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# Thoughts on the Theory and Practice of Speculative Markets qua Event Predictors

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## Thoughts on the Theory and Practice of Speculative Markets *qua* Event Predictors

One of the most interesting and potentially significant developments of the last thirty years of economics and political economy has been the establishment of a viewpoint in which markets are seen as more than simply a collection of social institutions and rules within which commodity exchanges occur. The usual, cursory understanding of markets as non-discursive, non-deterministic phenomena governed by inscrutable laws of supply-demand and displaying natural underlying human proclivities—expressed in the prices fetched by the production of and exchange for things desired—is readily associated with Smith’s economic and philosophical liberalism. Most versions of markets do not view them primarily as making significant contributions to human self-understanding; rather, a market is just an important arena in which a *given* human activity occurs. When economists, other social scientists, or philosophers do view market functions and data reflexively, they generally view them as primarily static records of previous activity, as providing knowledge only of states of affairs that have already occurred. This view of markets as archives of human commodity production and exchange has been so influential that institutional investors and publicly-traded corporations have enshrined as a truism for fund or share price growth that “past performance is no indicator of future performance.”

In recent decades, however, there has been an increase in the number of economists, political economists, philosophers, politicians, members of the defense industry and military, institutional investors, and businesspeople who have come to view markets as conceptual tools, as technologies for both understanding *and* manipulating events and entities of both micro- and macro-scope.<sup>1</sup> This expansion in the scope of the role of markets is most obvious in the explosion of speculative markets (usually for derivatives), which within the last three decades have increasingly come to be viewed as predictors<sup>2</sup> of future events, the very market-knowledge of which potentially constitutes a feedback-loop allowing conscious manipulation of both the speculative market(s) in question and the underlying issues in which the speculative market’s derivatives (futures or options contracts, for example) trade.

The task of this paper is to investigate the emergence, presuppositions, workings, and effects of these speculative markets *qua* technologies. Following a philosophical and economic introduction, and as a sort of case study, this paper will investigate this subject by analyzing a model speculative market called the Policy Analysis Market (PAM), which was invented by DARPA as a market mechanism introduced into the FutureMap portion of the TIA program.<sup>3</sup> The point is to design and use PAM as a speculative market that will predict events in the Middle East, especially terrorist events, rather than simply providing back-data. The hypothesis of the paper is that PAM displays multiple internal contradictions that render highly problematic its use as a method for predicting terrorist events.

## I. Background

There are understandable philosophical reasons for the comparative novelty of viewing markets as a technology, much less as a conceptual tool for predicting future events. The static relationship between the analysis/analyzers of market information and that market information itself essentially is implied in the notion of the market's value for liberal economists and philosophers. That is to say, in their framework the significant benefits of markets in competitive equilibrium—their production-distribution advantages and general efficiency of allocation of scarce resources or capital—are predicated on market activity determined by an aggregation of given, collective demand and supply in a general context of self-interested competitive behavior. Inter-temporal equilibration of market prices—the measure of value—emerges (rather than is imposed) in the process of market price discovery; and from Adam Smith's invisible hand to Hegel's system of needs to Friedman's *laissez-faire* market fundamentalism it is well-enshrined in the philosophical and economics literature as the basis by which individual activity (whether corporate, institutional, or otherwise, and always satisfying all assumptions of competitive equilibrium), driven by self-interest qua profit-motive, leads to an efficient outcome for the system as a whole. In this sense, markets are self-organizing systems, insofar as their order is a function of price-taking market agents whose actions are considered from a local perspective, but which have an effect on the global state of the system.

This indicates then, in part, that markets display a complexity<sup>4</sup> that is daunting to attempts to understand the relationship between local states of a market system and the global state of the system. The very fact that human behavior is messy, not easily reducible to a set of algorithms or solvable differential equations, traditionally is what both nominates markets—which are taken simply to *reflect* that *given* messiness—as the most efficient method for producing and allocating scarce commodities, and nominates economics as “the dismal science.” When one says markets are complex, one is saying that their existence as a system is, from the viewpoint of information, fundamentally unlike that of a deterministic mechanical system. This is because, with market systems (which are generally non-linear, dynamic, and non-deterministic,<sup>5</sup> thus giving rise to the incredible formalism of academic economics), even an accurate description and analysis of one moment or region of the system cannot readily (and perhaps at all) be extrapolated to a description of the state of the entirety of the system, whether that be past, present or future. This explains why the standard tools of economists, technical analysis of past stock prices and fundamental analysis of business data, are primarily backward-looking.

In any event, the result of the acknowledgment that markets describe given, complex systems of behavior indicates their disutility as a technology, which implies some sort of significantly extensive factor of control and manipulation. In fact, the influence of liberal, neo-liberal, and neo-classical market theory has produced a philosophical, and some would say ideological, aversion to even considering extra-market control (although this is usually associated simply with an aversion to regulation). Interventions into markets—attempts to steer them, control their effects—are then viewed as impeding market function. The prevailing assumption is that market power, benefit, and progress paradoxically derive from the fact that competitive equilibrium market system behavior always exceeds whatever control or understanding is yoked to it. The view of French economist Leon Walras is indicative: he formulated the idea of discrete markets as fictions in which ghostly auctioneers ceaselessly function to equilibrate prices and clear the frictionless markets of neo-

liberal, marginalist economics. The auctioneer is a ghost, a fiction, because he is the best we can do to formulate the preternatural ability of the invisible hand.

In essence, complexity is linked to uncertainty,<sup>6</sup> and insofar as markets display the former, they are characterized by the latter, which makes them tenuous as a technology. This, however, is not to say that the study or manipulation of partial states of a market system cannot provide useful information about the whole. At any rate, the value of markets is seen in their ability to produce maximally efficient results—the effects of what we would imagine rational design, manipulation, and regulation to be—when that “intended” rationality is otherwise impossible (because of the uncertainty of human behavior). Market rationality qua efficiency emerges from atomistic behavior—which from the perspective of the totality of the system is self-adjusting—rather than is intended, designed, and imposed.

To take a specific example, one can turn to Pigou’s statement on the self-adjusting equilibration of the volume of employment in the labor market under classical conditions of *laissez-faire*. Pigou asserts that the quantity of employment in the labor market is dependent on several factors<sup>7</sup>: 1) the rates of real wages insisted on by laborers, and 2) the demand function for labor. Given these assumptions, he makes the following statement on the self-regulating nature of the labor market:

“With perfectly free competition among workpeople and labour perfectly mobile, the nature of the relation [between the real wage-rates for which people stipulate and the demand function for labor] will be very simple. There will always be at work a strong tendency for wage-rates to be so related to demand that everybody is employed. Hence, in stable conditions everyone will actually be employed. The implication is that such unemployment as exists at any time is due wholly to the fact that changes in demand conditions are continually taking place and that frictional resistances prevent the appropriate wage adjustments from being made instantaneously.”<sup>8</sup>

Immediately one notes that Pigou’s set of assertions relies on the fundamental principle that a commodity’s price, in this case that of labor, is regulated *endogenously* to the market system such that that price is optimal. This optimality is reflected in the maximally efficient production of that commodity. This is the meaning of the statement claiming full employment—the absence of persistent, general, involuntary unemployment (i.e., a waste of resources). Additionally, *ceteris paribus* the market is *instantaneously self-adjusting* to this equilibration point; any inter-temporal maladjustment in the form of unemployment is the result of a defective, impossibly slow reacting wage policy. In essence, the point is that the “market knows best” and full employment (rational, efficient production and distribution of a commodity) is achieved because the market’s “knowledge” comes about through the decentralized aggregation of a set of individual decisions based on partial bits of particular information (possessed by the self-interested market agents) which could not otherwise be quickly and accurately aggregated. This argument—which relies on the emergence of market rationality from the self-interested, partial rationality of agents with particular bits of knowledge that coalesce into a systemic knowledge—is central to *laissez-faire* opposition to labor market regulation, for instance a minimum wage.

Not surprisingly, this argument finds its philosophical basis in the political economy of Adam Smith, who theorized this market behavior on a far more general level in *The Wealth of Nations*. In

fact, he provided an early extrapolation of this principle and made it one of the guiding threads for his philosophical development of the elegance of markets. So, for instance, in discussing the concepts of natural prices<sup>9</sup> and atomistic effectual demand, which Keynes himself describes as the “leading lady” in the capitalist drama, Smith argues that:

“the natural price, therefore, is, as it were, the central price, to which the prices of all commodities are continually gravitating. Different accidents may keep them suspended a good deal above it, and sometimes even force them down even somewhat below it. But whatever may be the obstacles which hinder them from settling in this center of repose and continuance, they are constantly tending towards it.”<sup>10</sup>

This is to say, Smith asserts that prices determined by markets seem to be guided to the appropriate and “real” value of commodities. Many econometrically trained economists, using equations often adapted from physics and chaos theory, currently are investigating this hypothesis. At any rate, this thought summarizes much of the basic force attributed to markets. Insofar as market prices are tending toward equilibrium, and toward the natural price or “actual” value of a commodity, markets display a collective rationality about the value of scarce resources that is presumed to exceed that which could be manifested by the information or knowledge of any individual market agent. Insofar as one views markets as a component of economics, and economics as dealing with the allocation of scarce resources, then in this schema markets are maximally efficient, i.e. rational, to the extent that they discover the price (and hence underlying value) of those precious resources.

What lies behind the gravitation of market prices to “real” prices, actual objective value, is, paradoxically, subjective and atomistic activity. Keynes writes of the economic advantages of this in concluding his *General Theory*: “They are partly advantages of efficiency—the advantages of decentralisation and of the play of self-interest. The advantage to efficiency of the decentralisation of decisions and of individual responsibility is even greater, perhaps, than the nineteenth century supposed.”<sup>11</sup> The great hypothesis behind this theory of markets is that systemic rationality (reflected in prices), systemic efficiency, is generated by or emerges from the reciprocal mediation of the self-interested utility (profit) maximization of individuals. But, of course, although that individual activity is “rational” to the extent that it self-interested, this individual maximization of utility is generally thought of with respect to utility considered as the expression of subjective preference, happiness, and/or pleasure, i.e. as the expression of what for or in those human agents is arational.

In an ethical context, this set of propositions is the basis for a standard version of the utilitarian argument for markets. The ethical analogy to the rationality maximization of markets is that markets produce the most utility most efficiently, and since utility is the measure of utilitarian ethics, markets are the most ethical economic form. Insofar as the system is most efficient, it produces the most utility for the largest number. Another way of putting this is that a rising tide raises all boats. What makes that argument so unique is that each boat is unconcerned with the tide for all, but in their unconcern for the state of the whole (i.e. their self-interest) they maximize the benefits for that whole. The analogy comes full circle in that one then argues, paradoxically, that the ethicality (in this case, market produced general well-being) of the whole, of the system, is generated by the ethics (self-interest) of the individual.

Within a socio-political context, Hegel was influenced by this concept. His description of “civil society” (i.e., essentially a market society) is therefore “a system of all around interdependence, so that the subsistence and welfare of the individual and his *rightful* existence are interwoven with, and grounded on, the subsistence, welfare, and rights of all.”<sup>12</sup> The commonality underlying this proposition and that of the above-mentioned narrower sense of efficient market behavior is the dynamism that obtains between the relationship of the universal and the particular, the global state of the system and the local. For Hegel, as a market society we generate a system that increases productivity and efficiency for the whole (which is reflected in prices for commodities) by relying on the effects of the aggregation of individual preferences (reflected in individual willingness to pay for that commodity) for one item rather than another:

“In this dependence and reciprocity of... the satisfaction of needs, *subjective selfishness* turns into a *contribution towards the satisfaction of the needs of everyone else*. By a dialectical movement, the particular is mediated by the universal so that each individual, in earning, producing, and enjoying on his own account, thereby earns and produces for the enjoyment of others.”<sup>13</sup>

The basic idea here, in fact the entire efficacy of the market principle, rests on the dialectical concept referred to by Hegel as “the cunning of reason.” For lack of a more precise term, this is a concept informed by a quasi-expression of the idea of the effects of unintended consequences, of the realization of the resolution of a conceptual reversal. In this case, that conceptual reversal is that individual unconcern for the benefit of the whole is a necessary driving force behind the attainment of maximal benefit for the whole. In order to take the aforementioned description of the concrete assumptions of markets, and then abstract them, we can turn to Hegel again:

“The *special interest* of passion is thus inseparable from the actualization of the *universal*; for the *universal* results from the *particular* and *definite*... It is the *particular* which exhausts itself in the struggle and part of which is destroyed... But the *universal* results precisely from this struggle... This may be called the cunning of Reason—that it sets the passions to work for itself [my italics]...”<sup>14</sup>

This is the central notion behind the ethical, economic, and social arguments for the superiority of free markets characterized by a principle of self-interest qua unintended universal-interest, a principle that expresses itself in profit-seeking and utility maximization within the basic guidelines of fair competition. The cunning of reason is a dialectical conceptual expression of the movement of Pigou’s labor market, of Smith’s invisible hand qua equilibrating prices, and of Walras’s ghostly auctioneer.

## II. Changes in the Paradigm and the Rise of Markets as Decision Support Systems

It should be clear that a result of viewing the motor of market activity solely through the lens of the cunning of reason is that acquiring knowledge about the state of a whole market system is both theoretically and practically problematic. That is, because of the assumptions about market atomism and emergent rationality, for traditional versions of liberal, neo-liberal and neo-classical market theory it is very difficult to gain an instantaneous, comprehensive, bird’s-eye view of what a market is communicating. As a column in the Business section of the *New York Times* recently put it,



trying to game a market via analysis is like trying to drive forward while only looking in the rear-view mirror. This explains the old economics joke: that economists have predicted ten of the last three recessions, ten of the last three market bubbles, bear markets, bull markets, etc. If one cannot grasp the tool, understand its essential nature, using it becomes difficult. The wager, essentially, is that the market is “smarter” than any of its individual agents or analysts. This is called the “dumb-agent” theory of market price discovery.

However, over the last several decades researchers in several disciplines have made a bet that under certain circumstances the “dumbness” in the dumb-agent theory of market price discovery is not problematic for producing market knowledge that can be used to predict future events and as a decision support system. The primary feature of this viewpoint is that it combines the liberal, neo-liberal and neo-classical assumption of market efficiency via the cunning of reason with the field of information economics, an economics discipline that considers information as a commodity and as capital. Information too is subject in many ways to market principles. This robust version of market activity is based on a refined and updated version of the efficient market hypothesis. Rather simply, the core of this hypothesis is that the primary way in which market prices are produced is the rapid and accurate dissemination, production, distribution, and categorization of information. The basic principle of the emergence of a “collective” rationality, of the cunning of reason, is in force here insofar as there are assumed to be many investors out to maximize profit, but what distinguishes this modern efficient market hypothesis from the more hamstrung, earlier versions is that technical and fundamental analysis cannot decipher the correctness of an equilibration point of prices as well as information driven prices can. Another way of putting this is that, when unchecked, information is immediately contained in market prices.

For many reasons (there can be no technical analysis or fundamental analysis, backward-looking analytical tools, for prices that don't exist yet, etc.), this theory has had its most interesting trials with respect to speculative markets like futures markets, where individual agents consistently are required to measure the conditional, relative probabilities of future states of affairs (which are the issues underlying the futures contracts).

One of the most famous of these predictive markets is the Iowa Electronic Markets (IEM). Its most well-known contract is the Presidential Vote-Share Market, in which multitudes of individual investing market agents follow their individual passions qua profit motive, and thus via the invisible hand or Walras's auctioneer simultaneously effect trading behavior that forms a market price. Simply put, this market price discovery is created by market agents who, taking risks and in competition with each other, buy and sell futures contracts whose underlying issues are the outcome of the presidential election. The medium for traders to buy and sell contracts is an online, web-based, real-time exchange run by the Business department of the University of Iowa. The traders' activity aggregates into a constantly updated, real-time prediction for who will win the election.<sup>15</sup> The designers of the IEM describe the motor of this particular market thusly:

“The Iowa Electronic Markets are designed specifically as prediction markets. IEM markets are computerized, electronic, real-time exchanges where traders buy and sell futures contracts with payoffs based on the outcomes of interest [who wins the election]. Because real money is used, traders are subject to monetary risks and returns that result from their trading behavior.”<sup>16</sup>

Less than a structural involvement with the underlying issue, here what drives the aggregated, equilibrated market price for a given contract is primarily the information that each of the investors has. In fact, I hasten to add here that, with respect to the market outcome, the assumption is that the only meaningful involvement the market agent qua investor has in either the Vote-Share market or the futures contracts' underlying issue (the election itself) is (1) a set of *partial* bits of information about who the winner will be and (2) profit motive, the fact that s/he risks actual money when buying a contract.<sup>17</sup> Presupposing standard market ethics (free competition, the preponderance of price-taking market agents, etc.), these assumptions must be in place because: (a) the whole point is that different market agents have different yet incomplete information (this is what is being aggregated and organized); and (b) to assume significant involvement of a market agent in these contracts' underlying issue would be tantamount to insider trading.

What are the features of the function of the IEM? "First, the markets give continuously updated dynamic forecasts. Second, through the price formation process, the markets aggregate information across traders, solving what would otherwise be complex (at best) aggregation problems."<sup>18</sup> I have already mentioned the meaning of the second point: that information driven futures markets are, from an analytical perspective, superior to technical or fundamental analysis. The corollary to the first point is a major advantage of these information markets: that alterations in market prices at a given moment accurately indicate only the relevant, new alterations in information. Additionally, as the market designers note, there is evidence that (3) these markets are unbiased and relatively accurate because they (4), following standard efficient market theory such as is advanced by anti-regulators like Friedman and Hayek, weed out market agents with bias or consistently unreliable information.<sup>19</sup>

Why, one might ask, would someone be interested in what appears to be a sort of—admittedly eery—market based parlor trick? If one is a strategist for a petroleum services corporation, or a trans-national company specializing in building airplanes, or many other types of businesses, it is very useful to know in advance whether Bush or Kerry wins the 2004 presidential election, as the outcome will influence the future investment and direction in and of one's business. As mentioned, the IEM has consistently outperformed analysts and pundits in picking the election winner.<sup>20</sup> During recent decades there has been a natural growth of speculative futures markets for sundry commodities, and it has not escaped the notice of many analysts and corporations that these futures markets' contract close-out prices for delivery of a commodity—say, oil from Saudia Arabia—seem to have an uncanny ability to indicate future events. For example, Leigh, Wolfers and Zitzewitz have shown that long prior to the 2003 U.S. invasion of Iraq the price of petroleum futures contracts had incorporated a war premium, thus indicating a high probability of attack and instability in the region.<sup>21</sup> So, for instance, for obvious reasons if one is a production strategist for a car manufacturer considering increased production of hybrid automobiles, futures markets in this case are no longer simply a reflection of past behavior, expectation, or information: they are a vital conceptual tool for decision support.<sup>22</sup>

What is significant about the rise of futures markets is that they are uniquely suited to, from the perspective of the entirety of the system, producing rational information. Just as for Pigou the market—by a decentralized mechanism of aggregating individual bits of knowledge and information—generates the system-wide "knowledge" of where optimally to produce and place employment, so



these information markets produce knowledge and information as their commodity. These type of markets have information as both their input and output.

### III. The Policy Analysis Market

This background permits an analysis of an experimental speculative market for information, the Policy Analysis Market (PAM), created by DARPA and introduced into its FutureMap portion of the TIA program.<sup>23</sup> The hypothesis of this paper is that PAM is a mediated system insofar as the relative stability of the system and its elements or moments exhibits an absence of synchronic independent variability and the continual presence of a global-local diachronic feedback loop securing the system's *organization*; yet, this market system's fundamental incapacity to perfectly efficiently endogenously *regulate* its own behavior is implied within the system's antagonistic, dialectical operational *conatus*. The result is that PAM's effectivity is pathological.

By tracing the contradictions internal to PAM, this paper will demonstrate several features regarding PAM's effectivity<sup>24</sup>: 1) PAM's conceptual basis is self-negating, and thus the market/system does too little; 2) the desired rational efficiency is undercut by the properties of the trading instruments, derivatives, whose profitability in part stems from "irrational" trading behavior linked to derivatives; 3) this market system poses the significant probability of producing the terrorism whose function it is to predict *and* prevent (i.e. it does *too much*).

PAM's theoretical-functional system principles are a distillation of the structural features of the dominant neo-classical theory of capitalist markets in general: rapid and accurate dissemination, production, distribution, and categorization of information and commodities. But as the market designers note, and like the IEM, "PAM is a combinatorial information market: a market in futures, options, and derivatives that are based on eventualities rather than specific commerce. PAM will trade contracts on one year maturity, issued quarterly, that span economic, civil and military conditions" in the Middle East.<sup>25</sup> Like the IEM, traders purchase the contracts online using a fully electronic, computerized, point-and-click, Java applet-based trading interface platform.

A refined market technique focusing and collating information for "decision support"<sup>26</sup> and analysis toward event prediction, PAM's precedent as a technology is found in the recent phenomenon of private and public sector analysts employing derivatives and commodities market prices (for oil, currencies, national debt, interest rates, etc.) in estimations of event probabilities.<sup>27</sup> For a given derivative contract, if a PAM trader considers it as under-pricing (under-predicting) the future status of the issue by which it is conditioned, then his contract purchase (for profit "going long") would be aggregated with others (who may, to the converse, be ["short"] sellers of the same contract type, indicating over-prediction) into a price fluctuation forming a "signal" indicating the future probability of the underlying issue.

Because PAM is a combinatorial market, this market discovery process assumes hedges, "conditional beliefs."<sup>28</sup> That is, derivatives may describe linked events such as U.S. equity and military disposition in a given country. The PAM listed futures and options derivatives allow traders with knowledge of a specific "sector" to construct profitable combinations of contracts, thus permitting PAM to achieve high predictive resolution via conditional probabilities.<sup>29</sup> For example, a specialist on Jordan might have information on Jordan's political stability "given the duration of

Iraqi resistance to U.S. military policy. This expert can hold this insight without any special knowledge about the conduct of U.S. military policy. This amounts... to a hedge<sup>30</sup>; ‘Given that B happens, I believe that there is an X% chance of A happening.’”<sup>31, 32</sup> From the perspective of the analyst employing this market data, the goal is to build probability profiles terminating in the future status of a derivative’s underlying issue or event.

PAM’s original design<sup>33</sup> offered three types of futures and options contracts: 1) Regional securities based on data indices for economic health, civil stability, military disposition, and U.S. economic and military involvement in the major countries of the Middle East<sup>34</sup>; 2) Global securities on “U.S. equities, U.S. GDP, global trade, deaths from terrorism, and U.S. military deaths”<sup>35</sup>; 3) Special Event securities on one-off, verifiable occurrences (for example, an assassination or a *coup d’etat* in Jordan).

The theory on which PAM is founded is as old as Thales,<sup>36</sup> or at least as old as Hegel’s or Smith’s description of markets as the cunning of reason, the invisible hand, the eighth wonder of the world. PAM’s power relies on the theory of efficient market discovery via rapid, capillary, and accurate distribution of information. Said differently, and analogous to emergent phenomena, PAM posits the market’s securities values as containing more information, as providing a more “intelligent,” accurate, and extractable signal (measured in fluctuating contract prices), than any of its individual agents. There is interesting empirical evidence for this.

For example, Maloney and Mulherin find compelling precedent in the market’s reaction to the Challenger disaster. Although NASA’s expert committee needed months to find the cause of this widely observed event, comparative share prices for each of the four main shuttle contractors immediately determined the manufacturer responsible. Ruling out insider trading, Morton Thiokol, manufacturer of the faulty O-Rings, quickly was punished with a nearly 12% loss in share price.<sup>37</sup> Other shuttle contractors remained relatively free of market punishment.

PAM’s conceptual requirements, however, show distinctive contradictions resulting in an antagonistic phenomenology. The system does both too little and too much. This is clearly evident with regard to PAM’s centerpiece: terrorism/violence futures and options contracts.

Derivatives contracts offered for terrorist events in the Middle East were designed to predict them. A rapid rise in the value of a futures contract for a terrorist event (say in one month) in a friendly country would serve as a market signal for an equal<sup>38</sup> rise in the probability of that event (investors think the event is likely, and thus buy the associated contracts, driving their price up and giving security analysts dynamic market discovery information). This would trigger a response to stop the event, drastically *reducing* the event’s probability, and thus the condition of the possibility of a profitable value for the linked derivative contract. But a market’s supply-demand logic cannot tolerate the act of a securities purchase contributing to that act’s unprofitability.<sup>39</sup> The value of the associated terrorist future would not in fact show the rapid rise necessary to produce the “signal,” as to do so would lead precisely to the prevention of the event that must take place for the terrorist future to mature (a requirement for the contract to be realizable and profitable). The idea that government authorities employ the market to foresee events that they will prevent would, *a priori*, mute the signal. The system does too little.

This conceptual incoherence is present as the reflection of another internal, determinate negation. As just explained, a derivatives trader would not purchase a terrorist future because the very act of buying the contract would undermine the contract's value. What appears there as the paradox of the trader who, from the perspective of the future anterior, *will not have bought anything* is in fact the reflective determination of an inconsistency implicit in a moment conceptually prior: here, the derivatives of maximal predictive interest, the impetus for the system's design, terrorism derivatives, must be explicitly articulated in order to be offered. But if the market designers can list a specific terrorist event, then they have always already defined, determined, and predicted the very event that the market is designed to identify. If the market designers know which terrorist derivatives to offer, then they have already done the work of the market. Again, the system is inadequate to its concept. It contains within itself the unraveling of its own conditions of possibility.

Like all capitalist market systems, and indeed like all systems *per se*, PAM displays "friction," internal inconsistencies and antagonisms, despite its claim to ideality. This is actually expected, insofar as markets 1) are incredibly complex phenomena of rules and regulations, 2) produce markets within markets (internal competition) and links to other markets, and 3) are inherently unstable by virtue of their organizing principle (competition requiring growth, asset dominance, economies of scale, oligopolies, etc.).<sup>40</sup> Were PAM to be employed it would doubtless display these characteristics. In the case of PAM, this friction is structural insofar as it manifests as the internal, related contradictions of the first two moments of the system. Moreover, PAM's first two moments present themselves in a logically inverse manner,<sup>41</sup> but one fully consistent with Hegel's constant and counter-intuitive insistence on dialectical reversal. At least with respect to this policy analysis market the dialectical mechanics that produce the cunning of reason in markets in general produces a problematic dialectic. What appears as moment<sup>1</sup>, the failure to produce a signal at all, is in fact the consequent, moment<sup>2</sup>, the reflective determination of that failure's implicit ground, the actual moment<sup>1</sup> (the logical absurdity of defining a terrorist future, which is then to be speculated on in order to be determined). Formally, this is precisely the structural logic of the relative positions of the moments of Hegel's category analysis.<sup>42</sup> The first negation<sup>43</sup> (that of the failure, *within* the market system *as given*, to produce a signal) is itself negated by its implicit antecedent (the market's contract listing presupposes its object, and thus nullifies itself): thus the negation of the negation is the positing of the system's *a priori* failure, manifesting (in the mode of the future anterior) as a failure *within* the system.

Transitioning via the aforementioned moments of negation, PAM's immanent logical contradictions manifest themselves on a plane of surplus materiality. Unsurprisingly, because they are the mutually constitutive interface of subject and object, integral moments of the market system's "co-opetition," the movement from concept to materiality in PAM passes through the contradictory nature of the internal relation between the tradable instrument, the derivative, and the market efficiency that forms the basis for the market's price ("information") rationality and accuracy. Derivatives in general function to hedge risk and provide the possibility for quick, *temporarily* high profit yields. This second, vital feature, called "gearing," is key to derivatives because of their acute time sensitivity vis-à-vis their issue of interest. Within the economy of the system, gearing is a moment of explicitly articulated irrationality (an over-pricing which neo-classical economics argues dampens out over time<sup>44</sup> ).

Indeed, Nobel laureate economist Joseph Stiglitz argues that markets in general and speculative markets in particular are often *inefficient* in the short-run; but it is precisely short-run, time sensitive contracts (for terrorism, assassinations) that are of interest as signal providers to PAM. Stiglitz contends that price oscillations are very often governed not by new information rationally incorporated into a share or contract price, but rather by herding, an “irrational” and/or “emotional” investment behavior. This aspect of market psychology is a driving force in speculative markets like those for derivatives—in fact, it is the key determinant for price discovery in speculative markets. Keynes warned of this predominance of irrational speculative market herding behavior in his *General Theory*, and was one of the first to point out that the motor for this comes about because derivatives traders are less interested in the state of the value of the fundamentals underlying a derivative than they are “interested in discovering what opinion believes average opinion to be; and this... weakness finds its nemesis in the stock market.”<sup>45</sup> That is to say, speculative markets like those for futures discover price as much by rumor as by sound thinking, and this makes them volatile and often inaccurate. There is no reason to think that this behavior will not be predominate in PAM, and this is damaging to PAM because of its reliance on the operational rationality of efficient (both responsive *and* accurate) market discovery.

Interestingly, this aspect of market inefficiency is illustrated by the 2002 Columbia shuttle disaster. In the period between Challenger and Columbia, Morton Thiokol, the manufacturer responsible for Challenger’s explosion, was purchased by Alliant Techsystems Inc. Apparently suffering a flashback to 1986, upon news of Columbia’s re-entry explosion the market punished Alliant Techsystems with a share price loss of nearly 12%, almost exactly the market punishment meted out to Morton Thiokol in 1986. After Columbia, the other main shuttle contractors, Boeing and Lockheed Martin, were punished only 1.5% and 3% respectively.<sup>46</sup> So far, however, it seems that Columbia’s crash was due to a manufacturer failure by Lockheed Martin, not Alliant. With regard to this market failure qua misidentification, economist Daniel Gross comments that “the market may be efficient[,] [b]ut it can also emotional. Did traders with long memories rush to sell Alliant disproportionately because Morton Thiokol was deemed responsible for the Challenger disaster? Almost certainly.”<sup>47</sup>

Although as an argument for short-run market inefficiency the shuttle case is merely anecdotal, it is the case that a primary desideratum of derivatives is the possibility for short-term irrationality built into their very nature. As demonstrated, however, static contract values contain no information; only a PAM contract’s price changes are communicative, produce market discovery. The very property that makes derivatives desirable, gearing, makes them irrational, inefficient, and wildly unstable as a material instrument linked to terrorism prediction.<sup>48</sup> This flaw is systemic with regard to PAM’s operational requirements, which are predicated on the ability of a contract to shoot up in value. Previously this moment was analyzed as self-negating, as containing its own contradiction within itself. That analysis of inadequacy qua lack (failure of PAM to get off the ground) finds here, in the nature of its chosen instruments, a transitional point to an irrational, inadequate moment of *excessive production*. As is evident, PAM also does more than is intended.

Indeed, in the final analysis PAM’s concept, ostensibly predicting *and* preventing terrorism, displays the dialectical tendency to produce its opposite. PAM’s harnessing of cold profit logic actually generates a stimulus for purchasing a terrorism contract—linked say to an attack, using an

explosive laden furniture truck or donkey, against a cafe or police station—and then taking measures to *ensure the occurrence* of the underlying issue. This is not simply a problem of insider trading, of illegality that no market in the history of humanity has ever managed to eradicate.<sup>49</sup> Rather, this effect is internal to the system's logic. This is absolutely clear when one recalls the philosophical principle underlying the relationship between individual market agents and the market as a whole: the element that drives the aggregation and conversion of individually held information into dynamic market price discovery is self-interest qua profit maximization. In this case, a likely source of profit maximization—and an entirely rational act from the philosophical viewpoint that judges individual utility as the supreme driving force behind collective interest—would be to purchase contracts and then work to ensure that they pay off. Moreover, depending on PAM's design, one can argue that influential government analysts, agencies, and/or policymakers could wield significant power to create a market of self-fulfilling prophecies for regime changes and terrorism in the Middle East. PAM reaches its apotheosis at the moment it raises the significant possibility of generating the terrorism it is designed to hinder. Embedded within PAM's normal effective register is an antagonism manifesting itself as a surplus production, a materiality paradoxically both within and without the system's functional requirements.

#### IV. Reflections and Considerations

The birth of PAM is noteworthy for several reasons. 1) From a historical perspective, it marks an extension of the standard understanding of the scope of markets as a technology. 2) From a philosophical perspective, it is an interesting application of ethereal philosophical principles—the invisible hand, the cunning of reason, self-interest—to a technology that hybridizes modern electronics and market concepts in order to take on a tangible problem. Further, PAM's internal contradictions and flawed logic are grist for a dialectician's mill. What is also significant is the fact that PAM, in functioning as a sort of distillation or concentration of a certain set of philosophical and economic assumptions about what markets in general can do, provides a sort of isolated model or test case for viewing the validity of those assumptions, particularly those philosophical and economic assumptions about the smooth, self-regulating nature of the market mechanism. 3) From an ethical perspective, PAM presents a set of new, difficult issues.

Naturally PAM and its related issues are a rich mine of ideas, and I cannot deal with them all. Instead I will sketch out briefly the terrain for a deeper investigation into the considerations mentioned above. I will deal with these topics in reverse order, as it seems that one cannot begin to understand the historical shift without understanding the ethical and philosophical points.

3) A question of ethics: Most obvious, of course, is an ethical issue that is also a functionality issue: the easily intuited ethical breach that would come in the form of an investor committing a terrorist act in order for his/her contract purchase to pay off is additionally a clear failure with respect to the system's design. For many people, of course, this circumstance would in fact be the primary failure, with the ethical problem playing an obvious second fiddle. Furthermore, it is odious to contemplate the functional and ethical failure that would occur if a terrorist entity or some quasi-legitimate front organization (say, an Islamic charity) were able to create a self-fulfilling prophecy and finance future terrorist activities by profiting off the first. Presumably this *could* be controlled by advanced screening of traders, but I have seen no evidence that this issue has been addressed by PAM's designers. At any event, this is a real concern and by no means an easily preventable one.



Moreover, this screening process also would be unable to address the functional and ethical problem that would arise through government agencies creating self-fulfilling prophecies of terrorist events.<sup>50</sup>

Yet even if these problems were solved, there are deeper ethical issues. Not least of which is that regarding the admittedly ghoulish concept of a non-terrorist investor turning a profit because of a terrorist event. This would be a very new meaning of a very nasty word and old occupation: war-profiteering. In essence, terrorist markets are markets trading in death and chaos: of U.S. servicemen/women, of leaders of state, of civilian populations. Now, over and above the fact that, via market principles alone, I have shown that PAM cannot work, and in fact likely would (even assuming away its logical flaws) produce the terrorism it is designed to hinder—that is, even *if* PAM were to have the possibility of working, would its principle and payout structure pass an ethical test? For lack of a more philosophical term, I call this ethical test the “eeww” test. In the absence of formalized ethical principles about a given situation, the “eeww” test stipulates that if the object of moral inquiry causes one an uneasy, uncomfortable reaction, then that object likely has some ethical problem embedded in it.

The test is actually fairly standard as an argument advanced by ethical intuitionists. Many philosophers and most non-philosophers apply this test often, particularly when there are no easily identifiable ethical rules or principles for a given state of affairs. This test is comparatively conservative, and is often used as the bulwark of slippery slope arguments against changes in social patterns of behavior and advancements in technology and invention. The U.S. Supreme Court, for example, repeatedly has used the “eeww” test to distinguish between pornography and legitimate free speech protected by the 1<sup>st</sup> Amendment. In illustrating the difficulty of pronouncing legal, much less moral, judgments about issues with tremendous gray areas, one justice famously said of pornography: I don’t know what pornography is, but I know it when I see it. Many people, and in the EU particularly, apply this ethical test to the new technological issues surrounding the value of genetically modified crops. Recent significant technological progress in gene therapy, stem-cell research, and artificial intelligence often has outstripped the ability of formalized moral judgment to assess the moral ramifications of each, thus forcing many into the situation of applying the “eeww” test.

Because much of the world is struggling to establish a set of ethical guidelines for counter-terrorism activities, this test is particularly apt with respect to the particular methods of dealing with terrorism. This certainly is the case in the U.S., where post-9/11 trauma and the abuse of detainees in Iraq and Afghanistan have led recently to a serious public debate about the acceptability of torture as a tactic for gathering intelligence about potential terrorist acts. By and large, the moral content of much of this debate has focused on which side of the “eeww” test one falls. A similar question must be posed with respect to PAM. Is it the case that a market system based on profit by death and chaos is too odious?

The historical answer to this question may well be yes. As it so happens, PAM was cancelled by DARPA in 2003 after Congressional, media, and popular moral outrage about the ghoulish nature of war-profiteering via so-called “death markets,” the contracts that specifically traded in terrorist events, assassinations, and U.S. military service deaths.<sup>51</sup> Clearly this iteration of PAM failed the “eeww” test. The question is why, although I do not have space to answer here. I might simply say that the intuitive moral response that many had to PAM may well tell us something about our larger



ethical concerns vis-à-vis technological progress and the changing landscape of a post 9/11 world. At any rate, PAM is at the very least an example of how an alteration in human technological power can be reflexive, can provide us with information about values, priorities, and self-understanding.

2) Some general philosophical questions: Although the initial version of PAM was cancelled, a second version was scheduled to go online in March 2004 (although the larger project in which it was embedded, the TIA program, remains shelved). According to the PAM website, although the point is still to predict terrorist acts, the new PAM does not trade in derivatives contracts for terrorist acts or violent events, and PAM is no longer housed in any U.S. government agency.<sup>52</sup> Perhaps this marks the recognition of the ethical problems elucidated above, although it is more likely that the changes reflect the functional problems elaborated in the body of this analysis. In any event, PAM still exists as a decision support system employing the philosophical principles behind efficient market theory, and in this case that theory is now applied to information gleaned from derivatives contracts for market prices of petroleum, U.S. equity in the M.E., trade, investment, etc.<sup>53</sup>

Because in this iteration the derivatives contracts being traded are not also the contracts whose underlying conditioning issue is being prevented from occurring, and because there are no terrorist contracts traded whose listing on the bourse is paradoxically the condition of possibility of the contract not needing to be listed, and because the contracts are not *directly* predicated on payouts related to terrorist and violent events, PAM's designers have solved three of the flaws I identified as manifesting a dialectical inter-relation of sublation, where each contradictory moment of PAM represented the implicit truth of the contradiction of a logically prior moment. In any event, the alterations make PAM a functional concept, even if it does not actually help hinder terrorism. Nonetheless, it is not a slam dunk that the new version of PAM is ethically or philosophically sound.

On an ethical level, it does not seem clear that any philosophically rigorous argument could definitively state that the fact of a mere indirect relation of profit to terrorism makes a trader's participation morally unsullied. Traders will still be profiting off of derivatives contracts whose underlying issues are related to fundamental causes of terrorism: wildly fluctuating petroleum and currency market prices in places like Saudi Arabia or Egypt or Iraq (states where petroleum prices have abnormally significant impacts on political (in)stability, which is directly correlated with terrorism), U.S. military presence in various M.E. countries (which has been a stated reason for Al-Qaeda attacks), (low) GDP growth in the M.E., M.E. capital flight that exacerbates poverty, etc. In essence, it is worth asking whether or not there is something inherently predatory in this model, even after the removal of the trading of terrorism contracts.

This issue is related to another: whether or not, despite the changes to PAM, it is the case that the contradictions—particularly those regarding the production of the terrorism which is to be prevented—which are inherent in the first PAM model are still present implicitly in the second version. After all, the market principle is based on the notion of contradiction: that one achieves order through chaos, benefit for all through caring only about self-interest, the cunning of reason. Given this, it would seem likely that the new version of PAM would also have a tendency for self-fulfilling prophecies, especially since futures markets in general are notorious for this type of result. Keynes

argues precisely this point, and rests his argument on a principle of uncertainty that is common to all markets. Here is Martin Weitzman's brief synopsis of Keynes on this point about markets:

“[Uncertainty] is essentially due to insufficient or precarious knowledge of the mechanism by which the future is generated out of the past... Expectations play an important dual role as *both a manifestation of uncertainty and a cause of it* [my italics]. Such expectations are arbitrary to some degree because they can be based on almost anything, including self-fulfilling expectations of the behavior and expectations of others. And, as Keynes pointed out, ‘being based on so flimsy a foundation, these expectations of expectations are subject to sudden and violent changes’.”<sup>54</sup>

Why should one be surprised if the revised PAM displays a result that is the direct opposite of what intuition would dictate? Might it be the case that the catastrophic and contradictory irony of the first version of PAM, that it would produce the terrorism it was designed to hinder, is a manifestation of the deeper role of contradiction in markets in general? And thus might it be the case that this irony will be repeated in the revised PAM?

Not least is this possibly the case because, as mentioned, speculative traders themselves—particularly when exhibiting irrational herd behavior—often unduly influence the price of the derivative's underlying issue. The market response to the second Shuttle disaster is an example of this. One can also adduce as evidence the role of herd mentality on expectation and uncertainty in currency markets, where, for example, in 1998 a series of wild rumors about the weakness of the fundamentally sound Thai baht led speculative currency traders into herd behavior that destroyed that nation's currency and economy, leading to a massive IMF bailout. Thus, for example, in the case of the revamped PAM it is still possible that the market rumor mill Keynes described could effect the value of underlying issues like oil or investment; and it is by no means certain that, say, one of these herd speculation induced rapid and undue drops or rises in the price of oil or some other basic commodity will have a non-descript impact on the political economy of these M.E. nations. With PAM, which is a speculative market, the result of such herd behavior, to which derivatives traders are particularly prone, could be wrecked sectors of M.E. economies *and* terrorist activity.

In its original version the system's default setting, its normal equilibrium, is a crisis manifesting as a doubled auto-inadequation. At the risk of unnecessary conflation, one can think this aspect of systematicity along the lines of George Bataille's understanding of a “general economy.” For Bataille, the moments of a general economy have not arrived at the governing mechanism of the whole; rather, in the very act of attempting to fix its members, the system generates the impossibility of doing so. As he claims in *La Part Maudite*, a general economy is “by definition, this movement, the effect of which is prodigality,” which “is far from being equal to itself.”<sup>55</sup> Indeed, PAM's instability makes it a good candidate for exhibiting the features of a general economy. Its conceptual ideal is not adequate to its reality, in two ways. Its logical flaws prevent it from getting off the ground, and thus it does to little—and even if those flaws were solved the system still has the distinct possibility of doing too much, of producing the problem it is meant to solve. *Conceptually*, buying terrorism futures was to be buying security; *reality* happens when terrorism futures, designed to ensure security, do nothing more than secure the future of terrorism. The system's conceptual basis, the cunning of reason, is a philosophically venerable one—and also

very fickle. As such, the role of unintended consequences upon which the market is based can recoil badly, can produce results dialectically opposed to one's wishes.

1) Conclusion and Historical Considerations: I am sympathetic with the impetus behind PAM, as it is essentially an attempt to understand terrorism, whose possible range of definition has become narrowed in breadth and depth. Furthermore, it marks another attempt to shift the basis of markets from their historical position of being rather mute with regard to telling us about ourselves and about the future. But as with all evolution and paradigm changes of technological entities, results must be analyzed, lest the promise of a better tomorrow come with the reality of an unnecessary increase in destruction today. As Nietzsche once quipped, one can often experience "how much blood and horror lies at the basis of all 'good things'!"<sup>56</sup> Provided one's reasons are sound, advocating against a new technology is by no means simply a reactionary Ludditism. In this case, both the original and revised versions of PAM warrant distrust as technologies.

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### Notes

1. Richards J. Heuer, "Adapting Academic Methods and Models to Governmental Needs," in *Quantitative Approaches to Political Intelligence: The CIA Experience*, ed. Richards J. Heuer (Boulder, CO: Westview Press, 1978) pp. 1-10.; Andres Leigh, et al, "What do Financial Markets Think of War with Iraq?," Stanford University, March 17, 2003.; Robert Looney, "Oil Prices and the Iraq War: Market Interpretations of Military Developments," *Strategic Insight*, April 2003.; Robert Looney, et al, "Estimating the Economic Benefits of Forward-Engaged Naval Forces," *Interfaces* 31: 4 July/August 2001, pp. 74-86.; Edward F. Mickolus, "An Events Data Base for Analysis of Transnational Terrorism," in (ed.) Heuer, *Quantitative Approaches to Political Intelligence: The CIA Experience* (Boulder, CO: Westview Press, 1978) pp. 127-163.; Bayesian Schweitzer, "Analysis: Estimating the Probability of Middle-East Conflict," in (ed.) Heuer, *Quantitative Approaches to Political Intelligence: The CIA Experience* (Boulder, CO: Westview Press, 1978) pp. 11-30.; Robert J. Schiller, "From Efficient Markets Theory to Behavioral Finance," *Journal of Economic Perspectives* 17:1 Winter 2003, pp. 83-104.

2. A good example of this is the speculative market system called the Iowa Electronic Markets. The most well-known issue of the IEM is the Presidential Vote-Share market, which trades in futures contracts whose value is linked to which candidate wins the U.S. presidential campaign. The article will address this market.

3. DARPA (Defense Advanced Research Projects Agency) is an innovation and technology department in the Pentagon. FutureMap is DARPA's acronym for Futures Markets Applied to Prediction. The TIA is DARPA's acronym for the Terrorist Information Awareness program, formerly known as the Total Information Awareness program: motto, *scientia est potentia* (knowledge is power).

4. Following Isabelle Stengers, "complex" and "complicated" are not synonyms. Complication implies a deterministic, reversible system for which there is no fundamental lack of information in

one's model. Complexity arises from the nexus of the system's essential possibility for instability and the lack of complete information a modeler of the system would have. Markets, for instance, display characteristics of the chaotic behavior of systems defined by "strange attractors." Here is Isabelle Stengers on the subject of complexity: "Strange attractors... do not have the property of stability. Two neighboring initial conditions can generate very different evolutions. The slightest perturbation can push the system from one regime into a very different one. Instead of stabilizing into a predictable and well-determined state, the system wanders between possibilities; in other words, although governed by deterministic equations, it adopts aleatory behavior." Market activity meets these criteria for complexity. See Stengers and Gleick for further explanation.

5. James Gleick, *Chaos: Making a New Science* (New York: Penguin Books, 1987) pp. 4, 20 and passim.; Isabelle Stengers, *Power and Invention: Situating Science*, Trans. Paul Bains (Minneapolis: University of Minnesota Press, 1997) pp. 10-13, and passim.

6. In his *General Theory of Employment, Interest and Money* Keynes already pointed out that uncertainty is not the same thing as risk, which can very easily be calculated with a sufficiently robust set of actuarial tables. Uncertainty is a phenomenon that, as it were, gets in between what the instruments of risk analysis can measure. Uncertainty, amongst other things, is a development of the fact of a system's sensitive dependence on initial conditions, and usually these initial conditions are not adequately measureable (i.e. what separates risk from uncertainty is that the latter is characterized by a lack of information). That is, uncertainty is predicated on inexorable ignorance about how the future is generated out of the past.

7. These factors are in addition to the classical economic assumptions underlying the theory of employment. Keynes puts those assumptions thusly: 1) wage is equal to the marginal product of labor, and 2) the utility of the wage when a given volume of labor is employed is equal to the marginal disutility of that volume of employment.

8. A.C. Pigou, *Theory of Unemployment* (London: Macmillan, 1933) p. 252.

9. Natural prices are, roughly, what a commodity is actually worth (as opposed to what someone, subjectively, will pay for it). For Smith, this means the objective value of the price components (labor, ground rent, etc.) factored into the value of the commodity. Natural prices are distinct from market prices, which are the commodities' prices as determined by supply and effectual demand.

10. Adam Smith, *The Wealth of Nations* (New York: Bantam, 2003) p. 83.

11. J. M. Keynes, *The General Theory of Employment, Interest and Money* (Ch. 24), <http://www.marxists.org/reference/subject/economics/Keynes/general-theory/ch24.htm>. (Henceforth: GT)

12. G.W.F. Hegel, *The Philosophy of Right*, Trans. S.W. Dyde (New York: Prometheus Books) §199. (Henceforth: PR)

13. PR, § 199.

14. G.W.F. Hegel, *Reason in History: A General Introduction to the Philosophy of History*, Trans.

Robert Hartman (Upper Saddle River, NJ: Prentice-Hall, 1997) p. 42-43.

15. For a sample of the market quotes for the derivative contracts offered by IEM I highly recommend visiting the IEM website at <http://128.255.244.60/quotes/66.html>. This example shows Kerry has on average a 48.6% chance of winning, G.W. Bush a 51.5% chance.

16. Joyce E. Berg and Thomas A. Rietz, "Prediction Markets as Decision Support Systems," in <http://www.uiowa.edu/iem> (Henceforth: IEM)

17. This is important, as for an unknown reason the element of investor risk seems to be a crucial factor of the market forces driving prices (qua information) to an efficient outcome.

18. IEM.

19. IEM.

20. IEM.

21. Andres Leigh et al. "What do Financial Markets Think of War with Iraq," Stanford University, March 17, 2003.

22. These markets have a second, more common function. They are hedge opportunities. For instance, using this example, a car manufacturer analyzing futures contracts prices indicating sharply rising petroleum prices can hedge itself against a failed or underperforming hybrid model (that it manufactures as a response to rising petroleum prices) by purchasing futures or options contracts for that petroleum (contracts by which it will then profit, thus recouping some of the lost investment in the hybrid automobile). Hedges will come into play as I discuss the functioning of PAM.

23. Again, DARPA (Defense Advanced Research Projects Agency) is an innovation department in the Pentagon. FutureMap is DARPA's acronym for Futures Markets Applied to Prediction. The TIA is DARPA's acronym for the Terrorist Information Awareness program, formerly known as the Total Information Awareness program.

24. Provisionally, these contradictions are also moments of the system's transition from concept to reality.

25. Charles Polk, et al., "The Policy Analysis Market: An Electronic Commerce Application of a Combinatorial Information Market," in [www.americanactionmarket.org/policyanalysismarket.org/pam\\_concept.htm](http://www.americanactionmarket.org/policyanalysismarket.org/pam_concept.htm). (Henceforth: AAM).

26. AAM.

27. An example is how traders predicted the U.S. Navy's engagement with Iraq in 1990. See Robert Looney, David Schrady and Ron Brown, "Estimating the Economic Benefits of Forward-Engaged Naval Forces," in *Interfaces*, 31:4 July/August 2001, 74-86.

28. AAM.

29. An essential feature of derivatives markets in general, whose two desiderata, potentially abnormally high profit yields and sophisticated asset risk-management for traders and financial institutions, relies on fluid contract trading and well-designed hedges.
30. To see a sample conditional contract and the comparative values of market methods of prediction versus traditional methods, go to: <http://www.iwar.org.uk/news-archive/tia/futuremap-program.htm>: Image 1 shows the desired efficacy of using market methods for prediction. Image 2 shows a sample PAM derivative contract. This contract is conditional, insofar as issue A is conditioned by issue B. Prices correspond to probabilities. So, in this instance, an expert on Jordan's political condition who has no knowledge of Iraq's military vis-à-vis a U.S.-led invasion (his ignorance attested to by the 50%-50% probability of Iraq's resistance extending more than one month)—but who has excellent information that Jordan's monarchy would not collapse if Iraq-U.S. hostilities were less than one month, and would collapse if the hostilities exceeded one month—could structure a conditional contract without having to know anything about Iraq-U.S. military affairs. In this case, and given this hypothetical trader's ignorance of military affairs, the probability of Jordan's monarchy collapsing is 35%. The role of conditional beliefs, hedges, is central to PAM's theoretical ability to aggregate diverse information sets.
31. AAM.
32. Notice that these figures have the dimensions of relative price.
33. This is from the original PAM web site: [www.policyanalysismarket.com](http://www.policyanalysismarket.com).
34. To view a prototype of the PAM trader interface go to the website: <http://www.iwar.org.uk/news-archive/tia/futuremap-program.html>. It lists prices, market movement, spreads, etc. for the derivatives in which one trades. Notice the specific content of the three types of contracts listed on the right-hand side of the page.
35. AAM.
36. Aristotle's description of Thales's speculation on the olive harvest is similar to a futures contract. Aristotle, *The Politics*, trans. Carnes Lord (Chicago: University of Chicago Press, 1984), 51.
37. Michael Maloney and J. Harold Mulherin, "The Complexity of Price Discovery in an Efficient Market: The Stock Market Reaction to the Challenger Crash," in *Journal of Corporate Finance* 9:4, September 2003, 453-479. See also Daniel Gross, "The Disaster Market: Can Wall Street Figure Out the Cause of a Space Shuttle Crash Faster than NASA's Experts?," *Slate-online*, August 8, 2003. (Henceforth: Gross)
38. Because of "gearing," or "leverage," discussed below, the rise in contract value might not reflect the true (when judged by effective demand) value of the underlying issue.
39. *Exceptio probat regulum*: a quasi-exception to this is the use of derivatives as risk-management tools, where for example a trader will purchase an option contract (of high-yield and low probability) as a hedge against an improbable loss in a low-yield security associated with the



derivative contract in some way. But even here, ultimately the rationale behind the contract purchase is to produce profit. Furthermore, supply-demand logic always stipulates that the purchase of a security or derivative lowers supply, thus indicating rising demand and the expectation of a rise in price (leading to profit).

40. This is an adaptation of the critique of the normative, ideal, “frictionless” market theory assumed by neo-classical economics. For a good explanation of this: Colin Leys, *Market-Driven Politics: Neoliberal Democracy and the Public Interest* (London: Verso, 2001), 81-83. (Henceforth: MDP)

41. I.e. the contradiction I analyzed first, paradoxically, cannot even really exist because it is preceded by the contradiction listed second. I will elucidate this more.

42. Unfortunately, I cannot go into the specifics of this.

43. Which is the actual moment<sup>2</sup> masking itself the first moment.

44. One notices that the market’s effective demand is always retroactively constituted.

45. GT (Ch. 12).

46. Gross, August 8, 2003.

47. Ibid.

48. As a further claim for PAM’s self-undermining vis-à-vis terrorism prevention, it may also be the case that this irrational price fluctuation could inhibit conventional counter-terrorism and intelligence projects already established.

49. Just recently, witness: Enron, MCI Worldcom, Tyco, HealthSouth, Arthur Anderson, the SEC’s penalties for several large investment banks and mutual funds, Martha Stewart, Sam Waksal, etc.

50. For those who do not think governments perpetrate such activities: read Machiavelli, listen to the Nixon tapes, listen to the tapes of MacNamara and Johnson fabricating the attacks in the Gulf of Tonkin, etc. Geopolitics, *Realpolitik* in general, is by definition no respecter of ethics.

51. I hasten to note that it may well be the case that the moral outcry had little causality in the Pentagon’s decision to scrap PAM in its configuration at that time. It may well simply be the case that one of their staff economists or policy writers figured out the same problems presented in this paper.

52. Policy Analysis Market November 2003, <http://www.policyanalysismarket.com>.

53. The basic strategy for using this price discovery mechanism is the same as when the contracts also include terrorist events and the like, only in this second version the counter-terrorism analysts would have to judge the likelihood of the event from secondary indicators (e.g. a rapid drop in oil profits, trade, and foreign direct investment in a nation might indicate a likely terrorist event).

54. Martin Weitzman, "Profit-sharing Capitalism," in *Alternatives to Capitalism*, ed. John Elster and K.O. Moene (Paris: Cambridge University Press, 1993) p. 62.
55. Georges Bataille, *The Accursed Share*, Trans. Robert Hurley (New York: Zone Books, 1991).
56. Friedrich Nietzsche, *On the Genealogy of Morality* (1887), trans. Carol Diethe (New York: Cambridge University Press, 1994), 42. I owe these observations to an article by Jason Wirth, "Exhilarated Despair and Optimism in Nothing," in *International Studies in Philosophy*, 31, 1 (Winter 1999): 131-132.