Fundamental Indexation and International Diversification

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An active investment approach, which is intended to outperform a benchmark, and a passive investment approach, which is intended to simply track a benchmark, differ in many ways, but still have at least one thing in common: In the vast majority of cases, the assets in the benchmark are weighted by capitalization.

At least three reasons exist for cap-weighting the assets in the benchmark. First, a cap-weighted benchmark represents the options available to investors within an asset class. As will be discussed later in the article, any index not weighted by capitalization does not properly represent an investable opportunity set. Second, a cap-weighted benchmark reflects the average return of investors in an asset class, and any index not weighted by capitalization cannot play this important role. And third, modern financial theory suggests that the capitalization-weighted market portfolio is mean-variance efficient and thus provides the highest risk-adjusted return.

The mean-variance efficiency of the market portfolio has not deterred academics and practitioners from attempting to devise strategies to outperform the market in the long term. These strategies either restrict the opportunity set (limiting it, for example, to small-cap or value stocks) or weight the assets in the unrestricted opportunity set by measures other than market capitalization (such as, for example, dividends or earnings).[1] The issue of fundamental indexation explored in this article is largely, although not exclusively, concerned with the latter—weighting the assets by measures other than market cap.

Fundamental indexation refers to the construction of indices in which the assets are weighted not by capitalization, but by price-insensitive fundamental measures of value, such as dividends, earnings, cash flow, or sales. In a groundbreaking article, Arnott, Hsu, and Moore (AHM) [2005] argued that indices weighted by price-insensitive fundamentals should and do outperform cap-weighted indices. Using data for the U.S. between 1962 and 2004, they reported that indices weighted by book value, income, revenue, sales, dividends, and employment outperformed the S&P 500 in a variety of time periods and scenarios.[2]

The implication of the AHM article is that investors who aim to be diversified in U.S. equities should weight the stocks in their portfolios by price-insensitive fundamentals rather than by capitalization. If, however, investors aim to be diversified in *global* equity, what should they do? Should they weight country index funds and exchange-traded funds (ETFs) by capitalization or by price-insensitive fundamentals? And, if investors are willing to abandon the traditional cap-weighted portfolio in favor of alternative weighting schemes, can they do better than weighting by price-insensitive fundamentals? These are some of the main questions addressed in this article.

The globalization of capital markets has made it possible to easily build the globally diversified portfolios that financial economists have long been advocating, at least since the pioneering work of Grubel [1968], Levy and Sarnat [1970], and Solnik [1974], among others. In fact, for the past several years it has been possible to build low-cost portfolios of global equities using widely available country index funds and ETFs. For this reason, this article addresses the relationship between fundamental indexation and international diversification by evaluating whether capitalization, price-insensitive fundamentals, or other measures are the best way to weight country index funds and ETFs when building global portfolios.

Fundamental indexation, however novel, has already sparked a heated debate with heavyweights on both sides of the issue. While some, like Siegel [2006], referred to fundamental indexation as "a revolution" and "the next wave of investing," others, like Bogle and Malkiel [2006], warned that "intelligent investors should approach with extreme caution any claim that a 'new paradigm' is here to stay." Whether fundamental indices are really indices, whether fundamental indexation is passive or active investing, and whether price-insensitive measures are a superior weighting scheme are all issues discussed in this article and also likely to be hotly debated in the near future.

The rest of this article is organized as follows. The next section introduces the subject of fundamental indexation and discusses several relevant issues related to this approach. The third section evaluates the results of implementing an international diversification strategy through a cap-weighted scheme and through a fundamental scheme based on dividends; dividends is a fundamental variable that is objective, transparent, and independent of accounting principles. The fourth section considers two other strategies of international diversification and compares their performance to that of the strategies in the previous section. Finally, the last section concludes with an assessment.

THE ISSUE AT STAKE

Fundamental indexation may be viewed as a strategy designed to overcome the shortcoming of one of the key recommendations of modern financial theory, that of buying and holding the market portfolio. Alternatively, it may be viewed as a strategy designed with the sole purpose of enhancing returns and generating alpha. This section discusses the theory underlying fundamental indexation, dwells on the concepts of an index and a passive investment strategy, and concludes with a brief discussion of some of the pros and cons of fundamental indexation.

Theoretical Considerations

The efficient market hypothesis, one of the cornerstones of modern financial theory, suggests that an optimal long-term investment strategy is to simply buy and hold the market portfolio. Investors who seek higher returns can leverage this portfolio by borrowing at the risk-free rate, and those who seek lower risk can hold long positions in both this portfolio and the risk-free rate. Attempts to outperform the market on a risk-adjusted basis only result in higher transaction costs. Therefore, the efficient market hypothesis suggests that investors should just buy and hold a low-cost index fund or ETF that aims to track the market portfolio.

This market portfolio is the portfolio of risky assets that offers the best combination of risk and return, and is thus objectively preferred by all investors who seek to maximize their (mean-variance) utility. In this equilibrium, stock prices must be such that all markets clear, which in turn implies that the weight of each stock in the market portfolio is equal to the market capitalization of each stock relative to the total market capitalization. In other words, market clearing *implies* an equilibrium cap-weighted market portfolio.

In theory, then, the cap-weighted market portfolio offers the highest risk-adjusted return and investors can do no better than buying and holding this portfolio. But the real world rarely conforms to, and often grossly departs from, the assumptions underlying theories. Mayers [1976] was the first to argue that the mean-variance efficient market portfolio should include *all* risky assets, not just stocks, like the S&P 500 and all other widely used (mean-variance inefficient) equity benchmarks do. More recently, Markowitz [2005] argued that once real-world constraints are taken into account, the cap-weighted market portfolio is no longer mean-variance efficient. He further argued that the degree of inefficiency may be substantial and that would not be arbitraged away, even if some investors were not subject to borrowing constraints.

Treynor [2005] showed that market-valuation-indifferent indices are superior to cap-weighted indices because they avoid the problem of overweighting overvalued stocks and underweighting undervalued stocks.

He further argued that although equal-weighting is the most straightforward price-insensitive weighting scheme, it has a small-cap bias that is less pronounced in other price-insensitive weighting schemes, such as those based on the number of employees, number of customers, or sales. Finally, Hsu [2006] rigorously showed that if prices are noisy and do not fully reflect fundamentals, a cap-weighted portfolio is suboptimal. He also showed that the drag in cap-weighted portfolios is increasing the degree of price inefficiency and that portfolios based on price-insensitive weights can avoid this drag.

Siegel [2006] actually proposed a new paradigm, which he calls the "noisy market hypothesis," to replace the efficient market hypothesis. This new paradigm is one in which markets are subject to unpredictable, temporary shocks (noise) that prevent prices from always reflecting true value. These shocks stem from the existence of speculators, momentum traders, insiders, institutions, and other market participants who may trade for reasons unrelated to value.[3]

AHM gave two reasons for exploring alternatives to cap-weighted indices. They asserted, first, that capitalization is a very volatile way to measure true value and, second, that cap-weighted indices are bound to overweight overvalued stocks and to underweight undervalued stocks. For these reasons, they argued, indices based on less volatile, price-insensitive weights *should* deliver better performance than cap-weighted indices. They also showed empirically that portfolios based on a variety of price-insensitive weights *do* outperform the S&P 500.[4]

What is an Index?

A benchmark is a portfolio of assets that represents an investable opportunity set.[5] The proper representation of the options available to investors within an asset class, which is possible only when the assets in the benchmark are weighted by market capitalization, is just one of three advantages occurring as a result of this weighting scheme. A simple example may help to illustrate these advantages.

Consider a $10 million market composed of two stocks: $8 million of Stock 1 and $2 million of Stock 2. A cap-weighted benchmark of this market, which would give an 80% weight to Stock 1 and a 20% weight to Stock 2, would have three desirable properties. First, it would properly represent the investment opportunities available to investors, reflecting the fact that the investable opportunity set is highly skewed toward Stock 1. Second, it would show the returns of the average investor; some investors may obtain higher returns and some lower returns, but on average they would obtain the return of this cap-weighted benchmark. And third, it would enable *all* investors to link their portfolios to this benchmark at current market prices; that is, the prices and weights in this benchmark are at equilibrium values.

Assume that the companies issuing Stocks 1 and 2 pay the same dividends. Consider an alternative benchmark weighted by this fundamental measure. A dividend-weighted benchmark of this market, which would give a 50% weight to each stock, would have three problems. First, the 50–50 weights would not properly represent the investment opportunities available to investors; at current prices, the investable opportunity set simply does not have equal amounts of Stocks 1 and 2. Second, the index would not reflect the returns of the average investor. And third, not *all* investors could link their portfolios to this benchmark; an attempt to do so would imply substantial changes in the prices of both stocks.[6]

It is clear, then, that the fundamental indices proposed by AHM are not proper benchmarks. But some investment managers go even further, disputing whether they are indices at all. Schoenfeld, the chief investment strategist at Northern Trust Global Investments, claims that a fundamental index is not really an index but an "enhanced strategy calculated as an index" (Burr [2005]). In this view, an index and a benchmark are basically indistinguishable concepts and they share the sole purpose of reflecting the investment opportunities within (and performance of) an asset class.

One of the reasons some investment managers view fundamental indices as enhanced strategies is that, unlike a cap-weighted index built to simply track a benchmark, a fundamental index requires periodic rebalancing. This brings us to another controversy surrounding fundamental indexation; namely, whether it amounts to active or passive investing.

What is a Passive Strategy?

An important characteristic of a cap-weighted index is that—unless the constituents of the benchmark it is tracking change—it requires no rebalancing. The fundamental indices proposed by AHM, however, do require periodic rebalancing, which triggers transaction costs (such as trading costs and price impact) and taxes that would not be incurred by a cap-weighted index.

The fact that fundamental indices require periodic rebalancing leads some investors to view these indices as active strategies masquerading as passive indices. According to Burr [2005], Schioldager, the head of U.S. equity index products at BGI, does not view a fundamental index "as being an index product, but an active product." Again, a simple example may help.

Assume that extensive backtesting shows that a portfolio of companies weighted by the number of telephone calls they receive per month outperforms the market. Also assume that someone creates an index in which companies are weighted by this measure, someone else creates an ETF that aims to track this index, and some investors decide to buy and hold this ETF. On the one hand, these investors buy and hold a low-cost product that aims to track an index, which amounts to passive investing. On the other hand, the index the ETF aims to track must be rebalanced on a monthly basis and was created with the goal of outperforming the market, which amounts to active investment. Are these investors then following an active or a passive investing strategy? It is not entirely clear.

A passive strategy implemented by buying and holding an ETF that aims to track a cap-weighted index has very low turnover, transaction costs, and taxes. Buying and holding an ETF that tracks a fundamental index which must be periodically rebalanced and aims to outperform the market, however, is a strategy that has not only different risk-return characteristics, but also higher turnover, transaction costs, and taxes.

Schoenfeld [2006] argued that fundamental indices are designed to generate alpha, with the active bets taking place within the index construction. Similarly, Coyne [2006], the editor of *The Index Investor*, argued that many of the recently launched ETFs are "nothing more than a relatively low-cost quantitative active management strategy cleverly placed in an index 'wrapper' to enhance [their] appeal."

As argued by Schoenfeld and Ginis [2006], nothing is inherently wrong with an index taking active bets if investors are fully aware of the bets they are implicitly making when buying these products. Unfortunately, many index providers highlight neither the active nature of some of their indices nor the implicit exposure to well-known risk factors such as value and size.[7]

Pros and Cons of Fundamental Indices

As argued by Markowitz [2005], once real-world conditions are taken into account, the market portfolio ceases to be mean-variance efficient. In addition, as shown formally by Treynor [2005] and Hsu [2006], if stock prices are noisy and do not fully reflect true value, then cap-weighted portfolios overweight overvalued stocks and underweight undervalued stocks, thus producing a drag on performance. A first advantage of fundamental indices, then, is that they are not (or they are less) subject to this drag.

A second, and obviously related, advantage is that fundamental indices appear to have higher returns and lower volatility than cap-weighted indices, as shown by the evidence for the U.S. reported by AHM. Furthermore, widening the scope of the AHM inquiry, Hsu and Campollo [2006] built fundamental indices for 23 countries over the 1984 to 2004 period and found that these indices outperformed their respective MSCI cap-weighted benchmarks in every country, on average, by 2.8% a year.

Finally, AHM argued that fundamental indices retain many of the benefits of cap-weighted indices. These benefits include exposure to large-cap stocks that results in broad participation in the equity market, concentration in liquid stocks that reduces transaction costs, similar or lower volatility and beta than cap-weighted indices, and high correlation to the overall market.

But fundamental indices are not free from criticism. From a theoretical standpoint, these indices do not properly represent the investable opportunity set, do not reflect the returns of the average investor, and are not market-clearing portfolios. These objections may carry some weight with academics, but carry little weight with investors. It is relevant, however, for investors to know if they are investing in passive indices or in active products which are disguised as passive, with their correspondingly higher turnover, transaction costs, and taxes. And it is also relevant for investors to be aware of the implicit risk factors they are being exposed to when buying fundamental indices.

Finally, it is important for investors to consider whether fundamental indices will outperform cap-weighted indices *in the future*. For this to happen, investors must not bid up (down) the prices of companies with high (low) dividends, earnings, cash flow, or other price-insensitive fundamentals, even though widely available evidence now shows that indices which overweight (underweight) these companies deliver higher (lower) returns than cap-weighted indices.

THE EVIDENCE

However interesting a theoretical discussion on the merits of fundamental indexation might be, investors are ultimately interested in whatever strategy leads them to maximize the risk-adjusted return of their portfolio. This section compares the empirical performance of a traditional cap-weighted strategy to that of a fundamental strategy; the following section compares the performance of these two strategies to that of two simple alternatives.

Data

As mentioned earlier, this article aims to link the issues of fundamental indexation and international diversification by evaluating whether capitalization, price-insensitive fundamentals, or other measures are the best way to weight country benchmarks when building global portfolios. Exhibit 1 shows the 16 countries in the sample, as well as the arithmetic and geometric mean annual returns and annualized volatility of each country's equity market over the sample period from December 1973 to December 2005. Returns for all equity markets are calculated using Datastream indices, in dollars, and accounting for both capital gains and dividends.

Exhibit 1 also shows the market capitalization (in U.S.$ billions) of each country at the end of 1973 (the beginning of the sample period) and 2005 (the end of the sample period). The last two columns of the exhibit show the percentage of each country's market capitalization with respect to world market capitalization, also at the end of 1973 and 2005. Over the whole sample period, the combined market capitalization of all the countries in the sample oscillated between 82.1% and 99.1% of world market capitalization, with an average of 93.4%, indicating that the countries in the sample are obviously representative of the global market portfolio.

Methodology

Every fundamental indexation strategy is based on a set of price-insensitive weights. AHM [2005] considered

EXHIBIT 1
Summary Statistics

This exhibit shows the annual arithmetic mean return (AM), geometric mean return (GM), and standard deviation (SD) of each country's equity benchmark over the December 1973 to December 2005 period. It also shows the market capitalization (in U.S.$ billions) of each country at the end of 1973 (MC73) and 2005 (MC05), as well as the percentage of each country's market capitalization with respect to world market capitalization at the end of 1973 (%73) and 2005 (%05). All data are based on Datastream indices, in U.S. dollars and account for capital gains and dividends.

Country	AM	GM	SD	MC73	MC05	%73	%05
Australia	15.0%	12.1%	24.5%	9.0	721.0	1.2%	2.0%
Austria	19.6%	12.5%	21.4%	0.4	132.9	0.1%	0.4%
Belgium	14.7%	12.3%	18.8%	4.9	269.8	0.7%	0.8%
Canada	12.5%	11.1%	18.0%	8.0	1,206.3	1.1%	3.4%
Denmark	16.5%	13.5%	18.5%	1.7	162.7	0.2%	0.5%
France	17.5%	13.8%	22.7%	10.0	1,667.5	1.4%	4.7%
Germany	14.0%	11.2%	19.7%	28.4	1,218.6	3.9%	3.4%
Hong Kong	22.3%	15.2%	32.0%	4.4	778.0	0.6%	2.2%
Ireland	21.7%	15.8%	24.4%	0.6	110.8	0.1%	0.3%
Italy	15.4%	9.9%	25.7%	7.2	786.0	1.0%	2.2%
Japan	14.4%	10.3%	22.3%	108.2	4,419.7	14.9%	12.4%
Netherlands	16.2%	14.7%	17.0%	13.9	542.6	1.9%	1.5%
Singapore	15.3%	10.5%	28.6%	1.5	183.4	0.2%	0.5%
South Africa	17.4%	13.1%	28.1%	6.7	284.5	0.9%	0.8%
U.K.	17.2%	14.2%	22.7%	48.9	2,739.5	6.7%	7.7%
U.S.	13.5%	12.1%	15.5%	467.1	13,933.7	64.2%	39.2%
World	13.3%	11.8%	14.6%	727.4	35,524.6	N/A	N/A

book value, income, revenue, sales, dividends, and employment as potential weights. In this article, the fundamental indexation strategy evaluated is based on dividend per share, a price-insensitive fundamental variable that is objective, transparent, and independent of accounting principles.[8]

In order to compare the performance of a cap-weighted index and a fundamental index, two portfolios were calculated. The cap-weighted index (CWI) was calculated as follows. At the end of 1973, a sum of $100 was distributed among the 16 markets in the sample according to their relative market cap at that time, the latter calculated as the market cap of each country relative to the sum of all 16 market caps. This investment was passively held through December 2005 when the portfolio was liquidated.

The dividend-weighted fundamental index (DWI) was calculated as follows. At the end of 1973, a sum of $100 was distributed among the 16 markets in the sample according to their relative dividend per share at that time which was calculated as the dividend per share paid by each market relative to the sum of the dividend per share paid by all 16 markets. Returns for this fundamental index were calculated on a monthly basis through December 1974, at which point the index was rebalanced according to the relative dividend per share at that time. This computation of monthly returns with annual rebalancing at the end of December proceeded in the same fashion through December 2005 when the portfolio was liquidated.

For reference, a sum of $100 was also invested in the Datastream world market index (WOR) at the end of 1973 and passively held through the end of December 2005, at which time the portfolio was liquidated. As will be demonstrated later, the performance of this index is, unsurprisingly, very similar to that of the CWI.

The performance of all three indices was not adjusted for transaction costs (such as trading costs and price impact) and taxes, which is consistent with the AHM methodology, most academic research, and the standard practice of index providers. It should be noted, however, that the assets considered in this article are country benchmarks, not individual stocks. This is relevant because, although trading small stocks is likely to trigger high transaction costs, trading index funds and ETFs of small-cap countries is unlikely to do so. In other words, because transaction costs have a far lower impact when diversifying across country benchmarks than when diversifying across individual stocks, their omission is likely to be inconsequential.

Performance: Monthly Indices

The methodology described in the previous subsection generates two series for each index, one with the evolution of the $100 initial investment between December 1973 and December 2005, and the other with monthly returns over the same period. Summary statistics for the performance of all three indices are reported in Exhibit 2. The temporal evolution of all three indices is shown in Exhibit A1 in the appendix.

As Exhibit 2 shows, an investment of $100 in the DWI at the end of 1973 had a terminal value of $6,812 by the end of 2005. This investment outperformed, by a wide margin, $100 invested in the CWI over the same period, which earned a terminal value of $4,007. These terminal values translate into mean monthly compound returns of 1.11% for the DWI and 0.97% for the CWI. As expected, the performance of the world market portfolio was very similar to that of the CWI. An investment of $100 in the WOR at the end of 1973 had a terminal value of $3,637 at the end of 2005 and delivered a 0.94%

EXHIBIT 2

Monthly Performance of Capitalization-Weighted and Dividend-Weighted Indices, 1974–2005

This exhibit summarizes the performance of the cap-weighted index (CWI), dividend-weighted index (DWI), and Datastream world market index (WOR) over the December 1973–December 2005 period. TV100 denotes the terminal value at the end of 2005 of U.S.$100 invested at the end of 1973. For the three series of monthly dollar returns, the exhibit shows the arithmetic mean return (AM), geometric mean return (GM), standard deviation (SD), beta with respect to the Datastream world market index, risk-adjusted return (RAR = AM/SD), minimum (Min) and maximum (Max) returns, and coefficients of standardized skewness (SSkw) and standardized kurtosis (SKrt).

Index	TV100	AM	GM	SD	Beta	RAR	Min	Max	SSkw	SKrt
CWI	$4,007	1.05%	0.97%	4.11%	0.96	0.255	–16.01%	13.93%	–2.91	4.78
DWI	$6,812	1.21%	1.11%	4.53%	0.94	0.267	–21.85%	23.57%	–3.49	12.48
WOR	$3,637	1.03%	0.94%	4.21%	1.00	0.244	–14.97%	13.93%	–2.59	3.98

mean monthly compound return. The relative performance of the DWI and CWI is consistent with the results reported by AHM and Hsu and Campollo [2006], showing that fundamental indices do outperform cap-weighted indices.

Whether the DWI is more or less risky than the CWI depends on whether risk is measured by volatility or beta. In terms of volatility, the DWI is slightly riskier than the CWI, as reflected by monthly standard deviations of 4.53% and 4.11%, respectively. In terms of beta, the DWI is slightly less risky than the CWI, as reflected by betas of 0.94 and 0.96, respectively. AHM found that fundamental indices are more or less volatile than the S&P 500 depending on the weighting scheme and that the composite fundamental index is slightly less volatile than the S&P 500. Hsu and Campollo, in contrast, found that composite fundamental indices are less volatile than their respective MSCI benchmarks in 14 of the 23 countries they considered and more volatile in the other 9 countries.

Exhibit 2 also reports the risk-adjusted return of each index, defined as the arithmetic mean return divided by volatility. According to this measure, the DWI (0.267) outperformed the CWI (0.255). This result is also consistent with the findings reported by AHM, who showed that the Sharpe ratio of fundamental indices is higher than that of the S&P 500.

Finally, Exhibit 2 shows that all three indices have a significant degree of negative skewness and kurtosis.[9] The DWI not only has a higher negative skewness and (much) higher kurtosis than the CWI, it also has a lower worst-month return (–21.85% versus –16.01%) and a higher best-month return (23.57% versus 13.93%). Because negative skewness and kurtosis are usually viewed as risk-related attributes detrimental to investors, these coefficients seem to confirm that the DWI is somewhat riskier than the CWI.

Performance: Annual Indices

Exhibit 3 complements Exhibit 2 and displays, for ease of interpretation, the arithmetic and geometric mean annual returns and annualized standard deviation of all three indices. It also shows for all three indices the $100 initial investment at the end of 1973, the terminal value of the portfolio at the end of 2005, and the value of the portfolio at the end of every decade. As these exhibits show, a substantial part of the gap between the DWI and CWI was due to their relative performance in the more recent 2000 to 2005 period.

Over the sample period, the mean annual compound return of the DWI (14.1%) was higher than that of the CWI (12.2%) by the rather substantial margin of 1.9% a year. Furthermore, this better performance was not achieved at the cost of much higher volatility, given that the annualized standard deviation of the DWI was only 1.4% higher than that of the CWI (15.7% versus 14.3%). Exhibit A2, in the appendix, shows the differential return performance of these two indices and highlights the years in which one outperformed the other.

Exhibit 4 shows the multiperiod performance of all three indices. Panel A shows that the DWI did not consistently outperform the CWI over time; in fact, the DWI outperformed the CWI in four of the six (non-overlapping) 5-year periods in the sample, with the opposite being the case in the other two 5-year periods.

The DWI did outperform the CWI over the three (non-overlapping) 10-year periods in the sample (Panel B). Over rounded decades, however, the DWI underperformed the CWI in the 1980s and 1990s (Panel C).

EXHIBIT 3

Annual Performance of Capitalization-Weighted and Dividend-Weighted Indices, 1974–2005

This exhibit shows for the capitalization-weighted index (CWI), dividend-weighted index (DWI), and Datastream world market index (WOR) the initial investment of $100 at the end of 1973, the terminal value of the portfolio at the end of 2005, and the value of the portfolio at the end of every decade. For the three series of returns it also shows the arithmetic mean return (AM), the geometric mean return (GM), and the standard deviation (SD), all in annual terms and in U.S. dollars, over the December 1973–December 2005 period.

Index	1973	1979	1989	1999	2005	AM	GM	SD
CWI	$100	$165	$1,061	$4,051	$4,007	13.6%	12.2%	14.3%
DWI	$100	$222	$1,254	$4,628	$6,812	15.9%	14.1%	15.7%
WOR	$100	$166	$1,117	$3,336	$3,637	13.4%	11.9%	14.6%

EXHIBIT 4

Multiperiod Performance of Capitalization-Weighted and Dividend-Weighted Indices, 1974–2005

This exhibit shows the return performance of the capitalization-weighted index (CWI), dividend-weighted index (DWI), and Datastream world market index (WOR) in all non-overlapping 5-year periods (Panel A), non-overlapping 10-year periods (Panel B), and rounded decades (Panel C). All returns are in U.S. dollars.

Panel A	1974–1978	1979–1983	1984–1988	1989–1993	1994–1998	1999–2003	2004–2005
CWI	51.4%	92.4%	204.7%	52.4%	137.0%	–0.3%	25.3%
DWI	75.8%	73.3%	208.4%	105.8%	96.5%	22.0%	47.0%
WOR	52.8%	89.2%	230.5%	36.1%	93.6%	7.9%	33.9%
Panel B	**1974–1983**		**1984–1993**		**1994–2003**		**2004–2005**
CWI	191.2%		364.4%		136.4%		25.3%
DWI	204.7%		534.6%		139.7%		47.0%
WOR	189.1%		349.8%		108.9%		33.9%
Panel C	**1974–1979**		**1980–1989**		**1990–1999**		**2000–2005**
CWI	64.6%		544.6%		281.8%		–1.1%
DWI	121.9%		465.1%		269.1%		47.2%
WOR	65.9%		573.3%		198.8%		9.0%

In summary, although the DWI outperformed the CWI over the entire sample period by a substantial margin, it did not do so consistently over shorter periods of time.

Weights

The asset composition of the CWI and DWI consists of the same 16 country benchmarks in the sample. Their differential performance arises solely from the different weights given to the benchmarks in each index. Exhibit 5 shows the average weight of these 16 benchmarks in the CWI and DWI over the entire December 1973–December 2005 period.

As Exhibit 5 shows, 14 of the 16 countries have a higher weight in the DWI than in the CWI. This higher weight is achieved at the expense of the only 2 countries that have a lower weight in the DWI—the U.S. and Japan. Countries with very small capitalizations dramatically increase their participation in the DWI relative to their participation in the CWI; the weights of Austria, Denmark, and Ireland, for example, are increased 33, 24, and 40 times, respectively. Conversely, the weights of Japan and the U.S.—the largest markets in the sample in both 1973 and 2005—decrease by 88% and 91%, respectively, in the DWI compared to the CWI.

EXHIBIT 5

Weights of Capitalization-Weighted and Dividend-Weighted Indices, 1974–2005

This exhibit shows the average weight of each country benchmark in the capitalization-weighted index (CWI) and dividend-weighted index (DWI) over the December 1973–December 2005 period.

Index	AUS	AUT	BEL	CAN	DEN	FRA	GER	HK
CWI	1.5%	0.1%	0.6%	2.6%	0.3%	2.8%	4.2%	1.5%
DWI	4.9%	4.1%	6.1%	3.9%	7.0%	8.1%	5.3%	7.7%
Index	**IRE**	**ITA**	**JAP**	**NET**	**SIN**	**SAF**	**UK**	**US**
CWI	0.2%	1.6%	25.1%	2.1%	0.5%	0.9%	8.8%	47.3%
DWI	6.7%	4.0%	3.1%	9.8%	3.1%	6.7%	15.2%	4.4%

The DWI has a more even distribution of weights than the CWI. No country in the DWI, for example, has a weight smaller than 3%, while 12 of the 16 countries in the CWI do. In addition, the standard deviation of the 16 average country weights in the DWI is 3%, whereas in the CWI it is 12.2% (in both cases around the average of 6.25%).[10]

In short, then, the substantially different performance between the DWI and the CWI follows exclusively from the substantially different weights these indices give to each country benchmark. This, in turn, invites one more question about the relative performance of these two indices.

Size and Value Effects

The fact that large-cap countries such as the U.S. and Japan lose weight in the DWI and that small-cap countries such as Austria, Denmark, and Ireland gain weight in the index (in both cases with respect to the CWI), invites the question of whether the superior performance of the DWI is due to a size effect. Across the 16 countries and over the 32-year sample period considered, however, size is only weakly related to returns.

Exhibit 6 shows the cross-sectional correlations between market caps at two points in time (December 1973 and December 1989) and the subsequent 16-year mean compound returns for the periods 1974–1989 and 1990–2005, as well as the cross-sectional correlation between average market caps and mean compound returns, both calculated over the entire sample period. Although all three correlations have the expected negative sign, the size effect seems to play a significant role only in the second half of the sample (as indicated by the 0.01 *p*-value of the correlation). No significant size effect is observed in either the first half of the sample period or over the entire sample period.[11]

Large-cap (small-cap) countries lose (gain) weight in the DWI with respect to the CWI, but countries with high (low) dividend yield tend to gain (lose) weight in this index. For example, the weight of Japan, the country with the lowest average dividend yield, in the DWI is decreased by 88% with respect to the CWI. Conversely, the weight of Ireland, the country with the third highest average dividend yield, in the DWI is increased by 40 times, again with respect to the CWI. Is it the case that countries with a high dividend yield outperform those with a low dividend yield? Across the 16 countries and over the 32-year sample period considered in this study, this seems to be the case.

Exhibit 6 also shows the cross-sectional correlations between dividend yields at two points in time (December 1973 and December 1989) and the subsequent 16-year mean compound returns for the periods 1974–1989 and 1990–2005, as well as the cross-sectional correlation between average dividend yields and mean compound returns, both calculated over the entire sample period. As the exhibit illustrates, all three correlations have the expected positive sign and are significant both in the second half of the sample and over the entire sample period (as indicated by the 0.00 *p*-values of both correlations).[12]

These results suggest that at least part of the superior performance of the DWI is due to its exposure to the value factor and, to a lesser extent, to the size factor. This is consistent with the AHM discussion on the sources of excess returns of fundamental indices. It is also consistent with Bernstein [2006] who showed that about two-thirds of the excess returns delivered by the AHM

EXHIBIT 6
Size and Value Effects

This exhibit shows the cross-sectional correlation between market caps at the end of 1973 (S73) and mean compound returns over the 1974–1989 period (R74–89); market caps at the end of 1989 (S89) and mean compound returns over the 1990–2005 period (R90–05); average size (AS) and mean compound returns (AR), both over the 1974–2005 period; dividend yields at the end of 1973 (DY73) and mean compound returns over the 1974–1989 period; dividend yields at the end of 1989 (DY89) and mean compound returns over the 1990–2005 period; and average dividend yield (ADY) and mean compound returns both over the 1974–2005 period.

	Size			*Value*		
	S73/R74–89	S89/R90–05	AS/AR	DY73/R74–89	DY89/R90–05	ADY/AR
Correlation	–0.11	–0.64	–0.18	0.18	0.68	0.67
p-value	0.69	0.01	0.49	0.49	0.00	0.00

composite fundamental index (RAFI) relative to the S&P 500 are due to exposure to the size and value factors; the remaining one-third of outperformance is inherent to the technique, but not statistically significant.

Finally, these results are also consistent with Schoenfeld's [2006] findings which demonstrated that size, style, and industry exposures account for almost 90% of the return generated by the RAFI. Schoenfeld showed that the RAFI has large exposures to the book-to-price and earnings-to-price (value) factors and that about 40% of the RAFI's return can be attributed to sector weightings. Finally, and interestingly, Schoenfeld found that the RAFI is highly correlated with the S&P 500/Barra Value and Russell 1000 Value indices, and that the RAFI tends to outperform the market when value does well and to underperform when value does poorly.

MORE EVIDENCE: TWO ACTIVE STRATEGIES

The main results discussed to this point can be summarized as follows. The DWI has higher return, lower volatility, and higher risk-adjusted return than the CWI. The superior performance of the DWI over the 1974–2005 period was not achieved smoothly over time; instead, it was the result of alternating higher and lower returns than the CWI over shorter periods of time. Furthermore, this superior performance was the result of assigning different weights to the same country benchmarks. For this reason, both the value effect (to a larger degree) and the size effect (to a lesser degree) played a role in the generation of excess returns.

These results, together with those reported by AHM and Hsu and Campollo [2006], support the plausibility of fundamental indexation. But, if the main reason for moving away from cap-weighted indices and into fundamental indices is better performance, why not also consider other possible weighting schemes that may have *even better* performance? Two possibilities are considered in this section.

Strategies

The most straightforward price-insensitive strategy is equal weighting. The problem with this strategy when applied to individual stocks is that it gives large weights to small, illiquid stocks and, as a result, the transaction costs of the required periodic rebalancing are high. This criticism, however, does not apply to the strategy considered in this study; the transaction costs associated with trading country index funds or ETFs of large-cap and small-cap countries are essentially the same. For this reason, one of the two alternative strategies considered is an equally weighted portfolio.

In order to evaluate the performance of this strategy, an equally weighted index (EWI) was calculated as follows. At the end of 1973, a sum of $100 was evenly distributed among the 16 markets in the sample. Returns for this equally weighted index were calculated on a monthly basis through December 1974, at which point the index was rebalanced, evenly distributing the capital available at that time across the 16 markets. This computation of monthly returns with annual rebalancing at the end of December proceeded in the same fashion through December 2005, when the portfolio was liquidated.

The other strategy considered is one of the many possible variations of a value strategy. Many tools may be used to assess if a stock or market is cheap or expensive; the most popular of these tools are book-to-market ratios, PE ratios, and dividend yields. The value strategy considered in this study is based on market-wide dividend yields.

In order to evaluate the performance of this strategy, a dividend-yield-weighted index (DYWI) was calculated as follows. At the end of 1973, a sum of $100 was distributed among the 16 markets in the sample according to their relative dividend yields at that time, which were calculated as the dividend yield of each market relative to the sum of the dividend yields of all 16 markets. Returns for this index were calculated on a monthly basis through December 1974, at which point the index was rebalanced according to the relative dividend yields at that time. This computation of monthly returns with annual rebalancing at the end of December proceeded in the same fashion through December 2005 when the portfolio was liquidated.[13]

Results

Exhibit 7 reproduces the relevant information from previous exhibits to summarize the performance of the CWI, DWI, and WOR, and complements it with related information on the performance of the EWI and DYWI. Exhibit A3, in the appendix, shows the temporal evolution of all five indices.

As Exhibit 7 shows, both the EWI and DYWI delivered a higher terminal value than the DWI; the former

EXHIBIT 7

Performance and Weights of CWI, DWI, EWI, and DYWI, 1974–2005

This exhibit summarizes the performance of the cap-weighted index (CWI), dividend-weighted index (DWI), equally weighted index (EWI), dividend-yield-weighted index (DYWI), and Datastream world market index (WOR) over the December 1973–December 2005 period. TV100 denotes the terminal value at the end of 2005 of $100 invested at the end of 1973; the arithmetic mean return (AM); the geometric mean return (GM); the standard deviation (SD); the risk-adjusted return (RAR = AM/SD); the minimum (Min) and maximum (Max) returns; and the standardized coefficients of skewness (SSkw) and kurtosis (Skrt). All returns are in U.S. dollars and account for capital gains and dividends.

Panel A: Monthly Performance

Index	TV100	AM	GM	SD	Beta	RAR	Min	Max	SSkw	SKrt
CWI	$4,007	1.05%	0.97%	4.11%	0.96	0.255	–16.01%	13.93%	–2.91	4.78
DWI	$6,812	1.21%	1.11%	4.53%	0.94	0.267	–21.85%	23.57%	–3.49	12.48
EWI	$7,912	1.24%	1.14%	4.43%	0.93	0.281	–22.85%	22.01%	–4.75	14.03
DYWI	$10,843	1.33%	1.23%	4.61%	0.94	0.289	–24.42%	27.89%	–2.70	20.69
WOR	$3,637	1.03%	0.94%	4.21%	1.00	0.244	–14.97%	13.93%	–2.59	3.98

Panel B: Annual Performance

Index	1973	1979	1989	1999	2005	AM	GM	SD
CWI	$100	$165	$1,061	$4,051	$4,007	13.6%	12.2%	14.3%
DWI	$100	$222	$1,254	$4,628	$6,812	15.9%	14.1%	15.7%
EWI	$100	$220	$1,502	$5,180	$7,912	16.6%	14.6%	15.4%
DYWI	$100	$259	$1,703	$6,913	$10,843	17.8%	15.8%	16.0%
WOR	$100	$166	$1,117	$3,336	$3,637	13.4%	11.9%	14.6%

Panel C: Multiperiod Performance

	1974–1978	1979–1983	1984–1988	1989–1993	1994–1998	1999–2003	2004–2005
CWI	51.4%	92.4%	204.7%	52.4%	137.0%	–0.3%	25.3%
DWI	75.8%	73.3%	208.4%	105.8%	96.5%	22.0%	47.0%
EWI	72.5%	86.5%	243.4%	97.4%	86.1%	31.0%	48.9%
DYWI	99.6%	86.7%	240.4%	112.3%	96.3%	38.5%	48.0%
WOR	52.8%	89.2%	230.5%	36.1%	93.6%	7.9%	33.9%

	1974–1983	1984–1993	1994–2003	2000–2005
CWI	191.2%	364.4%	136.4%	25.3%
DWI	204.7%	534.6%	139.7%	47.0%
EWI	221.7%	577.8%	143.7%	48.9%
DYWI	272.8%	622.8%	171.8%	48.0%
WOR	189.1%	349.8%	108.9%	33.9%

	1974–1979	1980–1989	1990–1999	2000–2005
CWI	64.6%	544.6%	281.8%	–1.1%
DWI	121.9%	465.1%	269.1%	47.2%
EWI	119.6%	583.9%	244.9%	52.7%
DYWI	158.7%	558.2%	306.0%	56.8%
WOR	65.9%	573.3%	198.8%	9.0%

Panel D: Weights

Index	AUS	AUT	BEL	CAN	DEN	FRA	GER	HK
CWI	1.5%	0.1%	0.6%	2.6%	0.3%	2.8%	4.2%	1.5%
DWI	4.9%	4.1%	6.1%	3.9%	7.0%	8.1%	5.3%	7.7%
DYWI	8.1%	3.8%	7.3%	5.8%	3.9%	7.3%	4.9%	7.6%
Index	IRE	ITA	JAP	NET	SIN	SAF	UK	US
CWI	0.2%	1.6%	25.1%	2.1%	0.5%	0.9%	8.8%	47.3%
DWI	6.7%	4.0%	3.1%	9.8%	3.1%	6.7%	15.2%	4.4%
DYWI	7.7%	5.3%	2.2%	8.2%	5.1%	7.9%	8.6%	6.0%

being 16% higher ($7,912) and the latter 59% higher ($10,843). These terminal values translate into mean annual compound returns of 14.6% for the EWI and 15.8% for the DYWI, compared to 14.1% for the DWI. These higher returns were not earned at the expense of higher risk. The EWI and DYWI have essentially the same volatility and beta as the DWI. For this reason, both the EWI and DYWI outperformed the DWI on a risk-adjusted basis.

The 1.7% annual excess return of the DYWI over the DWI is far from negligible. Notably, the DYWI outperformed the DWI in every non-overlapping 5-year period, every non-overlapping 10-year period, and every rounded decade in the sample.[14] Exhibit A4, in the appendix, shows the differential return performance of these two indices and highlights the years in which one outperformed the other. As this exhibit shows, the DWI outperformed the DYWI in only 8 of the 32 years in the 1974–2005 period.

The weights in the DYWI are substantially different from those in the CWI and DWI. Relative to the CWI, the DYWI gives a lower weight to Japan and the U.S. and a higher weight to all the other countries. Relative to the DWI, the DYWI gives a higher weight to 9 countries and a lower weight to the other 7 countries. Interestingly, the weights in the DYWI are even more evenly distributed than in the DWI. The standard deviation of the 16 average country weights in the DYWI is 1.8%, compared to standard deviations of 12.2% in the CWI and 3% in the DWI (in all cases around the average of 6.25%).[15]

It is important to notice that the costs of implementing the equally weighted and value strategies considered in this study are not nearly as high as those typically associated with these types of strategies. First, the number of assets in both indices is very low; these are not indices of hundreds of individual stocks, but indices of just 16 country benchmarks. And second, both strategies can be implemented with low-cost index funds and ETFs. For the same reasons, both are strategies that any individual investor can easily implement without institutional help.[16]

CONCLUSION

Some investors follow buy-and-hold strategies while others actively buy and sell; some investors focus on individual stocks and others on funds; some investors diversify locally and others globally. Investors may use different means, but all agree on the ultimate goal, the maximization of risk-adjusted returns. Fundamental indexation is one of the means devised to achieve this universal goal.

The genesis of fundamental indexation is arguable; some see it as an answer to the shortcomings of the practical recommendations of modern portfolio theory, whereas others see it simply as a strategy devised with the goal of enhancing returns and generating alpha. Where fundamental indexation is going from here is also arguable; some see it as a revolution and the next wave of investing, whereas others see it as just one more paradigm that comes and goes.

Whereas fundamental indexation is controversial, international diversification is not. Both academics and practitioners have been advocating international diversification for many years, and the globalization of capital markets has made it possible to build low-cost, globally diversified portfolios. The aim of this article has been to link both fundamental indexation and international diversification, and to evaluate the extent to which the former is the best means to achieve the latter.

AHM showed that fundamental indices outperform cap-weighted indices in the U.S. Hsu and Campollo [2006] showed that the same happens in international markets. In both cases, fundamental indexation is recommended as a strategy that enhances returns and at the same time preserves the benefits of cap-weighted indices. Is that still the case when the goal is to build a *globally* diversified portfolio?

The evidence discussed in this article, based on 16 country benchmarks that represent over 93% of world market capitalization spanning a 32-year period, offers support for both premises, but overall casts some doubt about the benefits of fundamental indexation as the best way to achieve international diversification. The global fundamental strategy considered in this study and based on a price-insensitive, objective, and transparent fundamental variable—dividend per share—outperforms a global cap-weighted strategy in terms of returns (by 1.9% a year) and risk-adjusted returns. Yet, it is itself outperformed by a simple, low-cost value strategy in terms of returns (by 1.7% a year) and risk-adjusted returns.

Whether a passive investment in an ETF that aims to track a fundamental index is active or passive investing is of utmost importance to investors. Some investors believe that markets are largely efficient and implement this belief by buying and holding diversified portfolios

for the long term. Other investors believe that markets are largely inefficient, and actively buy and sell stocks and funds. *Who should be the buyers of products linked to fundamental indices—active investors or passive investors?* The answer to this question is not entirely clear and reasonable arguments could be made on both sides of the fence.

One thing is clear, however. If investors who aim to be globally diversified are willing to abandon the traditional cap-weighted portfolio, they can do better than following a fundamental strategy (at least the one considered in this study). Investors could follow a traditional value approach, weighting international benchmarks by dividend yields, and obtain substantially higher returns while bearing essentially the same risk. Once the door is opened to explore alternative weighting schemes, there seems to be no reason to stop with fundamental indexation, particularly when implementation costs of competing strategies are comparable.

In the 21st century, no academic or practitioner would argue against the benefits of international diversification, although some may argue against the benefits of fundamental indexation. This article links both of these issues and ultimately asks whether the latter is the best way to achieve the former. All the strategies considered in the article can be easily implemented with widely available country index funds and ETFs, and for this reason they all have low turnover, high liquidity, low transaction costs, and low taxes. In this context, fundamental indexation outperforms cap-weighted indexation, but is itself outperformed by a simple value strategy. Perhaps these results may help investors decide the best way to build a globally diversified portfolio.

APPENDIX

EXHIBIT A1

Performance of Capitalization-Weighted and Dividend-Weighted Indices, 1974–2005

This exhibit shows the performance of $100 invested on December 1973 and held through December 2005 in the capitalization-weighted index (CWI), dividend-weighted index (DWI), and Datastream world market index (WOR).

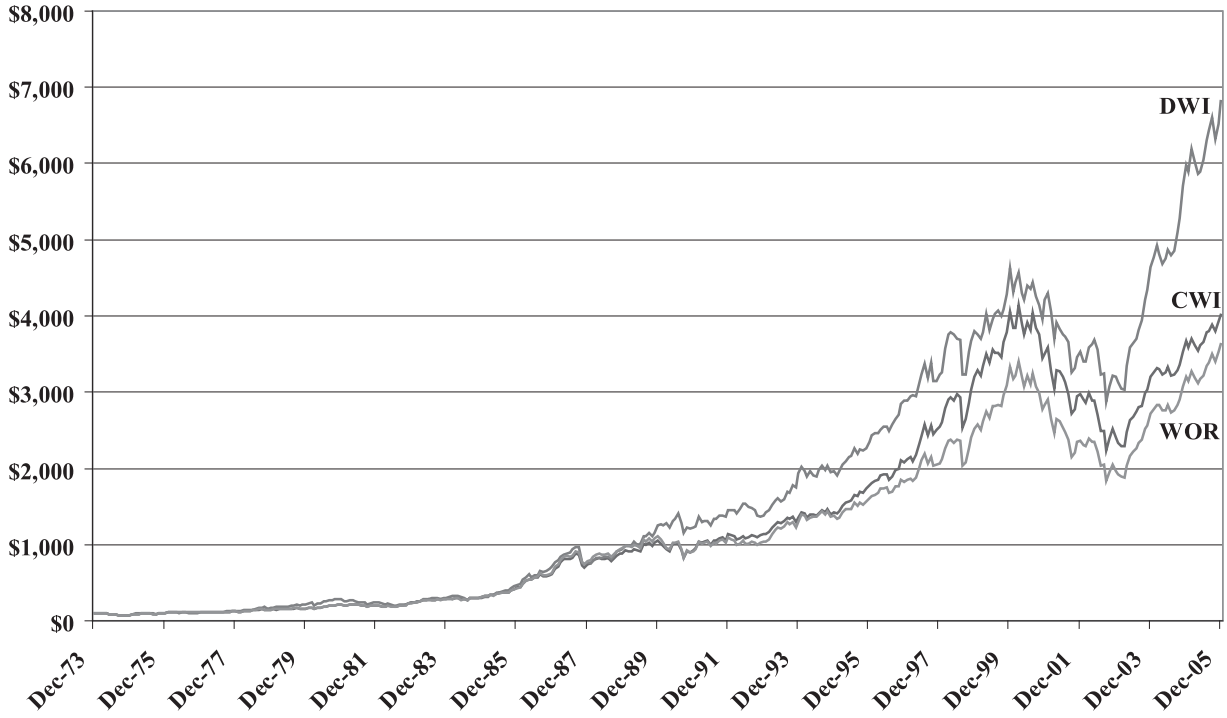


EXHIBIT A2

Differential Return Performance of Dividend-Weighted and Capitalization-Weighted Indices, 1974–2005

This exhibit shows the annual differential return performance (DWI–CWI) between the dividend-weighted index (DWI) and capitalization-weighted index (CWI) over the 1974–2005 period.

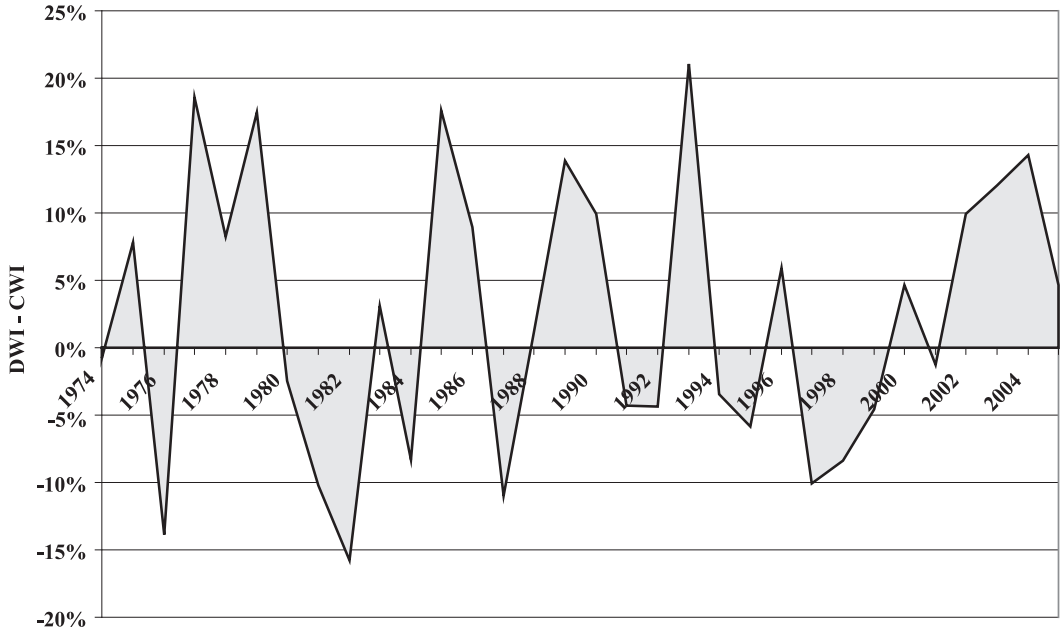


EXHIBIT A3

Performance of CWI, DWI, EWI, and DYWI, 1974–2005

This exhibit shows the performance of $100 invested on December 1973 and held through December 2005 in the capitalization-weighted index (CWI), dividend-weighted index (DWI), equally weighted index (EWI), dividend-yield-weighted index (DYWI), and Datastream world market index (WOR).

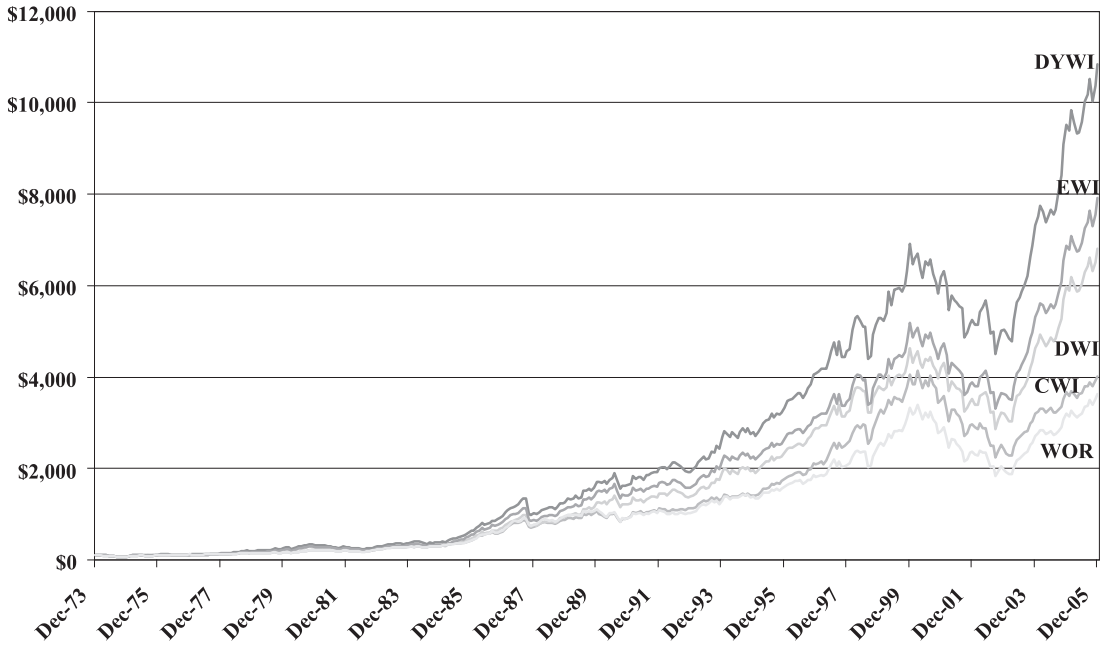
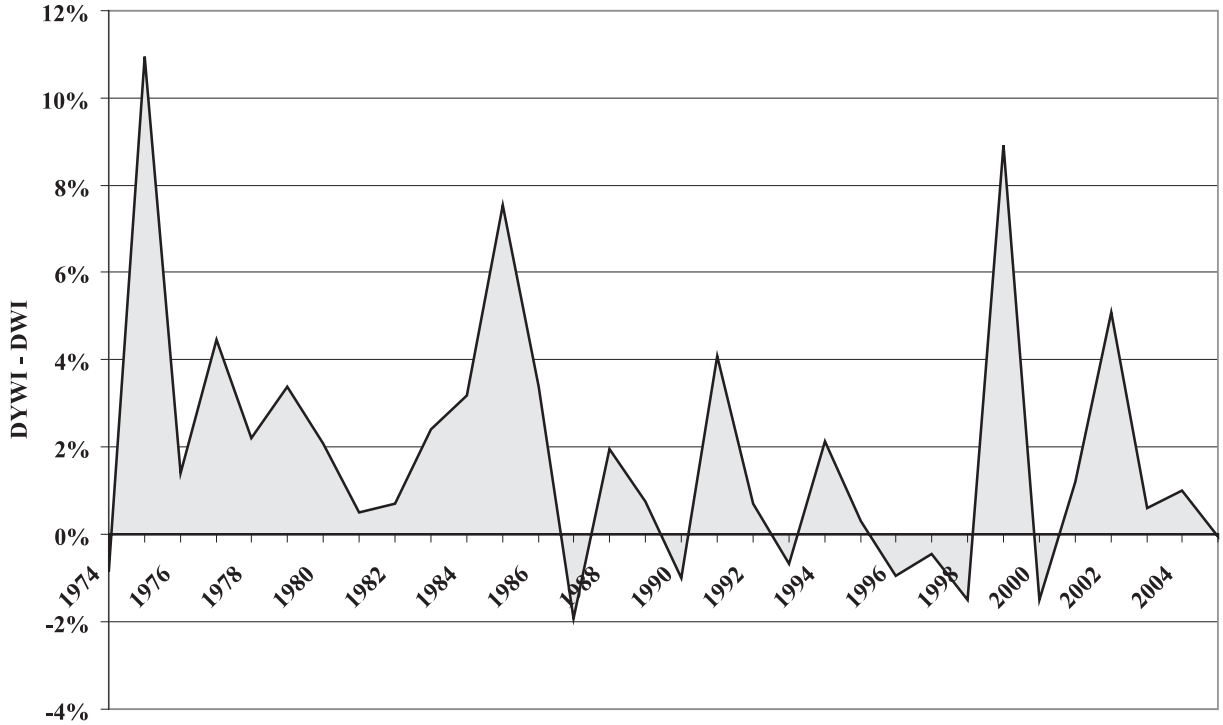


EXHIBIT A4

Differential Return Performance of Dividend-Weighted and Dividend-Yield-Weighted Indices, 1974–2005

This exhibit shows the annual differential return performance (DYWI–DWI) between the dividend-yield-weighted index (DYWI) and the dividend-weighted index (DWI) over the 1974–2005 period.



ENDNOTES

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[1]A combination of both strategies is possible, of course, such as a portfolio of biotechnology companies weighted by dividends or a portfolio of emerging market companies weighted by earnings.

[2]The performance of these fundamental indices led Research Affiliates to join with FTSE and PowerShares to introduce an exchange-traded fund (ETF) based on fundamental indexation, the PowerShares FTSE RAFI U.S. 1000 Portfolio, which has been trading since December 19, 2005. This ETF, based on the FTSE RAFI U.S. 1000 Index, aims to track the performance of the largest U.S. stocks based on their book value, income, sales, and dividends. Soon after, competitor WisdomTree launched several U.S. and international dividend-weighted ETFs that have been trading since June 16, 2006.

[3]Noise in stock prices does not necessarily imply easy money. Investors may know that *some* stocks are mispriced but they may not know *which* ones. This makes it difficult to devise a strategy that consistently earns abnormal returns. Nevertheless, a cap-weighted index ensures that *all* overvalued stocks are overweighted and *all* undervalued stocks are underweighted.

[4]A vast literature documents the superior performance of price-*sensitive* schemes. See, for example, the pioneering work of Basu [1977] on value investing, of Banz [1981] on small-cap investing, and of Fama and French [1992] on the impact of both value and size on returns.

[5]Schoenfeld and Ginis [2006] argued that one of the CFA Institute requirements for a benchmark is that the benchmark is a reflection of current investment opinions.

[6]AHM admitted that although a cap-weighted index is a market-clearing portfolio, the indices they proposed are not.

[7]An exception is the FTSE GWA Index series, which highlights that these products offer investors "an active management strategy."

[8]The fundamental index evaluated in this article is based on price-insensitive weights, but each asset in the index is based on price-sensitive weights. In other words, this index uses a price-insensitive measure (dividend per share) to weight country benchmarks, each of which uses a price-sensitive measure (market cap) to weight individual stocks. The advantage of this index is that it can be (and could have been) easily implemented using widely available country index funds and ETFs.

[9]At the 5% level of significance, the critical value for the tests of skewness and kurtosis, which should be compared to the coefficients of standardized skewness and kurtosis, is ±1.96.

[10]As discussed earlier, the DWI requires annual rebalancing, but the turnover is not very high. Over the 32-year sample period, the average annual turnover is 13.3%.

[11]The same qualitative results also follow from regressions between the three measures of size and the three measures of return with significance based on White's heteroskedasticity-consistent covariance matrix.

[12]Again, the same qualitative results also follow from regressions between the three measures of size and the three measures of return with significance based on White's heteroskedasticity-consistent covariance matrix.

[13]Note that the DYWI is a price-*sensitive* index. But instead of overweighting overvalued assets and underweighting undervalued assets, as cap-weighted indices do, the DYWI does precisely the opposite.

[14]The only very minor exception was during the 1994–1998 period, when the DWI outperformed the DYWI by 0.2% over the entire 5-year period (96.5% versus 96.3%, respectively).

[15]As discussed earlier, the DWI has an annual turnover of 13.3%. The EWI and DYWI have annual turnover rates of 13.7% and 24.8%, respectively.

[16]The good performance of equally weighted indices and indices weighted by dividend yields has not escaped the attention of the industry. The Rydex S&P Equal Weight ETF (an equally weighted version of the S&P 500) has been trading since April 4, 2003. More recently introduced, the WisdomTree High-Yielding Equity ETF (for the U.S.) and the WisdomTree DIEFA High-Yielding Equity ETF (for Europe, Far East Asia, and Australasia) have been trading since June 16, 2006.

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