Reversion to the Mean:
Sir Isaac Newton's Revenge on Wall Street

Presented by

John C. Bogle

Chairman and Founder, The Vanguard Group of Investment Companies

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It is an honor to have the opportunity to speak at this distinguished forum. I have selected a theme that I hope is worthy of the challenge, and shall present a perspective that is a combination of the academic and the pragmatic. For this audience clearly has not only a strong intellectual bent, but, I imagine, an awareness of the need to invest wisely today to assure a financially secure tomorrow.

The title of my remarks is "Reversion to the Mean." This theme may at first blush seem a bit dry and uninspiring. But I assure you that it is anything but that. For I suggest to you that RTM is a rule of life in the world of investing—in the relative returns of equity mutual funds, in the relative returns of a whole range of stock market sectors, and, over the long-term, in the absolute returns earned by common stocks as a group. RTM 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. Recognizing the discoverer of this universal law, I have added a subtitle: "Sir Isaac Newton Comes to Wall Street."

Many of you—perhaps most of you—have chosen mutual funds as part of your retirement savings programs. Whether you have or not, I'm confident that you have already carefully considered your own financial circumstances and risk tolerances, and decided on your optimal allocation of assets between fixed income investments and stocks. And if you share in the powerful, and rarely challenged, ethic of our era—that common stocks are virtually certain to provide the highest returns of any major asset class over the long-term—a substantial portion of your program is probably invested in equities.

Assuming that to be the case, how should intelligent investors who select mutual funds undertake the task of choosing them? Let me start with my own skeptical assessment of how *not* to go about it: letting selections be based principally, or even importantly, on the records of fund past performance that are published and promoted by the hyperbolic marketing machine that drives the mutual fund industry today. "Don't go there!" The overpowering lesson of history—as I shall try to persuade you today—is that *in the long run, a diversified equity portfolio is a commodity.*

That is to say, by the end of the 20-30-40-50 year period over which you may accumulate your retirement nest egg, it is an odds-on bet that a fund's *gross* rate of return will approximate that of the stock market. I choose the word "gross" with care. For with the excessive costs borne by most mutual

funds, including both fully disclosed (if often ignored) direct expenses—used for operating, marketing, and investment advisory costs plus generous profits for the managers—together with the hidden costs of fund portfolio transactions, the *net* rate of return of funds as a group, and, over the long run, of individual funds, has tended to lag the market by about 1-1/2 to 2-1/2 percentage points annually.

To save you the trouble of pulling out your calculators (or slide rules!), a long-term return of, say, 10% *without costs* will provide, over 40 years, a terminal value of twice as much as a return that incurs annual costs of 2% and thus provides a net return of 8%. Costs consume 20% of the return—and that's expensive. Exhibit I, simply a basic compound interest table, graphically contrasts the relative accumulations over time under these two return assumptions showing that $10,000 at a 10% return grows to $450,000 over 40 years, more than double the $220,000 it reaches at an 8% return. Superficially small differences in annual returns, extended over long periods of time, will make a dramatic difference in the final capital in your retirement fund.

1. RTM in Mutual Fund Returns

In periods as short as one year, many mutual funds—especially small, aggressive ones—can and do defy these odds. And in some decade-long periods, perhaps one out of five funds succeeds in doing so by a material amount. But in the very long run, there is a profound tendency for the returns of high-performing funds to come down to earth, and, just as inevitably, for the returns of low-performing funds to come "up to earth," as it were. Indeed, as I shall now show, the distance traveled in the course of these descents and ascents is directly proportional to the earlier distance above or below the market's return. In short: reversion to the market mean is the dominant factor in long-term mutual fund returns.

Let's begin with an example. I have selected the past two full decades to perform this test: the 1970s (which provided uncharacteristically modest equity returns) and the 1980s (which returned the favor by providing unusually generous returns—a sort of RTM example in a different context, but I'll come to that later on). In performing this analysis, I've used the middle-of-the-road growth-and-income funds and growth mutual funds. These funds include the large, well-known funds, and carry risks at about the same level as the Standard & Poor's 500 Composite Stock Price Index. (Aggressive growth funds, small cap funds, and international funds, which carry generally different—and higher—risks are excluded.)

This graph (Exhibit II) shows how the four quartiles of funds, ranked by performance relative to the Index in the first decade, regressed toward the market mean during the second decade. Note, for

example, that the top quartile of funds provided annual returns averaging an imposing 4.8 percentage points above the Index during the 1970s and ended up 1.0 point behind the norm during the 1980s, a downward reversion of 5.8 points to the Index. By the same token, the bottom quartile fell 4.1 points behind the Index during the 1980s, but reduced that gap to -1.8 points during the 1990s, an upward reversion of 2.3 points.

Even more strikingly, 33 of the 34 funds in the top quartile reverted toward the market mean during the 1980s, with two-thirds of the formerly superior funds actually falling behind the Index. For what it's worth, that one exception is a fund which provided a remarkable annual excess return of fully 11 percentage points during the 1980s. However, it has performed an exemplary RTM maneuver so far during the 1990s, providing an annual return precisely equal to the Index, an equally remarkable 11 point annual mean reversion. (Over the past four years alone, it has lagged the Index by 5.6 points annually.) Sometimes, clearly, the manifestation of RTM may require patience.

Now, the unmanaged Standard & Poor's 500 Index is not only a tough target (because it operates in a theoretical world, bereft of operating and transactions costs) but an elusive one (because it has a strong bias toward stocks with the largest market capitalizations). Even though I have chosen the mutual fund categories dominated by large cap funds with similar volatility characteristics to those of the Index, the capitalizations of the stocks in their portfolios are inevitably somewhat smaller. Nonetheless, during the two decades—which obviously includes considerable "survivorship bias" in favor of the funds—the comparative differences were not large. During the first decade, the survivors actually outpaced the Index by 16 basis points, a somewhat uncharacteristically favorable outcome, only to fall 152 basis points behind during the second decade, a more normal result.[1]

[1] If we compare the decade 1987-1997 with 1977-1987, the top quartile reversion to the market was a slightly larger 6.9 percentage points, with all 44 funds reverting toward the mean, including 35 that fell below it, an even more imposing outcome. The past decade was one in which the average fund fell 2.2% behind the Index.

In any event, to put that issue to rest, I present a similar tabulation with the same funds compared with one another. Exhibit III shows how the mutual funds each quartile have regressed toward the mean of the fund group itself rather than the Index. Again, RTM is the order of the day, with the top quartile funds losing 3.9 points of their former 4.7 point advantage. Fully 30 of the 34 top quartile funds reverted. In the bottom quartile, 33 funds improved their relative records and only one failed to do so. The bottom quartile funds reverted upward by 4.1 points, recouping precisely what they had lost in the prior decade. Clearly, RTM is sending investors a powerful message about the futility of evaluating funds based on their past returns.

Of course, mutual fund marketers assume—partially correctly—that most investors are completely unaware that today's top performers are overwhelmingly likely both to be tomorrow's ordinary participants in the stock market, and to parallel the average of their peers—in other words, that today's Beau Brummels are tomorrow's Joe Six-Packs. Indeed, despite the compelling evidence I have presented, fund advertisers consistently hawk the top performers. Believe me, fund organizations know full well that today's idols have feet of clay. But as long as there are believers in witchcraft, so the purveyors of witches' brew will create elixirs and offer panaceas—engendering costly, counterproductive investor choices that inevitably come to grips with yesterday's realities, not tomorrow's.

No study exists that suggests the opposite conclusion: that the very few long-term winners that have emerged (usually through highly superior returns in their early years when they have very small assets and few shareholders) can be selected *in advance*. But perhaps there is a better way to win the game of seeking superior performance than picking the top-performing funds in advance. So let us turn to a second category of RTM, and another reflection of Sir Isaac Newton's revenge on Wall Street.

2. RTM in Stock Market Segments

If the large cap growth and value mutual funds (used for my earlier examples) must provide short-term returns that parallel those of the stock market, but over the long run must fall significantly short, what about concentrating on stocks in selected segments of the stock market that may have characteristics that lead to superior long-term returns? Alas, there seems to be no systematic segment bias that has endured over time. RTM seems consistently to turn even what often appear to be long-term secular trends into mere cyclical phenomena, albeit often of considerable duration.

Let me illustrate this point by using four examples: growth stocks versus value stocks, high-grade stocks versus low-priced stocks, large cap stocks versus small cap stocks, and U.S. stocks versus

international stocks. The net result of all four examples, to tip my hand, is that, among each of these key market sectors, RTM is alive and well.

Let's begin with growth stocks (generally, those with above-average earnings growth, price-earnings ratios, and market-to-book ratios) and value stocks (lower in each case, and offering above-average yields). For this study, I've done a 60-year examination of growth mutual funds—those with stated growth objectives and demonstrated above-average volatility—and value mutual funds—equity funds stating that they seek both growth *and* income and demonstrating average volatility. (Before published industry norms became available in 1968, I've relied upon a sample of funds whose portfolios and annual returns made this distinction clear.)

The conventional wisdom today is to give the value philosophy the accolades as superior to the growth philosophy. Perhaps this is so because so few have examined the full historical record. Nonetheless, over the long run, as shown in Exhibit IV, RTM proves powerful and profound. In the early years, growth funds controlled the game, and were clearly the winners from 1937 through 1968. At the end of that era, the investment in value stocks was worth just 62% of the investment in growth stocks. Then, value stocks enjoyed a huge resurgence through 1976, redressing almost precisely the entire earlier deficit. (It is this recent history—covering but 8 of the entire 60 years—that has created the value stock mystique.) Then, growth stocks outperformed through 1980, and value stocks have pretty much dominated since then. Linking all of these cyclical fluctuations, as reflected in Exhibit IV, for the full six decades, the terminal investment in value stocks was equal to about nine-tenths of the growth stock investment. For the full 60-year period, the compound returns were: growth, +11.7%; value +11.5%. I'd call that match a standoff, and a tribute to RTM.

My second example of market sector RTM is high-grade versus low-priced stocks. This series—not much considered by investors during the past decade—has been published by Standard & Poor's Corporation on a consistent basis since 1926. Here, as shown in Exhibit V, the swings in market pre-eminence are much briefer than with growth and value stocks. The most sustained trends have been evident during the past four decades, with low-priced stocks enjoying a six-year feast from 1962 through 1968, followed by a complete reversal in favor of high-grade stocks, a six-year famine that lasted through 1974.

Continuing a cycle that seems to vaguely parallel the seven-year cycle of Biblical prophesy, the next feast for low-priced stocks lasted for nine years, through 1983, followed by a seven-year famine through 1990. But, when all was said and done, for the full seven decades, each $1.00 initially invested in high-grade stocks was valued at about 1.4 times the investment in low-priced stocks, exactly where it was at the end of 1927, a truly great year for the high-grade issues. Even including the distorting effect of that single opening year, high-grade stocks provided a historical return of +6.8%; versus +6.2% for low-priced stocks (excluding dividends in both cases).

Now to my third example. One of the seemingly indestructible myths of investing is that small cap stocks outpace large caps over time. Having accepted this proposition, its proponents then explain why, in terms easily enough understood. "Why, small caps carry higher risks, therefore it follows as the night the day that they must earn higher returns." This reasoning would seem to make consummate good sense, but in fact the cycles of small cap superiority have been relatively spasmodic, as shown in this historical chart. (See Exhibit VI.) From 1925 through 1964—a period of 39 years—small caps and large caps provided identical returns. Then, small caps more than doubled the large cap return through 1968. Virtually that entire margin was then lost during the next five years, leaving small caps about at par with large caps for nearly the full half-century. The small cap reputation was made during the 1973-1983 decade. Then, seemingly inevitably, RTM struck again for the fifth cycle. Just as the proverb warns us, it was darkest for the large caps before the dawn, and since then the sun has shone brightly upon them.

On balance for the full period, the compound annual return on small cap stocks was +12.7% compared with +11.0% for large cap stocks. This difference, to be sure, resulted in a terminal value for small cap stocks that was three times that of large cap stocks. But, given the dominance of small caps in this single decade, I'm not sure I'd rely on it. Without the relatively brief cycle of small stock

domination in 1973-1983—but one of seven decades in the period—large caps were actually superior. Annual returns: large cap +11.1%, small cap +10.4%. In any event, the relationship between large caps and small stocks, if not entirely dominated by RTM, is permeated with the force of market gravity.

We don't have an historical chronicle of comparable length to those I've used for my first examples of RTM. So, for the evidence in U.S. versus international stocks, I can rely only on data for the past 38 years. Here, as shown in Exhibit VII, we again see profound evidence for my thesis. Here, I'll compare the returns of the Standard and Poor's 500 Stock Index and the Morgan Stanley Capital International Europe, Australasia, and Far East ("EAFE") Index. While there were frequent swings to and fro, our ratio of cumulative value slightly favored the EAFE Index for the first 24 years through 1984. The compound returns were EAFE +9.7%; S&P +8.4%.

Then EAFE exploded, outpacing the U.S. by fully two times during the brief 1984-1988 cycle. Since then, the U.S. has fully repaid the compliment, more than redressing that flash of EAFE brilliance during the subsequent nine years. For the full period, the compound returns on U.S. stocks and international stocks were identical at +11.5%. The relative value of each initial $1.00 invested by the investor who stayed in the U.S. was worth precisely the same for the internationalist. Over the long run, then, RTM has clearly manifested itself in global equity markets.

I've now illustrated the powerful force of the law of relative market gravity, if not with Sir Isaac's precision.[2] His discovery of the law of universal gravitation has been described as the high point of the Scientific Revolution of the 17th century. To be sure, the utility value of mean reversion to investors in diversified equity funds and in stock market sectors that I have described here will hardly be the high point of this fading century. But RTM is a principle borne out by history, even though it may take decades to appear. The intelligent investor will ignore it at his or her peril. Indeed, Newton's third law: "every action has an equal and opposite reaction," is perhaps even a better translation of what happens in the financial markets. I'm willing to stake my own retirement investment strategy on the fact that it will continue to exist.

3. RTM in Common Stock Returns

Let me now turn to my third area of mean reversion: the long-term returns of common stocks. Here, unlike the previous two areas on which I've just commented, RTM relates, not to relative but to

[2] For the record, his equation: Force = $G\, m_1 m_2 / d^2$; i.e., force equals the relative masses of two objects divided by the distance squared, times the gravitational constant.

absolute, returns. The fact is that for more than two centuries the U.S. stock market has demonstrated a profound tendency to provide real (after-inflation) returns that surround a norm of about 6.7%. As shown in Exhibit VIII,[3] the swings around this norm over moving 25-year periods are reasonably narrow, with returns much above ten percent in only 7 of the 172 periods and returns much below four percent in another 5 periods. In short, real returns have ranged between roughly 4% and 10% in 93% of the 25-year periods, a remarkable record of consistency. Surely RTM is alive and well in the stock market. The standard deviation of returns in 25-year periods—about one-half of an investing lifetime for most investors today—is 2.0%. In fairness, in a shorter time frame of ten years, the standard deviation is 4.0%; in an investment lifetime of 50 years, it is a minuscule 1%. So time horizon makes a meaningful difference.

The root cause of these long-term returns is fundamental: corporate dividends plus the growth of corporate earnings. And, using data we have available from 1871 forward, we can measure the extent to which these two financial fundamentals have dictated the returns earned on equities. Real corporate earnings have grown at an annual rate of 3.9% since 1871; real dividend yields have averaged 2.8%. So, the total *fundamental* return on stocks has been 6.7%. This figure precisely matches the *actual* real return of 6.7% on stocks during this one-and-one quarter century period, a remarkable tribute to the long run rationality of the financial markets.

In the shorter run, to be sure, there is a lot of irrationality. (In particular, it seems apparent today.) Stock market irrationality can be measured by the ephemeral—but critical—factor of the price that investors are willing to pay for $1 of corporate earnings, the widely known price-to-earnings ratio. If, following Lord Keynes, we use the term *investment* to describe the fundamental return based on earnings and dividends, we use the term *speculation* to describe this second determinant of stock prices: the price that investors will pay for each dollar of earnings. If the power of fundamentals dominates market returns in the very long run—as it clearly does—the power of speculation dominates market returns in the shorter run. (Speculation, indeed, may be the *only* reason for the sometimes astonishing daily, weekly, or even monthly swings we witness.) Over time, investors have been willing to pay an average of about $14 for each $1 of earnings. But if, in their optimism, they are willing to pay $21, stock prices will leap by 50% for that reason alone. If, in their pessimism, they are willing to pay only $7, stock prices will fall by 50%. The changing price of $1 of earnings creates powerful leverage indeed—*but it doesn't last forever*.

[3] I am indebted to Jeremy J. Siegel, Professor of Finance at the Wharton School of the University of Pennsylvania, for his assistance in providing the data for Exhibits VIII and IX. His book "Stocks for the Long-Run" (Irwin, 1994) is a splendid reference. He also helped with innumerable supplemental materials.

Even over periods as long as a quarter century, however, there have been variations in returns based on the esoteric force of speculation, rather than on the rock foundation of investment. But they have been reasonably subdued. The combination of dividend yields and earnings growth have remained the predominant driver of return. Exhibit IX presents the differences between the two. Actual returns fall within a range of plus or minus some two percentage points of fundamental returns in 88 of the 102 25-year periods since 1871. I was struck by the fact that there seem to be six waves—each of plus or minus 15 years duration—from the peak-to-valley role of speculation versus investment. Just for fun, I've delineated these six waves, arguably three grand RTM cycles, on the Exhibit.

To illustrate just how these differences between fundamental and actual returns have worked in the past, I turn to Exhibit X, which compares the role of investment and speculation in two very different climates. When we moved from pessimism to optimism, as in 1937-1962, the fundamental return of 6.3% was supplemented by a speculative return of 3.1%. This additional return resulted from the upward reevaluation in the price of $1 of earnings, from $9.30 to $17.20, bringing total return to 9.4%. On the other hand, when optimism moved to pessimism, as in 1953-1978, the revaluation of $1 earnings from $9.90 to $7.90, resulted in a negative impact of -2.8%, reducing the fundamental return of 8.3% to 5.5%. With $1 of earnings today selling for $21, I suppose it's fair to say that our future expectations ought to be held in check.

My point in discussing the overpowering force of fundamental factors in driving stock returns is to emphasize that the economics of capitalism and competition seem somehow to have established an historic limit of 4% real (6% nominal) on long-term earnings growth. What is happening in the U.S. stock market today—and what has driven the stock market during its past three glorious years—is the notion that earnings growth has moved to a new, distinctly higher, plateau. Indeed, during the past 15 years, real returns have averaged fully 12.6%—a return significantly exceeded only five of the 181 15-year periods since 1816—and not by very much. (The record of 14.2% was set way back in 1865-1880.) Even if the coming decade produces but a 3% real return, the quarter century return would be 8.6%, far above the long-term norm of 6.7%. But the remarkable returns earned on stocks since 1982 have raised serious questions about whether the old shackles on fundamental returns have been ripped away, freeing America to enter a new era of corporate profitability.

For equity investors, it is the central question of the day. A year ago, one respected firm headlined its investment strategy bulletin, "A New, Higher Mean to Revert To?"[4] The report began by saying, "as the fat returns from U.S. equities keep piling up, you have to wonder if in this brave new world, the historical returns of 6%-7% real are obsolete, and have to be revised upward." Then it took the middle ground. "This golden age for equities won't last forever . . . but the mean for equities is probably somewhat higher than in the past, and famine will follow feast as it always has." This firm concluded that the new mean market return would be, "7%-8% real, but below the 10% today's bulls talk about. The real returns of around 12% generated for a decade now are simply not sustainable. Over time, returns will have to gravitate back toward the new mean."

If—*if*—this is so, the strategy bulletin seems to imply, stocks at today's levels are overvalued (i.e., overpriced relative to the fundamentals) by about 20%. In such an environment of revaluation, we would face a protracted period with real stock returns in the 3%-5% range. Stocks, then, would face serious competition from bonds. For bonds, based on today's yields, should provide returns of about 3 ½%-4% on average over the coming decade, at considerably lower risk. Given the hazardous nature of market forecasting, however, and the powerful odds against being right *twice* (selling at or near the highs, and buying back at or near the lows, a winning strategy of extraordinary unlikelihood), the possibility—even the probability—of inferior risk-adjusted returns on stocks should not be sufficient, in my judgment, to cause long-term investors to abandon stocks in their entirety. Still, the case for a balanced stock/bond program—rather than an all-equity program—seems to me to be even stronger today than at most times during the past quarter century.

4. The Implications of RTM for Investors

So far, I've emphasized the academic aspects of RTM—what the historical statistics tell us. I believe it is clear that mean reversion is alive and well. It is manifested in almost every aspect of investing: in shaping relative returns for individual mutual funds; in shaping the relative performance of diverse market segments; and in determining the absolute levels of long term returns (albeit *perhaps* at a prospective level that is slightly higher than in the past) of equity prices as well. If, as an academic matter, you accept this thesis, what actions does it imply for the wholly pragmatic business of investing? How can this history help you to assure yourself and your family with the optimal opportunity to amass a capital fund for retirement? It is to this question that I now respond.

First, as to asset allocation. While the financial markets today seem to me to carry a higher than normal risk component, I do not believe you should consider abandoning equities in your retirement plan. Rather, I would suggest continuing to balance the potential risks and returns by centering on a 70% equity/30% bond program. I'd shade equities higher (up to 85/15) for those at the beginning of their

[4] Morgan Stanley, February 24, 1997.

accumulation programs, with a healthy appetite for returns and a strong stomach for risks, and an extended time (15 to 40 years) before retirement. For those making investments that are modest relative to the capital already salted away, with more conservative instincts and shorter time horizons (1 to 15 years), I'd shade equities lower, all the way down to 35/65 at the extreme. For no one *knows* what future returns the financial markets will provide.

Here, I want to emphasize the incredible power of compounding over an extended period of years. Given sufficient time, even a small enhancement to returns is virtually priceless, even if equities fail to provide their historical premium—their excess real return—of 3 1/2% over bonds, as seems highly likely to me. After all, the equity premium has been more than 6% annually during the past decade, and some RTM would hardly be astonishing. But even a 2% risk premium—only about one-half the norm—would make a powerful difference. Exhibit XI shows that a retirement plan program—investing, say, $5,000 regularly, year after year—earning a 5% nominal return would produce $250,000 in 25 years and $634,000 in 40 years, while the same investment at 7% would produce terminal values of $340,000 and $1,068,000, respectively. The modest 2% equity premium adds $90,000 in 25 years, and adds $430,000 in 40 years, itself more than two times the cumulative $200,000 of annual investments. These are hardly trivial differences in capital accumulation.

But in the inevitably uncertain world of investing—and with the counterproductive interference of our emotions—I also think that betting the entire ranch on equities would be unwise. We are all fallible human beings, driven toward greed at market highs and toward fear at market lows. So, it is best to resist the temptation to turn emotion into investment action. A balanced approach has been validated over centuries, not, to be sure, because it provided the highest returns—it clearly didn't. But it did provide solid long-term returns, achieved without excessive short-term risks, and that's hardly an unacceptable outcome.

With the stage—or stages!—thus set for future market returns, what does RTM suggest about equity investment selections? I come quickly to the obvious solution: the choice of a low-cost stock index fund for your equities, or at least as the core of your equity commitment. Such a fund should, given the power of mean reversion, provide the maximum participation that is realistically possible in the future returns of equities as a group. Surely it has proved its worth in the past. I would caution you, however, that despite the recent success of—and accompanying accolades for—index funds modeled on the Standard & Poor's 500 Stock Index, they may not be the optimal choice. I happen to prefer, on both theoretical and practical grounds, an index fund that tracks the *total stock market*, providing

participation, not only in the giant cap stocks of the S&P 500, but also in the small-cap and mid-cap segments of the market. (While I see no compelling reason to include international equities in your program, I would note that they can be successfully indexed too.)

The index fund is the ultimate response to the power of RTM in the selection of mutual funds. It avoids "the loser's game" of selecting individual funds based on past performance that overpoweringly reverts to a mean that persistently falls short of the market return. Rare indeed is the serious study that suggests that it is possible to select significant winners in advance. Indeed, I accept the general notion of RTM among market segments such as growth stocks versus value stocks and U.S. stocks versus international stocks. But even if you believe that the clear lessons of history are pointing us in the wrong direction—always a risky bet—there would remain the equally risky bet of determining just which of the countervailing segments will in fact prove to be superior. If, for example, large cap and small cap stocks do not each revert to the market mean over the next 10 to 20 years, which of the two is the more likely to provide the superior return? Indeed, it is the extraordinarily broad diversification—the *total, absolutely complete,* diversity—of the total stock market index fund that commends it to investors.

But only if that diversity comes with minimal cost. Indexing wins because it is an exceptionally *low* cost strategy that is competing, finally, with all stocks as a group, by definition an equally-diversified universe. And the mutual fund portion of that universe—nearly one-quarter of it—is composed of thousands of different individual funds operating at *high* cost. In such circumstances, an equity index fund cost advantage conservatively estimated at 1.5% annually should provide 1.5% in added return over time. Yes, it is really just that simple. If the stock market's return is 9% in the future, the typical fund should be expected to deliver 7.5% at best. (If you cannot accept my thesis about RTM in the relative returns of mutual funds, I believe your chances of selecting the future good performers will be highest if you choose from among those with low expense ratios and low portfolio transaction costs.) As shown in Exhibit XII, this difference in compounding causes $10,000 to grow to $61,000 at 7.5% over 25 years, but to $86,200 at 9%. Over 40 years, to $180,000 at 7.5%, but to $314,000 at 9%. It seems almost too easy a way to earn an extra nest-egg of almost $100,000, holding risk constant. But there it is. In short, excessive mutual fund operating costs carry a high penalty in shareholder capital accumulations over the long run. *Cost matters*.

In this modern day and age, the old phrase, the crown jewels, has taken on a new meaning. Investors aspire to something far more important than mere diamonds, rubies, and sapphires. When the time for retirement comes to the breadwinner, the family's most valuable asset—its crown jewel—will almost certainly be the capital value of its retirement plan. And the tax-deferred plan is an especially rare jewel in the sense that tax-deferral is, along with low cost investing, the most valuable weapon in the entire arsenal of the long-term investor. Limited only by the provisions of the Internal Revenue Code, you should invest every penny you can afford in your IRA or in your 401(k) or 403(b) thrift plan.

An investment program carrying the theoretical armor of RTM, regular investing, and a balanced strategy, combined with the powerful weaponry of deferred taxes and low cost, would be applauded by Sir Isaac Newton: Even as the proverbial apple drops to the ground, so also do high performing mutual funds, and surging sectors of the stock market. And even the most productive eras of the market itself, given enough time, drop to normal levels. But his law of gravity, applied to the manifold mean reversions of returns in the financial markets, should also help you to think through and develop an intelligent financial plan, and enable you to accumulate a retirement fund of generous proportions. I hope that combining the academic with the pragmatic, as I've tried to do today, will help you on your way. Good luck!