Considering the Free Float-Adjustment of the TOPIX — The Need for a New Index and Possible Effects of Implementation

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1. Introduction

The two most prominent stock market indexes in Japan are the Nikkei 225 Average and Tokyo Stock Exchange Stock Price Index (TOPIX). The significant revision of the Nikkei Average in April 2000, and its large impact on the stock market, are still fresh on the market's mind. Meanwhile, a new debate has erupted over the TOPIX — whether to correct its shortcomings as a benchmark for asset management by adjusting for free float shares. Doing so could cause some turmoil in the stock market as institutional investors such as pension funds and life insurers readjust their portfolios.

This paper briefly describes the nature of the debate, and attempts to measure the impact of such a change of TOPIX on portfolios as well as on the market.

2. Recent Trends in Stock Market Indexes

(1) The Major Indexes

Because of conceptual differences, stock market indexes vary widely in their target market, number of stock issues included, and calculation method used.

The Nikkei 225, which averages the stock prices of 225 issues selected according to industry balance and market valuation, is the most widely know index in Japan. The TOPIX reflects the total market valuation (number of listed shares times market value) of the First Section of the Tokyo Stock Exchange, and is a widely used benchmark by institutional investors.

The major stock indexes abroad include the Dow Jones Industrial Average (DJIA), Nasdaq (OTC market) Composite, S&P 500 in the U.S., and FTSE 100 in the U.K. In addition, the MSCI index (maintained by Morgan Stanley Capital International) is a widely used benchmark for institutional investors

not only in the U.S and Europe, but for many pension funds in Japan with internationally diversified investments.

(2) Recent Developments in Stock Market Indexes

Broadly speaking, there are two ways to calculate stock indexes. One is to use the average stock price, such as with the Dow Industrial and Nikkei 225 indexes. The other is to use a weighted average of market capitalization, such as with the TOPIX, S&P 500, and MSCI indexes. Many weighted average type indexes are calculated using either the number of outstanding shares or number of listed shares. However, several experts have pointed out that adjusting for the free float would make stock indexes a more appropriate benchmark.

In fact, a global movement is underway to make adjustments for the free float. For example, the S&P/TOPIX 150 — developed jointly by the Tokyo Stock Exchange and Standard & Poors — uses independently calculated free float ratios in the index calculation. FTSE International of the U.K. and Dow Jones of the U.S. have announced stock indexes with free float-adjustment. Furthermore, as described later, MSCI is shifting to free float-adjusted indexes.

Figure 1 Major Stock Indexes in Japan and the U.S.

Stock index	Number of issues	Weighting method	Target market	Index manager
Japan				
Nikkei 225 Stock Average	225	Stock price average	TSE 1st section	Nihon Keizai Shimbun
TOPIX	Approx. 1450	Weighted average of market cap	TSE 1st section	Tokyo Stock Exchange
Nomura 400	400	Weighted average of market cap	TSE 1st section	Nomura Securities Financial Research
J30	30	Stock price average	Mainichi Newspapers	Mainichi Newspapers
U.S.				
Dow Jones Industrial Average	30	Stock price average	All listed co., Nasdaq	Dow Jones Co.
S&P 500	500	Weighted average of market cap	All listed co., Nasdaq	Standard & Poors Co.
Nasdaq Composite	Approx. 4,200	Weighted average of market cap	Nasdaq	NASD
Russell 3000	3,000	Weighted average of market cap	All listed co., Nasdaq	Frank Russell Co.

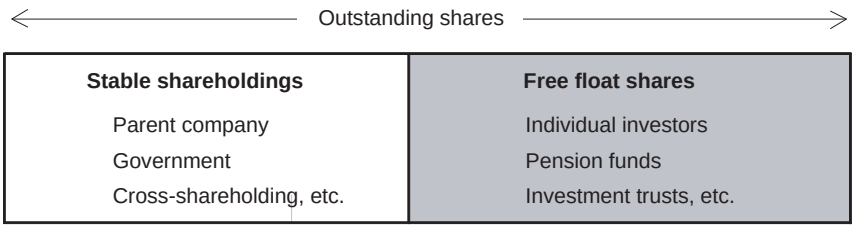
Note: Number of issues varies in the TOPIX and Nasdaq Composite.

3. Rationale for Free Float-Adjustment

(1) Definition of Free Float

The free float is generally defined as the number of outstanding shares minus shares that are restricted from trading. The free float ratio is the proportion of free floating shares in outstanding shares. Shares that are restricted from trading are called stable shareholdings, and include cases such as shares held by a parent company for control of a subsidiary, shares held by the government, and cross-shareholdings among companies.

Figure 2 Relationship Between Stable Shareholdings and the Free Float



Source: NLI Research Institute

(2) Need for and Implications of Free Float-Adjustment

Below we discuss what free float-adjustment means for an index and why it is needed by considering the case of TOPIX.

At present, the TOPIX includes all issues on the TSE First Section[1] and is calculated by multiplying each issues's stock price by the number of listed shares[2] to obtain market capitalization, and then indexing the aggregated capitalization. A particular issue's constituent weighting thus increases with the number of shares. The TSE, who manages TOPIX, explains that an issue’s impact on the overall index reflects the extent to which it is being held. As an index to gauge overall market trends, the calculation method makes sense. But it is inconvenient as a benchmark for pension funds and other institutional investors.

For example, NTT Docomo is the largest company in the TSE First Section, comprising 5.4 percent of total market capitalization as of the end of 2000 (Figure 3). Meanwhile, its largest shareholder is NTT, who holds a 67 percent stake as of September 2000 (Figure 4). NTT owns the shares to maintain control of NTT Docomo, rather than as a portfolio investment that might be traded in the future. Since TOPIX includes such shareholdings, it is not an “efficient” portfolio in the sense of maximizing returns for a given risk level. Experts point out that active managers who regard TOPIX as a bench-

mark have an inefficient portfolio as a target. Below we examine this statement in more detail.[3]

Consider NTT Docomo once again. Suppose you are an active manager who is judged by your performance against TOPIX. For simplification, assume that only NTT Docomo shares are subject to stable shareholding, and that all outstanding shares of other issues are free floating. If you have a neutral rating for NTT Docomo's share price, what weighting would you assign to NTT Docomo in your portfolio? Since your benchmark is TOPIX, which has a 5.4-percent weighting, you too would probably have a 5.4-percent weighting. However, since NTT holds two-thirds of the outstanding shares, only one-third of NTT Docomo's shares are actually being traded. Thus from the market's perspective, the actual weight of NTT Docomo is 1.8 percent (one-third of 5.4 percent). As a result, your NTT Docomo position would be overweighted (and hence your other positions underweighted), which contradicts your rating. The same type of contradiction arises no matter what your rating; only by adjusting for the free float can you resolve the problem.

However, the present stock index is not necessarily inappropriate for all investors. As explained earlier, stock indexes come in a variety of types, and have different uses depending on the objectives and applications. All we are saying here is that the index is inadequate as a benchmark for investors.

Figure 3 Top Five Issues by Market Capitalization in TOPIX

Issue	Weight
NTT Docomo	5.35%
Toyota Motor	3.87%
Sony	2.05%
NTT	2.04%
Mizuho Holdings	1.85%

Source: NLI Research Institute

Figure 4 Major Shareholders of NTT Docomo

Major shareholder	Ownership ratio
NTT	67.1%
Sumitomo Trust Bank Trust	2.1%
State Street Bank & Trust	2.1%
Mitsubishi Trust Bank Trust	1.9%
Toyo Trust Bank Trust A	0.8%

Note: As of end of September 2000.
Source: Toyo Keizai Shinposha, *Company Handbook.*

4. Impact on Japan's Stock Market

Thus far we have discussed the significance of free float-adjustment[4] in stock indexes and the need to do so. Below we calculate a free float-adjusted TOPIX, and compare it with the present TOPIX.

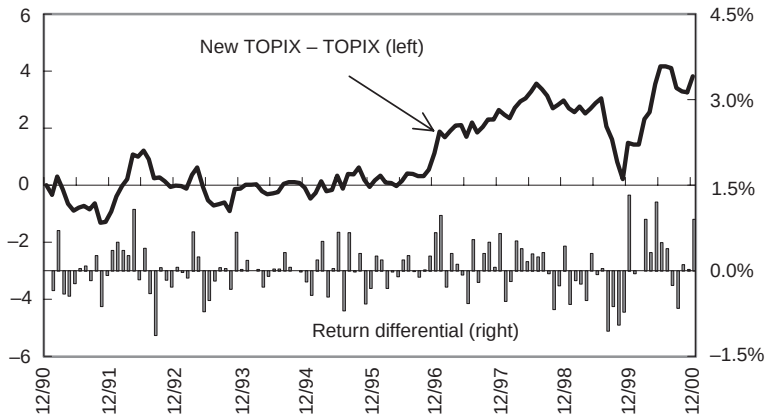
(1) Calculation of a Free Float-Adjusted TOPIX

To recalculate the TOPIX with free float-adjustment (called the revised TOPIX below), we estimated free float ratios for all issues as of each fiscal yearend in March, and applied the ratios from August to the following July. All other calculation methods are the same as for TOPIX. The August starting date was chosen based on the availability of financial statements.

In estimating free float ratios, we defined stable shareholding to include the following: (1) confirmed cross-shareholdings among listed companies nationwide, (2) one-sided shareholdings involving financial institutions, (3) shareholdings of listed companies in affiliates, (4) shareholdings of the five largest shareholders (excluding foreign banks and special accounts of life insurers), and (5) shareholdings of holding companies. However, all shareholdings of trust banks are counted as free floating shares even if they fall into the above categories. This is because much of the holdings are not stable shareholdings — such as holdings of investment trusts and pension trusts — but cannot be separated out and identified from publicly available data. The first three categories correspond with stable shareholding data in the *Survey of Cross-Shareholding* conducted annually by NLI Research Institute. To calculate free float ratios, we used the portfolio data in Yuka Shoken statements (obtained from attachments to the *Yuka Shoken Hokokusho*, and Nikkei Quick Joho), and Toyo Keizai Shinposha's *Major Shareholders Data*.

In Figure 5, the TOPIX and revised TOPIX are charted from December 1990 to December 2000. Their statistical values are shown in Figure 6.

Figure 5 Return Differential Between TOPIX and Revised TOPIX



Notes: Line graph shows return differential (revised TOPIX minus TOPIX) after both indexes have been standardized to December 1990 = 100. Bar graph shows differential in monthly returns.
Source: NLI Research Institute

Figure 6 Risk/Return Comparison of TOPIX and Revised TOPIX

(Annual rate)

	TOPIX	Revised TOPIX
Return	–2.6%	–2.2%
Risk	19.7%	19.2%
Return / risk	–0.13	–0.12

Notes: From December 1990 to December 2000. Risk is standard deviation of monthly returns.
Source: NLI Research Institute

(2) Performance of Stock Indexes

According to the simulation results, the revised TOPIX slightly outperforms TOPIX in both return and risk. Can the improved performance be attributed to the free float-adjustment?

Let us consider several factors. First, in terms of index returns, issues with above-average free float ratios will have higher weights after adjustment. Thus a price increase in these stocks would lift the revised TOPIX more than TOPIX, while a price decline would cause a larger decline. On the other hand, the free float-adjustment decreases the weighting of issues with below-average free float ratios.

Next we look at this relationship by sector. Figures 7 and 8 show trends in market capitalization weighting and free float ratio for four major sectors, while Figure 9 shows the revised TOPIX's relative performance by sector.

As Figure 8 shows, only the free float ratio for the electrical equipment sector consistently exceeds the average. Simply stated, the revised TOPIX was significantly boosted by strength in the electrical equipment sector (compared to TOPIX), while stock price increases in other sectors had a smaller effect (and even negative compared to TOPIX).

As Figure 9 shows, in 1997 — when credit instability was growing — the revised TOPIX outperformed TOPIX by 2 percentage points. This can mainly be attributed to the strong outperformance of the electrical equipment sector (high free float ratio) and the underperformance of the banking sector (low free float ratio). Then in the so-called IT bubble year of 1999, when the communications sector (low free float ratio) led the stock market upward, the revised TOPIX trailed TOPIX by 4.9 percentage points. In 2000, on the other hand, when the communications sector lagged far behind TOPIX, the revised TOPIX led TOPIX 2.7 percentage points.

As these results show, free float-adjustment of the stock index does not always boost return or risk (volatility).

Figure 7 Market Capitalization Weighting of Selected Sectors

(%, at yearend)

	93	94	95	96	97	98	99	00
Electrical equipment	10.2	11.0	11.6	12.5	15.1	14.8	21.8	18.7
Banks	24.6	23.2	23.3	20.0	15.8	12.3	10.1	10.4
Communications	1.5	1.6	2.0	2.4	2.8	6.1	14.5	8.5
Transport equipment	6.7	7.5	9.6	9.6	11.0	8.9	7.3	8.3

Note: The sharp increase in the communications sector's weighting in 1998 was due to the listing of NTT Docomo (October 1998).
Source: TSE, *Securities Statistics Monthly.*

Figure 8 Free Float Ratios of Selected Sectors

(%, as of March)

	93	94	95	96	97	98	99	00
Electrical equipment	60.6	62.5	64.5	64.5	67.1	66.3	71.0	73.3
Banks	40.6	41.3	40.8	42.5	45.0	47.3	46.6	52.4
Communications	84.3	86.5	81.1	78.0	80.5	55.3	46.7	50.1
Transport equipment	53.5	53.9	54.9	54.8	54.8	53.8	55.8	57.7
Overall average	54.4	55.4	55.2	56.8	58.1	58.3	58.6	62.9

Source: NLI Research Institute

Figure 9 Excess Returns of the Revised TOPIX by Sector (vs. TOPIX)

(%, as of March)

	93	94	95	96	97	98	99	00
Electrical equipment	11.0	8.7	0.9	8.7	16.6	1.3	76.9	-8.9
Banks	0.7	–5.6	1.2	–11.9	–15.7	–17.0	–27.3	5.9
Communications	(21.2)	(5.7)	–(5.3)	(6.7)	(15.2)	–(6.1)	193.5	–30.1
Transport equipment	3.8	12.2	31.4	31.4	12.8	–7.7	–27.4	14.9
Revised TOPIX	–0.1	0.1	0.0	1.3	2.0	0.7	–4.9	2.7

Notes: Circle indicates a positive effect on excess returns, triangle a negative effect. For the communications sector up to 1998, numbers are in parentheses to indicate the sector's minor effect on the index.
Source: Sector returns are from TSE, *Index Report.*

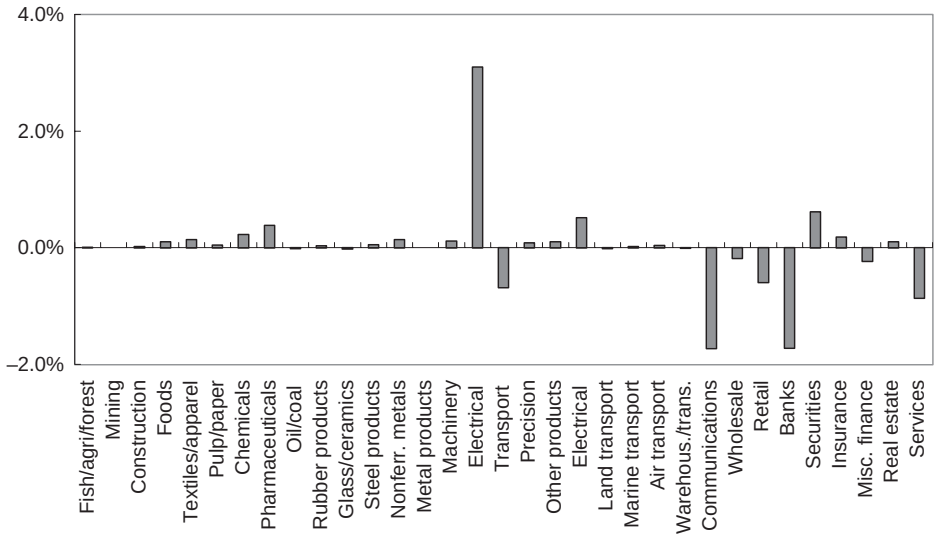
(3) Impact on Portfolios and the Market

We next consider how a passively managed index portfolio that aims to duplicate TOPIX returns would be affected by switching to the revised TOPIX benchmark.

Figure 10 shows the differences in industry weightings of the two indexes (revised TOPIX minus TOPIX; as of December 2000). Weights change in all industries, passive managers must reduce their positions in some sectors (communications, banks, transportation equipment, retail, services, etc.) and increase them in others (electrical equipment, etc.) However, these changes represent relative and average directions for each sector, and do not mean that all issues in a sector must be bought or sold without exception. The absolute value of the weighting changes adds up to approximately 22.2 percent, which is the turnover (value of transactions divided by value of portfolio) necessary for passive managers using a full replication method to adjust their portfolios.[5] The transaction fees and costs involved would be far from negligible.

In addition, if institutional investors rushed to adjust their portfolios to reflect the constituent weighting in the revised TOPIX immediately after its announcement, the impact of such transactions the market would be temporary but significant.

Figure 10 Difference in Weighting Between the Revised TOPIX and TOPIX



Note: As of December 2000. Weighting difference = Revised TOPIX – TOPIX
Source: NLI Research Institute

5. Revision of MSCI Index Methodology

(1) Description of MSCI Indexes

Morgan Stanley Capital International manages dozens of indexes including country indexes, region indexes and the All Country World Index (ACWI). These indexes are widely used as benchmarks by institutional investors with globally diversified investments.

According to MSCI estimates, three to four trillion dollars in assets are managed globally using MSCI indexes as benchmarks (of which approximately 50 percent is in the U.S. market). Japan's market alone accounts for approximately 500 billion dollars.

(2) Index Revision and Its Impact

In December 2000, MSCI announced its decision to change the index construction methodology in two major ways: to implement free float-adjustment, and to increase target market representation from 60 percent of total market capitalization to 85 percent (Figure 11).

The changes will be implemented in two phases ending in November 2001 and May 2002. Approximately half the free float-adjustment and coverage expansion will be made in the first phase, and the remainder in the second phase. In preparation for the changes, the list of index constituents and their weightings will be announced by June 2001.

In the present MSCI index methodology, if both parent and subsidiary companies are listed, the subsidiary is excluded from the index to prevent double counting. The new changes will allow the subsidiary to also be included in the index. In addition, for issues subject to foreign investment restrictions, the lesser of foreign ownership limit or free float ratio will be applied. Thus the weighting of issues such as NTT is expected to decline.

According to media reports, in Japan's case free float-adjustment will cause an outflow of funds, while increased target market coverage will cause an inflow.[6] Together, the net effect to Japan's market is estimated to reach no higher than 400 billion yen.[7] More accurate estimates of the full impact will become available after the constituents and weightings are announced.

Figure 11 Implementation Timetable for Changes to the MSCI Index

Date	Event
Sept. 2000	Transition proposed, opinions gathered
Oct. 2000	Meetings held worldwide to explain proposal
Dec. 2000	Outline and schedule of changes are released
June 30, 2001	Announcement of composition of index and weighting
Nov. 30, 2001	Implementation of first phase
May 31, 2001	Implementation of second phase

6. Conclusion

The practice of cross-shareholding is in decline, due partly to new accounting rules for market valuation and retirement benefits. To alleviate the negative effect that unwinding of cross-holdings has on

stock prices, measures being considered include share buybacks and lifting the ban on treasury stocks. As the structure of shareholding changes, should the market come to doubt the appropriateness of TOPIX as a benchmark, a new stock index will quickly emerge to take its place. However, any new index must be approached carefully, since its composition and balancing will significantly impact investors' portfolios and the overall market. The debates surrounding the Nikkei 225's overhaul last April serve as an important lesson.

Needless to say, should a new index emerge, investors must determine for themselves whether to adopt a new benchmark, what timetable to use, and whether to make the transition in phases or all at once.

In addition, free float-adjustment will require that free float date be obtained speedily and accurately. This will rest on more active disclosure of shareholder and shareholding data by companies.

Notes

1. Excludes preferred securities, post-allocation issues, and newly listed issues that have not yet been included in the index.

2. Formally called number of listed shares for calculating the stock index. Except for companies that issue preferred stock and deferred stock, and companies that do not list government owned shares (NTT and JT), it is basically equivalent to the number of outstanding shares.

3. See Takao Kobayashi and Hiroyuki Yamada, "Does the Listing of Parents and Subsidiaries Cause Market Distortion?" *Shoken Anarisuto Janaru* (Securities Analyst Journal), November 2000, pp. 40-54.

4. Because of the great difficulty (near impossibility) of ascertaining "true free float shares," all references here are actually to free float estimates.

5. In full replication, the portfolio manager adopts the same constituents and weightings as the index in question.

6. In Japan, since free float ratios are relatively low due to cross-holdings and other factors, free float-adjustment would cause an outflow of funds. On the other hand, expanded target market coverage would cause an inflow of funds from the increase in number of included issues.

7. *Nihon Keizai Shimbun*, December 12, 2000. Estimates are as follows: Goldman Sachs, 400 billion yen; Nomura Securities, 350 billion yen; Morgan Stanley Dean Witter, no effect.