

Market Efficiency versus Behavioral Finance

A Discussion with Burton Malkiel, Princeton University, and Sendhil Mullainathan, Harvard University

Led by Bruce Stangle, Analysis Group, Inc.*

Bruce Stangle: I am Bruce Stangle, chairman and co-founder of the economic consulting firm Analysis Group, Inc., and it is my privilege to lead this discussion of the continuing relevance of efficient market theory.

Over 30 years ago, Professor Burton G. Malkiel of Princeton University published the first edition of *A Random Walk Down Wall Street*.¹ There he maintained that stock prices follow a random walk and cannot systematically be predicted by stock market professionals. Professor Malkiel argued that investors throwing darts at the stock listings could do as well as professional stock pickers. Underpinning his argument of a random walk lay one of the most fundamental tenets of finance: markets are efficient, meaning that they rationally and accurately reflect all publicly available information.

Even as *A Random Walk* has become one of the most widely read books on Wall Street, market efficiency has been challenged by behavioral finance, described in a recent *New York Times* article as the “brand of economics that tries to explain the market in terms of the way humans behave—both rationally and not.”² Professor Sendhil Mullainathan of Harvard University is a leading scholar in behavioral finance, which focuses on when and how human behavior differs from the rational, profit-seeking behavior typified by proponents of market efficiency. In particular, he believes that humans have limits to their cognitive abilities and their willpower, and may not always act rationally.

Despite the obvious—and numerous—ways in which the efficient market and behavioral finance camps differ, they are, surprisingly, in complete agreement on their advice to the individual investor.

Dr. Malkiel, it's been over 30 years since your first edition of *A Random Walk Down Wall Street*, but there still seems to be a lot of controversy about the Efficient Market Hypothesis, or EMH. Has the academic profession's thinking changed about what constitutes an efficient market and whether stock markets are in fact efficient?

Burton Malkiel: I don't know of any idea in economics that I've studied and been associated with over this period of time that has held up as well. People used to think that monetarism worked quite well—that there was a very tight relationship between economic activity and the quantity of money. And now even Milton Friedman agrees that the monetary relationship isn't quite so tight as people once thought it was. But the concept of an efficient market—that on average you can't beat the market and so you're better off with an index fund—has been extensively analyzed and has met the test of time extraordinarily well. Even documented pricing anomalies like the weekend effect or the January effect have not held up, at least for the most part.

But there's no question that there are a lot of people, including Sendhil Mullainathan here on my right, who disagree with me that markets are in the main very efficient. Someone on the behavioral side would argue that markets are largely inefficient, and that markets often get things wrong. Dick Thaler, a behavioralist at the University of Chicago, says that the mispricing we've seen is only the tip of the iceberg and that the market could be in fact 90% inefficient. My view is quite the opposite—that occasionally the market may get things wrong, but it is 90% efficient.

Stangle: Dr. Mullainathan, there is clearly a powerful debate between your world view and Burton Malkiel's—do you think the economics profession is going to settle out so that one of these is eventually determined to be right?

Sendhil Mullainathan: For about 30 or 40 years, life was very good for advocates of EMH—there was simply no question, in terms of data, of another model. But however you want to interpret the evidence from the last 15 years, people are slowly starting to realize that the party is over. For example, we have documented market anomalies—like glamour stocks consistently underperforming relative to value stocks—so we've tried to patch up the original model

* Mr. Stangle would like to acknowledge the assistance of his colleagues Steve Herscovici and Eileen Harrington.

1. Burton G. Malkiel, *A Random Walk Down Wall Street* (New York: W.W. Norton &

Company, Inc., 1973).

2. Joseph Nocera, “The Quantitative, Data-Based, Risk Massaging Road to Riches,” *The New York Times Magazine*, June 5, 2005.

Figure 1 **Getting Burned by Hot Funds**

Fund Name	1997–1999		2000–2002	
	Rank	Average Annual Return (%)	Rank*	Average Annual Return (%)
Rydex: OTC Fund; Investor Shares	1	65.82	841	-37.07
RS Inv: Emerg Growth	2	62.46	832	-31.17
Morgan Stanley Capital Opportunity: B	3	59.47	845	-40.72
Janus Olympus Fund	4	58.49	791	-27.42
Janus Twenty	5	54.79	801	-28.63
Managers: Capital Appreciation	6	53.28	798	-28.20
Janus Mercury	7	51.51	790	-27.24
Fidelity Aggressive Growth	8	51.46	843	-39.09
Van Wagoner: Emerging Growth: A	9	50.05	851	-51.66
WM: Growth: A	10	49.67	793	-27.88
Average Top 10		55.70		-33.91
S&P 500 Return		27.56		-14.55

*Out of 851 funds with at least \$100 million in assets
Source: Bogle Financial Research Center.

by attributing the anomalies to missing risk factors and adding those risk factors to the model. Still, there is clearly a faction that won't give up on the idea of "the model"—along with others of us who recognize the inherent complexity of the financial markets and that it's not as simple as returns and data.

Malkiel: What I find really very interesting, however, is that for all the controversy, the advice for both individual and institutional investors is exactly the same: buy and hold a broad-based, low-cost index fund. I recommended index funds in the first edition of *A Random Walk* and that was before index funds even existed. In fact, the response from readers was, "But you can't buy the index"—and at the time I said, "Well, it's about time you were able to." Index funds have been around for a long time now, and their record is extraordinarily strong.

Stangle: Can you tell us a little more about how index funds have performed?

Malkiel: If you take all of the mutual funds in existence in 1970, and I think there were 355 of them, over 200 have died along the way. So there's already a survivorship bias in these numbers. But if you then look at the surviving mutual funds that have beaten the S&P 500 index by two percentage points or more since 1970, you will find that there are only five of them. It's like looking for a needle in a haystack—you don't know which funds will succeed. I am more convinced than ever that if you just buy the haystack, namely an index fund, you will be much better off.

There is very clear evidence that active mutual funds underperform a low-cost index mutual fund, on average. The typical active fund charges 140 basis points in expenses, and the index fund charges less than 20 basis points. In addition, the typical mutual fund completely turns over its portfolio each year, so you've got all of the transaction costs—and it's not just the three or four or five cents a share, it's also the bid-ask spread or the market impact cost that accounts for the typical active fund's underperformance. In decade after decade, we see the median active fund underperforming by 200 or more basis points.

And even the active funds that outperform the market are not able to maintain their edge—there's almost no persistence in excess performance. My brother-in-law, who is a doctor—and doctors are the worst investors, by the way—once said to me, "I don't want to be in your boring index fund. *This* is where the action is. *This* is where people tell me that they're making all their money." So he sold his index fund in late 1999 and bought one of those high-tech stock funds, which ultimately did three times worse than the index.

There's a chart in my *Random Walk Guide to Investing* that illustrates the disastrous effect of investing in the mutual funds with the best records from 1997 through 1999 (see chart above).³ I've updated those data recently and looked at the four years ending in 2000 versus the four years ending in 2004, and it's just as bad. In decade after decade, the top funds in one period are often the bottom funds in the next. Sure, there are a handful of funds that outperform, but there's no way to tell in advance which ones they're going to be, and as I said, there's no persistence in

3. Burton G. Malkiel, *The Random Walk Guide to Investing: Ten Rules for Financial Success* (New York: W.W. Norton & Company, Inc., 2003).

excess performance. The only clear predictability in mutual fund performance is that the higher the costs in the form of management fees, and the higher the turnover, the worse the fund does. My paper illustrating these findings was recently published by the *Journal of Portfolio Management*.⁴

Are Stock Prices Predictable? And Has EMH Survived the Bubble?

Stangle: According to the Efficient Market Hypothesis, one cannot predict stock prices or their future trend. Dr. Mullainathan, you are on record as saying that market prices are to a considerable extent predictable, or at least weakly predictable. How does that square with Dr. Malkiel's findings?

Mullainathan: The Efficient Market Hypothesis and Dr. Malkiel's book, *A Random Walk Down Wall Street*, have a funny reversible implication that says you can't make money in the market and you can't lose money in the market. You can lose transaction costs, but you can't lose money in the market. It's a comforting theory on one level—you can't screw up consistently. But from a behavioral finance view, there are some market inefficiencies, and we do see some predictability.

Malkiel: But what I reject is the notion that there is sufficient predictability to be useful for investors. There's a difference between a statistically significant relationship and an economically significant relationship. Robert Shiller, one of the early behavioralists, observed that stock prices are far too volatile to be explained by earnings and dividends. He did some work with John Campbell that showed that lower dividend yields on the S&P 500 were associated with lower future returns. Then when the dividend model no longer seemed to work, Campbell and Shiller suggested that perhaps dividend behavior had changed, and they re-did their work with P/E multiples. They found that when P/E multiples are well above average, future market returns are going to be terrible, and when P/E multiples are well below average, market returns are going to be higher than normal. Of course, this is really for the entire market, as opposed to individual companies.

Campbell and Shiller presented their work to the Board of Governors of the Federal Reserve in December 1996—just before Alan Greenspan's famous "irrational exuberance" remark—showing that the relationship between P/Es and long-horizon returns captures about 40% of the movement in the market. That's a pretty high R-squared. They said at the time that the stock market was terribly overvalued, and they predicted zero or negative rates of return. In fact,

Shiller's work predicted very low or negative rates of return from the early 1990s on.

Stangle: It's a good thing the Yale Endowment didn't act on that advice!

Malkiel: Exactly. From the time of Greenspan's irrational exuberance speech to the end of 2004, the market earned an 8% rate of return. And that includes the bursting of the Internet bubble—and I will use the word bubble, particularly now that even Gene Fama, a long-standing proponent of efficient markets, has finally conceded that there was a bubble.

I have taken the Campbell-Shiller dividend and P/E findings and simulated whether an investor could do better by going into bonds when the Campbell-Shiller model says the market's overpriced versus just buying and holding all the way through. A buy and hold strategy, even without rebalancing, does better than using Campbell-Shiller to move between bonds and stocks.

Stangle: What happens with rebalancing?

Malkiel: Actually, that's an interesting question. Let's say your preferred allocation is two-thirds equity and one-third bonds. You're a stock market investor trying to get in and out of the stock market, so you'll be out of the stock market when Campbell-Shiller says the market is overpriced. It still doesn't work—you come out with less money than if you were to just buy and hold. Rebalancing is clearly helpful to keep risk in control, but using valuation parameters to time the market does not help you.

Campbell and Shiller now say that the stock market is very high, and future returns are going to be low. I agree with that. I think we're in a single-digit world now. The rate of return on the stock market averaged 10.4% annually over the period 1926-2004. But current P/E multiples are higher than they were in 1926, and dividend yields are lower. My prediction is that we're probably looking at returns of around 7-7½% for the next decade or so. A Gordon model would indicate that when you start off with a lower dividend yield, you'll get a lower return. I think that's true. But it's not because the market is irrationally exuberant—it's because ten-year Treasuries are yielding about 4%. This is really where the weak form predictability comes in—not from irrational exuberance, but from the mean reversion of interest rates over time. So I think there is a little predictability in terms of when returns are going to be high or low, but not enough to do an investor any good, because nobody can predict when the market will turn. In 1982, when

4. Burton G. Malkiel, "Can Predictable Patterns in Stock Market Returns be Exploited with Real Money?," *Journal of Portfolio Management*, 30th Anniversary Issue (2004).

P/Es were eight and dividend yields were over six, a Gordon model would have predicted higher-than-average returns, which we got.

Stangle: But that's when the long Treasury rate was 13-14%.

Malkiel: Exactly. So, what's the opposite of irrational exuberance—irrational pessimism?

Now, where I will give the behavioralists their due is that I really do think the market gets it wrong sometimes. I did a piece in the *Wall Street Journal* early in 2000 in which I observed that if Cisco continued to generate a 15% rate of return and the GDP grew at 5%, then after not too many years the market capitalization of Cisco would be greater than our GDP, which just isn't plausible.⁵ I do think that during the bubble the market got it wrong, but we only knew the magnitude of the bubble after the fact. There's simply not enough predictability to help an investor, especially net of transaction costs.

Stangle: One of the underpinnings of the Efficient Market Hypothesis is that prices are always correct, fully rational, and that they reflect all available information.

Malkiel: That's why I'm a random walker with a crutch, because after the fact we know that errors are made.

Stangle: So prices were not correct during the bubble period.

Malkiel: No, but we only know that ex post. We don't know ex ante. And we certainly don't know how far it's going to go. Don't forget, Shiller was saying we were in a bubble in the early 1990s.

Stangle: And if you hedge, it gets very expensive. You could go broke buying the hedge, right?

Malkiel: That's correct.

Stangle: Were there hedge fund managers during the bubble who recognized that it wasn't sustainable and were therefore taking out big hedges in the market?

Malkiel: In fact, a behavioral colleague of mine did some work on the bubble and according to his analysis, the hedge funds were all momentum players, and they weren't hedging against anything. They were piling on.

Stangle: So they were exacerbating the bubble?

Malkiel: That's right.

Mullainathan: My research has similar findings regarding trading behavior that I, for one, hadn't appreciated before. For example, assume that noise traders infer something from price momentum, like stocks keep getting better or the stock is very hot. There are actually investors who call themselves "arbitrageurs" who not only don't lean against the wind, they are part of the wind. So if these arbitrageurs see that Internet stocks are getting hot, what would they do?

Stangle: They'd pile on.

Mullainathan: That's right—because they think it is going to get even hotter. So these traders might be making bubbles worse, because what they really want to do is ride a bubble all the way up and get out a minute before it starts to pop.

Stangle: Dr. Mullainathan, does the Internet bubble refute the EMH?

Mullainathan: Well, there are two ways to look at the Internet bubble. One is to say that you can't make money in the market. Let's say it is 1999, and an investor says, "I cannot believe that a company with no earnings could trade at these ridiculous P/Es." One response would be to say, "Well, markets are efficient. So this must be the market's best guess about the future earnings for this company."

A weaker response would be to say, "You know, this stock is overvalued. But things could get much worse before they get better." So, if you take a short position on the stock and it goes up for another three years, you might lose your shirt—which, as we know, is what happened! Now, that doesn't imply that pricing is correct in an informational sense. It suggests that our best guess may be that these prices are wrong, but because they might be even *more* wrong before they are corrected, you can't necessarily act on it. From a policy point of view, I think that those two views are very different. If we know that there's a bus coming down the road sometime, but we just don't know when, we'll probably take a very different attitude toward waiting for the bus than if we have no idea whether there will ever be a bus. If the market is overvalued, and if I have a long enough horizon, I might simply decide to be a lot less aggressive in equities because I don't want to get nailed in one short, big drop.

5. Burton G. Malkiel, "Tracking Stocks Are Likely to Derail," *The Wall Street Journal* (February 14, 2000).

Stangle: So you're saying that prices are predictable, because we know they are going to drop. Is the similarity to EMH that we don't know when?

Mullainathan: Exactly. In behavioral finance, stock prices are weakly predictable. I think the key here is arbitrage, which is one area where EMH and behavioral finance agree—they both recognize the importance of arbitrage. Take a foreign exchange market, for example. The behavioral finance view is if you buy a dollar, and convert it to yen, and convert it to pesos, and convert it back to dollars, there should be no huge arbitrage opportunity net of transaction costs—and yet there are lots of people who spend time looking for exactly these sorts of opportunities. It doesn't mean the yen isn't overvalued in some long-run sense, and that you expect it to drop. It means that all the easy arbitrage has been taken care of.

Where I think the traditional EMH differs from behavioral finance is that the traditional EMH will say that the complicated arbitrage is also taken care of. The ideal case for EMH, they would say, was in 1998 when some of the Internet companies were grossly overvalued. EMH would say that if they were overvalued, there would be hedge funds that would take a short position and carry it out until prices eventually fell.

But there are not many hedge funds with the horizon to do that. If you're a hedge fund manager, or a mutual fund manager, and you take that core position, the first year you'll get nailed if the price goes up. Your investors will begin to get nervous. If you're lucky, you might be good for another year. But if you get nailed a second year, it's all over—how long a horizon can a typical hedge fund manager hope to have? So behavioral finance recognizes that you can have predictability, albeit a very weak predictability.

Malkiel: Yes, but it's so weak that it's of no practical use, even if you don't pay transaction costs. Let me give you another example of something that was clearly irrational, an example that Dick Thaler used in a debate that we had at the Wharton School in 2002. In late 1999, 3Com, which owned Palm Pilot, spun off 5% of its Palm Pilot shares. Palm Pilots were becoming pretty popular at that point. If you took the number of shares of Palm Pilot that 3Com owned, and multiplied it by the price in the market of Palm Pilot, you arrived at an asset value of 3Com that was twice what 3Com was selling for in the market. And 3Com had said they were going to spin off the other 95% of their Palm Pilot shares. This is definitely a case where I can tell you *ex ante* that there's something irrational. So I went to my

broker and told him that I wanted to short Palm Pilot and buy 3Com, because that's the arbitrage. But my broker informed me that a lot of people in the hedge fund area had been asking him to do the same thing, and there weren't enough Palm Pilot shares to borrow to effect the arbitrage. When there is an imperfection in the market, lots of people see it and try to act on it, which is why it's so hard to beat the market.

Even though I thought in 1999 that the market was awfully overpriced, I didn't sell short, and it's a good thing I didn't. It's only *ex post* that you can tell for sure what the turning point is. *Ex ante*, you don't know how long a pricing "mistake" will last or how far it's going to go. For that reason, I don't think you can do better than buy and hold.

This gets back to the difference between statistical predictability and economically meaningful predictability. If you look at stocks that have had a poor return over the last five years compared to the ones that have had great returns—where there's been irrational exuberance—you should sell the winners and buy the losers, because statistically, if you've had lousy returns over the last five years, you'll have better returns over the next five years. And if you've had huge returns over the last five years, you will have lower future returns. I find enormous predictability from that.

Stangle: But can you make money from that strategy?

Malkiel: No—because the worst get better, and the best get worse, but they all do about the same! So there's some predictability, but I remain convinced of market efficiency because in an inefficient market there are clear arbitrage opportunities to make money—and those simply don't exist, not even for the professionals. I recently conducted a study with one of your Analysis Group colleagues on hedge funds, and there's a great deal of bias in the reported numbers, but when you correct for the biases, the hedge funds aren't making nearly as much money as they are reputed to be making.⁶ I just don't see the arbitrage opportunities around.

And that's why I say that although markets get it wrong from time to time, and there was certainly a bubble—probably the biggest bubble of all time, because there was more money lost in that bubble than in any other—there was no predictable way of making money on it. If you sold after Alan Greenspan's irrational exuberance speech, you did very poorly. Obviously, if you happened to sell in March 2000, you did very well. But not even the behavioralists can do that reliably.

6. Burton G. Malkiel and Atanu Saha, Analysis Group, "Hedge Funds: Risk and Return," *Financial Analysts Journal*, forthcoming.

How Does the EMH Account for Trading Volume?

Stangle: In a strict view of EMH, prices are always “correct” because they reflect all available information. In such a world, there shouldn’t be a lot of disagreement—so wouldn’t there be very little trading?

Malkiel: That’s true. There’s too much trading. In fact, that’s one of the arguments that the behavioralists and others have against the efficiency of the market. If the market were efficient, people wouldn’t be doing all of the trading that they do, because it would be a waste of time and money.

Stangle: Is there anything that you would do to cut down on trading, if you were a policy maker?

Malkiel: No. Because I think if you impose a transaction tax, liquidity will dry up, which would do more harm than good.

Stangle: But isn’t trading driven by differences in people’s beliefs? Or by investors’ overconfidence in their own interpretation of available information?

Mullainathan: That’s an excellent question. In EMH, trading is basically driven by re-balancing or liquidity needs. But it’s hard to believe that re-balancing and liquidity demand is high enough to drive the tremendous volume that we see. This is an area that behavioral finance is only now starting to notice. With EMH, there’s very little room for differences among investors, because the only reason for differences in beliefs would be differences in information.

Stangle: That strikes me as an awfully strong statement about the EMH—that it doesn’t allow for variation in beliefs. I thought the Efficient Market Hypothesis would allow investors to look at the same information and interpret it differently, but that on average there is no systematic misinterpretation of the data. So the price is still correct, even though you and I may still trade if I believe the stock’s going up and you believe the stock is going down. That’s what makes for a horse race.

Mullainathan: In a behavioral view, however, people can have differences of opinion because they have different biases, not just different information—or a bias that operates in different ways. Those differences create the ability for a behavioral model to generate tons of volume.

Let’s suppose that people tend to coarsely categorize stocks as bad stocks, good stocks, and average stocks. Say that Person A thinks that a particular stock is an average stock, but

Person B has seen two or three earnings announcements and concludes that it’s actually a bad stock. At any given price, Person A would tend to think he owns an underpriced stock, where Person B thinks it’s overpriced. These differences in opinion generate a very strong motive for trading. Person A thinks that Person B is wrong, and B thinks that A is wrong, and they both think they’re making money when they trade. This is not about liquidity, it’s about heterogeneity of opinions in the market—and not just because of differences in information, because if it were just about information, Person A would think, “What does Person B know that I don’t know?” The real question is whether we can get an understanding of volume by understanding heterogeneity.

There are two forces at work here. The first force is private information—“Why does she believe what she does?”—which motivates trading and leads to a rational process of making guesses about investors’ private information based on their willingness to trade. This iterative guessing process will quickly get investors to converge to common beliefs, so the process of trading should really cause heterogeneity to disappear if it is based on information rather than interpretation.

The second force is heterogeneity of opinion. But with so much information coming out, even our opinions will converge relatively quickly. And yet it’s remarkable that with the transparency in the market, there is still so much heterogeneity of opinion. It is a fact that we really struggle to capture and analyze.

Malkiel: When I give talks to institutional investors, I agree with the behavioralists that there are some good lessons for investors from behavioral finance. I even have Danny Kahneman lecture to my class about his findings in human judgment and decision-making for which he won the Nobel Prize in 2002. And what we’ve learned from the behavioralists is that there are at least two reasons for excessive trading. The first is probably overconfidence on the part of investors who really think they know something—and again, I think the behavioralists are onto something here. Professional traders are probably the most overconfident in their belief that they really do know something and that they can trade between one stock and another. Dick Thaler used to say that one implication of overconfidence is that growth stocks are always overpriced relative to value stocks—although I find it’s much more a matter of mean reversion, because there’s no real difference between the performance of growth funds and value funds over long time periods.

Terry Odean has a paper about individual trading that shows that the people who traded the most did the worst.⁷ My research on professional investors shows exactly

7. Terrance Odean, “Do Investors Trade Too Much?,” *American Economic Review*, Vol. 89, No. 5 (December 1999), pp. 1279-1298.

the same. Terry's research also shows that men are more overconfident than women, so his advice—which I agree with—is that if you're a male thinking of trading, ask your wife first, because she'll instill some rationality.

A second reason for excessive trading is perverse incentives. If a money manager just sits there and does nothing, which is what they probably should do, it's pretty hard to justify charging 150 basis points for management. Brokers generally make money if they encourage people to trade, so I think there's a business angle behind the trading. There's a rational reason for people in the business to encourage trading.

Stangle: On the investor side, a related concept might be Kahneman's notion of loss aversion, namely that people feel much worse off when they lose something relative to how good they feel if they win a similar amount. So if stocks are uniformly trading at their 52-week lows, you would expect to see less trading. And yet over the last two or three years in the stock market, we actually saw much higher volumes—so people are selling at a loss, on average, because the average stock is held for such a short period of time.

Mullainathan: My guess is that as the market started to go down, all the people who bought at, say, X—who are now starting to see their gains being eroded—are selling. But all the people who bought at a price higher than X are still holding on the way down. The average hold time may be low, but it's the distribution you have to look at. If you knew everyone who bought stocks, and you had the data on the distribution of purchase prices, then you could really get a sense of things like price support. For example, you might notice that a lot of people bought at, say, 51. So, once the stock goes below 51, you know the market really has no self-protection. I think that once we start to understand how a simple concept like that plays out, then we'll start to understand volume better.

Of course, loss aversion is a strong element of people's psychology, and no one likes to lose. But loss aversion actually means that if I give you something, and then take it back, that net transaction leaves you worse off. As a result, we see investors unwilling to sell a stock when it is below the price at which they bought, even though they can take the proceeds and invest in something else at a "good" price. Investors seem to sell losers too late and to sell winners too early, and if we can understand people's utility functions, we can better understand why they trade, and thus what drives trading volume.

Malkiel: That's a good point—if you look at what individuals do, they sell their winners and they hold on to their losers. It's exactly the wrong thing to do, not because there's necessarily any price momentum but because if you sell your losers, the government subsidizes part of your loss in the form of a tax deduction. If you sell your winners,

however, you have to pay more tax. In my *Random Walk Guide to Investing*, I have a chapter on rules for investors that mentions this.

Mullainathan: What's even more interesting—and it's probably the best and most interesting evidence that we have in behavioral finance—is that small investors—and it's typically day traders—consistently lose money. They are consistently on the wrong side of the trade. In that sense, I'd say that behavioral finance has strengthened one of the implicit pieces of advice in *A Random Walk Down Wall Street*: Don't try to make money in the market because most people, particularly small investors, typically lose a lot of money.

Stangle: Is that net of transaction costs also?

Mullainathan: Yes. If you could be on the other side of every one of the small investors' trades, you would really be making money! In fact, I know a few hedge funds that have been trying to get real data on where these small investors are investing—and then doing the opposite.

Stangle: So if you were a hedge fund manager and you could buy the trading tapes for a brokerage firm, and get on the other side of all the day traders' trades, that would be a profitable strategy?

Malkiel: There are good insights from behavioral finance, but one of them is not that there are ways to use behavioral finance to gain excess returns. I have a long-running argument with Danny Kahneman about being on the other side of trades. He says, "It must be the bright people on the other side who are making the money." And I say, "No, it's the croupier who's making the money." Both sides are losing, and it's the house that's making the money—it's the stock exchange specialists and the middlemen who are making the money.

Rationality and Arbitrage

Stangle: One of the underpinnings of the Efficient Market Hypothesis is that profit maximization and self-interest are what drive investors' activities. But some of the behavioral finance thinking is that there are other models of human endeavor and utility, including altruism or caring for someone else. Would modifying profit maximization as the underlying principle of the EMH help to ensure the durability of the random walk theory?

Malkiel: No. Look at some of the other stuff about bubbles—it's overconfidence and greed. There isn't any altruism—it's just the opposite. Individuals may act altruistically, but that doesn't make the market altruistic.

Stangle: So then it's a mischaracterization of the EMH to say it implies that all traders are rational.

Malkiel: Absolutely. The EMH says that there are enough rational traders that there are no arbitrage opportunities. You must know the joke about the finance professor and the graduate student who see a hundred dollar bill on the ground. The graduate student starts to pick it up, and the professor says, "Don't bother—if it were really a hundred dollar bill, it wouldn't be there." My view is the following: If you see mispricing in the market, act on it immediately. Because markets are sufficiently efficient that it's not going to last very long.

In the early days of some of the derivative markets, options weren't always priced correctly, and there were possible arbitrages between the common, the option, and the convertible security. But there are so many hedge funds now that even the hedge fund managers will tell you it's all gone. So whether or not there are lots of irrational investors in the market is not the point. The point is whether there are any arbitrage opportunities, any real hundred dollar bills on the ground. I don't see any consistent evidence of them.

Mullainathan: Sometimes there are good arbitrage opportunities in markets that are just opening up, where the arbitrageurs haven't had a chance to enter completely—India, for example. But I think arbitrage is actually weak. For example, if you look at the five largest winners and losers strategy, you'll do well on average, but you'll have years when you're nailed. And that's usually the problem. There is a class of models about the limitations of arbitrage, about moving beyond the fine-grained structure of an anomaly to understand investors' stock selection and when it is or isn't possible to arbitrage. This class of models is less concerned with what irrational traders do because their beliefs are just a kind of noise. Such a model might take those traders out of the model altogether in order to focus on completely rational, profit-maximizing traders—and on arbitrage—and on how they both affect prices.

Malkiel: But if markets were as irrational and inefficient as people say, then we clearly ought to see some opportunities for excess returns. The hedge fund managers are paid two and twenty: a 2% management fee and 20% of all the profits. And these are smart people, so if markets were so inefficient, they should be cleaning up. For me, the strongest evidence that markets are very efficient is that you don't see professionals making excess returns. And it strikes me that the behavioralists have got to cope with that argument.

Mullainathan: I'm doing some work now on pattern recognition. The mind is set up to recognize patterns and it's amazingly quick at doing so. The computer processing power needed to replicate it is enormous. The brain is very attuned to finding patterns, which is generally a useful thing. The problem is when you put it into a context where it doesn't work well—when there are no patterns to be found. It is very hard for people to process situations that are truly noise because we want to find patterns in the data, and because it is so rare in life that you encounter real noise. An unfortunate feature of asset markets is that when they work really well, they're their own worst enemies. When there is a lot of arbitrage, all the patterns that we're so good at finding—and that arbitrageurs are good at finding—are being arbitrated away, so that what's left is a lot of noise. We end up with the appearance of a pattern when there's no real pattern to be found. And because our brains are geared to finding some sense in things, we have a hard time saying, "That's just noise." So the naïve or insecure investor is going to hire a money manager, someone who claims to be good at finding patterns, rather than assuming that there are no patterns.

Malkiel: And, interestingly, that "noise" in the market is not exactly a random walk, because as Andy Lo and Craig MacKinlay pointed out in their book *A Non-Random Walk Down Wall Street*,⁸ the market isn't a perfect random walk; there is a little short-term momentum, which will create the appearance of patterns. But again, the quantitative managers who have tried to use that strategy have pretty much picked it clean, so while it may not be a perfect random walk statistically, there's no longer enough momentum in the market to provide any profitable opportunities.

Stangle: Suppose you had a market composed of a thousand traders. To make the market efficient, how many of those traders need to be rational to counterbalance the irrational ones?

Malkiel: My guess is that if 10% of the investors were rational, that would be sufficient for market efficiency.

But let me expand on that answer by posing another question that people often ask me: "What if everybody indexed? Wouldn't that mean that the market was going to be irrational?" There is a little bit of a paradox in market efficiency in that to induce people to do research, they need to be able to make a profit to compensate them for their efforts. I'll start worrying about that when 90-95% of the market is indexed. But right now, only 25% of institutional money is indexed, and only 10% of individual money is indexed.

8. Andrew W. Lo and Craig MacKinlay, *A Non-Random Walk Down Wall Street* (Princeton: Princeton University Press, 1999).

Stangle: Has that 10% increased since the bubble, or is it relatively flat?

Malkiel: No, it's growing all the time. In fact, the Vanguard 500 index fund is the biggest mutual fund in the world. But no broker is going to tell you to buy an index fund, because the broker doesn't get paid for that. Of course, the index fund has a built-in disadvantage, relative to an actively managed fund: the index fund is always fully invested, since that's the only way to track the index, so the index fund takes the full hit when the market is going down. They hold some cash to meet redemptions, but they offset it in the futures market. The typical active manager, on the other hand, always holds 5% in cash.

Investor Choice and Public Policy

Stangle: In light of the ongoing discussions on personal retirement accounts, do you have a view on the proposal that Americans should be allowed to put some of their Social Security funds into mutual funds? Is that a good idea from a policy perspective? And if so, what rules would you set up about where and how people could invest?

Malkiel: As a nation, we are undersavers. Anything we can do to encourage more savings would be a very good thing. My preference would be to have these accounts in addition to the Social Security system that we already have, because as much as I would like to see individual accounts, the transition from our pay-as-you-go system will not be that easy. And because I agree with the behavioralists that people make mistakes and are prone to biases such as overconfidence and loss aversion, I would impose considerable constraints. I would require that the accounts be diversified, first of all, and that equity holdings be restricted to the broadest possible index fund, which incidentally is not the S&P 500 but the total market. The argument for indexing bonds is even stronger than for stocks, because bonds are essentially a commodity product.

Stangle: One of the things that the behavioralists talk about is the concept of information overload. Because people can't process all the information they get, they develop the wrong investment heuristic and the wrong approach. For example, when a typical new employee is enrolled in a 401K plan, they are told to fill out the forms—but they're not given any guidance as to what to pick.

Malkiel: In fact, if you're given too much choice, it's often confusing. I wouldn't give people a lot of choice in personal Social Security accounts.

Stangle: We discussed earlier the concept of loss aversion. How do you distinguish investor loss aversion, which is

based on a fear of making the wrong choice, from other causes of aversion, such as the lack of adequate information or adequate time to manage one's investments effectively? Or simply the desire to have someone smarter than oneself figure it out instead?

Mullainathan: My guess is that your last point is the psychologically more important story, especially if it's not clear what the information gap is. For example, you might have informational seminars about 401Ks that you pay people to attend, but somehow this doesn't work very well. People know there's a complicated problem that they need to solve, and they acknowledge the uncertainty of their labor income and that stocks are risky. But they don't know how risky. People go to financial advisors because there is a kind of comfort—even if it's a false comfort—in being able to say, "Here's a person who does this for a living."

Stangle: Is there a role for behavioral finance in informing public policy?

Mullainathan: Well, I think that many economists feel that choice is good, and more choice is better, which has clear policy implications. But behavioral finance suggests that more choice may not be good, which has very different policy implications. For example, giving people the opportunity to trade actively in their Social Security portfolios is not necessarily a good thing. But if we're really dead set on allowing people to invest some of their Social Security wealth, then there are reasonable ways of doing so.

For example, there's the blank slate model versus the default model. In the blank slate model, people have free rein over their investment choices. But the default model might be 50% stock and 50% bonds, with the stock proportion declining as a function of the investor's age—so if the investor makes no selections, he or she will end up with the default selection. The end result may be similar from an economist's point of view, but from a psychological point of view those models are very different. There are a lot of studies now on what constitutes a default situation and how, even on very big decisions like this, a default "option" can have a very powerful effect.

Stangle: Like signing up for a 401K plan, where perhaps by default the money goes into cash.

Mullainathan: Yes. And we should also think about what and how to teach individual investors that would help them become better investors, and make better decisions with their money when the time comes.

Stangle: Could you also better inform the lawmakers? When they set up the 401K laws, for example, they could

have written them in such a way that the company had to put their participants in a particular asset allocation rather than offer a choice.

Mullainathan: We are really only beginning to scratch the surface of such areas as how people choose their portfolios, how and why they use investment managers, which funds are allocated money, what investment managers and fund managers do, and so on. Part of the reason that it's taken so long is that the EMH is so powerful in insisting that markets are efficient and that on average investors are choosing the optimal portfolios and that there's a fundamental rationality underlying everything, so that individual investor behavior doesn't really matter. It is only when you start to recognize that people have difficulty processing information, and they have difficulty in evaluating the status quo and making the appropriate adjustments, and they have difficulty making choices, that you begin to realize that the number and type of investment alternatives may matter—and that the investment process in general is worth studying.

Stangle: There's also the impact of marketing—and perhaps one of the reasons why people invest in actively managed funds is because they're chasing past performance, which is widely touted.

Malkiel: And yet this strategy doesn't work—we know that there isn't any persistence in performance.

Maybe there's something to the CNBC “too much information” effect, with people who seem very professional and knowledgeable suggesting that a particular piece of information will be helpful in “getting ahead of the curve.” But the fact is that when there's a bad earnings report, it's usually announced after the market closes. By the time the market price opens the next day, the news is in the price, so the individual investor has no hope of profiting from it.

How Do the Experts Invest Their Money?

Stangle: In your *Random Walk Guide*, you offered very clear advice on asset allocation for each of four different age groups.

Malkiel: Yes, I recommended a mix of 65% stocks and 20% bonds for someone in his or her mid-twenties, with the balance in cash and REITs, shifting over time to 25% stocks and 50% bonds for someone in his or her late sixties and beyond. But these are just rough guides, and any individual will be above or below, depending upon their attitude toward risk and how well they sleep at night.

Stangle: What asset allocation do you follow in your own investing behavior?

Malkiel: Well, I'm somewhat more aggressive. I don't think there's anybody who spends their life working on the stock market—and I started off working on Wall Street—who doesn't have some kind of a gambling instinct. So I'm inclined to take on more risk—to be more aggressive than most allocation models would be.

Stangle: I read in another interview that you do occasionally have a little fun by investing in stocks.

Malkiel: Yes, the majority of my portfolio is in index funds, but I do buy some individual stocks. Not because I think I'm going to do better than average, but because it's fun. I also go to Atlantic City, and I know perfectly well that even if I play blackjack the right way—even if I always split aces and eights and always double down an eleven—the house still has an advantage, because if I break, and then the dealer breaks, I've lost money. But if I spend a day gambling, and lose only \$50, that's fun.

Stangle: Dr. Mullainathan, how does your research inform your own investment behavior?

Mullainathan: One thing that I do like is trying to find arbitrage opportunities based on my research.

Stangle: Have you found any?

Mullainathan: I think I've found a few things. When I really felt the market was overvalued in 2000, I went short, and I also bought a bunch of put options. And there was another instance of a pharma company that was close to a pure play because they basically had only one drug. There was a favorable paper published in *Nature* about the drug, so I bought the stock. A few days later I saw an article in *The Wall Street Journal*, and the stock went up. Then *The New York Times* found it interesting enough to mention in their Sunday edition, which a lot of people read, and the following Monday the stock went way up. So it is not just information that matters, but how widely diffused the information is. This is the type of bet that a hedge fund would make—they would hire two or three Ph.D.s to read through *Science*, figure out what is out there, and then close the gap.

But by and large, I've given up that type of activity, mainly because this is not how you make money. I've learned that it is far too easy to convince yourself that you've found a good opportunity.

Will the EMH Survive?

Stangle: Dr. Malkiel, that sort of confirms your own point of view. You have a well-deserved pride in what the random walk concept has accomplished for the world and for the

investing public. Do you think it can last another generation in the academy?

Malkiel: I think it can, and I think it will. But I think the behavioral insights will probably last as well.

Stangle: So behavioral finance and the Efficient Market Hypothesis are not mutually exclusive?

Malkiel: I think they can co-exist, because there are some insights from behavioral finance that are very important for investors. But I think the bottom line is that whether you're a behavioralist or an efficient market person, you're both coming out with the same advice. The behavioralists and I may disagree about some things, but we both have exactly the same advice for investors: buy an index fund.

Mullainathan: Still, I think that once you move away from portfolio choice, the two views start to differ. For example, the concept of loss aversion is very important—and just because an index fund has lost money recently, it shouldn't distort an investor's decision to buy a house, for example.

Stangle: But as the “man on the street,” I shouldn't much care whether it's behavioral finance or the EMH that applies, because they both tell me to do the same thing—you can't beat the market, so buy an index fund. What do you see evolving in the years ahead?

Mullainathan: Well, stock market participation has been increasing. But how many people are going to get burned and decide to drop out of equities—and how many people will stay in? At this point, neither the EMH nor behavioral finance offers any real insights into people's attitudes toward the market and how their attitudes change in response to their own experiences and the experiences of those around them—and that's where we need the real insights, because that's what is going to drive market innovation.

Malkiel: I think we'll be seeing innovation in disclosure. More choice may not be a good thing, but better information clearly is. I think companies need to provide better information about their core earnings.

Stangle: Thank you both for your thoughts.