hanson Interview, *supra* note 30, at 8.

62. *Id.*

63. E-mail from Emile Servan-Schreiber, CEO NewsFutures, to Robert L. Rogers (Aug. 3, 2005) (on file with author) [hereinafter Servan-Schreiber Interview]. In addition to these public markets, NewsFutures also offers private information markets to corporate clients.

Servan-Schreiber created his company in part as a result of his long-running interest in journalism.<sup>64</sup> His family has run several press ventures in France, and Servan-Schreiber thought that prediction markets “could be the basis for a new type of journalism: let the readers collectively predict what will happen tomorrow based on what they read today. And treat those predictions as content themselves, yielding a truly new form of interaction between a media outlet and its audience.”<sup>65</sup> Servan-Schreiber’s co-investor, Maurice Balick was motivated by his belief “in the ability of free markets to allocate resources efficiently and predict outcomes through information aggregation.”<sup>66</sup> Yet despite these academic interests, in operating the market Servan-Schreiber is “definitely business focused.”<sup>67</sup> He hopes to make a profit, “if only because it’s hard to argue that you’re contributing something useful if no one is willing to pay for it.”<sup>68</sup>

John Delaney is the chief executive officer of the Trade Exchange Network Limited, which owns information markets such as [www.tradesports.com](http://www.tradesports.com) and [www.intrade.com](http://www.intrade.com).<sup>69</sup> When he started in March 2000, the most commonly traded subjects were sports and financial matters, which Delaney thought were topics that would be “most immediately acclimated” by the target group of individuals in the 20-45 age group with high amounts of disposable income.<sup>70</sup> Since then, the available topics for trading have expanded to cover a wide range of subjects, including current events, political elections, weather, and entertainment.<sup>71</sup>

Delaney sees enormous potential for information markets and thinks they may have a role to play in “every issue that is material to people.”<sup>72</sup> He notes, however, that while Trade Exchange Network is an Ireland-based company, the service can be accessed from at least 192 jurisdictions. These multitude of laws pose challenges, particularly when existing laws change, may be unclear, and do not

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64. *Id.*

65. *Id.*

66. E-mail from Emile Servan-Schreiber, CEO NewsFutures, to Robert L. Rogers, containing statement of Maurice Balick, CEO NewsFutures (Aug. 6, 2005) (on file with author) [hereinafter Balick Interview].

67. Servan-Schreiber Interview, *supra* note 63.

68. *Id.*

69. Telephone Interview with John Delaney, Chief Executive Officer, Trade Exchange Network, Ltd. (Jan. 24, 2006).

70. *Id.*

71. *Id.*

72. *Id.*

always “elegantly embrace” the type of products and services offered by information markets.<sup>73</sup>

In sum, the founders’ stories do not seem to present any unified explanation for why information markets have developed where they have. With the Trade Exchange Network, John Delaney targeted initial topics to reach a desired demographic group, but in other cases, the founders’ stories suggest that their information markets are, at least to some degree, results of their personal experiences. Hanson studied philosophy of science, and one of his initial markets focused on scientific questions. Servan-Schreiber came from a press family and saw the potential of information markets to shape media. This diversity of motivations is not particularly astonishing, but it does have implications for the predictability of the emergence of information markets, a subject that we address in greater detail in Section IV below.

### III. TRACING TRENDS IN MARKET DEVELOPMENT

In this section of the Article, we analyze the subjects covered by existing information markets and conclude that, for the most part, markets have most commonly arisen in two broadly defined areas: political elections and entertainment.

In the first part of this section, we analyze why this might be so, specifically examining the business models used by many information market founders and what impact those business models have on the subject matter of the market. Besides looking at the supply side, we also examine the attractions of information markets to participants and ask why individuals might be more willing to participate in certain markets than in others. In doing so, we use insights from cognitive psychology, including the “flow” experiences identified by psychologist Mihaly Csikszentmihalyi.

In the second part of this section, we examine the underdeveloped markets — areas where information markets could potentially lead to predictions that would significantly advance human knowledge or generate wealth — where markets have yet to be developed. And, in the final part of this section, we discuss the role that structural factors, such as legal constraints, have had in the development of information markets in particular areas.

#### A. *The Lure of Information Markets*

To date, most information markets tend to cluster around two broad subject areas, politics and entertainment. More than fifty percent of the current public information markets deal with these

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73. *Id.*

two subject areas alone.<sup>74</sup> This seems to be a startling subject concentration, especially given the proven predictive capabilities of information markets and the number of questions that they could help to answer.

There are currently twenty-one functioning public information markets. Of these twenty-one public information markets, six have elections or politics as their central focus. Indeed, one of the most groundbreaking paradigmatic information markets, the IEM, described in Section II, *supra*, has as its focus the outcome of the U.S. presidential elections. Dealing with foreign politics, the Austrian Political Stock Markets focus on Austrian elections,<sup>75</sup> Wahlstreet focuses on the outcome of German politics,<sup>76</sup> and the Election Stock Market focuses on Canadian elections.<sup>77</sup> Another market, the Political Stock Exchange,<sup>78</sup> allows participants to purchase shares of politicians and shares of political events, with participation by the general public using virtual money.<sup>79</sup> Finally, the Washington Stock Exchange focuses on predicting U.S. congressional races and pending federal legislation.<sup>80</sup>

The other popular area for information markets is entertainment. While "entertainment" broadly defined could include everything from opera to chess, we use it here to mean the Hollywood entertainment industry, including movies and television productions, and competitive sporting events with spectators, such as basketball and football. Of the twenty-one public information markets, three have entertainment or sports as their central focus. The Hollywood Stock Exchange, described in Section II, tries to predict whether a particular movie will be a success at the box office. Another example is the Celebdaq market,<sup>81</sup> which allows participants to buy shares of a celebrity, with incentives based on the celebrity's popularity, and dividends based on the amount of press coverage that the celebrity receives. Finally, TradeSports<sup>82</sup> allows the general public to invest

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74. See *infra* App. A. Attached as an appendix to this article is a listing of current public information markets, along with the general subjects that each market addresses.

75. Austrian Political Stock Markets/Austrian Electronic Markets, <http://www.imw.tuwien.ac.at/apsm>, (last visited Feb. 22, 2006).

76. Wahlstreet, <http://www.wahlstreet.de> (last visited Feb. 22, 2006).

77. UBC, Election Stock Market, <http://esm.ubc.ca> (last visited Feb. 22, 2006).

78. The Political Stock Exchange, <http://www.politistock.com> (last visited Jan. 1, 2006).

79. *Id.*

80. Washington Stock Exchange, <http://www.washingtonsx.com> (last visited Feb. 22, 2006).

81. Celebdaq, <http://www.bbc.co.uk/celebdaq> (last visited Feb. 22, 2006).

82. Tradesports, <http://www.tradesports.com> (last visited Feb. 22, 2006).

real money in futures contracts, primarily for sporting events, but also for politics, current events, and other topics.

Of the twenty-one public information markets, four additional markets also contain significant coverage of politics and entertainment. The News Futures<sup>83</sup> market allows virtual money participants the opportunity to predict news, financial, sports, and entertainment news. Although the focus of the market is best classified as “current events,” meaning newsworthy current stories, a significant portion of the predictions deal with the entertainment industry, sporting events, or politics. Another information market, InTrade,<sup>84</sup> allows participants to make a variety of predictions, including predictions about politics and entertainment. The Public Knowledge Exchange includes trading on futures in world events.<sup>85</sup> Finally, the Foresight Exchange<sup>86</sup> allows participants to predict a number of questions, some of which involve the outcomes of future political elections. Although the focus of the four markets is current events, that includes heavy doses of both politics and entertainment.

Indeed, the forgoing analysis shows that out of the twenty one public information markets currently operating, six have political elections as their focus, three have entertainment and sports as their focus, and four have a broader focus but one that incorporates politics, sports, and entertainment as a major concentration of the market. Therefore, thirteen of twenty-one public markets are concentrating in the areas of politics and entertainment. And so the next questions to ask are why are these subject areas so highly developed, when others, that are of possibly far greater social utility, have been relatively neglected? What are the attractions of these markets to founders? What attracts participants to trade in these markets? The next two sections provide some answers.

#### 1. Attractions to Founders

Although the intellectual challenges of the field may be an attraction, the founders, particularly of the for-profit exchanges involving real money, also have financial motivations.<sup>87</sup> Although this is not true of non-profit educational ventures such as the IEM, which is run by the Iowa University School of Business, most are run by private for-profit firms. We have discussed above what some of the

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83. NewsFutures, <http://www.us.newsutures.com/index.html> (last visited Feb. 22, 2006).

84. InTrade, <http://www.intrade.com> (last visited Feb. 22, 2006).

85. Public Knowledge Exchange, <http://www.publicgyan.com> (last visited Feb. 22, 2006).

86. Foresight Exchange, <http://www.ideosphere.com> (last visited Feb. 22, 2006).

87. See, e.g., Servan-Schreiber Interview, *supra* note 63.



founders said about their motivations for starting particular markets. Here, we look more broadly at larger trends that seem applicable to their choices, including the selection of a business model.

To some extent, the subject area of the market seems to be driven by the choice of the business model that information market entrepreneurs select. Firms running information markets seem to be choosing business models similar to those employed by traditional brokerage firms or the Internet businesses of the new economy. In part, it is these decisions about the business model that drive the decision about what subject matter the information markets will cover, as we discuss below.

Under the business model that a traditional brokerage firm uses, investors are initially charged a fee for setting up an account. The brokerage firm also charges investors for managing their portfolio.<sup>88</sup> If the investors prefer a more active role, the brokerage firm will charge fees for executing their trades.<sup>89</sup> Brokerage houses sustain themselves by charging investors what is essentially a “transaction cost” on their trades.

In the context of information markets, several of the currently existing markets generate profits through such a traditional brokerage business model. For example, Tradesports charges customers to establish an account, and then charges a monetary fee for each trade that a customer executes on the information market.<sup>90</sup> Increased attention to any particular predictive market will result in more accounts being opened. More accounts lead to correspondingly higher revenues for the information market maker. Similarly, an increase in trading results in higher commissions for the information market maker. An increase in the amount of publicity or attention will lead to an increase in the amount of revenue for those who run the exchange.

Under an Internet business model, a web site offers a program or service, usually either for free or at a de minimis cost to the user. To pay for its operating costs, the web site sells a portion of space on its page to advertisers.<sup>91</sup> Thus, the potential for profit is tied to the number of “hits” or “eyeballs” that the page receives, in other words, the number of visitors the page is able to attract with its free

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88. Jack Naudi, *Should You Hire a Financial Advisor? You'll Save a Lot On Fees By Going It Alone To Buy a Diverse Mix Of No-Load Funds*, ST. LOUIS POST-DISPATCH, Apr. 24, 2005, at E5 (describing how brokerage accounts work).

89. *Id.*

90. Tradesports homepage, <http://www.tradesports.com> (last visited Feb. 22, 2006).

91. Stephen Baker, *Where the Real Internet Money Is Made*, BUS. WK., Dec. 27, 2004, at 98.

service.<sup>92</sup> As the web sites had no revenue stream from users, many stock analysts widely criticized this business model as impractical.<sup>93</sup> Despite these criticisms, it seems that many firms,<sup>94</sup> as well as emerging information markets, are still using this model.

Since the key to generating profits under both the traditional brokerage and Internet business models is to increase the number of individuals opening accounts, the amount of trading, or the number of hits that a particular web site receives, it stands to reason that many information markets will be geared to attract the broadest audience possible. Information market firms create predictive markets based on the number of participants they think a particular subject area will attract. And it appears that many information market entrepreneurs are currently doing this by selecting topics and areas that they think will appeal to a mass audience, such as sports, entertainment, and politics.

Rather than starting with the question of what predictions would be most valuable – and then structuring a market to capture that information – what is currently occurring is that market entrepreneurs seem to target markets to areas that they believe will attract the most participants. And this seems somewhat intuitive: Public markets on popular topics will succeed, whereas public markets on the likelihood of dull events will fail. The idea of pitching the markets to a mass audience to attract publicity and generate fees or advertising, however, does have one serious consequence, namely the potential loss of valuable predictions in areas unlikely to attract and entertain a significant number of participants. If the primary goal of a market organizer is attracting traders, which may be a natural consequence of focusing on the revenue source that makes the market possible, then the information market becomes mostly a device for entertainment of its participants, and the information market may become largely divorced from its information-gathering and predictive functions. The result could be great fun, but provide little more social utility than the poker night at a local bar.

One of the greatest challenges and opportunities facing information market entrepreneurs in the coming years will be to develop a business model that allows a profit from the predictions the information market generates. For now, however, the information market founders may be making profits by attempting to pull in as broad a group of participants as possible. In the next section, we

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92. *Id.*

93. See Denise Caruso, *In the Internet Rat Race, Greater Value Seems To Be Put on Devising the Next Business Plan Than on Making It Work*, N.Y. TIMES, Oct. 25, 1999, at C4 (critiquing internet business models).

94. See, e.g., Yahoo, <http://www.yahoo.com> (last visited Feb. 22, 2006); Google, <http://www.google.com> (last visited Feb. 22, 2006).

explore the elements that may attract participants to trade on information markets and why certain subjects seem to be more popular with a mass audience.

## 2. Attractions to Participants

On an intuitive level, it seems to make sense that markets that are more “easy” or “fun” or a combination of these two elements, are bound to get more attention and, at least initially, draw more participants.

By “easy” we refer to the ease of gathering information about the uncertain event in question. For example, one could compare becoming informed about the Michael Jackson trial, with nightly coverage by the broadcast media, with the difficulty in obtaining information to predict the rate of new housing starts for the quarter. Predicting new housing starts requires specialized knowledge and analysis of the macro economy, the construction industry, and mortgage rates. All of this is knowledge that the average person would not know offhand, and, because of bounded rationality,<sup>95</sup> might never take the time to analyze. Although the outcome of trials also depend on many complicated factors, at the very least the press coverage of the Jackson trial provoked opinions from the general public, reactions that could mimic those of the jury in the actual trial.<sup>96</sup>

Politics are also “easy” in the sense that the news media, both print and broadcast, currently give extensive coverage to political races. Throughout the course of the presidential races, for example, the popular press will typically cover campaign stump speeches, the candidates’ publicity tours, and the presidential and vice-presidential debates. In addition, major news outlets often have information about polling and trends among voter demographics, as well as analysis about the popularity of major candidates. All of this information makes it relatively easy for the average person to stay well-informed about the election. Moreover, because the data about a candidate’s appeal is frequently directly accessible to any observer by assessing political positions and debate performance, individuals can

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95. Bounded rationality refers to the idea that individuals can only absorb and learn a certain amount of information. See Herbert A. Simon, *A Behavioral Model of Rational Choice*, 69 Q. J. ECON. 99, 104-05 (1955); Russell Korobkin, *Bounded Rationality, Standard Form Contracts, and Unconscionability*, 70 U. CHI. L. REV. 1203, 1222-23 (2003) (exploring idea that bounded rationality leads consumers to agree to terms in form contracts).

96. This raises the interesting question of whether information markets work best when the market participants have roughly the same amount of knowledge as the actual decisionmakers. The question is, however, largely beyond the scope of this Article.

develop their own assessments of the appeal independent of the media assessment of the candidate. Sometimes, for example, certain candidates are more popular with voters than with the press, and information markets with a political focus can reflect this fact.

Politics may also be a popular subject for markets because of the ease of setting up such a market, at least in the United States. With a typical election in the United States, usually only two major party candidates are running for office. Participants in the market are asked to make what is essentially a binary choice between who will win or lose.<sup>97</sup> Setting up such a binary market is easier for market organizers than is setting up a market in which the purpose is predicting the percentage of the vote that each candidate would receive. In addition, elections are “easy” because at the end of election day, all the votes are counted, and there is a clear “winner” and “loser,” which makes calculating payouts considerably easier.<sup>98</sup>

In addition, it may be that there is an element of “fun,” “play,” or “challenge” in an information market dealing with politics or entertainment that makes it appealing. To try to answer this question about the popularity of political and entertainment markets on the demand side, we turn to the social psychology work of Mihaly Csikszentmihalyi.<sup>99</sup> In his work, Csikszentmihalyi has studied how individuals spend their time, whether working, sleeping, engaging in housework or leisure activities, and had them rate their moods.<sup>100</sup> Examining a large number of these mood diaries, Csikszentmihalyi determined that individuals had elevated moods when they engaged in particular activities that triggered “flow states.”<sup>101</sup>

According to Csikszentmihalyi, flow states involve concentration, the use of skills, learning, and adaptation.<sup>102</sup> Engaging in activities that are challenging and at the same time enjoyable, an individual experiences flow, “the state in which people are so involved in an activity that nothing else seems to matter; the experience itself is so enjoyable that people will do it even at great cost, for the sheer sake

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97. Of course, this is not always true. Consider third-party spoilers such as Theodore Roosevelt, Ross Perot, and Ralph Nader. *See generally* Jesse Ventura, *Surviving as a Third-Party Candidate in a Two-Party Country*, 13 STAN. L. & POL'Y REV. 179, 179 (2002) (recounting Ventura's successful third-party gubernatorial bid).

98. This is not always the case, as the 2000 presidential election demonstrated, but in the vast majority of elections, the winner and loser are rapidly ascertainable.

99. *See* MIHALY CSIKSZENTMIHALYI, *FLOW: THE PSYCHOLOGY OF OPTIMAL EXPERIENCE* (1990).

100. *See id.* at 4.

101. *Id.* at 4-5.

102. *See id.* at 6.

of doing it.”<sup>103</sup> Csikszentmihalyi attributes much of a person’s happiness and feelings of accomplishment to entering flow states.<sup>104</sup>

Traders who participate in particular information markets may experience a form of flow. Making correct predictions about sporting events or political elections involves a challenge, although perhaps one that, at the same time, does not involve too much of a transaction cost in acquiring the information necessary to be competitive in the market. Elements of this can be seen in the popularity of play-money exchanges as well as the sports gambling industry. The popularity of virtual money markets suggest that people are often motivated to participate in information markets, as Wolfers and Zitzewitz have noted, “through the thrill of pitting one’s judgment against others . . . .”<sup>105</sup>

To some extent, there currently is an element of “fun” and challenge when either professional stock analysts or day traders follow financial news and developments and then execute trades. But information markets, especially those that take as their subject celebrities and sporting events, carry this idea even further. For such markets incorporate popular and enjoyable leisure activities, and then add the dimension of challenge and competition.

### 3. Structural Factors

In addition to the desires of the founders and the attraction of participants, additional factors that affect all parties influence where information markets have appeared. We identify some of the significant structural factors below.

One of the most obvious structural factors is the legal restrictions on information markets. Robin Hanson has suggested that legal barriers have kept people away from developing information markets,<sup>106</sup> and Emile Servan-Schreiber notes that most of the jurisdictions in which he and his business partner live ban on-line gambling, so therefore “we are constrained to operate only play-money markets.”<sup>107</sup> This restriction has influenced how NewsFutures operated its markets because the “economic constraints of operating play-money markets are very different from those of operating real-money-markets. We have had to rely on media partnerships, corporate sponsorships, generating high-value data, etc.”<sup>108</sup> The IEM, a market using real money in the United States, obtained a no-action

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103. *Id.* at 4.

104. *Id.* at 40-41.

105. Wolfers & Zitzewitz, *Prediction Markets*, *supra* note 12, at 19.

106. Hanson Interview, *supra* note 30.

107. Servan-Schreiber Interview, *supra* note 63.

108. *Id.*

letter from the Commodities Futures Trading Commission (“CFTC”) to assuage legal concerns, and the CFTC subsequently brought an enforcement action against another information market, alleging violations of U.S. commodities laws.<sup>109</sup> Clearly legal restrictions have influenced the creation of information markets.

Apart from legal restrictions, a number of other structural factors likely have influenced the development of information markets. One is the similarities with traditional polling and constitutionally protected speech. Participants and regulators may recognize as a form of polling the expression of an opinion on the outcome of the presidential election or who is likely to win an Oscar award. And, particularly in the case of speech on matters of public importance, the expressions of political expectations are arguably at the core of the speech the First Amendment was meant to protect.<sup>110</sup>

Also favorable is that information markets appear, at least on the surface, to pose no serious negative externalities.<sup>111</sup> Because there typically are not huge sums of money at stake, it seems unlikely that a large number of people will become destitute by speculating in information markets, that the markets will take significant amounts from the poor as it is alleged that lotteries do, that organized crime will be attracted to the market, or that any of the harms associated with traditional gambling have appeared with information markets to any significant degree.

Likewise, it is helpful to the development of information markets that they do not pose significant start-up costs, at least in comparison to other new technologies. (Consider in contrast the costs of starting a nuclear power plant or developing a new pharmaceutical drug). Emile Servan-Schreiber and Maurice Balick started three information markets with \$100,000.<sup>112</sup> While consequential, at the same time that is an amount that many entrepreneurs might be able to obtain through savings, loans, or grants.

The relative ease of start-up is also helpful. The main task seems to be designing the market and attracting participants. This is not

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109. See Press Release No. 5124-05, Commodity Futures Trading Comm’n, U.S. Commodity Futures Trading Commission Assesses Penalties Against Irish Company Trade Exchange Network Limited For Offering Illegal Commodity Option Contracts, (Oct. 4, 2005), available at <http://www.cftc.gov/opa/enf05/opa5124-05.htm>. A settlement was announced at the same time as the filing of the commission’s charges. *Id.*

110. The possibility of gain from one’s “speech,” of course, triggers other legal models such as restrictions on gambling. In a subsequent paper, we intend to explore the First Amendment constraints on the regulation of information markets.

111. Longer term, the matter may be more complex. We have pondered elsewhere if a successful information market in predicting Supreme Court decisions might undermine the Court’s legitimacy. See Cherry & Rogers, *supra* note 10, at 2.

112. Servan-Schreiber Interview, *supra* note 63.

trivial, but given that most of the work is intellectual (either in design, programming, or advertising), the origin of an information market is spared the transaction costs of, say, buying a factory or hiring a large staff of employees. By their nature, opening an information market can be a much leaner operation than, say, opening a manufacturing plant.

Obviously, a number of other structural factors on various levels of generality might be explored, ranging from the big picture of human curiosity and to the details of the ease of using the Internet to participate in information markets. We will not attempt to exhaust these factors, but we do want to identify how they, in addition to the motivations of the founders and the participants, have influenced the origins of information markets.

### *B. Underdeveloped Markets*

The data generated from a particular information market could be worth a great deal, either in money or in terms of social utility, but of course that all depends on what that data are and what the data are used for. Further, harnessing the power of information markets to make predictions could revise our way of thinking about areas that are dedicated to particular methods of thinking about future events. Although the entertainment, sports, and political arenas already have attracted a significant number of information markets, many areas where predictive markets would be useful, such as in law or business, have yet to be developed. In this section, we examine areas where information markets could provide valuable predictions and then identify barriers that may prevent particular markets from starting.

There are still significant, broad areas where information markets do not yet exist. Ideally, where would the presence of information markets generate the most valuable information? Although there is a certain subjectivity of value,<sup>113</sup> in using the term “valuable” we mean information that society could use, or which could create monetary wealth for either participants or organizers.

One intriguing possibility that Professor Michael Abramowicz has advocated is government use of information markets to improve the administrative agency policymaking process.<sup>114</sup> Professor Abramowicz proposes that information markets could predict

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113. See LUDWIG VON MISES, HUMAN ACTION: A TREATISE ON ECONOMICS 97, 204-5 (Rev. ed. 1963) (1949) (describing subjectivity of value). For example, Michael Jackson himself would value the information provided by the market on his trial much more highly than would the average person who had no stake in the outcome.

114. Michael Abramowicz, *Information Markets, Administrative Decisionmaking, and Predictive Cost-Benefit Analysis*, 71 U. CHI. L. REV. 933 (2004) [hereinafter Abramowicz, *Information Markets, Administrative Decisionmaking*].

insolvency of financial institutions,<sup>115</sup> make budgetary forecasts for administrative agencies,<sup>116</sup> and allow more efficient regulation by skipping notice-and-comment rulemaking.<sup>117</sup> All of these options could improve both the quality and efficiency of government policymaking.

Elsewhere, we have proposed harnessing the knowledge of the legal community to establish an information market in Supreme Court predictions.<sup>118</sup> We also believe that another underdeveloped market area is the prediction of corporate and securities law regulation. Such a market could provide significant monetary benefits to corporations and attorneys if better predictions were able to be made about this area of law and the outcome of certain cases.<sup>119</sup>

Of course, this discussion of missing markets is itself extremely incomplete. The subject areas where information markets could potentially provide predictions are nearly as expansive as human knowledge itself. Information markets either have been asked or are currently being asked to predict everything from whether (or when) certain technological and scientific advances will occur<sup>120</sup> to helping firms predict sales of new products in future quarters.<sup>121</sup> There are vast areas where information markets could generate value by aggregating the knowledge that individuals possess, and so far we have only barely begun to scratch the surface of potential applications.

Of course, some of these markets may be developed eventually. But because they do not present an immediate business opportunity — in terms of raising ad revenue or the number of eyeballs that come to the page — it may simply take a longer period of time for these markets to get started. After all, celebrity and election markets have an independent consumption value regardless of the information that could be extracted from them. This may not be the case in other areas, where the benefit ultimately inures to a diffuse group, the public.

The question remains particularly puzzling when these missing markets could potentially yield valuable information. If the business, structural, and legal factors only partially explain why these markets

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115. *Id.* at 987-88.

116. *Id.* at 990-91.

117. *Id.* at 993-95.

118. Cherry & Rogers, *supra* note 10, at 4.

119. *Id.* at 88.

120. Innovation Futures, <http://www.innovationfutures.com> (last visited Feb. 28, 2006).

121. See discussion of the Hewlett Packard market, *supra* note 45 and accompanying text.



are underdeveloped, are there other explanations that could be offered? And can anything be done about it?

#### IV. THE RANDOM WALK AND BEYOND

We next examine whether market developments are the product of a “random walk.” After concluding that they are at least partially, we consider whether any alternatives to a random walk exist that could better aid the development of information markets.<sup>122</sup>

##### A. *A Random Walk?*

We have set forth partial answers to why information markets have developed in some areas and not others, but these explanations do not seem entirely to resolve the question. The appearance of any given information market remains somewhat unpredictable and idiosyncratic. This section explores the hypothesis that, despite the elements set forth in Section III.A (including business models and government regulation),<sup>123</sup> the appearance of any particular market is essentially random. It then compares and contrasts that possibility with the far-more established hypothesis that stock prices in the major financial markets follow what has been deemed a “random walk” – that is, that short-run changes in stock prices cannot be predicted.<sup>124</sup> Finally, this section addresses the consequences for the potential of information markets if the random walk hypothesis about their origins is correct.

##### 1. Random Origins?

The following two sections have resulted in a paradox. On the one hand, current information markets share a number of characteristics. In general, founders seem motivated by personal interests and profit seeking. Their participants are motivated partly by the possibility of success or profit, and partly by the psychological fun of playing, a reward facilitated by its compatibility with the human psyche. Certain structural elements also have influenced the creation of information markets. All of these factors set forth at least a partial explanation of how and why these markets have developed. Yet despite these areas of knowledge, the overall question of why markets exist on certain subjects and not others remains partially

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122. See generally NEIL FLIGSTEIN, *THE ARCHITECTURE OF MARKETS: AN ECONOMIC SOCIOLOGY OF TWENTY-FIRST-CENTURY CAPITALIST SOCIETIES* (2001) (exploring how markets emerge, and the factors necessary to sustain markets from sociological perspective).

123. See *supra* Part III.A.

124. See MALKIEL, *supra* note 15, at 24 (defining random walk).

unresolved. As discussed above, the explanation certainly is not social utility or even monetary value from the information generated.

The answer, we suspect, may be that within certain boundaries such as business models and government regulation, the appearance of information markets is essentially random. Successful markets tend to share the characteristics described above, such as a relatively immediate pay off and popular interest in politics and entertainment. But within those boundaries, the markets exist chiefly because they sparked the interest of an entrepreneur dedicated enough to bring the market into being.

This result seems consistent with the results of our interviews with founders of information markets. As discussed above, we focused questions on the motivation for creating markets, and we eagerly hoped for a coherent explanation of why these markets appeared in some areas and not others. What we found was that the reasons for starting a market in certain areas were often personal or even idiosyncratic (for example, Hanson's study of science, Servan-Schreiber's family background in media). None of these data lend themselves to extrapolation into general rules of market origins.<sup>125</sup>

## 2. A Random Walk Down the Information Super-Highway

If the origin of information markets is partly random, it would not be shocking when viewed in context of the general history of financial markets. Information markets may be a new development, but capital markets are not. Stock markets have been studied exhaustively for more than a century, by first-rate theorists and investment managers seeking a competitive advantage that might result in huge profits. Billions of dollars depend on which way certain stock prices might move, and the practical and academic research devoted to this question has been correspondingly significant.<sup>126</sup>

After such extensive efforts, many researchers kept running into the same phenomenon of randomness. One of the most famous of these academics is Burton Malkiel, an economist at Princeton. Malkiel defined a random walk as one "in which future steps or directions cannot be predicted on the basis of past actions."<sup>127</sup> In the

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125. Although we had hoped for a clearer answer to explain the conundrum, we realized that the apparent randomness was consistent with our own experiences regarding the possibility of establishing an information market in Supreme Court predictions. *See generally* Cherry & Rogers, *supra* note 10. The idea for Tiresias arose by chance, and, in the end, we too were pawns of randomness. *See generally* NASSIM NICHOLAS TALEB, *FOOLED BY RANDOMNESS 2* (2d ed 2004) (identifying human tendency to underestimate the degree of randomness in life).

126. *See generally* MALKIEL, *supra* note 15, at 125-44 (discussing fundamental and technical analysis).

127. *See id.* at 24.

context of the stock market, it means that short-run changes in stock prices cannot be predicted.<sup>128</sup> This implies that Wall Street's technical analysis involving charts of price movements is basically worthless,<sup>129</sup> and the ability of professionals to out-perform the market by making superior stock selections based on the fundamental value of the underlying company is at best rare.<sup>130</sup> This is an academic finding with trillion-dollar implications for the investment markets (with vast sums spent on active management) and for the millions of individual investors whose retirement security depends upon their investment choices (such as choosing index funds, which mirror an entire market sector, instead of high-cost mutual funds run by active managers).

We suspect that a similar random walk may exist with regard to the emergence of information markets. In this context, a random walk would mean that the emergence of an information market in any narrow time period cannot be predicted from the emergence of past markets (analogous to technical analysis in the stock market) or the fundamental value of what an information market might provide. Markets for Oscar awards and pope bets exist; those for Supreme Court decisions or SEC rulemaking do not. Like daily movement of stock prices that cannot be predicted by fundamental value or past price movements, creation of information markets appear to be driven chiefly by randomness.

### 3. The Toll of the Random Walk

If the emergence of information markets is a random walk, what are its consequences? We have identified one above: The markets that currently exist do not provide the most valuable information that information markets are likely capable of producing. As discussed in Section III, a number of markets that would make valuable predictions simply do not exist.

Less obviously, the random appearance of information means that sometimes markets attempt more difficult challenges without success while neglecting easier ones where a victory might be more readily achieved. For example, consider the limited areas of Supreme Court nominees. Predicting which individual President George W. Bush would nominate to the Supreme Court is a difficult task, one that information markets did not appear to perform particularly well, at least in significant advance.<sup>131</sup> There are several possible reasons

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128. *Id.*

129. *Id.* at 169.

130. *Id.* at 200.

131. See, e.g., Andres R. Martinez, *Supreme Court Market Lets You Put Your Money Where Your Hunch Is*, Knight Ridder Tribune Business News, July 19, 2005

for this disappointing performance of information markets. There were a variety of options, not clearly defined, and the decision makers had considerable discretion about who to choose. They also did not specifically identify the top candidates under consideration, which reduces the ability of a market to concentrate its efforts on a limited number of options. In addition, it may be harder for information markets to predict the actions of a single decisionmaker, such as President George W. Bush, who may act from personal reasons that the public could not predict.

In contrast, compare a subsequent market on the Supreme Court Futures Market to predict whether Judge Samuel Alito Jr. would be appointed to the Supreme Court after President Bush had nominated him. Tradesports predictions in early January 2006 indicated a clear likelihood of Alito's confirmation, and in fact, the Senate approved the nomination later in the month.<sup>132</sup> Here, there is a binary choice – appointed or not – which presents a narrower range of options compared with trying to predict the initial nominee. Similarly, a larger group of decisionmakers (100 senators) made the decision, which reduces the importance of any one particular individual who might act from idiosyncratic reasons that are less discernable to an information market.

Why should the success or failure of any individual information market matter? On the one hand, those who create and participate in information markets are satisfying their personal desires without harm to others – certainly among the rights of a free and creative people. Moreover, any use of an information market spreads knowledge of the technology, and even the failures in prediction, if analyzed, can help discover where information markets are likely to work and where they are not.

All of this is true, and we certainly intend no criticism toward those laboring to advance information markets. Nevertheless, the risks of the failure of information markets – as a whole — need to be

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(identifying Judge Clement as the frontrunner as of that Monday afternoon). The information markets reflected the conventional Beltway wisdom on the day of the nomination, which initially favored Judge Edith Clement of the U.S. Court of Appeals of the 5th Circuit. *See id.* On Tuesday July 19, the markets switched to indicating the selection of Judge John Roberts Jr. of the D.C. Circuit. This was before the president's formal announcement that evening but apparently after leaks about who the nominee would be. For a blog discussion of the accuracy of the information markets on this question, see posting of Jim Lindgren, *A Response to Orin on Tradesports*, [http://volokh.com/archives/archive\\_2005\\_07\\_17-2005\\_07\\_23.shtml](http://volokh.com/archives/archive_2005_07_17-2005_07_23.shtml) (July 20, 2005).

132. *See, e.g., S.C. Confirm Alito*, visited 10:41 a.m. EST on Jan. 9, 2006, [www.tradesports.com](http://www.tradesports.com), (indicating that 87.3 bid and an 89.5 ask for the proposition that Samuel A. Alito would be confirmed to the Supreme Court by the U.S. Senate); David D. Kirkpatrick, *Alito Sworn in As Justice After Senate Gives Approval*, N.Y. TIMES, Feb. 1, 2006, at A1.

considered. Information markets are still novel in concept and limited in number.<sup>133</sup> Whether they will expand across the world in a variety of fields or whether they will wither into an intellectual curiosity is not yet definitively resolved. One has to look only to the harsh rejection of the proposed Policy Analysis Market to see that, however valid the potential of information markets, there exists a risk of public rejection.<sup>134</sup> For their spread in the long run, information markets need to be seen as more than an intellectual parlor game, and the clearest way to show their value is to produce accurate predictions on matters of consequence. Success in this helps advance the acceptance of information markets, but predictive failures suggest the opposite conclusion: that the technology is unreliable and may not be worth funding or may not deserve the time and participation of experts. A random walk in market origin gives little way to focus new markets on the areas most likely to succeed, and thus, with the increased risk of failure, the overall success of the technology becomes riskier.

The random walk can also lead to duplication among information markets and competing efforts. Normally, competition in markets is positive. It leads businesses to offer better goods or services at lower prices. Without competition, businesses tend to become complacent, less innovative, and less consumer friendly. Indeed, a fundamental purpose of statutes such as the Sherman Antitrust Act are to promote such competition throughout the U.S. economy.<sup>135</sup>

Although competition assists the economy overall, it is less clear that it always benefits the development of information markets. As indicated above, one goal of markets is to attract substantial numbers of what Professor Hanson has dubbed “wolves” – knowledgeable participants more likely to provide informed and insightful predictions.<sup>136</sup> Given that the number of “wolves” with knowledge of a technical subject is inherently limited, multiple markets on the same technical subject may dilute the wolf votes and decrease the overall accuracy of a particular market. It may be that an information market on a specialized subject that is functioning at least reasonably well is a new sort of natural monopoly, akin to the electric company or water utility for one’s house. If so, it may be that any additional competitors add little to the accuracy rates while

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133. See *infra* App. A.

134. Hanson Interview, *supra* note 30 (noting that the controversy from PAM has deterred government agencies from experimenting publicly with information markets).

135. See 15 U.S.C. § 1 (2000) (“Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce . . . is declared to be illegal”); *Id.* § 2 (“Every person who shall monopolize, or attempt to monopolize . . . shall be deemed guilty of a felony.”).

136. Hanson Interview, *supra* note 30.

allowing the wolves to be outvoted by those with lesser knowledge (those who Hanson dubs “sheep”).<sup>137</sup>

In addition, it will be interesting to see if the best designed markets truly become dominant in a competitive marketplace. One might expect this to happen because there are few if any barriers to entry and thus a new market offering a better design (either in ease or cost of use<sup>138</sup> or skill in finding questions of importance likely to be answered successfully) could easily displace the inferior incumbent. Yet there would be transaction costs in moving to a new market, not only in time but also in decreased accuracy. The cost of decreased accuracy would be especially acute in the plausible scenario where a transition of wolves to a new information market occurred incrementally and haphazardly rather than massively and simultaneously. In this case, a period of time might exist when, in either or both markets, the dilution of knowledgeable votes resulting from the wolf migration could result in the sheep votes predominating and thus the information market potentially becoming less accurate. These transaction costs are hard to quantify in advance, but it might very well be that the transition costs are prohibitive and thus prevent the success of a superior competitor. Such a result would not be unique in the history of technology.<sup>139</sup>

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137. Professor Hanson himself dismisses this possibility of a sheep victory over the wolves as “rather unlikely,” citing his previous research. See ROBIN HANSON, RYAN OPREA & DAVID PORTER, INFORMATION AGGREGATION AND MANIPULATION IN AN EXPERIMENTAL MARKET, July 12, 2005, available at <http://hanson.gmu.edu/biastest.pdf>; ROBIN HANSON & RYAN OPREA, *MANIPULATORS INCREASE INFORMATION MARKET ACCURACY*, July 2004, available at <http://hanson.gmu.edu/biashelp.pdf>.

138. For this reason, we would not anticipate much competitive success of a market that attempted to charge individuals significant amounts to participate. A free substitute likely would soon spring up at least on subjects of some academic interest, such as the IEM and the Supreme Court Futures Market at the University of North Carolina, which are sponsored by research universities.

139. As one simple example, consider the standard typewriter keyboard. The commonly accepted QWERTY keyboard was initially designed in the late 19th century for manual typewriters whose striking keys had a tendency to jam if the typist moved too quickly. To slow down the human operator, commonly used keys were placed in odd positions that required finger movements (“E” and “T”, for example, are the two most common letters in English, yet they are placed on the top row rather than the home row.) The design succeeded in slowing down the typist, but of course, modern electronic keyboards do not suffer from the same limitations. Yet we still keep the QWERTY keyboard, despite the slower speeds. Why? It isn’t for lack of alternative. The Dvorak keyboard, designed to let the typist move faster by placing commonly used keys on the home row, has been available since 1932. But the QWERTY keyboard was developed first and achieved market dominance. To switch, millions of typists would have to retrain, and thus far, the transition costs have proved prohibitive. See Jared Diamond, *The Curse of QWERTY*, DISCOVER MAG., Apr. 1997, at 34. What lasts is not always what is best, but sometimes merely what was first. What economists term “path dependence” can matter.

Finally, the random walk in the appearance of information markets muddles funding decisions. Is a given proposal the best possible subject for a new information market? Or merely what happened to appear at the time? Given the reality of limited resources that universities or foundations can devote, it would seem helpful to have some way of knowing where best to allocate the resources. In the stock market, investors can adapt to the random walk by purchasing index funds that track an entire market or market sector. If one cannot predict stock price movements, investors can just buy all the available stocks.<sup>140</sup> Alas, one doubts that universities and foundations will fund every information market proposal, akin to purchasing an index fund of possible information markets. As a result, those who allocate resources to future information markets may have to face the vagaries of the random walk and consider its implications for funding decisions.

*B. Beyond the Random Walk?*

Given the disadvantages of a random walk in the origin of information markets, it seems worthwhile to consider if anything can be done about the random walk specifically and the more general issue of organization and advancement of the new field of information markets. Two main sources of organization present themselves: A private body or a government actor. We discuss what each possibility might accomplish and then evaluate its feasibility.

1. Private Organization: AIMing for the Future

What would a private organization mean? Although almost every information market is private in the sense of being non-governmental, the type of organization here would be more akin to a trade association like the National Association of Realtors or a self-regulatory organization such as the National Association of Securities Dealers. We shall call it the Association of Information Markets (AIM) for discussion purposes.

Could AIM solve the problems of the random walk? We suspect not, at least not totally. Membership would be voluntary, and the organization would lack any power to bar new entrants into the market.<sup>141</sup> Accordingly, if an individual wished to open a new information market, however idiosyncratic the endeavor might be,

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140. See MALKIEL, *supra* note 15, at 267-68. This has done well as an investment strategy, beating some 75 to 80 percent of all actively managed funds on an after-fee basis. See *id.* at 268.

141. This is necessarily true in light of the antitrust laws. See generally 15 U.S.C. § 1 ("Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce . . . is declared to be illegal"); *Id.* § 2 ("Every person who shall monopolize, or attempt to monopolize . . . shall be deemed guilty of a felony.").

the organization would not interfere. Even if the organization somehow had the power to authorize or prohibit new markets (and it would not), exercising such power might be counterproductive. The organization might well have thoughtful views about what markets might be valuable, but intelligence is not infallibility, and the decisions about what markets might be successful or valuable might well be mistaken. Particularly in an emerging field that requires experimentation to develop the most successful approaches, entrepreneurs need to be free to fail.

Nevertheless, the organization could help address the random walk by the organizing discussion of where information markets might be most useful and suggest the best areas for new markets. It might function as a type of peer-review panel for entrepreneurial ideas in this area, and its endorsement of an area as appropriate for an information market could help potential market founders obtain from outside sources such as foundations or government grants. In this way, while not eliminating the vagaries of the random walk, AIM might help make the process of market creation less chaotic.

Beyond mitigating the random walk, such an organization could promote other common interests of the field of information markets. Examples of these common interests include many possibilities:

- attracting new participants to existing information markets,
- advertising the predictive efficacy of existing markets where possible,
- analyzing the reasons for any predictive failures to understand why they occurred,
- developing more accurate systems of information market design,
- facilitating academic research into information markets (potentially by publishing an annual journal),
- generally encouraging the expansion of information markets into new areas.

AIM might also help prevent misunderstandings about the nature of information markets. Part of the reason the DARPA's Policy Analysis Market failed was a congressional perception that the market would encourage people to profit by terrorist attacks.<sup>142</sup> The reality was more complicated,<sup>143</sup> of course, and it might be helpful to have a voice for the information markets to be able to explain that

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142. HANSON, IMPOLITE INNOVATION, *supra* note 9, at 9-13.

143. *Id.*



they are not about encouraging illicit gambling or allowing terrorists to profit from acts of savagery.

Thus, while a private organization may not be able to mitigate all the negative consequences from a random walk, it could offer significant benefits for advancing the field of information markets.

#### 1. Government organization

If the private sector cannot overcome the random walk, could a government do better? To be clear, we are not talking here about government regulation,<sup>144</sup> merely government sponsorship. Could the U.S. federal government, for example, create a blueprint for the development of American information markets as part of some type of industrial policy?

Certainly the government has assisted in developing information markets in areas of special interest to the government. The Policy Analysis Market, for example, was initially sponsored by DARPA before political controversy ended the project. And as discussed above, the use of information markets has significant potential for administrative agencies,<sup>145</sup> and government agencies might well advance the development of information markets in these areas.

But outside these areas of government interest, it seems questionable if the U.S. government will undertake substantial work with information markets. There are myriad groups seeking substantial government funding, ranging from agricultural interests to the military to victims of Hurricane Katrina. No well-organized constituency exists to lobby on behalf of information markets, and to the extent that Congress remains aware of the technology, it may associate it with the controversial DARPA plan that had to be abandoned.<sup>146</sup> Consequently, the immediate prospects for a substantial government investment in information markets do not appear particularly promising.

Furthermore, government actors may have incentives not to promote information markets. The information produced by some markets may be contrary to government interests if they reveal government actions in advance or undercut the official government position. It is quite easy to envision an information market reacting negatively to a politician's speech, and if the market is funded by the

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144. Government regulation of information markets is a fascinating subject, involving questions of international jurisdiction, traditional governmental authority in cyberspace, gaming law, analogies to constitutionally protected speech, and many more considerations. We will reserve this topic for a future article, however.

145. See generally Abramowicz, *Information Markets, Administrative Decisionmaking*, *supra* note 114.

146. Hanson Interview, *supra* note 30 (noting that the PAM controversy has discouraged government agencies from pursuing information markets publicly).

government, this might create tensions, even if no government officials ever attempted to control the content of a market (an attempt that may not be inconceivable). More broadly, to the extent that government agencies justify their existence through supposed expertise, information markets that expose the inaccuracy of government statements or provide private-sector competition to certain government estimates may not be particularly welcomed.

More charitably, the prospect of government funding also might place government officials in the role of trying to pick market winners and losers – a task that they may not wish to undertake. Indeed, it would be consistent with a free-market ideology for government leaders to say that information markets are not inherently or even particularly a governmental function, and thus their development and sponsorship ought to be left to the private sector.

In general, then, the prospects for government sponsorship of information markets on any broad level face significant obstacles and do not appear particularly promising at this time. That may change as the technology develops, or as the political climate changes with time, however, and of course government sponsorship of more discrete projects is still possible, despite the DARPA fallout. But for the moment, the federal government does not appear ready to coordinate a rescue from the consequences of the random walk.

Thus, in the end, supporters of information markets, like investors in stock markets, may be left with the vagaries of the random walk. Actions such as forming a private association to advance information markets can have value. Yet on balance, the wisest solution may be to stop wishing for an unobtainable order and embrace the random messiness of markets – Michael Jackson pools and all.

## APPENDIX A: CURRENT INFORMATION MARKETS

The following is a list of currently functioning information markets on the Internet, compiled from Internet searches, and accurate as of January 25, 2006. *See also* Information Futures Markets, <http://www.informationfuturesmarkets.com>; AEI Brookings Joint Center, <http://www.aei-brookings.org/pages/index.php?id=37>; Brendan I. Koerner, *What Weird Futures Can You Buy?: A Guide to Online Prediction Markets*, <http://slate.msn.com/id/2086316>.

Austrian Political Stock Markets/Austrian Electronic Markets

<http://www.imw.tuwien.ac.at/apsm>

Information markets predicting outcomes of Austrian elections.

Blogshares

<http://www.blogshares.com>

Establishes a "fantasy stock market" for weblogs, web applications "which contain periodic, reverse chronologically ordered posts on a common web page" such as personal diaries or posts on a particular subject matter. Players invest fictional money in shares of blogs, which are valued by the number of links to them.

Celebdaq

<http://www.bbc.co.uk/celebdaq>

British trading market that values celebrities based on their current popularity. Participants use fictional money to buy and sell shares in celebrities. Dividends, based on the amount of press coverage, are paid weekly. Participation is open to the general public. When a participant's net worth tops £ 1,000,000, her shares are liquidated and she receives status symbol icons and £ 10,000 to continue future trading.

Election Stock Market

<http://esm.ubc.ca>

The general public can use real money to bid on the outcomes of Canadian elections.

Economic Derivatives

<http://www.gs.com/econderivs>

Web site launched by Goldman Sachs and Deutsche Bank allowing investors to use real money to purchase options on macro-economic events, such as retail sales, employment statistics, inflation and general economic growth.

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Foresight Exchange

<http://www.ideosphere.com>

Allowing players to bid, using virtual money, on the outcomes of questions, such as whether Hillary Clinton will be elected president. Scores are tabulated based on the number of correct bids. Participation is open to the general public.

Hollywood Stock Exchange

<http://www.hsx.com>

Participants buy and sell shares of actors and new movies using virtual money. Valuation is based on the success of the movie. Participation is open to the general public. Winnings can be exchanged for discounts on merchandise.

Influenza Prediction Market

[http://iemweb.biz.uiowa.edu/OUTBREAK/flu\\_quotes.html](http://iemweb.biz.uiowa.edu/OUTBREAK/flu_quotes.html)

An invitation only market allowing Iowa medical professionals to buy and sell futures contracts to predict weekly influenza activity in Iowa. The market uses fake money, but winnings are converted to real money, which is paid as grants toward educational and professional expenses.

Innovation Futures

<http://www.innovationfutures.com/bk/index.html>

Players use virtual money to buy and sell contracts based on future prospects of technologies as well as business, economic, and financial trends. Participation is open to the general public. Merchandise prizes are awarded to contest winners.

InTrade

<http://www.intrade.com>

The general public can invest real money to bid on the outcomes of various events ranging from the closing value of the Dow to December snowfall in Central Park to which Supreme Court Justice will be the next to leave the bench.

Iowa Electronic Markets (IEM)

<http://www.biz.uiowa.edu/iem>

Best known for its presidential election market, IEM also has other political and economic markets in which members of the general public can invest real money. The IEM's earnings and returns markets are limited to academic traders.

Long Bets - Accountable Predictions

<http://www.longbets.org>

Philanthropic project where a person can pay \$50 to make a prediction about something of social or scientific importance that will or will not happen at least 2 years in the future. Someone can turn the prediction into a bet by taking the other side (and paying more money). The money goes to the designated charity of the winner.

News Futures

<http://www.us.newsutures.com/index.html>

Players use virtual money to bid on the outcomes of news, financial, sports, and entertainment events. Participation is open to the public. Contests offer cash and merchandise prizes. Current contests involve pharmaceutical trends and 4th quarter drug sales.

Political Stock Exchange

<http://www.politistock.com>

Players use virtual money to purchase shares of politicians and political events. Participation is open to the general public. Prizes are offered for contests.

PublicGyan: The Public Knowledge Exchange

<http://www.publicgyan.com>

Users buy and sell futures to predict world events, technological inventions and business news.

Smarkets

<http://www.smarkets.net>

Buy and sell futures to predict the top-selling products at amazon.com, a popular Internet site for buying books and music.

TradeSports

<http://www.tradesports.com>

The general public can invest real money in futures contracts. Contracts are primarily for sporting events, but participants can also bid on politics, current events, and other topics.

Wahlstreet

<http://www.wahlstreet.de>

Information market predicting outcomes of German elections.

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Yahoo BuzzGame

<http://buzz.research.yahoo.com/bk/index.html>

Information market allowing the general public to buy shares in current technological products – web browsers, satellite radios, and the iPod. The site also contains an experimental section allowing users to trade on Atlantic hurricanes.

Washington Stock Exchange

<http://www.washingtonsx.com>

An information market that tracks individual U.S. congressional races along with pending House and Senate legislation.