

Building Useful Knowledge

Paul Sztorc

truthcoin@gmail.com

Version 0.7 – Feedback Welcome

Knowledge and Ignorance

“All Suffering is caused by Ignorance.”

-Siddhartha Gautama, founder of Buddhism

Current sources of information do not inform and are therefore unacceptable. Formal scientific publications are unavailable (even Harvard cannot afford them¹), incomprehensible (even among insiders²), fragile (easily buried/discredited by opponents), slow, frequently limited to topics of essentially no significance to the reader, and, on top of that, not even true (60%³ to 90%^{4 5} of university-grade research claims later turn out to be false)! Informal sources, such as TV/Internet, lack even the pretense of objectivity, rewarding content that is flattering or amusing.

Fortunately, people generally ignore science and media⁶, and instead draw conclusions using their own experiences and the advice of their friends/family/peers. While understandable, this a huge waste of scientific talent and technological capability. This project aims to quickly, accurately, and continuously integrate all available human knowledge into a clear and useful representation of reality. No question is taboo, no source of information is overlooked, and all info-sources are balanced in a way that is consistently and unanimously acceptable (ie, with no disagreement from any person at any time).

The key problem of the Information Age is information-aggregation: combining different sources of information. Many times, most individuals will have nothing new to contribute, and some would like to lie. How do we know which people know the most, and what do we do if they disagree?

Actually, if the ‘right people’ can see the current answer, and disagree with it, then they know who they are, and what to do. We don’t need to choose; they will come to us.

The economic technology that provides this incentive is called a Prediction Market.

¹ <http://www.theguardian.com/science/2012/apr/24/harvard-university-journal-publishers-prices>

² <http://www.the-scientist.com/?articles.view/articleNo/34196/title/Opinion--Communication-Crisis-in-Research/>

³ <http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.0020124>

⁴ <http://www.jove.com/blog/2012/05/03/studies-show-only-10-of-published-science-articles-are-reproducible-what-is-happening>

⁵ <http://www.economist.com/news/briefing/21588057-scientists-think-science-self-correcting-alarming-degree-it-not-trouble>

⁶ Even the most popular cable news show never achieved a weekly viewership of even 1% of the US population.

What is a Prediction Market?

Whereas a stock market is a place to buy and sell shares of a corporation's earnings, a Prediction Market (PM) is a place to buy and sell predictions. Valid predictions entitle their owner to \$1⁷, whereas false predictions are worthless. The current market price of these tradable predictions can then be interpreted as a global consensus of the likelihood of the prediction coming true (the "summary of all human knowledge").

For example, a prediction might reward a dollar if Hillary Clinton is elected US President in 2016, such that any individual who thinks that she has at least a 70% chance of winning the election should be willing to buy that prediction for up to 70 cents. Predictions can be about anything: sports, politics, nominations and awards, scientific theories, the effect of a certain economic policy on the unemployment rate, the relationship between a war-declaration and casualties, etc.

I still don't get it.

Television has a gift for simplifying and communicating ideas:

1. [John Stossel gives an introduction](#), The Stossel Show, (4:13).
2. [Neil deGrasse Tyson sketches out the general idea](#)⁸, Real Time with Bill Maher, (1:22).
3. [InTrade and the 2008 Presidential Election](#), CNBC, (2:22).
4. [CEO of InTrade on Elections and Recessions](#), Kudlow Report, (4:06).
5. [News segment on PMs](#), The Stossel Show, (8:31).

"Pay Up!" – The Counterparty Curse

One might rightly ask, "If prediction markets are so great, why don't we already use them everywhere?" The most central reason is that if you make a bet with someone, you have to trust them to pay. True Commodity-Predictions, defined as "tradeable assets which will have a definite value based *solely* on their future accuracy" have never before existed. Previously, the value of the commodity-predictions depended substantially on the behavior of the counterparty (ie, the guy holding the money, in this case the administrator of the marketplace).

In practice, the PM administrator has proven to be unambitious at best (accepting only a few bet-topics) and unreliable at worst (losing funds and/or going out of business). I suggest that this is because traditional PMs rely on trust (holding customer deposits, "Trust Problem"), yet are prevented

⁷ Or any amount...call this "the unit price".

⁸ Note that a] Maher himself seems more interested in allying the more-popular guest than in learning the science (a psychological/social barrier to truth which PMs aim to overcome), b] the formation of the bet ('the experiment') represents a clear/measurable outcome on which individuals have literally agreed to disagree (they are not open to persuasion), and c] the micro-debate terminates with mutual respect.

from accessing trust-establishment institutions (contracts/courts, brands/reputation) because they are misunderstood and face regulatory/legal challenges (“Image Problem”).

Name / Link	Status
www.economicderivatives.com	Transferred to the CME in 2005. Still alive, limited to economic variables (CPI, GDP, payrolls). Trading is expensive and not anonymous.
http://www.intrade.com/v4/home/	Dead. Mysteriously closed following problems with US regulatory compliance in early 2013.
http://tradesports.com/	Sports only, Died Nov 2008, Reborn with InTrade Jan 2013, Immediately died again. Now back with InTrade2.0.
http://inklingmarkets.com	Healthy, for now.
http://www.thewsx.com/	Restricted to election outcomes. Long dead anyway.
http://bizpredict.com/	Dead.
http://tippie.uiowa.edu/ie m/about/	Individual Account balance limits of \$500, not anonymous, only 3 contracts are open to trading by non-academics.
http://www.betfair.com/	Sports only, Europe Only, but very much alive.
http://newsfutures.com/	Dead. Remnant absorbed into private consulting group.
http://www.lumenogic.com/	Private industry applications only, private operations. No publically available prices or data. Presumably expensive.
http://ideosphere.com/	Play-Money only.
http://www.policyanalysis market.com	Killed within 24 hours ⁹ by ignorance ¹⁰ .

Table of PM operators, roughly in order of peak significance.

The Image Problem

PMs have weak advocates and strong opponents. Firstly, PMs are essentially betting¹¹, which can be taboo. For an excellent summary of the discomfort many have with betting, see [this blog post](#). Secondly, PMs often work too well, and as every member of a large organization knows, ‘flattery’ and ‘loyalty’ trump petty details like ‘accuracy’ every time. If you’re smart, you tell people what they want to hear, and definitely not what you really know. Most organizations, governments especially, don’t want accurate forecasts¹² and anyone who advocates for them may appear to accuse the existing forecasters of lying (a career risk).

Thus, defenseless PMs are targets of anticompetitive lobbying behavior on the part of casinos¹³. According to CFTC bureaucrats trying to advance their political careers¹⁴, however, PMs are not gambling, but instead an unregulated futures market¹⁵. No relevant laws exist, and existing irrelevant laws are abused for economic or political gain at the expense of the public interest. Most famously, the ‘Policy Analysis Market’ triggered the psychological bias known as “taboo tradeoffs” (as, for some

⁹ http://www.newyorker.com/reporting/2013/12/16/131216fa_fact_lizza?currentPage=all

¹⁰ <http://hanson.gmu.edu/PAMpress.pdf>

¹¹ PMs basically are betting, with the “odds” set by market forces instead of bookkeepers.

¹² <http://www.cato-unbound.org/2011/07/13/robin-hanson/who-cares-about-forecast-accuracy>

¹³ <http://youtu.be/6xkSPUj5ZgQ?t=5s>

¹⁴ <http://dealbreaker.com/2012/11/now-you-cant-buy-your-crude-oil-futures-in-10-increments-on-intrade/>

¹⁵ <http://www.cftc.gov/PressRoom/PressReleases/pr6423-12> (InTrade was an Irish, not US company)

contracts, someone might benefit from an event which harms the group), creating an onslaught of uninformed^{10 16}, irrational¹⁷ fake politician-outrage. None of it made any sense, but I'm sure it made someone's political opponents look bad.

The situation will never improve. Overwhelming academic and industry support¹⁸ is not enough. Even overwhelming public support would not be enough (were it ever obtained for an idea which is taboo, new, and difficult to explain). Economist Bryan Caplan has remarked¹⁹ that a bet is "a tax on hypocrisy"; would our political leaders really bring a tax upon themselves?

The Trust Problem

Bitcoin operates independently of a nation's legal framework, and might seemingly avoid the Image Problem. If so, competing "Bitcoin InTrades" would appear to fulfill market demand.

Unfortunately, PMs require a way to store up money and pay it out based on a real world outcome, which implies trusting a third-party with your money. The Image Problem prevents the creation of any brand, reputation, or legal guarantee that would justify this trust.

Bitcoin is P2P software. It was not ever designed for *other people* to store your money; it was designed for *you* to store your own money. The Bitcoin businesses that oppose this intent by holding customer funds (a clear example being the currency exchanges) lose those funds regularly. Although businesses can prove their solvency, proof of future-solvency is impossible, and even solvent Bitcoin PM businesses would be able to steal funds by trading on and then reporting incorrect prediction outcomes. The Trust Problem only worsens with scale, as there is a bigger pot of money for hackers or insiders to steal.

Blockchain Solutions

Although Bitcoin does not solve our PM problems, it demonstrates that a blockchain can provide scalable, censorship-resistant, and trustless solutions. Blockchain solutions also generate efficiency by cutting out middlemen and avoiding overhead costs (no brick-and-mortar, compliance, or administration). They are egalitarian and immortal.

For these reasons, I designed a blockchain which creates and manages prediction markets. My design was able to solve a few other PM-problems as well. Any user can create a market, removing the dual-requirement that a PM-administrator must not only be trustworthy, but also share your prediction-interests. Market scoring rule technology ensures that trading volume is irrelevant, and traders will always be able make a trade updating the price to their estimation (even if they are the only trader). Markets are not limited to two 'Yes'/'No' states, nor are they limited to one dimension. Finally, a custom

¹⁶ <http://www.overcomingbias.com/2013/12/wyden-puff-piece-errors.html>

¹⁷ <http://hanson.gmu.edu/innovations.pdf>

¹⁸ <http://hanson.gmu.edu/promisepredmkt.pdf>

¹⁹ http://econlog.econlib.org/archives/2009/03/what_does_the_b.html

algorithm, based on a game-theoretic application of weighted singular value decomposition, determines and sustains accurate reports about the market outcomes.

I hope you're interested in helping me make world-class knowledge freely available to everyone, and allowing individuals to profit by contributing their personal experiences. To learn more about what I have to say, you could consult the following:

1. If you'd like to dive into the technical details of the PM blockchain, read [Truthcoin 1.1.pdf](#).
2. PMs are easiest to understand in their simplest "Yes" / "No" form, where the price of "Yes" represents the probability of the event happening. However, PMs can easily be combined into more interesting types. File [2 PM Types.pdf](#) discusses multi-state and multi-dimensional contracts in greater detail.
3. PMs can be used to build the optimal efficient forecast of the future. They aggregate all available information, prefer cheaper info sources to expensive ones, and discourage waste and redundancy. However, PMs can do *much* more than just predict the future. For a taste of some of these other possible applications, read [3 PM Applications.pdf](#).
4. PMs can be difficult to understand. I have personally observed even professional forecasters making the same misinterpretations over and over again. Refer to [4 PM Myths.pdf](#) to avoid embarrassing yourself!
5. Market manipulation is a frequent subject of discussion in the PM world. If we are to trust PM-accuracy enough to use PM-estimates to inform our decisions, we have to consider how adversaries might strategically respond to such trust. In [5 PM Manipulation.pdf](#) I discuss the immunity all PMs have to naïve manipulations, and describe how the Blockchain PMs I designed have unique features which enable them to resist *all* manipulation attempts, and even profit from these attempts at the expense of the manipulator.
6. The PM Blockchain employs something called the Logarithmic Market Scoring Rule, which can be difficult to understand. I built an Excel spreadsheet demo of hypothetical trades in [LogMSR Demo.xlsx](#) to help anyone interested.

Conclusion: Market Empiricism and The Second Revolution

For millennia, there was suffering and misery. Can you imagine a world without music, or eyeglasses, or DayQuil? Our ancestors wished they knew how to make those things. They wished they knew how to stay warm, prevent their teeth from falling out, or use the stars to navigate. They probably wondered what stars were. Despite having brains that were essentially the same as ours, no one in any occupation in any region of the world would see an answer to that question or countless others. They wouldn't even see progress, any hope that the questions even *had* answers, until a very special time.

If the utopian Scientific Revolution (1543-1687) had a motto, it was arguably that of the Royal Society of London: "*Nullius in Verba*", which implored individuals to "*Take no one's word for it*". Knowledge could not be received passively from an authority figure; it all had to be verified by personal experience. It was an idea that would literally change the world.

Sadly, the world has only partly-changed. Most people still “take someone’s word” for their civic and scientific news, and most don’t even know how tell if knowledge was “verified by personal experience” or not. Those who do try to verify even a few claims are quickly overwhelmed by the massive amount of work required. Political think-tanks, for example, often reach opposite conclusions with equal vigor. However, there is only one *reality* experienced, and so only one *truth* (in the sense of “a global consensus of honest expectations”). Opposite conclusions can’t both be true.

Another unresolved problem is that we often take our own “word” for things. Modern social psychology reveals that man can be very hypocritical^{20 21 22 23}. Evolution produced a creature designed to survive-first, think-later, and to behave and talk accordingly. When everyone pretends to know more than they do (to seem impressive or valuable) it can be hard for a first-mover to admit ignorance honestly. Unfortunately, this means that smart people leave, and the most oblivious take center stage. Politicians do not need to bury the truth, if the public entomb it within a Library of Babel.

PMs allow the layperson to examine the relationship between truth and experience as easily as checking the day’s stock market. Is global warming going to affect my life? Check the markets on the likelihood of future temperatures, future sea levels, and future hurricane damages. Will a campaign promise be fulfilled? Will a new medical treatment really live up to its hype? Will a scientific theory still be accepted in 50 years? Which team is mostly likely to win the Super Bowl?

The printing press helped set the stage for first Scientific Revolution, but it took a new way of looking at information (a heretical, taboo way) to make *what was printed* have the impact that it did. Similarly, we today have the internet, drowning us in information-sources. *What is broadcast* is less useful than it would otherwise be if we could reliably combine multiple sources into one Truth. We need a new (heretical, taboo) way of looking at information today! Viva la revolución!

²⁰ http://en.wikipedia.org/wiki/Introspection_illusion

²¹ <http://www.overcomingbias.com/2010/03/homo-hipocritus.html>

²² <ftp://ftp.gate.cnrs.fr/RePEc/2012/1216.pdf>

²³ http://en.wikipedia.org/wiki/List_of_cognitive_biases