

Pension fund management

New Equity Index May Overcome Problems of Capitalization-Weighted Indexing

by Shingo Ide
side@nli-research.co.jp

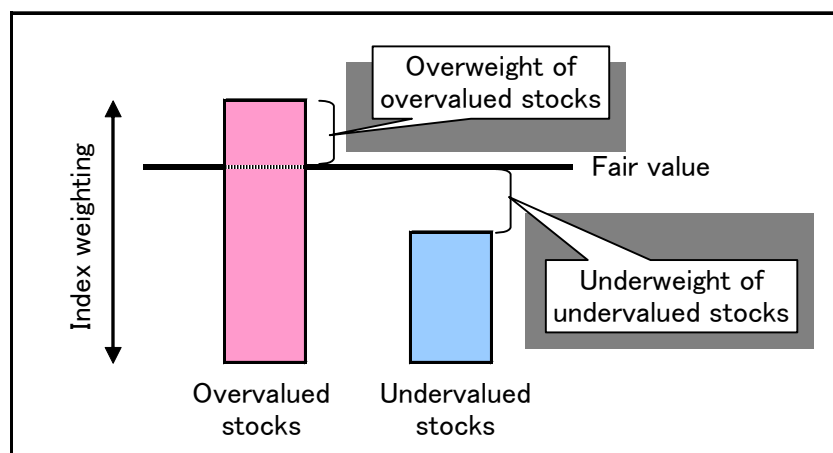
We apply a new indexing method developed in the U.S. to Japanese equities. Backtesting of the new index indicates a significant improvement in risk-return efficiency over the TOPIX index. While TOPIX is now the prevailing benchmark for equity investment, the new method offers an opportunity to consider alternatives.

Widely used benchmarks for equity investment such as TOPIX and MSCI (particularly in pension fund management) are capitalization-weighted indexes, in which components are weighted by market capitalization. The theoretical basis for this type of index was put forward by Nobel Prize winner William Sharpe in his capital asset pricing model (CAPM). The model states that from the perspective of the mean-variance approach, a total market portfolio that weights all risky assets by capitalization is the most efficient, and cannot be improved upon by any investor.

However, since a total market portfolio must include real estate and other assets, an equity index—which consists only of listed shares—does not satisfy the CAPM precondition. In fact, many academic studies have shown that capitalization-weighted indexes such as TOPIX are inefficient, and suggest that more efficient methods of indexing are possible. In this context, Robert Arnott and others in the U.S. have developed a new concept for an equity index.

The new concept addresses a major problem of capitalization-weighted indexing—that is, since a capitalization-weighted index structurally overweights all overvalued stocks, and underweights all undervalued stocks, price corrections toward fair value reduce the index return (Exhibit 1). Arnott aims to alleviate this problem using weights based on fundamental company size. The key point here is that the weighting is isolated from stock prices.

Exhibit 1 Problem with Capitalization-Weighted Indexing

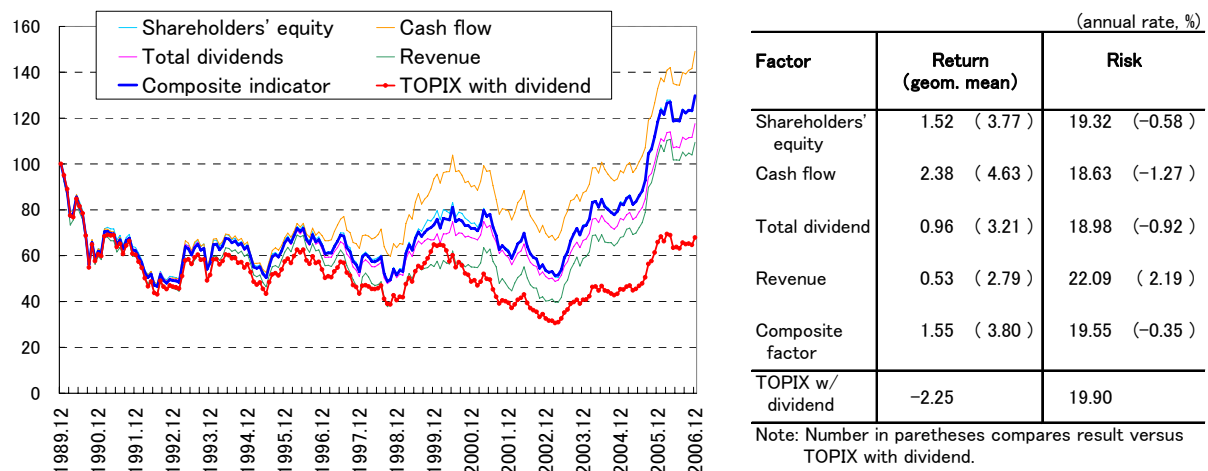


Specifically, the new indexing method replaces market capitalization with fundamental factors such as shareholders' equity, cash flow, revenues, total dividends, and number of employees. Four of these factors (excluding number of employees) are then combined into a composite factor. Studies of U.S. equities have shown that the new index outperforms the S&P

500 index by approximately 2% annually. Moreover, similar studies on global equities report that the new index also outperforms the MSCI and FTSE global indexes by over 2%.

We applied the new indexing method to Japanese equities (100 = TOPIX peak reached at the end of 1989; Exhibit 2). The individual factors and composite factor all exceeded the TOPIX peak approximately one year ago, even outperforming the TOPIX with dividend (Exhibit 2). In addition, except for the revenue factor, the risk exposure (standard deviation of monthly returns) is below that of the TOPIX with dividends. These results suggest that the new indexing method offers greater risk-return efficiency in the long-term.

Exhibit 2 Fundamental-Weighted Index of Japanese Equities



The composite factor is compiled by calculating the simple average of component weights from each index (adjusted so that the final weight adds up to 100%). While the equal weighting of the four factors is simple and straightforward, there is no guarantee that it properly reflects the concept of fundamental company size.

However, by backtesting, it is possible to reformulate the composite factor to outperform the equal-weight composite factor. Using a proprietary method, we adjusted weights so as to extract the fundamental company size more faithfully, and improved the risk-return efficiency (Exhibit 3).

Exhibit 3 Adjusted-Weight Composite Factor

	Return (geom. mean)	Risk
Composite factor (equal weight)	1.55 (3.80)	19.55 (-0.35)
Composite factor (adjusted weight)	1.81 (4.07)	19.15 (-0.75)
TOPIX w/ dividend	-2.25	19.90

Note: Number in parentheses indicate difference versus TOPIX with dividend.

While our adjusted-weight composite factor alters the weighting of individual factors, improvements to the individual factors should further enhance risk-return efficiency.