ON A CONSTRUCTIVE THEORY OF MARKETS

 ${\bf SUMMARIZED\ FROM\ VOLUME\ 1\ of}$ "The Strategic Analysis of Financial Markets"

April 1, 2017

Steven D. Moffitt[†]

Abstract

This article is a prologue to the article "Why Markets are Inefficient: A Gambling 'Theory' of Financial Markets for Practitioners and Theorists" (Moffitt (2017d)). It presents important background for that article — why gambling is important, even necessary, for real-world traders, the reason for the superiority of the strategic/gambling approach to the competing market ideologies of market fundamentalism and the scientific approach, and its potential to uncover profitable trading systems. Much of this article was drawn from Chapter 1 of Moffitt (2017a).

In theory, there's no difference between theory and practice. In practice, there is.

Walter J. Savitch, computer scientist and author of Pascal: An Introduction to the Art and Science of Programming (1984). Often incorrectly attributed to Johannes Snepsheut or Yogi Berra.^a

 a Thanks to Harry Markowitz for correcting the original attribution.

Economics consists of theoretical laws which nobody has verified and of empirical laws which nobody can explain.

epigram of Michal Kalecki, quoted by Steindl (1965), p18.

1 A Practical Approach

Behind most models of mathematical finance lie some really astounding assumptions ... that everybody is rational, that the law of one price holds, that no persistent arbitrage is possible, and so on. And most introductions to investing are either revelations of secret methods for making millions, or recitations of the immutable laws of cash flows, risk-adjusted returns and efficient portfolios. But little of this literature offers credible, general principles to an investor trying to get an edge in the investment game. Get rich schemes fail the sniff test—why are these precious secrets being peddled for \$34.95? And most "investing theory" can be trusted only if its assumptions align with reality (which they do not). The received wisdom of finance today, to paraphrase something I was told ages ago, is "a magic show and a bag of tricks."

Mainstream economic theory's markets are populated by rational automatons, but real markets are populated by human beings. Emotions are important. Mistakes abound. And indeed, markets are no

more efficient than the emotional, mistake-ridden people that comprise them. To emphasize this point, consider a little tale of the economist and the gambler.

2 A Tale of the Economist and the Gambler

An economist and a gambler are presented a puzzle: "A fair coin turns up heads on 20 consecutive flips. What's the probability of this outcome?" The economist, practiced in the art of probability, answers "1 in 1,048,576." But the gambler answers, quizzically, "It's not a fair coin!"

On the surface of it, the economist's answer seems more sensible since he interprets the puzzle literally, imagining that fair coins, that is, ones having a probability of exactly 1/2, exist. He reasons that all sequences of 20 heads and tails are equally likely, implicitly assuming independent flips. Thus he arrives at the answer "1 in 1,048,576." This standard reasoning has been taught to millions of students. But how many realize its deficiencies?

First, fair coins do not exist in the real world. Ones that are effectively fair can be manufactured through contrivance and ingenuity, but they do not exist in nature nor among coins minted in the United States. Is an United States penny minted in 1960 fair? Answer: Indeterminate without additional information, but under reasonable assumptions explained below, no! ¹

Second, the act of "flipping" is ignored in the economist's version, but in reality, that act is of crucial importance. If, for example, the coin is flipped with low angular momentum, then the result will be strongly biased toward the face that is upward when the coin is flipped! That is, if the upward face is heads, then heads will occur more often than tails, but if the upward face is tails, then tails will occur more often (Diaconis et al. (2007))! And not only does the bias persist when larger angular momenta are imparted to the coin (the upward face lands up about 51% of the time with reasonable assumptions on an upper limit to angular momentum), but in theory and in practice it never dies out completely! On the other hand, if a U.S. penny

¹The Lincoln Head penny of 1960 emphasizes that a real coin, not a hypothetical one, is unfair. Other years in the Lincoln series could have been specified interchangeably.

minted in 1960 is spun on its side with a flick of the finger on a level, flat surface, the probability of tails is about 0.70, that of heads 0.30. Clearly, then, the instructions on how to randomize the coin, as well as initial conditions, will affect the outcome.

Here is a little story that actually happened in San Francisco in 1985. A friend of mine who was an options market maker and champion backgammon player was approached by a man who offered him offered him 3:2 odds on flips of a coin. My friend would win, say, \$15 when he called the coin correctly, but pay only \$10 when he was wrong. He was what I'd term a "mathematical gambler," accustomed to playing against people, both in the options pits and in backgammon, who made inferior "moves." When he thought he had an edge, he was quick to pounce. So the "Flipper" began calling the coin that my friend flipped and my friend won a little at first. When the flipper then asked to escalate the bet, he agreed. After a bit of back and forth, the bet size was further escalated, at which point my friend promptly went on a losing streak that cost \$15,000! The Flipper was a "confidence man," or "con man" for short, who gained victims' confidences in order to rip them off. He appeared for a while in San Francisco and stung a few traders there, and then vanished as mysteriously as he'd appeared. There is a saying in the markets and in life — if it's too good to be true, it isn't.

Unlike the economist, the gambler imagines "If I had the opportunity to bet on head or tail of a coin that has just come up heads twenty consecutive times, what would I do?" In this interpretation of the puzzle, few would disagree – "Bet heads on the next flip," which from a gambler's perspective, implies that the coin is unlikely to be fair.

This difference in approach can be cast in familiar terms. An economist is a probabilist, a gambler, a statistician. No people enter the financial theorist's thought; people are always present in the gambler's. In the "20 heads of a fair coin," the gambler admits the possibility that the puzzle's presenter is a liar or misinformed, i.e. that the coin is in actuality unfair.

3 Why Speak of Gambling?

I feel obliged to explain why gambling is being discussed in a serious article about financial markets. A popular view holds that gambling

is a vulgar activity that attracts the low-minded, thus having no redeeming social value. A friend even joked, "Having gambling on your resume is a plus only if you want to be a trader." Gambling is often thought of as reckless betting, and this caricature is reinforced by movies of reckless gamblers who lead roller coaster lives, an anathema to prudent people.

Although ill-favored "gambling" and respectable "investing" have much in common, the "sophisticated" wealth creation community eschews any mention of gambling. Nor is the vulgar gambling idiom, "bankroll," ever heard in the stead of "wealth" or "betting" for "trading." And academic finance, by and large, has adopted the polite terms, as if they make the entire enterprise of investing more acceptable.

Consider this anecdote. My friend Harold, a successful gambler I'd known for many years was getting married. Several of his old gambling buddies, myself included, sat together at the ceremony as the Rabbi introduced the bride and groom. Julia, he said, was from a respectable family and was honorably employed as a teacher. But Harold's avocation, he said, was "professional risk taking." The word "respectable" and "gambler" (Is "respectable gambler" an oxymoron?) did not pass his lips.

Such genteelisms are amusing to professional gamblers who believe, correctly in my opinion, that high-minded terms like "investing" and "wealth creation" are designed for "suckers," those investors who naïvely believe that their money is in the hands of prudent managers. And this is a dangerous mirage indeed, since "prudent" investment managers are mostly wandering in the dark with penlights searching for winners, just like everybody else, and that as a group they achieve sub par returns.

There is another illusion at work, though. While there are wild gamblers who leave their fates to the gods, such is most assuredly not true of professional gamblers. The principles followed by professional gamblers are as simple to state as they are hard to follow: (1) never bet without an edge, and (2) bet an amount (possibly zero) appropriate for that edge.

The paradigm of "20 heads" that opened this article is emblematic of the difference between the economist and the gambler, pointing to differences in motivation and methods. The economist seeks to understand how markets work, but has a bias that markets can't be beaten consistently. Since the economist accepts that markets can't

be beaten, he conducts no serious investigation of that possibility. The gambler on the other hand, also cares about understanding markets, but only for insight on how to gain an edge. And for the gambler, it is more important to infer that someone made a bad bet than to understand why.

This article is about the gambler, not the economist. And about unfair coins, the "Flipper," and the general question of how to win.

4 On "Economic Arguments", Efficiency and Equilibrium

Much of modern financial economics rests on the assumption that most people are rational. But what if that assumption is wrong? Standard equilibrium arguments of the form "the price x of an asset must be y because if it were higher, (rational) traders would sell it down toward y, or if it were lower, (rational) traders would buy it up toward y" are then invalid. If this principle fails, the *no-arbitrage principle* is unjustifiable. The argument for CAPM likewise fails. Markets can still be efficient without rationality, but the usual justification that relies on rational arbitrageurs is unavailable. Financial economics makes such pervasive use of rationality and by extension, equilibrium arguments, that it's not clear how much of current theory survives without them.

The basic problem with many "economic" arguments is that they argue by contradiction — "if such and such were not true, then market magic would cause it to become true." I reject this sort of thinking as magical, not constructive, thinking. It uses a mathematical form of argument by contradiction, without the mathematical justification of that form — namely that a proposition can either be true or false without any exceptions. The form would not be a problem if the clause "because if it were not true, then somebody would make it true" holds, but there are obvious logical problems with such statements. For example, is it even possible for people to devise a remedy, i.e. is there path or strategy whereby the remedy would be manifested? This is simply an existence question — does a remedy even exist? Even if a remedy exists, will someone bother to employ it? Moreover, is a phenomenon obvious enough to be recognized by somebody? How can "new" phenomena be discovered if they are already known? These and other troubling aspects of the magical approach lead me to reject it in favor of a constructive approach.

Now back to the main thought: if rationality is absent, can analytic understanding of financial markets be attained only through the conjuring of statistical magic?

I think not. Markets can be understood only by dropping the assumptions of rationality and efficiency in their extreme forms, and showing that markets still have an inherent order and inherent logic. But that order results primarily from the "predictable irrationality" of investors, as well as from people's uncoordinated attempts to profit. The market patterns that result do not rely on rationality or efficiency. In particular, there is a general failure to understand that myopic, self-interested actions often lead to self-defeating outcomes, despite the fact that this has always been a basic feature of markets (Anand et al. (2013)). It is amazing that this feature is so ill understood, that it is little discussed in a literature that purports to describe real markets. The companion article Moffitt (2017d) offers a framework that captures the order and logic of markets, and which argues that rationality and efficiency are routinely violated.

5 Approaches to Understanding Markets

A shortcoming of the financial literature is its general neglect of the topic of "market philosophies." Roughly speaking, a market philosophy offers a simple (and often quite inadequate) paradigm of how markets operate. Most market participants, whether consciously or not, subscribe to a market philosophy. Therefore, it is important to understand these philosophies, the thesis being that as viewports through which investors see the financial world, they are essential to understanding its operation. Three philosophies and one major variant thereof are discussed below.

5.1 The Idealistic Approach and Market Fundamentalism

Mainstream finance in much of the last half of the twentieth century was mainly an idealistic study. It postulated that people are rational without systematically studying their actual behavior, then developed theory from that assumption — an approach often called market fundamentalism. The efficient market hypothesis (EMH), for example,

assumes that almost all people are rational and that they unanimously agree on prices, so that fair prices result. The development of the EMH was not based on direct observation of people acting rationally, but rather from studies of how prices evolve and how markets react to news. But there are two major problems with this approach. First, one cannot conclude that because the interactions of many people produces certain behavior in markets, e.g. martingale prices, that those behaviors resulted from rationality. There can be other individual behaviors that could produce similar market outcomes. Second, that markets act as if rational people produced the prices is quite difficult to test.

Regardless of its theoretical value, the EMH did capture one aspect of agreement between economists and investors — that the market is hard to beat. Unfortunately, economists expressed this idea in the most extreme fashion possible, claiming that the market is impossible to beat except by arbitrageurs. The fact that many famous non-arbitrageur investors and speculators have earned superior returns over their entire careers is not prima facie evidence against the EMH, because a few winners should be expected by chance alone.

However, as more evidence against the EMH accumulated in the 1990's, its defenders relied increasingly on the argument that hidden risk underlay anomalous phenomena. Thus the mainstay of the EMH, CAPM, guarantees the fairness not of returns, but of risk-adjusted returns, so high returns are natural when risk is high. But of course, high losses are also be expected when risk is high — in this view, anomalistic winners were just lucky.

But some anomalies are immune to this argument. Lee et al. (1991) showed that the Closed End Discount Puzzle could not be argued away by high risk, while a behavioral paradigm offers an intuitively satisfying explanation. Despite the argument that a few will be lucky, it is also difficult to reconcile the EMH with the consistent superior risk-adjusted returns of famous investors such as Warren Buffet and speculators such as George Soros.

Facing increasing evidence against the EMH, two of its long-time supporters capitulated, saying in effect, "The market's not as efficient as we thought." But that's a story to be told elsewhere.

5.2 The Scientific Approach

The first thorough scientific studies of financial theory were initiated by psychologists Daniel Kahneman, Amos Tversky (K&T) and Vernon Smith. Over a period of years, K&T performed numerous experiments to learn how people make financial decisions. In 1979, K&T produced a general formula for their prospect theory based on the average behavior of experimental subjects. It showed convincingly that individuals' decisions are described by prospect theory, not utility theory. Nonetheless, their theory falls short of the ideal, for it fails to produce unambiguous predictions. But by showing that human behavior is hardly random, it diminishes the *noise trader* pillar of efficient markets.

The most disheartening thing from a scientific standpoint is that K&T's work was for many years ignored by economic theorists, and rational expectations (RE) theories continued to be expounded as if nothing had changed. But since the late 1980's things have been changing, due to the discovery of numerous efficient market anomalies. In addition, markets events have made it increasingly hard to justify market efficiency, e.g. the global market crash of 1987, the Dot-com Bubble of the late 1990's and the Global Financial Crisis of 2007-8.

Vernon Smith pioneered the study of economic predictions using laboratory experiments, a field often called experimental economics. In important research, Smith studied how participants in auctions respond to incentives and institutional structure. He found in early experiments that experimental equilibria were close to those predicted by theory, and that institutional structure affected the speed of convergence. But in the mid 1980's, Smith et al. (1988) and colleagues developed more sophisticated protocols, discovering that bubbles and crashes occurred routinely! And those findings have been corroborated again and again. Nonetheless, in a tribute to the tenacity (if not wisdom) of true believers, those findings were discounted because they often used undergraduate college students, because they were simplified versions of real markets, and so on.

But not all economists before the late 1980's were so myopic as to ignore experimental findings. Hersh Shefrin, Meir Statman and Richard Thaler, among others, began exploring the implications of prospect theory to understand investor behavior. They found that it explained common features of financial decision making — Shefrin explained investors' preferences for dividends in equities and the dispo-

sition effect and Thaler introduced mental accounting and status quo biases. Today, behavioral finance is an accepted field of economics, but unfortunately, has yet to fully penetrate the culture and training of economists and financial professionals.

Physicists began serious studies of markets in the 1990's, calling their field "econophysics." Their approach was quite different from economists'. In general, scientists start by discovering "empirical regularities" of a system — this is the observational/experimental stage of the scientific method. Scientists then develop theories to explain these regularities; the criterion for a valid theory is that it must make unambiguous predictions. This is the hypothesis-forming stage of the scientific method. Each hypothesis so formed is then tested on its predictions using new data, not whether it conforms to the data that gave rise to it — this is the verification stage of the scientific method. Hypotheses that run this gauntlet are tentatively accepted by the scientific community; those that do not are discarded (in principle at least).

At this writing, econophysics is still in the observational/experimental stage, with few theories yet formulated. But the research activity is intense, especially for high-frequency trading, and one should expect it to enter the hypothesis forming stage in the future.

5.3 Market Personification

Naïve investors have a tendency to endow a market with human emotions, as if through caprice it were at times nice, at others angry: "Despite recent choppiness, an optimistic market finished up an agreeable one half percent." Not unlike the shenanigans of Greek Gods whose motives, we are told, lie hopelessly beyond the comprehension of mere mortals.

Such artistic license may be harmless, but its cousin, the "they" of market lore, is not. "They took the market down today." "They really liked XYZ's earnings!" Though superficial, these sentiments are too persistent to be entirely ignored. Their unstated premise, obviously, is that the market's puppet-strings are manipulated by powerful, if unseen, actors. And investing would then become divination or the fastidious parsing of pronouncements from acknowledged puppet-masters (which seems remarkably similar to today's "FED watching"). Yet surprisingly, a version of this idea does make sense. In the spirit of our scientific/statistical/gambling approach, it is based not on whimsy

or divination, but on an analytical analysis that is presented in the books Moffitt (2017a,b).

5.4 The Strategic Approach

The strategic approach is essentially a practical, non-ideological one that draws its inspiration from gambling. Professional gamblers view the market as a game with a large number of players — they realize that some players are more informed, more skilled than others. They realize that some are very poor players. They understand that emotional people usually don't make good decisions. They realize that some markets are nearly zero-sum, i.e. futures and options markets and some are not, i.e. equity markets. In an analysis of equity markets, gamblers realize that the players includes corporate management, not just investors and speculators.

There are really only two principles in gambling theory: (1) never bet unless you have an edge (= positive expected return) and (2) bet an amount appropriate for that edge. Most long-term losers at games of chance violate one of these two principles.

Perhaps surprising to economists, most professional gamblers are pretty much risk neutral (Alevy et al. (2006)). For them, each opportunity to bet is viewed as an opportunity to maximize expected return; gamblers prefer many small bets in order to avoid huge swings in capital. Therefore, professional gamblers make bets in some proportion to their bankroll (investment funds). If they have a small bankroll, they make small bets; if they have a large bankroll, they make large bets. Professional gamblers view their work as one long game. Odds will change, games will change, competitors will change — but it's still just one long game. The secret is to be tolerant to boredom, since the activity consists of using the same methods with mind-numbing, ultra-consistency over years and years.²

Not surprisingly, professional gamblers are usually good money managers. They know that their bankroll is all they've got to keep them in the game. Incidentally, the reason professional gamblers are largely risk-neutral is that being risk-averse "gives up edge", while being risk-seeking needlessly increases risk. There is a difference between most gambling games and the market. Most gambling games,

²A quote from George Soros, "If investing is entertaining, if you're having fun, you're probably not making any money. Good investing is boring."

e.g. poker, involve only a few players. The same game is played repeatedly. In single sessions, the game involves the same players. The best professional gamblers are good at reading people, that is, at guessing what they're trying to do. Some behaviors give away what a player is doing — these are called tells. Interestingly, lots of gamblers have the same tells! For this reason, gamblers find it plausible that market participants also have tells.

So, what does all this gambling stuff have to do with markets? A great deal, actually!

The big difference between the idealistic and the scientific approaches compared to the strategic approach is that the strategic approach explicitly views markets as games in which some people use inferior strategies. The strategic approach explicitly rejects efficient market ideology as a way of understanding how markets operate. It replaces this with the view that strategic interaction leads to price formation, and that the key to understanding markets is understanding how competing strategies lead to prices. Efficient markets are a byproduct inasmuch as simple trading patterns are so easily exploited by simple counter-strategies, that they don't occur in easily recognizable forms.

The point of the market game is to develop strategies that win. Strategies that are revealed, that is, which can be anticipated — are candidate inferior strategies.

6 Examples of a Strategic/Gambling Approach to Markets

We offer several examples of a gambling approach to markets, the central topic of the two volume series "The Strategic Analysis of Financial Markets," Moffitt (2017a,b).

One rather obvious requirement for getting a gambling edge is choosing a favorable game. A moment's thought suggests some criteria that should guide game selection. First, good gamblers should choose games with weak players. But what constitutes weakness?³ A few common examples: (1) a (relatively) large group that telegraphs the strategies they'll play, (2) a group of players who act on "auto-

³There's an old poker saying: "Look around the table. If you don't see a sucker, it's you."

matic pilot," using predictable heuristics that don't engage reflective cognition, and (3) players (not necessarily traders or investors) who are constrained to act in a patterned manner, e.g. mutual funds can't short stock, the FED is mandated to discuss policy at scheduled meetings, etc. Second, the "weak" players should be sufficiently influential to move markets — not necessarily the entire market — but at least a part of it (a stock for instance). Some examples: (1) investors in IRAs on tax day, (2) decisions by the Federal Reserve on announcement days, and (3) corporate management deciding to raise a dividend. Third, markets sometimes exhibit biases that are important for trading. In bull markets, for example, it is usual that bad news is ignored and good news has a (diminishing) positive impact.

Here are three examples of systems that were developed using the strategic/gambling approach.

The Tax Day Trade

The equity curve of Figure 1 is discussed thoroughly in Moffitt (2017c). The trade sets up because tax payers procrastinate in deciding to establish IRAs and flood brokers with money on the last day (the day taxes are due) to open one. Brokers place those orders on the next day, causing the S&P 500 to gain about 1/2% on average.

The Holiday Effect

The holiday effect, a strategy of buying stocks before a holiday and selling them shortly after the holiday, has been known for a long time, e.g. Fosback (1976); Hirsch (1987); Lakonishok and Smidt (1988). Older studies were done mostly in the U.S. markets, but the effect exists in many countries (Keim and Ziemba (2000); Ziemba (1994)). Ziemba (2012) presents an analysis that shows that for U.S. markets in recent years, it has been best to buy on Day -3 and Sell on Day +2.4

There have always been two explanations for the holiday effects. The rational explanation is that a few traders sell pre-holiday in order to reduce risk, thus exerting downward pressure which is subsequently corrected post-holiday. The "animal spirits" (irrational) explanation is that the warm glow of post-holiday cheer leads to optimistic trading. Since modern finance is dominated

⁴Dates are the number of trading days relative to the holiday. Note: In the U.S., markets are closed on all the holidays,

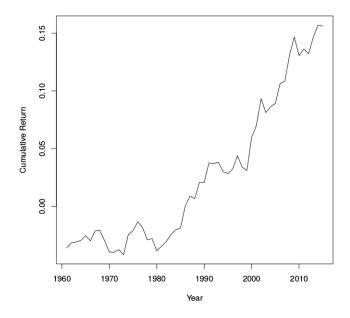


Figure 1: Cumulative returns from buying the S&P 500 index on the close of U.S. tax day and selling on the close one day later. Commissions and slippage not included.

by rational theory, it is hardly surprising that the rational explanation holds sway at present.

But a recent article (Gama and Vieira (2013)) uses a "natural experiment" to reexamine this explanation. The authors note that the Portuguese stock market was "synchonized" in 2003 to the European holiday calendar, so that the Portuguese market no longer ceases trading on most Portuguese national holidays, as it previously did. Thus the natural experiment: compare market action on traded (since 2003) Portuguese national holidays to that before 2003. And ... surprise, surprise, the price action around Portuguese national holidays is much as it was formerly! Thus gamblers accept holiday anomalies as due mainly to animal spirits, and perform analysis to determine the trading strategies.⁵

 $^{^5}$ The rational explanation may play a role, but that seems unlikely. After all, if one empirically observes excess pre-holiday returns, wouldn't it be rational to buy, not sell before a holiday?

A Risk-Aversion Trade

We won't describe the details of this trade because it would likely cause it to cease working, but here is a little information about it. It is based on investor's risk aversion; its cumulative returns (not compounded) for a seventeen year period after fees and slippage is shown in Figure 2. The system was designed using strategic principles recommended in the companion paper Moffitt (2017d).

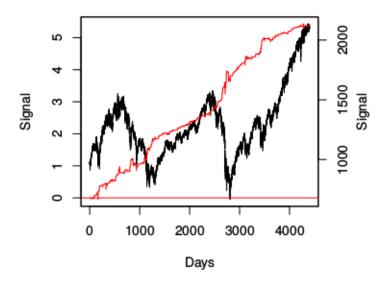


Figure 2: Seventeen years of daily cumulative returns (no compounding) for a trading system based on risk aversion. It averages 25% per year and has a single drawdown of about 35% just prior to day 3000. In the portion of the curve from day 3000 to the end, the worst drawdown was about 12%.

For completeness, we discuss these three examples from the perspective of market fundamentalism and the scientific approach. For each of these three examples, market fundamentalism would argue that either (1) there is a problem with study design, so that the purported effects are spurious, or (2) that the effects are too small to be important to market efficiency or (3) they will be arbbed out soon after becoming known. Since traders have made (and continue to make) money) with calendar trading (Ziemba (2012)) and since these effects have been around for over a hundred years (Lakonishok and Smidt

(1988)), the only viable explanation is (2). But (2) is problematic because it admits that traders are irrational!

The scientific view of behavioral finance is that known heuristics account for the first two "anomalies" but not the third. Neither behavioral finance nor economics considers risk aversion "irrational." Yet it is — it gives away money!

7 Summary

This article and its companion Moffitt (2017d) dispense with timeworn clichés⁶ about rational actors and efficient markets, which have little to do with how actual market participants behave — arguing instead that actors are neither rational nor markets efficient. It takes the view that markets are best understood as the result of strategic interaction among the participants. In this view, each strategy can have its day in the sun depending, of course, on the mix of other strategies it faces. Trading based on fundamental analysis, technical analysis and arbitrage will be successful, albeit not all the time nor all at the same time. Market movement occurs only when the transacting parties use different strategies; markets respond both to "external" news and to "internal" effects, that is, to secondary effects due only to strategic interaction, not news.

One cannot gain a durable edge in investing without understanding other participants' strategies, and a critical component of such understanding is investor psychology. Thus the new field of behavioral finance is essential for anyone who wishes to invest or speculate successfully. But one must also understand the basic principles of game analysis and gambling theory, since most patterned phenomena in markets have causes both behavioral and strategic.

A experienced trader's response to this article might be, "Isn't this obvious, that good gambling is essential to successful trading?" My answer: "Yes, it is obvious." But certain of its consequences are definitely not obvious. For example, how can you guess — without any data analysis — that a hypothesized anomaly is like to persist? The obvious answer according to efficient market thinking, that it will disappear after discovery, is absolutely wrong! Or, how can you

⁶Has "time-worn cliché" itself become a time-worn cliché?

⁷A colleague communicated that Merton Miller told him that revealed anomalies wouldn't disappear immediately, as efficient market theory requires, but would likely take

guess that a bubble is forming, again without any data analysis? These are consequences of a strategic analysis, and as I said, they are not obvious.

It's time for a revision of market theory. The overwhelming evidence is that markets have never been efficient in the sense of the efficient market hypothesis. Astute readers will realize that the ghosts of bygone inefficiencies still haunt us — only their shapes have shifted.

 $^{3~{\}rm years}$ or so. But this is demonstrably wrong, as the case of market momentum demonstrates.

References

- Alevy, J. E., Haigh, M. S., and List, J. (2006). Information cascades: Evidence from an experiment with financial market professionals. NBER Working Papers 12767, National Bureau of Economic Research, Inc.
- Anand, K., Kirman, A., and Marsili, M. (2013). Epidemics of rules, rational negligence and market crashes. *The European Journal of Finance*, 19(5):438–447.
- Diaconis, P., Holmes, S., and Montgomery, R. (2007). Dynamical Bias in the Coin Toss. *SIAM Review*, 49(2):211–235.
- Fosback, N. (1976). Stock market logic: a sophisticated approach to profits on Wall Street. Institute for Econometric Research.
- Gama, P. M. and Vieira, E. F. S. (2013). Another look at the holiday effect. *Applied Financial Economics*, 23(20):1623 1633.
- Hirsch, Y. (1987). Don't Sell Stocks on Monday. Penguin Group (USA) Incorporated.
- Keim, D. and Ziemba, W. (2000). Security Market Imperfections in Worldwide Equity Markets. Publications of the Newton Institute. Cambridge University Press.
- Lakonishok, J. and Smidt, S. (1988). Are seasonal anomalies real? a ninety-year perspective. *The Review of Financial Studies*, 1(4):403–425.
- Lee, C. M. C., Shleifer, A., and Thaler, R. H. (1991). Investor sentiment and the closed-end fund puzzle. *Journal of Finance*, 46(1):75–109.
- Moffitt, S. D. (2017a). The Strategic Analysis of Financial Markets, Volume 1: Framework. World Scientific Series in Finance. World Scientific.
- Moffitt, S. D. (2017b). The Strategic Analysis of Financial Markets, Volume 2: Trading System Analytics. World Scientific Series in Finance. World Scientific.
- Moffitt, S. D. (2017c). The Tax Day Trade: An Efficient Market Anomaly. Social Science Research Network Working Paper Series.
- Moffitt, S. D. (2017d). Why Markets are Inefficient: A Gambling "Theory" of Financial Markets for Practitioners and Theorists. *Social Science Research Network Working Paper Series*.
- Smith, V., Suchanek, G. L., and Williams, A. (1988). Bubbles, crashes, and endogenous expectations in experimental spot asset markets. *Econometrica*, 56(5):1119–51.

- Steindl, J. (1965). Random Processes and the Growth of Firms. A Study of the Pareto Law, Etc. Economic theory and applied statistics. London.
- Ziemba, W. (2012). Calendar Anomalies and Arbitrage. World Scientific series in finance. World Scientific.
- Ziemba, W. T. (1994). World wide security market regularities. European Journal of Operational Research, 74(2):198–229.

\mathbf{Index}

arbitrage, 2, 8, 15, 16 arbitrageur, 8	market fundamentalism, 7, 15 market personification, 10
bankroll, 11	Mental Accounting, 10
bubbles	philosophical approaches
Dot-Com Bubble of	idealistic, 7, 15
1996-2000, 9	market personification, 10
CAPM, 6	scientific, 9, 15 strategic, 11
closed-end discount puzzle, 8 crashes	professional gamblers, 5, 11, 12
.COM Crash of 2000, 9	prospect theory, 9
Global Crash of 1987, 9 Global Financial Crisis of	rational expectations, 9 rationality, 6–9, 16
2007-8, 9	reading people, 12
2001 0, 3	return
Disposition Effect, 10	risk-adjusted, 2, 8
edge, 5, 11	risk-adjusted return, 2, 8
efficient market hypothesis	
(EMH), 7–9, 16	science
noise trader model, 9	experimental stage, 10 hypothesis-forming stage,
experimental economics, 9	10
gambles surfacional 5 11 19	verification stage, 10
gambler, professional, 5, 11, 12 games & game theory, 2, 11,	scientific approach, 9, 15
12	Shefrin, Hersh, 9
zero-sum, 11	Smith, Vernon, 9
zoro sum, 11	Soros, George, 11
heuristics & biases	Statman, Meir, 9
disposition effect, 10	Status Quo Bias, 10
mental accounting, 10	strategic approach, 11
status quo bias, 10	tall 19
high-frequency, 10	tell, 12 Thaler, Richard, 9
Kahneman, Daniel, 9	Tversky, Amos, 9