

Fundamental Indexation and International Diversification

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Abstract

As much as fundamental indexation is novel and controversial, international diversification is traditional and widely accepted. This article links both issues and evaluates a fundamental strategy of international diversification. Considering 16 country benchmarks that make up over 93% of the world market capitalization and a 32-year (1974-2005) sample period, the results here show that a dividend-weighted fundamental index outperforms a cap-weighted index by the substantial margin of 1.9% a year. However, if investors are willing to abandon cap-weighted portfolios, the results here also show that a simple value strategy that weights the same country benchmarks by dividend yields outperforms the dividend-weighted fundamental index by 1.7% year over the same period. All the strategies evaluated in this article can be easily implemented with widely-available, low-cost country index funds and ETFs.

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1. Introduction

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

There are at least three reasons for this. First, a cap-weighted benchmark represents the options available to investors within an asset class; as discussed in more detail below, 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; any index not weighted by capitalization does not play this important role. And third, modern financial theory suggests that the capitalization-weighted market portfolio is mean-variance efficient, thus providing the highest risk-adjusted return.

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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, though not exclusively, concerned with the latter.

Fundamental indexation refers to the construction of indexes 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, among others. In a groundbreaking article, Arnott, Hsu, and Moore (2005), referred to as AHM from this point on, argue that indexes weighted by price-insensitive fundamentals should and do outperform cap-weighted indexes. Using data for the US between 1962 and 2004, they report that indexes weighted by book value, income, revenue, sales, dividends, and employment outperform the S&P500 in a variety of time periods and scenarios.²

The implication of the AHM article is that investors that aim to be diversified in US equity should weight the stocks in their portfolios by price-insensitive fundamentals rather than by capitalization. Now, if investors aim to be diversified in *global* equity, what should they do? Should they weight country index funds and 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.

¹ A combination of both strategies is of course possible, 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 indexes led Research Affiliates to team up with FTSE and PowerShares to introduce an ETF based on fundamental indexation, the PowerShares FTSE RAFI US 1000 Portfolio (trading since Dec/19/05). This ETF, based on the FTSE RAFI US 1000 Index, aims to track the performance of the largest US stocks based on their book value, income, sales, and dividends. Soon after, competitor WisdomTree launched several US and international dividend-weighted ETFs (trading since Jun/16/06).

Fundamental indexation, however novel, has already sparked a heated debate with heavyweights on both sides of the issue. While some, like Jeremy Siegel,³ refer to fundamental indexation as “a revolution” and “the next wave of investing,” some others, like John Bogle and Burton Malkiel,⁴ warn that “intelligent investors should approach with extreme caution any claim that a ‘new paradigm’ is here to stay.” Whether fundamental indexes are really indexes; whether fundamental indexation is passive or active investing; and whether price-insensitive measures are a superior weighting scheme are issues both discussed in this article and also likely to be hotly debated in the near future.

The rest of this article is organized as follows. Section 2 introduces the subject of fundamental indexation and discusses some relevant issues related to this approach. Section 3 evaluates the results of implementing an international diversification strategy through cap-weighted scheme and a fundamental scheme based on dividends, a fundamental variable that is objective, transparent, and independent of accounting principles. Section 4 considers two other strategies of international diversification and compares their performance to that of the strategies in the previous section. Finally, section 5 makes an assessment.

2. The Issue at Stake

Fundamental indexation may be viewed as a strategy designed to overcome the shortcomings 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.

2.1. 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 and, 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.

³ “The ‘Noisy Market’ Hypothesis.” Wall Street Journal, Jun/14/2006.

⁴ “Turn on a Paradigm?” Wall Street Journal, Jun/27/2006.

This market portfolio is the portfolio of risky assets that offers the best combination of risk and return, and is therefore 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&P500 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 it would not be arbitrated away even if some investors were not subject to borrowing constraints.

Treynor (2005) shows that market-valuation-indifferent indexes are superior to cap-weighted indexes because they avoid the problem of overweighting overvalued stocks and underweighting undervalued stocks. He further argues 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, the number of customers, or sales. Finally, Hsu (2006) rigorously shows that if prices are noisy and do not fully reflect fundamentals, a cap-weighted portfolio is suboptimal. He also shows that the drag in cap-weighted portfolios is increasing in the degree of price inefficiency, and that portfolios based on price-insensitive weights avoid this drag.

Jeremy Siegel goes as far as proposing a new paradigm, which he calls the “noisy market hypothesis,” to replace the efficient market hypothesis.⁵ This new paradigm argues that 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 that may trade for reasons unrelated to value.⁶

AHM give two reasons for exploring alternatives to cap-weighted indexes. They claim, first, that capitalization is a very volatile way to measure true value; and second, that cap-

⁵ “The ‘Noisy Market’ Hypothesis.” Wall Street Journal, Jun/14/2006.

⁶ 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.

weighted indexes are bound to overweight overvalued stocks and to underweight undervalued stocks. For these reasons, they argue, indexes based on less volatile, price-insensitive weights *should* deliver better performance than cap-weighted indexes, and go on to show empirically that portfolios based on a variety of price-insensitive weights *do* outperform the S&P500.⁷

2.2. What Is An Index?

A benchmark is a portfolio of assets that represents an investable opportunity set.⁸ 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 the three advantages brought about by this weighting scheme. A simple example may help to illustrate these advantages.

Consider a \$10 million market with 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 asset 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 equilibrium magnitudes.

Assume now that companies 1 and 2 pay the same dividends and consider then 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.⁹

It is clear, then, that the fundamental indexes proposed by AHM are not proper benchmarks. But some go even further and dispute whether they are indexes at all. Steven

⁷ There is of course a vast literature documenting the superior performance of price-*sensitive* schemes. See, for example, the pioneering work of Basu (1977) on value investing, Banz (1981) on small-cap investing, and Fama and French (1992) on the impact of both value and size on returns.

⁸ Schoenfeld and Ginis (2006) argue that one of requirements of the CFA Institute for a benchmark is to be a reflection of current investment opinions.

⁹ AHM do admit that although a cap-weighted index is a market-clearing portfolio, the indexes they propose are not.

Schoenfeld, 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.” (See Burr, 2005.) In this view, an index and a benchmark are basically indistinguishable concepts and their sole purpose is to reflect the investment opportunities within (and performance of) an asset class.

One of the reasons for which some view fundamental indexes 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.

2.3. What is a Passive Strategy?

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

The fact that fundamental indexes require periodic rebalancing leads some to view these indexes as active strategies masquerading as passive indexes. Amy Schioldager, head of US equity index products at BGI, argues that she does not view a fundamental index “as being an index product, but an active product.” (See Burr, 2005.) Again, a simple example may help.

Assume that extensive backtesting shows that a portfolio of companies weighted by the number of telephone calls a month they receive 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, transactions costs, and taxes. Buying and holding an ETF that tracks a fundamental index that 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) argues that fundamental indexes are designed to generate alpha, with the active bets taking place within the index construction. Similarly, Tom Coyne, editor of *The Index Investor*, argues 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.”¹⁰

As argued by Schoenfeld and Ginis (2006), there is nothing inherently wrong with an index taking active bets, as long as 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 indexes nor the implicit exposure to well-known risk factors such as value and size.¹¹ (More on this below.)

2.4. Pros and Cons of Fundamental Indexes

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 indexes, then, is that they are not (or they are less) subject to this drag.

A second (and obviously related) advantage is that fundamental indexes appear to have higher returns and lower volatility than cap-weighted indexes, as the evidence for the US reported by AHM shows. Furthermore, widening the scope of the AHM inquiry, Hsu and Campollo (2006) build fundamental indexes for 23 countries over the 1984-2004 period and find that these indexes outperform their respective MSCI (cap-weighted) benchmarks in every country, and on average by 2.8% a year.

Finally, AHM argue that fundamental indexes retain many of the benefits of cap-weighted indexes. These 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 indexes; and high correlation to the overall market.

But fundamental indexes are not free from criticism. From a theoretical standpoint, neither these indexes properly represent the investable opportunity set, nor they reflect the returns of the average investor, nor they are market-clearing portfolios. These objections, to be sure, may carry some weight with academics but little with investors. However, it *is* relevant for

¹⁰ “When Is an ETF Not Quite an ETF?” *Financial Times*, Oct/2/2006.

¹¹ An exception is the FTSE GWA Index series, which highlights that these products offer investors “an active management strategy.”

investors to know whether they are investing in passive indexes or in disguised active products with their correspondingly higher turnover, transaction costs, and taxes. And it also *is* relevant for investors to be aware of the implicit risk factors they are being exposed to when buying fundamental indexes.

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

3. 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.

3.1. Data

As mentioned above, 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 return and annualized volatility of their equity markets over the whole Dec/1973-Dec/2005 sample period. 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 billions of dollars) of each country at the end of the years 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 the world market capitalization, also at the end of the years 1973 and 2005. Over the whole sample period, the combined market cap of all the countries in the sample oscillated between a minimum of 82.1% and a maximum of 99.1% of the world market capitalization, with an average of 93.4%, which indicates that the countries in the sample are obviously representative of the global market portfolio.

Exhibit 1: Summary Statistics

This exhibit shows the annual arithmetic mean return (AM), geometric mean return (GM), and standard deviation (SD) of each country equity benchmark over the Dec/1973-Dec/2005 period. It also shows the market capitalization of each country at the end of the years 1973 (MC73) and 2005 (MC05), both in billions, as well as the percentage of each country's market capitalization with respect to the world market capitalization at the end of the years 1973 (%73) and 2005 (%05). All data based on Datastream indices, in dollars, and accounting 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	0.0%	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%
Honk 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%
UK	17.2%	14.2%	22.7%	48.9	2,739.5	6.7%	7.7%
USA	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		

3.2. Methodology

Every fundamental indexation strategy is based on a set of price-insensitive weights. In their article, AHM consider book value, income, revenue, sales, dividends, and employment. In this article, the fundamental indexation strategy evaluated is based on dividends per share, a price-insensitive fundamental variable that is objective, transparent, and independent of accounting principles.¹²

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, \$100 dollars were 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 Dec/05, when the portfolio was liquidated.

The dividend-weighted fundamental index (DWI) was calculated as follows. At the end of 1973, \$100 dollars were distributed among the 16 markets in the sample according to their

¹² The fundamental index evaluated here is based on price-insensitive weights, but each asset in the index is based on price-sensitive weights. Put differently, this index uses a price-insensitive measure (dividends per share) to weight country benchmarks, each of which uses a price-sensitive measure (market caps) 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.

relative dividends per share at that time, the latter calculated as the dividends per share paid by each market relative to the sum of the dividends per share paid by all 16 markets. Returns for this fundamental index were calculated on a monthly basis through Dec/1974, at which point the index was rebalanced according to the relative dividends per share at that time. This computation of monthly returns with annual rebalancing at the end of December proceeded in the same fashion through Dec/2005, when the portfolio was liquidated.

For reference, \$100 were also invested in the Datastream world market index (WOR) at the end of 1973 and were passively held through the end of Dec/2005, at which time the portfolio was liquidated. As will be seen below, the performance of this index is, unsurprisingly, very similar to that of the CWI.

The performance of all three indexes 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.

3.3. Performance – Monthly Indexes

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

Exhibit 2: CWI v. DWI, Monthly Performance

This exhibit summarizes the performance of the cap-weighted index (CWI), the dividend-weighted index (DWI), and the Datastream world market index (WOR) over the Dec/1973-Dec/2005 period. TV100 denotes the terminal value at the end of 2005 of \$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) return, 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

As the exhibit shows, the DWI turned an investment of \$100 at the end of 1973 into \$6,812 by the end of 2005, thus outperforming by a wide margin the CWI, which turned \$100 into \$4,007 over the same period. 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, turning \$100 into \$3,637 and delivering a 0.94% mean monthly compound return. The relative performance of the DWI and the CWI is consistent with the results reported by AHM and Hsu and Campollo (2006) showing that fundamental indexes do outperform cap-weighted indexes.

Whether the DWI is more or less risky than the CWI depends on whether risk is measured by volatility or beta. In the first case, the DWI is slightly riskier than the CWI, as reflected by monthly standard deviations of 4.53% and 4.11%. In the second case, the DWI is slightly less risky than the CWI, as reflected by their betas of 0.94 and 0.96. AHM find that fundamental indexes are more or less volatile than the S&P500 depending on the weighting scheme; they also find that the composite fundamental index is slightly less volatile than the S&P500. Hsu and Campollo (2006), on the other hand, find that composite fundamental indexes are less volatile than their respective MSCI benchmarks in 14 of the 23 countries they consider, and more volatile in the other 9 countries.

Exhibit 2 also reports the risk-adjusted return for each index, defined as the arithmetic mean return divided by volatility. According to this magnitude, the DWI outperformed the CWI, as reflected by the 0.267 and 0.255 figures that correspond to each index. This result is also consistent with those reported by AHM, who show that the Sharpe ratio of fundamental indexes is higher than that of the S&P500.

Finally, Exhibit 2 shows that all three indexes have a significant degree of negative skewness and kurtosis.¹³ 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.

3.4. Performance – Annual Indexes

Exhibit 3 complements Exhibit 2 and displays, for ease of interpretation, the (arithmetic and geometric) mean annual return and annualized standard deviation of all three indexes. It also

¹³ 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 .

shows for all three indexes 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 figures show, a substantial part of the gap between the DWI and the CWI was due to their relative performance in the more recent 2000-2005 period.

Exhibit 3: CWI v. DWI, Annual Performance

This exhibit shows, for the capitalization-weighted index (CWI), the dividend-weighted index (DWI), and the 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 measured in dollars, over the Dec/1973-Dec/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%

Over the whole 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 at the cost of much higher volatility given that the annualized standard deviation of the DWI was only 1.5% higher than that of the CWI (15.7% versus 14.3%). Exhibit A2, in the appendix, shows the differential return performance of these two indexes and highlights the years in which one outperformed the other.

Exhibit 4 shows the multiperiod performance of all three indexes. Panel A shows that the DWI did not outperform the CWI consistently 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.

Exhibit 4: CWI v. DWI, Multiperiod Performance

This exhibit shows the return performance of the capitalization-weighted index (CWI), the dividend-weighted index (DWI), and the 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 measured in dollars.

<i>Panel A</i>	1974-78	1979-83	1984-88	1989-93	1994-98	1999-03	2004-05
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%
<i>Panel B</i>	1974-83		1984-93		1994-03		2004-05
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%
<i>Panel C</i>	1974-79		1980-89		1990-99		2000-05
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%

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 both in the '80s and the '90s (panel C). In short, then, although the DWI outperformed the CWI over the whole sample period by a substantial margin, it did not do so consistently over shorter periods of time.

3.5. Weights

The asset composition of the CWI and the DWI consists of the same 16 country benchmarks in the sample. Their differential performance, then, stems solely from the different weights given to these benchmarks in each index. Exhibit 5 shows the average weight of these 16 benchmarks in the CWI and the DWI over the whole Dec/1973-Dec/2005 period.

Exhibit 5: CWI v. DWI, Weights

This exhibit shows the average weight of each country benchmark in the capitalization-weighted index (CWI) and the dividend-weighted index (DWI) over the Dec/1973-Dec/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	USA
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%

As the exhibit shows, 14 of the 16 countries have a higher weight in the DWI than in the CWI. This higher weight comes at the expense of the only 2 countries that have a lower weight in the DWI, the US and Japan. Countries with very small capitalizations dramatically increase their participation in the DWI relative to that in the CWI; Austria, Denmark, and Ireland, for example, see their weight increased by 33, 24, and 40 times. Conversely, Japan and the US, the largest markets in the sample both in 1973 and in 2005, see their weight in the DWI decreased by 88% and 91% with respect to the CWI.

The DWI has a more even distribution of weights than the CWI. No country in the DWI, for example, has a participation smaller than 3%; 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 that in the CWI is 12.2% (in both cases around the average of 6.25%).

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

3.6. Size and Value Effects

The fact that large-cap countries like the US and Japan lose weight in the DWI, and that small-cap countries like Austria, Denmark, and Ireland gain weight in this index (in both cases with respect to the CWI), invites the question 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 here, however, size is only weakly related to returns.

Exhibit 6 shows the cross-sectional correlations between market caps at two points in time (Dec/1973 and Dec/1989) and the subsequent 16-year (1974-1989 and 1990-2005) mean compound returns, as well as the cross-sectional correlation between average market caps and mean compound returns both calculated over the whole 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). There is no significant size effect either in the first half of the sample period or over the whole sample period.¹⁴

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.

	<i>Size</i>			<i>Value</i>		
	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

At the same time that large-cap (small-cap) countries lose (gain) weight in the DWI with respect to the CWI, it is also the case that countries with high (low) dividend yield tend to gain (lose) weight in this index. For example, Japan, the country with the lowest average dividend yield, sees its weight in the DWI decreased by 88% with respect to the CWI. Conversely, Ireland, the country with the third highest average dividend yield, sees its weight in the DWI increased by 40 times, again with respect to the CWI. Is it the case that countries with high dividend yield outperform those with low dividend yield? Across the 16 countries and over the 32-year sample period considered here, that does seem to be the case.

Exhibit 6 also shows the cross-sectional correlations between dividend yields at two points in time (Dec/1973 and Dec/1989) and the subsequent 16-year (1974-1989 and 1990-

¹⁴ 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.

2005) mean compound returns, as well as the cross-sectional correlation between average dividend yields and mean compound returns both calculated over the whole sample period. As the figures show, all three correlations have the expected positive sign and are significant both in the second half of the sample and over the whole sample period (as indicated by the 0.00 p -values of both correlations).¹⁵

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 indexes. It is also consistent with the discussion in Bernstein (2006), who shows that about two-thirds of the excess returns delivered by AHM's composite fundamental index (RAFI) relative to the S&P500 are due to exposure to the size and value factors; the remaining one-third of outperformance, he shows, is inherent to the technique but not statistically significant.

Finally, these results are also consistent with those of Schoenfeld (2006), who reports that size, style, and industry exposures account for almost 90% of the return generated by the RAFI. He shows 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, he shows that the RAFI is highly correlated with the S&P500/Barra Value and Russell 1000 Value indexes, and that the RAFI tends to outperform the market when value does well and to underperform it when value does poorly.

4. More Evidence: Two Active Strategies

The main results discussed so far 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 whole 1974-2005 period was not achieved smoothly over time; rather, 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. However, a relevant question needs to be asked: If the main reason for moving away from cap-weighted indexes and into fundamental

¹⁵ 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.

indexes is their better performance, why then not also consider other possible weighting schemes that may have *even better* performance? Two possibilities are considered in this section.

4.1. 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; as a result, the transaction costs of the required periodic rebalancing are high. This criticism, however, does not apply to the strategy considered here; the transaction costs associated to trading country index funds or ETFs of large-cap countries and small-cap countries are essentially the same. For this reason, one of the two alternative strategies considered here 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, \$100 dollars were evenly distributed among the 16 markets in the sample. Returns for this equally-weighted index were calculated on a monthly basis through Dec/1974, at which point the index was rebalanced distributing the capital available at that time evenly across the 16 markets again. This computation of monthly returns with annual rebalancing at the end of December proceeded in the same fashion through Dec/2005, when the portfolio was liquidated.

The other strategy considered here is one of the many possible variations of a value strategy. Whether a stock or market is cheap or expensive may be assessed with many tools, the most popular of which are book-to-market ratios, P/E ratios, and dividend yields. The value strategy considered here is based on marketwide 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, \$100 dollars were distributed among the 16 markets in the sample according to their relative dividend yields at that time, the latter 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 Dec/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 Dec/2005, when the portfolio was liquidated.¹⁶

¹⁶ Note that the DYWI is a price-*sensitive* index. However, instead of overweighting overvalued assets and underweighting undervalued assets, as cap-weighted indexes do, it does precisely the opposite.

4.2. Results

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

As Exhibit 7 shows, both the EWI and the DYWI delivered a higher terminal value than the DWI; the former 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 did not come at the expense of higher risk; the EWI and the DYWI have essentially the same volatility and beta than the DWI. For this reason, both the EWI and the DYWI also outperformed the DWI on a risk-adjusted basis.

Needless to mention, the 1.7% annual excess return of the DYWI over the DWI is far from negligible. Also 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.¹⁷ Exhibit A4, in the appendix, shows the differential return performance of these two indexes and highlights the years in which one outperformed the other. As this exhibit shows, in only 8 out of the 32 years in the 1974-2005 period the DWI outperformed the DYWI.

The weights in the DYWI are substantially different from those in the CWI and the DWI. Relative to the CWI, the DYWI gives a lower weight to Japan and the US 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 with standard deviations of 12.2% in the CWI and 3% in the DWI (in all cases around the average of 6.25%).

It is important to notice that the costs of implementing the equally-weighted and value strategies considered here are not nearly as high as those usually associated with this type of strategies. First, the number of assets in both indexes is very low; these are not indexes of hundreds of individual stocks but indexes 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.¹⁸

¹⁷ The only very minor exception was during the 1994-98 period, when the DWI outperformed the DYWI by 0.2% over the whole five years (96.5% versus 96.3%).

¹⁸ The good performance of equally-weighted indexes and indexes 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&P500) has been

Exhibit 7: CWI v. DWI v. EWI v. DYWI

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

<i>Panel A: Monthly Performance</i>										
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
<i>Panel B: Annual Performance</i>										
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%		
<i>Panel C: Multiperiod Performance</i>										
	1974-78	1979-83	1984-88	1989-93	1994-98	1999-03	2004-05			
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%			
	1974-83		1984-93		1994-03		2004-05			
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%			
	1974-79		1980-89		1990-99		2000-05			
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%			
<i>Panel D: Weights</i>										
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	USA		
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%		

trading since Apr/4/2003. More recently introduced, the WisdomTree High-Yielding Equity ETF (for the US) and the WisdomTree DIEFA High-Yielding Equity ETF (for Europe, Far East Asia, and Australasia) have been trading since Jun/16/2006.

5. An Assessment

Some investors follow buy-and-hold strategies and some others actively buy and sell; some investors focus on individual stocks and some others on funds; some investors diversify locally and some others do it globally. They may all use different means but all investors agree on the ultimate goal, the maximization of risk-adjusted returns. Fundamental indexation is one of those 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 some 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 a revolution and the next wave of investing, whereas some others see it as just one more of those paradigms that come and go.

As controversial as fundamental indexation is, international diversification is not. Both academics and practitioners have been advocating it 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 show that fundamental indexes outperform cap-weighted indexes in the US. Hsu and Campollo (2006) show that the same happens in international markets. In both cases, fundamental indexation is recommended as a strategy that enhances returns, while at the same time preserving the benefits of cap-weighted indexes. Is that still the case when the goal is to build a *globally*-diversified portfolio?

The evidence discussed in this article, using 16 country benchmarks that make up over 93% of the world market capitalization and spanning over a 32-year period, goes both ways. But overall, it casts some doubts about the benefits of fundamental indexation as the best way to achieve international diversification. The global fundamental strategy considered here, based on a price-insensitive, objective, and transparent fundamental variable, dividends per share, does outperform a global cap-weighted strategy in terms of returns (by 1.9% a year) and risk-adjusted returns. On the other hand, it is itself outperformed by a simple, low-cost value strategy also 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. Some others believe that markets are largely inefficient, and actively buy and sell

stocks and funds. *Who should be the buyers of products linked to fundamental indexes, active investors or passive investors?* It is not entirely clear, and reasonable arguments could be made on both sides of the fence.

However, one thing is clear. If investors that 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 here. They could follow a traditional value approach, weighting international benchmarks by dividend yields, and obtain substantially higher returns bearing essentially the same risk. Once the door is open to explore alternative weighting schemes, there seems to be no reason to stop with fundamental indexation, particularly when the costs of implementing competing strategies are comparable.

In the 21st century, nobody would argue against the benefits of international diversification, though some may argue against the benefits of fundamental indexation. This article has linked both issues and ultimately asked whether the latter is the best way to achieve the former. All the strategies considered here 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 does outperform cap-weighted indexation but is itself outperformed by a simple value strategy. Perhaps these results may help investors decide what is the best way to build a globally-diversified portfolio.

Appendix

Exhibit A1: CWI v. DWI, Performance

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

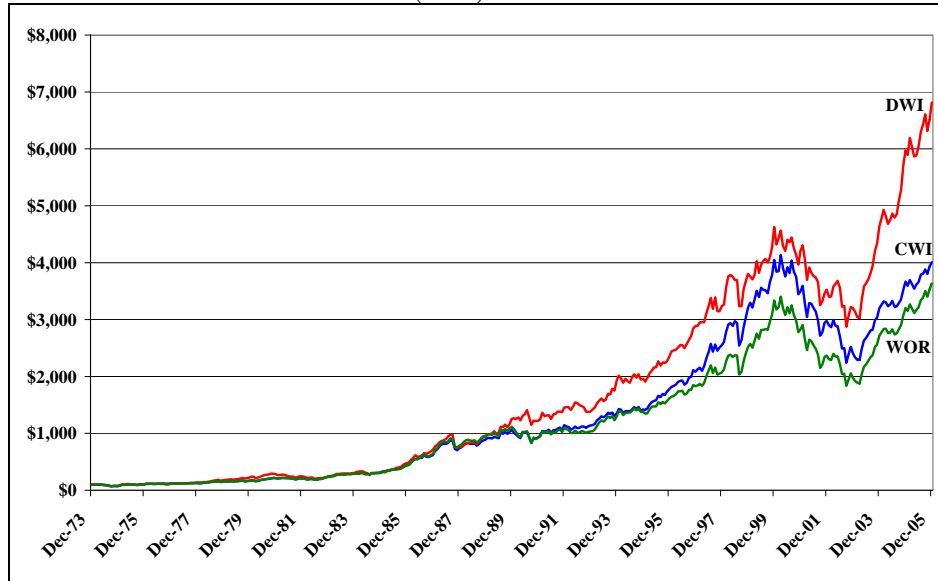


Exhibit A2: CWI v. DWI, Differential Return Performance

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

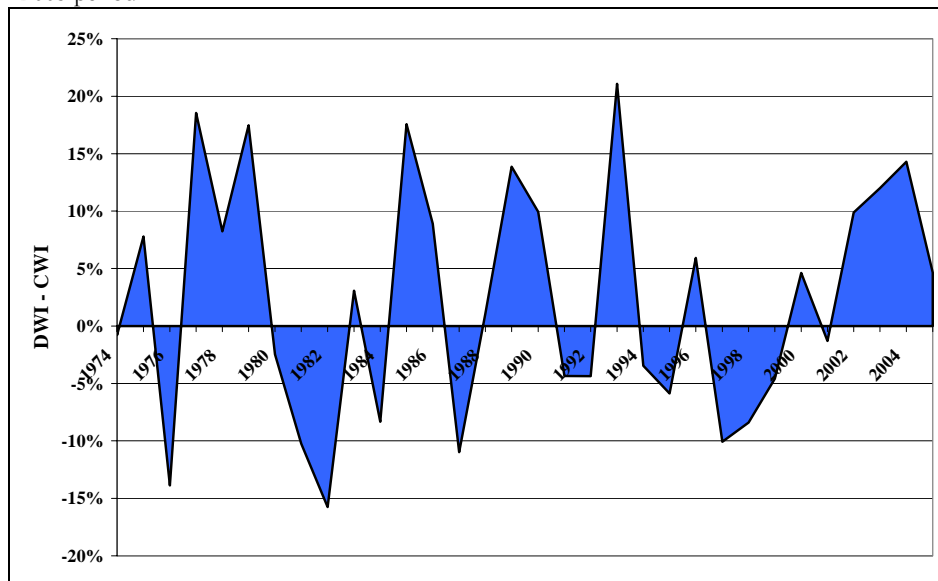


Exhibit A3: CWI v. DWI v. EWI v. DYWI, Performance

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

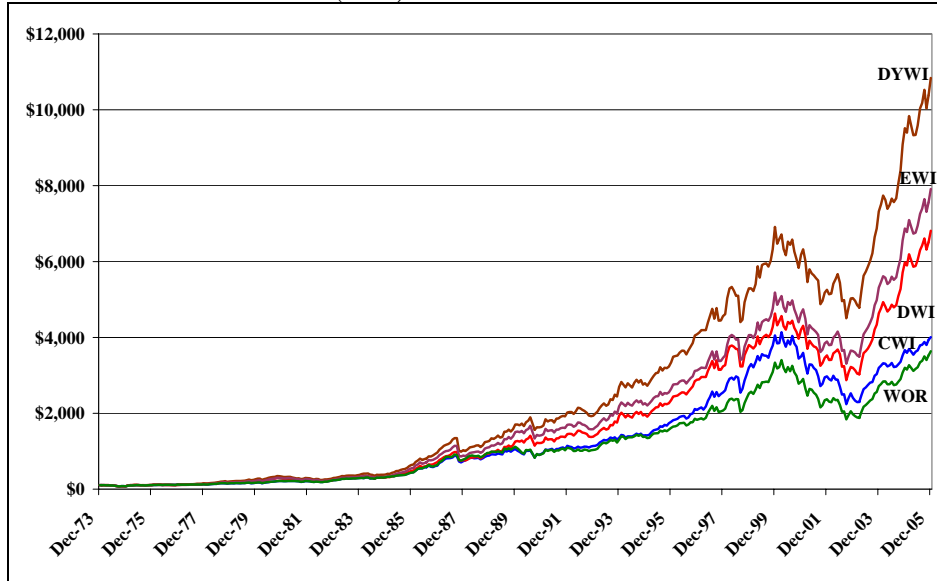
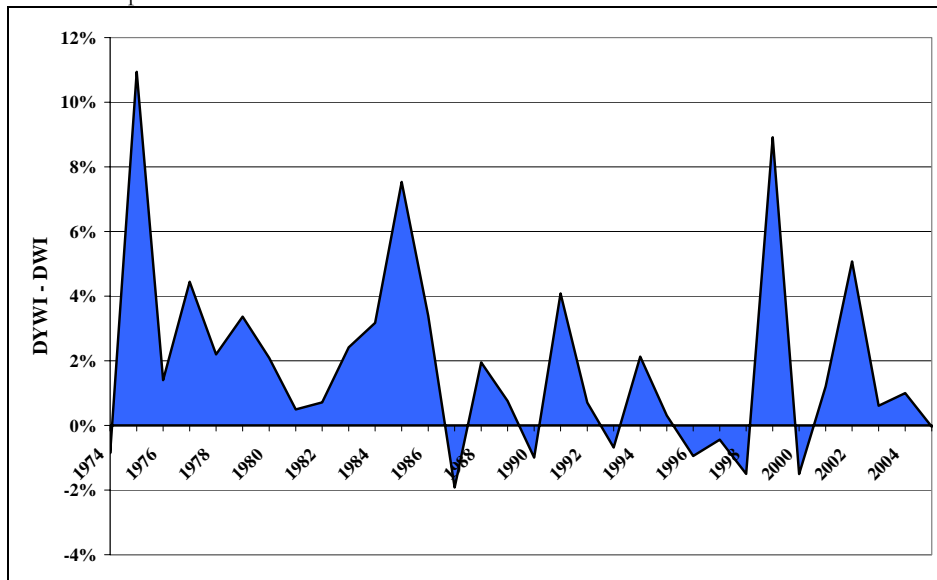


Exhibit A4: DWI v. DYWI, Differential Return Performance

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.



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