

# Hot Hand, Regression to Mean, and Unmet Expectations: Marketing the Mutual Fund Mirage

OUTSTANDING PAPER: Consumer Behavior

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## ABSTRACT

Investors flock to 5-star mutual funds hoping they're betting on a winner. Be it sports or investments, people believe in a hot hand. In the feature film "The Big Short," economist Richard Thaler compares speculating in financial markets to making side bets on a game of blackjack. Can studying a card game tell us something about the nature of mutual fund returns? Wins and losses from card games produce a statistically significant positive serial correlation in a sequential set of 469 card games (4000+ hands) between two evenly matched players. The result reverses the "hot hand fallacy" reported by Gilovich, Vallone, and Tversky (1985). Short bursts of streaks and slumps are frequent and somewhat predictable, but in the long run results regress to a mean. There are implications for investor education and the marketing practices of mutual fund companies.

## 1. Introduction

Marketing influences mutual fund sales for better or worse. Investment firms exuberantly promote their mutual funds touting 4-star and 5-star Morningstar ratings. The marketing is effective. Over a 12-month period, investors put almost \$190 billion into 5-star funds while pulling out over \$240 billion from 2-star and 3-star funds (Waggoner, 2017). Investment firms with top-rated funds make Morningstar ratings a part of an investor's decision process. But does this practice make consumers better off? A critical Wall Street Journal article (Grind, McGinty, and Krouse, 2017, henceforth GMK) says, no! Consumers don't buy mutual funds to speculate, they want long-term stability and growth. Unfortunately, as GMK points out, after three years what was once a 5-star fund performs no better than a typical 3-star fund. What does this mean in average returns? The annualized S&P return from 1997 to 2016 was 7.68%. Over the same period, the mutual fund investor's return was only 4.79% (Roberts, 2017). GMK warns, "Funds that earned high star ratings attracted the vast majority of investor dollars. Most of them failed to perform."

Morningstar ratings allow consumers to pick top-rated funds like they are selecting a hotel or buying something on Amazon. People tend to buy funds that have been successful in the past, believing the funds will be successful in the future (Sirri and Tufano, 1998; Barber et al., 2005). When a mutual fund is on a winning streak, people believe it will continue to win. People have a persistent belief in the hot hand. It is possible that investment firms may be encouraging behavior that benefits the firm more than the consumer. Investors want to “beat the market” and advertising infers they may be able to. Advertising may foster beliefs that consumers can “be in control”, “achieve financial goals”, “secure their retirement,” and have all the relevant investment tools and market information at their fingertips.

Who can blame consumers for relying on star ratings and slick charts mapping each fund’s past performance and prospects for the future? The market is flooded with mutual fund products. Morningstar rates 10,000+ funds sorted into 100+ categories. The top performing 10% of funds are awarded 5 stars. Are there really 1000+ mutual funds that will generate above average returns now and for many years into the future? Morningstar cautions investors that “Past performance does not guarantee future success”, but also defends its star ratings saying, “Picking higher rated funds leads to better future results” (Phillips, 2017). Can star ratings that categorize the goodness/badness of past returns predict future outcomes? Morningstar thinks so. Morningstar claims their star ratings are moderately predictive. GMK reports that after ten years, only 14% of 5-star funds remained in the top 10%. Morningstar points out that this cohort of 5-star funds beat the odds (Phillips, 2017).

Is marketing contributing to unrealistic optimism? Can consumers “be in control”, “achieve financial goals”, and “secure their retirement” by investing in top-rated funds? This is a controversial question. Academics say mutual funds often underperform the market and fund managers that are successful do so mostly out of luck (Fama and French, 2010). Forty-five years of studying the financial markets has lead Princeton finance professor Burton Malkiel to say, “A blindfolded monkey throwing darts at a newspaper’s financial pages could select a portfolio that would do just as well as one carefully selected by experts” (Malkiel, 2019). Wall Street investors don’t agree with the academics and naysaying academic papers are perhaps too dry or technical for main street investors to take much notice.

In the 2015 feature film, “The Big Short”, Nobel Prize winner Richard Thaler compares Wall Street investing to a game of blackjack. He explains, in a way that everyone can understand, how the stock market lost \$8 trillion in value when the housing bubble burst in 2007. It is a simple message. Don’t trust the hot hand. Even experts on a hot streak with favorable odds can run out of luck. When that happens, investors betting on the experts can lose big. With a nod to Richard Thaler, let’s find out what a card game can tell us about mutual funds. A card game combines skill and luck, and like investing, gives experience and ability a clear advantage. When investing in top-rated funds, consumers are betting a hot streak will continue long into the

future. Consumers may disregard warnings about the hazards of predicting future performance. It goes against consumer logic to invest in a 3-star fund rather than a 4-star or 5-star fund. What kind of a consumer would buy a 3-star product on Amazon when a similar, competitively priced 5-star product is available?

### *1.1 Ride winners and cut losers*

Consumers shift billions of dollars to winners from losers based on Morningstar ratings. Dalbar's 2017 QAIB estimates that investors hold funds, on average, less than four years. People, in general, suffer from a cognitive illusion. They believe a random sequence of hits and misses should look more balanced than they usually do and consequently see a positive correlation between successive outcomes when none exist (Tversky and Kahneman, 1974). People believe in a hot hand. Gilovich, Vallone, and Tversky (1985, henceforth GVT) use data from shooting basketballs to prove the point. Fans and players believe shooters making one or two shots are more likely to make their next shot compared to shooters missing their last one or two shots. But taken as a whole, streaks and slumps in a player's shooting record do not have a positive serial correlation. GVT show that a shooter's hits/misses are like random flips of a fair coin. The current outcome has no influence on any future outcome. People trip themselves up when they believe what happens in the short term will also continue into the future.

A hot hand continues to be an interesting research topic. Although usually focused on sports, over thirty studies testing for a hot hand have been published since the landmark GVT study with mixed results (Bar-Eli, Avugos, and Raab, 2006). Bocskocsky, Ezekowitz, and Stein (2014) provide some support for a hot hand in basketball once they take into consideration the difficulty of the shot. The study analyzes 83,000 shot attempts collected with the SportVU tracking system during the 2012-2013 National Basketball Association (NBA) season. For example, when taking the difficulty of shot into consideration, making three out of four 3-point shots is a hot hand, whereas making three out of four layups is not. A study of online gambling also provides evidence of a hot hand (Xu and Harvey, 2014). When betting on horse races, soccer matches, and dog races, winners are more likely to follow up a bet with another win than are losers. Losers are more likely to follow up a bet with another loss than are winners. Winning leads to more winning because successful bets are followed up with less risky bets. Losing leads to more losing because unsuccessful bets are followed up with riskier bets. Successful bettors manage risk by using good judgment. Unsuccessful bettors show poor judgment by ignoring risk. One can only presume that successful fund managers follow a strategy similar to successful bettors. There are billions of dollars at stake for funds that can retain 4-star and 5-star ratings.

Aside from sports and online gambling, some evidence of a hot hand in mutual fund returns has been found by Hendricks, Patel, and Zeckhauser (1993) and Zwirlein and Reddy (2000). If there

is a difference between “hot hand” cognitive illusion and “hot hand” genuine phenomenon, investors need to know it. Investors search the sky for buy/sell signals as do their financial advisors. It’s estimated that 250,000 financial advisors rely on Morningstar data, predictive or not. Is there evidence of the hot hand in a card game? Is it persistent enough to suggest a successful investment strategy? A card game is a much closer analogy to what happens on Wall Street than shooting basketballs. Also, it may be easier to follow what’s going on with mutual funds by studying a similar, but simplified situation rather than trying to grasp the complexity of the 10,000+ mutual funds available to American consumers.

### *1.2 Smart investing or smart marketing*

Sales pitches such as, “If you’d invested in XYZ five years ago, your investment would be worth ZYX today,” may make people feel they are missing out on big financial opportunities and perhaps encourage overconfidence. The truth is often very different. The trouble is that even successful investors may not be as good as they remember. Investors that bought Apple in 2004 at \$1 and then sold off in 2007 when it hit \$15 missed the real opportunity. Today Apple trades at over \$180. For other high profile examples, there is Tesla and Netflix. If you bought Tesla in 2011 at \$25, would you have sold in 2013 at \$55? Today it is over \$290. If you bought Netflix in 2007 at \$3, would you have sold in 2009 at \$9? Today it is over \$360.

Salesmanship may encourage consumer overconfidence and build unrealistic optimism in the financial industry’s ability to predict the future and build wealth. The stock market marches onward and upward, but unpredictably and in short bursts. In studying trading days from 1963 through 2004, University of Michigan finance professor Nejat Seyhun found that 96% of market gains occurred on just 93 of the 10,000+ trading days (Seyhun, 2005). Every month 200+ mutual fund returns will be two or more standard deviations above average. This isn’t always because these mutual funds are a sure bet, but because monthly mutual fund returns are normally distributed and there are more than 10,000 of them. Morningstar ratings policy guarantees that there are 1000+ 5-star funds for consumers to choose from. It is like walking into a Las Vegas casino with lights flashing, music ringing, and coins jingling from every direction. It is easy to get the impression that everyone is winning. What about hot streaks in a card game? Will there be long streaks of wins or short bursts of luck?

### *1.3 What’s left over is luck*

Aside from Malkiel’s “blindfolded monkey throwing darts” theory, there is another way to interpret the inability of actively managed funds to consistently beat the market. Wall Street attracts lots of smart people. Everyone is looking for an edge. When skill is the same, what’s left over is luck. Like regression analysis, once all the salient predictors are in the equation all that remains is random error.

Proponents of Efficient Market Hypothesis (Heakal, 2013) and/or Random Walk Theory (Smith, 2019) believe that no amount of technical analysis (forecasting from past performance) or fundamental analysis (forecasting from health of company) give analysts a meaningful and persistent advantage when trying to beat the market. In their opinions, the additional fees associated with actively managed funds are not worth the price.

Mutual fund performance does wander up and down. Performance also regresses to the mean over time, as shown by Morningstar data reported by GMK. There is not much agreement as to why this happens, particularly between Wall Street professionals and university economists. If fund returns act as if they are on a random walk, then investment firms perhaps should encourage consumers to buy low cost index funds. Will card game results support professional investors or university economists? Will a card game between similarly skilled players, always on the look out for a competitive edge, produce results that wander up and down, and then ultimately regress to a mean?

## 2. Method and data

This study tests for a hot hand in a card game, cribbage, which rewards experience and smart game play. Statistics from online cribbage games show that experienced players dealing the first hand in a new game will beat inexperienced players nearly 70% of the time. This study (1) finds evidence of a hot hand, (2) demonstrates that scoring the goodness of wins and the badness of losses is an important step for identifying a hot hand, and (3) suggests that a hot hand is real, but long winning streaks are uncommon.

### 2.1 Analysis methods

The results from hundreds of cribbage games are analyzed for serial correlation using a time series of wins and losses as well as game-by-game goodness/badness (G/B) scores. Game outcomes are compared with millions of cribbage hands reported by online cribbage players. G/B scores are assigned to each game, which penalize the “first dealer advantage”, and reward exceptional wins. G/B scores are good approximations of the actual point margin of a win/loss ( $r = 0.87$ ,  $p < .0001$ ,  $n = 100$ ). G/B scores are similar to Morningstar ratings, which penalize risk and rank according to performance.

### 2.2 Data set

The playing history from December 31, 2017 to January 1, 2019, of the same two cribbage opponents, was recorded in a game diary. In total, 469 games were played which adds up to more than 4,000 individual hands. Each entry in the game diary records the following information: date of play, identity of first dealer, high score of first player, high score of second player, zero-point hands of first player, zero-point hands of second player, wins and losses, wins greater than 30 points (skunk), and goodness/badness scores for each player. Starting in February 2019, the diary also records each player’s win/loss margin in points. The loser of the

last game always deals the first hand in the next game (first dealer). The winner of the last game always deals the second hand in the next game (first pone). To win two or more consecutive games, a player must repeatedly overcome the first dealer advantage.

Two-player cribbage dates to 17th century England. Using a standard 52-card deck, players score points by making combinations of 15, making pairs, and making runs of three or more cards. Cribbage is a fast game. The first player to score 121 points wins. Experienced players can complete a game in 15 or 20 minutes. It is a game of strategy, tactics, and chance. Winning relies on experience, judgment, and understanding the odds of one play versus another. There is considerable advantage in being the first dealer over the first pone (about six points) because the first dealer also counts the first crib. Online cribbage game statistics show, on average, that the first dealer has an 11-percentage point advantage and wins 55.5% of the games whereas the second dealer (first pone) wins 44.5% of the games. The first dealer has about a 10% chance of winning a game by more than 30 points (skunk). The first pone has only about a 5% chance of winning a game by more than 30 points.

Using results calculated from the win/loss point margin recorded in the game diary, a 0-to-100 goodness/badness (G/B) score is assigned to each game for both players. To be consistent with Morningstar ratings, G/B scores penalize the advantage of the first dealer (equivalent of risk-adjusting returns) and reward the difficulty of winning a game by more than 30 points (equivalent of assigning 5 stars to top 10% of funds in the category). The G/B score for the first dealer (1) losing by more than 30 points, (2) losing by less than 30 points, (3) winning by less than 30 points, and (4) winning by more than 30 points, is 0, 30, 60, 95, respectively. The G/B score for the first pone (1) losing by more than 30 points, (2) losing by less than 30 points, (3) winning by less than 30 points, and (4) winning by more than 30 points, is 5, 40, 70, 100, respectively. With this scoring system, the average G/B scores for evenly matched players will be about 50.

### 3. Results and analysis

#### 3.1 Hot hand serial correlation

Table 1 lists the serial correlation of consecutive games, lagging the time series by one game. When calculated from simple win/loss data, the serial correlation of game outcomes is close to zero, negative, and not statistically significant ( $r = -0.017$ ,  $p < 0.7138$ ). The results are similar to GVT and numerous other studies failing to find a hot hand when using hit/miss data.

In comparison, G/B scores that penalize advantage and reward exceptional performance are more predictive. The serial correlation of G/B scores is small, but positive, and statistically significant ( $r = 0.178$ ,  $p = 0.0001$ ). Correlations are grouped by quarter to show that the predictability of outcomes changes over time as players go through streaks, slumps, and trading wins back and forth.



	G/B Score	Win/Loss
Overall	.178*	-.017
January-March	.123	-.173
April-June	.276	.068
July-September	.221	.007
October-December	.096	.017

\*Statistically significant ((p = .0001)

Table 18: Serial Correlation of Consecutive Games

### 3.2 Hot Hand Momentum

Following up wins with more wins is a key element of hot hand tested by GVT. In this study, average G/B scores are higher following consecutive wins than when following consecutive losses. Table 2 lists average scores following one, two, and three consecutive wins and losses. Recalling that 50 is the dividing line between win and loss, the data show it is more likely to win after a win than it is to win after a loss.

Using preliminary results from the 2019 game diary, the winning point margin is 14.6 points following a win, while it is only 11.5 points following a loss. Winning players have momentum, overcoming the six-point first dealer advantage and, on average, still scoring more points than losing players coming out of a slump.

Consecutive Losses	Score after Loss			Consecutive Wins	Score after Win			
	Average	Stdev	n		Average	Stdev	n	p-value
1	45.7	22.9	233	1	54.6	23.0	235	< .001
2	45.5	23.9	113	2	54.1	22.3	116	.003

3            46.6        22.6        54            3            52.8        21.9        59        .070

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*Table 19 Goodness/Badness Score Conditioned on Consecutive Wins and Losses*

### *3.3 Hot Streaks, Cold Slumps, And Regressing To A Mean*

Table 3 lists month-by-month winning percentages for both players with and without the first dealer advantage. The overall winning percentage for both players is higher when dealing the first hand, as predicted by online cribbage statistics. Nevertheless, there is considerable month-to-month variation. For example in June 2018, neither player has any luck coming off a loss. They lose more than two-thirds of their games although they have the first dealer advantage. In May 2018, the opposite is true. Players are having trouble following up one win with another. Then there is July 2018, when Player One is winning a disproportionate share of all games. That being said, performance regresses to the mean. Out of 469 games, one player won 234 times while the other won 235 times.

A long run of streaks or slumps is very much out of the ordinary. Only once in an entire year of game play, did one player win twelve games in a row and the other player win thirteen games in a row. Wins and losses occur in short bursts and look a lot like chance until one considers that a player with a streak of consecutive wins starts each game at a substantial disadvantage. In these data, the loser always deals the first hand of the next game putting the recent winner at a six-point disadvantage. Six points is a lot in a game where one or two points can often make the difference between winning and losing.

A long winning streak gains a lot of attention when it happens. Joe DiMaggio had at least one base hit in 56 straight games. Oral Hershiser pitched 59 consecutive scoreless innings. Kobe Bryant played ten consecutive games scoring 30 or more points. Byron Nelson won 11 straight golf tournaments. These are rare events, but because of their notoriety people may think long winning streaks occur much more frequently than they really do.

In these data, there are many short bursts of three, four, or five consecutive wins. Short bursts of winning streaks are frequent enough to make them at least somewhat predictable. Players gain and lose momentum. There is a positive and statistically significant serial correlation in the data. Good outcomes are followed up by other good outcomes with a regularity that rules out chance error. A winner following up one or more wins scores more points than a winner following up one or more losses.

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P(win\first dealer)

P(win\first pone)

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Month*	Player One	Player Two	Player One	Player Two
January	.579	.611	.389	.421
February	.444	.563	.438	.556
March	.667	.684	.316	.333
April	.454	.462	.539	.546
May	.706	.632	.368	.294
June	.333	.240	.760	.667
July	.579	.440	.560	.421
August	.474	.529	.471	.526
September	.529	.474	.526	.471
October	.458	.458	.542	.542
November	.500	.619	.381	.500
December	.417	.500	.500	.583
Overall	.511	.509	.491	.489

\*About 40 games are played each month

*Table 3: Probability of Winning Conditioned on Dealing the First Hand*

## 4. Discussion

Interpreting hit/miss data may not be as straightforward as it may seem. Miller and Sanjurjo (2018) identify a “streak selection bias” in past hot hand studies. Simply stated, when considering short runs of hits/misses, the probability of a hit being followed up with another hit is much less than 50% even when making tosses with a fair coin. When correcting for the bias, Miller and Sanjurjo reverse the findings of GVT and its replicates. They conclude the previous studies, when analyzed correctly, provide strong evidence that “it is not a fallacy to believe in the hot hand.”

Simple wins and losses ignore advantage/disadvantage of starting position and strength/weakness of performance. They are uncorrelated. Assigning goodness/badness scores to these same wins and losses produces a positive, statistically significant correlation. This finding may say something about the predictability of mutual fund performance. The penalty/reward style of Morningstar ratings either spotlights a hot hand or creates an illusion of

a hot hand. It calls attention to something that shouldn't be missed or adds something that isn't there. The least one can say is that Morningstar ratings effectively filter out the poorest mutual funds awarding them only 1 or 2 stars.

The legacy of GVT is to show that people frequently see patterns in randomness, and this cognitive illusion makes for bad decisions. This is true whether a person believes a hot streak won't end (hot hand fallacy) or a slump won't continue (gambler's fallacy). But human nature being what it is, wouldn't we all like to have better information when deciding if a pattern is real and whether it will continue? Investing is a type of game in which smart choices and discipline are supposed to pay off. It is unsatisfying to attribute exceptional success to the flip of a coin.

When it comes to picking investments, consumers are stuck between the proverbial "a rock and a hard place". Don't bet on the hot hand. Don't sell a winner too soon. Don't hold a loser too long. Don't wait too long before getting back into a growing market. To sum it up, consumers are given a lot of confusing advice, and then told to "do the opposite of what feels comfortable to earn higher returns" (Egan, 2018).

Dalbar's 2015 Quantitative Analysis of Investor Behavior (QAIB) describes the situation, "Improvements through investor education have only produced marginal benefits. After enormous efforts by thousands of industry experts to educate millions of investors, imprudent action continues to be widespread." Dalbar's analysis shows investors chronically sell off good investments too soon, and then, once burnt with a loss, wait too long before buying back into the market once it heats up. The 2017 QAIB reports that the S&P 500 continues to outperform equity mutual fund investors at a margin over and above what can be reasonably expected primarily because of "panic selling" and "following the herd".

## 5. Marketing Implications

It may be possible that mutual fund marketing encourages a consumer's worst biases. In Sweden, company-sponsored advertising, emphasizing past performance (Morningstar 5-star ratings) and image (Harrison Ford can give you a better pension), convinced two-thirds of over four million eligible consumers to sign up with actively managed private pension funds rather than the default government fund. The government fund performed better, was much less expensive, and carried less risk than the private funds (Cronqvist and Thaler 2004, Cronqvist 2004). At least in this example, advertising deemphasized risk and fees. Over the first three years of the Swedish plan, the average private pension fund lost about 40% of its value.

*Promising to give consumers what they want obligates marketing to give consumers at least what they need.* Morningstar believes their star ratings are moderately predictive, but few 5-star funds produce above average returns for more than two or three years. Consumers hope

for more, but they shouldn't if mutual fund returns behave like a card game. Outcomes of card games show that hot hand winning streaks are not easy to predict and don't last for long. Past outcomes are not very predictive when chance plays a big role in determining future outcomes. Chance guarantees surprising streaks and devastating slumps. Consumers that ignore "fine print" warnings are bound to be surprised when their savings plans take a dive. Star ratings are well intentioned, but Morningstar itself admits that expense ratios (the percentage of asset deducted each year for fund expenses) are more predictive of future performance than are star ratings (Kinnel, 2016). As an example, a 4-star fund that consistently performs a little above the median, such as Vanguard's Total Stock low cost index fund, has proven to be a better long-term investment than many 5-star funds.

*Many choices won't necessarily lead to better choices.* Even in a simple card game it is difficult to distinguish between illusion and the real deal. A hot hand is real, but it comes and goes without much warning and doesn't stay for long. Morningstar rates 10,000+ funds sorted into 100+ categories. Product proliferation may hide genuine stars and complicates choices for consumers. No doubt there is a golden needle in the haystack, but even investment professionals can struggle to find it. All these products and product categories are not the fault of Morningstar. It is a common practice of an entire industry that has discovered the miracle of compound complexity. Customer-focused marketing strives for better choices not just more choices.

*Justifying a high price is easier than earning one.* Popular investment strategies such as buy-and-hold when combined with high cost, actively managed funds all but guarantee poor returns. As the number of card games stacks up, each player's performance regresses to the mean. Each player dominates the other for a time, but in the long run both perform about the same. Just like a card game, fund performance runs in streaks and slumps and ultimately regresses to the mean. In the GMK review, after ten years the average 5-star fund earns 3-stars and the average 1-star fund earns about 2-stars. Consequently, investing in low cost index funds using strategies such as dollar cost averaging (consistent periodic investment) and annual rebalancing (buying and selling assets to maintain the original fund allocation) should be considered.

*Zwirlein and Reddy (2000) analyzed risk and returns for three mutual fund strategies.* Using data from January 1977 through December 1992 a "hot hand" strategy worked best when compared to a buy-and-hold strategy, and a low-cost strategy in IRAs, 401(k) plans, and other tax-favored investments. With a \$600 monthly investment, the hot hand strategy returned \$489,023 compared to \$345,838 and \$320,335 for buy-and-hold and low-cost, respectively. Rebalanced quarterly, the hot hand strategy invested every dollar into the fund performing best in the previous month. Hendricks, Patel, and Zeckhauser (1993) made a similar observation about the short-run persistence of mutual fund returns.

*Getting workers to invest in a 401(k) is a bigger marketing problem than fighting over which fund(s) workers choose.* In 2019, for the first time in history there is as much money invested in index funds as there is in actively managed funds (Segal, 2019). Only three years ago, actively managed funds had over \$9 trillion under management whereas index funds had less than \$3 trillion under management. Consumers apparently are responding to the call of low cost index funds and walking away from the notion of beating the market.

*Not saving for retirement is a bigger problem than maximizing returns.* It takes many years, probably decades, to build an adequate retirement fund and Americans are not saving. CNBC reports that only about 16% of Americans have saved \$200,000 or more towards retirement (Martin, 2019). In 2016, the Bureau of Labor Statistics reported that the average retired household spends about \$3,800 a month. In 2017, the Social Security Administration reported that the average monthly benefit is just over \$1,400. Personal savings will have to make up the gap. One possible way for mutual fund companies to make consumers better off is to consider redirecting marketing budgets to support cooperative efforts with employers to make low cost 401(k) plans available and encourage American workers to start saving.

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*Relevance to Marketing Educators, Researchers, and Practitioners:*

Suggests several ways that mutual fund marketing can become more customer focused rather than product focused. Consumers may be beginning to question mutual fund company promotion tactics, product proliferation, and pricing practices. Starting in 2107 trillions of investment dollars have shifted from branded, high cost actively managed funds to more generic, low cost passive index funds. Perhaps of greater importance, marketing is not persuading more employers to offer savings plans or more Americans to save. It is estimated 80% of Americans are underinvested. Only 16% of Americans have saved \$200,000 or more towards retirement. Comparing mutual fund returns to a card game spotlights the complexity of choosing from among 10,000+ funds available to American consumers. Game results, like mutual fund returns, run in streaks and slumps, and then ultimately regress to a mean. Even with expert play, chance plays a key role in determining outcomes.

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