Anthropic Finance and Better Markets:

Toward a New Understanding of How Markets Function and the Role They Serve in Society

(1) Anthropic Finance: How Markets Function

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How Markets Function

Market Fundamentalism, Efficient Markets and Neoclassical Economics vs. Anthropic Finance

Preface

The financial crisis of 2008-9 convinced many observers that something was very wrong with our markets, and with the theories through which we had been trying to understand them. The *Anthropic Finance and Better Markets* series brings together academics and real market participants. This powerful combination of scholarship and real world experience is directed towards diagnosing what went wrong with financial markets and our theories about them, and suggesting alternative approaches to understanding markets that can enable legislators, regulators, and market participants to avoid the mistakes of the past.

This first paper in the series, *How Markets Function*, begins by making explicit the theoretical status quo that underpinned the ideas and behaviors that made the financial crisis possible, and in many cases directly contributed towards causing it. The paradigm in question arose from the assumptions neoclassical economics, and is generally referred to as the *efficient markets* paradigm. The paradigm includes a theoretical characterization of market participants as fully informed agents with rational expectations. From these assumptions about the nature and situation of market participants, efficient markets theorists developed a model of markets known as the *Efficient Markets Hypothesis* (EMH), which states that market prices reflect all known information. The ramifications of this theory are that markets naturally lead to maximally rational resource allocation because of their perfectly rational price formation mechanism. For this reason, EMH has become associated with a "free market" ideology of maximal deregulation. The idea behind this connection is that if markets are "naturally" efficient, in the sense of EMH (i.e. prices are perfectly rational), then governments ought to minimize intervention in markets, for any attempt to interfere will simply detract from the market's innate ability to allocate resources optimally.

While this story seems benign enough, the policies that were based on it have proved disastrous. This paper traces back the failures of the efficient markets paradigm, and the models that came out of it, to its unrealistic assumptions about the nature and situation of market participants. Far from being ideally rational, fully informed autonomous agents, market participants are real people acting in real institutional roles. Their behavior is therefore not governed by abstract rational rules, but by a combination of their institutionally driven incentives (*Mandate*) and individual and collective psychology (*Mind*). This view of market participants generates the name *Anthropic Finance*, from the Greek $\alpha\eta\theta\rho o\pi o\sigma$ (*anthropos*), meaning "human".

Anthropic Finance should not be confused with *Behavioral Finance*. The latter is based on recognition of various cognitive biases inherent in human reasoning, and the discrepancies this generates between actual behavior of market participants, and that predicted by the efficient markets paradigm. Anthropic Finance aims to incorporate the insights of Behavioral Finance, while recognizing that the vicissitudes of human reasoning are simply one component of the failure of the efficient markets paradigm. Alongside psychological traits (*Mind*), another set of considerations drives behavior: situational traits (*Mandate*). This latter group includes all incentives and institutional or

legal restrictions on behavior. Not only does this add another dimension to the behavioral critique of efficient markets, it is actually a far more important factor in governing market participant behavior, according to Anthropic Finance.

This paper proceeds to examine the assumptions inherent in the theoretical paradigm of *efficient markets* to uncover exactly where it went wrong. In the remainder of the document, the policies and procedures that were largely based on such faulty theories are scrutinized, and an alternative is proposed, both theoretical and practical. The next installment in the series, *Better Markets*, takes off where this paper leaves off. *Better Markets* explores the broader normative issues surrounding the role of markets in society, and the appropriate framework within which to understand the political debate surrounding regulation of markets and financial derivatives.

As Akerlof and Shiller have argued, "So many members of the macroeconomics and finance profession have gone so far in the direction of 'rational expectations' and 'efficient markets' that they fail to consider the most important dynamics underlying economic crises".[1] While it is certainly the crisis itself that has provided the impetus for practitioners and theorists to develop a better understanding of markets and economies, the applications of the new theory are quite broadly applicable. It is our hope that the theory contained within this document will prove useful not only in navigating what remains of the present crisis, but also in preventing future crises and in building a healthier financial sector healthier than has been seen before.

[1] G. Akerlof and R. Shiller, *Animal Spirits* (Princeton 2009) p169

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1. Neoclassical Economics and Market Fundamentalism

1.1 Beginning in the 1980s and continuing to the present day, a phase of market deregulation, privatization of public services, and radical free market rhetoric and theory came to dominate the public arena. Inseparable from the policy initiatives of deregulation and privatization were the theories of neoclassical economics and the philosophy of market fundamentalism.

The New Palgrave Dictionary of Economics summarizes neoclassical economics as an approach founded on three main assumptions: 1. People have rational preferences and expectations among outcomes. 2. Individuals maximize utility and firms maximize profits. 3. People act independently on the basis of full and relevant information.[2]

The neoclassical paradigm is therefore a theory about individual decision makers (they are rational maximizers), and about the context in which they operate (a context in which information is full and symmetric).

The philosophy of market fundamentalism takes the theoretical apparatus of neoclassical economics and uses it to build an ideological approach to market structure (absolute deregulation), and to the normative status of markets (their ultimate objective is maximal efficiency). This paradigm of economic thought has generated various models, which in turn have been used to inform economic policy. The key to understanding how this connection has played out is the Efficient Markets Hypothesis (EMH), which uses neoclassical assumptions to derive the result that free markets are socially optimal.

1.2 The Efficient Markets Hypothesis is a central tenet of neoclassical economics.

The standard definition of EMH is that "markets are informationally efficient." This is taken to mean that prices on traded assets already reflect all known information, and any new information is instantaneously reflected in a change in prices. Implicit in this definition (and the explanation for it) are a range of principles that collectively define the neoclassical paradigm: rational, independent agency and perfect, symmetric information. Additionally, EMH assumes that for any given set of available information, there is a precise rational intrinsic value for every asset. Let us consider these assumptions in order:

(i) EMH assumes that market participants are self-interested and rational.

The model assumes that market participants are self-interested, and have rational expectations. Although this does not necessarily imply they act fully rationally (less hard-line proponents allow that some non-rational or irrational behavior may occasionally cause brief, minor aberrations), it implies that they will, for the most part, do so.

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[2] John Eatwell, Murray Milgate, Peter Newman, *The New Palgrave: A Dictionary of Economics* (The Stockton Press, 1987), 323.

Ultimately, these non-rational behavioral determinants are theorized out of the final model. For even if some participants over- or under-react to information, EMH assumes that the presence of purely profit driven speculators will ensure that prices return to rational levels. This is because sophisticated speculators will perceive that prices do not reflect fundamentals (do not match the intrinsic values implied by available information), and thus avail themselves of an arbitrage opportunity.[3] Therefore, EMH implies that markets in which speculators are present are at least as efficient as markets in which all participants are producers and consumers (see §4), and often more efficient.

(ii) EMH assumes all participants are fully and equally informed.

In order that prices remain rational (i.e., in accordance with the most reasonable estimation of intrinsic values, given the available information), EMH assumes not only that market participants make reasonable valuations, but also that they do so on the basis of complete information. Were there to be gaps in the information on which some participants based their valuations (and therefore buy/sell) decisions, there would be no reason to suppose prices should reflect the information that was not considered. As a supporting assumption, EMH assumes that there are no liquidity constraints or transaction costs that might prevent market participants from acting on a piece of relevant information.

Thus, EMH rules out information processing costs, gaps and asymmetries. This abstraction from the real world is contentious, but is generally justified by EMH proponents by the principle that unrealistic assumptions are legitimate if they generate reliable predictions. EMH, then, conceives of a market as a place where fully informed participants buy and sell based on independent, largely rational valuations that take into account all available information. In this sense, prices "reflect" information: they are the product of transactions between fully informed agents acting rationally.

(iii) EMH assumes specific intrinsic values.

The third explicit assumption of EMH is that information about individual companies, the economy, plus anything else that may have an impact on future asset values determines a unique present value for every asset. Although this is generally accepted without question among EMH theorists, it is a controversial philosophical stance.[4] In effect, EMH implies that there is a unique rational response to any given set of evidence. Evidence, however,

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[3] In academic circles, "arbitrage" is generally used to refer to the phenomenon of simultaneously buying one asset while selling another, in order to profit from a divergence in the relationship that ought to hold between the two, or buying an asset and then instantaneously selling it in a different market at a higher price. Strictly, an arbitrage thus defined is "risk free". The term "arbitrage" is used here in the broader sense in which market participants tend to use it: any trade that aims to take advantage of a perceived divergence between price and intrinsic value. The fact that the most famous hedge fund failure in history resulted from "fixed income arbitrage" on the part of LTCM suggests that not all arbitrage is in fact "risk free".

[4] See, e.g., Derek Parfit, *Reasons And Persons*, (USA: Oxford University Press, 1986), and Arrenheus, Gustaf, "An Impossibility Theorem for Welfarist Axiologies," *Economics and Philosophy*, 16 (2000): 247-266

is a complex notion. By its very nature, evidence implies uncertainty: the reason we employ evidence is to remedy uncertainty about what the future holds. We collect information we consider to be relevant. Using this information, we can form subjective probabilities for whatever range of possible outcomes is under consideration. The key term here is *subjective* probabilities. While certain interpretations of quantum mechanics invoke the concept of objective probability, outside of quantum mechanics, "probability" is most often used to mean the subjective probability of some outcome based on an individual's evaluation of the evidence available.[5]

The issue of whether or not some evaluations of available evidence are better than others is a contentious issue among probability theorists and modern epistemologists studying the rationality of human decision-making. It seems clear that some interpretations of a piece of evidence are unacceptable (e.g., taking the announcement that company X has just posted record earnings as evidence that they are about to go bankrupt), but there is no definitive philosophical explanation of what it is that makes this unreasonable. At the very least, however, the consensus among all parties is that there is almost always a range of possible evaluations – no single response to evidence is uniquely rational.[6]

This casts some doubt on the ultimate coherence of EMH. Without a unique rational response to evidence, there is no real basis for the idea of an intrinsic value, and therefore no objective standard against which to measure a market's efficiency. Without uniqueness, markets become simply an aggregation of subjective views. The implications of this for regulatory structure are clear and significant: if markets reflect participants' subjective views and motivations, then they must be structured so as to protect against the concentration of power by any one group. For if one group becomes sufficiently powerful, it will be able to drive markets in ways that serve only its own interests, at the expense of all others. Infamous cases of how excessive power concentration leads individuals and firms to serve their own interests at the expense of the rest of society, through legal means or otherwise, include the SEC-investigated activities in Credit Suisse First Boston's alleged spinning of the IPO market,[7] Drexel Burnham's manipulation of the junk bond market[8] and Salomon Brothers' cornering of the US Treasury Bond market in 1991.[9]

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[5] See, e.g., Wiley, J., *Subjective and Objective Bayesian Statistics: Principles, Models, and Applications (2nd ed.)*, (Hoboken: S. James Press, 2003).

[6] See Talbott, W., "Bayesian Epistemology," *Stanford Encyclopedia of Philosophy* (2009 Edition), Edward N. Zalta (ed.), URL = http://plato.stanford.edu/contents.html#epistemology-Bayesian-Talbott/ (retrieved 2/5/2010). For a more technical discussion, see Hartry Field's *John Locke Lectures*, University of Oxford, http://www.philosophy.ox.ac.uk/lectures/john_locke_lectures, Retrieved 2/5/2010.

[7] See Liu, Xiaoding and Ritter, Jay R., "The Economic Consequences of IPO Spinning" (September 18, 2009). AFA 2008 New Orleans Meetings Paper. Available at SSRN: http://ssrn.com/abstract=968712, (retrieved 2/10/2010)

[8] See SEC News Digest, Issue 90-79, April 24, 1990, http://www.sec.gov/news/digest/1990/dig042490.pdf (retrieved 2/10/2010), and Connie Bruck, *The Predators' Ball: The Inside Story of Drexel Burnham and the Rise of the Junk Bond Raiders* (New York: Penguin Books, 1989).

[9] Bradford D. Jordan and Susan D. Jordan, "Salomon Brothers and the May 1991 Treasury Auction: Analysis of a Market Corner," *Journal of Banking and Finance*, 1995.

According to EMH, however, market manipulation is impossible, and the best market is the least protected market – one in which all checks and balances are removed, and the natural tendency of markets towards maximal efficiency is allowed free reign.

1.3 Rational agents and perfect information together imply efficiency.

Rational agents consider all information when making decisions. Therefore, when rational agents act on the basis of perfect and complete information, that information is, in this sense, "reflected" in prices. This holds as long as there are no obstacles to free buying and selling by these rational, fully informed investors (in the form of liquidity constraints, transaction or processing costs, or regulatory inhibitions).

Although all information is thus "reflected" in prices, in the sense that it was used in the process of arriving at valuations that prompted the buying and selling behavior that generated those prices, it is not reflected in the stronger sense of being encoded. There is no way of recovering all the information that went into creating prices just by looking at those prices.

1.4 Efficiency bypasses participants.

Because market participants serve only to translate information into prices, they are redundant in EMH, and any model based on EMH. There is a direct function from information to prices, and the entire model can be specified without reference to market participants. This is what allows EMH to generate such simple mathematical models (if news flows are stochastic, and participants merely translate information into prices, then market prices can be modeled with the relatively straightforward and versatile mathematics of stochastic analysis).

This, in essence, is the core difference between the neoclassical, EMH-based paradigm, and the alternative proposed in this document: anthropic finance. Neoclassical economics dispenses with human participation in markets, while anthropic finance is entirely based upon its recognition.

1.5 According to market fundamentalism, free markets are maximally efficient.

Since market participants act rationally and independently, and use all relevant information in making buy and sell decisions, EMH implies that their default behavior leads to efficient markets. Thus, any external interference, such as limits placed on speculation, simply serves to reduce efficiency.

Of course, this is only an issue if there is no compensation for the loss in efficiency. For instance, if reduced efficiency were balanced by increased levels of some other value, like justice.[10] However, the last part of market fundamentalism speaks to this point, answering it with the belief that efficiency is the supreme goal of markets. This is the key

[10] For more on this point, see the partner piece to this one, Frenk, D., and Masters, M., *The Social Role of Markets* (2010).

issue about which the theory of "Better Markets," explored elsewhere in the *Anthropic Finance and Better Markets* series, diverges from market fundamentalism. Whereas the old paradigm posits efficiency as the sole goal of markets, the new paradigm recognizes that markets are essentially society's chosen resource allocation mechanism, and ought therefore to reflect a range of values appropriate to their social function. In fact, as we shall see, Anthropic Finance implies that "free markets" in the sense of deregulated markets, are actually less than maximally efficient. So not only is regulation required for ensuring other values are reflected in markets alongside the value of efficiency, it is also necessary to protect market efficiency itself (from monopolistic concentrations of power).

1.6 According to market fundamentalism, efficient markets optimize resource allocation.

Markets are society's chosen mechanism for resource allocation.[11] Logically, optimal allocation has both a procedural element (resources should be allocated by appropriate procedures) and a distributive element (the resultant distribution of resources should meet certain criteria). Market fundamentalism places greater emphasis on the first, procedural component of allocative optimization, either by denying that there is any distributive condition on optimal allocation,[12] or by arguing that optimal procedures will generally also guarantee optimal distributions.[13] Free markets, so the argument runs, are procedurally optimal, because prices determine resource allocation, and free markets are the only way to ensure that prices reflect all relevant information. If prices reflect all known information concerning future scarcity and need (supply and demand), they are therefore maximally rational. The allocation determined by efficient markets is therefore the most rational one possible, given the information available. From the further plausible premise that the optimal procedures are the most rational ones, market fundamentalists conclude that efficient markets optimize resource allocation.

Consider a practical example: the stock market. Here, if prices are rational, then the higher a company's likelihood of success, the higher its value is assumed to be. Hence, we do not see capital (resources) allocated to weak companies that are unlikely to use it productively. Nor do we see companies with good prospects struggling to raise the capital they need to operate. Rather, each company receives the exact allocation of resources appropriate to its prospects, so that the overall productive use of available resources is maximized, based on the best information available. Nor, in efficient

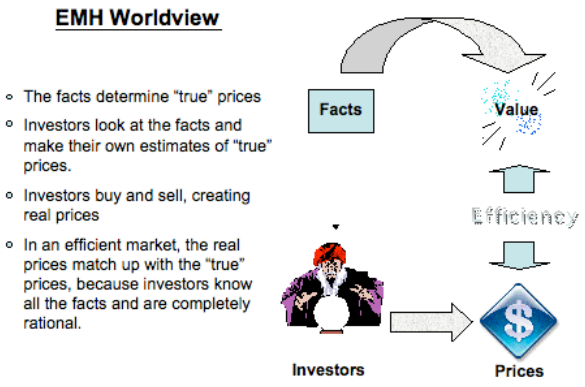

Fig. 1 *The EMH worldview.*

[11] Frenk, D., and Masters, M., *op. cit.*
[12] Robert Nozick, *Anarchy, State and Utopia* (USA: Basic Books, 1974).
[13] e.g., Ludwig Von Mises, *Nation, State, and Economy* (Original publication, 1919).

markets, do we see much of society's existing wealth destroyed by *de facto* bad bets in scenarios where share prices diverge from rational values.

1.7 EMH implies that speculators cannot consistently beat the market except by chance.

EMH implies it is impossible to consistently beat the market over long time periods except by pure chance.[14] More moderate believers accept that some events may be more predictable to some people than to others, or that there are occasional breakdowns of efficiency that some investors might be able to exploit. However, these are merely ephemeral aberrations, quickly corrected by arbitrage opportunists. The basic principle remains the same: available information determines the "right" price for each asset, and investors simply aggressively buy assets until the price rises to the "right" level, or, if the price is too high, they aggressively sell until the price drops.

Those few speculators who are able to profit over time (except through merely capturing a share of a general market appreciation due to increased productivity), must do so – if EMH is correct – through arbitrage between irrational prices and fundamental values. Thus, according to EMH, all profitable speculation is benign: it serves only to restore prices to rational levels if they have diverged because of some market failure. Over time, those speculators who bid prices away from rational values will fail to make money (as prices will inevitably correct in the opposite direction from the bid they made).

Therefore, EMH implies that, over time, an evolutionary process will guide markets containing speculators towards ever-greater efficiency. In this sense, neoclassical thought implies that the more speculation we add to a market of pure consumers and producers, the more purely the market reflects the supply and demand of those producers and consumers. Prices in a market free from speculation are the imperfect outcome of supply and demand, corrupted as they are by market failures. It is assumed that the actions of speculators remove these corruptions, and therefore generate the perfect prices for optimal alignment between supply and demand. Once again, benign, profitable speculation, under EMH, simply serves to optimize resource allocation in the economy.

1.8 EMH is not directly testable empirically.

As mentioned in §1.3, EMH entails that all available information is reflected in prices. This stems from the assumptions that market participants are fully informed and use all information in reaching valuations and therefore buy and sell decisions. Conversely, however, the information that went into price formation is not retrievable after the fact from prices alone. Unless EMH is taken as axiomatic, there is always an ambiguity as to what information was used to determine prices. This point is discussed in more detail in §4. Thus, either EMH is just assumed to hold (in which case actual prices can give no

[14] At the very least, it is nearly impossible to do so; there is some equivocation on this point. See, e.g., Burton G. Malkiel, *A Random Walk Down Wall Street*, (New York, W. W. Norton & Company, Inc., 1973), and Fama, Eugene F. and French, Kenneth R., "The Capital Asset Pricing Model: Theory and Evidence" (August 2003). CRSP Working Paper No. 550; Tuck Business School Working Paper No. 03-26. Available at SSRN: http://ssrn.com/abstract=440920 or doi:10.2139/ssrn.440920

evidence for or against, and other, *a priori* arguments – if any exist – must be given), or it is subject to evidential testing, but the primary evidence available – market prices – is insufficient to make a determination. Thus, in either case, EMH is not directly testable empirically.

There are, in fact, even more basic reasons to doubt the testability of EMH. As discussed in §1.2, the EMH assumption that goods have rational intrinsic values implies that there is a unique rational response to new information. This is a philosophically suspect proposition. It implies that any piece of information, no matter how obscure, entails a perfectly precise rational adjustment to the price of every good, so that for instance the discovery of a new oilfield with as yet unknown dimensions determines the exact penny value of the rational price change of each oil-affected stock in the S&P 500. To entertain such a notion requires quite a stretch of the imagination. What would generate such intrinsic values? Some objective law of nature? Valuations are generally considered subjective entities: gold is valuable because we value it, not because of any intrinsic worth. Even when the item being valued is essential to our economic enterprises, it is still not clear how we would arrive at an objective value for it from an aggregation of subjective valuations; it is even less clear on what grounds one could suppose that such an objective value exists independently from our own valuations, waiting to be discovered by "rational investors."

At the very least, it is difficult to deny that there is a range of rational valuations for a given asset based on available information. Hence, there is an appropriate *range* of values for "rational" price adjustments to new information. Furthermore, there is no well-defined way to place definitive boundaries on such a range. But if there is no uniquely rational response to new information, and prices are determined by the responses of rational agents to new information, the conclusion must be that any given information set can be "reflected by" a wide (and indeterminate) range of prices. Thus, it is impossible to test EMH by looking at how prices change when new information becomes available: there is no data that could possibly decide one way or the other. At best, a theorist can make a subjective judgment call on whether prices look more or less efficient to him. And indeed, there have been EMH supporters arguing that all kinds of price patterns are efficient, even during the recent financial crisis.[15] Such subjective judgment calls are no basis for scientific inquiry, yet they are the best EMH can do, logically. EMH, in short, lacks empirical content. In fact, some key proponents of EMH have accepted as much, without necessarily realizing the full implications of such an admission.[16]

But if EMH lacks empirical content, then belief in it is no more than an article of faith. And its applications (primarily quantitative models that invoke EMH in order to justify certain axioms), are founded on faith alone, not evidence. While such a state of affairs may be tenable within the academy, it is unacceptable in practice, where the decisions based on such applications cause real consequences for actual people. Improving

[15] See Fama's comments at: http://www.dimensional.com/famafrench/2009/11/qa-is-market-efficiency-the-culprit.html (retrieved 02/10/2010).
[16] e.g., Fama, Eugene, "Efficient Capital Markets: A Review of Theory and Empirical Work," *The Journal of Finance Vol. 25, No. 2*, (May, 1970): 383–417.

financial markets requires a great deal of good legislation. And a prerequisite to good legislation is a proper understanding of the subject matter. To this end, we must move beyond the arcane understanding of financial markets that EMH and its related paradigm promoted. We must move towards a new paradigm – one which begins with a recognition of the reality that markets are human constructs made of real human participants. Those participants behave according to the dictates of institutional mandates, and the vicissitudes of the human mind.

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We now propose an alternative picture to EMH: one which builds from a rich and rigorous account of human decision making rather than the neoclassical bypassing of human influence in markets. This picture not only begins with more realistic assumptions about the structure of markets and the nature of its participants; it also results in clear and testable empirical content. EMH, neoclassical economics, and market fundamentalism, as outlined above, can be boiled down to a three-part proposition:

A proposition about **how market participants make decisions**. As explained above, neoclassical economics models decision makers as rational maximizers. The next two sections of this document address the shortcomings of this approach.

A proposition about **the conditions under which market participants make decisions**. EMH assumes perfect and symmetric information. Sections 3 and 4 of this document discuss why this is rarely, if ever, the case, and illustrate the dangers of operating as though it were.

A proposition about **how markets should be structured**, through public policy and private practices. This is essentially a normative proposition. This is not discussed in depth in the present work. Instead, there is another document in this series entirely aimed at addressing this point, entitled *Better Markets*. It discusses the role of markets in society, the range of values markets can reflect, and the role of regulation in determining market structure.

2. Markets Are Made of Participants

2.1 Markets are made of participants.

Markets are venues (either actual physical locations, or merely virtual constructs) where goods or assets are bought and sold at various prices by individual participants or by groups of individuals acting together as one institution (firm). Where the goods exchanged are tangible, like a bushel of wheat or an automobile, we talk of a physical market. Where what is exchanged is simply contracts, financial instruments or other legal entitlements, we talk of a capital market. Unless specified otherwise, wherever reference is made to an asset in the discussion that follows, the same statement can be assumed to hold for a physical good, and vice versa. Similarly, any reference to a market, except where a distinction is explicitly drawn, can be assumed to hold for both capital and physical markets.

A transaction consists of an exchange of goods or assets at a certain price. This price may be relative, as in bartering, or may be absolute, when a currency is used as a medium of exchange. As goods or assets change hands, their prices may vary. By determining who can afford to buy what (and sell), it prices are the mechanism through which markets allocate resources. For every transaction, a price is set; for every transaction, there is a buyer and a seller at that price. A market, therefore, is sustained by a series of asymmetries between a buyer and a seller, based on underlying asymmetries in valuation. This, in turn, may indicate asymmetries in knowledge of facts or expectations, stemming from a difference in the objective situation or subjective perspective of each party to a transaction.

2.2 There are three types of market participant: producers, consumers and speculators.

A given individual or firm may be a buyer at one time and a seller at another, but for a particular transaction in which he is involved, he is either one or the other. Individuals who generally tend to produce a good over time and bring it to market are called **producers** of that good, while those who tend to buy a good at market in order to consume it are called **consumers** of that good.[17] The third type of participant tends neither to produce nor consume, but rather to buy assets with the intention of selling them at a higher price later, or to borrow and then sell assets with the intention of repurchasing them at a lower price later and keeping the profit ("short-selling"). This third participant is the **speculator**.

2.3 "Investors" are speculators.

[17] Of course, an individual or firm may be a producer of one good, and consumer of others, or may be a consumer and producer of the same good at different times. Moreover, individuals and firms may become virtual "buyers" or "sellers" simply by entering into contractual agreements without any physical goods changing hands.

A speculator with a sufficiently long time horizon is called an "investor." Speculators seek to profit from changes in prices, i.e., from the difference between the price of an asset now (at the time of purchase), and its future price. With certain exceptions (e.g., those who seek non-monetary returns, such as prestige or heritage), so-called "investors" also seek to profit by increases in the monetized value (i.e., price) of their investments. Investors are therefore a sub-type of speculator. According to neoclassical economics, such speculation has a net social benefit, as it ensures available information is efficiently used in allocating scarce economic resources (§1.7). An alternative view holds that speculation can have a range of effects, either positive or negative. Whatever belief one espouses, it is clear that if the relationship between agency (speculation) and markets is ignored or ill-understood by companies and policy-makers, the policies and initiatives they undertake are unlikely to be successful.

2.4 Market Purity

The composition of a market depends to a large degree on the prevalence of speculative activity. Later sections of this paper discuss the informational and allocative ramifications of higher or lower degrees of speculative dominance of markets. They also explore how this dynamic differs in capital markets versus physical markets. In general, however, we can say that a market's purity declines as the proportion of its participants that are speculators increases. Thus, a perfectly pure market contains no speculation at all, while a perfectly impure market consists of only speculators. Different degrees of purity may be appropriate to different markets, and the level of purity of a given market will depend on its regulatory structure and other environmental factors – in other words, on the incentives faced by market participants. The idea of market purity is discussed in some depth in §5.

2.5 A fourth type of actor exists in markets.

In many markets, whether pure or impure, a fourth type of actor exists, though his mode of participation is often quite different from the main three. This fourth market member neither produces, nor consumes; nor is he a traditional speculator. Rather, he serves as an **intermediary** for all three types of actual market participant. An intermediary may act in either (or both) of two capacities: as **principal**, or as **agent**. In the first instance, an intermediary who acts as principal commits his own capital to take one side of a transaction with a producer, consumer, or speculator, in the expectation of quickly taking the opposite side of an identical transaction at a better price (from the perspective of the intermediary). In this way, the intermediary aims to profit by the "spread" between the price of the first transaction and that of the second. As such, an intermediary who acts as principal is effectively a speculator with a very narrow time horizon, perhaps only a few seconds long (or even shorter, depending on the trading technologies available – the infamous "high frequency trading" is a fully automated version of this procedure). Intermediaries who act as principal are often referred to as "market makers", as the high frequency with which they trade is supposed to facilitate transactions by other participants, and thus allow markets to flourish. This idea is discussed in more depth in §4.

In contrast to a principal, the other kind of intermediary commits no capital of his own. When acting as an agent, an intermediary simply executes orders on behalf of a client. In so doing, the intermediary benefits by collecting a fee, while the customer is, in favorable circumstances, compensated for the increased cost of transaction arising from the fee, by cheaper execution of his order in the form of a better market price (made possible by the intermediary's connectedness, and consequent ability to "shop around"). From the perspective of the overall market, this "better price" rationale is a zero sum game, because a higher price procured for a producer means a higher price paid by a consumer, and vice versa. From this perspective, therefore, agents justify their existence by claiming to improve liquidity, so that transactions are made easier to execute, and information flows freely, thus improving resource allocation. This is discussed in more depth in §3.

2.6 Market participants trade based on obligations, perceptions, expectations and emotions.

When a market participant trades in a good, he may do so because of a legal or contractual **obligation**, such as when a bank must borrow from the Fed in order to meet reserve requirements, when a hedge fund must sell to honor redemptions, or when an institutional money manager must buy stocks from a particular sector to rebalance his portfolio when market moves have moved it away from its target asset allocation.

In cases where there is no obligation, buy and sell decisions are at the market participant's discretion. In such cases, a market participant will generally compare the prevailing market price to his own valuation of the asset in question. This valuation will be based on his **perceptions** of what factors are likely to influence the price of the asset, and his **expectations** of how those factors will behave. All three types of market participant – consumers, producers, and speculators – must base their buy and sell decisions not just on present prices, but also on their expectations of the future. This is because, in the absence of other constraints such as perishability of the goods in question, they may be able to postpone purchases/increase sales if they expect prices to fall, or make extra purchases/hold goods off the market now if they expect prices to rise.[18]

These perceptions and expectations may be based on more or less rational considerations. It is well documented within behavioral psychology in general, and behavioral finance in

[18] Additionally, a consumer or producer of a good may wish to insulate himself from the effects of price fluctuations, and therefore take a contractual position in (or inversely correlated to the price of) the good(s) he produces/consumes, to counteract the effects of price moves on his consumption/production. This is known as "hedging." Thus, e.g., a producer of wheat, fearing a fall in prices, might short-sell wheat (or rather, enter into a contract with some other party that effectively amounts to the same thing) so that he will recoup some of the losses he will experience if he has to sell the wheat he produces at a lower price. Of course, if he ends up selling the wheat at higher prices, he will lose money on the hedge, which will reduce his profit. A hedge, therefore, reduces expected profit in return for a corresponding reduction of risk. While the same instrument can be used for either hedging or speculation, the former must clearly be distinguished from canonical speculation where the speculator has no fundamental reason for owning the object of speculation other than prospective gains from reselling. A hedge, simply stated, reduces risk, while a speculative bet increases it.

particular, that **emotions** can have a significant influence on financial decisions.[19] It has been noted that in some cases the effect of emotions may actually improve decision-making, both in terms of leading to more desirable outcomes and by providing the necessary motive for more careful rational appraisal of available evidence.[20]

In brief, buy and sell decisions are either **mandatory (obligations)** or **discretionary**. In the latter case, they may be based on either **rational** factors (**perceptions** and **expectations)**, which are subject to various cognitive biases, or **non-rational** factors **(emotions)**, or on a mixture of the two.

2.7 Trading behavior is determined exclusively by Mandate and Mind.

Ultimately, all the categories of behavioral determinant in the foregoing analysis can be understood as facets of either **incentives** or **psychology**. We refer to these as **Mandate** and **Mind**. A market participant's Mandate includes his entire incentive structure, from easily overridden low-level incentives all the way up to incentives so strong they are considered obligations – after all, what is a legal prohibition, but an injunction backed up by the deterrent threat of strong sanctions? A participant's Mind includes all psychological factors, both rational and non-rational. **The interactions between Mandate and Mind govern all behavior.**

Mandate and Mind does not directly challenge the neoclassical theory of rational expectations as far as content is concerned. Rather, it challenges it with regard to scope. Mandate and Mind aim to capture rational expectations in so far as these determine participant behavior, but they also fill in the rest of a broader picture of what determines behavior. The theory is premised on the belief that rational expectations are part of the explanation as to what drives behavior, but not the whole explanation. Based on the principle that market participants are real people, and the observation that people do not behave perfectly rationally in situations outside of the market place, Anthropic Finance asks the question *why should they suddenly behave as such within a market context*?

Indeed, the theory of Mandate and Mind allows us to identify clear cases in which rational expectations is the appropriate lens through which to view and explain market participant behavior (such as when an options trader is legally mandated by the terms of his contract to use a certain EMH-type valuation model, and thus to behave in EMH-type ways – though this too will break down under extreme conditions). On the other hand, we also see cases where groups of participants consistently act in ways incompatible with rational expectations, retail investors being the best-documented example.[21]

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[19] See, e.g., George F. Loewenstein, et. al., "Risk as Feelings," *Psychological Bulletin (American Psychological Association)* Vol. 127, No. 2 (2001): 267-286.
[20] Alice M. Isen, "An Influence of Positive Affect on Decision Making in Complex Situations: Theoretical Issues with Practical Implications," *Journal of Consumer Psychology*, Vol. 11, No. 2(2001): 75-85.
[21] See, e.g., Terrance Odean Brad M. Barber, "The Courage of Misguided Convictions: The Trading Behavior of Individual Investors," *Financial Analyst Journal,* (Nov./Dec. 1999): 41-55.

To see how this works, we must take a more detailed look at the theory of Mandate and Mind. Recall that trading behavior, as with any behavior, can be divided into what must be done (obligatory), and what is open to free choice (discretionary). Obligatory trading behavior on the part of a market participant is governed exclusively by that participant's **Mandate**. This includes the laws he is subject to (insofar as he is forced or compelled to abide by them), as well as the specific requirements of his institutional role (e.g., a large-cap manager may be mandated to sell a stock if its market cap drops below a certain threshold), and his incentive structure (e.g., a manager may be compensated based on quarterly performance). Components of **Mandate** may be explicit, as in the above examples. But they may also be implicit, such as when a mutual fund trades under the assumption that its investors will pull money out if the fund underperforms its benchmark (and is thus incentivized to stay close to the index), or when a bank trades under the assumption that the government will be forced to bail it out if it faces large losses (and is thus incentivized to take bigger risks).

Discretionary trading behavior is governed exclusively by the participant's **Mind**, but only within the parameters established by his **Mandate**.[22] This includes all faculties that enter into the decision-making process, both rational (cognitive) and non-rational (emotional). So, for instance, a large-cap equity growth manager may only buy large-cap stocks, but within these parameters, he has a certain leeway, and the particular stocks he buys will be determined by the decisions he arrives at through his own subjective appraisal of available evidence, based on his rational faculties and non-rational biases and propensities.

Thus, all trading behavior is determined exclusively by Mandate and Mind: in the obligatory case, by **Mandate** alone, and in the discretionary case by **Mind** alone, subject to the constraints of **Mandate**.[23]

The diagram below maps these relationships.

[22] Though it is, of course, conceivable that under extreme circumstances a participant's Mind might overrule his Mandate. Such a scenario arises when, e.g., a trader breaks the law because he feels he can get away with it, or because his emotions get the better of him.

[23] As noted previously, in cases of extreme irrationality, Mind may overrule Mandate. Examples include market participants who deliberately engage in illegal activity, or act counter to their own incentive structure due to extreme emotional duress.

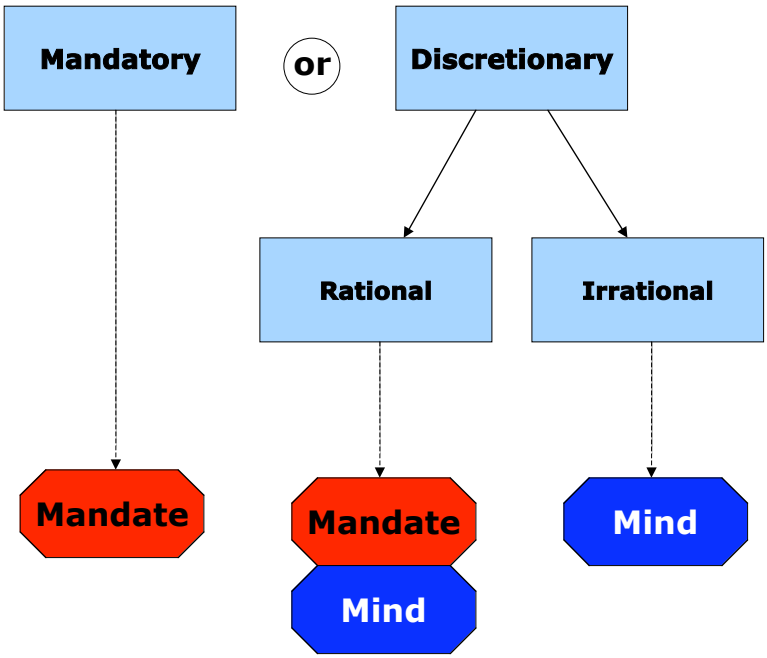

Fig. 3 *All buying and selling behavior is mandatory or discretionary, rational or irrational, governed by Mandate or Mind.*

2.8 Behavior is ultimately prompted by the Trump Rule.

Although the totality of behavioral rules contained within a participant's Mandate and Mind is extremely large and complex, to understand his behavior within a given context it is necessary only to understand a small subset of those rules. Indeed, in the final analysis, it is necessary to understand but one: the rule that ultimately governs action over that particular bounded time period. Within the model of Mandate and Mind, the rule that governs behavior for a given time period is the Trump Rule. Over time, the Trump Rule for a given participant varies, sometimes frequently, sometimes infrequently. Homogeneity of behavior among large groups of participants can be modeled as a coincidence of Trump Rules for those participants for some time period. Therefore, to understand the important effects that tend to arise when large groups of participants act in similar ways, on must understand the sorts of environmental factors that will give rise to such coincident Trump Rules. Put otherwise, one must look for overlaps in the Mandate and Mind of market participants.

The Trump Rule at any given moment can come from either Mandate or Mind. Some of the most obvious Trump Rules pertain to employment, evaluation and compensation. If an action is mandatory in order that a participant keep his job, then the rule specifying that action will trump all others. If a certain action is necessary in order to attain positive evaluation, especially when monetary reward is involved, it will tend to trump other possible actions. For modeling purposes, some such results can be taken for granted *a priori*. But the most valuable results are those based on experience and empirical research. The field of behavioral economics has produced several interesting results in

this area, drawing on the experimental psychology literature to demonstrate surprising Trump Rule tendencies. At one end of the spectrum are such classic and important findings as Kahnemann and Tversky's observation that people tend to adopt different risk preferences with respect to prospective losses than prospective gains of the same magnitude.[24] Or again, there is the well-documented phenomenon that people's behavior towards a commodity is far more sensitive to its relative scarcity than to its relative utility.[25] At the other end are such novelties as the tendency of a salesman's height to influence the decision to buy from him.[26]

Some important practical applications of this include benchmarking, whereby for a given time period every fund manager of a particular box style will behave in ways that are completely dominated by just one criterion: the performance and composition of his portfolio relative to those of his benchmark. This is his Trump Rule: to buy assets that will make his own portfolio more like those of his peers who have outperformed him, and less like those who have underperformed. Any observer who can spot a benchmark component asset that is under-held among underperforming managers can empirically verify this effect, as the price of that asset rises predictably during the window over which managers must dress their portfolios prior to evaluation. As suggested above, the Trump Rule is discovered by studying the terms of evaluation, and especially compensation, that these participants are subject to (i.e. components of their Mandate). The homogeneity of their behavior is guaranteed by the overlap in their Mandates, as they are all evaluated at the same time according to the same standards, and compensated accordingly.

2.9 Mandate and Mind allow for a rigorous analysis of market participant behavior.

As in the examples above, the theory of Mandate and Mind, along with the Trump Rule methodology, can be applied to any market situation in order to analyze and predict behavior. Since in general what is obligatory must precede what is voluntary, to analyze behavior we must look first at mandatory behavior. Therefore, the point of departure for any analysis of market participant behavior must be Mandate. Within Mandate, there is a hierarchy of constraints, each of which may be either explicit or implicit.

At the highest level of Mandate is the law, to the extent that it is enforced. Given that violating the law generally results in the most severe punishments, it is correspondingly the most powerful component of Mandate. However, when those laws are not enforced, the mandatory behaviors they purport to govern become voluntary. In such cases, we can discount such laws from our analysis of mandatory behaviors, and instead consider them as part of our analysis of voluntary behaviors.

Below the enforced law, but above all other considerations, is the contract under which a market participant operates, and the explicit and implicit wishes of his employer, if he has

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[24] D. Kahneman, and A. Tversky, "Prospect Theory: An Analysis of Decision under Risk," *Econometrica*, XLVII (1979)
[25] R. Cialdini, *Influence: The Psychology of Persuasion*, Collins (Rev. 1998)
[26] R. Cialdini, *Op. Cit.*

one. For a contract, though not directly enforced by the legal authorities, is legally binding in the sense that it allows the other party to sue for its breach. It thus provides a strong incentive for its signatories to honor it. In the case of a market participant, the strength of the contract is moderated by the explicit and implicit wishes of his employer, and any higher sources of capital (e.g., for an investment manager, investors into the fund that employs him). For instance, the employer may wish for the manager to stick exactly to the letter of the contract, or may prefer some liberties to be taken if they are advantageous to all parties. In such cases, if the market participant in question is aware of such expectations, we may say he is implicitly mandated in a way that contradicts (and trumps) elements of his explicit Mandate.

Below the strict and implicit requirements of the employer and other sources of capital, the next most important feature of a market participant's Mandate is his compensation structure. Again, taking the example of a professional money manager, the details of how he is compensated based on the performance of his portfolio will provide an extremely strong incentive for him to act in certain ways. For example, if he is paid based on a measure of performance relative to his peers, he will have a strong incentive not to stray too far from the benchmark against which he is measured, and thus to behave similarly to other money managers. If we take, instead, an amateur investor, whose tax bill is calculated at year end, such an investor will have an incentive to sell stocks at a loss in December, in order to claim a tax deduction, and to hold those that have performed strongly, to postpone capital gains payments.

The analysis of Mandate-based obligatory behaviors can continue to more and more fine-grained levels. However, for practical purposes, the majority of important behaviors are captured by looking at legal, contractual (explicit and implicit), and compensation structures.

Having examined mandatory behaviors, we turn to discretionary behaviors. Here, the focus is on Mind, though all voluntary behaviors are shaped by the parameters set by Mandate. Within Mind itself, there is at all times a potential conflict between rational and irrational or non-rational elements. Thus, when the rational part of Mind is dominant, behavior will closely follow the subject's incentive structure, as specified by his Mandate (to the degree that the agent is aware of his own incentives). At other times, the non-rational, or irrational parts of Mind will dominate. In such cases, the subject will engage in behaviors that a simple rational choice model would fail to make sense of. Traditionally, such behaviors would be attributed to the capricious and unpredictable vagaries of human nature. However, the framework of Mandate and Mind allows us to move beyond such a simplistic "rational or unpredictable" model. For there are various components of the non-rational and irrational Mind that we see repeated across many different individuals in many different contexts. These tendencies and biases are given further treatment in §3.3 of this document.

In extreme cases, as has been noted, the non-rational or irrational components of Mind may become so dominant as to completely over-ride Mandate. Such cases, once again, render mandatory behaviors discretionary. Additionally, discretionary behaviors can

appear very volatile and unpredictable, though controversial research has pointed to predictable patterns even under such extreme conditions.[27]

In less extreme cases, the degree to which rational or non-rational components of Mind dominate will vary across individuals. Various generalizations can be drawn, however, based on homogenizing tendencies common to all human beings, as well as more specific homogenizing tendencies arising from shared educational background, occupation, etc.

These considerations lead to a schematic approach to analysis of behavior on the basis of Mandate and Mind:

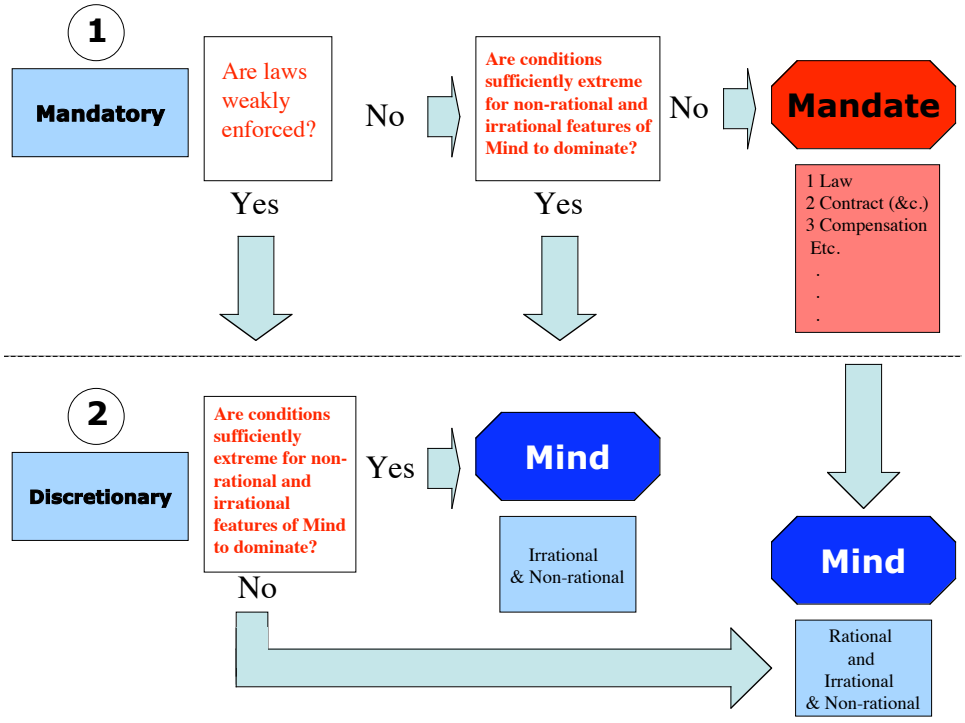

Fig. 4 *Schematic approach to analyzing behavior on the basis of Mandate and Mind*

2.10 Market participant theory is a special case of a general theory of human behavior.

This understanding of how market participants make buy/sell decisions is simply a corollary of a more universal theory of how people make decisions.[28] In general, people

[27] See, e.g., Ivan P. Pavlov, M.D., *Lectures on Conditioned Reflexes*, (New York: International Publishers, 1928), and Horsley Gantt, "What the Laboratory Can Teach Us About Nervous Breakdown," Lecture printed in *Medicine In A Changing Society*, Iago Galdston, ed. (New York: International Universities Press, 1956).

act either because they are forced to by laws and other external constraints (Mandate), or because they choose freely, based on their own reasoning processes and non-rational preferences and biases (Mind).

It is only in finance, and certain branches of social science, that theorists attempt to deny the non-rational component of Mind, and to ignore the role of Mandate altogether. The justification for such an approach has always been, following Milton Friedman, that the true measure of a model is its predictive power, rather than the realism of its assumptions. While this may be valid in some special cases (such as cutting edge physics, where the very structure of reality is open to debate, so realism is not at issue), it is a fallacy to believe that such an approach is universally valid. Certainly, abstracting from known facts to frame new and potentially illuminating models is a useful exercise, and can occasionally usher in a paradigm shift in our understanding. However, reverting to a simplistic picture of market participants as purely rational beings acting outside of their institutional roles is not to reframe our knowledge of human decision-making. Rather, it is to ignore the progress we have made in developing such knowledge. The inferences it leads us to draw are simply incompatible with what we know to be true and relevant. And a theory built upon ignorance (rather than reconception) of existing scientific knowledge is one which logic and good scientific practice compels us to reject.

Since the model of market participant behavior developed earlier in this section is based on a general theory of human decision-making, rather than a simplified model specific to *homo economicus*, it can be extended beyond actual buy and sell decisions to explain other behaviors. For instance, we can use Mandate and Mind to analyze how market participants with competing interests interact with one another, or how market regulation will impact outcomes due to its effect on incentives. Mandate and Mind is a lens though which all market participant behavior can be better understood.

2.11 Market participants generate supply and demand.

At any given time, the total goods made available for sale at each possible price in a market is that market's (gross) supply, while the total goods that would be purchased at any given price is the market's (gross) demand. In other words, (gross) supply and demand are abstract functions that model the aggregate buying and selling behavior of all market participants for a range of possible market prices.

At a given time, we can talk with certainty about the quantity traded (in retrospect, at least). But the "quantity demanded" and "quantity supplied" is indeterminate. There are upper limits on these quantities (set by production capacity and inventory levels on the supply side, and liquidity on the demand side). However, after the fact, once a given quantity has been traded at the market clearing price, it is indeterminate what quantities "would have traded" at any other price. Supply and demand, therefore, are theoretical constructs. They comprise a model of the aggregate behavioral propensities of all market participants.

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[28] See, e.g., Ludwig Von Mises, L., *Human Action: A Treatise on Economics* (New Haven: Yale University, 1949), 7.

Since aggregate behavioral properties supervene upon individual behavioral properties, supply and demand must ultimately be explained by Mandate and Mind. By aggregating the Mandate and Mind of individual market participants, we arrive at supply and demand for the total market. This is not a straightforward task, and many actions, reactions and interactions must be taken into account. Indeed, much economic theory has attempted to avoid the difficulty of deriving supply and demand from the individual behavioral propensities that are its logical source, either oversimplifying the model of individual behavior so that it aggregates straightforwardly to give a simple and manageable model of supply and demand, or simply taking the latter as exogenous variables.[29] As we have suggested, this theoretical shortcut is not as benign as has been previously assumed. For one thing, it encourages a picture of market participants as focusing solely on the prevailing market price, and making strategic decisions on this alone, in isolation from other expectations, perceptions (and emotions). To ignore the complex processes by which market participants interact to generate market prices and volumes can perhaps be useful for deriving mathematically simple models. However, if we then import the simplification back down to the level of the basic unit of market theory - the individual participant - then whatever gains were previously made are more than wiped out.[30] Moreover, any policy decisions and business strategies that use such a simplified picture are bound to run into difficulties. What the Mandate and Mind approach comprises is a theory in which supply and demand retain their roots in individual participant behavioral propensities, i.e., Mandate and Mind. We thus view the market price not as the inscrutable intersection of two exogenously given variables, but rather as the product of the interactions of many individual market participants, each with a unique (though often quite groupable) Mandate and Mind. The diagrams on the next page illustrate this difference in approaches.

It will be useful for the sake of clarity to distinguish between (gross) supply and demand, as above, and (net) supply and demand, which includes only the behaviors of producers and consumers, and discounts the effect of speculators. Essentially, the neoclassical view says that gross supply and demand are the same as ideal net supply and demand (with no market failures or liquidity constraints), plus noise. The anthropic view we are setting out here states that gross supply and demand are irreducibly different from net supply and demand.

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[29] See, e.g., N. Gregory Mankiw, *Macroeconomics* (6th Ed.) (Worth, 2006).

[30] Indeed, one consequence of such a re-importation, quite common in the microeconomic literature (see, e.g., Hal Varian, *Microeconomic Analysis* 3rd ed. [New York: W.W. Norton, 1992]) is that predicted individual behavior directly contradicts experimentally demonstrated tendencies. The traditional neoclassical rendering of supply and demand theory states that for each given price, quantity x will be supplied/demanded at price p. However, prospect theory has shown that real individuals' perception of a price depends not only on its absolute value, but also on the price history (Daniel Kahneman, and Amos Tversky, "Prospect Theory: An Analysis of Decision under Risk," *Econometrica*, XLVII [1979], 263-291). Thus, we would expect producers and consumers to react differently to a drop in price from p+1 to p, than to an increase from p-1 to p, even though the final price is the same in both cases. Neoclassical theory's inability to account for such behaviors stems from its *de facto* ignorance of the fact that supply and demand, and market prices, are the product of market participant behavior, and must ultimately be analyzed as such if mistakes of this type are to be avoided.

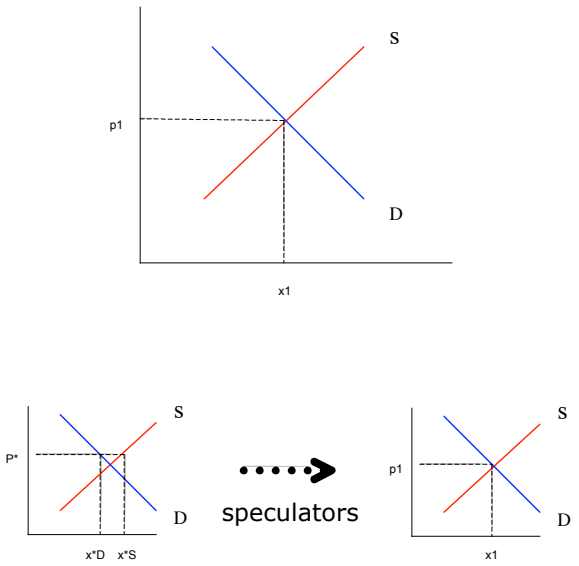
Neoclassical view: S_g & $D_g = S_n$ & $D_n + V$ where V is a random "noise" variable

Anthropic View: S_g & $D_g \neq S_n$ & D_n

It is also important to understand the relationship between supply and demand of an underlying good, and supply and demand of its derivatives. Before studying the actual mechanisms by which market prices are determined, it is natural to assume that the price of the derivative is simply a function of the price of the underlying. Indeed, this is assumed by many neoclassical theories, based on a standard arbitrage argument. The idea behind this argument is that since a derivative is generally a contract conferring a right to sale or purchase of the underlying good at or before some specified date, the price of the derivative must adapt to changes in the price of the underlying, or else a sophisticated arbitrageur could profit from the divergence. Under the assumption that real market participants take advantage of such opportunities, it seems logical to conclude that the real world should look like the neoclassical theory predicts. However, there is no *a priori* logical for reason for why this must be the case. All that must happen for the arbitrage opportunity to be exploited and therefore for the divergence to resolve is that the two prices move back into relationship. Logically, this is symmetric: the price of the underlying can adjust to the derivative price, or vice versa. In practice, the direction of the resolution depends on the conventions of the market in question. This is discussed in depth in §5.7. A failure to grasp this point lies behind many misunderstandings, including the popular argument that speculators can only influence commodity prices through direct investment in physical commodities, rather than via futures markets.[31]

[31] See, e.g. Craig Pirrong's comments at http://money.cnn.com/2008/06/27/news/economy/birger_oil_speculation.fortune/index.htm

Neoclassical View

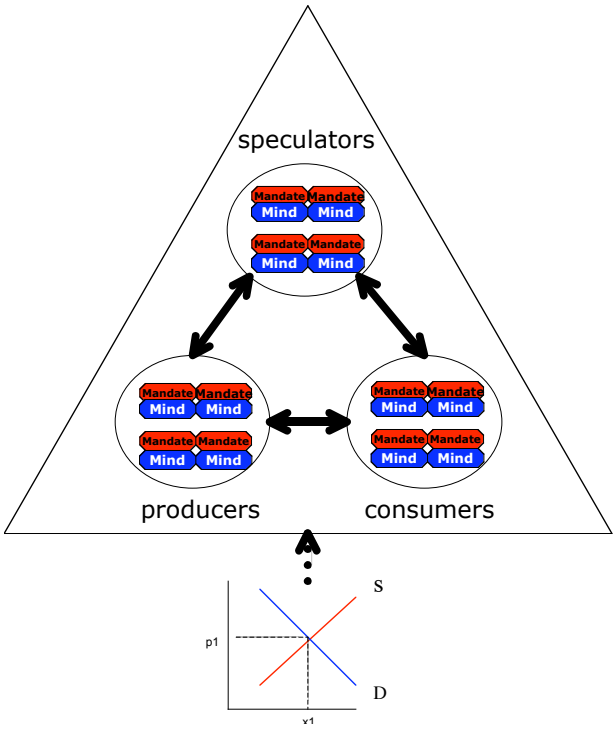


Supply (producers) and demand (consumers) interact to generate market prices.

In cases where prices depart from their intrinsic values, speculators act to bring them back into line.

Fig. 5A *Neoclassical characterization of supply and demand.*

Anthropic View



Speculators, producers and consumers interact, generating gross supply and demand.

This interaction generates market prices, which then feed back into the system as information.

Fig. 5B *Anthropic characterization of supply and demand.*

3. Participant Behavior Determines Prices

3.1 Participant Behavior Determines Prices.

At each moment in time, the market price is the last price at which a transaction closed. It is therefore the last price at which a buyer agreed to buy and a seller agreed to sell. In the final analysis, therefore, a transaction occurs only when two market participants decide to act – one to buy, and the other to sell. Moreover, the direction in which the price moves depends on the relative aggression of the buyer versus the seller. The urgency with which a buyer tries to buy, or a seller tries to sell determines whether and to what degree the market price rises or falls, respectively. Whereas neoclassical economics assumes valuations are fixed relative to available information, real transactions involve valuations that are context dependent: the price at which a seller is prepared to sell, or at which a buyer is prepared to buy, may vary with highly contingent circumstances, such as the time of day, or a lost order that was never placed on time. Prices are therefore set by transactions between buyers and sellers possessing context-dependent subjective valuations of the goods in question.

Since buying and selling behavior from market participants determines the market price, any attempt to explain a change in prices must also, ultimately, explain market participant behavior. Section 1 outlined one such theory, Mandate and Mind. This theory is based on the principle that all human behavior can be modeled as either obligatory actions (governed by laws and incentives – Mandate) or voluntary actions (governed by rational considerations or irrational impulses – Mind). Thus, participant behavior is best viewed as just a special case of general human behavior, and price formation is to be explained with awareness of such in mind. The alternative approach is to suppose that market participants behave in some unique fashion due to their participation in financial markets. Indeed, neoclassical economists have assumed that (at least some) market participants act completely rationally and independently, considering all available information, and buying and selling in such a way as to bring prices into line with their own rationally derived valuations. In other words, these theorists hold that Mandate has a minimal importance in financial markets – its only relevance being the laws that market participants must observe. They also hold that the Mind of market participants – unlike that of human decision makers acting outside of financial markets – possesses only rational and independent features, with none of the non-rational emotional factors, and irrational biases we usually encounter.[32] Once again, this begs the question: what reason is there to suppose that a person behaves one way while participating in markets, and an entirely different way in all other matters?

3.2 Market prices disseminate information about supply and demand.

[32] The very weakest form of neoclassical economics requires only that some sophisticated participants meet these criteria, and that they possess sufficient liquidity to counteract the ulterior-motivated, irrational, or biased behavior of other participants. Stronger forms require all or most participants to act in this hyper-rational way.

Hayek has argued that one of the central functions of markets is their capacity to disseminate information.[33] The buying and selling actions of market participants cause changes in prices. Therefore, each transaction generates a piece of information – the clearing price – which reveals information about the relative position of the transactors: they were willing to do business at that price. This information is publicly available to all who choose to observe it (assuming markets are relatively transparent). It therefore broadcasts information about market conditions (i.e., about supply and demand) to all interested participants.

A particularly interesting market structure, given the informational role of markets, is "over-the-counter" (OTC) markets. These markets are specifically designed to avoid the transparency requirements of more public markets. OTC markets shield prices, enabling dealers to offer different prices to different consumers. As such, they provide a profitable informational edge to the supplier or intermediary. For example, a bank may profit from the "spread" between the price of an option to buy some commodity, which it negotiates with a producer, and an equivalent option to sell that commodity, which it negotiates with a consumer. The producer thus pays a higher price for its put option, and the consumer receives a lower price for its call option, than would be the case with transparent pricing. The bank, acting as a speculator, profits from the margin thereby created.

Traditionally, the argument for OTC markets – made by the banks that profit from them – has been that the flexibility required for customized options is only possible through such a mechanism.[34] They argue that clearinghouses, and the standardization they bring, compromise flexibility for the sake of unnecessary transparency. If customized options are unavailable, businesses are unable to buy and sell the contracts they need to optimize their operations, so efficiency is lost. However, this argument glosses over the fact that the information loss from opaque OTC markets more than overrides the benefits of their added flexibility. Banks are mandated to seek the largest possible spreads, and are therefore explicitly incented to use their informational edge to give customers the worst possible deal in what is essentially a zero sum game. It is therefore no surprise that some of the most catastrophic losses to institutional investors during the financial crisis came from OTC derivatives. OTC markets are only efficient at transferring resources from the economy onto the balance sheets of banks. If there is truth in the time-honored comparison of financial markets to a casino, then OTC markets are like a casino in which the house gets to set different rules for different players in order to maximize its own profits.[35]

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[33] See, e.g., Friedrich A. Hayek, *The Pure Theory of Capital* (Chicago: University of Chicago Press, 1941): "prices serve two important functions: They communicate information about the relative scarcity of resources, and under certain assumptions they improve coordination of the plans of transactors."

[34] See, e.g., Financial Regulatory Forum Blog, http://blogs.reuters.com/financial-regulatory-forum/2009/07/14/analysis-us-banks-prepare-to-battle-over-otc-derivatives/ (retrieved 2/8/2010)

[35] Informational asymmetries in OTC markets are so rife that even large, "sophisticated" investors like AIG took their turn as the sucker at the table. See, e.g., Gretchen Morgenson and Louise Story, "Testy Conflict with Goldman Helped Push A.I.G. to the Edge," *New York Times*, February 6, 2010, Business Section, http://www.nytimes.com/2010/02/07/business/07goldman.html (retrieved 2/8/2010).

The point makes intuitive sense. In all walks of life, customization comes at a cost. A tailored suit from Saville Row costs more than a suit off-the-shelf. So too, customized derivatives come at a cost. The difference, however, is that while the cost of a customized garment is borne merely by the customer, the cost of customized derivatives is borne by the whole market. Unlike a tailored suit, customized derivatives are ultimately (in aggregate) convertible back into standardized derivatives. Indeed, this is the whole basis for the business model of swaps dealers: to sell customized contracts that are then offset by purchases made in the open market. This way, the dealer limits his own exposure to price volatility, and profits from the spreads between the private contracts and their open-market equivalents. The net effect of this operation is to remove information from the open market and concentrate it in the hands of dealers, who are then able to use this informational advantage to enrich themselves, trading contracts on the open market at the instant that best suits them. A dealer, seeking to offset customized options from consumers, is able to time its purchases and choose the offsetting venue (the open market, or OTC markets) that will bring it the greatest return, and therefore generate the highest cost for consumers. Through this mechanism, dealers are able to siphon off value from producers and consumers. The open market loses supply and demand information from producers who go off-market into OTC contracts. This causes the open market to allocate less well. At the same time, producers and consumers ultimately pay higher prices. For even if a customized option appears to offer better value initially, it must be offset somehow. The informational edge handed to dealers of OTC derivatives - who are, after all, only intermediaries – allows them to make use of the offsetting process to extract profit for themselves. In so doing, they push up costs for the primary market participants, producers and consumers.

The existence of OTC markets siphons information from the open market, and later re-introduces it, in a way that benefits the intermediaries at the expense of the end users of markets. Clearly, then, market outcomes depend in large part on information distribution. The general structure of the market (specifically, the level of transparency and the degree to which it is a "pure" or "impure" market – see §4) will determine the extent to which information is disseminated, and in particular the degree to which this information corresponds to, or reveals, underlying economic information. According to neoclassical theory, market prices reflect all and only the information relevant to economic fundamentals (supply and demand from consumers and producers). This, indeed, is the neoclassical definition of market efficiency.

In summary, well-functioning, transparent, competitive markets are essential for disseminating information, and therefore ensuring that resource allocation is based on full information.[36] OTC derivatives markets, though appearing on the surface to offer valuable services to producers and consumers, ultimately push up costs for end users, and damage the ability of markets to function well.

EMH implies that sophisticated arbitrageurs will counteract any actions of other market participants that might cause price information to diverge from economic fundamentals.

[36] Hayek, *op. cit.*

However, even in such an idealized scenario, there still remains the fact that prices will initially have diverged before being arbitraged back to their fundamental levels, so the system will contain more information than just the pure economic fundamental information. Neoclassical theorists refer to this extra information as "noise." **If consumers and producers are unable to distinguish noise from fundamental information (as is impossible without additional information exogenous to the price system), this will lead to sub-optimal resource allocation** (see §3).

Neoclassical theorists assume such eventualities are relatively rare. However, the evidence suggests that partial information is much more widespread than the neoclassical model assumes (see §3), especially in OTC markets, which depend for their very existence on a lack of transparency. In fact, as the financial crisis demonstrated, such "noise"-driven price trends can last for a long time – what neoclassical theorists term a "bubble." The idea of a bubble poses a real problem for neoclassical theorists, for it raises the question of why there should be only efficient markets at one extreme, bubbles at the other extreme, and nothing in between. Moreover, strong-form neoclassical theory implies bubbles should never actually happen. It therefore appears to posit one theory for normal market functioning, and another theory for bubbles. But Ockham's razor advises us to opt for simplicity where possible. A single theory that explains efficient markets, bubbles, and everything in between, is therefore scientifically superior to a patchwork of *ad hoc* theories with no clear common principle to unite them. Moreover, if different theories are needed for different situations, there must be some way to determine which theory is relevant at a given time. Neoclassical economics can do so only after the fact; there is no way at any given moment to tell, under neoclassical theories, whether we are in the middle of a bubble or normal efficient market functioning. This point is underscored by the fact that the hardest-line EMH believers have actually argued that the financial crisis was simply the efficient market in action.[37]

The present work attempts to provide a theory, therefore, that applies to all market situations, and which can give early warning signals when speculative bubbles are in a formative stage. To do this, it is necessary to start from a universally applicable theory of human agency, and to build from the ground up, rather than theorizing market participants out of the picture through oversimplified rational expectations models. At an individual level, a buy or sell decision is a subjective decision, and the market as a whole is an aggregation of such decisions, not an objective price-setter that filters down rational values to individual decision makers. **The direction of valuation is from market participants up, not from the market as a whole down**.

3.3 Market Participants use available information to make buy and sell decisions.

Because market participants wish to make efficient use of their resources, they make use of available information about potential purchases and sales in order to value them against prevailing market prices (see §1.4). Additionally, since market participants have

[37] See John Cassidy, "After The Blowup," *The New Yorker* (January 11, 2010), 28.

projects and plans that extend into the future, they are interested not only in present values and prices but also in future values and prices (see §1.3).

Important information about current conditions and future prospects may be encoded in market prices. For example, if two substitutable goods trade at different prices, this may indicate a difference in relative scarcity. Looking at inter-temporal prices, an increase in the price of an asset over a time period during which its supply remains constant potentially indicates an increase in demand for the asset (caveats apply).[38] This is often taken as a signal that expectations about its future prospects have improved.[39] Static prices allow for comparisons to be made between different goods (e.g., the relative scarcity of raw materials).[40] Once the element of time is introduced, it is also possible to infer changes in supply and demand conditions for a single good by observing how prices change over time.[41] The information encoded in prices is then used by market participants, in conjunction with other available information, to form the valuations, perceptions and expectations on which they base their buy and sell decisions. Thus, information (from prices and other sources) is the input which Mandate and Mind operate on to generate participant behavior.

3.4 Participant behavior is, itself, information.

As stated in §3.2 above, the buying and selling actions of market participants create publicly available information (except in OTC markets, where this information is specifically shielded to maximize the interests of the intermediary). This is, in fact, tautological: market participant behavior generates prices, and prices are publicly available information. Traditional neoclassical theory attempts to distinguish the "fundamental" information in prices from the "noise" of speculation.[42] Of course, the pure price information alone gives no logical way to make such a distinction. It is, however, common among neoclassically influenced market strategists to try to impose such an order by looking for patterns in prices that display relatively stable oscillations about a steady (usually linear) underlying trend. Nevertheless, the reality of the situation is not so convenient. Prices make no such neat distinction between pure supply and demand transactions between producers and consumers, and artificial transactions involving speculators. Nor do they differentiate between transactions involving speculators that bring prices "closer" to the "fundamentals" of net supply and demand, and those that do the opposite. Speculators trade with consumers, consumers with producers, and producers with speculators. Thus, in a market that includes speculators,

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[38] For more on this, see §4.
[39] The exact conditions under which such an interpretation is valid are discussed in §7.2.
[40] Hayek, *op. cit.*
[41] For a brief discussion of this idea, see Clement E. Ward and Ted C. Schroeder, "Price Determination versus Price Discovery," *Managing for Today's Cattle Market and Beyond,* http://agecon.uwyo.edu/marketing/mngtcmkt/PricDetr.pdf (accessed 2/5/2010).
[42] The market price that reflects the "fundamentals" is whatever price would prevail if net supply were to operate without any market failures or liquidity constraints. Under the neoclassical model, speculation can provide liquidity (allow consumers and producers to transact in cases where they otherwise could not, due to some artificial constraint, or "market failure"), or it can produce "bubbles" by forcing prices away from their "fundamental" levels. The latter is "noise," while the former simply serves to keep markets efficient.

prices do not neatly distinguish between the "true" transactions, and the "noise." **The presence of speculators irrevocably alters the system.** Only in a market with no speculative interest do prices reflect the pure interaction of supply and demand. Such pure markets have their own issues to contend with, which are discussed in §4.

In a market containing speculators as well as producers and consumers, therefore, prices give information about the buying and selling propensities of all three types of market participant. Prices themselves do not differentiate between "fundamentals" and "noise," because they are determined by gross supply and demand, which involves all activity by all types of participant, without any mechanism for distinguishing between them. Nevertheless, many market participants try to draw such distinctions. As is discussed in §7, the failure to recognize this inconsistency – that prices do not distinguish between fundamentals and noise, but that market participants attempt to draw such a distinction, is a huge obstacle to improving market function. Many market participants attribute pretty much all market moves under "normal" circumstances to pure fundamentals, and by ignoring the powerful effect of speculators, they allow themselves to be taken advantage of time and time again. The conventional neoclassical wisdom that speculators are subordinate to fundamentals, and must ultimately sink or swim by their adherence to fundamental reality, is true only for relatively pure markets. Once speculators become enough of a presence in a market, they can create their own reality.

3.5 Information (from prices and other sources) is often imperfect and incomplete.

Even in a pure economic market, with no speculative interest, there is always a degree of ambiguity in the information "encoded" by prices. For example, an upward trend in prices could result from an expansion of demand, or a contraction of supply. In and of itself, the pure price information is indeterminate between these two possibilities. However, in combination with other information, pure price information can be used to make certain inferences about market conditions, and – under certain conditions – underlying economic reality.

Traditional neoclassical theories assume that all information is instantaneously available to all market participants, and that each participant independently evaluates all the information before making buy and sell decisions. There are (at least) two strong reasons to doubt this assumption:

1) Market participants with privileged access to information have an incentive to withhold it from other participants.

2) The sheer volume of information forces market participants to selectively filter the information they use for decision-making.

<u>Market participants with privileged access to information have an incentive to withhold it from other participants.</u>

To understand how competing market participants with differing access to information interact, we return to the theory of Mandate and Mind. Recall that the primary components of a participant's Mandate are the prevailing legal structure and the participant's institutionally generated obligations and incentives (see §1.6). It is generally acknowledged that certain market participants, especially large banks and investment companies, have privileged access to large quantities of data, especially in OTC markets, which are specifically designed to entrench such privileged access, and which accounted for over $600 trillion of notional exposure in 2009,[43] compared with US GDP of $14.5 trillion.[44] Even in non-OTC markets, such institutions generally facilitate transactions for other market participants, and therefore have access to a huge amount of information about how those participants are trading. The legal structure of the financial industry since Regulation FD (Reg FD) (Aug. 2000)[45] dictates that equity market participants may trade only on the basis of publicly available information. However, this regulation does not extend to OTC markets, which are even *de facto* exempt from normal CEA fraud laws.[46] This begs the question of why transparency regulation is considered necessary for equity markets but not for OTC markets, which are much larger than equity markets, and therefore have a significant impact on the health and functioning of our economy.[47] Moreover, even where Reg FD does apply, thus giving the appearance that market participants are mandated to trade only on publicly available information, the difficulties associated with enforcing such a law often undermine its utility. Beyond the numerous prosecutions for insider trading, various sources provide anecdotal evidence of widespread undetected violation of the Reg FD restrictions on private information.[48] When laws are not enforced, the obligatory behaviors they purport to regulate become voluntary. In other words, if institutions have sufficiently strong incentives to break the law, some will.

Large financial institutions, behave according to Mandate and Mind. What this means is that each member of such an institution, from executives to traders, behaves based on their own incentives and psychology. Thus, in most cases, we can read off the projected

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[43] *BIS Quarterly Review*, December 2009, http://www.bis.org/statistics/otcder/dt1920a.pdf (retrieved 2/5/2010).

[44] Bureau of Economic Analysis National Economic Accounts, *National Income and Product Accounts Table 1.1.5 Gross Domestic Product,* http://www.bea.gov/national/nipaweb/TableView.asp?SelectedTable=5&Freq=Qtr&FirstYear=2007&LastYear=2009 (retrieved 2/5/2010).

[45] U.S. Securities and Exchange Commission, *Final Rule: Selective Disclosure and Insider Trading,* http://www.sec.gov/rules/final/33-7881.htm (retrieved 2/5/2010).

[46] See Fried Frank, "Fraud Enforcement and Recovery Act of 2009: Congress Amends Money Laundering and Criminal Fraud Statutes to Expand Their Scope and Penalties," May 27, 2009, http://www.ffhsj.com/siteFiles/Publications/915B867ED1F35AE338B0AE358725900F.pdf (retrieved 2/8/10) for a more in-depth survey of the relevant legal terrain.

[47] Total US equity market cap as of October 2008 was $13 Trillion: see Dr. John Rutledge Blog post, http://rutledgecapital.com/2008/10/03/us-market-cap-has-fallen-58-trillion-since-capital-markets-froze/ (retrieved 2/10/10).

[48] See, e.g., Andrew Ross Sorkin, "Goldman Acknowledges Conflict With Clients," *New York Times,* January 12, 2010, Business Section, http://dealbook.blogs.nytimes.com/2010/01/12/goldman-executive-discloses-conflicts-policy/ (retrieved 2/10/10).

behavior of the "corporation" simply by studying the incentive structure (and psychology) of its key decision makers.[49] The issue for a large financial market participant with privileged access to information, therefore, becomes a simple cost-benefit analysis, weighing the advantages of illegal use of information against the relatively low risk of being caught and prosecuted.[50] The relatively low chances of prosecution due to the difficulty of enforcing insider-trading regulation, as well as the huge returns that can be generated from exploiting it generate strong incentives for insider trading. The question, ultimately, is not *whether* market participants will ever retain private information, but rather *how much* they do so. As noted above, the evidence suggests such behavior is widespread even in markets that are supposedly protected by Reg FD.

However, insider trading is not the real villain. Although the abuses perpetrated in its name can be particularly galling, and although there is evidence that its prevalence is rather more widespread that one would hope, it is nevertheless clear that the great majority of people employed in finance do not engage in it. Far more damaging are the systematic informational asymmetries permitted by a market structure that allows large financial institutions to siphon information by executing orders for others, or by engaging in OTC swaps and other derivatives (see §3.4), and then to use that information for their own advantage.

Whichever problem one focuses on, whether the acute but contained phenomenon of insider trading, or the more ubiquitous and therefore more pernicious asymmetries inherent in agent-principal conflicts, stronger measures are required if the informational flow required for well-functioning markets is to be restored. Such measures include structurally restricting the use of insider information by separating the institutions that possess such information (generally banks) from the institutions that use it in markets (investment companies). Similarly, agent-principal conflicts must be eliminated by prohibiting companies that execute orders on behalf of customers from also engaging in their own proprietary trading. As explained in §3.4, OTC markets and other markets not protected by Reg FD, such as commodities, require protection if information is to flow freely – a precondition of efficient market function. In the latter case, this requires imposing strict transparency requirements, by bringing derivatives back onto exchange-like clearing-houses. Such an initiative is, of course, widely unpopular on Wall Street, because increased transparency means reduced spreads, which mean lower profits and therefore lower bonuses. To the producers and consumers who use the structured products sold in these markets, reduced spreads ought to more than compensate any costs incurred by the procedural constraints and margin required for true transparency. This is so even before we consider the overall societal benefits of increased transparency that come from the reduction of systemic risk (because with price transparency and novation, books are marked to a transparent benchmark, so there can be none of the sorts of

[49] This is a crucial point for regulators and legislators to understand.

[50] Additionally, a firm may get around the issue by charging prohibitive premiums for access to information, thus serving to provide extra income to the firm and restricting the flow of information among the rest of the market participant universe.

accounting equivocations that made possible the collapse of AIG, Lehman Brothers, *et al*.).

The sheer volume of information forces market participants to selectively filter the information they use for decision-making.

Neoclassical economics assumes that market participants weigh all available information before making a buy or sell decision. However, in a modern marketplace, where participants are continually bombarded by more information than they can assimilate in the limited time available to them, they must necessarily fall back on various shortcuts and filters, in order that they might successfully make a decision at the appropriate moment.

An in-depth treatment of these shortcuts and heuristics, and the biases and "market failures" they consistently give rise to, has been undertaken by researchers in the field of behavioral finance.[51] Some excellent and interesting work has been produced by these researchers. However, we consider their picture incomplete. The behavioral finance literature accurately captures a portion of the non-rational and irrational components of Mind. There is more to Mind, however, than behavioral finance explores, both within the non-rational/irrational spectrum, and also – to an even larger degree – in the rational element. Because behavioral finance tends to focus on cases in which it tries to explain participant behavior purely by invoking departures from rationality, it does not presently capture the more complex ways in which the rational and non-rational components of Mind interact to generate more or less rational responses to incentives (i.e., how Mind interacts with Mandate to generate behavior). Many critics of behavioral finance are impressed by some of its findings, but complain that it falls short of providing a viable alternative to neoclassical theory, which enjoys greater completeness and mathematical simplicity.[52] For these critics, the theory of Mandate and Mind can perhaps provide a blueprint for an attempt to fill the gap. With this theory, we are able to isolate the exact conditions under which rational expectations and rational choice provide a good model, and those under which they do not.[53]

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[51] For a recent synopsis of the literature, see Hersh Shefrin, *Beyond Greed and Fear* (New York: Oxford University Press, 2007).

[52] For example, Fama: "The alternative hypothesis to market efficiency is vague, market inefficiency. This is unacceptable." Cited at http://www.chicagobooth.edu/capideas/sp99/fama.html (accessed 2/10/10).

[53] The decision procedure is outlined in §1.6. A very simple formalization would run as follows:

For a given decision situation, we number the rational decisions $R_1 \ldots R_j$, and the irrational decisions $I_1 \ldots I_k$ (measured by some criterion based on a combination of some external constraints with the agent's own subjective standards of rationality). Let us define the set $\mathfrak{R} \ni \{R_1 \ldots R_j\}$ and the set $\mathfrak{I} \ni \{I_1 \ldots I_j\}$. Let L, E, B be variables, each ranging from 0 to 1, expressing respectively the rule of law, the extremity of circumstances, and the balance of rational/irrational propensities of the agent in question. Let l be the threshold for breaking the law, and e be the threshold for non-rational dominance. Then the chosen outcome O behaves as follows:

If $L > l$ then $\mathfrak{R} \ni O$

If $L \leq l$ and $E < e$ then $\mathfrak{R} \ni O$

As Roman Frydman and Michael Goldberg have pointed out, behavioral economics characterizes its own program as cataloguing departures from perfect rationality, rather than redefining the notion of what it is for an economic agent to behave rationally. For example:

> Behavioral economists, for their part, have also uncovered many inconsistencies between the way market participants "actually" behave and standard representations of rational behavior. However, they have not interpreted their findings as evidence that the contemporary standard of rationality does not adequately represent rational decision-making. Instead, they have concluded that market participants are not "fully rational." This view has led some behavioral economists to use parts of the contemporary standard of rationality to specify certain components of their models, while replacing others with their empirically motivated alternatives.[54]

Anthropic Finance itself is, in a sense, neutral between these two interpretations. Whether we as theorists are in the business of documenting departures from "perfect rationality," or redefining what it is to be a rational decision maker in a context of institutional mandates and imperfect knowledge is, to some degree, a moot point. Anthropic Finance takes as its point of departure a picture of how real market participants do in fact behave, rather than a vision of how ideally they ought to behave.

If $L \leq l$ and $E \geq e$ then Pr [$\mathfrak{R} \ni O$] = B

Many other formalizations would fit with the present framework. Exploring them is beyond the scope of the present work.

[54] R. Frydman, and M. Goldberg, *Macroeconomic Theory For A World Of Imperfect Knowledge*, in *Captalism And Society* (3:3 2008)

4. Market Prices Determine Resource Allocation

4.1 Market prices determine resource allocation.

Neoclassical economics gives a particular picture of how resources are allocated in a market economy. Over sustained periods of time, producers of a good will generally discontinue supplying that good if the market price is below the marginal cost of production. Similarly, in the long run consumers will discontinue demanding a good if its price is above the value they place on it. This is the model of equilibrium price: prices eventually settle at a stable level where the quantity demanded equals the quantity supplied.

The model is supposed to apply to any market, though some markets play a more central role in economic functioning than others. For example, commodity exchanges are generally set up to coordinate markets in the most important raw materials for a country's economy. In such markets, any movement in prices has an immediate and far-reaching impact on the total economy, and therefore society. A change in price for one commodity can mean a difference in the technologies that are developed, impacting the industrial sectors on which a country's economic prosperity relies. Even more immediately, such exchanges include markets in the most basic food products, so a movement in prices can determine what food is available to people, and at what cost.[55]

In addition to the raw materials used for production, another key market is that of ownership of the means of production. That is, the stock market. Since this market distributes ownership of publicly traded companies, it is one of the most direct mediums through which capital flows into different sectors of the economy. An increase in demand for ownership of companies in a certain sector will drive up the price of ownership. Thus, companies in that sector enjoy higher valuation, which brings with it the ability to issue new equity at higher price levels, and to negotiate better terms on debt. Thus, an increase in demand, whatever its cause, diverts resources away from other sectors into the more highly demanded one.

According to the neoclassical model, a stock market in which all market participants are rational and fully informed will obey the following relationship between prices and information: a rise in the price of a company's stock always signals an improvement in that company's prospects (except in rare and extreme circumstances). Since, under such assumptions, the money always follows the best estimates of future prospects, the stock market leads to an optimal allocation of resources, given the information available. If, however, we abandon neoclassical assumptions and accept that stock prices may fluctuate for reasons independent of future prospects, we must also accept the possibility that markets may sometimes allocate resources sub-optimally. If we go one step further and entertain the possibility that stock price movements are governed by supply and demand for stocks (as in any other market), and therefore ultimately depend on the Mandate and

[55] See D. Mitchell, *A Note On Rising Food Prices*, (World Bank, 2008)

Mind of stock market participants (investors – i.e., speculators), then there is no longer any reason to suppose such a market would allocate optimally.

4.2 Market participants take prices as signals.

Just as in the stock market, investors operating under neoclassical assumptions infer from a rise in its stock price that a company's prospects have improved, so do participants in all markets make equivalent inferences. So long as a neoclassical paradigm prevails, fluctuations in the price of everything from oil to grains to consumer durables are typically attributed to changes in fundamentals that imply changes in future prospects (in the case of a commodity, future scarcity and need). Exceptions arise only under extreme circumstances, or on occasion where the influence of human nature is too clear to deny. All three types of market participant read prices as signals.

(i) Producers

Producers often face storage costs and other incentives to minimize overproduction. Thus, it is often worthwhile for them to forecast demand for their products out into the future. Through competitive intelligence, they may be able to form a picture of the actions of their competitors. This can then be combined with price signals to form the basis for strategic production decisions. For example, an increase in prices, combined with no contraction of supply implies, classically, an increase in demand.[56] Producers reasoning according to neoclassical assumptions will therefore, all else being equal, increase production to meet the perceived rising demand. In an impure market, however, a post-neoclassical approach (which recognizes that different types of market participants are motivated by different incentives, and will therefore behave differently) requires us to distinguish between net supply and demand from producers and consumers, and gross supply and demand, which includes the effect of speculation (for, unlike in the neoclassical model, speculation does not merely serve to reinforce and stabilize net supply and demand). This opens up an additional layer of ambiguity that price signals, even in combination with competitive intelligence, are often unable to penetrate. Nevertheless, producers acting on neoclassical assumptions will read such ambiguous data as unambiguously pertaining to net supply and demand. Such is the mechanism by which speculation-driven prices in markets masquerade as optimal and efficient.

Returning to our previous example, an increase in prices, unaccompanied by a contraction of (net) supply, is still ambiguous between an expansion of (gross) demand, and a contraction of (either gross or net) supply. In plainer words, competitive intelligence rules out the possibility that the price rise came from producers cutting supply. It cannot, however, distinguish between the possibilities that the price rise was caused by cuts in supply or increases in demand from speculators, or expansion of demand from consumers. Neoclassical theory leads producers to automatically conclude it is the latter. Thus, in impure markets, **neoclassically-inclined producers, making**

[46] Varian, *Op. Cit.*

decisions on neoclassical assumptions alone, are prone to drawing invalid inferences, and thus make strategic decisions under false premises.

The diagram below illustrates the differences between the two paradigms:

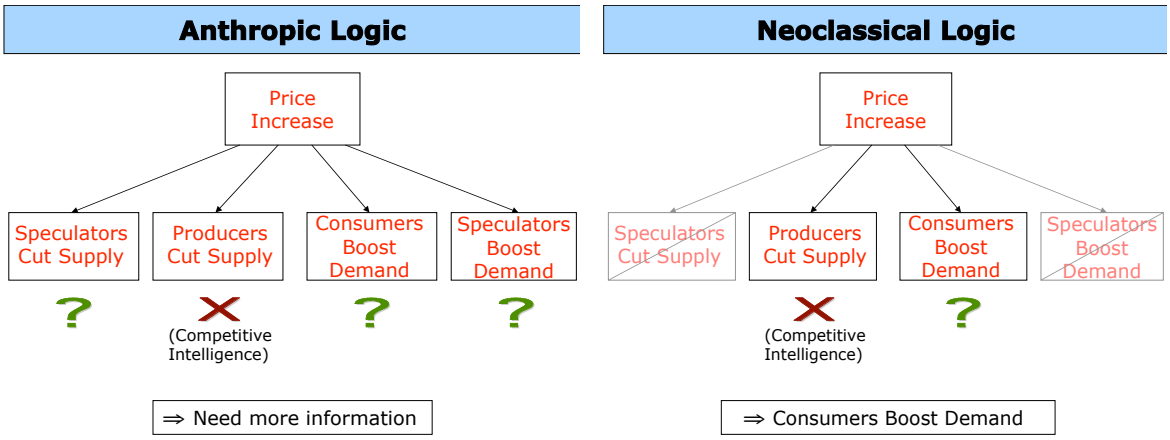

Fig. 6 *Neoclassical logic excludes possibilities that anthropic logic recognizes. This can lead market participants operating under neoclassical assumptions to arrive at false conclusions from perfectly accurate information.*

(ii) Consumers

Consumers purchase goods for one of two purposes: either for personal consumption or for use in the manufacture of other products. In the former case, that of "end consumers," strict rationality dictates that they will seek to make purchases as the lowest possible prices, given other constraints they may face. In the second case, that of consumers in one market who are producers in another, the situation is even more acute. These participants must try to balance their own estimates of future demand for their products with estimates of supply of the materials they must purchase. As discussed above, producers operating under neoclassical assumptions can face disastrous consequences when they act based on correct conclusions about net supply and demand that nevertheless do not accurately capture reality due to a failure to account for the impact of speculators. Recent examples include the airlines, or any other company that used only neoclassical-based logic to make forecasts of the price of oil in 2008 and 2009, and suffered large losses from such exposure.

(iii) Speculators

By its very nature, speculation depends on forecasting the future. By definition, speculators buy goods with the intention of later selling them at a higher price, or borrow and sell them short with the intention of later repurchasing them at a lower price, and keeping the difference (§1.2). Thus, speculators attempt to accurately predict future supply and demand conditions that will determine prices. Speculators operating with a neoclassical worldview will therefore look to determine the prospects for net supply and

demand from current and historic price information in combination with whatever other information is available. Speculators with an anthropic worldview will recognize that speculative behavior itself constitutes a form of supply and demand, and will therefore seek to determine not merely net supply and demand, but gross supply and demand. As before (§3.5 – and see also §5.1), mere price data is insufficient on its own to determine between a number of possible sets of circumstances. However, many market participants, especially in stock markets, try to deduce who must be buying and selling, based on the specific size, timing and impact of the transactions generating the price changes.

We see here a crucial difference between neoclassical thought and anthropic thought. In the former case, the more impure a market in terms of speculation, the more purely its prices reflect supply and demand, because the liquidity added by speculators helps to prevent market failures, while the presence of sophisticated arbitrageurs prevents speculative interest itself from driving price trends. Anthropic finance, on the other hand, recognizes that speculators have their own agenda, based on their own incentives and psychology, and therefore the greater the level of speculation in a market, the less purely its prices reflect supply and demand from producers and consumers. In commodity derivatives markets, for instance, pure hedgers are motivated primarily by fundamentals, whereas financial speculators are often driven by diversification considerations, or currency hedging, as well as many other factors unrelated to fundamentals.

4.3 Most market participants read price signals according to neoclassical assumptions.

Despite a history replete with incompatible events – both daily (such as the end-of-day rebalancing activities of exchange-traded funds [ETFs]), and occasional (such as the cataclysmic financial crisis of 2008) – financial market participants and academics writing about financial markets continue to cling to a neoclassical worldview.[57] Nowhere is the maxim that all experience is shaped by theory more true than in the case of finance. The convenience of a worldview that characterizes self-interested punting as socially beneficial easily outweighs the evident incongruities between the predictions it makes and financial reality as actually observed.

4.4 Speculation is itself a form of resource allocation.

The neoclassical view adopted by most financial market participants exonerates them of any responsibility for economic resource allocation. This is based on the premise that speculation merely reinforces net supply and demand, and does not distort it. Yet, according to anthropic finance, speculation is driven not by pure, rational evaluation of fundamentals of production and consumption, but rather by a combination of rational and irrational features of Mind, along with the institutional and incentive structures of Mandate. Thus, the effect of speculation on prices will reflect the composition of these

[57] It is clear that many market participants and even academics have broken free of the thrall of neoclassical thinking. For instance, George Soros has been an outspoken critic of EMH, and behavioral economists deny certain tenets of the neoclassical worldview, such as rational expectations. However, the experience of the authors has made it clear that neoclassical assumptions still pervade the beliefs of many politicians, academics and even money managers.

behavioral determinants. Since market prices determine resource allocation (§4.1), speculation therefore allocates resources. By deciding to invest money in one asset or asset class rather than another, speculators not only choose to use their own resources in that way, but also attract the resources of others (consumers and producers, as well as speculators) due to the price signals their buying behavior generates. By short-selling an asset or asset class, the inverse effect is propagated. **In summary, speculation is a form of resource allocation, motivated by individual profit, and governed by Mandate and Mind.**

The normative implications of this structural observation are explored in the second part of this document. One particularly pressing issue that arises out of this discussion is how the observation that resources are allocated via speculative behavior pertains to commodities markets and their regulatory structure. Briefly, the question can be stated as follows: if speculation is a form of resource allocation, and speculators are explicitly mandated to act solely in their own interests, even when these conflict with the interests of the broader society, how should society regard speculation in those markets that are as essential to our economic prosperity as those for food and energy?[58]

[58] The empirical evidence for speculative dominance in commodities markets is growing. For example, M. van der Molen, *Speculators Invading The Commodity Markets: A Case Study Of Coffee* (Utrecht; 2009) analyzes the effect of speculation in coffee, while D. Sornette, R. Woodard, W., -X., Zhou, *The 2006-8 Oil Bubble And Beyond* (2009) looks at the same phenomenon within the oil markets. P., Wahl, *Speculation Undermines the Right of Food*, (2008) – available at http://www.eurodad.org/aid/article.aspx?id=126&item=3032 (retrieved 2/10/2010) – summarizes some empirical findings and ties them to a broader ethical argument.

5. Market Purity

5.1 Market Purity is a function of speculative interest.

As discussed in §2.4, markets may be more or less impure according to the prevalence of speculative interest. Both pure and impure markets can function well, but each can also fail. Liquidity gaps and other issues can cause market failures in pure markets, leading to wasted resources. On the other hand, speculative excesses can drive asset bubbles that, when burst, can devastate an entire economy. Speculation introduces liquidity that can help bridge the gap and avoid market failure, but at the same time it can import additional risks into a market, which arise from the tendency for speculators to make purchases and sales to make strategic asset allocations based on decisions unrelated to the fundamentals of the market in question. The degree to which speculation is desirable will therefore vary from market to market. Making this determination for important markets, and then placing limits on speculation, or making markets more available for entry from speculators, is the difficult task confronted by market regulators. Ultimately, if speculation is justified by its tendency to alleviate market failures (e.g., in commodity markets), then it ought to be capped at level that achieves this goal, and prevented from reaching levels where the risks it brings outweigh the benefits. If speculation is justified by other considerations (as it may be in, e.g., capital markets), then these too should be weighed in order to determine the regulatory structure appropriate for the market in question.

As a definition, we may say that the greater the proportion of speculative interest (in terms of dollars deployed) versus interest from producers and consumers, the more impure the market. Within a perfectly pure market, consumers trade with producers, and prices are generated roughly along the lines described by classical economics. Of course, these prices are ultimately to be explained with reference to the actual buying and selling behavior of market participants, and therefore to their Mandate and Mind, but modeling prices with "fundamentals" that peg supply and demand to broad micro- and macroeconomic factors provides a good approximation. For example, in a pure commodity market, if new reserves of some essential natural resource are found, we can expect supply to increase (ceteris paribus) and price to decrease. This gives a reasonable approximation. The specifics of how the price will actually change, however, are determined by the Mandate and Mind of the producers and consumers of the good in question. The "supply and demand" of classical economics can therefore best be modeled by studying the actual Mandate and Mind of real producers and consumers of that good, and the equilibrium model that falls out should, on the whole, give a reasonable approximation of actual prices.

When speculation is introduced into the system, this dynamic changes entirely. Now, in addition to producers trading with consumers, there are also producers trading with speculators, consumers trading with speculators, and speculators trading with other speculators. The result is a radical scrambling of information. The more speculation is introduced into a market, the *less* its prices reflect pure "supply and demand" from consumers and producers. Interest from speculators imports speculative information into

the system. When a market is in a state of excessive speculation, speculative information dominates "supply and demand" so that prices can and do diverge from "fundamentals" of production and consumption for long periods of time. When producers and consumers in an impure market make strategic decisions based on price information that they take to be indicative of supply and demand fundamentals, they are therefore liable to make sub-optimal decisions. **Thus, impure markets in which producers and consumers fail to appreciate the informational impact of speculation are liable to systematically misallocate resources**.

This is the exact opposite conclusion of that reached by EMH (§1.5). By assuming perfect rationality and complete information for all speculators, EMH concludes that greater impurity serves only to improve the reflection of supply and demand fundamentals in prices. However, once we recognize that buying and selling behavior is driven by Mandate and Mind, we must conclude that the opposite is true: speculators trade on the basis of their own Mandate and Mind, which is very different from the Mandate and Mind of producers and consumers. When speculators are introduced into a previously pure market, they bring with them a Mandate and Mind that motivates them to act on the basis of very different concerns than those that previously drove buyers and sellers in that market. To this extent, the market pays a price in terms of dilution of pure supply and demand information.[59] **The more speculation that enters a producers and consumers, therefore, the less prices reflect fundamentals of supply and demand.**

This is so even for speculators with a focus on fundamentals. Information is often asymmetric between different market participants (§3). Even when it is symmetric, however, differences in Mandate and Mind will lead to variations across valuations and behaviors. Thus, increasing the levels of speculation in a market, even when those speculators are "focused on fundamentals" leads to a change in the informational state of the market. It is crucial that market regulators and participants recognize the informational impact of speculation. Neoclassical theory implies that this impact can be ignored. On the other hand, a theory that recognizes that market participants are real people with real incentives and psychology implies that ignoring the informational role of

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[59] Formally, this can be stated as follows. The classic EMH model, as laid out by Eugene Fama, relativizes prices to the information set available to investors at time *t*, such that the rational expected change in the price of a security *j* from time t to time t+1 relative to information set Φ_t (of all available information at *t*) is equal to the price of *j* at *t* times the rational expected return on a basket of similarly risky stocks (relative to Φ_t), i.e., $E(p_{j,t+1} \mid \Phi_t) = [1+E(r_{j,t+1} \mid \Phi_t)]p_{jt}$. Eugene Fama, "Efficient Capital Markets: A Review of Theory and Empirical Work," *Journal of Finance* 25 (1970), 383-417.

In contrast to this, we differentiate between ΦS_t (information pertaining only to the behavior of speculators, and therefore representative of their Mandate and Mind) and ΦP_t (information pertaining only to the behavior of producers and consumers, and therefore representative of supply and demand fundamentals). The total information set at *t*, Φ_t, is made up of both of these subsets. We posit that the following relationship roughly holds. Where S/P is the ratio of speculative interest to interest from producers and consumers (measured in capital deployed), $S/P \propto \sigma [| E(p_{j,t+1} \mid \Phi P_t) - E(p_{j,t+1} \mid \Phi_t) |]$. In other words, the ratio of speculative interest to interest from producers and consumers is directly proportional to the variance in the absolute difference between the rational expected future price of *j* vis-à-vis all available information, and the rational expected future price of *j* vis-à-vis just information pertaining to fundamentals.

speculators can lead only to unsatisfactory regulation and sub-optimal strategic decisions by producers and consumers.

Capital markets display an important difference from commodity markets, for in a sense they are the most extreme form of an impure market. Every participant in a capital market is, to some degree, a speculator (an "investor," after all, is just a speculator with a sufficiently long time horizon, §1.2). Any successful attempt to participate in or regulate such markets must begin with the recognition that even fundamentals-focused speculators encode information about their own Mandate and Mind into prices, as well as information about fundamentals. Successful capital market participants have long known this, hence their lukewarm feelings towards EMH. **However, the prevalence of neoclassical thought in today's discussions of markets – perpetuated by a media that attempts to tie every price move to some change in fundamentals, no matter how tenuous the connection – prevents many market participants and regulators from clearly perceiving how markets do, in fact, function, and therefore keeps them from making optimal decisions.**

In a capital market, "fundamentals" only matter to prices to the degree that speculators believe they matter, and thereby base their buying and selling behavior on them. When speculators in a capital market focus on fundamentals, they can, at times, bring prices closer to the underlying economic fundamentals of business conditions. However, the behavior of speculators, even those who focus on fundamentals, is always mediated by their Mandate and Mind. Therefore, prices and "fundamentals" relating to actual business conditions can diverge for long periods of time (George Soros' "far from equilibrium conditions"[60]). This is perpetuated to an even greater degree when participants in such markets fail to recognize the impact of their own behavior on prices, so that a price rise that encodes speculative buying can be interpreted as an improvement in fundamentals, which triggers more speculative buying, which leads to a further increase in prices, and so on, until we enter what classical theorists describe as a "price bubble." Understanding this dynamic is of paramount importance to anyone participating in or regulating capital markets.

Market price movements may provide information about supply and demand fundamentals, or they may not. In the latter case they may be only providing information about the Mandate- and Mind-based motivations of speculators. Simply ascribing all price movements in markets to fundamentals is at best a simpleminded practice, and at worst a very costly mistake. The EMH appeal to sophisticated arbitrageurs is of no use here. Once we recognize that fundamentals only matter for prices in capital markets to the extent that speculators believe they do, we are forced to conclude that a small minority of fully rational, fully informed, fundamentals-focused sophisticated speculators would be insufficient to make prices systematically reflect fundamentals: unless dominant in numbers (capital), they would always be outweighed by the "unsophisticated" many. As was discussed in §3, the existence of any such fully rational and fully informed "sophisticated arbitrageurs" is far-fetched (if not impossible). The

[60] George Soros, *The New Paradigm for Financial Markets: The Credit Crisis of 2008 and What It Means* (New York: Public Affairs, 2008).

notion that capital markets are primarily composed of such beings is a patent absurdity. Of course, fundamentals do ultimately matter to businesses, which will prosper if business booms, and fail if it crashes. But capital markets do not simply reflect those fundamentals; they reflect the Mandate and Mind of their participants, and the information that this leads them to focus on.

The long-mystified relationship between the cycle of boom and bust in capital markets and in the economy can at last be demystified. The relationship is reciprocal: booms and busts can be transferred from the economy to capital markets and vice versa. In the first case, a boom and bust cycle is transferred from the economy into capital markets via speculators focusing on fundamentals. The relative timing, severity and duration of the capital market boom and/or bust will depend on the extent of the economic boom/bust as well as the Mandate and Mind of the capital market participants. In the opposite direction, a boom and bust cycle that begins in capital markets can transfer to the real economy by increasing or reducing wealth and disposable income of the purchasing public through changes in asset prices and valuations. This change in wealth and income in turn affects business conditions, which shape the business cycle. The timing, duration and severity will depend on the size of the capital market cycle, and the Mandate and Mind of the consumers and producers that make up the real economy. Finally, the two cycles can intertwine, with some fundamental change (e.g., a fall in housing prices) causing a change in behavior from fundamentals-focused speculators (e.g., a crash in mortgage-backed securities), which, in turn, changes the income and wealth of the population at large (homeowners, plus everyone else affected by the correlated collapses in other markets due to the overexposure of key financial institutions to mortgage-backed securities, and the consequent collapse in their purchasing power and willingness to prop up capital market prices), thus leading to a joint crisis of both the real economy and the capital markets.

5.2 Deregulation increases market impurity.

Casual usage makes references to “regulated” and “de-regulated” markets. Broadly speaking, a market becomes more deregulated the less strictly speculators are constrained (in terms of position limits, filing requirements, etc.). Since regulation alters the incentives for speculators to enter and operate in a given market, it will, to a large degree, determine its purity – though other factors beyond government control will also affect how attractive a market will be to speculators.

5.3 A side-by-side comparison of pure and impure markets, followed by a more detailed discussion:

(i) Pure Markets

→ All participants are either producers or consumers.
→ All supply and demand is net of speculation.
→ Possible sources of market failure exist.
→ Derivative markets enable participants to hedge.*

(ii) Impure Markets

→ All participants are producers, consumers, or speculators.
→ Supply and demand include the buying and selling of speculators.
→ Speculation may either rectify or exacerbate market failures.
→ Unregulated derivative markets enable leveraged speculation.

5.4 Pure and impure markets differ in composition.

The defining difference between a pure and impure market is the composition of their participants. The purer a market, the less speculation it contains, with the paradigm case being that of a market entirely free of speculation. At the other extreme is a market within which no actual tangible goods exchange hands, only contracts. Such markets may either pertain to contracts for the delivery of goods, or ownership of the means of production (such as commodities and stock derivative markets, respectively), or may be linked to observable events, such as the weather or political outcomes (which some individuals and firms may use to hedge against various risks). It is even possible to organize a completely speculative market in which participants gamble on the outcomes of totally random events. Such a market would resemble a casino.

5.5 Pure and impure markets differ in the character of their supply and demand.

All other differences between pure and impure markets stem from this central one. Because there are no speculators in a pure market, all supply and demand is what has been termed net supply and demand (see §2.10). In an impure market, on the other hand, speculative buying and selling may exacerbate pre-existing trends, or even generate price trends on its own. In such a market, prices are determined by gross supply and demand from producers, consumers and speculators, even if many market participants focus their

* Derivative markets generally incorporate some degree of speculative interest – though it is possible to have a derivative market used for hedging without the presence of speculators; buyers and sellers can simply use derivatives to lock in long-term prices that suit both parties. Some speculation will, in general, no doubt improve liquidity, making more transactions possible at cheaper prices. However, excessive speculation, we argue, leads to increased volatility and therefore much higher hedging costs for producers and consumers. See §4.7 for a more in-depth discussion of this point.

attention on net supply and demand and ignore the impact of speculation-driven supply and demand due to their neoclassical worldview.

5.6 Pure markets can fail. Impure markets can either improve or worsen failures.

Within a pure market, there are several possible sources of "failure", which have been studied extensively by classical and neoclassical economists. In this context, a market failure includes any sustained mismatch between supply and demand which the market mechanism fails to correct.[61] Other types of market failure include situations where a market simply fails to arise, or where a market has unintended negative side effects for non-participants. Typically, economists focus on three sources of failure: imperfect information, public goods (where a market for a good fails to mature, despite the fact that the good is desired), and externalities (unintended side effects).[62]

As has been discussed above (§3.4), information is often imperfect and incomplete. Those with privileged access to information have an incentive (Mandate) to keep it from others. Even though the market mechanism can help to redress this imbalance by disseminating information through prices, this price data is itself ambiguous (between, e.g., an expansion of demand and a contraction of supply). The problem is worsened for impure markets, in which speculators add information to the system (the "noise" of neoclassical finance). Lastly, with advances in information technology, the volume of information available to market participants has reached a level where they are forced to filter information selectively, so that even relatively complete information generates "market failures" that mirror those arising from incomplete information. Paradoxically, the greater the information available, the more significant this problem becomes.

In the case of public goods, speculation may actually improve the situation. In cases where the obstacle to market maturation is a liquidity gap, speculation can help bridge the gap. For example, consider an industry for which storage capacity is limited. Production under 100 units costs $5 per unit, while additional production over 100 units costs $4 per unit, due to economies of scale. Producers can ship 100 units at a time, with any additional units being stored for a subsequent shipment. Storage, however, is limited, and investing in new capacity is prohibitively expensive. Thus, production never exceeds 100 units per month, falling short of demand. Speculators possessing storage capacity may enter the market, purchasing direct from producers and using their own storage facilities to hold the goods. In doing so, they increase demand to a level where production costs fall, and at the same time, they are able to make up the shortfall in supply. Their own profit comes from the gap between the new lower prices they can command from producers, and the prices they can charge to consumers (the "spread"). Producers are able to sell more goods and enjoy lower production costs, and consumers no longer face shortages of the good. In such a case, an impure market may function better than a pure market.

5.7 Derivative markets serve different (and opposed) purposes in each market type.

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[61] See, e.g., Paul Krugman and Robin Wells, *Economics* (New York: Worth Publishers, 2006).
[62] See, e.g., H. Varian, *Microeconomic Analysis* 3rd ed. (New York: W.W. Norton, 1992).

Sometimes, market participants wish to insure themselves against future price changes. For instance, a producer may seek to secure a steady revenue stream when investing in new equipment that will require time to return value. Or a producer of a secondary product might seek to insure himself against shocks to the price of the raw materials he uses for production. In such cases, participants may turn to derivative markets. These markets are exchanges on which contracts for future transactions are traded (either obligations to buy/sell, or rights to buy/sell). By trading such contracts, market participants can secure a future transaction at a pre-determined price, and thereby bring a degree of certainty to the future, reducing the risk associated with longer-term plans and projects. Such long-term projects are essential to a nation's prosperity. Thus, well-functioning derivative markets can serve an important economic purpose.

Derivative markets themselves are, in a sense, the limiting case of an impure market. In them, no actual goods exchange hands – only contracts. Such contracts are, in essence, a bet on the direction of future prices of the underlying good, of which the market is a derivative. Hence, all transactions in derivative markets are, in this sense, speculative. However, there is a clear difference between those participants who are consumers or producers of the underlying good and those who are not. Producers and consumers are primarily engaged in using derivatives to hedge against risks, while speculators generally have no such exposure, and are in fact trying to take risk. Speculators primarily turn to derivative markets in cases where trading in the actual goods would be impractical (due to storage and transportation costs), or where they wish to leverage their available capital (make bigger bets for the same price). Since the price of a contract is generally small compared to the price of the actual goods specified by the contract, the same dollar investment will pay back (or lose) a far greater amount when allocated to derivatives rather than the underlying good.

As with any market price, the price of a contract in a derivative market is determined by supply and demand for that contract. However, neoclassical theory dictates that since a derivative market is linked to the market for an underlying good, prices of contracts must also fluctuate along with prices of the goods they pertain to (or else an arbitrage opportunity would quickly arise). Logically, the relationship could work either of two ways: prices of the underlying goods could be determined by supply and demand for those goods, and derivative prices would then adjust accordingly, or the inverse could hold. There is no *a priori* reason to favor one direction over the other, and in practice we see what look like examples of both. The market for equity derivatives (options) appears to follow the first pattern, since market makers tend to use valuation models that take stock prices as inputs. On the other hand, many physical commodities are traded at prices that are negotiated on the basis of derivative (futures) prices.

Ultimately, a clear understanding of how prices are determined in derivative markets can only be attained by looking with a finer grain. The mechanism of Mandate and Mind analysis allows us to take just such a closer look. For instance, in an equity market where participants are institutionally bound to use valuation models like Black Scholes, whose output varies with the price of the underlying stock, we can expect to see derivative

prices follow the prices of the underlying asset.[63] On the other hand, in commodities markets where local supply can vary wildly, producers and consumers have an incentive to lock in stable prices for planning purposes by negotiating prices based on futures prices (plus basis). In this case, prices of the underlying goods follow the prices of the derivatives. This is the actual price-setting mechanism for oil and grain markets.[64,65,66]

Neoclassical models can only countenance a one-way relationship from underlying goods to derivative prices: since underlying prices are efficient (by EMH), the prices of derivatives must, as their name suggests, be derived from the prices of the underlying goods, or else arbitrageurs would exploit the dichotomy. However, once we reject EMH for the underlying market, the playing field is leveled: the price of the underlying is determined by supply and demand for the underlying, and the price of derivatives are determined by supply and demand for derivatives. The two must move in a relatively close relationship, or else – as neoclassical theory infers – arbitrage will occur. However, the arbitrage can occur in either derivative (future) or physical (spot) markets. Which market is the primary arena for such arbitrage depends entirely on the specific structure of the market in question. As explained above, the arena of arbitrage, and thus the direction of correction, is different for stocks and options than it is for commodities and futures.

This is of crucial significance for futures markets. Recall that futures markets are designed to allow producers and consumers to hedge against fluctuations in unpredictable local supply. If excessive speculation makes the price of futures as unreliable as the local supply of goods, they are no longer capable of fulfilling the crucial economic function for which they were created. The increased volatility that rampant speculation generates leads to higher costs for *bona fide* hedgers, that are siphoned off as extra profits for the speculators: rather than make money from facilitating economically advantageous transactions that would not take place without their intermediary action, speculators simply make money from widening spreads due to unpredictable price fluctuations. The less transparent a market, the more pronounced is this effect. It is therefore correspondingly greatest in unregulated OTC markets.[67]

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[63] Ironically, Fischer Black, who arguably contributed at least as much to the efficient markets paradigm as any other academic, recanted in 1986, moving from MIT to Wall Street, and uttering the famous words "markets look a lot less efficient from the banks of the Hudson than the banks of the Charles," cited in Peter L. Bernstein, *Against The Gods: The Remarkable Story of Risk* (New York, John Wiley and Sons, 1998)

[64] The CFTC explains this mechanism for futures markets in general at http://www.cftc.gov/educationcenter/economicpurpose.html (retrieved 2/8/2010): "In many physical commodities (especially agricultural commodities), cash market participants base spot and forward prices on the futures prices that are 'discovered' in the competitive, open auction market of a futures exchange."

[65] In the case of oil markets: "In the spot market, therefore, negotiations for physical oils will typically use NYMEX as a reference point, with bids/offers and deals expressed as a differential to the futures price. Using these differentials, Platts makes daily and in some cases intra-day assessments of the price for various physical grades of crude oil, which may be referenced in other spot, term or derivatives deals." Platts (a leading pricing service for the energy industry), *Platts Oil Pricing and Market-on-Close Methodology Explained – A Backgrounder* (Platts McGraw-Hill, 2007), 3.

[66] We are grateful to Adam White at White Knight Research, for his helpful research in this area.

[67] See §IV of United States Senate Permanent Subcommittee on Investigations, "The role of Market

A derivative market, like any other market, is susceptible to market failures. Imperfect information is as common with derivatives as it is with any other traded asset (indeed, even more so when particularly esoteric derivatives are involved, as in OTC markets). A key question is whether the presence of speculators mitigates against such failures, as in the previous example, or whether it can in fact worsen the risks. The attempt to find an answer to this question, once again, leads us into the analysis of Mandate and Mind. While neoclassical theory dictates that speculators in derivative markets – as in all markets – act only to correct market failures (due to their perfect information and rational expectations), anthropic finance implies this will only be the case if the Mandate and Mind of speculators makes it so. Empirically, speculators in derivate markets have displayed Mandate-based actions that appear to undermine the neoclassical view. Because of strategic asset allocation decisions, many have moved into so-called "index speculation".[68] Thus, speculators are driven to open long positions (buy) in futures markets without sensitivity to the net supply and demand conditions in the underlying markets. By doing this, they hedge against risks associated with inflation and exchange rate fluctuations. Thus, they have a strong incentive (Mandate) to do so. The impact on commodity markets (the futures market initially, and then the underlying market, due to the mechanisms described above) is therefore to exacerbate market failures rather than to correct them; it is to destabilize prices rather than steady them by providing liquidity.

OTC markets are the ultimate example of information-related market failures. In OTC markets, participants have no benchmark against which to compare the prices they pay for contracts. It is this very feature of the market in OTC mortgage-backed securities that allowed large financial institutions to vastly overpay for what were effectively worthless securities in the run-up to the financial crisis.[69] Such markets are presently utilized for highly speculative purposes, despite the fact that their lack of transparency make them equivalent to a casino in which the house gets to change the value of the cards as they please in the middle of a game.

Treasury Secretary Timothy Geithner explained some of the risks posed by unregulated OTC markets in a testimony before Congress in July 2009:

> Because of a lack of transparency in the OTC derivatives and related markets, the government and market participants did not have enough information about the location of risk exposures in the system or the extent of the mutual interconnections among large firms…This lack of visibility magnified contagion as the crisis intensified, causing a very damaging wave of deleveraging and margin increases, and contributing to a general breakdown in credit markets…Market participants and investors used derivatives to evade regulation, or to exploit gaps and differences in regulation…The

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Speculation in Rising Oil and Gas Prices: A Need to Put the Cop Back on the Beat" (2006) available at http://levin.senate.gov/newsroom/supporting/2006/PSI.gasandoilspec.062606.pdf (retrieved 2/8/2010).

[68] For a discussion of how the financialization of commodity markets has lead to increased volatility and therefore decreased utility to producers and consumers, see, e.g., Tang, K, and Xiong, W., "Index Investing and the Financialization of Commodities" (Princeton University, 2010), http://www.princeton.edu/~wxiong/papers/commodity.pdf (retrieved 2/8/2010).

[69] See, e.g., http://www.cfainstitute.org/centre/overview/councils/iwg/pdf/letter_us_congress_otc_derivatives.pdf (retrieved 2/8/2010)

> lack of transparency in the OTC derivative markets combined with insufficient regulatory policing powers in those markets left our financial system more vulnerable to fraud and potentially to market manipulation.[70]

The neoclassical paradigm simply cannot provide an adequate framework for designing appropriate regulation to deal with these issues. The last four sections of this document have explored its shortcomings both in terms of decision theory and in terms of the conditions under which decisions are made. Given that neoclassical economics comes up short on both these fronts, it is no surprise that it fails to give an adequate account of how markets ought to be structured. In the next section, we turn to this question, synthesizing the material discussed up to this point in order to provide a framework for understanding how markets should be structured in order to ensure that they function optimally.

[70] Secretary Timothy Geithner, Written Testimony, House Financial Services and Agriculture Committees Joint Hearing on Regulation of OTC Derivatives, July 10, 2009, http://agriculture.house.gov/testimony/111/h071009/Geithner.pdf (retrieved 2/8/2010).

6. Anthropic Finance

The diagram below outlines the discussion so far:

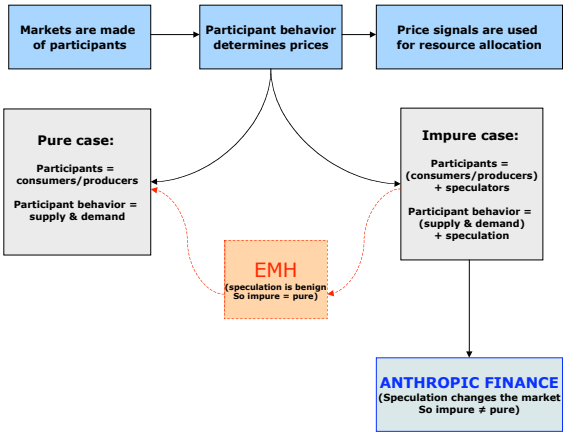

Fig. 7 Outline of Market Theory

We now revisit these points in order to give a complete and concise statement of the view we are putting forward as an alternative to the technical elements of the paradigm comprised of EMH, neoclassical economics and market fundamentalism. Recall that this paradigm was characterized (§0) as a claim about **how market participants make decisions**, as well as **the conditions under which they make decisions**, and lastly, **how markets should be structured**. In the remainder of this first section of the philosophy, we discuss the first two questions, while most of the discussion of the third question is reserved for the second part of the document, which addresses the normative issues that must be tackled in order to give a satisfactory response.

6.1 Anthropic finance: markets are made of (human) participants.

Both neoclassical and anthropic finance begin with the observation that markets are made of participants. However, as we have seen (§1.5), the neoclassical approach then makes assumptions about the nature of those participants that renders them irrelevant, and effectively eliminates their human agency from the market model. Anthropic finance, on the other hand, takes as basic the fact that participants in financial markets are human (even automated trading platforms are programmed by humans, and can be overruled by their human owners). **Markets, as human constructs, therefore possess human flaws.** This human face to the market has implications for supply and demand, price formation, information flows, and regulatory structure. As in any construction, physical or abstract, the characteristics of the whole are a function of the characteristics and interactions of the parts. A market made of real people interacting looks very different from one made of

pure reasoning machines. The "Invisible Hand," therefore, is at best a diverting fantasy, and at worst a dangerous fallacy.[71]

6.2 Market participants, like all human agents, behave according to Mandate and Mind.

The theory of Mandate and Mind is laid out in detail in §§2.6-9. It is based on the simple observation that human behavior is driven first by what people must do, and then what they choose to do. The theory also notes that much of what people "must" do is transient, and enforced only by their incentives and mental habits. Thus, under extreme circumstances, the irrational and non-rational components of human cognition can overrule the rational, and cause a person to act against their best interests, even to the point of breaking laws and taking wild gambles. Finally, the theory recognizes that even in less extreme circumstances, the context in which a person operates determines the degree to which his rational or non-rational/irrational cognitive faculties dominate.

Thus, taking Mandate to include all legal and institutional restrictions on an agent's behavior plus his incentive structure, and taking Mind to include all his mental and emotional faculties, rational or otherwise, we derive a rich theory of human behavior and decision making which we then apply to market participants. In the absence of extreme circumstances or poorly enforced legal and institutional restrictions, participants behave according to their Mandate, insofar as Mandate determines an exact course of action. Beyond this realm of determinacy, they behave according to Mind, with the exact context determining the degree to which the rational or non-rational/irrational dominates. When laws or other elements of Mandate are poorly enforced, their impact on behavior is diminished (though their psychological power may still mediate behavior where non-rational and irrational components are strong). Finally, when circumstances are sufficiently extreme, Mandate has little or no impact on behavior, and Mind (in particular the non-rational and irrational components) becomes the sole driver of behavior.

This approach can be approximated by the rule of thumb: when seeking to understand how market participants will behave in a given circumstance, look first at their incentives, and then at their psychology.

6.3 Information is often incomplete, asymmetric, and selectively filtered by participants.

In §3.5, we gave two principal reasons why information is generally neither complete nor symmetric, contrary to the basic assumptions of EMH and the neoclassical paradigm:

1) Market participants with privileged access to information have an incentive to withhold it from other participants.

2) The sheer volume of information forces market participants to selectively filter the information they use for decision-making.

[71] In fact, many commentators have argued that Adam Smith understood this point, and that his Invisible Hand metaphor has been misinterpreted and overemphasized. See, e.g., E. Rothschild, "Adam Smith and the Invisible Hand," *The American Economic Review* 84(2) (1994): 319-322.

The first of these points explains why, even in a well-connected world, information does not reach all quarters. Even if those participants with privileged access to information do, in fact, sell their information to others, the costs associated ensure the distribution of information is still, to a large degree, asymmetric. Indeed, as long as the gains to be made from privileged access outweigh the premiums that can be charged, there remains a strong incentive (Mandate) for participants not to sell their knowledge. Assuming normal circumstances, therefore, in which rational Mind guides most behavior, within the boundaries set by Mandate, information would only be sold at a price at which it yields no additional value for the participant selling. In cases where the value of information is relatively consistent for both buyer and seller, therefore, the buyer can extract no value over and above the price paid, and hence has no reason to buy the information. The effect on both non-buyer and non-seller (of information) is therefore zero. However, the social costs of one party now acting on incomplete information are not zero, since asset allocation will now be determined in part by buy/sell decisions made on the basis of asymmetric and incomplete information.

This presents one opportunity for well-crafted regulation to boost the allocative efficiency of markets. By separating information gatherers from information users, regulation can ensure that sellers and buyers of information have different value structures. This creates a functional market for information, which improves transparency and results in asset allocation depending on the decisions of better-informed market participants. For example, by enforcing separation of banking units that execute trades from investment companies that benefit from information about the trades executed, regulation creates a functional market for that data. A bank with no trading agenda of its own gains nothing from holding information off the market. On the other hand, if banking units also possess their own proprietary trading units, they have the strongest possible Mandate-based incentive to hold such information off the market (up to the price at which other investment companies will fail to derive value). Such blending of banking and trading limits the spread of information, resulting in less well-informed market participants, and therefore sub-optimal allocation of capital in the economy. Nor is it sufficient just to require Chinese wall procedures. Because of the difficulty in enforcing such regulations, they can have only a limited impact.

The most glaring case in which informational advantages serve the narrow interests of just one group of participants at the expense of all others is OTC markets. Here, a distinct lack of transparency allows financial intermediaries to widen spreads at the expense of both consumers and producers. The opaque nature of OTC markets also makes it possible for large financial institutions to concentrate large positions in securities that are impossible to value because of the lack of a transparent and competitive pricing mechanism. OTC markets must therefore be made transparent, or esoteric derivatives be brought onto exchanges if market participants are to be protected from the damaging effects of entrenched information asymmetries.

As we saw in §3, even when information is freely available, it is not perfectly reflected in prices. Market participants, as human beings rather than idealized agents, possess finite

cognitive capacity. Thus, they must selectively filter the information they receive. Researchers in the field of behavioral finance have studied many of the heuristics by which market participants filter available information into usable packages. They have also made significant headway in identifying and illustrating the biases such heuristics can generate with respect to buying and selling behavior. It is important for both regulators and participants to understand the ways in which psychology affects participants' reactions to any regulatory or deregulatory initiatives.

6.4 Human agents and imperfect information imply risk.

When human agents make decisions on the basis of Mandate and Mind, using imperfect information, there is no reason to suppose the markets that reflect those decisions will allocate resources optimally. Markets are human constructs, and consequently they display human flaws.

The fall-out of markets being composed of real human participants is not, however, limited to allocative imperfection. Beyond mere imperfection, irrational and non-rational behaviors, when aggregated, can pose risks of catastrophic proportions. Since humans do not act independently, but interdependently, we see numerous well-documented cases of reinforcement effects.[72] Irrational behavior, in other words, tends to propagate further irrationality. When this process gains sufficient momentum, extreme asset price bubbles can arise, bringing with them disastrous consequences.

Among the ways in which asset price bubbles harm society are the following:

First, there is the familiar allocative issue. When producers interpret consistently rising prices as a sustained rise in consumer demand (see §4.2), they allocate resources towards additional production. When the sustained price rise is really just an asset bubble, this productive capacity is useless in the wake of the inevitable bursting. Indeed, the overproduction it generates may actually serve to exacerbate the downward spiral of prices in the subsequent bust. Thus, the investment in extra capacity amounts to a waste of society's resources, which could otherwise have been used for other, more beneficial purposes.

Second, because asset bubbles involve sustained periods of elevated prices, they can price out various consumers of the goods in question. In the case of essential natural resources like food and energy, this can directly cause widespread suffering and loss of life.[73] Given that today markets are society's chosen allocation mechanism and are therefore required to balance the needs and interests of as broad a range of constituencies as possible (see §8), asset bubbles in food and energy markets must be avoided at all costs if markets are to continue to serve their social function.

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[72] See Shefrin *op. cit.*, on herding and confirmation bias, among other behavioral biases.
[73] See "Casino of Hunger: How Wall Street Speculators Fueled the Global Food Crisis," *Food & Water Watch* (November 2009), http://www.foodandwaterwatch.org/food/report/casino-of-hunger-how-wall-street-speculators-fueled-the-global-food-crisis/casino-of-hunger-how-wall-street-speculators-fueled-the-global-food-crisis-view-in-full/ (accessed March 13, 2010).

Third, since bubbles, by definition, increase volatility in prices, they discourage long-term planning and investment. As many economists have pointed out, such long-term planning is essential to economic prosperity.[74] Regulators require a satisfactory theoretical framework like the one presented here if they are to be able to determine when volatility goes beyond what is required for healthy market functioning, and begins to benefit only large banks at the expense of all other constituents. At an even more fundamental level, various social philosophers have argued that a central component of the sort of individual liberty prided in social democracies like the United States is the freedom to embark upon personal projects and see them through to completion without undue hindrance.[75] Given that excessive price volatility impedes long-term planning, asset bubbles thus strike against what many consider to be the very core of American values. This is discussed in depth in the separate document, *Better Markets*. Even without invoking any normative considerations, however, there can be no doubt, a market with zero volatility, in which prices are unable to adjust to conditions, and in which the informational role of markets is therefore sacrificed, is undesirable from the viewpoint of economic success. Our discussion of OTC markets made it clear just how damaging can be the effects of informational breakdowns in markets.

At the other extreme, excess volatility – where prices reflect a vast quantity of information over and beyond that of supply and demand from producers and consumers, is equally destructive. Ultimately, such volatility benefits financial intermediaries, as they can act as counterparties to trades of either direction, and can therefore take commissions on any price move. However, it harms every other group: producers and consumers are unable to plan for the future, and when the very stability of the financial system is threatened, as occurred during the financial crisis, the losses that such intermediaries would suffer are in fact transferred to the taxpayer, due to the status of such institutions as "too big to fail." Regulated markets have, at times, been accused of being "un-American." Once we understand how deregulated markets can compromise American values, we see that really the opposite is true. This is treated in some depth in the second section of the present document.

6.5 Any understanding of markets that ignores psychology and incentives is flawed.

Given that prices are formed by transactions between participants, and that the decisions of those participants to transact is based on their psychology (Mind) and incentives (Mandate), any understanding of markets that ignores these elements is flawed and incomplete. EMH is a prime example, as its assumptions reduce participant psychology to rational expectations, and effectively ignore the role of incentives entirely. A hedge fund selling securities to meet redemptions, or a large bank buying commodities to hedge against inflation, are simply not scenarios that EMH envisages, and yet they are the bread and butter of real financial markets.

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[74] See, e.g., Henry Hazlitt, *Economics In One Lesson* (New York: Three Rivers Press, 1979), original publication 1946, http://jim.com/econ/, Retrieved 2/5/2010.
[75] Indeed, for Nozick this is the central criterion of liberty.

To understand how a given market structure will play out, we must therefore turn to game theory and behavioral psychology. To give just one example of an important concept from the former field, the idea of Nash Equilibrium is especially illuminating. A group of players is in Nash equilibrium if each one is making the best decision that he or she can, taking into account the decisions of the others. However, Nash equilibrium does not necessarily mean the best cumulative payoff for all the players involved; in many cases all the players might improve their payoffs if they could somehow agree on strategies different from the Nash equilibrium.[76] In general, this requires external third-party coordination and enforcement. This casts an important light on the market system. Within financial markets, participants are incented, and encouraged rhetorically, to single-mindedly pursue profit. A large bank would be failing its "duty to shareholders" were it to fail to pursue this goal. Thus, in Nash-type situations, we can expect sub-optimal outcomes to result from deregulated markets.[77] Even in non-Nash type situations, incentive analysis entails that deregulation will lead to outcomes that favor the most powerful groups at the expense of the rest of society. As we will now go on to discuss, such a scenario is antithetical to the role of markets in society, and runs the risk of undermining the entire economic structure itself.

[76] See Max Black, *Perplexities: Rational Choice, the Prisoner's Dilemma, Metaphor, Poetic Ambiguity, and Other Puzzles* (New York: Cornell University Press, 1990).

[77] We are grateful to Mark Lapolla at Knight Strategic Research for his helpful input on Nash equilibria and financial markets.

7. Concluding Remarks

Having explored in some detail the shortcomings of the neoclassical paradigm as an account of how decisions are made, in what context they are made, and the understanding of markets based on this tradition, it is clear that alternatives are needed to the deregulatory initiatives that were premised on this paradigm. Markets simply do not operate as EMH and associated theories suppose they do. Therefore, they cannot be expected to self-regulate. Without EMH there is no reason to suppose that deregulated markets will tend to stability and efficiency or that they will function fairly.

Some better alternative must be implemented, based on our improved understanding of how markets function. But the deregulatory initiatives justified in the name of neoclassical economic thought were based on more than just a theory of how markets work. They were also premised on ideas about the role markets ought to serve in society, and the rightful role (or lack thereof) of government in markets. A theory of markets, then, is normative as well as merely prescriptive. The second document in this series, *Better Markets*, explores the relevant normative issues. From the fundamentals of political theory and the legal framework of the United States, it derives an account of the role of markets in society, the role of regulation in markets, and therefore what purpose market regulation ought to serve in a society like the United States.

Even without exploring these normative arguments, however, certain properties of right regulation emerge from the descriptive theory alone. First, even neoclassical theories of healthy markets are premised on assumptions of transparency and perfect competition. Any market in which participants transact without adequate scrutiny and freedom of information is likely to fail to serve its economic purpose even by neoclassical standards. For this reason, unregulated OTC derivatives markets ought not to be tolerated. By bringing OTC derivatives onto an exchange-like system, it is possible to greatly improve transparency. This increases efficiency and reduces externality costs for all participants. The same is true for other markets where participants are able to concentrate power: even neoclassically, such markets are unlikely to serve their proper economic function; rather, they will tend to serve the interests of a narrow few at the expense of the rest of society. The normative implications of this are discussed in more depth in *Better Markets*. Suffice to say that Anthropic Finance, and its theory of Mandate and Mind, makes it abundantly clear just how and why concentration of power is dangerous: financial firms are implicitly and explicitly mandated to act only in the interest of their own shareholders and executives. Neoclassical economics implies that under perfect competition, such self-serving ends simply aggregate to healthy, well-functioning markets. In uncompetitive markets, however, they destroy value. The Anthropic approach enables us to see even more clearly the full extent of the destruction wreaked on market participants – and, by extension, the taxpayer, small and large businesses, and the economy as a whole. The present market structure allows large financial institutions to siphon information from the open market to use for their own profit, thereby increasing costs for end users. At the same time, these financial institutions are able to make leveraged bets with the implicit support of a taxpayer bailout. This combination – a system in which private financiers appropriate information from public markets while leveraging risk upon the public at

large – constitutes a de-democratization of information, and a direct transfer of value from the public into private hands. Like an anti-Robin Hood, the present system takes from the needy and gives to the powerful.

For this reason, speculative financial institutions should not be able to concentrate excessive power. "Too big to fail" is merely one way of defining "excess" in this context. One might equally turn to the concept of market purity for clarity on this point: a financial firm has excessive power in a market if it is able to dominate price discovery through its speculative buying and selling. Collectively, speculative power in a market is excessive beyond the point at which it ceases merely to support producers and consumers by providing liquidity, and instead begins to generate and sustain price trends of its own.

In the abstract, this is merely an academic debate. In reality, however, its implications are exceedingly urgent. It is hardly an overstatement to say that the deregulatory policies implemented in the name of efficient markets and neoclassical assumptions were directly causally linked to the financial crisis. To the degree that neoclassical thinking lay behind deregulation, therefore, we can say: Bad market theory caused the financial crisis. The financial crisis, in turn, caused real suffering to millions of men, women and children in America and beyond. By replacing our old theories of markets with newer and better ones, we are not merely servicing an academic itch; on the contrary, we are laying the groundwork for policy and regulation that will serve to ensure a brighter, more prosperous, less crisis-filled future for everybody who is affected by markets.

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