SPECIAL FEATURE—Indexing and Benchmark

Abnormal Returns on New Additions to TOPIX
—From the Perspective of an Index Fund Manager—

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Analysis of the performance of stocks before and after the Effective Date of their being included in the Tokyo Stock Exchange Price Index (TOPIX) showed that they generated abnormal returns and that this can be ascribed to their being added to the index. Given this observation, the investment behavior of TOPIX-tracking funds may not always bring optimal long-term returns for sponsors. This has not been discussed under the conventional indexing evaluation framework, and we thus think it necessary to further explore this observation.

1. Introduction

Stock index management (hereinafter "indexing") aims to replicate the performance of a selected index (hereinafter "index") such as TOPIX (Tokyo Stock Exchange Price Index) and the Nikkei Stock Average. This has recently been highlighted as a stock management approach appropriate for the investment of funds with a long-term horizon, including pension funds.

Indexing is predicated on index development rules for the selected index and is designed to systematically replicate the performance of such index. Active management aims to generate a return exceeding the market by selecting individual stocks, etc. In contrast to active management, indexing style is passive. No portfolio investments are replaced as a result of an investment decision. Thus, trading turnover is so low in general as to bring a reduction in transaction costs. No infrastructure such as a research department is needed to arrive at investment decisions, which ensures lower management fees. Therefore, the total cost of indexing is lower than that of active management. Passive management is considered to have a significant cost advantage over active management.

An index is intended to reflect overall changes in the market. Its value is calculated by summing up the prices of all the constituent stocks according to specified criteria. The obtained value is adjusted to compare with the previous level. It should be noted that the constituent stocks and the weighting used for summing up stock prices, etc., are not always constant because they are affected by the addition or deletion of constituent stocks and also corporate action such as an increase or reduction in capital, stock splits, and mergers. Thus, ordinary and simple buy-and-hold management is unable to replicate the performance of an index over a long period of time.

Accordingly, decisions to buy and sell must instantly respond to the targeted index levels in indexing when an event affecting the index occurs. This is true not only with pure index players such as pension funds or investment trusts, but also traders

pursuing arbitrage between futures and cash, including the TOPIX and the Nikkei Stock Average.

Market players acknowledge that adding stocks to or deleting them from an index is a significant factor in itself, and the replacement of stocks in an index has gained wide acceptance with respect to TOPIX, the Nikkei Stock Average, the MSCI Index, etc. When such a factor emerges, it attracts the attention not only of index players but also of other market participants.

This paper analyzes changes in stock price, highlighting the replacement of stocks in an index and discusses the impact that it has on index management. TOPIX was used in this analysis because it is applicable to many types of index management, including indexing for pensions. Deletion and replacement of stocks in TOPIX is mainly due to delisting as a result of bankruptcy, corporate merger, etc. Stock price fluctuation is not considered the result of the replacement of the constituent stocks of the index. Therefore, only stocks new to TOPIX are subject to analysis in this paper.

2. Scope of Analysis

Analysis in this paper is limited to changes in stock price and volume the preceding and following days on which the following stocks were added: those stocks newly listed on the TSE (Tokyo Stock Exchange) First Section from February 1, 2000 to December 5, 2000. The analysis covers 104 stocks, with the exception of Mizuho Holdings, which were transferred to the First Section during the period. Before being added to the index, they had been listed on their respective markets and, among others, 68 on the TSE Second Section. TSE is at the top of the list, followed by other exchanges such as the Osaka Stock Exchange and the Nagoya Stock Exchange. Some 17 stocks were listed on these exchanges, 13 as over-the-counter stocks, and six directly listed on the TSE First Section. A breakdown by size in the RUSSEL/NOMURA Indexes is as follows. TOP (large capitalization) includes two stocks, MID (middle capitalization) 16, and SMALL (small capitalization) 81. The other unknown five stocks are also classified as SMALL, in general, based on their market capitalization (see Table 1). A simple summing up of capitalization shows that it was around 5.4% at the time the respective stocks were added to TOPIX.

For analysis of stock price change, the change in daily closing price was measured as basic data. The period of analysis begins on the date when the individual stocks were included in the calculation of TOPIX, which is considered the zero-point day (hereinafter the “Effective Date”). The period spans 20 days, beginning 10 business days preceding the Effective Date and ending the 9th business day after. TSE closing prices on the day previous and after the Effective Date were applied to the period. The closing prices on their respective stock exchanges prior to the second day before the Effective Date (if a stock had been listed on one or more markets, a representative market was chosen) were applied for the period. A total of 104 stocks were added to TOPIX on different dates. Excess return (against TOPIX, calculated by deducting TOPIX price change from the stock price change in each stock〈percent basis〉) was used to analyze the stock price change of these 104 stocks under the same conditions.

Volume analysis also covered this 20-day period. The period begins on the 10th business day preceding the Effective Date and ends on the 9th business day after. Daily volume is measured as the total of all stocks traded on the Tokyo, Osaka, and Nagoya stock exchanges, and the respective over-the-counter stock markets. Those traded on other local exchanges and between institutional investors and brokers were excluded. If there had been a stock split during the period, adjustments were made accordingly. To adjust for the differences in number of outstanding shares among issuers and the markets where shares were

Table 1 Attributes of Stocks Analyzed

Number of stocks	104	
Scope	Stocks listed on or transferred to TSE First Section, except “Mizuho Holdings”, during the period from February 1, 2000 to December 5, 2000.	
Stock exchange	TSE Second Section	68 stocks
	Non-TSE	17 stocks
	Over-the-counter	13 stocks
	TSE First Section direct listed	6 stocks
Size *	TOP	2 stocks
	MID	16 stocks
	SMALL	81 stocks
	Non-classified	5 stocks

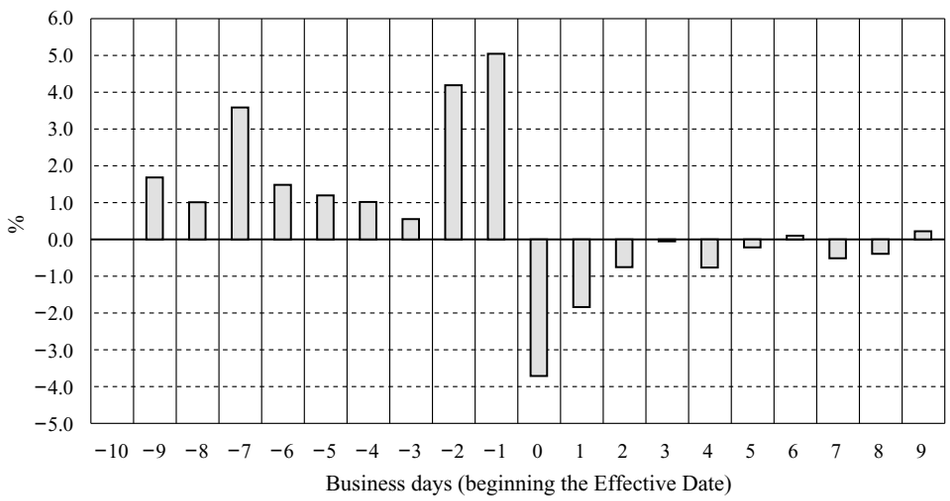
* Based on the RUSSEL/NOMURA classification. Stocks not classified had been excluded from the 2001 population of sample stocks because they were too small or had just been listed.

Table 2　Rules for Addition to TOPIX

	Effective date	Stock price used for revising reference market capitalization
Transfer from TSE Second Section	Date of transfer	Stock price before the transfer date
Transfer from non-TSE exchange	Day following transfer	Stock price on the transfer date
Transfer from OTC market	Day following transfer	Stock price on the transfer date
Direct listing on TSE First Section	Next business day after the corresponding date the next month of the listing date	Corresponding date the next month of the listing date

Source: Table developed based on TSE materials.

Figure 1　Average Excess Return against TOPIX



traded, this analysis used the ratio obtained by dividing the volume at each point by daily average volume for five days. This ratio was calculated by dividing volume at each time with the daily average volume for a five-day period. The period begins on the 16th business day before the Effective Date and ends on the 12th business day preceding it.

The Effective Date is based on the date of listing on the TSE First Section. The rule regarding the respective dates is indicated in Table 2 below. These dates represent the date of transfer from the TSE Second Section, the listed date from non-TSE exchange or over-the-counter market, and the TSE First Section direct listing date. The Effective Date of stocks directly listed on the TSE First Section used to be prescribed as “the first business day following the newly listed date” as in the case of other listed stocks. However, for all stocks listed on or after April 1, 2000, this has been revised to “the next business day of the corresponding date in the next month following the month when the stock was newly listed.” In addition, a one-month period preceding the Effective Date has been designated as the transaction period. In this paper, all six TSE First Section directly listed stocks have been added to TOPIX according to this new rule.

3. Price Performance of Stocks Before and After Effective Date of Being Added to TOPIX

In Figure 1, the average excess return against a TOPIX of 104 stocks subject to the analysis is plotted by business day originating from the Effective Date as the zero-point day.

Figure 2 shows the cumulative value of average excess returns on the respective business days as plotted in Figure 1. They are accumulated beginning on the 11th business day preceding the Effective Date.

These figures illustrate that positive excess returns were generated, and were significant on the two business days preceding the Effective Date. The excess return on the first date of the two was an average 5.04% and on the second date 4.21%. The positive excess returns were created long before the Effective Date. As for TSE First Section directly listed stocks, the Effective Date is usually notified at least one month before. In other cases, the Effective Date is officially announced one or two weeks before. Thus, it is acknowledged that stock price reaction upon the disclosure of the Effective Date might have led to the positive excess return long before the Effective Date.

Figure 2　Cumulative Average Excess Return

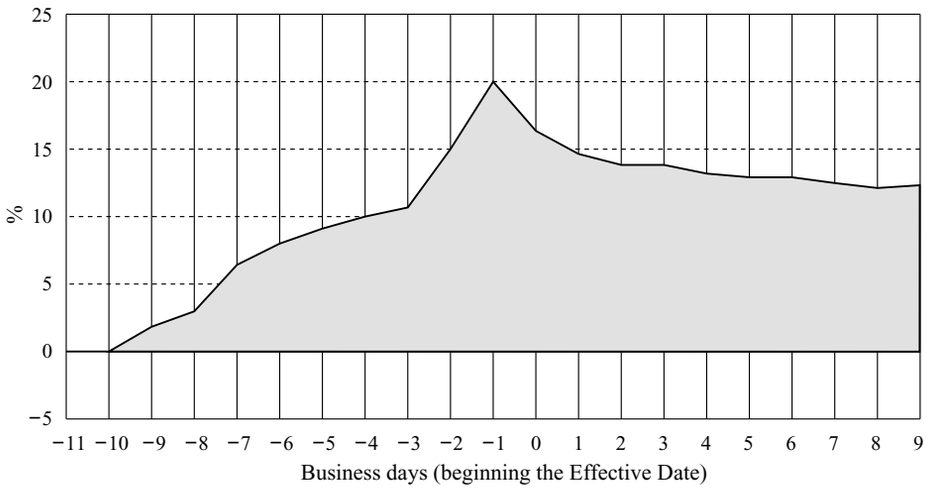


Table 3　Distribution of Cumulative Excess Returns

(A) Before Date Added to TOPIX	
Range	No. of Stocks
55% or more	3
50% min. － below 55%	3
45% min. － below 50%	1
40% min. － below 45%	5
35% min. － below 40%	3
30% min. － below 35%	9
25% min. － below 30%	11
20% min. － below 25%	11
15% min. － below 20%	15
10% min. － below 15%	19
5% min. － below 10%	15
0% min. － below 5%	6
-5% min. to below 0%	2
Below -5%	1

(B) After Date Added to TOPIX	
Range	No. of Stocks
30% or more	1
25% min. － below 30%	0
20% min. － below 25%	0
15% min. － below 20%	1
10% min. － below 15%	2
5% min. － below 10%	1
0% min. － below 5%	13
-5% min. － below 0%	25
-10% min. － below -5%	23
-15% min. － below -10%	18
-20% min. － below -15%	11
-25% min. － below -20%	3
-30% min. － below -25%	5
Below -30%	1

On the other hand, negative excess return was observed after addition. The negative swing is relatively smaller compared with that observed in the days before the Effective Date. The largest average decline of 3.71% was recorded on the Effective Date, the second largest was -1.76% on the next day. Excess return was obviously impaired over time, in comparison to the positive excess return before addition observed during the same time horizon. The negative excess return was not so obvious from the 3rd business day following the Effective Date.

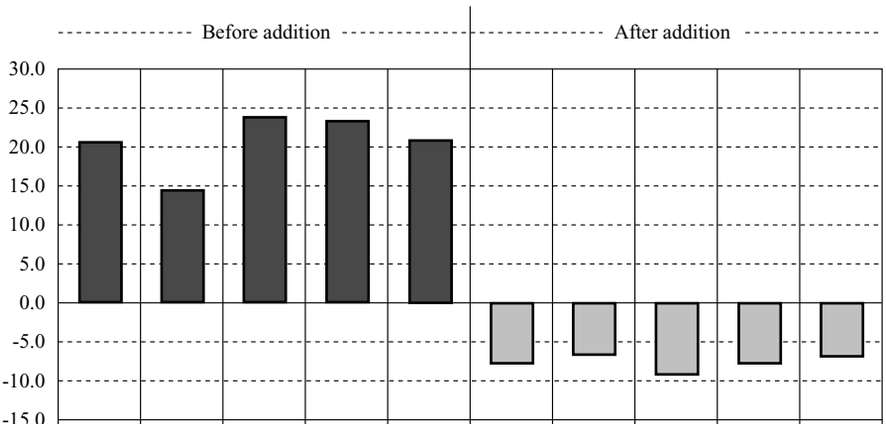
The next analysis was made with the cumulative excess return before and after the Effective Date. The cumulative excess return before the Effective Date was calculated by deducing the (geometric) cumulative rate of change in value of TOPIX from the (geometric) cumulative rate of change in the price of each stock during the same period. The period was set as starting on the 10th business day before the Effective Date and ending on the 1st business day before the Effective Date. The return after the Effective Date was calculated as described above. The period begins on the 10th business day before the Effective Date and ends on the 9th business day following.

Table 3 shows the distribution of cumulative excess returns (A) before the Effective Date and that of cumulative excess returns (B) after the Effective Date. Only three out of 104 stocks had a negative cumulative excess return before being added. Only 18 stocks (17% of all samples) had a positive excess return after being added.

The average cumulative excess return for the period before the Effective Date was 20.72%, and after the Effective Date, -7.42%.

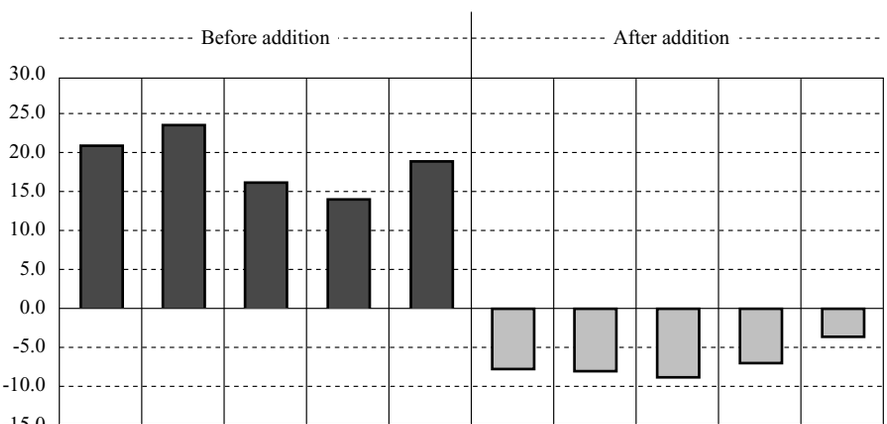
Figures 3 and 4 show the results from analysis of the average cumulative excess returns of listed stocks by such attributes as size at the time of addition and the market before their listing on the TSE First Section. The classification by size is based on

Figure 3 Average Cumulative Excess Return by Size



	Overall	1st quartile	2nd quartile	3rd quartile	4th quartile	Overall	1st quartile	2nd quartile	3rd quartile	4th quartile
Before addition	20.7	14.7	23.9	23.3	21.0					
After addition						-7.4	-6.3	-9.4	-7.4	-6.5

Figure 4 Average Cumulative Excess Return per Market Before Listing



	Overall	TSE 2nd Section	Other market	Over-the-counter	Direct listing	Overall	TSE 2nd Section	Other market	Over-the-counter	Direct listing
Before addition	20.7	23.5	15.5	13.9	18.7					
After addition						-7.4	-7.5	-8.5	-7.1	-3.7

the ratio of market capitalization of each stock on the day preceding its Effective Date to TOPIX market capitalization in order to eliminate the influence occasioned by differences among respective Effective Dates. Based on the ratio, the 104 stocks were divided into four quartiles of 26 stocks each. Those stocks with the highest ratio were included in the first quartile, and those with the lowest ratio in the fourth quartile.

Analysis revealed a trend in the excess return straddling the Effective Date that is common to both per size and per relevant market before listing. Regarding the differences due to attributes, excess return before the Effective Date in the first quartile containing larger stocks with the largest ratio was smaller than those in the other quartiles in the case of size. In the case of market before listing, the excess return of those stocks transferred from the TSE Second Section looks larger. On the other hand, the excess return of stocks directly listed on the TSE First Section looks smaller. However, it is difficult to tell whether there is any difference between markets because the number of samples has skewed distribution.

As for the stocks newly added to TOPIX, a positive excess return was observed until the day before they were added. A negative excess return was observed after they were added. On the 10th business day preceding addition to TOPIX, the average cumulative excess return was 20%. On the 10th business day after addition, the average was -7%. The fluctuation in return is significantly large for such a short period.

Regardless of the size or the relevant market before listing, there is a trend commonly observed in all newly added stocks, namely, the excess return before and after the Effective Date as observed in the analysis is not independent of being added to

TOPIX, which can be reasonably considered as an abnormal return ascribable to the addition.

4. Volume Trend Before and After the Effective Date

In this section, daily average trading volume is assumed to be normal for a period of five business days before disclosure of the addition. The period begins on the 16th business day before the Effective Date and ends on the 12th business day before the Effective Date. Analysis focused on changes from the assumed volume. The volume for 104 stocks at each point in this analysis disregards the number of outstanding shares and is expressed as a ratio (normal volume ratio) in multiples to normal volume. The above-mentioned period was selected for the calculation of normal volume because, in the case of transfer or listing from other markets, the official announcement of being added to TOPIX always comes one or two weeks before the Effective Date, unlike direct listing.

First, the normal volume ratio of all the stocks was averaged by business day and its development observed. In Figure 5, the Effective Date is fixed as day zero. The average normal volume ratio is plotted on a daily basis. In this figure, the volume of the newly added stocks increased substantially before or after the Effective Date. Volume on the day preceding the Effective Date reaches a peak of 13.5 times normal volume. On the Effective Date, volume is 6.4 times normal volume and on two days before 4.6 times. However, this rise in volume is not limited to the days preceding or straddling the Effective Date. Volume increased long before addition to TOPIX, as in the case of the abnormal return described in the previous section. Volume stayed at around double normal volume and plummeted only after the Effective Date. Still, volume remained at slightly less than 1.5 times normal volume even on the 9th business day after the Effective Date.

Table 4 shows the results from observation of volume (A) on the day preceding the Effective Date, and average volume (B) after the Effective Date.

Average volume after the Effective Date is average volume for five business days beginning on the 5th business day following the Effective Date and ending on the 9th business day following the Effective Date. Consequently, there was a tendency for a relatively moderate increase in average volume on the day preceding and following the Effective Date. Not a few large cap stocks attract public attention regardless of the previously traded market. On the other hand, many small cap stocks fail to attract interest until news of their transfer or listing on the TSE First Section is released, which is considered to have caused a moderate increase in trading volume. Average volume of the stocks directly listed on the TSE obviously was lower than normal volume after the Effective Date. Normal volume was calculated for directly listed stocks during a certain period when the volume of new stocks usually increases. During this period, information that a stock is being added to TOPIX is no longer a surprise. These three factors are all possible causes of underperformance.

The volume of newly added stocks significantly increases on the day preceding and the days straddling the Effective Date. This trend might result from the investment behavior of TOPIX-tracking funds. Under the TOPIX calculation rule, purchasing newly

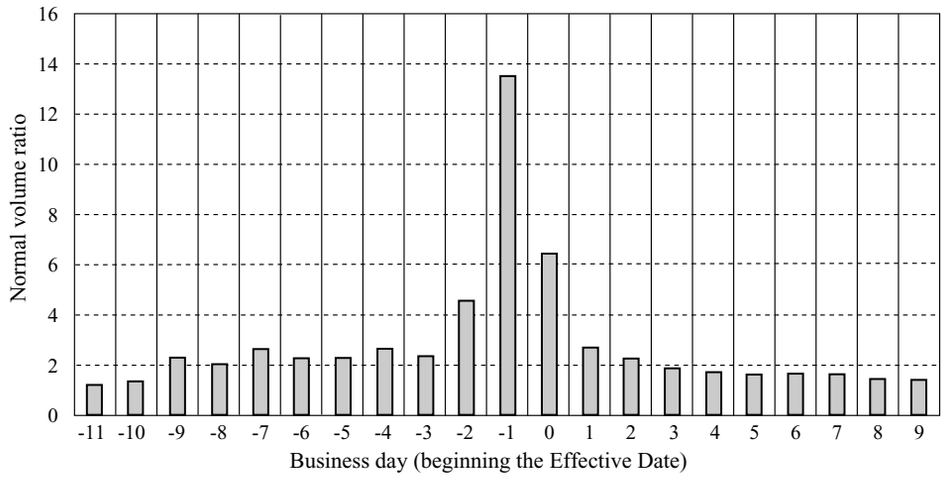
Table 4 Average Normal Volume Comparison by Attribute

(Times)

		Before date added to TOPIX (A)	Average volume After date added to TOPIX (B)
Total		13.48	1.60
Per market	TSE Second Section	13.01	1.68
	Other market	16.52	1.60
	Over-the-counter	14.62	1.60
	Direct listing	7.68	0.61
Per size	1st quartile	8.88	1.25
	2nd quartile	12.25	1.36
	3rd quartile	17.20	1.95
	4th quartile	15.59	1.83

Notes: 1 Average volume comparison for the period beginning the 16th business day preceding the Effective Date and ending the 11th business day preceding the Effective Date.
2 Size is classified into 1st to 4th quartiles in descending order.
3 Average volume after the Effective Date is the average for the period beginning on the 5th business day following the Effective Date and ending on the 9th business day following the Effective Date.

Figure 5 Average Daily Normal Volume Ratio



added stocks at the closing price on the day preceding the Effective Date should increase the accuracy of tracking the index. Therefore, an index manager who pursues a higher level of replication may be strongly motivated to purchase newly added stocks at a price with maximum proximity to the closing price on the day preceding the Effective Date. In contrast, ordinary investors do not always persist in trading with a similarly strong motive.

On the other hand, an increase in volume was observed earlier than the Effective Date. This was also seen in the lapse of time after the Effective Date. It is unlikely that these are the direct consequences of the investment behavior of index managers because replication accuracy may be compromised by action taken earlier than the day preceding the Effective Date. An increase in volume during the days preceding the Effective Date might include short-term trading by investors, who, based on past experience, expect price appreciation. The rise in volume after the Effective Date might be due in part to the higher name recognition that listing on the TSE First Section offers and to the broadening of the investor base.

Further increase in volume was seen over some period after the Effective Date, which means that at least a portion of the abnormal returns observed before and after the Effective Date can be interpreted as a liquidity premium for the increase in trade volume. On the other hand, it would be hard to provide justifiable explanation for the abnormal returns based solely on liquidity premium as long as the negative excess return is observed after addition to TOPIX and overly inflated excess returns are only seen for a very limited time.

5. "Invisible Costs" in Indexing

As described above, analysis of 104 stocks selected from those newly added to TOPIX in 2000 indicated the following : ① occurrence of an abnormal return with a peak on the day preceding the Effective Date, and ② an increase in volume during the period straddling the Effective Date. The extreme increase in volume on the day preceding the Effective Date suggests that TOPIX-tracking funds bought the newly added stocks with a strong intention to properly track TOPIX.

The trend mentioned under ① above actually exists. Whether it is consequential or not depends on if index managers continue to operate with the aim of achieving a high level of replication, as indicated by the above trend under ② . Discussion of the impact of both of these trends on indexing performance follows.

It should be noted here that index managers may well be habitually buying stocks newly added to TOPIX at the peak of abnormal return on the day preceding the Effective Date. If such investment behavior continues, performance may deteriorate. Nevertheless, the impact from such abnormal returns observed in this paper has rarely been brought to the attention of market participants. It is probably ascribable to the peculiarity of indexing because its performance is simply evaluated for its accuracy in replication with the index return.

Table 5 shows a simplified numerical sample to identify the point at issue. Let us assume that there are only two companies in the market, Company A and Company B. The index here is also assumed to be a market capitalization-weighted index such as TOPIX. Only Company A constituted the index at the beginning. Company B was newly added to the index according to its capitalization weight at X. X corresponds to the day preceding the Effective Date, as described in previous sections.

The price of the new stock, Company B, goes up from (X-T) to X. It will move down toward (X+T) after being added to the index. On the other hand, to keep the calculations simple, the stock price of Company A is assumed not to change before or after addition. The market capitalization of Company A and of Company B is assumed to be completely equal by (X+T). It is also assumed that there is no change in the capital structure of either company.

The initial budget for both companies is equal to 100 at (X-T) under the above-mentioned assumptions, with the exception of the point when Company B was added to the index. We will now examine three different investment approaches, assuming their inception at the following timing : (a) at the same point as the index, (b) at an earlier (X-T) than the index, or (c) at a later (X+T). We also assume that each manager in the above three cases, (a), (b), and (c), intends to build a portfolio replicating a capitalization-weighted index. In any of these cases, the weight of Company A and Company B will be the same as the index at 50:50.

Table 5 (a) shows the performance of the portfolio, where Company B is added at X, at the same timing as the index. The portfolio's performance in this case exactly matches the benchmark index, because no transaction costs are taken into account in this case. The performance of portfolio (a) was +0% from (X-T) to X, reflecting only the return from Company A. From point X to (X+T), performance was -20%, reflecting weight composition at X.

Table 5 (b) shows performance when Company B was added to the portfolio at (X-T) with the capitalization weighting at that point, earlier than the index. Performance (b) rises +25%, reflecting the rise in the price of Company B from (X-T). So, the portfolio outperformed the index by 25%. On the other hand, the performance of the portfolios respectively comprising companies A and B with equal weight from X to (X+T) were the same as the index at -20%.

Table 5 (c) shows performance of the portfolio when Company B was added at (X+T). Performance (c) was equal to the index at +0% during the period from (X-T) to X, as both the portfolio and index only held Company A. On the other hand, the

Table 5 Change in Performance According to When Stocks Added

Changes in Market Capitalization of Company A and Company B

	X−T	X	X+T
Company A's market capitalization	100	100	100
(Change)		(+0%)	(+0%)
Company B's market capitalization	100	150	100
(Change)		(+0%)	(-33%)

(At (X-T), Company A's capitalization = Company B's capitalization = 100)

(a) Where Company B is added at X (same calculation as index)

	X−T	X	X+T
A's equity	100	40	40
B's equity	0	60	40
Total	100	100	80
(Change)		(+0%)	(-20%)

(b) Where Company B is added at (X−T)

	X−T	X	X+T
A's equity	50	50	50
B's equity	50	75	50
Total	100	125	100
(Change)		(+25%)	(-20%)
Excess return		+25%	+0%

(c) Where Company B is added at (X+T)

	X−T	X	X+T
A's equity	100	100	50
B's equity	0	0	50
Total	100	100	100
(Change)		(+0%)	(+0%)
Excess return		+0%	+20%

portfolio's performance from X to (X+T) was 0%. The portfolio outperformed the index by 20% because the portfolio was not affected by the decline in Company B.

In terms of index tracking capability, portfolio (a) was the highest among the three portfolios as a matter of course, because it is fully in compliance with the rules of the index composition. On the other hand, in terms of performance, portfolio (a) was inferior to both (b) and (c). This is attributable to the fact that portfolio (a) missed the opportunities of obtaining profit from the rise in Company B as well as the opportunities for averting a loss caused by the fall in Company B's price from X to (X+T). The higher level of replication of portfolio (a) was achieved by sacrificing excess return against the index. This return might have been obtained from the investment behavior as seen in both (b) and (c). Such sacrificed excess return can be considered a kind of opportunity cost.

However, comparing portfolio returns with the index, it is not possible to recognize how much portfolio (a) sacrificed excess return. This is because the index itself does not include the positive excess return created before adding new stocks. The index has an asymmetric structure to reflect only the negative excess return accruing after addition. This is subject to the condition that new stocks are added to the index precisely at the peak of abnormal return. If index mangers add these stocks to a portfolio at any other point than the index, their outperformance is always warranted. In other words, the benchmark index itself shows skewness because it has no scale to measure below the zero point.

How can we determine the sacrificed excess return for the sake of replication? For this purpose, it is necessary to compare investment results from portfolio (a) with those of (b) or (c). In both the latter portfolios, the respective investment behavior is different from that of (a). However, the investment behavior in portfolio (b) or (c) is only considered to be taking an active timing risk against the index within the framework of a typical indexing performance analysis. The excess return obtained will be considered an active return.

Let us assume that the stocks are purchased at the peak of abnormal return on the date preceding the Effective Date. Performance will deteriorate compared to the case of purchase based on other investment decisions. Though, as mentioned above, it is difficult to recognize the deterioration in the general indexing evaluation framework. In recent years, indexing costs have drawn more attention. Some explicit costs, including transaction costs or management fees, have already received sufficient consideration. In recent studies of the market impact, a framework has been established to take into account abnormal stock price fluctuation during a trading session. As discussed in this paper, abnormal return has been created for a relatively long time, i.e. a few weeks. However, such trends apparently have not yet been included in the indexing evaluation framework. Such abnormal return is currently regarded as an unrealizable "invisible cost," even though it is an opportunity cost for index managers.

This "invisible cost" assumes the existence of an abnormal return from newly added stocks as a matter of course. And, this is not as explicit as transaction costs. On the other hand, it is necessary in indexing to recognize the possibility of bearing a kind of opportunity cost to keep track of the index. This is supported by the results of the analysis in this paper. The average cumulative excess return generated by newly added stocks is around 20% for ten business days before the Effective Date for new stocks. Their average cumulative return reaches around -7% for ten business days after the Effective Date. These are considerably higher than the broker's commission of approximately 0.2% for an institutional investor.

The impact on overall indexing is not insignificant. For example, when calculating the weighted cumulative excess return before the Effective Date using the capitalization weight on the Effective Date, it reached 0.96%. When calculating the cumulative excess return after addition in the same manner as above, it produced a negative return of -0.63%. These figures should not be ignored when comparing them to total transaction costs paid annually or the trustee fees.

6. Conclusion

This paper analyzed changes in stock price and volume of 104 stocks from among those added to the Tokyo Stock Exchange Stock Price Index (TOPIX) during 2000. As a result of this analysis, positive excess return was observed in these stocks on the day preceding the Effective Date. A negative excess return was also clearly observed after addition. Volumes for newly added stocks were observed to build up towards a peak on the day preceding the Effective Date. These trends were observed long before the Effective Date, which might have been caused by the announcement in advance of their addition to TOPIX. In the case of typical transfer to the TSE First Section from the same or other markets, such announcement is made one or two weeks before addition to TOPIX. In the case of direct listing on the TSE First Section, the announcement is made at least one month

before.

The day preceding the Effective Date is the optimal day for purchase in order to maintain a theoretical minimum tracking error in TOPIX-tracking funds. This analysis shows that the extreme increase in trading volume on that day has been caused by many index managers purchasing stocks at the peak of abnormal return generated from the newly added stocks. Such investment behavior is rational for index managers in terms of maintaining a close replication with the target index. However, the behavior of purchasing at the peak of abnormal return may cause deterioration in performance as a whole. On the other hand, such deterioration may be considered an opportunity cost to be paid in compensation for assuring replication. The extent of this cost may not be negligible and it could be measurable, when compared to explicit costs such as transaction fees, market impact, etc.

In addition to the above summary of this paper's analysis, the authors would like to add the following supplementary comments. Today, index managers compete with each other to demonstrate their superiority as managers by strictly mirroring index performance. Their level of accuracy is high. As for managers of large pension funds, the daily or weekly tracking error is said to be from a few basis points to 10 basis points on an annualized basis. However, this analysis indicates that pursuit of replication to the limit may cause an abnormal return due to intensive trading activity in the stocks newly added to the index. In addition, this abnormal return may increase opportunity cost. If so, whether closely tracking the index is in the long-term interest of sponsors who opt for indexing should be reviewed.

There are more supplementary points to be made. The indexes targeted by index managers, including TOPIX and the Nikkei Stock Average, have the characteristic of serving as an economic index such as industrial output and CPI. They are not always intended for index management. This means that strictly tracking the index may lead to irrational investment behavior. The following might be the latest case.

In April 2001, The Sanwa Bank Limited, Tokai Bank, and Toyo Trust Bank, were to be consolidated and reestablished as UFJ Holdings Inc. These three banks were removed from TOPIX on March 27 and UFJ was added on April 3. This took only a week. Ordinary investors were allowed to trade these three banks as those of UFJ from April 2 without paying any extra heed. It should be noted that they would be requested to sell all shares in the three banks at the closing price of March 26, and then buy UFJ at the closing price of April 2 if they wanted to strictly maintain a high level of replication with the index.

As of the middle of March, when the authors are writing this paper, it is uncertain how many index managers will follow the above course. However, considering other large-scale consolidation at the same timing, they would suffer a significant tracking error if they did not follow the procedure described above. Therefore, not a few index managers are likely to execute trades in these stocks. Advanced skills are required to execute such trades as market impact, changes in index composition, and maintaining replication with the index have to be considered. However, it is an open question as to whether this trade is necessary for investors from a long-term perspective.

As mentioned at the beginning of this paper, the interest of investment managers in indexing has increased in Japan. Further discussion is anticipated about how to evaluate the issues specific to indexing that are discussed in this paper.

Note : Since this paper was prepared solely for personal purposes to examine these issues it does not represent the viewpoint of the organization to which the authors belong, and has no bearing on matters pertaining to its investment management.