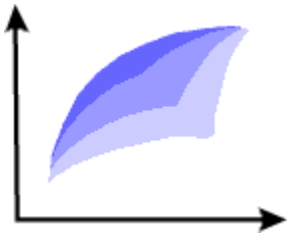
Efficient Frontier



An Online Journal of Practical Asset Allocation

Edited by William J. Bernstein

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William J. Bernstein

Technology and Investing—A Concrete Example

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The bedrock of this most euphoric and prosperous of equity markets is the belief that technological progress drives stock returns. And viewed through the longest of historical lenses this is almost certainly true. Angus Maddison, in his seminal *Monitoring the World Economy 1820-1992*, estimates the annualized growth of global per capita GDP at less than 0.1% from Roman times until 1820, increasing to 1% following 1820. The sudden shift in the planet's economic fortune that occurred with the early nineteenth century's technologic burst is one of the pivotal events of human history. For example, as late as 1811 it took goods about 5 weeks to travel from Paris to Lyon, with considerable attendant expense, physical pain, and peril. By 1850 the steam engine made the same journey possible in one or two days, and at a tiny fraction of its former price, discomfort, and risk.

The revolution in communication was even more dramatic. For most of recorded history information traveled as slowly as physical goods. (The Romans briefly had a signaling system that enabled short messages to travel across the continent in a matter of hours, but only in good weather.) With the invention of the telegraph by Cooke and Wheatstone in 1837 instantaneous communication abruptly changed the face of economic, military, and political affairs in ways that can scarcely be comprehended by even our modern technologically jaded sensibilities. It is humbling to realize that the news of Grant's election in 1868 traveled from New York to San Francisco almost as quickly as it would have today.

Arguably the most physically transformative invention occurring at the birth of the modern was not a new discovery at all, but the resurrection of concrete by John Smeaton. This was in fact an ancient invention, lost for over a thousand years with the fall of Rome.

A credible argument can in fact be made that the pace of technological progress has lately been *slowing*, not accelerating. After all, what scientific discoveries of the past 80 years rank with thermodynamics, electromagnetism, relativity, and quantum mechanics? An intelligent inhabitant of the western world in 1950 would have no trouble understanding the technology of 2000. On the other hand, a citizen from 1800 or 1900 would each have been rendered inchoate by the technologies of 50 years later.

So what does all this have to do with investing? Surprisingly little. Were there a direct relationship between technological innovation and investment results then equity returns in the first half of the 19th century should have been spectacular. Alas, not. From 1801 to 1850 returns in the US market were just 7.40%. And for the period of the most rapid technologic progress, from 1821 to 1840, stocks returned only 4.36%. The 1830s were a perfect example of how finance so often snatches defeat from the jaws of technological victory, with the political pyrotechnics surrounding the expiration of the charter of the Second Bank of the US overshadowing the apogee of human innovative velocity.

The nature of finance in those halcyon days provides a

cautionary tale for those who today extrapolate modern information technology into high security returns. What transpired was quite simple. The excitement generated by the canal, railroad, and telegraph in the 19th century made it very easy for entrepreneurs of varying ability and character to raise capital. In financespeak, the "cost of capital" was dramatically lowered for such ventures. And, unfortunately for investors, cost of capital is simply the opposite face of the investment return coin; cheap capital means low returns. The history of railroad and canal investing on both sides of the 19th century Atlantic was one of wildly inflated expectations, fraud, and bankruptcy.

The same occurred in the 1920s with the invention of the aircraft, automobile, and radio. In fact, the very word "radio" became synonymous with the highflying stock of RCA. Although it eventually became a highly successful company, RCA first brought ruin to hundreds of thousands of investors in the early 30s. The Cowles Commission, chartered by congress in the wake of the crash to document stock returns, found that the "radio, phonograph, and musical instruments" stock category returned -4.4% per year for the 13-year period from 1925 to 1937, versus +4.9% per year for all stocks. (I'm indebted to Professor Will Goetzmann of Yale for providing this data.)

Also quite sobering was the experience of the auto industry. By 1929 there were almost 1,000 car manufacturers. Forty years later there were only 3 players of any size. And the most successful of these, Ford, did not go public until the 1950s. While the return on GM was 12.9% per year for 1925-37, the rest of the industry returned -2.9% per year. Of all the new technologies of the era, aircraft generated the least financial excitement, as its profit-making potential was not immediately obvious. Yet it had the best returns of all industry groups for the period, at 9.3% annualized.

Which brings us to the current era. Unless you've just spent the past few years doing missionary work in Chad, you know that internet startup companies receive capital with an enthusiasm and cheapness unparalleled in financial history. Although undoubtedly great business fortunes will be made by some of these companies, there can be no question that the ease of capitalization in this arena engenders an inattention to the

parsimony and efficiency necessary for successful human enterprise. Without putting too fine a point on it, the word that comes most easily to mind here is "orgy." And orgies are not a place where productive work is usually done. (If you want to be both entertained by and informed about the internet IPO scene, I highly recommend Michael Lewis' *The New New Thing*.)

Investing is the most richly paradoxical of all human activities. History shows that it is precisely the promise of unlimited technological progress that proves most corrosive to equity returns.

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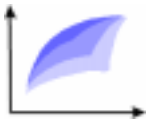

William J. Bernstein

Of Earnings, Dividends, and Agency

In one important regard it really is different this time, and that's dividends. For most of the past two hundred years the market yield has fluctuated between 3% and 6%. Forays above/below this range have usually proved a brief but reliable harbinger of high/low subsequent returns.

But in 1994 yields fell below 3% and haven't looked back since. The new conventional wisdom is that dividends no longer matter; stock returns come not from payouts but from capital gains, which in turn rely on the ability of companies to grow their businesses through retained earnings. Implicit in this belief is the assumption that companies can invest these earnings as well as, if not better than, the shareholders can invest their dividends. A universe yielding 1.2% requires an unprecedented degree of faith in the ability of large corporations, owned almost exclusively by outsiders, to properly dispose of these massive cash flows. How well placed is this faith?

In order to answer this question we first have to examine what academicians call the "dividend puzzle;" what determines how much payout shareholders receive, or even whether they get any at all?

Consider a company that earns 10% of its capitalization each year. If it pays out all its earnings as dividends—i.e., a 10% yield—then it will not have capital to grow, its stock price will not increase, and its return is just the 10% dividend. If it pays one half of its earnings out—a 5% dividend—it will reinvest the remaining 5% in the company, which will then grow at 5% per year, producing a 5% capital gain. The 5% dividend and 5%

capital growth add up to the same 10% total return. (This, by the way, was the source of the mistake made by Glassman and Hassett in their early writings on Dow 36,000 that drew howls of laughter from economists; they "double counted" earnings as both payout and growth.) And finally, if the company never pays out a dividend it will grow at 10% per year, which will accrue to the shareholder as a 10% annual capital gain.

Thus, in a taxless world a company's dividend policy should matter not at all to the shareholder. Inside academia, this is known as the "Modigliani-Miller theorem." In the taxable world, of course, shareholders prefer capital gains to dividends. So why do companies pay them?

Because, to put it bluntly, corporate officers are often scoundrels and theives. They lie. They cheat. They steal. They invest in projects more on the basis of turf, prestige, and politics than cash flow. They run around in Learjets and eat fois gras on your nickel. Shareholders intuitively know this and insist on spiriting their cash away from these bad actors as fast as they can.

This dismal view of corporate finance falls under the rubric of "agency costs." In other words, the shareholder's priorities (e.g., maximizing return) are not at all the same as the officers' priorites (turf, prestige, high salaries, and luxurious surroundings, all removed from bothersome outside scrutiny).

Agency costs are also old news. Listen to Ben Graham in the 1934 edition of ***Security Analysis***:

> The typical investor would most certainly prefer to have his dividend today and let tomorrow take care of itself . . . *Given two companies in the same general position and with the same earning power, the one paying the larger dividend will always sell at the higher price.* (Graham's emphasis)

This wisdom usually gets forgotten in speculative bubbles. Surely, says the modern investor, the lack of a payout is of no consequence; my return will accrue from capital gains. We're in a new era, after all. Well, Mr. Graham spent several chapters in ***Security Analysis*** describing another "new era"—the one from 1921 to 1929. Listen again:

> The customary reasoning on this point may be stated in the form of a syllogism, as follows:
>
> > Major premise—Whatever benefits the company benefits the shareholders.
> >
> > Minor premise—A company is benefited if its earnings are retained rather than paid out.
> >
> > Conclusion—Stockholders are benefited from the withholding of corporate earnings.
>
> The weakness of the above reasoning rests of course in the major premise. Whatever benefits a business benefits its owners, *provided* the benefit is not conferred upon the corporation at the *expense* of the shareholders . . . An inductive study would undoubtedly show that the earnings power of corporations does not in general expand proportionately with increases in accumulated surplus.

The Dean's elegant prose needs some grammatical and historical translation for the modern audience: "I can guarantee you that retained earnings are bad news. You say you want hard data? Well, I don't have it. Remember, this is 1934—prying the requisite numbers from companies is back-breaking work. Maybe when the 1933 Securities Act kicks in and we get some sunshine I can prove my thesis. Maybe some day modern technology will allow us to extract this information with the push of a few buttons. But not just yet."

Over the past several decades the sun has indeed shone in on corporate finance. In fact, one of the great ironies of global finance is that our markets have become the world's most transparent and liquid precisely because they are the most heavily regulated. But I digress. A large body of data has indeed accumulated proving Graham's hypothesis, much of it published in the past several months in the ***Journal of Finance***. (Note: all of the articles I'll refer to are available online, but you'll need the Acrobat reader to view them.)

In the December issue Jarred Harford found that cash-rich firms destroyed 7 cents of corporate value for every dollar of cash reserves held. How does this happen? Let's take two firms, both of which are considering a project or acquisition of marginal value. The first firm is cash-poor, and must obtain the capital from a bank, or a stock or bond issuance. This necessitates scrutiny of the project from the outside. The second firm is cash-rich, and thus requires no outside scrutiny—they can simply cut a check. Clearly, the cash-rich company is much more likely to make this potentially unprofitable investment. Or, as Harford puts it, "Large cash balances remove an important monitoring component from the investment process."

In short, retaining earnings provides management with excess cash, which in turn frees them from outside scrutiny. Rather counterintuitively, excess cash turns out not to be such a good thing.

Three more pieces from the February issue dovetail with this theme. Rajan, Servaes, and Zingales look at the performance of large conglomerates, and find that investment capital tends to flow most readily to its *least productive* divisions. The more highly diversified the company (i.e., the less related its component businesses) the more dramatic the effect. What is most interesting is that Harford's research found that cash-rich companies are more likely to make diversifying acquisitions—in other words, to turn them into the same companies that this paper shows are the least efficient. Like, say, when a large cash-rich internet service provider acquires an even larger company know for its glossy magazines and Looney Tunes.

In the same issue, Ang, Cole, and Lin find that agency costs are highest when the managers own little or no stock, when there is a large number of nonmanager shareholders (i.e., ordinary investors), and when there is no bank scrutiny. In short, the most efficient business is one run by the sole owner. This should resonate with health-care practitioners, as it is a commonplace that small practices are the most efficient and only rarely fail; large specialty clinics go belly up with alarming frequency, and investor-owned HMOs have become a long-running disaster movie playing at a mutual fund near you.

Last and not least, the February ***JoF*** contains an absolute gem from La Porta, Lopez-de-Silanes, Shleifer, and Vishny on dividend policy around the globe. Their primary finding is that in so-called "civil law" countries, such as most of Latin America, Scandinavia, and southern Europe, where investor protection is the weakest, dividend payouts are low. In so-called "common law" countries—basically the world's English-speaking nations, where investor protection is excellent—payouts are high. Which gets back to Graham's basic premise; investors prefer dividends and take them whenever the law and culture allow. The authors reinforce the points made by Graham and the other pieces; "failure to disgorge cash leads to its diversion or waste, which is detrimental to outside shareholders' interest."

But what is most remarkable about this piece is its tone, which is almost Menckenesque in its description of modern corporate ethics. They describe a Hobbesian world in the kind of plain English rarely seen in academic finance; "Firms appear to pay out cash to investors because the opportunity to steal or misinvest it are in part limited by law, and because minority shareholders have enough power to extract it."

So we are faced with a startling paradox. The enormous recent success of American corporations has left them with elephantine cash flows that free them from outside scrutiny, which is in turn likely to result in future capital inefficiencies. A nearly identical scenario played out when low dividend payouts led to the conglomerate mania of the '60s, which in turn generated the industrial malaise of the 70s. Plus ça change.

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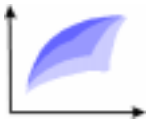


William J. Bernstein

Dunn's Law Review—Foreign Funds

In the spring edition we tested Dunn's Law in the US style-box arena, and found that except for a disastrous showing in 1999 due to the performance of the NASDAQ, it had acquitted itself well.

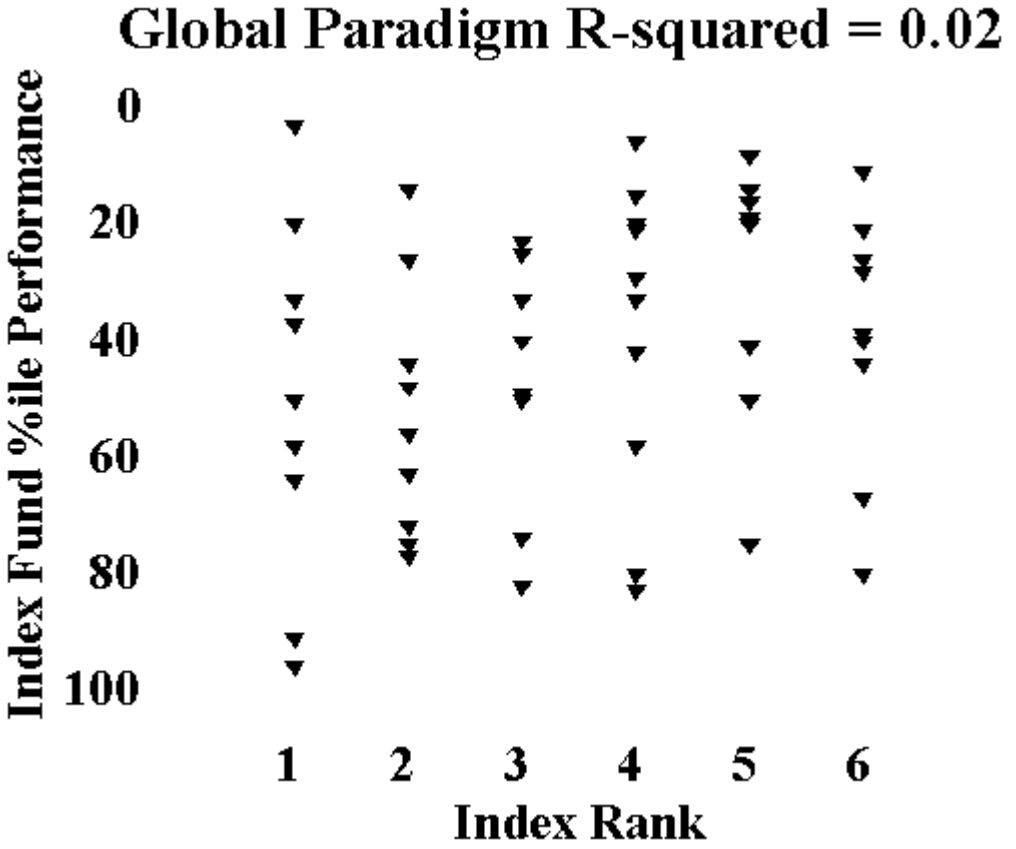
In this edition we examine how accurately it explains fund performance across nations and regions. In other words, if Japanese equity has a particularly good year, as occurred in 1999, would that reflect favorably in the performance of a Japanese index fund relative to its peers? Last year I had begun to suspect that there was trouble in paradise; in 1999 the DFA and Vanguard emerging markets index funds had mediocre relative performance in spite of the superb emerging markets returns that year, and the exact opposite occurred in 1998.

In order to look at this more closely, I looked at the relative performance of 6 different global general equity assets, comparing the percentile performance of the index, assuming that it was a fund, versus the appropriate actively managed funds. For each year from 1990 to 1999 I looked at the following 6 classifications (except for 1990 and 1991, when there was <2 Latin funds):

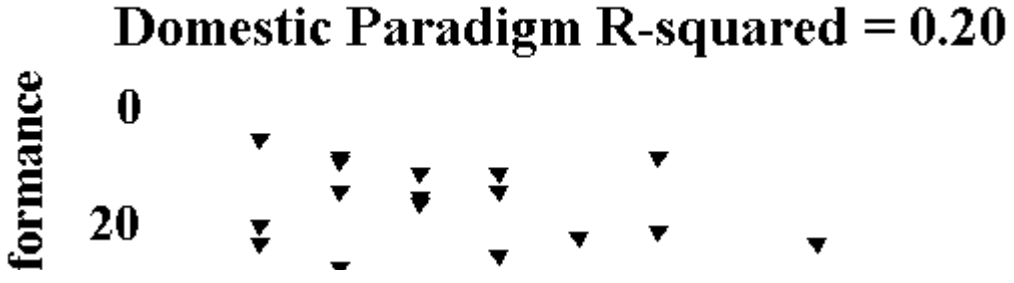
Region/Nation	Index	Fund Classification
US	Wilshire 5000	Morningstar Diversified Domestic
Europe	MSCI-Europe	Morningstar European
Japan	MSCI-Japan	Morningstar Japan
Pacific Rim	MSCI-PacXJ	Morningstar Pacific Rim, Japan <10%

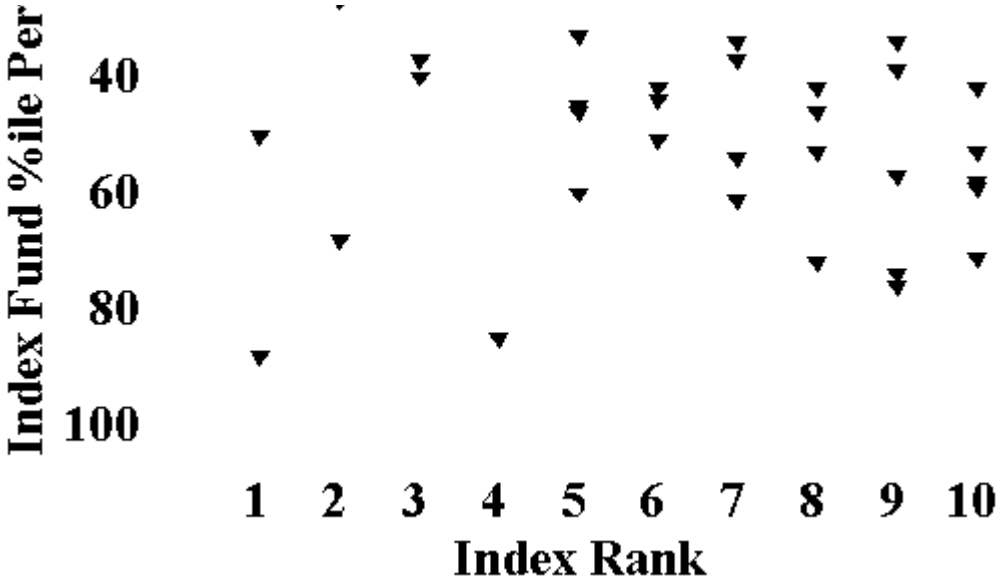
Emerging Markets	MSCI-EM	Morningstar Diversified EM
Latin America	MSCI-EM/Latin	Morningstar Latin American

To make a long story short, Dunn's Law strikes out at the global level. Although in some years there was a strong positive relationship between relative fund and index performance, it is strongly negative in others. When the data are aggregated (58 data points in all) it produces an almost perfect scattergram:



Contrast this with the aggregated data for 1995-9 for the 10 domestic style boxes:





Although the neatness of the plot is marred by the 1999 results, there is still an easily appreciated relationship between relative index and fund performance; the results are highly statistically significant, with at t-stat/p-value of 3.41/0.0013 and an R-squared of 0.20.

So what's going on here? In a word, asset class purity. The "purity hypothesis," extensively discussed by John Rekenthaler in a piece on the Morningstar site, is that fund managers frequently stray from their assigned market cap and valuation pigeon holes. After all, even if the prospectus pegs a fund as a small cap value offering, there's no reason why the manager can't sneak in a bit of Microsoft or Cisco. And, of course, many fund managers would categorically reject the entire style box paradigm as an externally imposed tyranny—"My job is to pick the best stocks, regardless of market cap and price/book ratio." So if small value has a bad year, then a small value index fund will do very poorly relative to its actively managed peers, since the active funds are free to invest beyond that year's dismal style box playground.

And, as we've seen, this is in fact the case domestically. But Dunn's Law fails abroad for a simple reason; the purity hypothesis does not operate across borders. Although it's easy for a domestic small cap value manager to stray beyond her mandated style box, it's much harder for a regional foreign manager to wander out his continent. After all, if you're a European fund manager having a bet on Telmex blowing up in

your face just won't do.

The average domestic index funds' relative performance for 1995-9 was 32nd percintile for each year. This is slightly better than predicted on theoretical grounds. (If an index fund has a 2% total expense advantage [fund expense ratio plus commissions, spreads, and market impact costs] over the average index fund, and the scatter of annual return funds is about 8%, then it is expected to perform 2/8 = .25 SD above the mean, which puts it at the 40th percentile for one year returns. For a fuller discussion of this phenomenon click here.)

But the 1990-99 annual performance for global indexing is 40th percentile, and only 48th percentile when US funds are taken out of the picture. This is much worse that expected, since the average foreign index fund should have about a 4% expense advantage over its actively managed cousin. (4/8 = .5 SD above the mean, which is the 31st percentile.)

How have active foreign funds managed to do so well? In a word, "growth." If you think that the past 10 years have been cruel to the US value investor, then take a look abroad. In 1999 alone, for example, the correlation of fund returns with aggregate P/B was 0.62, with a t-stat of 19.9 and a p value of 4×10^{-69}. In other words, the single most important determinant of foreign fund relative performance was growth/value orientation. And in the aggregate, the average P/B of actively managed funds was higher than that of the indexes—at the time of this writing, 5.5 for the average diversified foreign fund versus 4.7 for the EAFE index, so it is not surprising that indexing has not worked spectacularly abroad in recent years.

The best place to demonstrate this is with European funds, where a relatively large number of offerings are available that are fairly free of regional bias. For the 5-year period ending 2/00, the Vanguard European Index Fund ranks a disappointing 25th out of 38. Again, growth appears to be the culprit, with the Vanguard fund having a P/B of "only" 6.2. The 24 funds ranked above it have an average P/B of 7.6; the top 10 funds, 8.2; and the top 5, 9.1. So growth orientation seems to be the culprit here as well.

Also, the Morningstar database is not survivorship-bias-free, and it is likely that this is a significant factor with foreign funds. In the domestic area Burton Malkiel estimates it at about 1.5% per year, which would put the Vanguard European fund in the top half of the pack.

I must admit that Dunn's Law has engendered more confusion than I had thought it would. Some advocates of passive management accuse it of being an excuse to buy actively managed funds in poorly performing asset classes. It does no such thing; one simply cannot predict which asset classes will perform well or poorly going forward. Others note with surprise that it in fact has no predictive value. Guilty as charged; Dunn's Law is simply a rebuttal to the hackneyed argument that some asset classes, like small stocks, are inefficient enough that it pays to use active management, but that passive management is better in the more efficient large stock arena. The first 2 months of this year, with its small-cap dominance, vividly disprove this so-called "efficiency argument. " Dunn's Law predicts that during this period small stock indexing should work better than large stock indexing, and in fact the Vanguard Index 500 Fund ranked in the 77th percentile of all large cap funds for January-February, whereas the DFA 9-10 index fund and Vanguard Small cap index fund ranked in the 8th and 19th percentiles, respectively, of all small stock funds.

So, while Dunn's Law is a powerful explanation of indexing efficacy domestically, it does not travel well.

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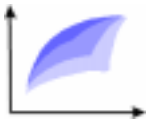

William J. Bernstein

The Studio 54 Market Hypothesis

Robert Shiller is no new era enthusiast. In ***Irrational Exuberance Exuberance*** he takes the reader on a scholarly tour of the excesses of the millennial capital markets. Much of the book is spent attempting to reconcile the current madness of crowds with the efficient market hypothesis (EMH).

Distilled to its essence, the EMH states that the price of a security is the sum of all public information about it. (And in its "strong form," all private information also.) Unless you are in possession of new information your estimate of its price is not likely to be more accurate than the market's, and you are thus unlikely to earn an excess return trading it.

But what if the trading environment itself goes barking mad from time to time? If the markets are so rational, then how do you explain eToys, a firm which right before it fell off a cliff had $6 billion in capitalization, $30 million in sales, and a hoard of hungry competitors, not the least of which is Toys "R" Us? An intellectually honest EMH true believer trying to rationalize this security's behavior bears a strong resemblance to a Christian Scientist with appendicitis.

Shiller's model is similar to the EMH, with one important difference. He admits that a stock price is the sum of all public knowledge about it, but that this knowledge is incomplete. Consider, he says, two new restaurants on the same street. It is 5 PM, and both have just opened for dinner. The first customer, having no idea how good the cuisine is in either establishment, examines the menu and the facilities of both, and makes a decision that is only imperfectly informed. She picks Restaurant A. Others make the same uninformed, and essentially random sort of decision, and purely by chance at 6 PM there are now

several diners in restaurant A, but only one in restaurant B. The fate of each establishment for the evening is now sealed; successive diners will conclude that because it is more crowded, restaurant A must be superior to restaurant B. The latter will remain empty. This phenomenon is familiar to anyone who has been to Paris. One season, for no good reason, a given certain café will be jammed every evening, whereas the café opposite will remain empty. The next season, the two cafés' fortunes reverse.

Club goers of a certain age may remember Studio 54 in Manhattan. In the late 1970s this establishment, fueled by celebrity, sex, but most of all, cocaine, was *the* place to be seen. Only the elite were allowed past the bouncer, and would-be entrants literally died attempting to pass its doors. It remained packed and profitable until the moment an IRS raid turned up stacked boxes of drugs and undeclared cash.

How can the markets become so irrational? Shiller cites psychological experiments in which subjects are asked to perform simple quantitative tasks, such as measuring the length of a line, or counting the number of x's on a sheet of paper. When asked to accomplish such tasks alone, subjects perform them quite accurately. However, when done in the presence of other people (who unknown to the subjects are in league with the investigators) who intentionally demonstrate to the subjects the wrong answer, they are quite likely to provide the same wrong answer themselves. The applicability of this paradigm to the capital markets should be obvious.

Shiller is brutal about the quantitative abilities of the average investor, who is unlikely to be either willing or able to perform even the most rudimentary kind of security analysis. As the century turns one can imagine them roaming the streets of our fictional city block. They find the stock café jammed with happy, noisy diners; the bond, cash, and real estate cafes nearly empty; and the investment equivalent of Studio 54—the internet and tech markets—a frenzied mob. One should not be surprised if mistakes are made.

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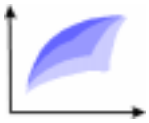


William J. Bernstein

Factor Rotation

Of all of the tidbits of financial pornography bandied about in the media by market analysts, none is more hackneyed than "rotation:" "Well Lou, I think what we saw this week was a rotation out of the cucumber sector and into bagels." Which is a fatuous way of observing that cumbers got cheaper, and bagels more expensive.

Most rotation is probably random noise, although rarely a few interesting patterns emerge. The most fascinating was the divergence of the Dow Jones Industrial Average and the NASDAQ Composite on Monday, April 3, with the former leaping by several hundred points while the latter fell by about the same amount, the pattern then reversing later in the week. Even the thickest of observers realized that the flow of funds into and out of value (DJIA) and tech (NASDAQ) stocks had become a sort of zero sum game, with a good day for one meaning a bad day for the other.

But rotation can be viewed in a much broader context. In order to understand this we're going to have to spend a page or so on the (groan) 3-factor model. These factors are:

- "Market." This is the market risk premium, defined as the difference in return between the broad market (defined variously as the Wilshire 5000, Russell 3000, or CRSP-All.) and short t bills.

- "Size." The difference in return between small and large stocks.

- "Value." The difference in return between value and growth stocks.

A few caveats. First, implicit in this schema is the notion that all 3 of these are simply premiums, which can be positive or negative, and are earned in excess of the risk free (t-bill) rate. Second, the 3 factors are each in fact long-short portfolios. As such, "size" and "value" are impossible to hold in isolation in the real world. For example, to own pure "size" you'd have to own the several thousand stocks in the CRSP 6-10 and short the several hundred stocks in the CRSP 1-5. To own pure "value" you'd have to go long the thousands of stocks with the top third of P/B and short the thousands in the bottom third.

Each factor can be though of as the flour, water, and yeast in a loaf of bread. The relative proportions of each can be though of as the basic character of the resultant loaf. (Profuse apologies to James Beard.) And for much the same reason, you don't want to bake with just one.

Let's get our fingers dirty with them for a minute. For the 10-year period (monthly returns) from 1990 to 1999 here are the results of 3-factor analyses for 4 different asset classes and the 3 most commonly used market indexes:

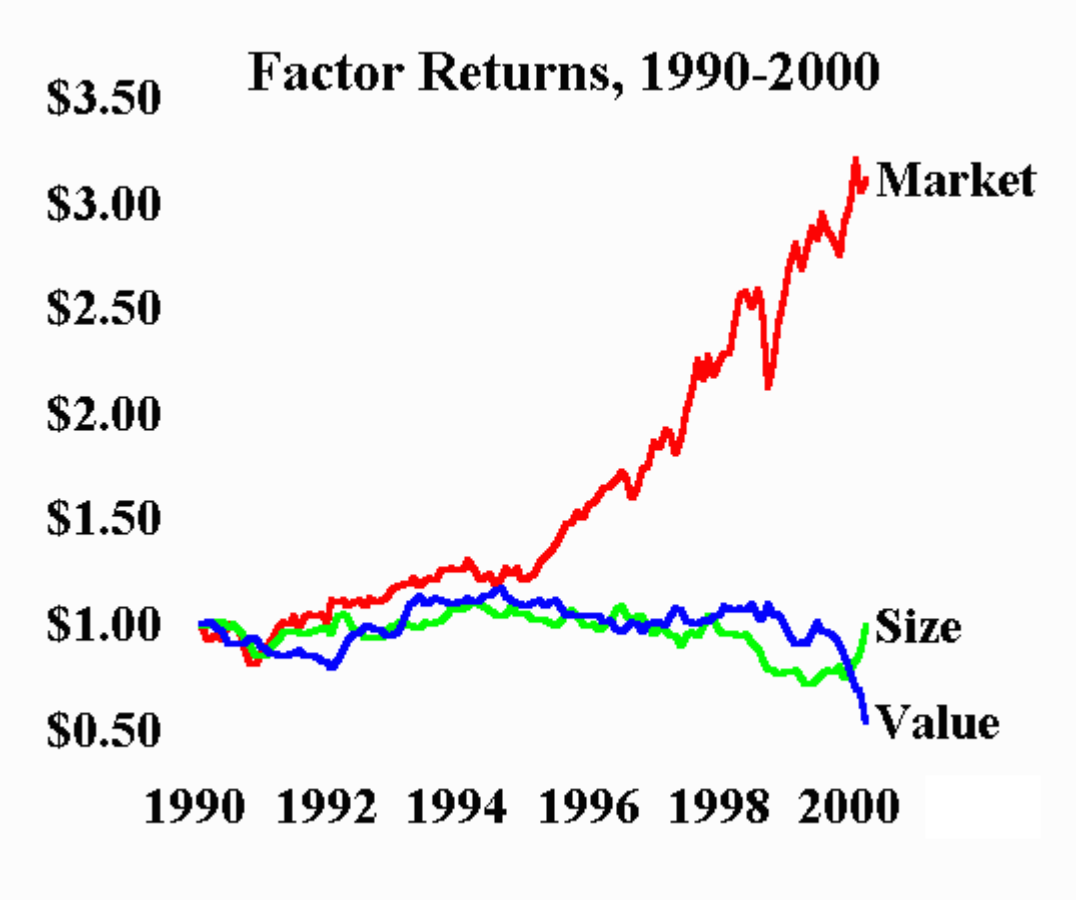
Asset Class/Index	Alpha	Market Loading	Size Loading	Value Loading	R-squared
S&P 500	0.01	1.00	-0.17	0.02	0.99
FF Large Growth	0.08	0.98	-0.19	-0.29	0.98
FF Large Value	-0.12	1.06	0.06	0.68	0.92
FF Small Growth	-0.14	1.09	1.13	-0.32	0.96
FF Small Value	-0.02	1.01	0.93	0.73	0.99
Dow Jones Ind. Avg	0.04	1.03	-0.14	0.22	0.87
NASDAQ Comp.	0.41	1.08	0.52	-0.50	0.91

(FF = Fama/French, source = DFA)

First, note that the market loadings of each of the indexes are all very close to 1.0. In other words, each of the indexes is fully exposed to market risk and return. Next, note the differences in size loadings, with the large cap indexes having a loading of about zero, and the small cap indexes having a loading of about 1. The NASDAQ is intermediate between the two. Finally, the value loadings top out at about 0.7 for the value indexes, and are about -0.3 for the growth indexes. The NASDAQ can be

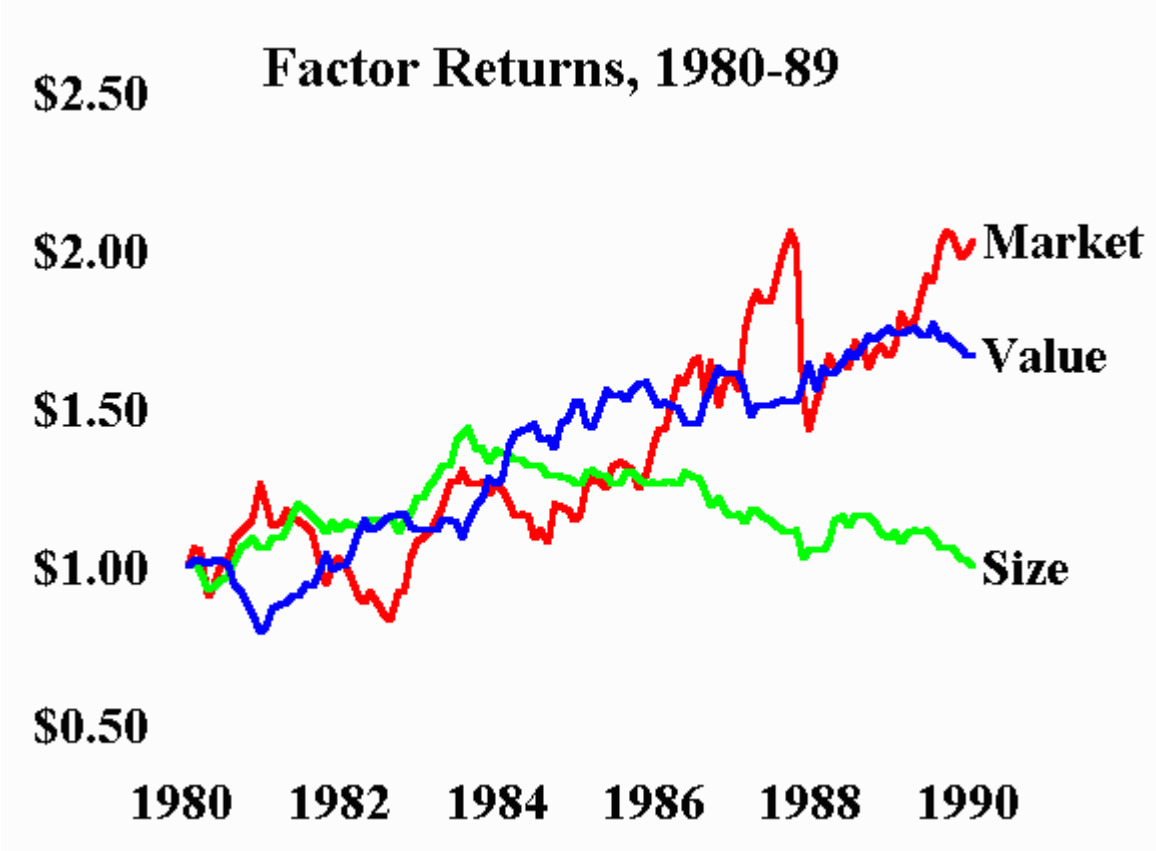
considered a "growth index on steroids," with a value loading of –0.5. The R-squareds show how well the returns of each index fit the model, which is very well indeed in almost all cases. The Dow, with only 30 stocks, has the lowest value, but is still quite respectable at 0.87. The alphas tell us how much higher or lower the average monthly return for the index is than is predicted by the model. Most values are very near zero, except for the NASDAQ, which is about 41 bp per month (or 5% per year) higher than predicted by the model.

This laborious preamble is necessary to better understand how real market rotation occurs over decades, because it involves all 3 factors. We'll travel back in time, and plot the returns of $1.00 invested in each of the factors for each decade, starting with the last one:



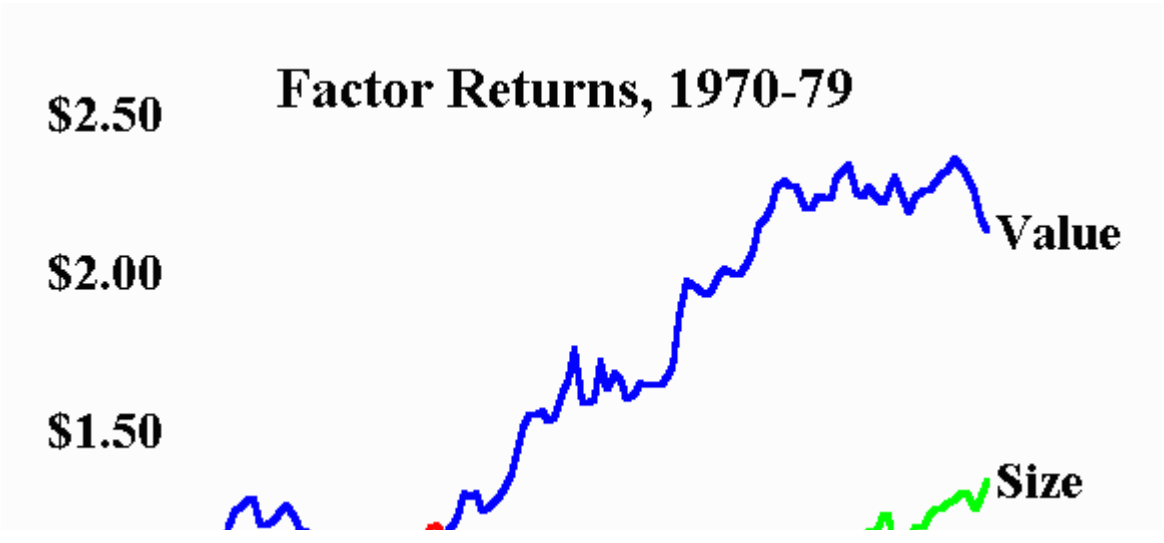
As you can see, in the 90s the only asset worth owning was the market. The returns of both size and value were negative, which is the same thing as saying that both large cap and growth tilts were favored. No surprise here—large cap growth stocks have been the place to be in recent years.

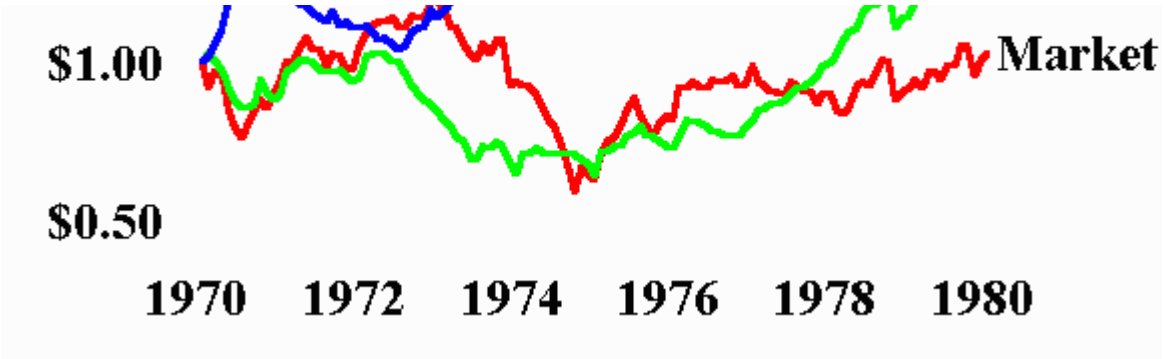
The 1980s were somewhat different:



Again, "market" had positive returns, but not as dramatic as in the 90s. And unlike the current decade, "value" had significantly positive returns as well. So the growth tilt which did so well would have reduced returns in the 80s.

And finally, the Ghost of Christmas Past, the 70s:





What could be more different than the last decade in the market than an environment where market exposure was a highly negative factor and exposure to small size and value were the only things which saved your bacon? Note particularly the years from 1973 to 1975, where exposure to the value factor nearly made up for the severe market losses of the worst modern bear market.

Finally, consider the Markowitz inputs from 1964 to 1999:

	Market	Size	Value	Return	SD
Market	1			5.74%	15.16%
Size	0.26	1		2.00%	13.21%
Value	-0.41	-0.24	1	2.96%	12.54%

The strong negative correlation between market and value is robust, being present in all 3 decades. If anything, it has grown stronger with time. As might be expected, when these values are fed into a mean variance optimizer a strong value bias appears. In fact, even when one reduces the return of value it does not disappear from the efficient frontier mix until a return of –1.5% per year is reached. In other words, even if the return of the value factor is zero or slightly negative, you still want exposure to it. The "inclusion threshold" for size is almost exactly zero—you have to believe that its return is positive to use it. (Warning: you cannot toss the above parameters into most off-the-shelf optimizers, as the composition constraints are radically different from the standard case, where their sum must equal unity. In the present case all 3 compositions/loadings can add up to any positive or negative number.)

So over the long haul, the most important "rotation" is in and out of the 3 major market returns factors. And although we can't predict what they will be over the next decade, it's a lead-pipe cinch that they won't look anything like the last 3.

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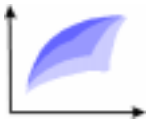
Efficient Frontier



William J. Bernstein

Op Ed from Krugman, Wisdom from Buffett

I have a small confession to make. I never took economics in college; finance just wasn't cool in the 60s. That's unfortunate, because there's a lot of counterfeit economic thought emanating from both sides of the political spectrum, and some of it is downright dangerous. If you don't have the proper economic background, you and your nation may prove highly susceptible to these dangerous viruses.

Paul Krugman is the highly enjoyable cure. If you've never come across him, you're in for a treat, and if you have you'll be delighted to know that this MIT econ prof now writes a biweekly column for the ***New York Times***. You'll have to register (free), but it's well worth it. (As a bonus, you can catch the likes of Tommy Friedman and Maureen Dowd on the same page.) I sweep this archive at least once every few weeks.

It's also a kick in the pants when you possess heretical notions about security characteristics (in my case, that the expected future returns of stocks are in the 6% range), and find that Warren Buffett agrees with you. The Sage of Omaha doesn't often discuss the equity markets in the general case; this interview in ***Fortune*** from last fall is classic Buffettaica.

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