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# An overwrought orthodoxy

Traditional benchmarks like the Standard & Poor's 500 index habitually overweight overvalued stocks and underweight undervalued stocks, leading to a performance drag. Fundamentally based indexes correct this shortcoming by reweighting benchmarks in a way that is willfully ignorant of market cap. So why all the controversy?

By Robert Arnott

**F**undamental Indexes™ have stirred interest and debate among some of the biggest names in the worlds of investing and academic finance. Since my firm, Research Affiliates, unveiled the concept in 2004, it has provoked attacks from John Bogle, founder of Vanguard Group, and Princeton University economics professor Burton Malkiel, godfather of the efficient markets hypothesis and a former member of Vanguard's board. In October the spirited debate spilled into the pages of this magazine when Clifford Asness, a disciple of the University of Chicago's Eugene Fama and a founder of investment firm AQR Capital Management, argued that fundamentally based indexes are merely a repackaged version of value investing (*Institutional Investor*, October 2006).

What is fundamentally based indexing, and why is it so controversial? Only the investment community thinks that a company's size should be defined by the total market value of its stock. By contrast, most people think of a company's sales, profits or even the number of its employees as measures of its size. Instead

of selecting and weighting companies in an index on the basis of market capitalization, a fundamentally based index selects and weights its constituent companies using these fundamental measures.

No law dictates that all indexes must be weighted by market cap or by the available float of a stock, but that has been the religion. The concept of fundamentally based indexing provokes strong reactions for a simple reason: It rattles our faith in 50 years of finance theory and indexing convention.

When the Standard & Poor's index was expanded from the original 90 stocks to 500, in 1957, it was intended to measure the performance of the broad stock market, which was and is cap-weighted. Finance theory offered a helping hand to the indexes. In 1964, William Sharpe published the capital asset pricing model, or CAPM, which posits that the expected return on a stock is linearly related only to its nondiversifiable risk (its beta) and that the "market clearing" portfolio (that is, the cap-weighted market) is mean-variance efficient. In addition, the efficient markets hypothesis posits that the price of every asset is equal to its

When data contradict theory in a discipline like physics, there is excitement among scientists about the potential to improve the theory. When data contradicts theory in finance, there is dismissal. Indeed, complex and tortured mathematics relating to hidden risk factors are used to explain the size effect, the value effect, the interplay between the two, the mean-reversion effect and the value added by valuation-indifferent indexes.

Which brings me to Ockham's razor. William of Ockham was a 14th-century logician and friar whose principle states that "entities should not be multiplied beyond necessity." Albert Einstein later embellished on this idea, suggesting that we should "make everything as simple as possible, but not simpler." A more modern paraphrase is: "Keep it simple, stupid."

With that in mind, what if I told you that just one thing — call it a pricing error, or noise — creates a size effect, a value effect, a long-horizon mean-reversion and a performance drag for cap-weighted indexes relative to valuation-indifferent fundamentally based indexes? Wouldn't William of Ockham approve of a single, simpler explanation of these effects? Shouldn't we?

**"We settled on a composite of four financial metrics that are very different measures of a company's size: sales, cash flows, book values and dividends."**

true fair value, at every moment. The takeaway from both of these theories, which quickly became orthodoxy, is that most investors can't outperform the capitalization-weighted market portfolio. This realization led to the development of index funds, which began slowly in the 1970s but became the dominant investment strategy for many large investors by the 1990s.

As the S&P 500 index evolved from a tool to measure results against a cap-weighted market into a benchmark for investing in cap-weighted indexes, the rationale for cap weighting became less compelling. This point became abundantly clear in the 1990s, when tens of billions of dollars moved into S&P 500 index portfolios. With the technology bubble inflating, these funds were increasingly invested in stocks with price-to-earnings ratios and price-to-sales ratios that were without precedent. Graham and Dodd were in exile.

The tech bubble is only one of many observable phenomena that call into question prevailing finance theories. There's a size effect: Small- and midcap companies have sharply outperformed large-cap companies over the past 80 years, albeit with extended dry spells. There's a value effect: Companies with low price-to-earnings ratios, low price-to-book-value ratios, low price-to-sales ratios and high dividend yields tend to outperform growth stocks at the other end of those spectrums (again, with extended dry spells). There's a momentum effect: Last month's winners tend to repeat, but winners of the past decade tend to reverse their momentum. And perhaps most importantly, cap-weighted indexes tend to substantially underperform the average stock in the self-same indexes. This result also holds true for equal-weighted and valuation-indifferent indexes, which beat their cap-weighted counterparts over extended periods, as shown in more recent studies of fundamental indexation (more on this later).

Breaking with indexing orthodoxy isn't easy. The efficient markets hypothesis and CAPM have long provided the purported theoretical rigor to silence critics. Academics who challenge these tenets do so at substantial peril to their careers, and so practitioners who are skeptical of conventional wisdom have no support from theory to help make their case. With cap-weighted indexes like the S&P 500 in place and endorsed by the academic world, our industry has been effectively granted permission to stop thinking about the topic.

Of course, we know that neither the efficient markets hypothesis nor CAPM is precisely correct. Finance theories are based on proofs, and proofs require simplifying assumptions that help make the mathematics manageable. So let's relax those assumptions and suppose that the price of a stock equals its true fair value plus or minus a random error that we can call "noise." Let's suppose that the market is always seeking the unknowable true fair value. Because the market will inherently be trying to find the correct value for every asset, this noise mean-reverts toward zero.

Let's further suppose that it takes time to identify and correct these errors — for stocks, it could be years or even decades — but that stocks move toward fair value most of the time. As prices move toward fair value, new surprises — and thus new errors — come along, keeping the typical magnitude of the noise steady over time. Most finance professionals, and many academics, would say that this is a far more realistic view than the tenets of the efficient markets hypothesis.

This means, of course, that many stocks are trading either above or below their true fair values. What can be said of those that are trading above fair value? These stocks will all have lower long-term average returns, because price seeks fair value. They

also have larger market caps and higher valuation multiples than they should. A cap-weighted index puts more money into these stocks than if they were fairly valued, so an investor's capital is disproportionately allocated to overvalued stocks. Companies that have moved well above fair value have presumably enjoyed positive momentum.

So what does that mean? It means that overvalued stocks will be a bit too common among the large-cap stocks and will underperform in the long run, *leading to a size effect*. Overvalued stocks will be a bit too common among the high-P/E, high-P/B, high-P/S and low-yield stocks and will underperform in the long run, *leading to a value effect*. Overvalued stocks will be a bit too common at the long-term, high-momentum end of the market and will underperform in the long run, *leading to long-term return reversal and mean reversion*.

Finally, because cap weighting (and by extension price weighting, as with the Dow Jones industrial average) structurally links a stock's weight in an index to its market capitalization, and hence to its pricing error, cap weighting structurally and irrevocably overweights the overvalued stocks and underweights the undervalued stocks. This creates an intrinsic performance drag relative to valuation-indifferent indexes.

Proponents of cap-weighted indexes have been well aware of these problems but have tended to dismiss them as unimportant or unavoidable. For example, Vanguard founder Bogle recently told the *San Francisco Chronicle* that advocates of Fundamental Indexes™ assert "fairly enough, that in a cap-weighted portfolio, half of the stocks are overvalued to a greater or lesser extent, and half are undervalued." In response, he added, "Of course, but who really knows which half is which?"

S&P 500 indexers readily acknowledge that a cap-weighted index will load up on growth stocks and punish value stocks with light weightings, relative to the makeup of the broad economy. They argue that this result is reasonable because growth stocks will be a larger share of tomorrow's economy, so the market should correctly gauge future growth and pay for it — before it happens. In this fashion the market prices growth and value stocks to offer the same risk-adjusted returns. This means that the growth tilt of cap-weighted indexes is not expected to help investors' performance!



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Conversely, the evidence that fundamentally based indexes beat cap weighting in the long run is pretty overwhelming. In the March/April 2005 edition of the *Financial Analysts Journal*, my colleagues and I published research suggesting that Fundamental Indexes™ delivered 210 basis points of excess return annually over a 43-year span. My firm has also demonstrated that from 1990 to 2006, our indexes outperformed cap-weighted S&P indexes in all ten industry sectors. The margin of annual excess returns ranged from 100 basis points to more than 700 basis points. Finally, a fundamentally based index of over-the-counter stocks has been shown to add more than 500 basis points per annum relative to the Nasdaq composite index from the index's 1973 inception to 2006.

The results outside the U.S. are equally compelling. As detailed in the October 2005 edition of the *Japan Security Analysts Journal*, Nomura Securities tested the concept of Fundamental Indexes™ on all 23 countries in the developed world indexes overseen by Morgan Stanley Capital International and FTSE Group — and found that fundamentally based indexing beat cap-weighted indexes in all 23 countries since 1988, delivering an average of more than 260 basis points per year. In emerging markets our research suggests that fundamentally based indexing adds roughly 1,000 basis points of annual excess return from 1994 to 2006.

Although there were no advocates of fundamentally based indexing at the table when Standard & Poor's began exploring the idea of a broad market index in 1956, a number of money managers have experimented with fundamentally weighted portfolios over the years. Robert Jones at Goldman Sachs Asset Management was, so far as I know, the first to do so, reweighting the S&P 500 on the basis of adjusted operating earnings. From 1990 to 1996 he managed money on this basis and beat the S&P 500 by 1.0 percentage point per year, but he never attracted serious assets. (GSAM's active core equity program added more value during this span, attracting the lion's share of the group's new money.)

In 1998, John Morrell & Associates, based in London, pursued the first multiple-factor fundamentally weighted index. Leading a small research team, David Morris tested the idea (again) of reweighting the S&P 500, based on a blend of sales, profits and book values. His group also reweighted the countries in the Europe, Australasia and Far East index, now over-

seen by MSCI Barra, on these same fundamental measures of the size of each country's market, without reweighting the individual companies. Although this effort fizzled in 2002, Morris started his own firm in 2003, called Global Wealth Allocation, which revived the idea and broadened the reweighting to the FTSE all-share index — the functional equivalent of a true Fundamental Index™ of all companies. Morris's firm manages no assets directly, but its licensees oversee more than \$500 million.

In 2002, Paul Wood pursued a similar idea focused on reweighting the S&P 500 based on company profits. Today he subadvises a common fund and two pension strategies in this fashion, managed by Counsel Trust, a Pennsylvania investment firm, and has delivered strong results since inception. The very next year, Barclays Global Investors launched iShares Dow Jones select dividend index, an exchange-traded fund that reweights the S&P 900 on the basis of the total dividends paid by each company. This ETF was the first dividend-weighted fund and remains the largest fundamentally reweighted strategy in the world as of this writing. Through November 16, its three-year annualized total return of about 15 percent outperformed the S&P 900 by some 3 percentage points.

I have long thought that it would be interesting to construct an index weighting companies by their sales or book values, instead of by market cap. During the tech bubble, when the S&P 500's valuation multiple rose to double its long-term average, some leading investors also began advocating a new indexing paradigm, notably George Keane, president emeritus of investment manager CommonFund and a trustee of the New York Common Retirement Fund from 1985 to 2004. In 1999, Keane proposed shifting half of the New York fund's then-\$30 billion S&P 500 index portfolio into the Russell 1000 value index.

But given the prevailing indexing mantra and the S&P 500's strong returns in the preceding years, Keane's proposal met with resistance, and the New York Common Retirement Fund went on to experience a substantial decline in its equity portfolio. Though U.S. stocks were, on average, up in 2000, the major indexes were down. This situation repeated in 2001 and again in the opening months of 2002. The bull market of the 1990s didn't really end — for most companies — until the spring of 2002!

In light of this experience, Keane proposed that Research Affiliates explore a more effective method of indexing. I decided to take up his challenge, which was the genesis for our work. In late 2002 and early 2003, I met with Keane and a fellow New York Common Retirement Fund trustee, Martin Leibowitz, then vice chairman and chief investment officer of TIAA-CREF, for brainstorming sessions. Our research team, led by Jason Hsu, used the Fortune 500 to test the idea of sales-weighted indexing going back more than 30 years. When we found more than 200 basis points of average annual excess return, we knew we were on to something very interesting.

Our next step was to buy a deeper data set. We incorporated suggestions from my firm's advisory panel and looked at sales and revenues, earnings and cash flows, dividends and book values over the 43-year period from 1962 through 2004. Although the lists of the largest companies indexed by sales and by dividends were very different, they had performance that was far more similar than either index compared with cap-weighted indexes. Every

fundamental weighting we tested delivered excess return. Cap weighting was the only outlier.

It was then that we had our first "aha!" moment: The reason that fundamentally based indexes all perform similarly, while cap weighting does not, is that cap weighting inextricably links the weight of a stock holding with its pricing error, or noise. Fundamental Indexes™ do not. Equal weighting of the S&P 500 severs this link somewhat but not entirely, because the starting point is still a list of companies chosen in part on the basis of market cap. The roster of names that make it onto the radar screen of the index committee at S&P will typically exclude many medium-to-large companies trading at distressed deep-discount multiples. That bias in selecting the list of companies in the S&P 500 tacitly introduces a small link between overvaluation and weight, even in this equal-weighted index.

Even so, merely reweighting an existing index gets us only about two thirds of the way to true fundamentally based indexing. Consider the Russell 1000, a cap-weighted index of the 1,000 largest U.S. companies. This index excludes a number of big companies trading at distressed enough multiples to fall into the small-cap domain. Yet these small-cap large companies have outperformed large-cap small companies by nearly 1,000 basis points per annum since 1962. If we merely reweight the Russell 1000, we miss these wonderful companies.

This led us to our second "aha!" moment: It is very important to both select and weight stocks based on fundamental measures of company size. Of course, each fundamental weighting has its own shortcomings — for instance, a dividend-based index excludes more than half the publicly traded stocks in the U.S. That's why we settled on a composite of four financial metrics that are very different measures of a company's size: sales, cash flows, book values and dividends. If a company doesn't pay dividends, its weighting is determined by averaging the other three factors.

By mid-2004 we felt our work was ready for prime time. We circulated a draft of an article to the academic community that later appeared in the March/April 2005 *Financial Analysts Journal*. We attracted our first institutional client, the South Dakota Retirement System, before the year was out and even before the article was published. Acceptance by investors continues to grow: Today more than \$4 billion in assets are invested in Fundamental Indexes™.

Our work attracted skepticism from the start. Some indexers, academics and practitioners complain that a fundamentally based index is not an index. Among other critics, Sharpe, Bogle, Malkiel and Asness have all made this complaint. They assert that the market is cap-weighted and suggest that any index that isn't cap weighted shouldn't be called an index. In our view this criticism is a matter of semantics. If only cap-weighted portfolios can be indexes, then I agree — fundamentally based indexing is an active strategy.

That said, I define the word "index" in a more pragmatic, less academic way: as something that is objective, rules-based, transparent and replicable — and that exhibits low turnover. By this definition fundamentally based indexes qualify. The S&P 500, which is selected by a secretive committee, misses on several counts: It isn't rigorously objective, transparent or replicable. The float methodology used to create the Russell indexes is also

secretive enough to make replication an issue. As for the equal-weighted S&P 500 “index”? It flunks on all counts: Not only does it fail the same tests as the S&P 500, it also suffers from high turnover. Those critics who protest that a fundamentally based index isn’t an index because it isn’t cap-weighted were strangely mute on the subject of equal-weighted indexes.

Are Fundamental Indexes™ just a new name for value investing, as Asness and some academics contend? They’re right and they’re wrong. Cap weighting doubles the weight of any growth stock trading at twice the market multiple and halves the weight of any value stock trading at half the market multiple. The result is a strong growth tilt, relative to the typical stock on the market. So from a cap-weighted-centric view of the world, fundamentally based indexes *do* have a value tilt. But for those who see no reason to structurally favor growth, fundamentally based indexing is a sensible core portfolio that weights growth companies in proportion to their current economic scale.

percent for a composite index to 15 percent for some single-metric approaches. That’s a difference between very low turnover and extremely low turnover.

Asness says that the advocates of fundamentally based indexing ignore theory, especially the vast literature on why value investing works. In his recent essay in this magazine, he argues that we are “planting a flag on somebody else’s terrain and chanting, ‘I can’t see you, I can’t see you.’” Not true. We acknowledge that vast and important literature but contend that two things are new: First, pricing error or noise quite literally creates the value effect and several other so-called market anomalies. Ockham’s razor in action. Second, if we simply move away from cap weighting and weight our portfolios in a manner that ignores price, market cap and valuation multiples, we have good reason to expect better long-term performance.

Bogle and Malkiel have both suggested that fundamentally based indexing is a passing fad. Although I certainly disagree,

## “Most fundamentally based indexes are similar enough to the cap-weighted market that they likely have collective capacity of \$1 trillion or more.”

The results against value indexes are startling. The Russell 1000 value index beats the broader Russell 1000 by 1 percentage point per year since their inception in 1979. With barely half as large a value tilt, one might expect the comparable fundamentally based index, the FTSE RAFI US 1000 index, one of a series of Fundamental Indexes™ developed by my firm, to add half as much value, or barely 50 basis points per annum over that period. Instead it more than doubles the incremental return to 230 basis points. The returns have been even stronger in the six and a half years since the tech bubble burst. In that period the Russell 1000 value index has climbed 56 percent, far short of the 68 percent return for the FTSE RAFI US 1000 index, despite the fact that our index includes many growth stocks (even quite a few bubble-era highfliers).

There’s another fact that dispels the “Fundamental Indexes™ are just value investing” argument: Fundamental Indexes™ actually outpaced cap weighting in the growth years of 1962 to 1969. No “value” indexes did that!

Some argue that fundamentally based indexing wins because of its small-cap bias, and others suggest that its turnover is too high. The small-cap bias is a red herring. On average, it is very slight — indeed, these days, there is actually a large-cap bias. When small-cap stocks are priced at higher valuation multiples than large caps, as they are today, cap-weighted indexes will overweight them, while fundamentally based indexes, blissfully ignorant of these valuation multiples, won’t. The criticism regarding the amount of turnover is also a false alarm: Cap weighting has averaged 6 percent annual turnover in the 43-year period ended 2004, while Fundamental Indexes™ have averaged 10

one aspect of their argument is worth addressing: New ideas in the investing world often fail soon after they become widely acted on. If the entire world moves from cap weighting to fundamentally based indexing, then the cap-weighted index and the fundamentally based index become one and the same, and the excess return disappears. For this to happen, though, truly vast sums must move to the new paradigm.

Plenty of capacity exists. In fact, most fundamentally based indexes are similar enough to the cap-weighted market that they likely have collective capacity of \$1 trillion or more. Even at that scale, fundamentally based indexes would be about 5 percent of total stock market capitalization and yet would own 20 percent or more of the available float in only 20 of the top 1,000 U.S. companies.

Pioneers who developed financial theories have amply earned the esteem and praise that has been showered upon them. Still, the mathematics of finance get very hairy, very fast, and so academia has a powerful incentive to simply assume that although stock prices may not equal fair value, they are close enough that the error doesn’t matter. *But it does.* We do our clients and ourselves a disservice by accepting theories as fact, no matter how brilliant or elegant, when we have relentless evidence to the contrary.

With Fundamental Indexes™, we eliminate the disruptive effect of investor sentiment on the price of stocks — and thereby on their market caps. No longer must investors suffer a performance drag by settling for an index that inherently overweights every overvalued company and underweights every undervalued one. With due respect to the pioneers in finance theory and the cap-weighted indexers, there is a better way.

