THE ARRIVAL OF ARTIFICAL INTELLIGENCE AND RE-APPEARANCE OF TRUE RETURN

EXECUTIVE SUMMARY

Investors face two major challenges in their attempt to get a true return on their investment that justifies the risk they are taking:

Challenge 1: The New Global Economic Environment

Challenge 2: The Shortcomings of Existing Investment Strategies

Navigating a Whole New World

The new global economic environment is uncharted territory for today's investor. U.S. and global debts are reaching unprecedented highs. Central banks are keeping interest rates low and instilling a false sense of economic confidence. High-frequency trading and global events are influencing the speed and frequency of market volatility. Market globalization is connecting the most influential countries together and creating portfolio diversification challenges. Collectively, these new economic factors have set the stage for diminishing returns, future volatility, and a market dislocation.

Employing Dated Tactics

Investors are still relying on the conventional investment strategies of *buy and hold (asset allocation)* and *active management (professionally managed or DIY)* to navigate the new global equities market. The unfortunate reality is that both strategies fall short, and investors are ultimately paying the price.

Buy and hold assumes that the investor and investment professional are emotionally strong enough to ride out market volatility throughout a full bull and bear market cycle. DALBAR, Inc., the financial community's leading independent expert for evaluating, auditing and rating customer performance, once again proved in its *2016 Quantitative Analysis of Investor Behavior (QAIB)*, that *buy and hold* doesn't work for average investors, as they are "loss averse" and simply don't have the emotional strength to withstand market volatility [DALBAR]. As a result, investors are selling low, buying high, and ultimately failing their investment plans.

In contrast, *active management* is failing investors for various reasons ranging from economic influencers to the inability to analyze complete market data in real time. Regardless of *why*, research continues to prove that active management is not allowing investors to capitalize on market opportunity. The June 2016 S&P Indices Versus Active (SPIVA®) Scorecard reported that over the past year, 90.2% of the actively managed U.S. mutual funds that invest in domestic equities were beaten by their benchmarks, when their returns are calculated net of fees [Foley]. During the same one-year period (excluding actively managed emerging markets funds), the majority of global equities, international, and international small-cap equities managers underperformed their respective benchmarks. SPIVA® also determined that over the last ten years, 87.5% of domestic equity funds underperformed and managers across all international equity categories underperformed their benchmarks [Soe].

Today's Options: Chase Returns or Employ AI

These multi-faceted challenges have created an investment environment of uncertainty, diminishing returns, and the willingness to chase returns while assuming significantly greater risk. Investors need to be reminded that assuming more risk does not always equate to higher returns and in fact, could result in financial hardship.

In response to the quest for sustainable solutions, an innovative, viable strategy has emerged: Artificial Intelligence Investment Strategy (AIIS). It is designed to help navigate the complexities of the new global equities market by providing the investor with overall risk management perspective beyond their portfolio makeup.

AIIS consists of…

- Sophisticated algorithms;
- Real-time quantitative modeling;
- Bull and bear market detection;
- Personalized communications;
- Complete transparency; and the
- Ability to remain committed to their investment strategy.

Just as the global economy has evolved, so have the technological advancements that have incited the design of a sophisticated algorithm investment process that is encapsulated in an artificial intelligence system. The purpose of this paper is to provide transparency and understanding of the current investment environment and why conventional strategies are failing investors. It explores how the arrival of artificial intelligence is transforming the investment process, and allowing investors to realize a true return that quantifies the risk they are assuming, with added risk management measures beyond what is included in their portfolio composition.

PROBLEM

In today's global equity markets, investors face the same question:

How do I actually get a true return on my investment that justifies the risk?

Investors are cautiously optimistic as the new global equity markets pose two hefty challenges that are hindering their opportunity for success.

Challenge 1: The New Global Economic Environment

The Federal Reserve's economic stimulus strategy of cutting interest rates and using *quantitative easing* to flood financial markets with newly created money has increased asset prices and forced investors to assume riskier opportunities in the hunt for higher returns [Barclays]. While investors may be pleased with the return on those investments, the reality is that this added risk is more than they can afford. The economic signs of rising U.S. and global debt, U.S. interest rate hikes, the surge in globalization, and the appearance of high-frequency trading are suggesting greater market volatility, a market dislocation, and possibly a global recession, all while over-exposed investors are susceptible to catastrophic loss.

Debt, Globalization, and Interest Rates

The United States' and global debts are reaching unprecedented highs. Since 2008, the U.S. has racked up its national debt to more than 20 trillion dollars (refer to *Figure 1.1*), not including outstanding liabilities such as Social Security and Medicare. "Over the long term, a growing Federal debt is like driving with the emergency brake on. As the debt-to-GDP ratio increases, debt holders will eventually demand larger interest payments. They want compensation for an increasing risk they won't be repaid. Diminished demand for U.S. Treasuries would further increase interest rates and slow the economy" [Amadeo].

FIGURE 1.1 | The Growth of U.S. Government Debt from 1950 to 2015
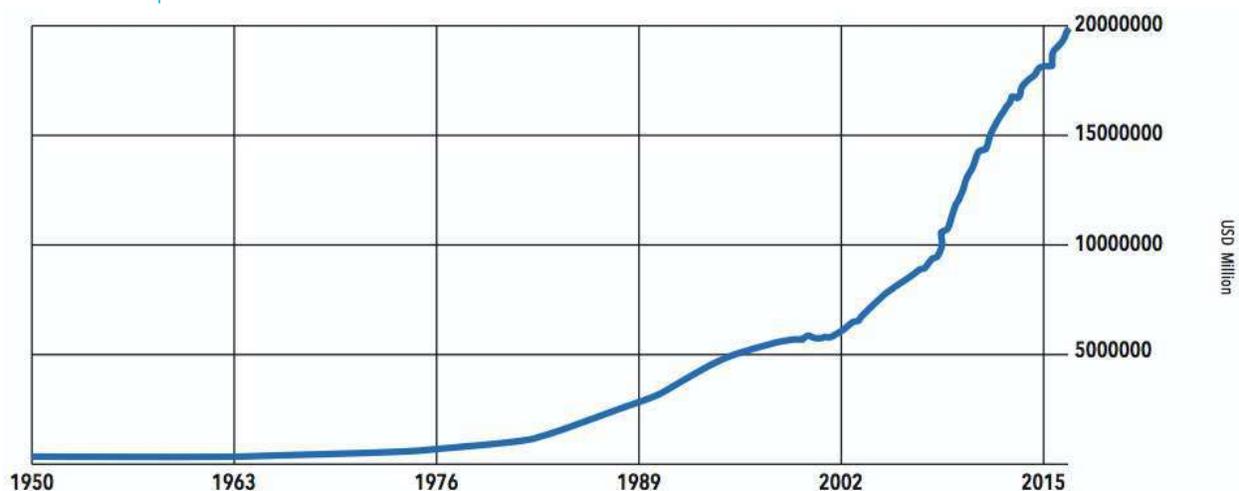
SOURCE | WWW.TRADINGECONOMICS.COM AND U.S. DEPARTMENT OF THE TREASURY

A slowing economy, or one that is in a recession, is felt beyond the boundaries of a single country. *The Great Recession* of 2008, triggered a global economic slowdown and prompted central banks from around the world to employ low interest rates and *Quantitative Easing (QE)* in an attempt to stimulate the world economy. Nearly ten years later, central banks are continuing to prop up their markets by providing cheap capital even with little to no success [Petruno]. Below, *Figure 1.2* illustrates the rather stagnant growth of the World's GDP after rebounding from the 2008 recession.

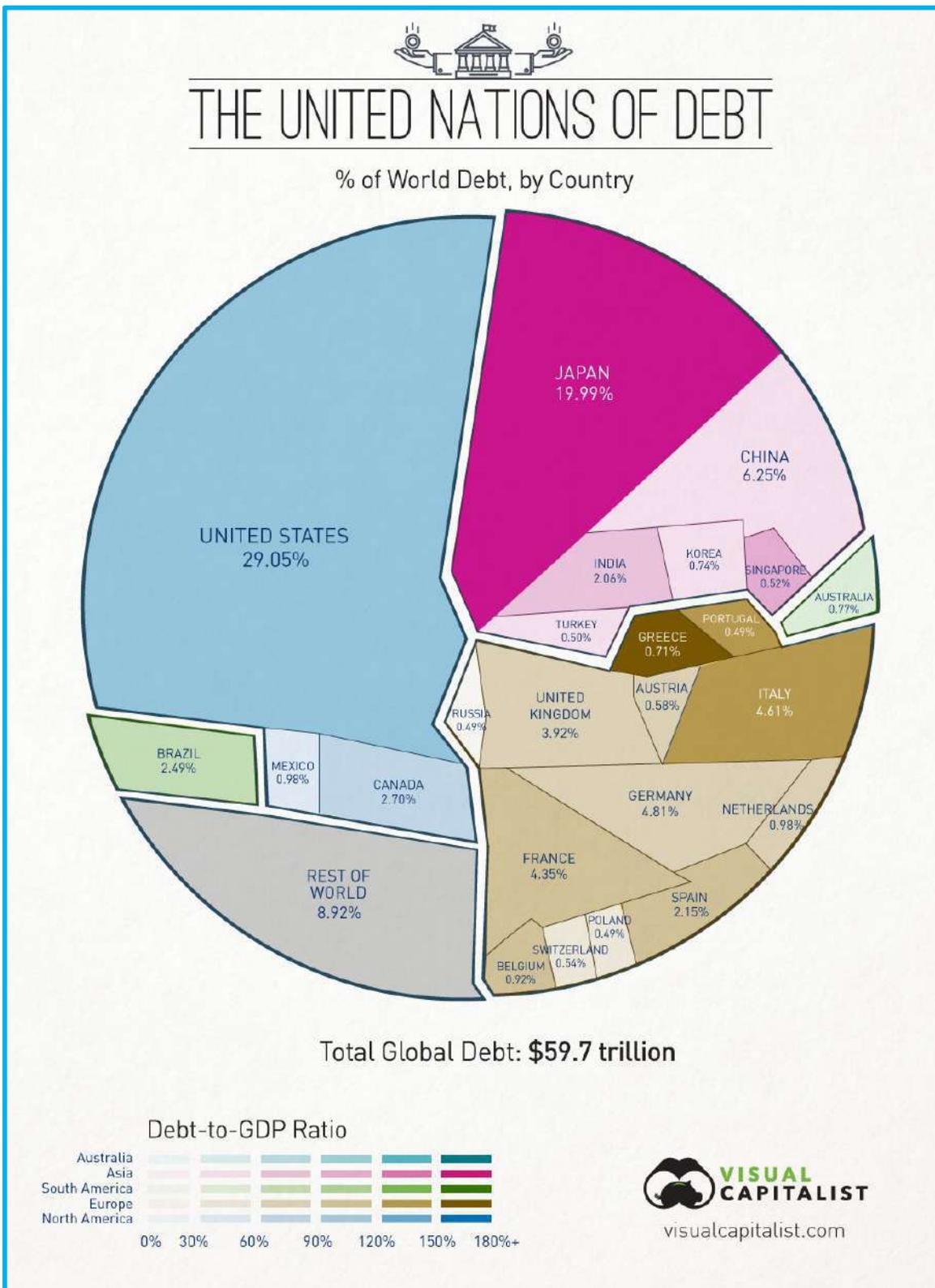**FIGURE 1.2** | World GDP Per Capita Growth (Annual %) from 2004 to 2014
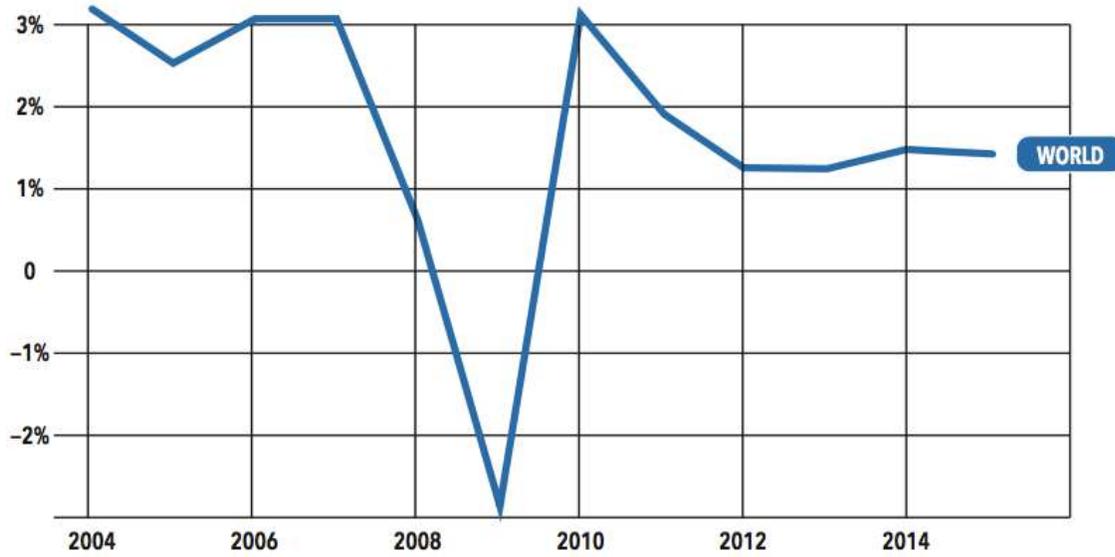
The International Monetary Fund (IMF) reported that toward the end of 2015, the global debt was around 60 trillion dollars, with the U.S. accounting for 29.05% of this. Japan ranked second with 19.9%, and China was in third at 6.25%. Jeffrey Rosenberg, chief investment strategist for fixed income at Black Rock, Inc., told the *Los Angeles Times*, "The whole world is growing at a level that is far lower than in the pre-crisis environment." He also noted that some kind of global debt blowup has occurred roughly every seven or eight years since the early 1980s. That means we would be right on schedule [Petruno]. *Figure 1.3* provides a visual representation of the world's debt and the percentage owed by country.

Hikes in interest rates or decisions to withdraw or reduce *quantitative easing* (I.e. European and Japanese central banks) are likely to have a negative impact on global markets. Even the suggestion that central banks will raise interest rates again can be enough for stock markets to slide [Barclays]. The Federal Reserve anticipates two to three interest rate hikes in 2017 [Payne].

FIGURE 1.3 | The United Nations of Debt (% of World Debt, by Country)

THE UNITED NATIONS OF DEBT

% of World Debt, by Country

JAPAN 19.99%

CHINA 6.25%

UNITED STATES 29.05%

KOREA 0.74%

SINGAPORE 0.52%

AUSTRALIA 0.77%

INDIA 2.06%

TURKEY 0.50%

PORTUGAL 0.49%

GREECE 0.71%

AUSTRIA 0.58%

ITALY 4.61%

RUSSIA 0.49%

UNITED KINGDOM 3.92%

GERMANY 4.81%

NETHERLANDS 0.98%

BRAZIL 2.49%

MEXICO 0.98%

CANADA 2.70%

FRANCE 4.35%

SPAIN 2.15%

POLAND 0.49%

SWITZERLAND 0.54%

BELGIUM 0.92%

REST OF WORLD 8.92%

Total Global Debt: **$59.7 trillion**

Debt-to-GDP Ratio

Australia
Asia
South America
Europe
North America

0%   30%   60%   90%   120%   150%   180%+

VISUAL CAPITALIST

visualcapitalist.com

SOURCE | VISUAL CAPITALIST "60 TRILLION OF WORLD DEBT IN ONE VISUALIZATION' (6 AUGUST 2015)
http://www.visualcapitalist.com/60-trillion-of-world-debt-in-one-visualization/

Market Sensitivity from High-Frequency Trading and World Events

Market sensitivity from high-frequency trading (HFT) and world events adds another level of complexity for investors and investment professionals to navigate in the new global equities market.

- High-frequency trading (HFT) is the computerized buying and selling of financial products in a matter of microseconds. AARP reported that HFT affects investors in two key ways: 1) Investors lose out on money they are entitled to as the trades happen on a granular basis. 2) The overall stability of the market is being damaged. The market is moving at unfathomable speeds with a fairly consistent occurrence of breakdowns. HFT was a leading participant in the "flash crash" of 2010 [Salmans].

- Nations are tied together through globalization, making it no surprise that world events such as economic developments, terrorism, foreign policy, and even hype affect global equity markets' volatility. For example, when the United Kingdom chose to leave the European Union in June 2016, the U.S. stock market suffered its worst drop in ten months with the Dow Jones Industrial Average dropping 3.4% and Standard & Poor's 500 falling 3.6%, erasing roughly $800 billion in U.S. market value, as measured by the Wilshire 5000 index [Bomey]. The first trading day after the 9/11 attacks in New York and Washington, D.C. resulted in the Standard & Poor's 500 index dropping nearly 5% [Bell]. Today, analysts are closely watching China as its debt continues to grow, and its economic growth remains suspect. Unless significant reform transpires, it's just a matter of time before this world powerhouse takes a tumble that will be felt by investors worldwide.

Challenge 2: The Shortcomings of Existing Investment Strategies

Navigating the new global equity markets with old investment strategies has become a failed undertaking for investors, so much so that they are chasing returns and taking on more risk in this very uncertain investment environment.

Buy and Hold

The widely held passive investment strategy, *buy and hold*, is based on the idea that once the investor is invested, he or she will hold the investment for a long period of time, regardless of market fluctuations. Additionally, the investor is not concerned with short-term price movements and technical indicators. The caveat with *buy and hold* is that there are two critical conditions that must be met in order for the investor to be successful.

Condition #1: Emotionally Strong Enough to Withstand Market Volatility

The first condition is that the investor (and investment professional) must be emotionally strong enough to ride out market volatility throughout the duration of the investment process. As mentioned, DALBAR, Inc. proved in its *2016 Quantitative Analysis of Investor Behavior (QAIB)*, that *buy and hold* doesn't work for average investors as they are "loss averse" and simply don't have the emotional strength to withstand market volatility. [DALBAR]

Investors who suffered through the 2008 recession are unwilling to subject themselves to that scenario again. *The New York Times* quoted Denise Shull, the founder of financial neuroscience consulting group Trader Psyches, in saying, "Many investors are using the 2008 panic as their new reference point. After so many people lost so much money, many investors no longer hesitate to sell at the first sign of trouble. How your brain deals with uncertainty – when it recognizes it is in an uncertain situation – is that it tries to pull it from a bigger context. The context of 2008

- and not wanting to see it happen again - would absolutely influence these people to hit the sell button. It then becomes self-fulfilling for the market" [Creswell].

Investors are their own worst enemy. "The greatest losses occur after a market decline. Investors tend to sell after experiencing a paper loss and start investing only after the markets have recovered their value. The devastating result of this behavior is participation in the downside while being out of the market during the rise" [Williams]. *Figure 2.1* highlights the causes of equity investors' underperformance with the most-costly being *Voluntary Investor Behavior Underperformance*, which includes behaviors such as: panic selling, excessive buying, and attempted market timing.

FIGURE 2.1 | Major Causes of Equity Investor Underperformance (20-Year Analysis)

Major Causes of Equity Investor Underperformance (20-Year Analysis)		
Cause	**% Contributed to Underperformance**	**Underperformance ($ Billions)**
Lack of Availability of Cash to Invest [1]	0.54	44
Need for Cash (Planned and Unplanned) [2]	0.68	55
Fund Expenses (Including Management Fees)	0.79	65
Voluntary Investor Behavior Underperformance [3]	1.50	122
TOTAL	**3.52**	**286**
[1] Lack of availability of cash represents the investor return that is lost by delays the investment. [2] Need for cash represent the percentage of investor return that is lost or gained by withdrawing the investment before the end of the period being measured. [3] Voluntary investor behavior general represents panic selling, excessively exuberant buying and attempts at market timing.		

SOURCE | DALBAR'S 22ND ANNUAL QUANTITATIVE ANALYSIS OF INVESTOR BEHAVIOR FOR PERIOD ENDING DECEMBER 31, 2015
http://www.qidllc.com/wp-content/uploads/2016/02/2016-Dalbar-QAIB-Report.pdf

Condition #2: Ideal Market Entry and Exit Timing
The second condition that must be met is that the investor must enter into and exit out of the market at an ideal time. Take, for example, those investors who retired in 2000. Over the two decades before that, the stock market realized an annualized return of 17.8%, including double-digit gains in excess of 20% each year from 1995 to 1999. In contrast, those who were looking to retire after 2000 to 2010, faced two bear markets [Price].

T. Rowe Price Associates produced a noteworthy study in 2001 titled "Dismal Decade Offers Cautionary Lesson for Retirees." This study examined different responses to a market downturn at the time of retirement (January 1, 2000 through December 31, 2010) (refer to *Figure 2.2*).

FIGURE 2.2 | Success of Options When Retiring into Bear Markets

T. Rowe Price Study | Options When Retiring into Bear Markets

This chart outlines four options for handling a 30-year retirement account, starting January 1, 2000, with an account balance of $500,000 invested in a 55% equity, 45% bond portfolio. In this hypothetical example, the retiree withdraws 4% (or $20,000) the first year and increases the annual withdrawal amount by 3% each year to keep up with inflation. Actual returns for stocks and bonds are used for the period January 1, 2000, through December 31, 2010, and returns thereafter are based on 10,000 simulations of possible future market scenarios.

The four options below assume the investor retired on January 1, 2000. The table reflects the impact of the two major bear markets over the past decade on the investor's chance of not running out of money over a 30-year retirement – as well as the impact of making certain adjustments to compensate for the misfortune of retiring into a dismal decade for equity investing. Past performance cannot guarantee future results. This chart is for illustrative purposes only and does not represent the performance of any specific security.

Account Status	Portfolio Value	Monthly Withdrawal Amount	Odds of Success*	Odds of Success After Bear Market (Ended March 2009)
At retirement on January 1, 2000	$500,000	$1,667	89%	
Results as of December 31, 2010, Assuming Four Different Strategies				
OPTION 1 Continue withdrawals as planned	$334,578	$2,307	29%	6%
OPTION 2 [Best Outcome] Reduced withdrawals by 25% for three years after each bear market bottom	$386,113	$1,493	84%	**43%**
OPTION 3 Take no additional inflation adjustments for three years after each bear market bottom	$352,367	$1,990	69%	26%
OPTION 4 [Worst Outcome] Switched to 100% bond portfolio after first bear market bottom on Oct. 1, 2002	$270,669	$2,307	0%	**0%**

*Represents the percentage of total simulations in which the investor does not run out of money during a 30-year retirement period. The odds of success on January 1, 2000, reflect the initial investment and withdrawal assumptions. The odds of success at the various states of the options reflect historical return data and any changes in the investment or withdrawal assumptions and projections thereafter. For historical returns, the S&P 500 Index is used for stocks and the Barclays Capital U.S. Aggregate Index is used for bonds. For simulations, stocks are expected to return 10% overall with a standard deviation of 15% and fees of 1.211%; bonds are expected to return 6.5% with a standard deviation of 5% and fees of 0.726%. Portfolios are rebalanced monthly, and withdrawals are made monthly. This example does not take into account taxes or required minimum distribution from retirement plans.

SOURCE | T. ROWE PRICE "STUDY: A DISMAL DECADE OFFERS CAUTIONARY LESSONS FOR RETIREES" FEBRUARY 21, 2011
https://www4.troweprice.com/iws/wps/wcm/connect/e3c2ec8045961707ba69bf32e4e97423/DismalDecade.pdf?MOD=AJPERES&CACHEID=e3c2ec8045961707ba69bf32e4e97423

This study highlights the potentially devastating result of a *buy and hold* investment strategy. In *Option 1*, the investor maintained the *buy and hold* strategy, made zero changes to the portfolio, and continued withdrawals as

planned. The end result suggested that the investor will have a mere 6% probability of success after the bear market concluded in March 2009 (this was the second to worst outcome).

How Does Modern Portfolio Theory (Asset Allocation) Fare in the New Global Economic Environment?
Assuming an investor is able to meet the two critical conditions of *buy and hold*, the next fundamental question to answer is whether the diversification elements of *buy and hold* can survive the new global economic environment. As *modern portfolio theory (MPT)* dictates, the best possible returns investors can expect from their portfolios is related to the level of volatility they're willing to accept. Meaning, investors seek the greatest possible return associated with the least amount of risk possible. *MPT* works to achieve this through asset allocation (incorporating "safer" assets into the portfolio mix) and diversification (varying the investments within those invested asset classes) practices. While *MPT* has been a steadfast belief for *buy and hold* investors since the 1950s, obstacles from the new global economic environment are amplifying its limitations.

Obstacle: Fixed Income Yields are Historically Low Due to Bullish Bond Markets Over the Last 35 Years
Investors are unable to rely on U.S. Treasury Funds (a former staple in the *buy and hold* strategy) to help diversify their portfolios, as interest rate yields have continued to decline since the1980's (refer to *Figure 2.3*).

FIGURE 2.3 | 10-Year U.S. Treasury and Federal Fund Yields from Q1 1970 though Q1 2016
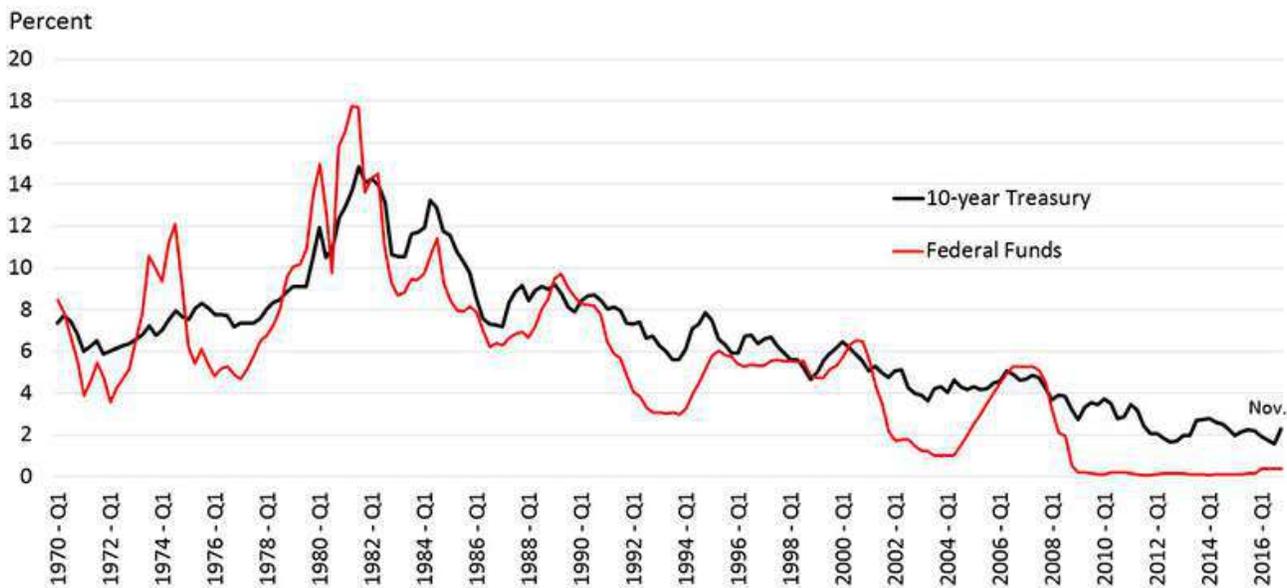
SOURCE | BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM, H.15.

**Obstacle: Fixed Income and Equities Are More Correlated**
According to Morgan Stanley Research, from June 2015 through June 2016, bond markets have been cursed with a higher correlation to equities. Additionally, global credit/equity has become more highly correlated, as it has deviated above its long-term average by more than 22% in 2016. "There's no getting around the fact that when assets are highly correlated it's difficult to construct a diversified portfolio," says Jim Caron, portfolio manager with Morgan Stanley Investment Management. "The increase in correlation is a new dynamic risk factor that investors

need to account for in their asset allocation. If you want fixed income to help balance out volatile equity returns, then you need to invest in funds or construct portfolios that seek to reduce this correlation risk" [Morgan].

Obstacle: Rising Correlation is Affecting the Success of Diversification through Asset Allocation

According to Morningstar, correlations between individual stocks in the S&P 500 have generally risen over the last two decades. Based on the average daily correlation over the trailing six months, correlations have risen from roughly 10% in 1994 to 66% at the end of 2011, as can be seen in *Figure 2.4*.

FIGURE 2.4 | S&P 500 Average Security Correlation since 1994
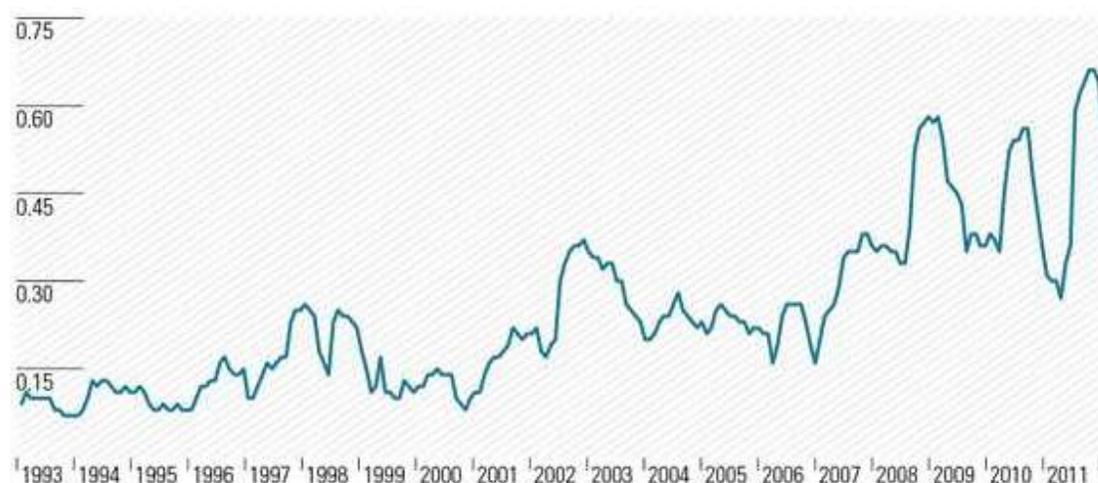
This rising correlation is an inherent risk factor, as it can influence the effectiveness of diversification strategies. "For simplicity, consider a portfolio of just two assets--stocks ABC and XYZ--that are held in equal proportions. Shares of ABC have a volatility of 40%, and XYZ have a volatility of 30%. If the two stocks have a correlation of 10%, the overall volatility of the portfolio would be 26%. However, if the correlation between the two stocks rises to 66%, the volatility of the portfolio increases to 32%" [Rawson].
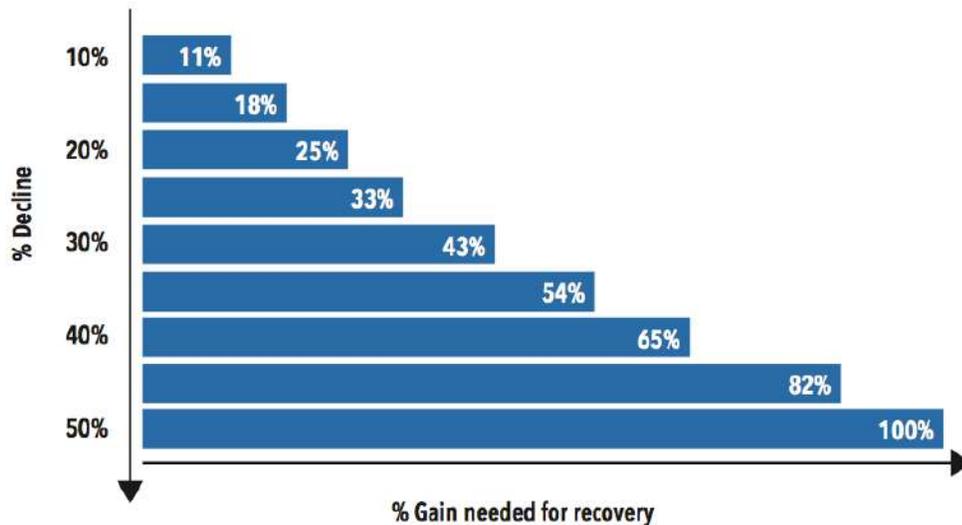
Obstacle: *Risk Premia* and Regulations Are Trumping Fundamental Valuations for Fixed Income Assets

Risk premia is the difference between the anticipated return on a security and the certain return on a riskless security. For Treasuries in June 2016, one of the elements influencing *risk premia* was the Federal Open Market Committee's decision not to raise rates, contrary to previous market expectations. For investment-grade corporate bonds, it's the fact that regulations have irrevocably reduced the ability to sell sizeable amounts of bonds at any one time. Managing Director of Morgan Stanley, Jim Caron, argues that extensive *quantitative easing* has driven Treasury yields down to levels well below their fundamental value, leaving *risk premia* the more dominant factor dictating yield. That, in turn, has pushed yields down on corporate bonds, leaving their values more influenced by concerns about liquidity and other risks not associated with the credit quality of borrowers [Caron].

The True Cost of Loss

When implementing a *buy and hold* strategy, it is easy to make the argument for purchasing low-cost Index ETFs and riding out the stock market. However, when it comes to loss, the math behind the breakeven point actually costs the investor more than the actual loss. For every percentage point in investment capital an investor loses, it takes more than that to break even. *Figure 2.5* demonstrates the relationship between percentage of loss and the percentage of gain needed to recover that loss.

FIGURE 2.5 | The Mathematical Catch-Up Game

Example: If an investor holds a stock that starts at $10 and falls 50% in value, the stock is now at $5. Only gaining the 50% loss put the stock value at $7.50. This means that in order for the stock to get back to $10 (the investor's breakeven point), it would need to gain 100% (or twice as much as it lost in percentage terms). Recouping losses always requires a larger percentage gain than the loss itself, and the difference between the two gets more dramatic as the losses become larger [Kathman].

What the *Mathematical Catch-Up Game* doesn't account for is the loss of time. If investors are looking to retire in the near future and suffer significant loss, they may not have the time to make up that loss by their anticipated retirement date. "On average, it takes 3.1 years after a bear market begins for stocks to battle back to where they stood before. That 3.1-year period encompasses both the initial bear market, which on average lasts almost exactly one year, and the subsequent recovery, which lasts another 2.1 years" [Hulbert]. If an investor is looking to retire within five years or less and the recovery takes longer, it could mean postponing retirement or reducing one's quality of life to afford retirement.

Active Management

An a*ctive management* investment strategy utilizes an investment professional, or team of professionals, to actively manage a portfolio. Active managers will utilize research, forecasts, and human judgment when making decisions on which securities to buy, hold, and sell. Subscribers to *active management* strive to profit from the stock market through mispriced securities with the goal of outperforming the market (passively managed index funds). While *active management* allows for greater

flexibility and proficiency when managing risk, research continues to prove that active management is failing investors in today's new global equity markets.

Active Managers Aren't Beating Their Benchmarks

1-Year Performance
The June 2016 S&P Indices Versus Active (SPIVA®) Scorecard reported that over the past year, 90.2% of the actively managed U.S. mutual funds that invest in domestic equities were beaten by their benchmarks, when their returns are calculated net of fees [Foley]. Excluding actively managed emerging markets funds, the majority of global equities, international, and international small-cap equities managers underperformed their respective benchmarks in June 2015 through June 2016 [Soe].

10-Year Performance
Similarly, over the 10-year investment horizon, 85.36% of large-cap managers, 91.27% of mid-cap managers, and 90.75% of small-cap managers failed to outperform on a relative basis; 87.5% of domestic equity funds underperformed, and managers across all international equity categories underperformed their benchmarks [Soe].

Who Is Performing?
Over the 12-month period ending June 30, 2016, data shows that only 1 out of 10 large-cap, midcap, and small-cap growth managers outperformed their respective benchmarks. Across nine U.S. style categories, large-cap value managers performed the best over the 10-year horizon, with 32% of managers outperforming the benchmark, the S&P 500 Value [Soe].

Active Management-Investors Have Been Lagging for Years
DALBAR, Inc. has been measuring the long-term annualized returns of the average equity mutual fund investor compared with the S&P 500 since 1994. In the *2016 Quantitative Analysis of Investor Behavior (QAIB),* DALBAR revealed that, "The average investor has always lagged the overall market. While the gap between the average equity mutual fund investor and the S&P 500 has narrowed considerably in the past 15 years, the average investor still has only earned less than half of what they would have earned by buying and holding an S&P index fund (4.67% vs. 8.19%)" [DALBAR] (refer to *Figure 3.*1).

FIGURE 3.1 | Long-Term Annualized Returns S&P 500 vs. Average Equity Fund Investor
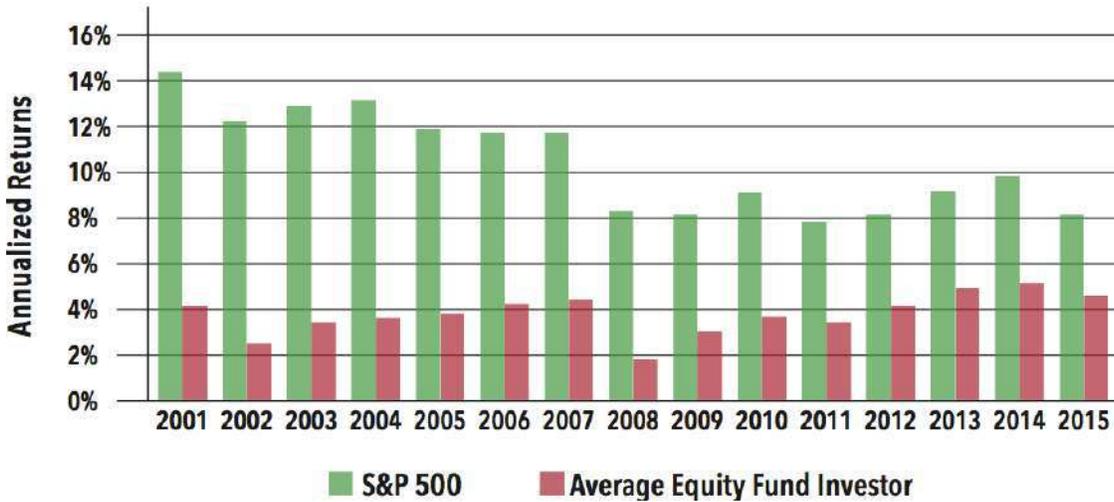

* The original analyses began in 1984, so 2001 represents an 18-year analysis and 2002 represents a 19-year analysis. Starting in 2003, the long-term analysis covers a 20-year timeframe.

SOURCE | DALBAR'S 22ND ANNUAL QUANTITATIVE ANALYSIS OF INVESTOR BEHAVIOR FOR THE PERIOD ENDING DECEMBER 31, 2015
http://www.qidllc.com/wp-content/uploads/2016/02/2016-Dalbar-QAIB-Report.pdf

In 2015, the underperformance of the average equity and fixed income investor was coincidently the same (3.66%) when compared against the S&P 500 and Barclays Aggregate Bond Index, respectively. The underperformance of the average asset allocation investor was greater (4.86%). Last year was particularly noteworthy because the overall market did make modest gains, but the average investor suffered depreciation in his or her account value (refer to *Figure 3.2*) [DALBAR].

FIGURE 3.2 | One-Year Return Comparison for 2015
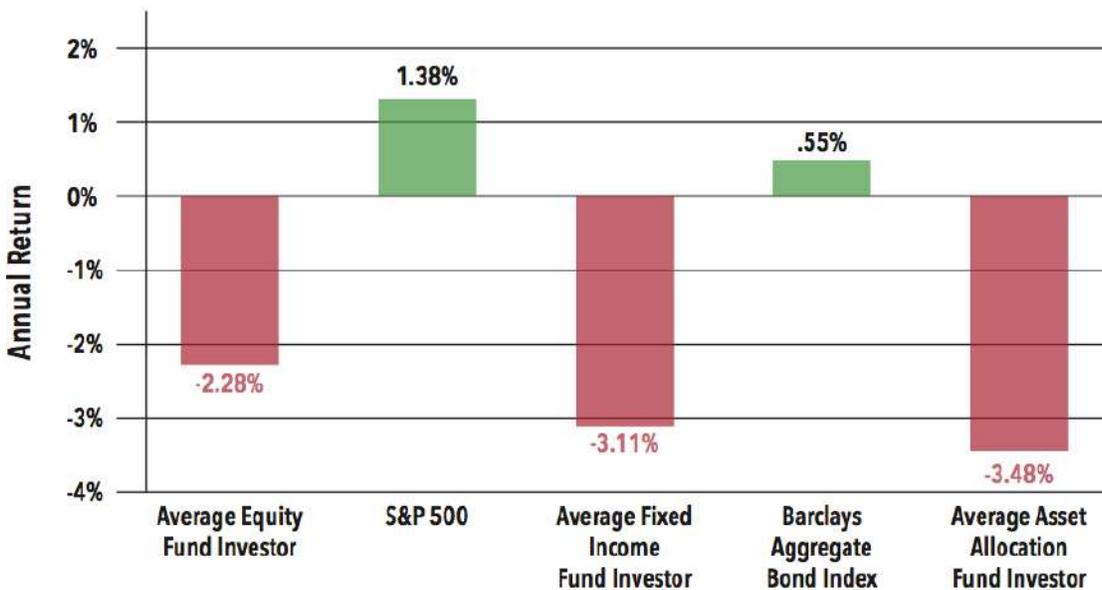
SOURCE | DALBAR'S 22ND ANNUAL QUANTITATIVE ANALYSIS OF INVESTOR BEHAVIOR FOR PERIOD ENDING DECEMBER 31, 2015
http://www.qidllc.com/wp-content/uploads/2016/02/2016-Dalbar-QAIB-Report.pdf

This flow is typical of bull markets as underperforming active managers and investors begin to chase returns. When the markets correct, these investors will panic when they reach their personal "downside threshold" and sell their assets at a depressed price in an attempt to lock in their gains or limit losses.

Investors Are Unable to Commit to Long-Term Plans in Active Management
DALBAR also determined that investors are not remaining invested in their funds for the long haul and that their movement into and out of such funds coincides with market fluctuations. This short-term retention does not adhere to a prudent, long-term strategy and is likely the result of short-term thinking and market timing [DALBAR].

- Over the past 20 years, equity mutual fund investors have seldom managed to stay invested in their funds for more than 4 years.
- Fixed income mutual fund investors have not remained invested in their funds for longer than 4 years at any time in the past 20 years.
- Asset allocation mutual fund investors have continued to stay invested longer than their equity and fixed income counterparts, hovering around or over the 4-year mark over the past 20 years [DALBAR].
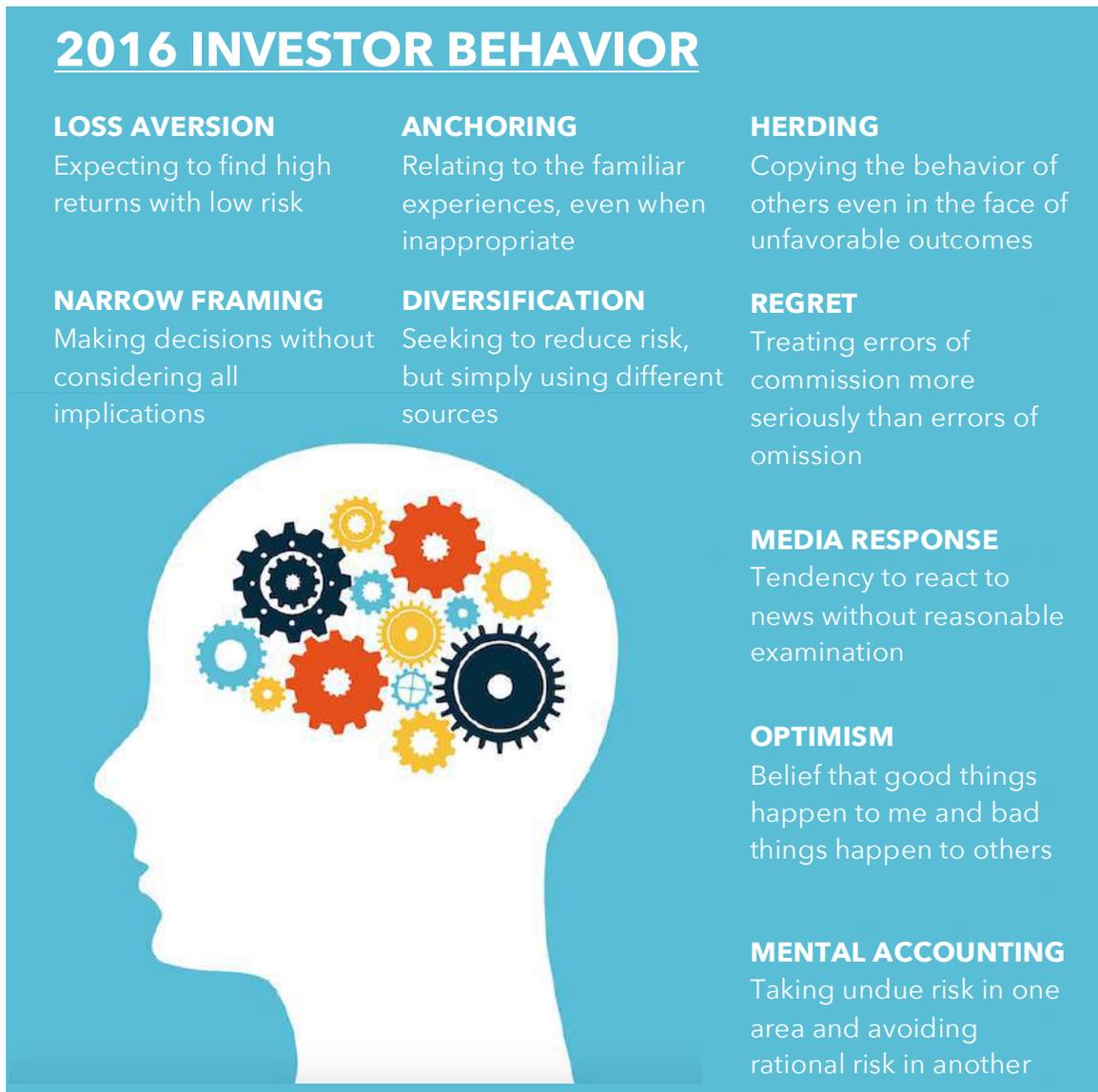
Active Management Allows for Emotional Investment Decision Making
Human beings instinctively respond to pain or discomfort. This survival technique, albeit a good one in certain scenarios, works against them in the investment world. Psychological traps, triggers, and misconceptions cause investors to act irrationally. That irrationality leads to buying and selling at the wrong time, which leads to underperformance.

Cognitive psychologists Daniel Kahneman and Amos Tversky are considered the "fathers of behavioral economics and finance". Since the late 1960s, they have published around 200 works, and in 2002, Kahneman received the Nobel Memorial Prize in Economic Sciences for his contributions to the study of rationality in economics. Their most notable works include writings about *prospect theory* [Phung].

Prospect theory, also known as *loss-aversion theory,* suggests that people express a different degree of emotion towards gains than towards losses. Individuals are more stressed by prospective losses than they are happy from equal gains. A loss always appears larger than a gain of equal size [Pareto]. Therefore, when investors are faced with the challenge of bearing the pain and discomfort associated with market volatility, they tend to sell low and buy high – a counterintuitive action to a successful investment strategy.

DALBAR has identified nine distinct behaviors that tend to plague investors based on their personal experiences and unique personalities (refer to *Figure 3.3*).

FIGURE 3.3 | 9 Investor Behavioral Traits

2016 INVESTOR BEHAVIOR

LOSS AVERSION
Expecting to find high returns with low risk

ANCHORING
Relating to the familiar experiences, even when inappropriate

HERDING
Copying the behavior of others even in the face of unfavorable outcomes

NARROW FRAMING
Making decisions without considering all implications

DIVERSIFICATION
Seeking to reduce risk, but simply using different sources

REGRET
Treating errors of commission more seriously than errors of omission

MEDIA RESPONSE
Tendency to react to news without reasonable examination

OPTIMISM
Belief that good things happen to me and bad things happen to others

MENTAL ACCOUNTING
Taking undue risk in one area and avoiding rational risk in another

SOURCE | DALBAR'S 22ND ANNUAL QUANTITATIVE ANALYSIS OF INVESTOR BEHAVIOR FOR PERIOD ENDING DECEMBER 31, 2015
http://www.qidllc.com/wp-content/uploads/2016/02/2016-Dalbar-QAIB-Report.pdf

Active Management Sets the Stage for Unreasonable Expectations
A subsection of *loss aversion* is *expectation-based loss aversion*. This concept is also based on the fact that humans are more sensitive to losses than they are to gains as well, but it also suggests that when the expectations of an individual fail to match reality, the individual loses an amount of utility from the lack of fulfillment of those expectations [Kőszegi]. When applying this theory to active management, investors expect to find higher returns with lower risk – which is a complete contradiction to the fundamental principle behind investing and the relationship between risk and return (low levels of risk are associated with low potential returns and high levels of risk are associated with high potential returns). This means that average investors' expectations of their investment performance (and investment manager's performance) are unrealistic and they will rarely be satisfied.

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Investors Are Subjected to the True Costs of Loss with Active Management

Loss is loss, regardless of investment strategy method. As mentioned, it costs an investor more to break even than it does to prevent loss, and even if the investor is able to break even, he or she can never make up the time that was lost in doing so. Loss can easily influence an investor's timeline to retirement and/or quality of life, which makes the lagging success of active management a precarious choice.

The limitations surrounding *buy and hold* and *active management* investment strategies can misinform investors and create missteps with their investment plan and ultimately yield sub-par results at best. If *buy and hold* and *active management* are "losing strategies" in today's investment environment, how can investors get a true return on their investments that justifies the risk?

SOLUTION

In today's global equity markets, investors face the same question:

How do I actually get a true return on my investment that justifies the risk?

Solution: Artificial Intelligence Investment Strategy (AIIS)

Artificial Intelligence Investment Strategy (AIIS) is intelligence exhibited by an algorithmic trading system. AIIS is flexible, has clear preferences, and set investment goals. It models global and domestic market data, provides an overall risk management perspective, and alerts the portfolio manager of potential significant shifts toward bull or bear markets. In simpler terms, AIIS perceives its environment and takes actions that maximize its chance of success in meeting the investor's goal.

How does AIIS Combat the Two Major Challenges Investors Face Today?

Challenge 1: The New Global Economic Environment

The new global economic environment is hampered with mounting debt, rising interest rates, the prospect of significant market volatility, and a possible market correction. AIIS allows investors to look forward to the future with a greater confidence. It can assimilate real-time information and work to recognize potential market transitions with the goal of helping investors avoid major market corrections.

Challenge 2: The Shortcomings of Existing Investment Strategies

As the new global economic environment continues to evolve, so must the investment strategies investors employ. The limitations of *buy and hold* and *active management* are failing investors and hindering their investment goals.

Buy and Hold

AIIS does not advocate a *buy and hope (hold)* investment model. Instead, it utilizes a sophisticated algorithm and artificial intelligence to amass technical data and process it simultaneously through its 22 sub-systems. Each sub-system detects critical market opportunities, weighs each data point to determine the probability of a major market shift. Unlike *buy and hold*, where the investor is vulnerable to making investment decisions based on emotions, AIIS utilizes a non-emotional algorithm-based system that works to capture potential opportunities.

AI PROJECTIONS

South African mathematician, Richard Craib, founder of Numerai, the world's first encrypted data-science tournament for equity price predictions recently shared his thoughts on AI growth in the financial sector with London-based finance and tech magazine, ***Raconteur.***

While experts largely estimate AI will surpass human intelligence by 2040, Mr. Craib believe this could happen in the stock market sooner. "I think it's really untenable to think that, long term, humans will be better than AIs at predicting the future of an equity in 100-dimensional feature space." [McGrath]

Active Management

Research has shown that the majority of active managers aren't beating their benchmarks when making decisions on what securities to buy, hold, and sell. Historically, their algorithms fall short as they are unable to successfully process data for optimal investment outcomes.

AIIS works to empower investors with the confidence and tools needed to help grow wealth in today's investment environment. It is designed to provide strategic oversight of the portfolio to help meet the needs of today's investor in the new global economic environment. Investing in the markets can be emotionally challenging, AIIS's goal is to help keep investors committed to their overall investment strategy.

A Leader of Artificial Intelligence Investment Strategy

SolomonAPI™ *Advanced Portfolio Intellect*, has been on the forefront of AIIS technology development for more than ten years. Its sophisticated AIIS is designed to help investors avoid major market corrections. The features and benefits of SolomonAPI™ *Advanced Portfolio* include:
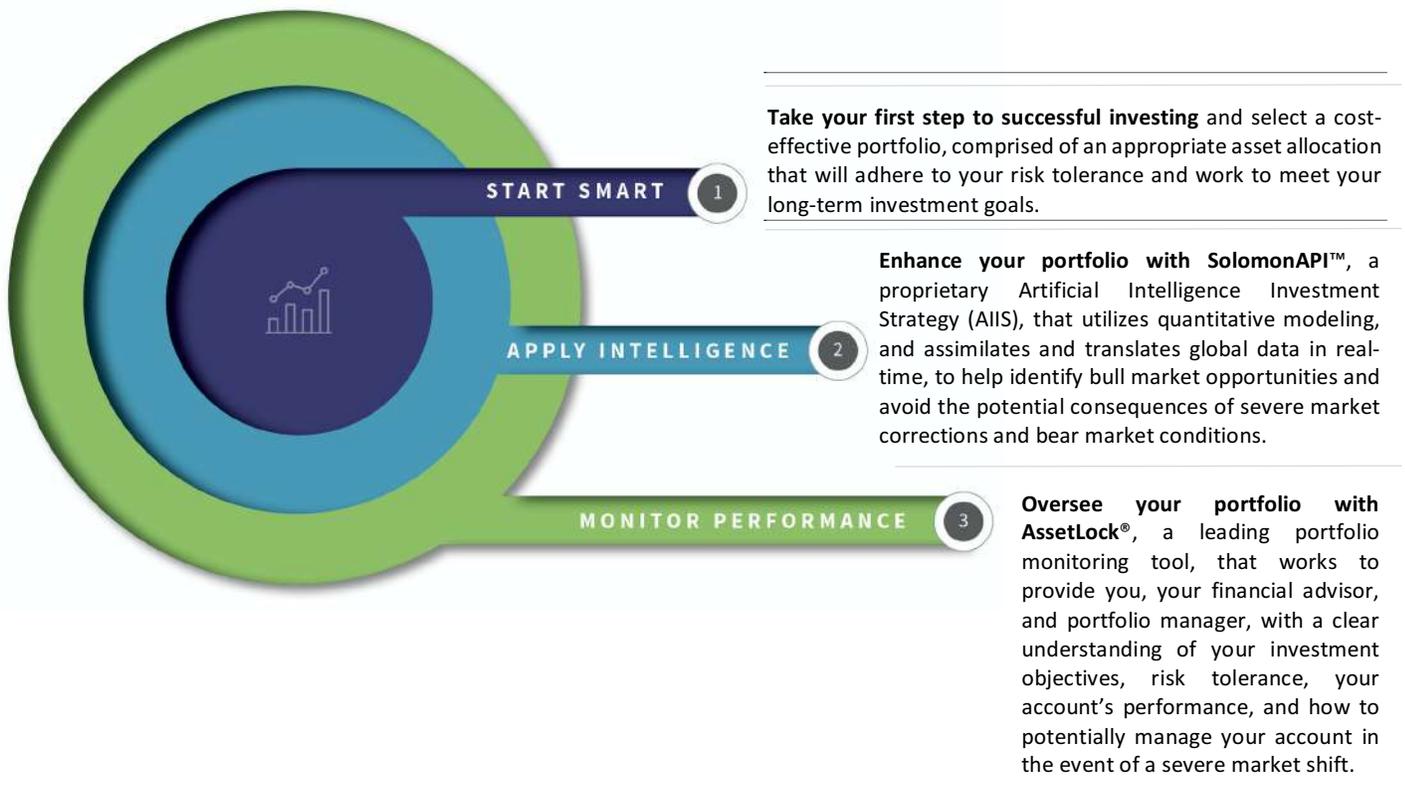
Artificial Intelligence Algorithm Drive: The AIIS system's sophisticated algorithm drives thousands of lines of code and 22 sub-systems to deliver data into the primary mainframe structure. This primary system acquires information 24 hours per day and responds to actual real-time market movements that have material impact on the overall AIIS system.

Bull & Bear Market Detection: The AIIS performs quantitative modeling of global market data in real-time, with the goal of detecting bull and bear market shifts. This critical risk measure works as a secondary strategy to the risk management strategies within the portfolio.

Personalized Portfolio Monitoring & Communications: Through AssetLock®, the leading investment portfolio monitoring and communications tool, AIIS is able to monitor the investor's account daily. It will notify the investor, financial advisor, and portfolio manager if the investor should consider adjusting his or her investment strategy. Email and text notifications are disseminated when the investor's account has reached an all-time high, when it's nearing the investor's risk threshold, and when the investor may want to consider exiting or re-entering the market. This risk measure works as a tertiary strategy to the risk management strategies within the portfolio. Personalized weekly financial summaries, quarterly performance reports, and annual gain/loss reports for tax planning and preparation available through additional service providers. For more information about AssetLock®, please visit: www.AssetLock.com.

Transparency: Investors have complete transparency of their investment accounts through AssetLock®'s secured online platform. The investor, financial advisor, and portfolio manager have a clear understanding of the investor's objectives and risk tolerance, the account's performance, and how to manage the account in the event of a market correction.

How SolomonAPI™ Artificial Investment Strategy (AIIS) works for investors, is best depicted in the three-step process illustrated in *Figure 4.1*.

FIGURE 4.1 | The SolomonAPI™ Advantage

Take your first step to successful investing and select a cost-effective portfolio, comprised of an appropriate asset allocation that will adhere to your risk tolerance and work to meet your long-term investment goals.

Enhance your portfolio with SolomonAPI™, a proprietary Artificial Intelligence Investment Strategy (AIIS), that utilizes quantitative modeling, and assimilates and translates global data in real-time, to help identify bull market opportunities and avoid the potential consequences of severe market corrections and bear market conditions.

Oversee your portfolio with AssetLock®, a leading portfolio monitoring tool, that works to provide you, your financial advisor, and portfolio manager, with a clear understanding of your investment objectives, risk tolerance, your account's performance, and how to potentially manage your account in the event of a severe market shift.

CONCLUSION

SolomonAPI™ has released a viable option for investors in today's global equity markets: Artificial Intelligent Investment Strategy (AIIS). The shortcomings of *buy and hold* and *active management* are driving investors to chase returns in precarious global economic environment, regardless of their risk tolerance.

SolomonAPI™ was designed specifically for smart portfolios with the goal of producing a true return for investors, while minimizing their opportunity for over-exposure. The strategic combination of AI and advanced communication technology, allows investors to remain committed to their investment plan as they are informed and have added risk measures in place that work to avoid market corrections and capitalize on bull market opportunities.

About SolomonAPI™

At SolomonAPI™, our mission is to growth and protect wealth intelligently for our investors. Technology is the foundation of Solomon API™. Our proprietary Artificial Intelligence Investment Strategy (AIIS), Solomon, utilizes a sophisticated algorithm, quantitative modeling, and a global perspective to manage risk, beyond the risk management strategies within a smart portfolio. Solomon works in conjunction with the leading portfolio monitoring tool, AssetLock®, to advance communication and transparency among the investor, financial advisor, and portfolio manager. The combination of AI and advanced communication technology, works to help ensure the investor is informed, and that the financial representatives have a clear understanding of the investor's objectives throughout the investment process. Our combination of world-class computing power and financial expertise has generated advanced investment strategies specifically for investors who are seeking a true return that's commensurate with their risk tolerance in the new global economic environment.

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