

Occam's Razor Redux: *Establishing Reasonable Expectations for Financial Market Returns*

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In three articles published in this journal, Bogle [1991a, 1991b, 1995] presented a new, simple methodology for establishing reasonable expectations for returns on the two primary financial assets—stocks and bonds—over decade-long periods. In the first of these articles, Bogle noted that Occam's razor, the fourteenth-century postulate of Sir William of Occam, had inspired his methodology. His rule suggested, in substance, that the simplest solution to a problem is the solution most likely to be correct, and that problems should not be complicated more than necessary ("the law of parsimony").

In this article, we review the models first presented in those earlier articles and assess how useful they have been in establishing realistic expectations for stock and bond market returns. We test the model first used in 1990 against the actual returns on stocks and bonds since then, and also evaluate the model over the preceding century. We then provide our views on what to expect from the markets over the coming decade. We close by defending the models against anticipated challenges, and commenting on some implications of our model to investors and for the broader financial industry.

ENTERPRISE AND SPECULATION

Late in the 1980s, Bogle connected Occam's concept of simplicity to the wisdom

of John Maynard Keynes, originally cited in Bogle's 1951 honors thesis at Princeton University (Bogle, 2001). In Chapter 12 of his *General Theory of Employment, Interest, and Money*—"On the State of Long-Term Expectations"—Keynes had also described the value of simplicity. There, Keynes warned, "it is dangerous to apply to the future inductive arguments based on past experience, unless we can distinguish the broad reasons for what the past was" (Keynes, 1936).

Keynes' solution was Occam-like. We must consider the sources of stock returns. He enumerated just two: enterprise and speculation. Enterprise refers to the actual business results of corporations—the stuff of which dividend discount models are made. For Keynes, enterprise involved "forecasting the prospective yield of assets over their entire life." Speculation, on the other hand, involved "forecasting the psychology of the market," the ephemeral, emotional response of investors seeking to anticipate how other investors will react to particular events.

In his thesis, Bogle cited those very words. He also noted Keynes's concern that the "conventional valuation [of stocks], which is established [by] the mass psychology of a large number of ignorant individuals ... is liable to change violently as a result of a sudden fluctuation of opinion due to factors which do not really matter much to the prospective yield."

To combat the developing influence of speculation on the stock market, Keynes argued for “a substantial government tax on all transactions.” Disagreeing, Bogle argued that a growing mutual fund industry would come to alleviate the problem by “supply[ing] the market with a demand for securities that is steady, sophisticated, enlightened, and analytic, a demand that is based essentially on the performance of a corporation [i.e., its intrinsic value] rather than the public appraisal of the sale of a share, that is, its price.”

Time would soon prove that Keynes got it right and Bogle got it wrong. Although the transaction tax concept has not yet become reality, mutual fund managers have largely become active traders with a short-term horizon, rather than sophisticated long-term investors focused on enterprise.¹ But this distinction between speculation and enterprise remained on Bogle’s agenda right up to the time he wrote that first article in this publication in 1991.

QUANTIFYING THE SOURCES OF STOCK RETURNS

Keynes made no known attempt to quantify the distinction between enterprise and speculation, so Bogle tackled the task. He expressed that distinction in simple terms that Bogle postulated could establish in advance reasonable expectations for decade-long returns on stocks. Enterprise (which Bogle redefined as investment return or fundamental return) would consist of the dividend yield at the start of the period, plus the annual rate of earnings growth that followed. Speculation (which he modified to speculative return) would consist of the annual percentage rate of expansion or contraction of the price/earnings multiple during the period.²

To state the proposition in quantitative terms, we can describe expected total return on equities using this formula:

$$R_t = D_0 + G_t + \Delta P/E_t$$

where R_t is the return over some period of time t (ten years), D_0 is the dividend

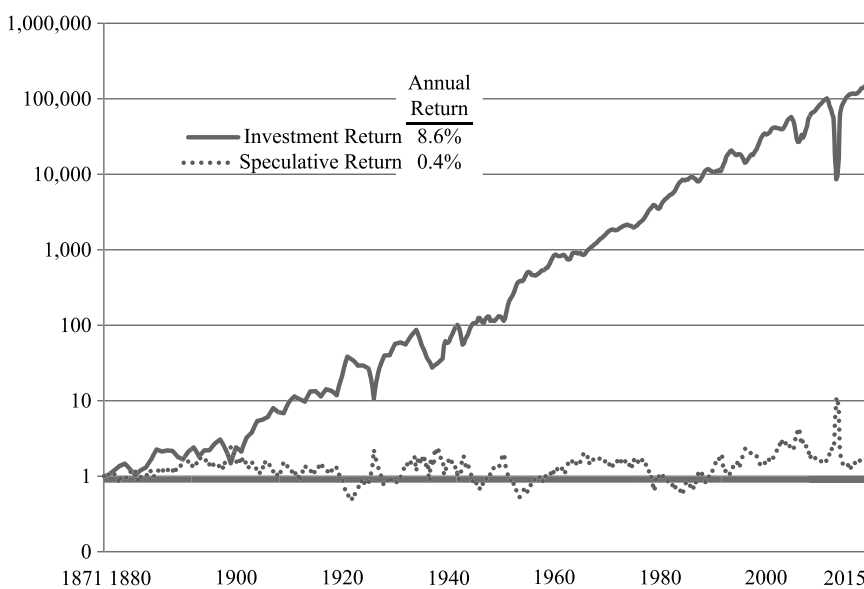
yield at the beginning of period t , G_t is the annual expected growth in nominal earnings per share during period t , and $\Delta P/E_t$ is the expected annualized rate of change in the price/earnings multiple over period t . This simple formula—we’ll call it the Bogle Sources of Return Model for Stocks (BSRM/S)—was designed to serve as a sound basis for developing reasonable expectations for future equity market returns.

That these two elements of stock returns are distinctively different should be painfully obvious. Investment return represents the intrinsic value that corporate businesses create. It has risen steadily ever since the availability of historical data, now more than 125 years. Yes, there have been variations—a few quite substantial—from the trend line’s upward slope. But the upward trend is clear. Since 1871, investment return has grown at a nominal annual rate of 8.6%. (See the upper line in Exhibit 1.)

Speculative return, on the other hand, has no such stability, nor does it demonstrate any long-term upward bias. As optimism fades, pessimism flourishes (and vice versa), so the influence of speculation on stock returns resembles a sine wave (or perhaps an errant cardiogram). Accordingly, the P/E ratio soars and then tumbles, over and over again, producing but a tiny positive addition

EXHIBIT 1

Cumulative Investment Return and Cumulative Speculative Return, 1871–2015



to stock returns on balance over the century. As it happens, during the past 100 years, the P/E ratio rose erratically from 14× at year-end 1914 to 20× at year-end 2014. As a result, the annual rate of speculative return came to just 0.4%. What we see here is a classic case of reversion to the mean (RTM). (See the lower line in Exhibit 1.)

We conclude that, in the long run, the average total return of 9% earned on stocks during the past century has been substantially about the economics of business, not the emotions of speculators. As Benjamin Graham wisely put it, the stock market is a weighing machine in the long run, but it is a voting machine in the short run.

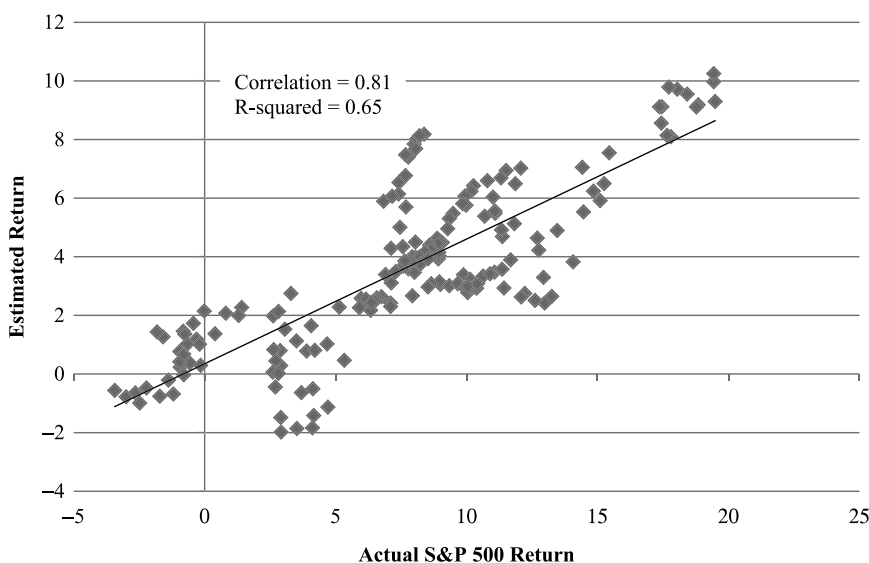
A QUARTER-CENTURY OF ACTUAL RESULTS

Some 25 years have now passed since January 1, 1990, the inception date of Bogle's first study. We now have 15 moving 10-year periods during which to appraise whether our sources of return model has been effective. This period began with a great bull market, up 455% (1989 to mid-2000), followed by two bear markets of roughly -50% (2000 high to 2002 low and 2007 high to 2009 low), interspersed with two more-than-commensurate recoveries, ending up with a 25-year return of 894%, or 9.6% annually. Surely it would be easy to make the case that such volatility was characteristic of past stock market history, and would likely be characteristic of future market fluctuations. However, as we shall later note, future returns on stocks are likely to be significantly lower than in the past quarter century.

Looking at each 10-year period since 1990, the sources of return model exhibited useful predictive power. We looked at rolling 10-year periods on a monthly basis (12 observations per calendar year) in order to build a robust data set. We estimated the forward-looking input parameters of the BSRM/S (initial dividend yield, average 10-year trailing earnings growth, and the effect of P/E reversions to their 30-year average) for each month from 1990 to 2005 to compute a predicted 10-year prospective return for 180 intervals. We then looked at what the model would have predicted for

EXHIBIT 2

Actual Equity Returns vs. Predicted Returns—Moving 10-year Periods, 1990–2014



each subsequent 10-year period using the simple heuristics described above, and compared that return to the actual total returns on the Standard & Poor's 500 Stock Index (S&P 500) for each comparable 10-year period. (See Exhibit 2.)

In total, the BSRM/S suggested that during this quarter century, reasonable expectations for annual stock market returns would come to 9.2%. In fact, the total return on the S&P 500 came to 9.6%—almost identical. Although we find this validation of the model gratifying, we suspect a fit this close to the actual total return has a lot to do with luck.

Reaching this virtual identity in total returns for the full period, however, came from a series of significant variations over the decades, as shown in the scatter diagram. Exhibit 2 shows the relationship between monthly returns on BSRM/S and the S&P 500. Although the diagram makes the BSRM/S's short-term imperfections obvious, surely the correlation of 0.81 and R-squared of 0.65 suggest that the model is a highly useful one.

A TOUGH OPENING DECADE

Not that the model started off well—quite the reverse. Ironically, the largest gap between the expected return under BSRM/S and the actual return of the S&P 500 occurred during the very first decade following

the publication of Bogle's initial *Journal of Portfolio Management* article, covering the period from 1990 to 1999 inclusive. In that original article, Bogle presented a "stock matrix for the 1990s" that combined the rate of earnings growth and the terminal P/E ratio. On the horizontal axis, annual earnings growth was shown at intervals of two percentage points, ranging from 0% to 12%. On the vertical axis, the terminal P/E ratio was also shown at intervals of two percentage points, ranging from 6× to 20×.

In Bogle's conclusion, he noted that "... stocks will have their work cut out for themselves to exceed returns in the +8% to +12% range during the 1990s, perhaps averaging 10% annually." But he was cautious about his projection, noting that we could "have unusually optimistic sentiment that results in high price-earnings ratio (indeed, why not?) and earnings growth for the decade higher than those of any prior decade (again, why not?)." Those two events came to pass, and when the decade ended in 1999, the annual return on stocks totaled 18.2%.

As a system, the BSRM/S worked almost to perfection. That is, the model can be used to effectively decompose actual returns during the 1990s. Adding the dividend yield of 3.2% at the beginning of the decade, plus actual earnings growth of 7.7%, the investment return came to 10.9%, only slightly more than the long-term average of 9.2%. But the P/E ratio soared to a record year-end high of 31.6× as 1999 came to a close—a level then without precedent in stock market history—and the speculative return totaled 6.9% per year, producing an actual annual stock return of 18.8%. The actual annual return for the S&P 500 over the decade was 18.2%.

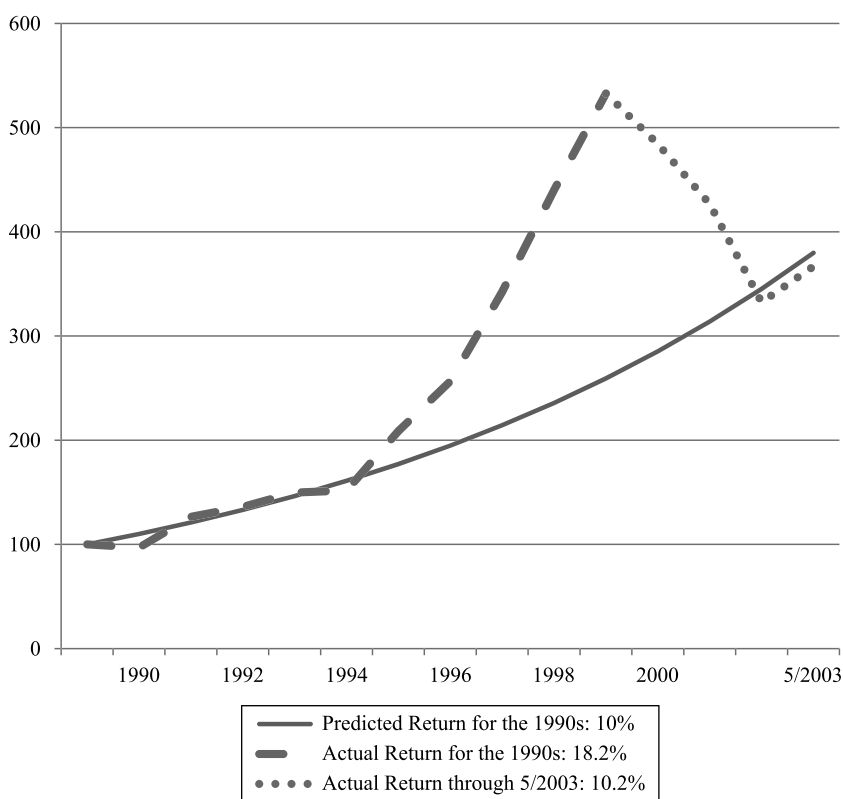
Although the BSRM/S system worked almost perfectly, Bogle's expectation for stocks' total returns during the 1990s was a flop. His projection of investment return proved right on the mark—an initial dividend yield of 3.2%, plus earnings growth of 7.0%, for a total of 10.3%.³ He had expected a negative speculative return of -0.8% based on a slight decline on the P/E ratio. But the P/E ratio soared to 31.6×. Speculative return soared accordingly,

adding 6.9% per year to the investment return. The actual return on stocks during the 1990s turned out to be 18.2%, a far cry from Bogle's rational expectation of 10%.

In his original article, Bogle had considered this very possibility. "One might say that the 1990s will be just like the 1980s [when annual stock returns averaged 17.6%]. To get a 17% return, however, will take, among other combinations [reading from the matrix] a 12% earnings growth rate and an increase in the price/earnings multiple to 20×, a multiple that has usually indicated significant overvaluation, soon corrected by a market decline," he wrote.

Viewed in this light, Bogle's BSRM/S input appears far more reasonable. The stock market would peak in March 2000, just a few months into the subsequent decade. It would then decline by some 50% through early 2003. If we include those additional two-plus years through May 31, 2003, the actual annualized return on stocks was 10.2% for the period of 12-plus

EXHIBIT 3 Reversion to the Mean in Stock Returns



years, a number essentially equal to the BSRM/S expectations model of 10%.⁴ (See Exhibit 3.)

Yes, sometimes *what* will happen in the stock market is obvious, but predicting exactly when it will happen is a fool's errand. Speculative return often feeds on itself. The behavior of investors—and especially speculators—over the short term is difficult, if not impossible, to predict. In his adaptive markets hypothesis (AMH), Lo [2004, p. 23] discussed in depth the importance of investor behavior:

Under the adaptive markets hypothesis, investment strategies undergo cycles of profitability and loss in response to changing business conditions, the number of competitors entering and exiting the industry, and the type and magnitude of profit opportunities available. As opportunities shift, so too will the affected populations.

Even fear and greed—the two most common culprits in the downfall of rational thinking, according to most behaviorists—are the product of evolutionary forces, adaptive traits that enhance the possibility of survival. ... Emotional responses are a significant factor in real-time processing of financial risks.

A CENTURY-LONG EVALUATION OF THE BSRM/S

Is a quarter century of experience with results of the simple BSRM/S sufficiently long to prove its merit as an effective means for setting realistic expectations for future stock returns? Perhaps not. But certainly a full century should be an adequate test. Using available stock market data, we can backtest the model for the first 75 of the past 100 10-year periods (1906 to 1989) and combine the results with the actual returns for the final 25 years (1990 to 2014 inclusive), using annual returns from 1906 through 1925, and monthly observations thereafter, when these data became available.

As in the earlier model, we assume reversion to the 10-year mean for earnings growth and reversion to the 30-year

mean for the P/E ratio. (The dividend yield at the beginning of each period remains the known quantity in each equation.) The results remain impressive, albeit not quite as impressive as the 25-year data provided earlier in this article. The correlation of the BSRM/S returns with actual equity market returns came to 0.67 (R-squared 0.44). We present these data in the scatter diagram in Exhibit 4.

In all, it seems fair to conclude that the establishment of rational expectations for subsequent decade-long returns on common stocks with the BSRM/S has been effective. Its principal flaw has been manifested during those periodic occasions when investor behavior was highly erratic (and unfathomable), leading to sharp changes in P/E multiples. But while such variations can magnify the inevitable volatility of short-term stock returns, P/E's have, over time, inevitably reverted toward the long-term mean.

In fact, P/E ratios are not wholly unpredictable. Our data show that, over the past century, when the multiple at the start of a given decade was 20× or more, it was lower at the decade's end 70% of the time. If the multiple was 12× or less, it was higher at the end of the decade 84% of the time. (See Exhibit 5.) We will continue to consider whether our formula should be revised to take these historic patterns into account.

EXHIBIT 4

Actual Equity Returns vs. Predicted Returns Moving 10-Year Periods, 1915–2014

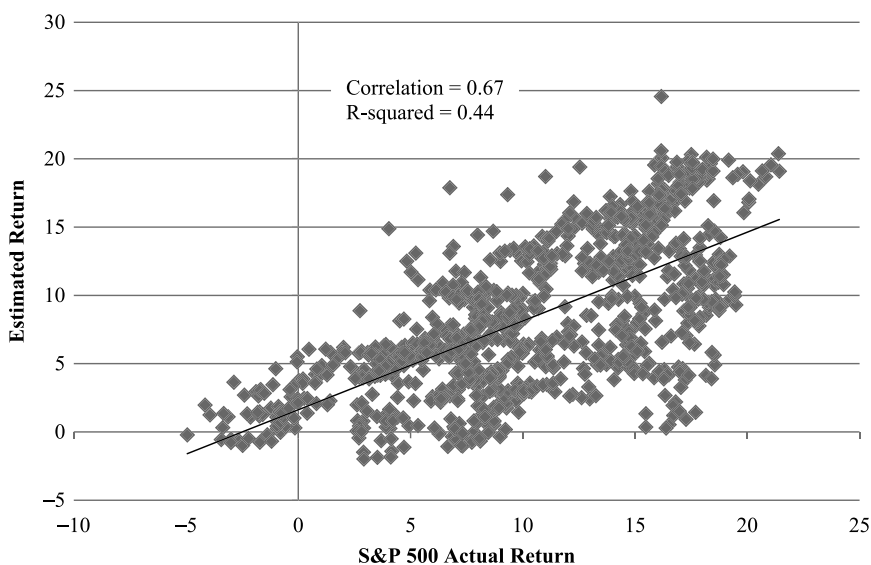


EXHIBIT 5

10-Year Reversion in Price-Earnings Ratios: 1915–2014

Initial P/E	Number of Observations	P/E 10 Years Hence			
		Higher	Lower	% Higher	% Lower
P/E > 20×	166	50	116	30%	70%
12 × < P/E < 20×	609	205	404	34%	66%
P/E < 12×	425	359	66	84%	16%
Total	1200	614	586	51%	49%

WARNING: LIMITED ACADEMIC SUPPORT FOR BSRM/S

Despite the strong empirical evidence for its effectiveness, academic notice of BSRM/S has been only spotty, perhaps because of its remarkable simplicity. But some academics have taken favorable note. One important supporter is Burton Malkiel [2015], who praised it as “Bogle’s corollary” to the famous Gordon growth model. Gordon’s dividend discount model can be stated as:

$$r = \frac{D_1}{P_0} + g$$

“Very long-run returns from common stocks,” Malkiel wrote in the 14th edition of *A Random Walk Down Wall Street* [2015], “are driven by two critical factors: the dividend yield at the time of purchase, and the future growth rate of earnings and dividends ... [which] can be shown to produce a very simple formula for the long-run total return for either an individual stock or the market as a whole. ... The dividend yield for the market as a whole on January 1, 1926, was about 5%. The long-run rate of growth of earnings and dividends was also about 5%. Thus, adding the initial dividend yield to the growth rate gives a close approximation of the actual rate of return [of 10%].”

Malkiel then added an important caveat that took into account the final element of the BSRM/S: “Over shorter periods, such as a year or even several years, a third factor is critical in determining returns. This factor is the change in valuation relationships—specifically, the change in the ... price-earnings [P/E] multiple.”

Grinold and Kroner [2002] put forth a model that also was based on the sources of stock returns, but made some further refinements. The Grinold-Kroner

model includes the initial dividend yield and the effect of changes in the P/E, but decomposes the growth in nominal earnings per share into three components: growth in total corporate real earnings (not earnings per share), the inflation rate, and the repurchase yield (the percentage change engendered by the reduction in the number of corporate shares outstanding, also called the buy-back dividend).

Javier Estrada [2007] was gracious in his appraisal of BSRM/S. In his 2007 article, “Investing in the Twenty-First Century with Occam’s Razor and Bogle’s Wit,” he concluded, “Sir William of Occam taught us to focus on the essentials, and Bogle showed us how to apply that lesson to forecasting the long-term returns of stock markets. Taking a cue from both, I evaluate the forecasting ability of two simple models [the BSRM/S and Estrada’s modification, which added the annual rate of dividend growth as a fourth factor], and show that they are surprisingly successful ... and set the bar quite high for other forecasting models.”⁵

Finally, Martin Leibowitz [2014a, 2014b], Morgan Stanley’s highly respected veteran portfolio strategy analyst, used the BSRM/S in his articles on “P/E-Based Horizon Returns,” citing all three Bogle articles published in *The Journal of Portfolio Management*, plus Bogle’s 2003 speech to The Investment Analysts Society of Chicago (now CFA Society Chicago). Relying in part on the BSRM/S, Leibowitz concluded that, despite sizable variations in rolling monthly periods, “these average-value based results should be viewed primarily as providing some insight into how returns evolve over time.”

Despite this limited series of affirmations, the powerful historical correlation of 0.67 between the results of the BSRM/S and the actual returns on stocks over the past century suggests a high level of effectiveness, albeit with notable interim failures. The appendix presents detailed data for the full period.

Yes, there is still work to be done on the model, perhaps including refining the basis for expectations for earnings growth and for terminal P/E ratios, and considering an extension of the time period for stock market expectations to longer intervals, perhaps 12 to 15 or even 25 years. Nonetheless, the sheer simplicity of the BSRM/S commends it over highly complex models, none of which (as far as we can determine) has offered similar accuracy.

FROM STOCKS TO BONDS

Although we consider the BSRM/S a model of simplicity in establishing realistic expectations for future stock returns, it pales in comparison to the simplicity of the BSRM for bonds (BSRM/B). There is but a single dominant source of decade-long returns on bonds: the interest coupon. The historical record confirms that the entry-level bond yield is an excellent proxy for their subsequent decade-long returns. For example, the 10-year return on the 10-year intermediate-term U.S. Treasury note has been almost wholly determined by its initial yield to maturity. Indeed, it is difficult to imagine a tighter fit. (See Exhibit 6.)

In his original 1991 essay in *The Journal of Portfolio Management*, Bogle wrote not only about reasonable expectations for stock returns, but also about reasonable expectations for bond returns. He examined in detail the perhaps self-evident relationship between entry yield and total returns over the subsequent decade. He wrote, “the fact of the matter is that there is a number worth knowing (to establish reasonable expectations for future returns on bonds): the initial interest rate.” In the 12th edition of his classic book on investing, *A Random Walk Down Wall Street*, Malkiel [2015] comes to an almost identical conclusion: “Long-run returns from bonds are

easier to calculate than those from stocks. Over the long run, the yield that a bond investor receives is approximated by the yield to maturity of the bond at the time it is purchased.”

In that initial article, Bogle emphasized that looking at past bond returns had misled bond investors. Following four consecutive decades (the 1930s through the 1960s) in which the nominal return on the long-term Treasury bond averaged 1.9%, he explained, “bonds became known as ‘Certificates of Confiscation.’” But Bogle argued that, “... past returns on bonds are ... utterly devoid of meaning. ... There is almost no lesson of history that is relevant except the wrong lesson: ‘Never buy bonds.’”

As the 1990s began, Bogle noted that the yield on the long Treasury was 8.1%, more than four times its average yield during those four earlier decades. With his initial expectation that stock returns would be around 10% range over the coming decade, Bogle argued that U.S. Treasury bonds, with substantially lower risk to principal, should provide competitive returns. Whatever the case, he expected an annual return of 9% on the long-term U.S. Treasury bond during the 1990s. The actual return came in at 8.6%.

Again, Bogle recognized that the relationship between initial yield and subsequent 10-year return

would probably be inexact. It would depend in part on the extent that bond yields rose or fell during the decade, affecting the reinvestment rate for bond interest coupons. If that rate rose, the 10-year return on bonds would likely be enhanced; if rates fell, the return would likely be reduced.

Despite the near-certainty of a Treasury bond’s return over the long term, changing interest rates can create significant price fluctuations in the interim. Volatility rises as the maturity of a bond lengthens, and the long-term bond is especially volatile. Despite the success of the initial model for the long-term Treasury, an intermediate-term Treasury would be less volatile. Further, Bogle came to believe most individual investors—for better or worse—would have time horizons shorter than 25 years.

EXHIBIT 6

Initial Bond Yield and Subsequent 10-Year Return

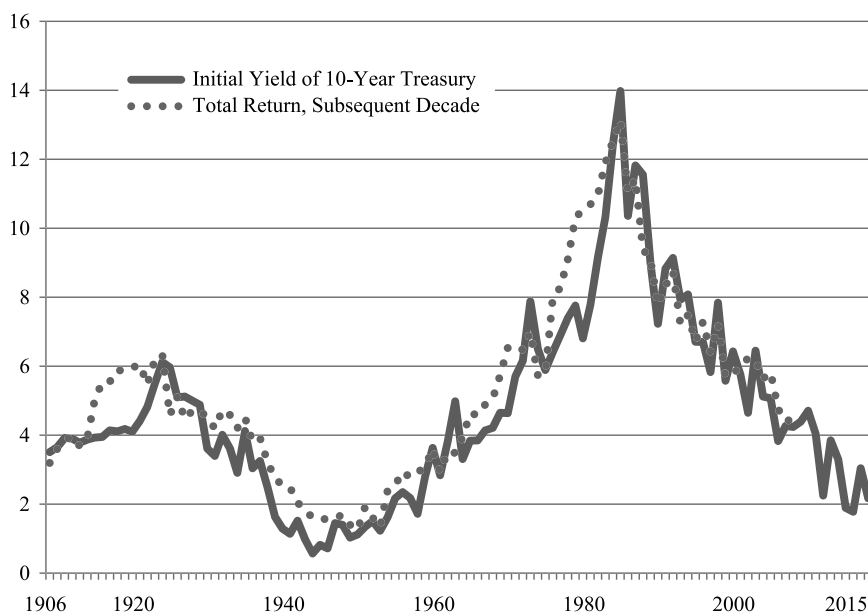
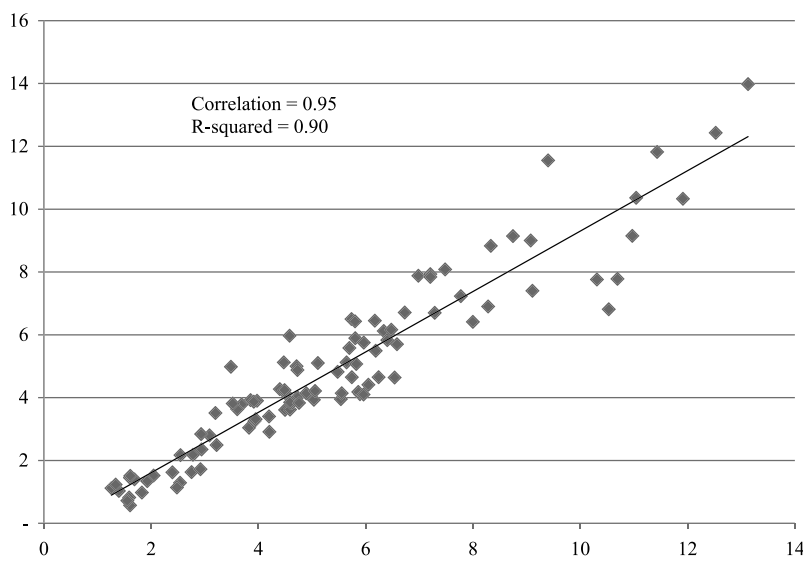


EXHIBIT 7

10-Year Treasury Return vs. Initial Yield 1915–2014



For this reason, his later work centered on the intermediate-term 10-year Treasury.

The analysis in this article focuses on the 10-year Treasury bond, illustrated in Exhibit 5. Had it been chosen as the standard in the 1991 article, the comparison would have begun with the 1990 yield to maturity of 8.1% on the 10-year Treasury note. Thus reasonable expectations for bond returns during the 1990s suggested a range of 7% to 9%. The actual return was 7.5%. The scatter diagram shown in Exhibit 7 begins in 1906 and compares the initial yields on the 10-year Treasury note with returns in the subsequent decade. The correlation (0.95) and the R-squared (0.90) suggest a high degree of reliability.

Viewed 25 years ago, Bogle's bond model may have seemed an important revelation to relatively unsophisticated investors, although doubtless not to the academic community nor to experienced money managers. Today it has become the conventional wisdom. By knowing the single overwhelming source of that return—its initial yield to maturity—the BSRM/B should continue to be highly effective in establishing reasonable expectations for bond returns in future decades.

WHAT'S AHEAD FOR STOCKS AND BONDS

Given the BSRM's solid results in establishing realistic expectations for decade-long stock and bond

returns, it seems almost obligatory for us to consider the return possibilities over the coming decade, 2015 to 2024 inclusive.

Stocks

The dividend yield on stocks was 2.1% on January 1, 2015, less than one-half of the long-term norm of 4.5%. Although historical nominal earnings growth has averaged 4.7% per year, investors have enjoyed earnings growth of 6.2% per year over the past quarter century. With an apparent secular slowdown ahead in U.S. economic growth—and likely slower corporate earnings growth—earnings seem likely to increase at around 5%, or perhaps even less, during the coming decade. Thus, the prospective nominal investment return on stocks seems likely to run in the range of 7%, well below the long-term rate of about 9%. Nonetheless, it seems reasonable to

expect that the historical upward slope of stock returns will continue, although likely at a lower rate than in the past.

As for speculative return, the mystery of investor behavior remains. The market's P/E multiple as 2015 began was 20× (past reported earnings relative to stock prices at year-end 2014), compared to the historical norm of 17.8×. A reversion to that mean would entail an 11% decline in the P/E, equivalent to about one percentage point per year, reducing stocks' annual investment return of 7% to 6% per year in nominal terms. For the record, a drop in the P/E ratio to 12× would mean a five-percentage-point reduction in investor return; an increase to 25×, however unlikely, would increase stocks' annual investment return of 7% by about two percentage points, to 9%.

Bonds

The current outlook for bond returns is far below the historical norm (over the past century) of 5%. In mid-2015, the 10-year Treasury note's yield to maturity was 2.4%, suggesting a future return in the range of 2% to 3% during the coming decade. If rates were to tumble to 1% in the immediate future, the return would fall to about 2.3%; were they to leap to 5%, the 10-year return could reach 2.7%.

A Balanced Portfolio

Combining our central expectations for stocks' nominal annual returns during the coming decade at 6% and a rounded 3% for bonds, we would expect an investment portfolio of 50% stocks and 50% bonds to produce a 4.5% annual return over the coming decade. Compared to an annual return of 8% over the past 100 years for a 50/50 portfolio (and for the past 25 years as well), such a return would represent a substantial shortfall that could well shock investors who have earned those generous returns during the past quarter century, as well as investors who have put too much faith in market history.⁶

CAUTION: FEW INVESTORS CAPTURE (OR EXCEED) THE MARKETS' RETURNS

All the data in this article have focused on past returns of the U.S. stock and bond markets. These returns, however, are not the returns that investors actually receive. As a group, all investors must and do earn the gross returns provided by our financial markets, they must also incur the costs of buying, holding, and trading those securities, as well as the costs of investment advice, administration, and marketing that permeate the system.

In his study of the all-in expenses incurred by mutual fund investors (who own about one-third of the \$20 trillion total capitalization of the U.S. stock market), Bogle's article "The Arithmetic of 'All-In' Expenses" estimated these annual costs for the average actively-managed mutual fund: 1.12% expense ratio; cash drag 0.15%; portfolio turnover costs 0.50%; and sales loads and/or fees to registered investment advisors 0.50%, for a total of 2.27% per year (Bogle, 2014).

In addition, Bogle noted that trading in actively managed mutual fund portfolios added an extra tax cost, estimated at 0.75%. Further, he noted that the returns earned by mutual fund investors have typically lagged the returns reported by the mutual funds themselves. This lag averaged 1.2% per year over the preceding 15 years, according to Morningstar, and resulted from fund investors' apparent tendency to invest in funds with superior performance after that performance has been achieved. Investors have failed to recognize that funds' past returns are not indicative of their future returns. More often, high past returns are a signal of inferior returns in the

future. (Of course, the losses incurred by this counter-productive behavior by mutual fund investors must be offset by gains earned by investors on the positive side of this equation. It is unclear who they may be.)

In *The Triumph of the Optimists*, Dimson, Marsh, and Staunton [2002] largely confirm the Bogle analysis:

"Mutual funds and other pooled vehicles often charge investors a management fee as high as 1½ or 2 percent per year. We can also include load charges, distribution fees, custody and other charges, brokerage commissions, bid-ask spreads, price impact, relevant taxes, and other expenditures by the manager. Given the relatively high rates of turnover of many mutual fund investors, the deadweight costs can be as much as 3 percent per year, or even more."

In any event, taking known fund costs into account, estimating others, and adjusting for taxes for taxable investors, the 4% gross annual return on that 50/50 balanced portfolio before costs of at least 2% could easily be slashed to 1% or even 0% for investors in actively managed mutual funds. (Yes, costs could easily consume 50% of the annual return.)

We hardly need add that we have been speaking of nominal returns before inflation. Real returns measured in spendable dollars, after adjusting for inflation—perhaps 1.5% to 3% in the coming decade—could be lower, taking real returns into significantly negative territory. In such an environment, traditional mutual funds' functioning would leave much to be desired.

A REASONABLE ALTERNATIVE

There is a reasonable alternative for investors in the traditional, actively managed equity mutual funds that have dominated the industry since its inception in 1924. Investors may easily buy and hold a low-cost, all-U.S. stock market index fund.⁷ In such a fund, there are sharply lower expense ratios, no advisory fees, minimal (if any) portfolio turnover costs, and no sales loads. The record is clear that investors owning index funds tracking the total U.S. stock market and the S&P 500, with the substantial cost advantage that they offer, have earned significantly higher returns than the returns reported by those active funds. Further, the behavior gap among index fund investors has been minimized or

even eliminated, since such index funds simply track the stock market. They do not surprise investors with either superior or inferior performance.

Although passively managed index funds can strip away the burden of nearly all the costs incurred by their actively managed cousins, they cannot eliminate inflation's negative impact. But it is difficult to overestimate the substantial value provided by minimizing all-in fund costs and avoiding counterproductive investor behavior.

When stock returns averaged an unprecedented 18% per year during the 1980s and 1990s, it was easy—too easy—for fund investors and fund marketers to ignore the negative impact of fund costs. With the far lower gross returns on stocks since January 1, 2000 (4% per year), investor awareness of the cost advantage of index funds has rapidly accelerated. With rational expectations for gross annual stock returns during the coming decade that are apt to be well below the 9% norm of the past century, we expect the growth of ultra-low-cost index funds to accelerate.

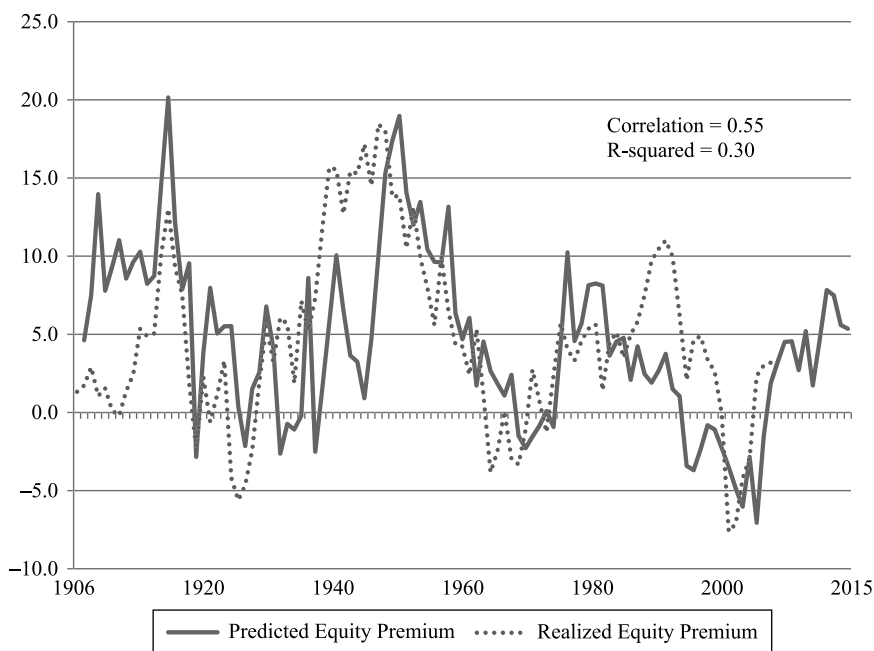
CHALLENGE ONE TO BSRM/S: WHAT ABOUT THE EQUITY PREMIUM?

The BSRM can be challenged for its simplicity. For example, it is fair to ask: “In establishing reasonable expectations for stock returns, why ignore the level of the risk-free interest rate at the start of the period under consideration? Shouldn't we consider the equity risk premium on stocks?” After all, if the expectation for stock returns is (for instance) 10% during a given decade, does it matter whether the return on the 10-year U.S. Treasury note is 2% or 8%? Indeed, it seems almost self-evident that a high equity premium—in this example, 8%—would augur better times for equities, while a low premium—in this example, 2%—would augur relatively worse times for stocks.

It is an interesting challenge, but market history has offered it no validity whatsoever. The spread between the expected return on the 10-year U.S. Treasury note (reflected in the yield to maturity at the start of each

EXHIBIT 8

Rolling 10-Year Equity Premium: Predicted vs. Realized



moving decade) and the expected stock return under the BSRM/S has exhibited huge variations over the past 100 years. (See Exhibit 8.) It is remarkable for its extreme volatility. In 29 decades, the equity premium has been above 8%; in 37 decades, it has been less than 2% (including 24 decades in which it has been negative).

Although the data in the chart are noisy, there are some clear patterns: relatively high expected equity premiums through 1921; generally lower expected premiums during 1922 through 1940; falling premiums (from high levels) from 1941 until 1959, as the Federal Reserve kept a lid on interest rates; then irregularly positive and negative premiums through about 2001. When the Fed again held down interest rates, positive expected premiums became the rule, right up to 2015. Even with the current weak outlook for stock returns, the expected premium stands at 3.2 percentage points in mid-2015, not far from the historic long-term average of 4.6 percentage points.

To the naked eye, the lines depicting the realized and predicted moving 10-year equity risk premiums are remarkably close. While the correlation (0.55) and R-squared (0.30) are less impressive, the overall pattern generally validates the BSRM. But perhaps we should let the parallel lines in the chart speak for themselves.

In any event, what seems so logical in the abstract—that the BSRM/S should incorporate equity premiums—just doesn't prove itself upon close examination. Our model stands better on its own, again reaffirming the principle of simplicity espoused by Occam's Razor.

CHALLENGE TWO TO BSRM/S: WHAT ABOUT SHARE BUYBACKS?

In recent years, it has been argued that corporations' buybacks of their own shares is a new form of dividend that returns cash to shareholders. In the abstract, because total earnings are divided by a smaller number of shares outstanding, share repurchases should enhance earnings per share. What seems like a simple proposition, however, proves to be anything but simple.

Although we have solid data on gross buybacks of shares each year, there is less solid data on net buybacks. The widespread use of stock options to compensate executives often offsets the repurchases. Indeed, many "old economy" corporations, in an attempt to offset earnings dilution, buy back shares in an amount equal to those issued to executives as compensation, so net buybacks may be zero. On the other hand, many "New Economy" corporations issue huge numbers of new shares, often as executive options. Their issuance may dwarf a firm's share repurchases.⁸

The record is clear that companies have little insight in effectively timing their share repurchases. Indeed, at the 1999 stock market peak, total corporations share repurchases reached a record high of 7.2% of total shares outstanding, only to fall to less than 1% in 2000 and to zero in 2001, as stock prices tumbled. The result? As Warren Buffett said in his 2011 letter to shareholders, "Charlie [Munger] and I favor repurchases when ... [a company's] stock is selling at a material discount to the company's intrinsic business value, conservatively estimated." Buffett goes on to say, "The first law of capital allocation ... is that what is smart at one price is dumb at another." The lesson: When buybacks are executed at a discount to intrinsic value, they benefit stockholders. But when shares are purchased at a premium over intrinsic value, buybacks are detrimental.

In their article on the equity premium, Grinold and Kroner [2002] cite the stock repurchase yield as one source of stock returns. Yet they express only modest confidence in its effect, noting that the repurchase yield had averaged 2% per year in the recent era, but is forecast

to average only 0.5% in the future. Interestingly, market strategists Arnott and Ryan [2001] share our view, and ignore the effect of repurchases.⁹

SOME BENEFITS OF THE BSRM

Using the BSRM to develop reasonable expectations for stock and bond returns, we believe, provides as sound and rational an approach as has yet been advanced. No, it is hardly a model of perfection. But, as military theorist General Carl Philipp Gottfried von Clausewitz reminded us, "the greatest enemy of a good plan is the dream of a perfect plan."

One of the model's major assets is that, with its 10-year time horizon, it emphasizes the need for investors to focus on the long term. Focusing on the short term is the business of speculators, for the momentary movement of stock prices is (in Shakespearean terms), "a tale told by an idiot, full of sound and fury, signifying nothing."¹⁰

Another major point in the BSRM's favor is that it shifts investor focus away from historical stock and bond returns and toward the future. When we shift our focus to the sources of stock and bond returns, expectations for future returns are demonstrably more accurate. For example, history tells us that the long-term dividend yield on stocks has been 4.5%. The current yield on stocks is 2%. That 2.5 percentage-point reduction, in and of itself, calls for more cautious expectations for stock returns in the years ahead.

A side benefit of BSRM: Market strategists who now forecast, with carefree abandon, stock returns in a coming year of (for instance) 12%, would be pressed not merely to guess at a single number, but to cite the sources of those returns—the dividend yield, the earnings growth, and the change in P/E multiples—a constructive discipline that investors will, we believe, come to demand.

IMPLICATIONS OF THE BSRM FOR MONEY MANAGERS AND INVESTORS

The BSRM's implications for both institutional and individual investors are profound. As we noted, realistic expectations for a balanced portfolio of half stocks and half bonds currently suggest a 4.5% future annual return (before investment costs), versus the 8% return earned over the past quarter century. Defined benefit pension

funds must urgently reconsider their use of an assumed annual return of 7% to 8% when the outlook suggests only about one-half of that return. Both public and private funds will likely need to increase contributions and/or reduce benefits. (They'll also be obliged to give more important consideration to investment costs.)

Further, fund managers and marketers must communicate the strong likelihood of lower returns on a balanced portfolio in the years ahead to investors in defined contribution plans such as 401(k)s and individual retirement accounts (IRAs). The outlook for lower investment returns in the years ahead will force plan investors to consider increasing their contribution rates in significant amounts or to accept lower retirement fund accumulations than they now anticipate.

Finally, the clear separation between investment return and speculative return would bring greater rationality to discussions of returns in the stock and bond markets. Even better, money managers might begin to focus on the long term, "supplying the market with a demand for securities that is steady, sophisticated, enlightened, and analytic," focused more on a corporation's long-term intrinsic value than on its stock's momentary price.

It is at least possible that Bogle's expectation of the dominance of enterprise over speculation—expressed again in the quotation from his 1951 college thesis—will at last begin to permeate our financial markets. Yes, in the years that followed his thesis, his hopes proved completely wrongheaded. But investors have paid a costly penalty for ignoring its philosophy, and investment management professionals are learning the hard way from the experience.

THE NEW MUTUAL FUND INDUSTRY

In its enlightened self-interest, the mutual fund industry will have to remake itself, altering its behavior and serving its clients more effectively. During its 90-year history, the industry has learned important lessons, and must now recognize that fund shareholders are increasingly demanding that their managers act as their fiduciaries, putting the interests of their investor-clients first.

The rise of the low-cost diversified index fund—designed to be held for the long term, even an investor's entire lifetime—is changing the world of investing.

Index funds now account for one-third of equity mutual fund assets, and have accounted for 130% of their net cash flow since January 1, 2008. (Cash flow into equity index funds +\$1.3 trillion; cash flow out of active funds −\$325 billion.) The marketplace of investors has spoken. Traditional fund managers had better listen.

Yes, our view reflects our conviction that the index fund—bought and held forever—is a better way to invest. But other students of financial history increasingly share that view. Again, hear Dimson, Marsh and Staunton [2002]:

Nearly all the gains in wealth from equity investment would [henceforth be] transferred from the investor (who still bears the investment risk) to become a resource for the investment manager, professional advisor, and tax-collecting authority. What would happen if investors were to become convinced that the annualized equity premium might indeed be little more than 3 percent? This would impose cost pressure on mutual funds. Many investors are unlikely to be willing, on a continuing basis, to forego a large majority of the reward for investing in the stock market. There will be competitive pressures to control fees and expense ratios.

At the same time, retail investors are becoming better informed about the true likelihood of mutual funds outperforming their benchmarks, even on a pre-costs and fees basis. Regulators and those concerned with investor protection are helping to educate investors [about these issues], and also to curb the more strident, performance-based advertising claims made by some money managers. We therefore expect a growing appreciation of the advantages of buy-and-hold strategies, and a move toward favoring funds that choose either a demanding outperformance objective or a low cost structure.

The BSRM, in short, holds important implications for investors, professionals, regulators, academics, pension consultants, market strategists, and, most of all, for the 100 million American families who are investing for their future security. The virtues of rationality and simplicity are becoming too evident to be denied.

APPENDIX I: Bogle Sources of Return Model: 1915–2014

10-Year Period Ending December 31	STOCKS										BONDS		EQUITY RISK PREMIUM	
	ESTIMATED PARAMETERS / MODEL INPUTS					ACTUAL	INPUT		Total Return on Inter-Term U.S. Gov't Bonds	Estimated Premium	Actual Premium			
	Investment Return		Speculative Return				Initial Yield on 10-Year Treasury							
	Initial Yield	Earnings Growth	P/E Ratio	Annual Speculative Return	Total Return									
1915	3.5%	4.0%	14.2	0.7%	8.1%	4.5%	3.5%	3.2%	4.6%	1.3%				
1916	4.1	5.4	12.9	1.7	11.1	5.3	3.7	3.6	7.5	1.7				
1917	6.7	6.8	10.0	4.4	17.9	6.7	3.9	3.9	14.0	2.9				
1918	4.4	7.4	15.6	-0.1	11.7	5.0	3.9	4.0	7.8	1.1				
1919	4.3	7.5	13.6	1.3	13.1	5.2	3.8	3.7	9.3	1.5				
1920	5.2	7.5	12.4	2.2	14.9	4.0	3.9	3.9	11.0	0.1				
1921	5.2	7.3	15.4	0.0	12.5	4.8	3.9	5.0	8.6	-0.2				
1922	5.1	7.0	13.4	1.5	13.6	6.9	4.0	5.5	9.6	1.4				
1923	6.0	6.5	12.8	2.0	14.4	8.0	4.1	5.6	10.3	2.4				
1924	5.7	5.7	14.1	0.9	12.3	11.2	4.1	5.9	8.2	5.3				
1925	4.5	4.8	10.8	3.6	12.9	10.7	4.2	5.9	8.7	4.9				
1926	5.7	4.1	6.4	8.9	18.7	11.0	4.1	6.0	14.6	5.1				
1927	10.1	3.7	5.3	10.7	24.6	16.2	4.4	6.0	20.2	10.1				
1928	7.2	3.7	8.0	6.0	16.9	18.5	4.8	5.5	12.1	13.0				
1929	5.9	3.6	9.6	3.9	13.4	15.4	5.5	6.2	7.9	9.3				
1930	7.5	3.3	8.5	4.9	15.7	13.9	6.1	6.3	9.5	7.5				
1931	6.3	2.8	25.2	-5.9	3.1	6.4	6.0	4.6	-2.8	1.8				
1932	5.8	2.3	12.7	0.8	8.9	2.7	5.1	5.1	3.8	-2.4				
1933	6.2	2.4	8.7	4.5	13.1	6.7	5.1	4.5	8.0	2.3				
1934	5.4	2.8	10.9	1.9	10.1	4.1	5.0	4.7	5.1	-0.6				
1935	4.8	3.1	10.0	2.5	10.4	5.9	4.9	4.7	5.5	1.1				
1936	5.1	2.6	10.9	1.4	9.1	7.8	3.6	4.5	5.5	3.3				
1937	4.4	1.7	15.7	-2.4	3.8	0.0	3.4	4.2	0.4	-4.2				
1938	3.7	1.2	16.8	-3.0	1.9	-0.9	4.0	4.7	-2.1	-5.6				
1939	4.5	1.2	13.3	-0.6	5.1	-0.1	3.6	4.6	1.5	-4.6				
1940	6.3	1.5	16.0	-2.4	5.5	1.8	2.9	4.2	2.5	-2.4				
1941	9.7	2.1	13.8	-0.9	10.9	6.4	4.1	4.5	6.8	1.9				
1942	7.3	2.5	16.6	-2.7	7.1	9.3	3.0	3.8	4.1	5.5				
1943	4.4	1.7	22.7	-5.5	0.6	7.2	3.3	3.9	-2.6	3.2				
1944	4.9	0.5	18.9	-3.6	1.8	9.3	2.5	3.2	-0.7	6.1				
1945	3.6	-0.4	17.2	-2.7	0.5	8.4	1.6	2.8	-1.1	5.7				
1946	4.2	-0.8	16.7	-2.3	1.1	4.4	1.3	2.5	-0.2	1.9				
1947	7.3	-0.7	9.8	3.2	9.7	9.6	1.1	2.5	8.6	7.1				
1948	4.0	-1.2	19.8	-3.8	-1.0	7.3	1.5	2.0	-2.5	5.2				
1949	5.0	-2.3	13.7	-0.2	2.5	9.2	1.0	1.8	1.5	7.3				
1950	6.4	-2.9	10.0	2.9	6.4	13.4	0.6	1.6	5.8	11.8				
1951	8.1	-3.0	7.6	5.8	10.9	17.3	0.8	1.6	10.0	15.7				
1952	6.2	-2.4	9.2	3.5	7.3	17.1	0.7	1.6	6.5	15.5				
1953	5.3	-0.8	12.2	0.6	5.1	14.3	1.5	1.6	3.6	12.7				
1954	4.9	0.6	14.1	-0.8	4.6	17.1	1.4	1.7	3.2	15.4				
1955	3.8	1.3	18.1	-3.2	1.9	16.7	1.0	1.4	0.9	15.3				
1956	4.7	1.7	14.3	-0.6	5.8	18.4	1.1	1.3	4.7	17.2				
1957	5.6	2.0	9.3	3.8	11.4	16.4	1.3	1.9	10.0	14.5				
1958	6.1	3.2	6.6	7.5	16.8	20.1	1.5	1.6	15.3	18.5				
1959	6.9	5.1	7.1	6.6	18.6	19.4	1.2	1.3	17.4	18.0				

APPENDIX I: (Continued)

10-Year Period Ending December 31	STOCKS										BONDS		EQUITY RISK PREMIUM		
	ESTIMATED PARAMETERS / MODEL INPUTS					ACTUAL		INPUT		ACTUAL		ESTIMATED		ACTUAL	
	Investment Return			Speculative Return		Total Return on S&P 500	Initial Yield on 10-Year Treasury	Total Return on Inter-Term U.S. Gov't Bonds	Estimated Premium	Actual Premium	Estimated Premium	Actual Premium			
	Initial Yield	Earnings Growth	P/E Ratio	Annual Speculative Return	Total Return										
1960	7.4	6.3	7.0	6.8	20.6	16.2	1.6	2.4	19.0	13.8					
1961	6.0	6.9	9.6	3.3	16.2	16.4	2.2	2.5	14.1	13.9					
1962	5.4	7.1	10.9	1.9	14.4	13.4	2.4	2.9	12.0	10.5					
1963	5.8	7.0	9.9	2.8	15.6	15.9	2.2	2.8	13.5	13.1					
1964	4.4	7.4	12.6	0.4	12.2	12.8	1.7	2.9	10.4	9.9					
1965	3.6	8.3	12.5	0.5	12.4	11.1	2.8	3.1	9.6	8.0					
1966	3.7	9.7	13.6	-0.3	13.2	9.2	3.6	3.6	9.6	5.6					
1967	4.4	10.5	12.0	1.0	16.0	12.8	2.8	2.9	13.2	9.9					
1968	3.3	10.2	18.5	-3.3	10.1	10.0	3.8	3.5	6.3	6.5					
1969	3.1	9.3	17.4	-2.7	9.7	7.8	5.0	3.5	4.7	4.3					
1970	3.4	8.6	17.4	-2.7	9.4	8.2	3.3	3.9	6.0	4.2					
1971	2.8	7.8	22.5	-5.0	5.6	7.0	3.8	4.6	1.7	2.4					
1972	3.4	7.3	17.1	-2.3	8.4	9.9	3.9	4.6	4.5	5.3					
1973	3.1	6.8	18.5	-3.1	6.8	6.0	4.1	4.9	2.6	1.1					
1974	3.0	6.3	18.5	-3.2	6.1	1.2	4.2	5.1	1.8	-3.8					
1975	3.0	5.4	17.7	-2.7	5.7	3.3	4.7	5.7	1.1	-2.5					
1976	3.5	4.4	14.7	-0.9	7.0	6.6	4.6	6.5	2.4	0.1					
1977	3.1	3.9	17.9	-2.7	4.2	3.6	5.7	6.6	-1.5	-3.0					
1978	2.9	4.0	18.5	-3.0	3.9	3.2	6.2	6.5	-2.3	-3.3					
1979	3.5	4.3	15.8	-1.4	6.3	5.9	7.9	7.0	-1.5	-1.1					
1980	3.5	4.5	17.6	-2.4	5.7	8.5	6.5	5.7	-0.8	2.7					
1981	3.1	4.9	17.4	-2.1	6.0	6.5	5.9	5.8	0.1	0.7					
1982	2.7	5.1	18.3	-2.3	5.5	6.7	6.4	8.0	-0.9	-1.3					
1983	3.6	5.3	11.6	2.3	11.2	10.7	6.9	8.3	4.3	2.4					
1984	5.4	5.6	7.5	6.7	17.6	14.8	7.4	9.1	10.2	5.7					
1985	4.1	5.7	11.1	2.5	12.3	14.3	7.8	10.3	4.6	4.0					
1986	3.9	5.8	10.6	2.9	12.5	13.8	6.8	10.5	5.7	3.3					
1987	5.0	6.0	8.6	5.0	15.9	15.3	7.8	10.7	8.1	4.6					
1988	5.3	6.1	7.8	6.0	17.4	16.3	9.2	11.0	8.2	5.4					
1989	5.2	6.4	7.3	6.8	18.4	17.6	10.3	11.9	8.1	5.6					
1990	4.6	6.9	9.0	4.5	16.1	13.9	12.4	12.5	3.6	1.4					
1991	5.4	7.5	8.1	5.7	18.5	17.6	14.0	13.1	4.5	4.5					
1992	4.9	7.8	11.0	2.4	15.1	16.2	10.4	11.0	4.8	5.1					
1993	4.3	7.7	11.7	1.8	13.9	14.9	11.8	11.4	2.1	3.5					
1994	4.6	7.6	9.9	3.6	15.8	14.4	11.6	9.4	4.2	5.0					
1995	3.8	7.8	14.2	-0.1	11.5	14.9	9.0	9.1	2.5	5.8					
1996	3.3	7.8	17.2	-1.9	9.1	15.3	7.2	7.8	1.9	7.5					
1997	3.7	7.5	13.8	0.4	11.5	18.1	8.8	8.3	2.7	9.7					
1998	3.5	7.3	11.6	2.0	12.9	19.2	9.1	8.7	3.7	10.5					
1999	3.2	7.0	15.2	-0.8	9.4	18.2	7.9	7.2	1.5	11.0					
2000	3.7	6.4	15.4	-0.9	9.1	17.5	8.1	7.5	1.0	10.0					
2001	3.1	5.5	24.3	-5.4	3.3	12.9	6.7	6.7	-3.4	6.2					
2002	2.8	4.8	22.8	-4.6	3.0	9.3	6.7	7.3	-3.7	2.1					

10-Year Period Ending December 31	STOCKS										BONDS		EQUITY RISK PREMIUM	
	ESTIMATED PARAMETERS / MODEL INPUTS					ACTUAL					INPUT	ACTUAL	ESTIMATED	ACTUAL
	Investment Return		Speculative Return			Total Return on S&P 500		Total Return on Inter-Term U.S. Gov't Bonds						
	Initial Yield	Earnings Growth	Initial P/E Ratio	Annual Speculative Return	Total Return	Total Return on S&P 500	Initial Yield on 10-Year Treasury	Total Return on Inter-Term U.S. Gov't Bonds	Estimated Premium	Actual Premium				
2003	2.7	4.7	21.3	-3.9	3.5	11.1	5.8	6.4	-2.4	4.7				
2004	2.9	4.5	14.9	-0.4	7.0	12.1	7.8	7.2	-0.8	4.9				
2005	2.2	4.6	18.1	-2.4	4.5	9.1	5.6	5.7	-1.1	3.4				
2006	2.0	5.0	19.2	-2.9	4.2	8.4	6.4	5.8	-2.3	2.6				
2007	1.6	5.7	24.2	-5.0	2.3	5.9	5.8	6.0	-3.5	-0.1				
2008	1.4	5.7	31.6	-7.3	-0.2	-1.4	4.7	6.2	-4.9	-7.6				
2009	1.2	5.7	29.7	-6.4	0.4	-0.9	6.5	6.2	-6.0	-7.1				
2010	1.2	6.2	26.6	-5.1	2.3	1.4	5.1	5.6	-2.8	-4.2				
2011	1.4	6.6	46.4	-9.9	-2.0	2.9	5.1	5.8	-7.1	-2.9				
2012	1.8	6.9	32.6	-6.3	2.3	7.1	3.8	4.8	-1.5	2.3				
2013	1.6	7.0	22.2	-2.4	6.1	7.4	4.3	4.4	1.9	3.0				
2014	1.6	7.3	20.5	-1.5	7.5	7.7	4.2	4.5	3.2	3.2				

*The P/E ratio on December 31, 2014 was 20.1x.

ENDNOTES

The opinions expressed in this article are solely those of its authors and do not necessarily represent the views of Vanguard's present management.

¹In 2014, portfolio turnover of actively managed equity funds totaled 118% (purchases plus sales of portfolio investments as a percentage of average assets).

²To implement the analysis of this simple concept, Bogle used data on prices, dividends, and earnings from the Standard & Poor's 500 Composite Stock Price Index.

³In Bogle's original article, the basis for his calculations was not precise. But he clearly anticipated a total return of about 10% on stocks for the subsequent decade.

⁴The closing date for this extended period was dictated by Bogle's speech before The Investment Analysts Society of Chicago on June 5, 2003.

⁵Estrada employed his model to evaluate stock returns not only in the U.S., but in 11 non-U.S. nations, including the U.K., Germany, France, etc. The model proved equally effective in most instances, although Japan proved to be a notable exception.

⁶Even rational expectations may exceed—or may be exceeded by nominal returns in the markets—at least for a time. But the beauty of the BSRM/S model is that it facilitates the ability of those who may disagree to insert their own expectations for earnings growth and terminal P/E ratios (but not the current yield) and make their own forecasts.

⁷Bogle's views here are hardly objective. In 1975 he created the world's first index fund, now known as the Vanguard 500 Index Fund. Later he added multiple companions, including index funds tracking the total stock market, the extended (non-S&P 500 stock) market, growth stocks, income stocks, small-cap stocks, a balanced portfolio, and international and emerging market stocks, plus the bond market and its defined-maturity sectors.

⁸In June 2015, *New York Times* journalist Gretchen Morgenson reported that although Qualcomm had repurchased 238 million of its shares during its previous fiscal year, its actual share count increased by 41 million shares.

⁹When the Grinold-Kroner article was published in 2002, the authors predicted a 7.5% stock return over the next 10 years. The BSRM/S model expected a return of -2.0%. The actual return on the S&P 500 was 2.3%.

¹⁰Bogle first used this quotation in 1993, only to find out that Benjamin Graham had cited it decades earlier.

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