Building The Best Index

Equal-weighting vs. market capitalization

by David Blanchett

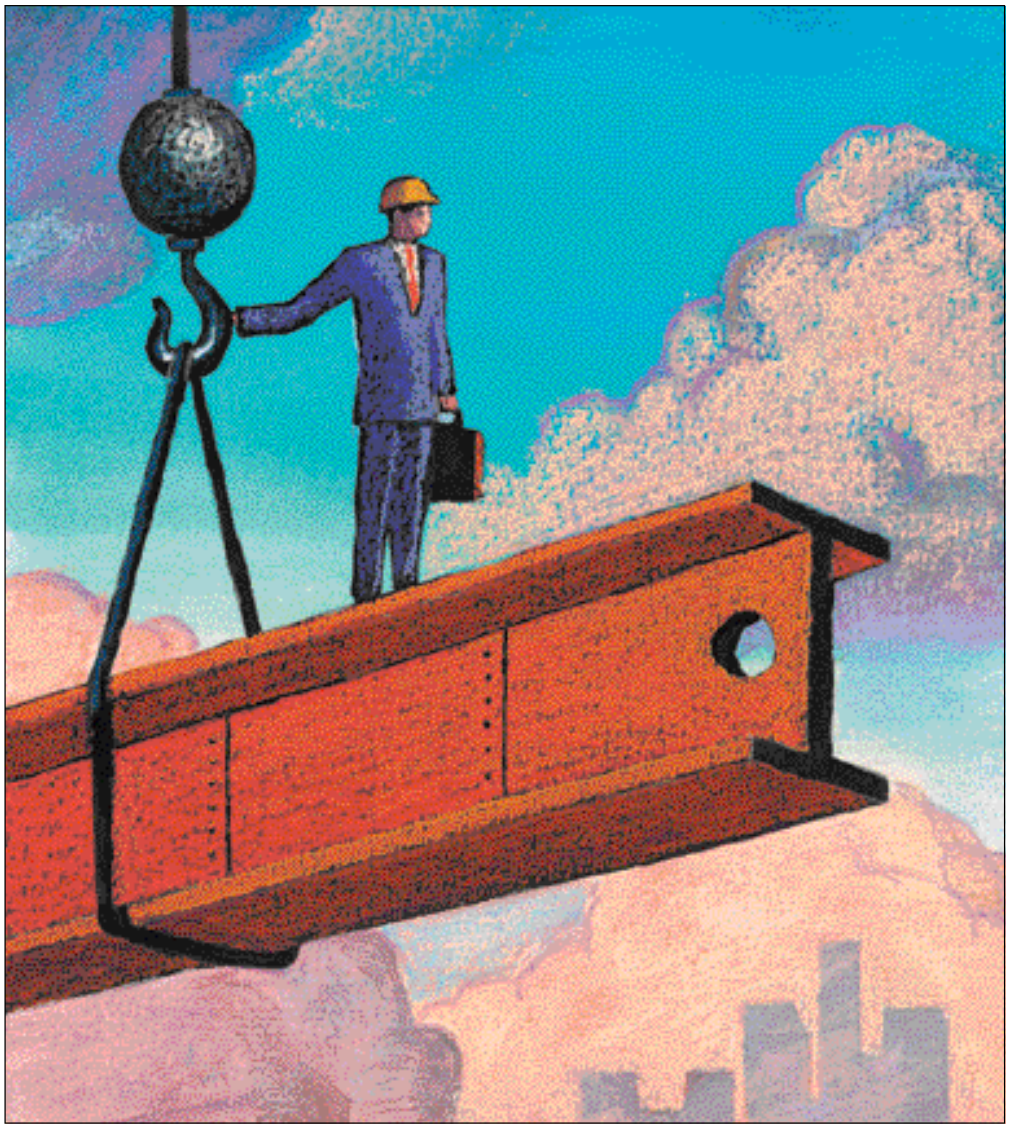


Illustration by Jonathan Evans

Market capitalization is currently the most popular weighting method for indexes. Its methodology is straightforward: Each stock in an index is weighted based on the total value of its outstanding shares (with some minor alterations, e.g., free float). Although using market capitalization makes sense from a total value perspective, it is only one method to capture the returns of a given asset category.

Market capitalization indexes, by virtue of their very nature, skew performance towards the larger stocks. For example, GE and Cisco Systems are both considered large-cap stocks, but GE's weighting in any market-capitalization-based index would be more than double Cisco's. An alternative methodology that could be used to construct an index would be to weight its constituents equally and then rebalance according to some preset schedule, in order to keep the weightings relatively constant.

There are a number of additional costs associated with the equal-weighting concept when compared to a simple market-capitalization-weighted alternative. The expense ratio of an equal-weighted index exchange-traded fund (ETF) or mutual fund is likely to be higher than its market capitalization peers, and increased turnover will reduce an investor's net returns both implicitly (through the commissions paid by the fund during rebalancings) and explicitly (through the possible tax implications). Although the tax effect would be eliminated if such an investment were held in an IRA or tax-deferred account, it would still remain a concern to some investors.

Currently, the most widely know equally weighted index is the S&P 500 Equal Weight Index. Rydex offers an ETF that tracks this index, which trades under the ticker RSP. The S&P 500 Equal Weight Index's benchmark is the plain vanilla S&P 500; this is an inadequate benchmark, though, because the S&P 500 Equal Weight Index holds a disproportionate number of small- and mid-cap stocks, skewing performance in favor of those asset classes. Therefore, it's not a fair test to compare the two indexes.

A relatively straightforward method that can be used to test the equal-weighted concept would be to historically test the 30 stocks that currently comprise the Dow Jones Industrial Average and compare them on both an equal-weighted and market-capitalization-weighted basis. These are all large-cap companies that represent the U.S. economy as a whole. Selecting the Dow also reduces the possibility of data mining, and using only its current stocks, as opposed to modifying its composition over time, eases the analysis because mergers, additions and deletions do not need to be considered.

The test period for analysis will be the previous 15 calendar years, and will compare three different portfolios:

1. A portfolio that is equal-weighted at inception and is not rebalanced (EW NO RE);
2. An equal-weighted portfolio that is rebalanced quarterly, which ignores transaction costs and tax impacts (EW); and,
3. A portfolio weighted by market capitalization (Mkt Cap).

The performance for the three portfolios will be tested on both a total-return (dividends included) and a stock-return basis (dividends not included). Average shares outstanding will be used, and outstanding shares will be considered to be issued and repurchased evenly throughout the year.

There will be two separate data tests: The first will be the total previous 15 calendar years (January 1990 to December 2004) and the second will be the three five-year periods that combine to create those 15 years. Risk will be determined by both standard deviation (because it is the most popular definition) and by a downside-risk measure. The downside-risk measure will be the sum of the negative returns squared, using a Minimum Acceptable Return (MAR) of 1.5 percent per quarter. To calculate the MAR, this number is multiplied by its downside potential ratio (the percent of total quarters in which the return was below zero) for the period. The risk-free rate is viewed as that of a domestic (U.S.) investor and is defined as the average yield on five-year Treasury Notes over the corresponding period.[1] The risk-adjusted returns will be measured by the Sharpe Ratio (period return minus period risk-free return divided by standard deviation) and by the Sortino Ratio (period return minus period risk-free return divided by downside risk). The Sharpe and Sortino ratios will be "modified" to allow for negative excess returns by raising the denominator (which is either standard deviation or downside risk) to the -1 power when the excess return for the period is negative.

Results

As you can see from the following 15-year data, the market-capitalization index beat the equal-weighted indexes.

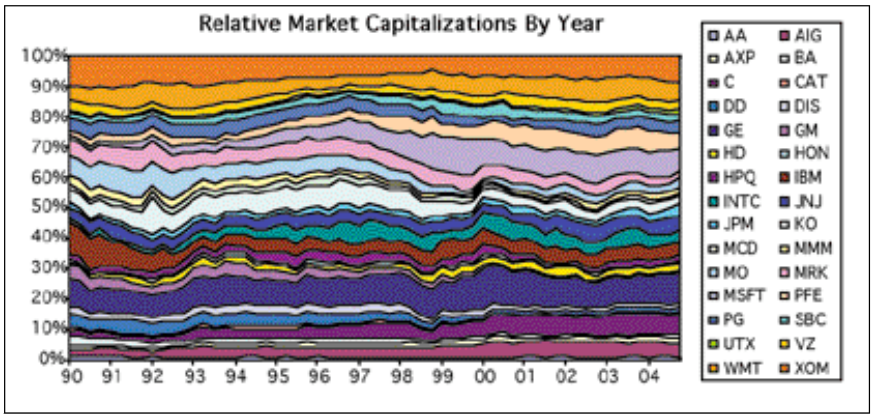
The five-year data (above) reflects the same trend for each of the three periods.

Although one might expect the equal-weighted, rebalanced portfolios to outperform the market-capitalization portfolios, that did not prove to be the case. The market-capitalization portfolios not only had better performance, they also had lower risk (as measured by both standard deviation and downside risk) and, therefore, higher risk-adjusted returns.

The outperformance of the market-capitalization portfolio

15-Year Data for Dow Jones Industrial Average						
Dividend Adjusted						
Rf 0.056104						
	ROR	Excess Ret	Stdev	Downside	Sharpe	Sortino
EW NO RE	0.167967	0.111864	0.083397	0.025241	1.341345	4.431833
EW	0.175896	0.119792	0.074933	0.019934	1.598666	6.009591
Mkt Cap	0.19796	0.141856	0.07281	0.009313	1.94831	15.23185
Stock Price						
Rf 0.056104						
	ROR	Excess Ret	Stdev	Downside	Sharpe	Sortino
EW NO RE	0.146293	0.090189	0.086103	0.031273	1.047462	2.883923
EW	0.151988	0.095884	0.075325	0.027366	1.272951	3.503744
Mkt Cap	0.1827	0.126597	0.074752	0.013978	1.693547	9.05694

5-Year Data for Dow Jones Industrial Average							
Dividend-Adjusted				Stock Price			
	90-94	95-99	00-04		90-94	95-99	00-04
Rf	0.067518	0.058962	0.041832	Rf	0.067518	0.058962	0.041832
ROR	**90-94**	**95-99**	**00-04**	**ROR**	**90-94**	**95-99**	**00-04**
EW NO RE	0.184008	0.383077	-0.02705	EW NO RE	0.152574	0.3521	-0.03348
EW	0.189495	0.33513	0.023813	EW	0.161147	0.306023	0.008106
mkt cap	0.189505	0.407163	0.027108	mkt cap	0.178625	0.380241	0.016936
Excess Ret	**90-94**	**95-99**	**00-04**	**Excess Ret**	**90-94**	**95-99**	**00-04**
EW NO RE	0.11649	0.324115	-0.06888	EW NO RE	0.085056	0.293138	-0.07531
EW	0.121977	0.276169	-0.01802	EW	0.093628	0.247061	-0.03373
mkt cap	0.121986	0.348202	-0.01472	mkt cap	0.111107	0.32128	-0.0249
Std Dev	**90-94**	**95-99**	**00-04**	**Std Dev**	**90-94**	**95-99**	**00-04**
EW NO RE	0.070723	0.083279	0.072234	EW NO RE	0.07234	0.09121	0.073579
EW	0.072964	0.070588	0.067891	EW	0.07351	0.07086	0.069508
mkt cap	0.063687	0.074521	0.056466	mkt cap	0.069869	0.074925	0.058683
Downside	**90-94**	**95-99**	**00-04**	**Downside**	**90-94**	**95-99**	**00-04**
EW NO RE	0.002097	0.000296	0.016559	EW NO RE	0.003107	0.000586	0.01796
EW	0.002324	0.000227	0.010786	EW	0.002564	0.000484	0.014001
mkt cap	0.0012	0.000103	0.005291	mkt cap	0.001865	0.000234	0.007273
Sharpe	**90-94**	**95-99**	**00-04**	**Sharpe**	**90-94**	**95-99**	**00-04**
EW NO RE	1.647132	3.891943	-0.00498	EW NO RE	1.175789	3.213893	-0.00554
EW	1.671738	3.912383	-0.00122	EW	1.273676	3.486612	-0.00234
mkt cap	1.915403	4.67254	-0.00083	mkt cap	1.590226	4.288026	-0.00146
Sortino	**90-94**	**95-99**	**00-04**	**Sortino**	**90-94**	**95-99**	**00-04**
EW NO RE	55.53779	1094.802	-0.00114	EW NO RE	27.37407	499.8925	-0.00135
EW	52.4864	1216.175	-0.00019	EW	36.52211	510.6799	-0.00047
mkt cap	101.6539	3388.334	--0.000078	mkt cap	59.58531	1374.093	-0.00018



would have even further exceeded the equal-weight portfolios had an estimate of the increased expenses involved with the rebalancing been included.

The accompanying graph is a visual representation of the relative market capitalizations of the securities by year over the test period. The relative portions of the stocks shift considerably over time. As the weightings of companies like Exxon (XOM) decreased during the market bubble in favor of companies like Microsoft (MSFT) that trend has recently reversed.

Although only including stocks that comprise the Dow does positively skew performance, it should have little effect on the relative performance of market capitalization versus equal weighting if the indexes are constructed from the same securities.

Conclusion

Indexes weighted by market capitalization will inevitably favor those securities that are in favor and therefore selling at higher prices. Such momentum would intuitively bring about greater risk and lower returns than an index that is regularly rebalanced. Based upon the research conducted for this article, though, this did not prove to be the case.

By allowing those outperforming securities to become an increasing portion of the portfolio, the market-capitalization index was able to outperform its equal-weighted peers on both a total return and risk-adjusted basis. Not only does the market capitalization methodology bring about increased performance, but it also does so without the increased costs of an equally-weighted index, and therefore represents a more advantageous strategy to utilize when constructing indexes.

Endnotes

[1] All Treasury information was obtained from the Federal Reserve at www.federalreserve.gov