

Are Markets Efficient? ... And Does It Matter?

Remarks by

Michael W. Nolan

Before the Personal Financial Planning Lecture Series

At Saint Vincent College

April 4, 2016

Thank you, Dr. Racculia, for inviting me to speak here at Saint Vincent College today. I'm honored to be here with you today. I have been working with Vanguard founder John C. Bogle for the past five years, helping him as he stands at his "Bully Pulpit" and advocates for a better financial world. Today I will discuss market efficiency as seen through the lens of Jack Bogle and the Vanguard way of investing, and then discuss the practical implications for investors. I'll close with some thoughts about what to expect going forward in the capital markets.

A Brief Overview of the Efficient Markets Hypothesis

The idea of efficient markets goes back to at least 1900, when the French mathematician Louis Bachelier wrote his Ph.D. thesis titled "The Theory of Speculation" at the Sorbonne. Bachelier was a pioneer in applying advanced mathematics to the financial markets, and he theorized that "past, present, and even discounted future events are reflected in market price." He concluded that "the mathematical expectation of the speculator is zero." (Bogle, 2005)

By the late-1960s, Eugene Fama of the University of Chicago formalized the Efficient Markets Hypothesis (EMH). He went on to describe three versions of the EMH: 1) the weak form, in which all information about historical prices is reflected in a given security's price; 2) the semi-strong form, in which prices reflect all publicly available information; and 3) the strong form, in which prices incorporate all public and non-public information.

This concept has been extraordinarily influential in the world of finance. Fama, after all, was awarded the Nobel Prize for his contribution (although he shared the prize with noted EMH skeptic Robert Shiller, as well as University of Chicago economist Lars Hansen). Clifford Asness and John Liew

(2014), the highly regarded co-founders of the alternative investment management firm AQR, said that the “EMH has contributed more to our understanding of finance and even general economics than any other single idea we can think of in the past 50 years.” They went on to say that Fama is “our clear pick as the MVP of modern finance and perhaps economics as a whole for the past almost half century.” While John Bogle was not directly influenced by Fama’s research when he created the first index mutual fund in 1975, Fama has made significant contributions to the intellectual foundation on which indexing stands.

Challenges to the EMH

The EMH presents a serious challenge to active investors. If market prices adjust quickly to effectively incorporate any relevant information, how can active managers add value by exploiting mispriced securities? The active manager answers, of course, by denying the premise of the question. After all, a strict interpretation of the EMH suggests that asset bubbles are impossible and that securities are always properly priced based on all relevant information. EMH skeptics would argue that surely the dramatic movements in the stock market over the last decade and a half—the tech wreck in the early 2000s and the recent Global Financial Crisis—are not only evidence that mispricings can occur, but evidence that they can occur on a massive scale. In December 1999, the CAPE (cyclically adjusted price/earnings ratio) popularized by Yale’s Robert Shiller reached an all-time high of 44.2, 285% higher than the long-term average at that time. Could that elevated PE possibly be an accurate reflection of economic reality? Further, is it reasonable to argue that the painful 50% decline in the stock market between March 2008 and March 2009 was the result of efficiently pricing stocks based on the information available at that time? One observer wrote in the *Financial Times* that EMH “is the financial equivalent of Monty Python’s dead parrot.” (Montier, 2009)

Perhaps the critics are taking the EMH too literally. As Princeton economist and former Vanguard director Burton Malkiel (2015) wrote in the eleventh edition of his classic book *A Random Walk Down Wall Street*:

As long as there are stock markets, mistakes will be made by the collective judgment of investors. ... But even if price setting was always determined by rational profit-maximizing investors, prices can never be “correct.” ... What the EMH implies is that we can never be sure whether they are too high or too low at any given time. Some portfolio managers correctly determine when some prices are too high and others too low. But at other times such judgments will be in error. And, in any event, the profits that will be attributable to correct judgments will not represent unexploited extraordinary returns that were obviously apparent. ... I believe that the evidence is very powerful that our

markets come very close to the EMH ideal. Information does get reflected rapidly in security prices. The EMH's basic underlying notion—that if there are obvious opportunities to earn excess risk-adjusted returns, people will flock to exploit them until they disappear—is as reasonable and commonsense as anything put forward by the EMH's critics.

Sir Isaac Newton's Revenge

Whether or not markets are strictly “efficient,” they are certainly hard to beat. For evidence that it is difficult for active managers to beat the market, we can look to the widely cited bi-annual SPIVA Scorecard (S&P Indices Versus Active), which details the performance of active mutual funds versus passive benchmarks. The year-end 2015 update for U.S. mutual funds shows that just under 75% of active funds were unable to beat the broad-market S&P Composite 1500 index on a one-year basis. Over longer periods, the results are even worse for active managers. The percentage of active funds that lost to the broad benchmark on a three-year basis was 80%; 88% over five years; and 83% over ten years. The report also evaluates various segments of the market (e.g., large-cap growth and small-cap value) and non-U.S. markets, with similar results. You might be tempted to look at the 17% of active managers who successfully beat the market over the last ten years and entrust your money to them. If they were good enough to win over the last ten years, they're good enough to win over the next ten, right? If only it were that simple...

Vanguard regularly updates a white paper titled “The case for index-fund investing.” (Philips et al., 2015) One of the many interesting analyses in this paper is a look at persistence in the performance of actively managed mutual funds. In other words, the report attempts to answer the question: “Do funds that outperformed in the past continue to outperform in the future?” The authors ranked the performance of all active equity funds for the five years ending 12/31/2009, then looked at how those same funds fared in the subsequent non-overlapping five-year period ending 12/31/2014. For the 20% of funds that finished the first period in the top quintile, only 13.5% remained in the top quintile for the next period—even worse than would be expected by random chance. Not only did the first-period winners fail to repeat their outperformance, 23.5% of them ended the second period in the bottom quintile—the worst showing of any quintile. In other words, investing in one of the winning funds from period one gave you the *highest* chance of owning one of worst performers over the second period.

This phenomenon is known as reversion to the mean (RTM). Jack Bogle (2010) devoted an entire chapter to this topic in his classic treatise on investing, *Common Sense on Mutual Funds*. As Jack put it, “Reversion to the mean represents the operation of a kind of law of gravity in the stock market,

through which returns mysteriously seem to be drawn to norms of one kind or another over time. This application of the universal law of gravity might even be characterized as Sir Isaac Newton's Revenge on Wall Street." Jack concludes: "In the long run, a well-diversified equity portfolio is a commodity, providing rates of return that are highly likely to resemble closely and finally fall short of those of the stock market as a whole." Jack demonstrated several high-profile, real-world examples of RTM in his 2012 book *The Clash of the Cultures: Investment vs. Speculation*. (2012) He charts several well-known funds like Fidelity Magellan, Janus Fund, Legg Mason Value and Vanguard's own Windsor and U.S. Growth funds. In each case, the funds delivered market-beating returns over a period of time (which of course attracted cash from investors and accolades for the managers), then inevitably lagged the market's returns, coming back down to earth. The universality of RTM and the lack of persistence in active fund returns seem to suggest that markets are, at the least, reasonably efficient.

Enter the Cost Matters Hypothesis

The validity of the EMH makes for an intellectually stimulating debate. But I would argue that for the average investor saving for retirement, or their children's education, or to pass on an inheritance to their heirs, the EMH debate is not particularly relevant. There is, however, a simple mathematical tautology that all investors should understand. John Bogle (2005) calls this essential pearl of wisdom the Cost Matters Hypothesis (CMH). The CMH simply states: *Gross returns in the financial markets minus the costs of financial intermediation equals the net returns actually delivered to investors*. As Jack put it in his article "The Relentless Rules of Humble Arithmetic," "No matter how efficient or inefficient markets may be, the returns earned by investors as a group must fall short of the market returns by precisely the amount of the aggregate costs they incur. It is the central fact of investing."

The CMH and its implications for investment strategy are perhaps best illustrated by way of a simple syllogism. All investors in the stock market, as a group, own the entire market and earn the market's gross return before costs. Investors in index funds own the entire market at a low cost (as low as 0.05% in widely available Vanguard index funds), and therefore, as a group, receive the gross market return minus a low cost. Active investors, as a group, also own the entire market. But rather than simply hold the market portfolio, they employ expensive managers and trade with one another in an effort to gain advantage over their peers. The costs of active management add up (as I'll discuss a bit later) to as high as 2% per year. So active investors as a group receive the gross market return minus the high cost of active management. Nobel Laureate William F. Sharpe (1991) of Stanford put it this way: "Properly measured, the average actively managed dollar must underperform the average passively managed dollar, net of costs. Empirical analyses that appear to refute this principle are guilty of improper measurement."

What's Wrong with Indexing?

The message is getting through to investors. Since the end of 2007, just under \$1.5 trillion has been invested in equity index mutual funds, while almost \$500 billion has been redeemed from active funds. This is an unprecedented sea change in the mutual fund industry. Despite this incredible success in investor net cash flow, nearly two-thirds of the total assets in equity mutual funds remain actively managed. Clearly, some investors still have reservations about indexing. Next, I'll tackle some common myths and misconceptions about indexing drawing largely from a white paper written by my colleagues at Vanguard (2014).

Myth #1: Indexing only works in 'efficient' markets. You may have heard some expert say that while indexing may make sense in, say, large-cap U.S. equities, an active manager is more likely to add value in less-efficient markets such as small-cap or emerging markets stocks. When thinking about this line of argument, it's critical to remember how investing works at the most basic level. When one investor buys a stock, another investor sells that same stock—every purchase is another investor's sale, and vice versa. Put another way, if one investor makes a winning trade and outperforms the market, another investor by necessity underperforms the market (before costs) by exactly the same amount. It's simply not possible, in any market segment, regardless of the level of market efficiency, for the average manager to be above average. So we return to the CMH. The average investor with high costs must underperform the average investor with low costs, regardless of the level of market efficiency. The simple arithmetic is inescapable.

Myth #2: You wouldn't hire an average brain surgeon, so why should you hire an average fund manager? Once again, look to the CMH. Index funds earn the market's gross return minus a low cost. The average active fund must also earn the gross return, but minus a much higher cost. So the net return to investors in the purportedly "average" index fund ends up well above average when ranked against its higher-cost active counterparts. We see this empirically in the SPIVA Scorecard mentioned earlier.

Myth #3: You get what you pay for. This is a useful rule of thumb for buying most consumer products. It's often worth shelling out a few extra dollars for, say, a nicer suitcase that will last longer than a cut-rate competitor. Unfortunately, this logic fails to hold in investing. In fact, as Jack Bogle is fond of saying, "in investing, not only do you not get what you pay for, you get precisely what you do not pay for. Therefore, if you pay nothing, you get everything." That is, you get virtually all of the returns provided by the stock market.

Myth #4: Market-cap weighting overweights overvalued securities. This myth is the foundation for the rise of so-called "Smart Beta" funds that have proliferated in recent years. It suggests that as the

irrational exuberance or unwarranted pessimism of investors causes some stocks to be overvalued and others to be undervalued, index funds will own too much of the worst (overvalued) stocks and too little of the best (undervalued) stocks. This line of argument brings us back to the EMH. A market-capitalization weighted index fund owns each stock in the precise weighting that reflects the collective wisdom of all investors. As new information becomes available, investors incorporate that information into a new fair price for a given security. Deviation from market-cap weighting suggests that the collective wisdom of investors is wrong—in other words, the EMH doesn't hold. But if markets are even reasonably efficient, than a given security's market capitalization is the best estimate of its fair value.

This myth goes on to say that market-cap weighted index funds must buy overvalued stocks and sell undervalued stocks. This part of the myth is completely off the mark. If you have a market-cap-weighted portfolio and one stock rises in value while another falls, you don't need to do anything. Without making a single trade, your portfolio continues to reflect the market weight, a sort-of automatic rebalancing. On the other hand, an equal-weighted portfolio that owns the same amount of each stock (a common alternative to market-cap weighting) must constantly buy underperforming stocks and sell outperforming ones to maintain the target equal weights.

The “All-In” Expenses of Investing

I'd now like to turn to a closer examination of the costs of investing, drawing heavily from a paper written by Jack Bogle (2014) called “The Arithmetic of ‘All-In’ Investment Expenses” from the *Financial Analysts Journal* in 2014. As the heavy cash flows into index funds mentioned earlier suggest, many investors in mutual funds now understand the importance of considering a fund's costs and the impacts those costs have on long-term returns. Savvy investors are accustomed to closely examining fund expense ratios. The mutual fund expense ratio captures many of the major costs of investing. If you dig through a fund's prospectus, you will see the expense ratio broken into three categories: management fees, distribution and service (12b-1) fees, and other expenses. So the expense ratio captures how much you pay your fund manager, the fund's sales force, and, well, some other stuff required to operate a mutual fund. Carefully evaluating expense ratios is critically important, but the expense ratio does not capture all of the relevant costs of investing in mutual funds.

The first of the “invisible” costs not included in the expense ratio is the cost of trading. This may come as somewhat of a surprise to many investors, but the costs of buying and selling the securities held by a mutual fund are not included in the expense ratio. The most obvious of these trading costs are the brokerage commissions paid to conduct trades, followed by the less easily quantifiable implicit costs of trading such as bid-ask spreads and market impact. Some of these costs (commissions and bid-ask

spreads) represent payments to intermediaries and are clearly a drag on investment returns. Some other costs, such as when one fund takes a “haircut” by selling a large block of stock in a way that moves the market price, are really just a transfer from one fund to another. That is, one fund’s disappointing selling price is another fund’s bargain buying price. So these costs are a wash for investors in the aggregate. Precision here is next to impossible, so Jack estimates these costs at 50 basis points (0.5%), a reasonable, if somewhat conservative, assumption given the results of various studies on the topic cited in his essay.

The next important cost is what I’ll call cash drag. Mutual funds commonly hold a position in cash of around 5% for various reasons, such as the ability to handle fund redemptions without having to liquidate assets or to have “dry powder” on hand if a compelling buying opportunity suddenly appears. But anyone who has a savings account knows that cash hasn’t been paying very well in recent years. So if the long-term annual premium for equities over cash is, say, 6% (which is about the long-term average cited by the University of Pennsylvania’s Jeremy Siegel in his classic work *Stocks for the Long Run*), then the drag from a 5% cash position would come to 30 basis points (0.3%) per year. Many funds “equitize” their cash position by holding ETFs or index futures, so Jack generously estimates the average annual cash drag at 15 basis points.

Sales and distribution fees are another drag on returns we must consider. While some fund-related distribution charges are included in the expense ratio—largely through so-called 12b-1 fees—there are still additional charges paid by investors. In the early days of the mutual fund industry, heavy front-end sales loads of 8% were common. While some funds still carry front-end loads of as high as 5%, the industry is trending towards asset-based fees. The recent rise of “robo” advisors is another force driving down the costs of investing and putting pressure on the typical 1% annual fee charged by many financial advisors. And of course, some investors are completely DIY and therefore incur no sales charges at all. With all that in mind, Jack estimates the average investor pays another 50 basis points (0.5%) per year in sales and distribution costs.

So we’ve estimated transaction-related costs at 50 basis points, cash drag at 15 basis points, and sales and distribution fees at another 50 basis points, for a total of 1.15% per year in addition to the expense ratio. I estimate the asset-weighted expense ratio for actively managed equity funds at about 0.85% (slightly less than the estimate in Jack’s essay), for a total cost to investors of 2% per year. 2% may not sound like all that much. But compounded over an investment lifetime, it becomes a huge sum. I’d like to illustrate the impact by way of an example.

Let’s start with a hypothetical recent college graduate. According to the National Association of Colleges and Employers (Poppick, 2015), the starting salary for the average college graduate is about

\$45,000. Let's assume this is a particularly frugal young person who manages to save 10% of her salary each year. She gets an annual raise of 3% each year, which a compensation expert at Towers Watson recently told CNN (Sahadi, 2015) is the “new norm.” Of course, even the thriftiest investor has to pay something for access to the market. So let's look at what the typical all-in costs of investing might do to her retirement savings.

If our college grad earned a gross market return of 6% per year for 50 years, she would accumulate a sizable nest egg of about \$2.1 million—about \$1.6 million of which represent the accumulated investment growth on her savings. But if she paid annual all-in fees of 2% and therefore only earned 4% on her investments, her retirement accumulation would fall to about \$1.2 million, with \$700,000 in cumulative investment returns. So she put up 100% of the capital and took 100% of the risk, but by paying an all-in annual fee of 2%, she only received 45% of the reward. That doesn't sound like such a great deal to me.

If instead she had invested in an index fund with an expense ratio of only 0.05% that has negligible trading, is fully invested, and paid no sales or advisory fees, she would earn 98% of the market's return over 50 years. As Jack Bogle so often says, the index fund is the only way to guarantee that you will receive your fair share of the market's returns.

The Low-Cost/Top-Talent Paradox

I've discussed at length the Cost Matters Hypothesis and the arithmetic of “all-in” investment expenses, and debunked some common myths and misconceptions about indexing. But I'm going to guess that some investors still aren't ready to give up all hope of beating the market, despite the odds. So what is an investor who still wants to try to beat the market but understands the importance of the low-cost investing to do?

Some of my colleagues at Vanguard have tried to answer that question in their white paper “Keys to improving the odds of active management success.” (Wallick et. al., 2015) While beating the market consistently over the long-term is very difficult, your odds are improved if you focus on high-quality managers that charge low fees. But wait a second... Why would a high-quality manager charge low fees? If an asset manager has exceptional skill, a proven track record, and an investment process that is reliably competitive with market returns, shouldn't that manager have the market power to command a premium price? And if high-quality managers can command a premium price, wouldn't those high costs eat into the excess returns they created?

At least one exception stands out. Vanguard is unique in the mutual fund industry. John Bogle created Vanguard in 1974 as a firm owned entirely by the Vanguard mutual funds, which are in turn owned by their mutual fund shareholders. With this unique structure, there is no conflict of interest between mutual fund investors and management company stockholders—they are one and the same. This alignment of interests allows Vanguard to operate on an at-cost basis, with any operating surplus going back to the funds in the form of lower costs. Vanguard is indeed the only truly *mutual* mutual fund company.

This model has proven successful. Vanguard is now the mutual fund industry leader with over \$3 trillion in global assets under management. This enormous size allows Vanguard's (already low) fixed costs to be spread over a large pool of assets; in other words, Vanguard's huge economies of scale keep costs low for our clients. With our incredible scale, Vanguard is the largest user of subadvisors in the world. As of June 2015, Vanguard used 30 subadvisors to oversee more than \$420 billion in active equity fund assets. Each manager starts with a large asset base, often \$1 billion, with the potential to grow over time.

Vanguard continually stresses the importance of maintaining a long-term focus in order to achieve investment success. We take the same approach in our relationships with subadvisors. On average, our subadvisors have remained engaged with Vanguard for more than 14 years. For many of Vanguard's subadvisors, it's preferable to earn fees at a lower rate over a larger asset base for a longer period of time with Vanguard than to earn higher rates on fewer assets for a shorter duration. This allows Vanguard to attract and retain skilled managers with long-term investment philosophies at reasonable rates.

This solution to the low-cost/top-talent paradox has served Vanguard's investors well. Looking at the historical record, whether the performance of Vanguard's active funds are weighted equally, asset-weighted, or weighted according to Vanguard's portfolio construction guidelines for a diversified long-term portfolio, our active funds have outperformed their benchmarks since 1982. So while the case for index fund investing is compelling, investors who insist on active management would be wise to focus on funds that are committed to keeping costs low.

Looking Ahead—Reasonable Expectations for Market Returns

I'd like to conclude my remarks with a look ahead in the capital markets. I had the tremendous honor of co-authoring a paper in the *Journal of Portfolio Management* with John Bogle (2015) last fall called "Occam's Razor Redux: Establishing Reasonable Expectations for Financial Market Returns." In

this paper, Jack and I revisit his crystal ball—that is, we review the models he first wrote about over 25 years ago for developing useful capital markets expectations. The models are simple and easy to understand, and, perhaps even more importantly, they have a proven track record as a useful guide to the future.

Let's start with stocks. Jack was inspired by the great 20th century economist John Maynard Keynes' concepts of enterprise (the actual business results of corporations) and speculation (the changing price investors are willing to pay for a dollar of earnings). Jack took these concepts and applied them to a simple decomposition of equity market returns. Jack rechristened enterprise as "investment return" and defined it as the initial dividend yield plus subsequent earnings growth of the stock market. "Speculative return" refers to the expansion and contraction of the P/E multiple. Forecasting the stock market over short periods of time is, well, nearly impossible. So Jack prefers to use 10-year periods, for two specific reasons. First, earnings growth can be very volatile in the short term. But over longer periods, earnings growth has typically trended toward a long-term average growth rate. P/E ratios behave somewhat similarly. They can rise shockingly high (as in the late 1990s) or fall very low in the short term, but generally revert to the long-term mean over time. In our paper, we looked at how Jack's model would have fared over the last quarter-century. The correlation between Jack's simple forward-looking model and actual market returns was 0.81.

Applying Jack's model to a look ahead at the next ten years, we start with the current dividend yield—a known quantity. The yield on stocks is currently about 2 percent. We then add to that an expectation for earnings growth. The long-term average for earnings growth is about 5 percent. As I said, earnings growth can be very volatile in the short term, and even over periods as long as 10 years. If you feel strongly that earnings growth will be faster or slower than it has been in the past, you can adjust your expectation accordingly. I prefer to base my expectation on the long-term average of 5 percent for the coming decade. In the language of Jack's model, then, my expectation for investment return over the coming decade is a 2 percent dividend yield plus 5 percent earnings growth for a total 7 percent investment return.

Now we must consider speculative return, or expansion and contraction of the P/E ratio. Do I (or anyone else, for that matter) know what the P/E will be in 10 years? Of course not. But we know more than we may think. As I mentioned already, P/Es have historically exhibited a mean-reverting tendency. If we look closely at the historical data (price to trailing 1-year reported earnings), some patterns emerge. When the P/E began a given 10-year period above 20, it was lower by the end of the period 70% of the time. That is, when the P/E starts off greater than 20, the speculative return over the following 10 years

was negative 70% of the time. Similarly, if the P/E began a decade below 12, it was higher 10 years later 84% of the time (i.e., speculative return was positive). Using Jack's preferred measurement, the P/E currently stands at 21, slightly higher than the long-term average. Therefore, it is likely (though certainly not necessary) that the P/E will decline slightly over the coming decade towards its long-term average to, say, 19. That would represent a 1 percent annual decline in speculative return over the coming decade.

Putting investment and speculative return together, a reasonable expectation for annual market returns over the coming decade might be about 6%, well below the long-term average return of about 9%. I'm speaking in nominal—before inflation—terms here. Of course, we can't know what inflation will be going forward, but market-based forecast for inflation over the next ten years is about 1.5%, which will further erode investor's buying power. This just underscores the importance of saving as much as we can for retirement.

Now let's briefly turn to bonds. Developing reasonable long-term expectations for bonds is far simpler than even our simple model for stocks. That's because a bond's current yield tells us its expected return if held to maturity. So if we want to estimate the 10-year future return on U.S. treasuries, all we need to do is open the *Wall Street Journal* and look at the current yield. The current 10-year Treasury yield is about 1.8%, well below the nominal long-term average. If we take a bit more risk by diversifying into a portfolio that includes high-quality corporate bonds and bonds of longer and shorter maturities (such as Vanguard Total Bond Market Index), the yield might rise to about 2.3%. So a 60/40 stock/bond portfolio might be expected to return about 4.5% per year over the next decade.

Such a return is considerably lower than what we've experienced in recent years. For example, Vanguard's 60/40 Balanced Index Fund has returned just over 7% per year over the last two decades. The implications for those of us saving for retirement are important. If returns are likely to be lower going forward than they have been in the past, we must save more and/or take additional risk with our portfolios. Taking on more risk, I must point out, requires a careful and honest evaluation of an investor's risk tolerance. The worst possible scenario is one in which an investor increases portfolio risk, and then bails out when the strategy fails to work in the short term, thereby locking in losses before the risky strategy has a chance to pay off.

I don't mean to end on something of a pessimistic note, but the outlook for future returns in the markets underscores the need to keep investment costs low so that you earn your fair share of the market's returns, to save as much as you reasonably can, and to develop a long-term strategy that fits your goals and risk tolerance—and to stick with it.

Thank you for your time; it was a pleasure speaking to you today. I'd be happy to take some questions.

References

- Assness, C., & Liew, J. (2014, March). The Great Divide. *Institutional Investor*.
- Bogle, J. C. (2005). The Relentless Rules of Humble Arithmetic. In R. N. Sullivan, & R. N. Sullivan (Ed.), *Bold Thinking on Investment Management* (pp. 127-144). Charlottesville, VA: CFA Institute.
- Bogle, J. C. (2010). *Common Sense on Mutual Funds: Fully Updated 10th Anniversary Edition*. Hoboken, NJ: Wiley.
- Bogle, J. C. (2012). *The Clash of the Cultures: Investment vs. Speculation*. Hoboken, NJ: Wiley.
- Bogle, J. C. (2014). The Arithmetic of "All-In" Investment Expenses. *Financial Analysts Journal*, 70(1), 13-21.
- Bogle, J. C., & Nolan Jr., M. W. (2015). Occam's Razor Redux: Establishing Reasonable Expectations for Financial Market Returns. *Journal of Portfolio Management*, 42(1), 119-134.
- Malkiel, B. G. (2015). *A Random Walk Down Wall Street*. New York: Norton.
- Montier, J. (2009, June 24). Insight: Efficient markets theory is dead. *Financial Times*.
- Philips, C. B., Kinniry Jr., F. M., Walker, D. J., Schlanger, T., & Hirt, J. M. (2015). *The Case for Index-Fund Investing*. Malvern, PA: The Vanguard Group.
- Poppick, S. (2015, April 22). *Here's What the Average Grad Makes Right Out of College*. Retrieved from Time.com/Money: <http://time.com/money/3829776/heres-what-the-average-grad-makes-right-out-of-college/>
- Sahadi, J. (2015, August 10). *Here's the Kind of Pay Raise You Can Expect Next Year*. Retrieved from Money.CNN.com: <http://money.cnn.com/2015/08/10/pf/pay-raise/>
- Sharpe, W. F. (1991). The Arithmetic of Active Management. *Financial Analysts Journal*, 47(1), 7-9, 18.
- Siegel, J. J. (2014). *Stocks for the Long Run*. New York: McGraw-Hill Education.
- Vanguard Research. (2014). *Debunking Some Myths and Misconceptions about Indexing*.
- Wallick, D. W., Wimmer, B. R., & Balsamo, J. (2015). *Keys to Improving the Odds of Active Management Success*. Malvern, PA: The Vanguard Group.