

Gambling for the Good, Trading for the Future: The Legality of Markets in Science Claims

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I. INTRODUCTION

Good ideas do not always lead to legal acts. Setting up a market in science claims,¹ for instance, certainly sounds like a good idea. Such a market could effectively open a shortcut to the future, giving us the means to answer crucial scientific questions more quickly, accurately, and cheaply than we can at present. Notwithstanding their salient benefits, however, U.S. law does not clearly approve of markets in science claims. They do not fit neatly into any category created by common law, statute, or regulation, and their legal status remains untested by the courts. This article aims to dispel some of the legal uncertainty surrounding markets in science claims and thus to help chart a path toward their implementation.²

Given that they remain almost wholly untried, and thus largely unknown, Part II offers a concise introduction to markets in science claims. Part III then compares the transactions supported by such a market with their closest analogs in extant U.S. law: gambling and commodity futures trading.³ That comparison finds the policies behind such laws generally more sympathetic to markets in science claims than the laws themselves, though even the latter offer some hope. Nonetheless, recognizing that some

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¹ In very brief, a “science claim” constitutes a statement provable within a specified and finite period of time by authoritative means. For details, see *infra* Part II.

² By way of full disclosure, I note that I have an interest in seeing markets in science claims made legal because I would like to see one established in honor of the late Dr. Julian L. Simon. Toward that end, I have won the permission of his widow, Dr. Rita A. Simon, to research the possibility of creating the Simon Market in Science Claims. See generally *The Simon Market in Science Claims*, Quantifying the Current Consensus, at <http://www.simonmarket.org> (last visited Jan. 11, 2002).

³ This article concerns only the law of the United States, though of course some general observations may well hold true of the law of other countries.

people refuse to let bad laws stand in the way of good acts, Part IV considers a few alternative strategies for implementing fully functional, if somewhat less than fully public or legal, markets in science claims.

II. THE WHY AND WHAT OF MARKETS IN SCIENCE CLAIMS

Scientific progress has given us increasingly healthy, wealthy, and well-informed lives.⁴ A chorus of critics, however, warns that our modern lifestyles threaten to repay us with nightmares such as rising sea levels, genetically engineered monsters, and nano-terrorism.⁵ Doomsayers often err on the dramatic side, of course. Paul Ehrlich once predicted, for instance, that the human race would run out of food by the year 1977.⁶ But the press loves a good horror story, legislators cannot ignore public fears, and none of us can risk misjudging a potential disaster. How, then, can we accurately resolve public policy questions that turn on disputed scientific claims?

Current means of publicly debating science questions do not work very well. The mass media too often dish up sensationalized and overly simplified reports. Official investigations move slowly, rely on “official” opinions, and favor mushy committee-speak over hard truths. Studies produced by think tanks and policy institutes raise questions of bias.⁷ Clearly, we need a better mechanism for resolving scientific disputes.

A better mechanism would ideally give honest, accurate, and timely answers to complex scientific questions. It would generate a precise numerical measurement of the current expert consensus about any given issue. Far from elitist, it would reward innovative and accurate predictions from any and all sources. Such an epistemic mechanism would look still better if it stimulated public interest in scientific and technological issues, generated its own funding, and lay ready at hand. Markets in science claims, a type of “idea futures” market, offer just such a means of tackling difficult and important questions.⁸

⁴ In the interest of brevity, “science” herein covers both the theoretical and applied—or what might be called “technological”—aspects of science.

⁵ See, e.g., Bill Joy, *Why the Future Doesn't Need Us*, WIRED, Apr. 2000, available at <http://www.wired.com/wired/archive/8.04/joy.html>.

⁶ See PAUL R. EHRLICH, *THE POPULATION BOMB* 36-40 (1968).

⁷ Such questions arise because think tanks and policy institutes typically rely on continuing contributions from their supporters, most of whom expect such organizations to favor particular points of view.

⁸ Robin Hanson apparently coined the term “idea futures” and has written several groundbreaking papers on markets in such instruments. See, e.g., Robin Hanson, *Could Gambling Save Science? Encouraging an Honest Consensus*, SOC. EPISTEMOLOGY, Jan. 1995, at 3, available at <http://hanson.gmu.edu/gamble.html> [hereinafter Hanson, *Could Gambling Save Science?*]; Robin D. Hanson, *Decision Markets*, IEEE INTELLIGENT SYSTEMS, May/June 1999, at 16, available at <http://hanson.gmu.edu/decisionmarkets.pdf> [hereinafter

I will here briefly outline the features of such a market in science claims by way of a simple example, drawing heavily on the work of Professor Robin Hanson.⁹ Although drawing analogies to gambling and futures trading helps to explain how such markets function, careful readers should resist letting those pedagogical tools unduly sway them. As argued in Part III, the type of market in science claims described here differs in some important respects—important *legal* respects—from gambling or futures trading. It also bears keeping in mind that the following example keeps details fairly thin and prices unrealistically low in the interest of simplicity.

Suppose that you have a theory, highly unorthodox but well reasoned and consistent with the available evidence, about the correlation between heat waves and earthquakes.¹⁰ Not having an advanced degree in geophysics or a reputation in the field, you find it hard for anyone to take your theory seriously. To demonstrate your confidence—and perhaps turn a profit in the process—you turn to a market in science claims.

First, you carefully word your claim to say, in essence, that within twenty years the professional geophysical community will have embraced your theory. You call your claim “HeatQuake” and name an impartial, authoritative third party to judge the claim on its own terms five years hence. Next, you have the science market’s bank print a matched pair of coupons, one marked “Heat-Quake true = \$1,” the other, “HeatQuake false = \$1.” As those labels indicate, the holder of the first coupon can redeem it at the issuing bank for \$1 if and when the HeatQuake claim proves true, whereas the holder of the second can do likewise should Heat-Quake prove false. The bank sells you the pair of coupons for \$1,

Hanson, *Decision Markets*]; Robin Hanson, *Idea Futures: Encouraging an Honest Consensus*, EXTROPY, Winter 1991-92, at 7, available at <http://hanson.gmu.edu/ifextropy.html> [hereinafter Hanson, *Encouraging an Honest Consensus*]; Robin Hanson, *Idea Futures: How Making Wagers on the Future Can Make It Happen Faster*, WIRED, Sept. 1995, at 125, available at <http://hanson.gmu.edu/ifwired.html>; Robin Hanson, *Shall We Vote on Values, But Bet on Beliefs?* (2000) (unpublished working paper, George Mason University, Department of Economics), available at <http://hanson.gmu.edu/futurachy.pdf> [hereinafter Hanson, *Vote on Values*].

I use “markets in science claims” herein because I intend to discuss a market hosting only those sorts of claims that will give it the best case for legality, whereas Hanson describes “idea futures markets” largely in functional terms, without barring them from hosting claims more likely to fall within the scope of gambling or commodity futures trading laws.

⁹ For Hanson’s website devoted to such markets, see Robin Hanson, *Idea Futures*, at <http://hanson.gmu.edu/ideafutures.html> (last visited Jan. 5, 2002), and Robin Hanson, *Idea Futures Publications*, at <http://hanson.gmu.edu/ifpubs.html#Hanson> (last visited Jan. 5, 2002), for a collection of related writings.

¹⁰ The example comes from Guo Ziqi et al., *Spatial Detect Technology Applied on Earthquake’s Impending Forecast* (Nov. 5-9, 2001) (paper presented at the 22d Asian Conference on Remote Sensing), available at <http://www.crisp.nus.edu.sg/~acrs2001/pdf/192Guo.pdf>.

calculating that because the claim cannot turn out to be both true *and* false, it will only have to pay off one of the two coupons.

Finally, you launch trading on the HeatQuake claim by offering to sell the “HeatQuake false” claim on the science market for \$.75. You keep the “HeatQuake true” coupon, looking forward to redeeming it later. In contrast, a professional geophysicist who hears about your offer, and thinks your theory ridiculous, snaps up the “HeatQuake false” coupon with the thought that she will redeem it and make an easy \$.25 on the deal. At that point, your HeatQuake (true) claim trades at \$.25 per coupon, showing that those playing the market regard your theory as twenty-five percent plausible.

That price-per-coupon does not yet mean much, of course, because only one coupon has swapped hands. But soon other professional geophysicists want to get in on what they regard as a sure deal. So you return to the bank, buy more coupon pairs, and sell “HeatQuake false” coupons to those skeptics as well. Their demand convinces you to raise the price of “HeatQuake false” to \$.84 per coupon, and then to \$.96 per coupon. In fact, demand grows so great that you can no longer afford to buy new coupon pairs from the bank. Fortunately, speculators, intrigued both by the extreme odds and by a paper about your theory that you have published on your webpage, join your side of the betting, increasing the market’s capitalization and pushing HeatQuake’s price up from its \$.04 per coupon low to \$.12 per coupon. At that point trading slows, your critics having spent as much as they dare and the speculators on your side unwilling to risk more money on behalf of your theory.

A few months later, however, a Taiwanese researcher publishes a study showing a statistically significant correlation between heat waves and earthquakes. Some of your former adversaries become anxious upon hearing the news and offer to sell their “HeatQuake false” claims at a slight loss. That moves HeatQuake’s price to \$.19 per coupon, thus reflecting a new assessment of your theory. More favorable research issues and the price moves again, and so on and so forth, HeatQuake’s value at any given time quantifying the consensus of all who back up their opinions with money.

This example skimps on many interesting details, as noted above, and a few very important ones. Readers should refer to Hanson’s writing for both more complete descriptions of “idea futures” markets, of which markets in science claims constitute a type, and for point-counterpoint treatment of many possible objections. Hanson’s work also describes the many advantages to such markets: they quantify the current consensus about complicated issues quickly, cheaply, and accurately; they reward valuable in-

formation no matter where it comes from; they force wildly inaccurate or under-informed pundits to “put up or shut up”; they generate public interest in current scientific disputes; they allow parties affected by the topics covered in science claims to hedge against risk; they require no taxes but instead can fund themselves; and, as the following examples show, they could start operating tomorrow.¹¹

Although no fully functioning market in science claims currently exists, various play-money versions and real-money analogs offer illuminating examples. The Foresight Exchange,¹² a play-money market designed to test Hanson’s theories, has been operating on the World Wide Web since 1994.¹³ It includes hard science claims (such as CFsn, which predicts the success of cold fusion),¹⁴ humane science claims (such as F-Pres, which predicts the United States will have a female president before 2014),¹⁵ and fun claims (such as King, which predicts that Prince Charles will be crowned the King of England).¹⁶ A handful of other web-based markets, because they function more like popularity contests than measures of objective criteria, prove somewhat less instructive. These markets include the Hollywood Stock Exchange, on which players use “Hollywood Dollars” to trade “shares” of actors, movies, and music artists;¹⁷ PolitiStock, on which players use “PolitiS-

¹¹ See *supra* note 8.

¹² Foresight Exchange Prediction Market, at <http://www.ideosphere.com/fx/main.html> (last visited Jan. 26, 2002). For a one-time alternative to the Foresight Exchange that has recently stopped active operation, see The U.S. Idea Futures Exchange, at <http://www.usifex.com> (last visited Jan. 26, 2002).

¹³ Robin Hanson et al., *The Story of the Idea Futures Web Site*, at <http://hanson.gmu.edu/if-prix.html> (last visited Jan. 26, 2002).

¹⁴ Foresight Exchange Prediction Market, Claim CFsn - Cold Fusion, at <http://www.ideosphere.com/fx-bin/Claim?claim=CFsn> (last visited Apr. 1, 2002). As of April 1, 2002, CFsn traded at twelve units, indicating a current consensus that the claim has a twelve percent likelihood of proving true. *Id.*

¹⁵ Foresight Exchange Prediction Market, Claim F_Pres - Female President Before 2014, at http://www.ideosphere.com/fx-bin/Claim?claim=F_Pres (last visited Apr. 1, 2002). As of April 1, 2002, F_Pres traded at forty-one units. *Id.*

¹⁶ Foresight Exchange Prediction Market, Claim King - Prince Charles Remains Heir, at <http://www.ideosphere.com/fx-bin/Claim?claim=King> (last visited Apr. 1, 2002). As of April 1, 2002, King traded at eighty-three units. *Id.*

¹⁷ Hollywood Stock Exchange, at <http://www.hsx.com/> (last visited Jan. 6, 2002). It bears noting, however, that the value of some items traded on the Hollywood Stock Exchange (such as MovieStocks) relates directly to an objective measure (such as box-office receipts). See Hollywood Stock Exchange, Glossary, at <http://www.hsx.com/help/glossary/> (last visited Mar. 26, 2002); see also Laura Pedersen-Pietersen, *The Hollywood Stock Market: You Can't Lose*, J. REC. (Okla. City, Okla.), Jan. 13, 1998, available at 1998 WL 11956867 (“HSX is designing a system in which its traders can invest real money in film projects. Keiser [one of HSX’s creators] said the idea, which is geared to cash-hungry independent film producers rather than big studios, will soon be before the SEC for approval.”).

tock soft*Money*” to do much the same with politicians;¹⁸ and Wall Street Sports, which targets athletes for similar treatment.¹⁹

Thanks to the proverbial distinction between talking and walking, no market limited to mere play-money can fully duplicate the incentives generated by a market using real money. The Iowa Electronic Markets (IEM) offers the best example of the latter.²⁰ The IEM offers a real-money on-line futures market where real-world events, most notably the outcomes of political elections, determine contract payoffs.²¹ Even though the IEM limits accounts to five hundred dollars,²² it has proven more accurate, on average, than polls in predicting election results.²³

Unfortunately, for all its help as an example of what a market in science claims might accomplish, the IEM offers little help in clarifying the law generally applicable to real-money idea futures markets. As discussed below, IEM operates by the grace of a special “no action” letter issued by the Commodities Futures Trading Commission (CFTC), which states “that as long as the IEM conforms to certain guidelines, the CFTC will take no action against it.”²⁴ Even if it wanted similar treatment, a market in science claims could not count on getting it.²⁵ Absent that one lucid statement by the CFTC, however, and as Part III reveals next, U.S. law does not speak clearly for or against markets in science claims.

III. THE UNCERTAIN LEGAL STATUS OF MARKETS IN SCIENCE CLAIMS

With regard to each area of law discussed in this Part, theory proves more forgiving than practice. The policy goals that justify banning all but a few carefully circumscribed forms of gambling and commodity futures trading do not convincingly justify placing identical constraints on a market in science claims. But the laws

¹⁸ See PolitiStock, The Political Stock Exchange, at <http://www.politistock.com/> (last visited Jan. 26, 2002); see also PolitiStock, PolitiStock FAQ, What is soft*Money*?, at <http://www.politistock.com/about/faq.shtml#whatisssoftmoney> (last visited Mar. 26, 2002).

¹⁹ See Wall Street Sports, at <http://www.wallstreetsports.com/> (last visited Jan. 26, 2002).

²⁰ See IEM, Iowa Electronic Markets, at <http://www.biz.uiowa.edu/iem/> (last visited Jan. 26, 2002).

²¹ See IEM, Iowa Electronic Markets, Frequently Asked Questions, at <http://www.biz.uiowa.edu/iem/faq.html> (last visited Jan. 7, 2002).

²² See IEM, Iowa Electronic Markets, IEM Basics, Applying for an Account, at http://www.biz.uiowa.edu/iem/trmanual/IEMManual_1.html (last visited Jan. 26, 2002) [hereinafter IEM, Applying for an Account].

²³ See IEM, Iowa Electronic Markets, Previous Market Performance (Graphs), IEM Accuracy Compared to Polls, at <http://www.biz.uiowa.edu/iem/media/previous.html> (last visited Jan. 26, 2002).

²⁴ IEM, Iowa Electronic Markets, Frequently Asked Questions, Is It Legal?, at <http://www.biz.uiowa.edu/iem/faq.html> (last visited Jan. 26, 2002) [hereinafter IEM, *Is It Legal?*].

²⁵ See discussion *infra* Part III.B.2.

passed to enforce those policy goals, evidently not having been written with a science claim market in mind, risk crushing it.

A. Science Claims as Gambling

Although a market in science claims would come close to qualifying as a gaming service, it would arguably differ from traditional types of gambling on both legal and policy grounds. The legal question presents the closest shave because answering it requires a somewhat metaphysical—and therefore uncertain—inquiry into whether chance predominates over skill in predicting the outcome of scientific disputes. The policy question proves less problematic, since none of the reasons for outlawing or heavily regulating gaming appear to apply to markets in science claims. This section discusses each question in turn.

1. Gaming Law

Although gaming remains largely the province of state law,²⁶ which varies from state to state, the common law generally requires proof of three elements to establish the existence of a gambling transaction: prize, chance, and consideration.²⁷ The first and third elements would indisputably apply to a fully functioning

²⁶ Although several federal statutes apply to gambling, they typically rely on state law for substantive definitions. *See, e.g.*, 18 U.S.C. § 1955(b)(1)(i) (2000) (defining “illegal gambling business” as one in “violation of the law of a State or political subdivision in which it is conducted”); *see also* Racketeer Influenced and Corrupt Organizations Act (RICO), *id.* § 1961(6) (defining “unlawful debt” in part by reference to state gambling laws); Indian Gaming Regulatory Act, 25 U.S.C. § 2703(7)(A)(ii) (1995) (defining “class II gaming” in terms of state law). Other federal statutes assess criminality based on state gambling laws. *See, e.g.*, Transportation of Gambling Devices Act, 15 U.S.C. § 1172(a) (1997) (exempting from illegality transport of gambling devices to any state or state subdivision that has legalized the gambling device in question); Interstate Horseracing Act of 1978, *id.* § 3002(3) (defining “interstate off-track wager” in terms of state law); Wire Transfer Act, 18 U.S.C. § 1084(a) (making illegal under federal law the use of interstate telecommunications facilities for placing wagers illegal in either the sender or recipient’s state); Charity Games Advertising Clarification Act of 1988, *id.* § 1301 (excusing from illegality interstate transport of lottery tickets permitted by authorities of affected states); Racketeering Act, *id.* § 1953(b) (excusing from illegality interstate transport of wagering paraphernalia if legal under state law).

²⁷ Ronald J. Rychlak, *The Introduction of Casino Gambling: Public Policy and the Law*, 64 MISS. L.J. 291, 294 (1995); Roland J. Santoni, *An Introduction to Nebraska Gaming Law*, 29 CREIGHTON L. REV. 1123, 1129 (1996); *see also* State v. One Hundred & Fifty-Eight Gaming Devices, 499 A.2d 940, 951 (Md. 1985) (describing three elements of gambling as “consideration, chance and reward”); State v. One ‘Jack and Jill’ Pinball Machine, 224 S.W.2d 854, 860 (Mo. Ct. App. 1949) (“(1) consideration or risk, (2) chance and (3) reward or prize”); Commonwealth v. Two Electronic Poker Game Machines, 465 A.2d 973, 977 (Pa. 1983) (“consideration, a result determined by chance rather than skill, and a reward”).

States also criminalize or regulate by statute a wide variety of games of chance. *See, e.g.*, CAL. PENAL CODE § 330b (West 2001) (outlawing slot machines). They do not, however, frown on games of skill as a general matter. *See, e.g., id.* § 330b(4) (exempting “predominately games of skill” from scope of statute). No state appears to have specifically targeted idea futures markets for the same treatment they have given, say, poker.

market in science claims. With regard to the prize element, a market participant would profit after having beat others in predicting the outcome of any particular controversy. Indeed, the prospect of such a prize, together with the bragging rights that come with it, serves as a vital incentive to draw players, and the information they bring with them, into the market. With regard to the consideration element, a market participant would have to buy into one side of a particular claim, via purchase of a “yes” or “no” coupon, in order to qualify for the prize.

Whether a market in science claims would qualify as a gambling service thus turns on the second of the three elements: chance. Here, the law grows murky. It cannot be that *any* element of chance, when combined with prize and consideration, suffices to create a gambling transaction; otherwise the most routine sort of business would likewise qualify. Even annuities, treasury bonds, and certificates of deposit, though they qualify as safe investments, present *some* risk of loss. So goes life.²⁸ The question thus becomes: how much chance does it take to qualify a transaction as gambling?

Authorities generally agree that under U.S. law, gambling arises when chance *predominates* over skill or knowledge in determining whether one who has offered consideration wins a prize in return.²⁹ It is hard to specify, in the abstract and in general, how a market in science claims would fare under that test. Participants in a such a market—especially successful ones—would no doubt aver that they rely far more on talent than chance, and it does seem plausible that intelligence and education would determine who wins most claims. The notion that relatively ignorant participants might unwisely rely on luck when trading on the market would not prove the contrary. As the California Court of Appeals has explained, “It is the character of the game rather than a particular player’s skill or lack of it that determines whether the game is one of chance or skill.”³⁰

²⁸ For a delightfully philosophical judicial disquisition on the matter, see *United States v. McDonald*, 59 F. 563, 565-66 (N.D. Ill. 1893).

²⁹ See *Johnson v. Phinney*, 218 F.2d 303, 306 (5th Cir. 1955) (“With respect to the element of chance, the authorities are in general agreement that if such element is present and predominates in the determination of a winner, the fact that players may exercise varying degrees of skill is immaterial; and the game or device is a lottery.”); Opinion of the Justices, 795 So.2d 630, 635-36 (Ala. 2001) (collecting authorities elucidating the “American Rule,” under which a scheme is a lottery if chance is the dominant factor in determining the result of the game even if skill or knowledge plays some role); *Finster v. Keller*, 96 Cal. Rptr. 241, 246 (Cal. Ct. App. 1971) (“The test is not whether the game contains an element of chance or an element of skill, but which of them is the dominating factor in determining the result of the game.”). *But see* *United States v. Rich*, 90 F. Supp. 624, 629-30 (E.D. Ill. 1950) (finding bookmaking scheme not a lottery, gift enterprise, or similar scheme under federal law on grounds, “there is always present something more than a mere guess and there is nothing which resembles the distribution of prizes by lot”).

³⁰ *Finster*, 96 Cal. Rptr. at 246.

Nonetheless, the ultimate determination of whether chance predominates over skill or knowledge would probably depend on the science claim in question—and on the judge or jury making that determination. Consider the variety of claims currently at play on the Foresight Exchange, a web-based play-money idea futures market.³¹ At one extreme fall claims like NDSen, which asserts that before 2012, there will be a U.S. Senator not affiliated with either the Democratic or Republican parties,³² and Ms.A, which asserts that before 2006, a woman will play in a professional major league sports game.³³ Though they hardly pose the same odds as roulette, winning those kinds of claims will require a significant, and arguably a predominant, share of luck. At the other extreme fall claims like GBch and Neut.³⁴ GBch asserts that Goldbach's Conjecture, which posits that every even number less than three is the sum of two primes, will be settled by 2021.³⁵ Neut asserts that the "rest mass of the electron neutrino is greater than 0.01 eV in ordinary space."³⁶ A mathematician or theoretical physicist could surely resolve those claims solely by dint of talent.³⁷ Other claims fall at various points along the spectrum that stretches from pure chance to pure skill. The parties responsible for operating a real-money idea futures market would face the difficult and somewhat risky job of categorizing which claims fall on the gambling side of the law.

It thus remains uncomfortably uncertain whether an aggressive prosecutor would allege that a market in science claims constitutes gambling. Although in recent decades gambling has won legal status in an increasing number and variety of real-space lo-

³¹ See Foresight Exchange Prediction Market, *supra* note 12.

³² Foresight Exchange Prediction Market, Claim NDSen - Indie Senator by 2011, at <http://www.ideosphere.com/fx-bin/Claim?claim=NDSen> (last visited Jan. 26, 2002).

³³ Foresight Exchange Prediction Market, Claim Ms.A - Woman Major-Leaguer By 1/1/06, at <http://www.ideosphere.com/fx-bin/Claim?claim=Ms.A> (last visited Jan. 26, 2002).

³⁴ Foresight Exchange Prediction Market, Claim GBch - Goldbach Conjecture by 2020, at <http://www.ideosphere.com/fx-bin/Claim?claim=GBch> (last visited Jan. 29, 2002); Foresight Exchange Prediction Market, Claim Neut - Neutrino Mass >0, at <http://www.ideosphere.com/fx-bin/Claim?claim=Neut> (last visited Jan. 21, 2002).

³⁵ Foresight Exchange Prediction Market, Claim GBch - Goldbach Conjecture by 2020, at <http://www.ideosphere.com/fx-bin/Claim?claim=GBch> (last visited Jan. 29, 2002).

³⁶ Foresight Exchange Prediction Market, Claim Neut - Neutrino Mass >0, at <http://www.ideosphere.com/fx-bin/Claim?claim=Neut> (last visited Jan. 26, 2002). Physicists define an eV (electron-volt) as the kinetic energy acquired by an electron losing one volt of potential. See About, Homework Help, Definition of Electron-Volt, at <http://physics.about.com/library/dict/bldefelectronvolt.htm> (last visited Mar. 26, 2002).

³⁷ Indeed, one probably would have done so long ago were a sufficient amount of real money at stake. Again, it makes no legal difference whether some participants in the market for such claims rely on luck rather than the expertise of a mathematician or physicist. "It is the character of the game rather than a particular player's skill or lack of it that determines whether the game is one of chance or skill." *Finster v. Keller*, 96 Cal. Rptr. 241, 246 (Cal. Ct. App. 1971).

cales³⁸—albeit under very heavy regulatory burdens—that fact offers scant solace to an enterprise that almost certainly would have to operate over the Internet were it to operate effectively at all.³⁹ Fortunately, courts, as a rule, interpret criminal statutes narrowly.⁴⁰ Regardless, the broad language of statutes that outlaw gambling and the penalties that they impose⁴¹ might well give pause to anyone interested in operating or entering a market in science claims.

2. Gaming Policy

In contrast, it appears quite plain that a market in science claims, as a matter of policy, would differ crucially from gambling enterprises. Lawmakers have outlawed or heavily regulated gambling purportedly because it presents an avoidable risk⁴² of social harm⁴³ and offers few if any social benefits in return.⁴⁴ None of

³⁸ Rychlak, *supra* note 27, at 303 (“As more and more states seek to take advantage of the enormous profits that can be derived from legalized gambling, new games, locations, and variations have swept across the nation.”).

³⁹ See discussion *supra* Part II (describing web-based operation of exemplar markets); see also discussion *infra* Part III.A.2 (describing the policy concerns that generally fuel suspicion of web-based operations versus real-space locales).

⁴⁰ See *United States v. Lanier*, 520 U.S. 259, 266 (1997) (“[T]he canon of strict construction of criminal statutes, or rule of lenity, ensures fair warning by so resolving ambiguity in a criminal statute as to apply it only to conduct clearly covered.”). This rule has particular salience in cases presenting entirely new facts to a court, as would be true of a court analyzing the legality of a market in science claims for the first time. *Id.* (“[D]ue process bars courts from applying a novel construction of a criminal statute to conduct that neither the statute nor any prior judicial decision has fairly disclosed to be within its scope . . .”).

⁴¹ See, for example, CAL. PENAL CODE § 337a (West 1999), specifying penalties for:

Every person, . . . [w]ho, whether for gain, hire, reward, or gratuitously, or otherwise, at any time or place, records, or registers any bet or bets, wager or wagers, upon the result, or purported result, of any . . . contest, or purported contest, of skill . . . or upon the result, or purported result, of any lot, chance, casualty, unknown or contingent event whatsoever; or . . . [w]ho lays, makes, offers or accepts any bet or bets, or wager or wagers, upon the result, or purported result, of any . . . contest, or purported contest, of skill . . . is punishable by imprisonment in the county jail for a period of not more than one year or in the state prison.

Id.

⁴² Rychlak, *supra* note 27, at 298. Early American colonists objected to gambling largely because it represented a discretionary and wasteful diversion from more important projects. *Id.*

⁴³ *E.g.*, John Warren Kindt, *The Economic Impacts of Legalized Gambling Activities*, 43 *DRAKE L. REV.* 51, 60-70 (1994) (relating evidence of social harm caused by legalized gambling). *But see* ROGER DUNSTAN, *GAMBLING IN CALIFORNIA IX-12* (1997) (“Any Attempt to Quantify Social Costs is Highly Speculative”); Mike Roberts, *The National Gambling Debate: Two Defining Issues*, 18 *WHITTIER L. REV.* 579, 590-99 (1997) (offering skeptical review of claims about relationship between gambling and crime); *id.* at 599-608 (offering skeptical review of claims about harms suffered by compulsive and underage gamblers).

⁴⁴ See Kindt, *supra* note 43, at 51-60 (criticizing claims made on behalf of economic benefits of legalized gambling); *id.* at 81-83 (criticizing claims that legalizing gambling captures taxes otherwise lost on illegal gambling activities). *But see* DUNSTAN, *supra* note 43, ch. IX (analyzing economic benefits of legalized gambling, both generally and with particular regard to California).

those three blameworthy features appear likely to attach to markets in science claims.

First, a market in science claims would not create risks solely for the sake of entertainment; rather, it would aim to quantify unavoidable risks already present in the world. In other words, whereas a casino manufactures chance, a market in science claims would merely report it. Second, the dry subject matter and slow pace of a market in science claims seems quite unlikely to encourage the sort of compulsive or underage gambling that worries critics of the gaming industry.⁴⁵ Third, and most important, a market in science claims would offer significant social benefits. The prices of its claims, because they would quantify current consensus views about complex and often important scientific issues, would constitute a positive externality capable of enriching the understanding of interested laypeople, policy makers, and the public at large.⁴⁶ Whereas legalized gambling at best diverts us from life's woes and eases our taxes,⁴⁷ markets in science claims promise to help us see into the future.

B. Science Claims as Commodity Futures Trading

Several ramifications, most of them somewhat discouraging, would follow if dealing in science claims qualified as commodity futures trading subject to the Commodity Exchange Act (CEA),⁴⁸ the federal statute that establishes the authority of the CFTC to regulate such trading. In that case, the parties who wanted to start a market in science claims would either have to convince the CFTC that they had surmounted the relevant—and hardly trivial—regulatory hurdles or that the CFTC should grant them a special exemption from regulation.⁴⁹ Neither option would prove easy, and failure to successfully pursue either would cast doubts on the legality of any science claims market subject to the CEA.⁵⁰ There remains a third option, however, that would raise relatively

⁴⁵ See Hanson, *Could Gambling Save Science?*, *supra* note 8, at 11 (“[S]cience questions are generally too long term to be a problem, offering no more ‘action’ than long-term stock investments.”).

⁴⁶ See Hanson, *Decision Markets*, *supra* note 8, at 16-17.

⁴⁷ See GUY CALVERT, *GAMBLING AMERICA: BALANCING THE RISKS OF GAMBLING AND ITS REGULATION* (Cato Policy Analysis No. 349, 1999) (describing benefits of gambling). Calvert objects to state gaming monopolies, however, on grounds that they unfairly and inefficiently shift tax burdens onto gamblers’ shoulders. *Id.* at 11.

⁴⁸ 7 U.S.C. §§ 1-27f (1999).

⁴⁹ See discussion *infra*.

⁵⁰ See, e.g., 7 U.S.C. § 2(a)(1)(A) (granting the CFTC exclusive jurisdiction over “accounts, agreements . . . and transactions involving contracts of sale of a commodity for future delivery, traded or executed” on markets subject to CFTC regulation); *id.* § 6(a) (providing that, absent an exemption by the CFTC, “it shall be unlawful for any person to . . . [deal] in . . . a contract for the purchase or sale of a commodity for future delivery (other than a contract which is made on or subject to the rules of a board of trade, exchange, or market located outside the United States, its territories or possessions) unless” in connec-

few legal difficulties: instead of creating a freestanding specialized market, convince an exchange already regulated by the CFTC to start listing science claims. This section will explore each of those three options in turn. First, though, it must grapple with the preliminary question of whether dealing in science claims indeed falls within the scope of the CEA.

1. Do Science Claims Fall Within the Scope of the CEA?

Would the transactions supported by a market in science claims qualify as commodity futures trading subject to the CEA? Here, as in the discussion of gambling law above, a firm answer proves elusive. It at least seems safe to say that the intangible nature of science claims would not alone suffice to remove a market in them from the scope of the CEA. The CEA defines “commodities” so broadly as to include “all services, rights, and interests in which contracts for future delivery are presently or in the future dealt in.”⁵¹

The CFTC might thus argue that a market in science claims deals in contracts for the future delivery of rights, each such right embodied in a coupon purchased at a value between \$0 and \$1 when its associated claim remains unresolved and redeemable at \$0 or \$1 when the claim settles.⁵² The CFTC would arguably err in that characterization, however. A more accurate account might have it that a market in science claims deals in contracts for the *present delivery* of rights, as embodied in coupons redeemable at \$1 each in the event a particular claim holds true.⁵³ To put it more concisely, and no less accurately, a science claim market deals in the spot purchase and sale of the coupons themselves.

The subtle distinction between those two characterizations makes a significant legal difference. As both a matter of policy and law, the CEA does not cover contracts that settle with the delivery of the underlying commodity. The CEA draws the justification for its very existence from the notion that buying and selling *contracts* for the future delivery of a commodity, rather than buying and selling commodities intended for actual delivery, invites dangerous speculation.⁵⁴ In essence, “[a] futures contract enables an investor to hedge the risk that the price of the commodity

tion with a CFTC-regulated exchange); *id.* § 6c(b) (prohibiting transactions in commodity futures in violation of CFTC regulations).

⁵¹ 7 U.S.C. § 1a(4).

⁵² See discussion *supra* Part II (describing how decision markets function).

⁵³ One of Robin Hanson’s earliest works on decision markets included, as an illustrative insert, a green coupon payable in the event a nanocomputer having particular specifications exists by the year 2020. See Hanson, *Encouraging an Honest Consensus*, *supra* note 8.

⁵⁴ See Lynn A. Stout, *Why the Law Hates Speculators: Regulation and Private Ordering in the Market for OTC Derivatives*, 48 DUKE L.J. 701, 721-24 (1999).

will change between the date the contract is entered and the date delivery is due—without having to take physical delivery of the commodity.”⁵⁵ The CEA does not cover contracts intended to effectuate future delivery, much less contracts that effectuate immediate delivery.⁵⁶

Understood as a forum for dealing in claim coupons, therefore, a market in science claims cannot fall within the scope of the CEA. The market could easily manage to ensure not only the future delivery of claim coupons in satisfaction of participants’ contractual rights, but also the instantaneous delivery of them. The market might, for instance, cast coupons in digital form, encrypt them, and download them immediately to purchasers’ computers.⁵⁷ “Sell” transactions would function the same way in reverse, with sellers uploading the encrypted certificate. Better yet, the market could function as a peer-to-peer network wherein coupons transfer directly to and from participants’ computers via the Internet, without passing through the market’s servers at all.

If that technological account proves unilluminating, it might help to think of claim coupons as akin to lottery tickets—albeit tickets for a “lottery” where skill or knowledge predominates over chance in determining which coupons win⁵⁸—and the market as a place where people gather to buy and sell their rights to various jackpots. Notably, the CFTC claims no jurisdiction over transactions in lottery tickets. Nor could the CFTC distinguish between these cases by claiming that the odds attributed to a science claim fluctuate, given that a lottery’s odds may vary with the number of tickets sold.⁵⁹

Admittedly, this line of argument may sound like the legal equivalent of a programming hack—a trick designed to fool a system into generating unintended or even unwanted results. Courts, like systems administrators, naturally frown on such maneuvering. As the Ninth Circuit observed, “[S]elf-serving labels that the defendants choose to give their contracts should not deter the conclusion that their contracts, as a matter of law, [are futures

⁵⁵ *Commodity Futures Trading Comm’n v. Noble Metals Int’l, Inc.*, 67 F.3d 766, 772 (9th Cir. 1995); see also Stout, *supra* note 54, at 722 (CEA does not apply “to contracts that are intended to be settled by delivering the underlying good or service.”).

⁵⁶ 7 U.S.C. § 2(a)(1)(A) (specifying that the CFTC has jurisdiction over, in relevant part, “transactions involving contracts of sale of a commodity for *future* delivery”) (emphasis added).

⁵⁷ Compare the analogous technologies used by such digital cash services as PayPal and Javien. PayPal, at <http://www.paypal.com> (last visited Mar. 16, 2002); Javien, at <http://www.javien.com> (last visited Mar. 29, 2002).

⁵⁸ See *supra* Part III.A.1 (explaining legal standard for defining gambling transactions).

⁵⁹ Lottery services thus often include a disclaimer such as this one from the West Virginia Powerball Gameshow: “The odds of winning will vary, depending on the number of entries received by the Lottery.” West Virginia Lottery, Powerball The Game Show, at <http://www.state.wv.us/lottery/gameshow.htm> (last visited Mar. 16, 2002).

contracts subject to the CEA].”⁶⁰ Nonetheless, courts should not read the CEA expansively. The Act specifically cautions that it shall not be “construed as implying . . . that” transactions specifically excluded from, exempted from, or otherwise not subject to it “would otherwise be subject to this Act.”⁶¹

Suffice it to say that because a market in science claims would neither operate exactly like nor serve all the same goals as the markets lawmakers evidently had in mind when they enacted the CEA,⁶² it remains an open question whether a court would hold that a market in science claims falls within the scope of that Act. It remains a vital question, too. As the next subsection illustrates, if markets in science claims do not escape the scope of the Act, they will almost certainly have to rely on the good will of CFTC regulators to operate within the bounds of U.S. law.

2. Markets in Science Claims Under the CEA

Suppose for the sake of argument that the sorts of transactions supported by a market in science claims fall within the scope of the CEA. Thanks to amendments made by the Commodity Futures Modernization Act of 2000,⁶³ the CEA now includes loopholes that can save even commodities avowedly within its scope from almost all CFTC regulation. Most pertinently, the CEA now leaves almost untouched⁶⁴ transactions in “excluded” commodities entered into on a principal-to-principal basis by eligible contract participants in an electronic trading facility.⁶⁵ Yet the CEA defines the relevant terms so as to make even that, the most promising loophole, a problematic fit for markets in science claims.

It appears at least plausible that any of the claims associated with the coupons traded on a market in science claims would qual-

⁶⁰ *Noble Metals Int'l*, 67 F.3d at 773 (quoting *Commodity Futures Trading Comm'n v. Am. Metal Exch. Corp.*, 693 F. Supp. 168, 192 (D.N.J. 1988)) (alteration in original) (internal quotation omitted). In the transaction critiqued by the court, the defendants claimed they had delivered metal to investors by transferring title to it, even though the metal remained in a third-party depository. *Noble Metals Int'l*, 67 F.3d at 772-73. In that case, there existed a tangible commodity separate from the title. *Id.* The intangible nature of science claims, in contrast, ensures that the commodity (the right to payment contingent on a claim's settlement) effectively merges with the title (the coupon documenting the right).

⁶¹ 7 U.S.C. § 2(i).

⁶² See Hanson, *Decision Markets*, *supra* note 8, at 18 (“Accepted functions of markets now include entertainment, capitalization, and hedging, but not *information aggregation*,” and explaining that information aggregation is the primary function of an idea futures market.)

⁶³ Pub. L. No. 106-554, 114 Stat. 2763 (2000).

⁶⁴ 7 U.S.C. § 2(d)(2) requires only that excluded electronic trading facilities satisfy the applicable requirements of §§ 7a, 7a-1, and 7a-3, which in general call for self-regulatory processes.

⁶⁵ *Id.* § 2(d)(2), (e)(1); see also CHARLES W. EDWARDS ET AL., COMMODITY FUTURES MODERNIZATION ACT OF 2000: LAW AND EXPLANATION 26-27 (2001). For the definition of “electronic trading facility,” see 7 U.S.C. § 1a(10).

ify as an “excluded commodity” under the CEA,⁶⁶ whether as an “index based on . . . values, or levels that are not within the control of any party to the relevant contract,”⁶⁷ or as a “contingency . . . that is—(I) beyond the control of the parties . . . and (II) associated with a financial, commercial, or economic consequence.”⁶⁸ Granted, that interpretation stretches the statutory language a bit because it is not clear that the values of science claims would constitute indexes under the former provision, or that their values would be associated with the sorts of consequences specified in the latter one.⁶⁹ But commentators have already concluded that commodity futures based on weather forecasts—instruments already in trade⁷⁰ and not far removed from the sorts of claims in which a science claims market would traffic—fit the CEA definition.⁷¹ Furthermore, CFTC regulations themselves interpret the Act in terms broad enough to include science claims, explaining that commodities have:

- (i) A nearly inexhaustible deliverable supply;
- (ii) A deliverable supply that is sufficiently large that the contract is highly unlikely to be susceptible to the threat of manipulation; or
- (iii) No cash market.⁷²

The first two criteria arguably hold true of a science market claim because there exists no theoretical limit to the number of opposing true/false assessments that might attach to any particular claim.⁷³ The first two criteria notwithstanding, the third criterion seems

⁶⁶ It bears noting that in the rather less likely event that the rights traded on a science claims market qualified as commodities subject to the CEA, but not as “excluded commodities,” they would certainly qualify as “exempt commodities” under the Act. See 7 U.S.C. § 1a(14) (“The term ‘exempt commodity’ means a commodity that is not an excluded commodity or an agricultural commodity.”). Were it found to transact in exempt commodities, a market in science claims would at best qualify for slightly more stringent regulatory burdens than it would under the least regulatory approach afforded to excluded commodity electronic trading facilities. *Id.* § 2(h)(3)-(5); EDWARDS ET AL., *supra* note 65, at 28-29.

⁶⁷ 7 U.S.C. § 1a(13)(iii).

⁶⁸ *Id.* § 1a(13)(iv).

⁶⁹ According to one commentator, excluded commodities also impliedly refer to non-finite processes, Louis Vitale, *Comment: Interest Rate Swaps Under the Commodity Exchange Act*, 51 CASE W. RES. L. REV. 539, 587 (2001), whereas the claims on a science market, because they would include judging deadlines, would resolve in a finite period.

⁷⁰ See, e.g., Neela Banerjee, *When Bad Weather is Good Business*, N.Y. TIMES, Aug. 13, 2000, § 3, at 4, available at 2000 WL 25031051 (interviewing Ravi Nathan, portfolio manager of weather derivatives at Aquila Energy, regarding nature and uses of weather derivatives); Chicago Mercantile Exchange, Weather Products, at http://www.cme.com/products/index/weather/products_index_weather.cfm (last visited Jan. 9, 2002) (discussing weather-based futures traded on the exchange).

⁷¹ EDWARDS ET AL., *supra* note 65, at 26.

⁷² 17 C.F.R. § 37.3(a)(1) (2002); see also *id.* § 37.3(a)(5) (specifying that commodities meeting those criteria qualify as “excluded commodities”).

⁷³ See Hanson, *Could Gambling Save Science?*, *supra* note 8, at 16-18; Hanson, *Vote on Values*, *supra* note 8, at 22-24 (discussing why idea futures markets resist manipulation).

sufficient to bring science claims under the rubric of the CEA because claim coupons are not the sort of thing you can generally buy and sell on the open market.

A market in science claims would have to satisfy still other statutory definitions, however, before it could qualify for the loophole that allows certain transactions in excluded commodities to largely escape CFTC regulation. What about those other terms of art? The CEA does not define “principal-to-principal,”⁷⁴ though common sense and common law would indicate that most transactions on a market in science claims would, or by market rules easily could, qualify as such because a typical participant—a professional scientist or educated lay person—would play the market on his or her own behalf. A market in science claims would also easily qualify as an “electronic trading facility” as defined by the Act.⁷⁵

The problem arises with the definition of “eligible contract participants,” a label that the CEA generally reserves for financial institutions, financial professionals, or individuals having at least five million dollars in assets.⁷⁶ That describes very few scientists or educated lay people, yet the success of any market in science claims would rely on their participation. The definition of “eligible contract participants” thus effectively closes the regulatory loophole most promising for markets in science claims. To put it more precisely, and to introduce the second means of escaping CFTC regulation of commodity futures falling within the CEA’s scope, no scientist or educated lay person would qualify as an eligible contact participant unless the CFTC specially judged him or her “eligible in light of the financial or other qualifications of the person.”⁷⁷ The CFTC would no doubt have wide discretion in making such a judgment.⁷⁸

More generally, the CFTC might allow a market subject to its jurisdiction to engage in futures trading by specially excusing that market from regulation.⁷⁹ Unlikely though that option may sound, the CFTC has in fact established something of a precedent

⁷⁴ EDWARDS ET AL., *supra* note 65, at 27.

⁷⁵ 7 U.S.C. § 1a(10) (2001).

⁷⁶ *Id.* § 1a(12).

⁷⁷ *Id.* § 1a(12)(C).

⁷⁸ See *Chevron, U.S.A., Inc. v. Natural Res. Def. Council, Inc.*, 467 U.S. 837, 843-44 (1984) (holding that an agency’s interpretation of an ambiguous statute will have controlling weight unless manifestly unreasonable).

⁷⁹ 7 U.S.C. § 6(c) (allowing the CFTC to exempt a class of transactions from its regulations on a finding that it would serve the public interest). *But see id.* § 6(c)(2)(B)(i) (allowing such exemption only for transactions between “appropriate persons”); *id.* § 6(c)(3) (defining “appropriate persons” largely to include only financial institutions and professionals). Only one loophole arguably allows the CFTC to exempt from its regulations the sort of science claims market described herein. *Id.* § 6(c)(3)(K) (including “other persons that the Commission determines to be appropriate in light of their financial or other qualifications, or the applicability of appropriate regulatory protections”).

for liberating idea futures markets from its oversight. The only real-money idea futures market operating within the reach of U.S. law, the Iowa Electronic Market, operates by the grace of a no-action letter received from the CFTC.⁸⁰ That letter not only saves the IEM from the running the gantlet of CFTC regulations but also, thanks to the preemptive force of federal regulation, arguably⁸¹ saves the IEM from liability under state gambling or bucket-shop laws⁸² that would potentially interfere with the CFTC's regulatory authority.⁸³ To win such benefits, however, the IEM had to make a concession: no individual's account can exceed five hundred dollars.⁸⁴

Even if the CFTC were willing to issue another such no-action letter, no market in science claims could accept a five hundred dollars per account cap without losing some of its functionality. If the CFTC were willing to impose a less restrictive account limit—high enough, say, to fund a comfortable living for a renegade but ultimately correct scientist—a market in science claims might still fulfill much of its promise, of course.⁸⁵ If the CFTC were furthermore willing to forego blunt account caps for the more tradi-

⁸⁰ IEM, *Is It Legal?*, *supra* note 24 (“The CFTC has issued a ‘no-action’ letter to the IEM, stating that as long as the IEM conforms to certain guidelines, the CFTC will take no action against it.”).

⁸¹ In fact, neither the CFTC nor the IEM expressly claims that the no-action letter preempts state law, and the precise legal question appears to remain unresolved. Practically speaking, though, state prosecutors and regulators have left the IEM in peace.

⁸² See Kevin T. Van Wart, *Preemption and the Commodity Exchange Act*, 58 *CHI.-KENT. L. REV.* 657, 659 n.15 (1982) (“The term ‘bucket shop’ refers to firms that offer customers the opportunity to bet on changes in futures market prices without actually entering into futures transactions on the contract market.”).

⁸³ See *Am. Agric. Movement, Inc. v. Board of Trade*, 977 F.2d 1147, 1157 (7th Cir. 1992) (“State laws specifically directed towards the futures markets naturally operate in an arena preempted by the CEA.”); *Rasmussen v. Thomson & McKinnon Auchincloss Kohlmeyer, Inc.*, 608 F.2d 175, 178 (5th Cir. 1979) (“[T]he Commodity Exchange Act preempts all state laws inconsistent with its provisions.”); Thomas Lee Hazen, *Rational Investments, Speculation, or Gambling?—Derivative Securities and Financial Futures and Their Effect on the Underlying Capital Markets*, 86 *Nw. U.L. REV.* 987, 1013-17 (1992); Van Wart, *supra* note 82, at 720 (“Congress has vested solely in the CFTC both authority to determine whether to designate a contract market for a proposed future, and exclusive jurisdiction for the regulation of such markets after their designation.”); *id.* at 662-63 (discussing how, before the advent of federal preemption, states’ “bucket shop” laws restricted the operation of futures markets).

For a preemption provision only very recently added to the CEA, and especially suitable for a science claims market capable of benefiting from the “excluded commodity” loophole, discussed *supra*, see 7 U.S.C. § 16(e)(2) (“This Act shall supersede and preempt the application of any State or local law that prohibits or regulates gaming or the operation of bucket shops (other than antifraud provisions of general applicability) in the case of . . . an agreement, contract, or transaction that is excluded from this Act”) (citation omitted).

⁸⁴ See IEM, *Applying for an Account*, *supra* note 22 (“The minimum investment for U.S. Dollar denominated accounts is \$5.00 and the maximum is \$500 per account. Investments may be increased at any time, provided they do not exceed the maximum \$500 limit”).

⁸⁵ Its hedging functions might suffer, however. If account limits were set at one hundred thousand dollars, for instance, an insurer could hardly buy claims payable in the event of global warming as a hedge against the losses caused by rising sea levels.

tional and subtle tools of position limits (which restrict the size of any trader's stake in a particular contract),⁸⁶ or trading limits (which restrict the size of particular transactions),⁸⁷ a market in science claims might operate still more effectively. Thanks to the *Chevron* doctrine⁸⁸ and the CEA's broad language about such matters,⁸⁹ however, the CFTC would have near-absolute discretion to give a market in science claims as little leeway as it gave to the IEM—or even less.

In summary, a freestanding market in science futures would face several options, each legally uncertain and none without risk, for accommodating U.S. commodity futures regulations. First, proponents of a market in science futures might successfully argue that it does not engage in commodity futures trading, at least not the kind covered by the CEA. In that event, the market would not win CEA's protective preemption of state laws, such as those criminalizing or regulating gambling. Second, should a market in science claims find itself subject to the CEA, it could attempt to qualify for the "excluded commodity" loophole that would largely free it from CFTC regulation. It looks highly probable, however, that the CFTC would have wide discretion to thwart any such attempt. At the least, to judge from precedent, the CFTC would probably not exclude a market in science claims from its regulations without also imposing crippling conditions. That makes the third option—seeking a no-action letter from the CFTC—similarly unattractive.

3. Listing Science Claims on an Existing Market

Although markets in science claims may very well have trouble meeting the CEA's requirements if they fall within the scope of that Act, science claims themselves might not face the same difficulty. The claims would have to find a new home, however, on a market already approved by the CFTC. Of the five types of exchanges defined by the CEA,⁹⁰ registered derivatives transaction execution facilities (DTEFs)⁹¹ appear most suitable for hosting science claims.

⁸⁶ See 7 U.S.C. § 6(a).

⁸⁷ *Id.*

⁸⁸ See *Chevron, U.S.A., Inc. v. Natural Res. Def. Council, Inc.*, 467 U.S. 837, 843-44 (1984) (holding that an agency's interpretation of an ambiguous statute will have controlling weight unless manifestly unreasonable).

⁸⁹ See 7 U.S.C. § 6(c)(1) ("In order to promote responsible economic or financial innovation and fair competition, the Commission . . . may . . . exempt any agreement, contract, or transaction (or class thereof) from most of the requirements of the CEA.).

⁹⁰ EDWARDS ET AL., *supra* note 65, at 21.

⁹¹ 7 U.S.C. § 7a (establishing DTEFs); see also EDWARDS ET AL., *supra* note 65, at 31-33 (discussing DTEFs). In general terms, because DTEFs host trading only in contracts that resist manipulation, they operate under comparatively little CFTC oversight.

The Commodity Futures Modernization Act of 2000 recently amended the CEA to give trading facilities broad discretion in the types of claims they issue.⁹² Essentially, when a DTEF submits a new contract for approval,⁹³ the regulations deem the contract approved unless the CFTC objects to it as not conforming to CEA standards.⁹⁴ What standards would the CEA apply to such contracts? The same standards (among others) already applied above⁹⁵ in explaining why science claims qualify as “excluded commodities”: the underlying commodity may have a nearly inexhaustible deliverable supply, a supply so large as to render the contract highly resistant to manipulation, or no cash market.⁹⁶ The Act also separately provides that DTEFs can elect to transact in excluded commodities.⁹⁷ It thus looks likely that DTEFs could support trading in science claims.

This is not to say that most people would be able to participate directly in science claims hosted on DTEFs. Direct participants would in general have to qualify as “eligible traders,” a term that would fit very few of the people from whom a market in science claims would need input in order to fulfill its potential.⁹⁸ By working through a futures commission merchant, however, professional scientists and educated lay people could indirectly win access to science claims trading on a DTEF.⁹⁹

Would a DTEF have any interest in issuing science claims? Such markets exist¹⁰⁰ to make money, after all, and it does not appear extraordinarily likely that the transaction fees charged for trading in science claims would generate a great deal of revenue.¹⁰¹ Still, it might generate enough positive public relations to justify some costs, and benefactors interested in promoting science claims might help out as well. Here, as with regard to markets generally, we can only guess what services parties would find worth their while to sell.

⁹² See EDWARDS ET AL., *supra* note 65, at 21.

⁹³ A “contract” in this context represents the very thing traded on the DTEF: a contract for the payment of a particular sum contingent on a particular condition. It should thus call to mind the coupons traded on a market in science claims.

⁹⁴ See 7 U.S.C. § 7a-2(c)-(d); 17 C.F.R. § 40.3 (2001).

⁹⁵ See discussion *supra* Part III.B.2.

⁹⁶ 7 U.S.C. § 7a(b) (describing requirements for contracts traded on a DTEFs).

⁹⁷ *Id.* § 7a(g).

⁹⁸ *Id.* § 7a(b)(3); see also *id.* § 1a(12) (defining “eligible contract participant”).

⁹⁹ *Id.* § 7a(b)(3)(B); see also *id.* § 1a(20) (defining “futures commission merchant”). Relying on agents such as futures commission merchants would plainly disqualify a science claims market from the loophole discussed, *supra*, in Part III.B.2, as that loophole requires principal-to-principal transactions.

¹⁰⁰ Or, more precisely, *would* exist; at present, no DTEFs exist. CFTC.gov, Table of Registered DTEFs, at http://www.cftc.gov/dea/deadtdefs_table.htm (last visited Jan. 25, 2002).

¹⁰¹ Markets in science claims appear unlikely, after all, to generate the sort of trading volume generated by for-profit commodities futures markets.

IV. ALTERNATIVES TO FULLY PUBLIC AND LEGAL SCIENCE MARKETS

As the above analysis suggests, it will not be easy for a market in science claims to win clearly legal status under U.S. law. No discussion of the legality of such markets would be complete, however, without at least a brief mention of a few more subtle, if sometimes less legal, approaches to the problem. This Part considers three such strategies, each having a lower cost-to-risk ratio than the next.

At the high end of the cost-to-risk spectrum falls the strategy of keeping a science claims market wholly in-house, open only to the members of a commercial firm. Hewlett-Packard, for instance, has found that internal idea futures markets consistently beat official forecasts at predicting printer sales.¹⁰² Siemens has experimented with similar markets,¹⁰³ and the Department of Defense has invited proposals for the development of limited-access futures markets for its use.¹⁰⁴ The law appears to regard such markets as purely private affairs, not subject to the regulatory burdens that might attach if the public could participate in them.¹⁰⁵ They thus pose little legal risk. A market in science claims would probably not achieve its potential unless it were open to a very large variety and number of participants, however, and to try to bring them all within the bounds of a private firm would probably not prove cost-effective.

As an alternative presenting a more moderate cost-to-risk ratio, Internet gambling sites based offshore could host and offer public access to markets in science claims. That option presents more peril in theory than in actuality, as U.S. law can neither effectively regulate overseas gambling sites nor bar U.S. citizens from patronizing them.¹⁰⁶ It remains doubtful, however, that operating out of such sites would serve science markets very well. It may sound encouraging that Internet-based bookmakers have al-

¹⁰² Hanson, *Vote on Values*, *supra* note 8, at 11.

¹⁰³ Hanson, *Decision Markets*, *supra* note 8, at 19.

¹⁰⁴ See Small Business Innovation Research, Department of Defense, *Defense Advanced Research Projects Agency Submission of Proposals, DARPA SB012-012: Electronic Market-Based Decision Support*, at <http://www.acq.osd.mil/sadbu/sbir/solicitations/sbir012/pdf/darpa012.pdf> (last modified Apr. 30, 2001) (requesting submissions for proposals to "[d]evelop electronic market-based methods and software for decision analysis, to aggregate information and opinions from groups of experts," and to identify "a group of knowledgeable market participants . . .").

¹⁰⁵ See, e.g., CAL. BUS. & PROF. CODE § 17539.3(a) (West 2001) (stating that certain statutes regulating the offer of betting to the public "shall not apply to a game conducted to promote the sale of an employer's product or service by his employees, when those employees are the sole eligible participants").

¹⁰⁶ See TOM W. BELL, *INTERNET GAMBLING: POPULAR, INEXORABLE, AND (EVENTUALLY) LEGAL 2* (Cato Policy Analysis No. 336, Mar. 8, 1999).

ready offered bets on unconventional topics like political races¹⁰⁷ and the likelihood of aliens landing in Washington, D.C.¹⁰⁸ Nevertheless, a bookmaking service cannot duplicate markets in science claims because it typically relies on a bookmaker, rather than the interplay of market participants, to set the odds on a claim.¹⁰⁹ Bookmakers consequently avoid carefully estimating the odds on difficult and obscure scientific disputes, preferring to set safe odds on flashy and amusing claims likely to draw in customers who will migrate to sports betting.¹¹⁰ It may also prove true that demand for online versions of more conventional types of gambling would make running a market in science claims relatively unprofitable for Internet bookmakers and casinos. At any rate, given that a market in science claims touts as one of its main benefits the dissemination of soberly accurate measures of experts' consensus views on matters of pressing concern, having the market located in the Internet equivalent of the Las Vegas strip threatens to largely defeat its purpose.

At the low end of the cost-to-risk spectrum, a market in science claims could ignore the legal uncertainties and simply charge ahead, trusting that authorities would not notice, not care, or at least not succeed in convincing a court that so well-intentioned a project ought to give rise to civil or criminal liability. That strategy could prove either a heroic success or a foolhardy failure. It has not gone completely untried, however. Perhaps showing how much advocates of a market in science claims want to get one up and running, they have indeed flown one under the law's radar. Though documentary proof naturally remains somewhat scanty, the tax-exempt Foresight Institute¹¹¹ for some time test-ran a real-money idea futures market accessible only to its high-level donors.¹¹² It recently discontinued that experiment, however, and has now focused its research on ways of making a similar market available to the public at large.¹¹³ At present, it does not look likely that anyone in the United States will attempt the still more risky scheme of publicly launching a full-blown, real-money market in science claims.

¹⁰⁷ See, for example, the bets offered by the Antigua-based Intertops website. Intertops.com, Betting, Politics, at <http://www.intertops.com/sportsbook/cgi-win-2/itwww.exe?> (last visited Jan. 10, 2002).

¹⁰⁸ See Leander Kahney, *Y2K Disaster? You can Bet on It*, WIRED NEWS, Sept. 27, 1999, available at <http://www.wired.com/news/news/culture/story/21946.html>.

¹⁰⁹ Hanson, *Could Gambling Save Science?*, *supra* note 8, at 20-21.

¹¹⁰ *Id.*

¹¹¹ See Foresight Institute, at <http://www.foresight.org> (last visited Jan. 19, 2002). Notwithstanding the similarity of their names, the Foresight Institute and the Foresight Exchange, discussed *supra* Part II, have no formal ties.

¹¹² Trustworthy people closely involved with the Foresight Institute have spoken to me of such a market and have given me qualified permission to mention their work here.

¹¹³ Correspondence is on file with the author.

V. CONCLUSION

Advocates of markets in science claims should take heed but take heart. The brightest prospect for such markets winning fully legal status under U.S. law—qualifying them as neither a form of illegal gambling nor as commodity futures trading subject to the scope of the CEA—looks quite bright, indeed. A market in science claims could then set up operations on U.S. soil with no more regulatory worries than those that typically come with the start-up of a for-profit business or tax-exempt organization. At present, though, with a dearth of controlling cases or clearly applicable statutes, it remains uncertain whether a market in science claims would enjoy so easy a path to legal respectability. Persuading an exchange already regulated by the CFTC to issue science claims thus offers an attractive, if perhaps expensive, alternative.

Those two approaches—aiming for the legal gap between gambling and commodity futures trading or taking regulatory shelter under an existing commodity futures exchange—offer the most obvious routes toward making markets in science claims fully operational in the United States. They do not offer the only routes toward that end, however, as there remain somewhat less attractive, because somewhat less than fully legal, alternatives. Given all the ways to work with or around the law, and the fundamentally sound policy reasons for doing so, it seems worthwhile and realistic to aim at putting the theory of markets for science claims into practice. When good ideas find no outlet in lawful acts, after all, good acts can change our ideas about the law.