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TOPIX Revisions and Stock Returns: Evidence for Phased Exclusions

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Abstract

This paper examines the impact of phased exclusions from the Tokyo Stock Price Index (TOPIX), introduced by the Tokyo Stock Exchange to gradually remove firms with extremely small free-float market capitalization. Using event study methodology, we analyse the market reactions to ten sequential index weight reductions implemented between 2022 and 2025. Our findings show that excluded firms experienced consistently negative abnormal returns, especially among the smallest and least liquid stocks. While previous research has documented stock price declines upon index exclusion, this study highlights that even under a phased exclusion system, the negative impact remains strong. Notably, the excluded firms in our sample are typically overlooked by analysts and investors, yet they still experienced substantial adverse effects. These results demonstrate that mechanical rebalancing by passive funds imposes significant costs on excluded firms, even though the overall effect on the index is minimal. Our findings carry policy implications for Asian equity markets, where major indices are also constructed from all listed stocks. If similar reforms were implemented in those markets, the same pattern of concentrated negative effects on individual stocks might be observed.

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TOPIX Revisions and Stock Returns: Evidence for Phased Exclusions

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Abstract

This paper examines the impact of phased exclusions from the Tokyo Stock Price Index (TOPIX), introduced by the Tokyo Stock Exchange to gradually remove firms with extremely small free-float market capitalization. Using event study methodology, we analyse the market reactions to ten sequential index weight reductions implemented between 2022 and 2025. Our findings show that excluded firms experienced consistently negative abnormal returns, especially among the smallest and least liquid stocks. While previous research has documented stock price declines upon index exclusion, this study highlights that even under a phased exclusion system, the negative impact remains strong. Notably, the excluded firms in our sample are typically overlooked by analysts and investors, yet they still experienced substantial adverse effects. These results demonstrate that mechanical rebalancing by passive funds imposes significant costs on excluded firms, even though the overall effect on the index is minimal. Our findings carry policy implications for Asian equity markets, where major indices are also constructed from all listed stocks. If similar reforms were implemented in those markets, the same pattern of concentrated negative effects on individual stocks might be observed.

Keywords; TOPIX revisions, Event study, Small-cap stocks

JEL classification: G10, G14, G23

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1. Introduction

Stock indexes are expected to serve multiple roles. First, they represent the overall market movement. Second, they represent the theoretical market in investment theory, serving as benchmark indexes. For example, the Dow Jones Industrial Average (DOW 30), a globally recognized stock index calculated since 1896, was initially intended to measure the overall stock prices. Stock prices have been used as leading indicators of economic activity. In the 1970s, the role of representing investment theory was added. For instance, stock indexes representing the overall market have been used as "the market" in theories such as the Capital Asset Pricing Model (CAPM). This underscores the importance of stock indexes. Furthermore, it's recognized that because there are many financial products that track stock indexes, changes to these indexes can have significant impacts.

As mentioned, stock indexes play a significant role, and it is believed that their revision should not be frequent. Apart from regular updates like stock rebalancing or reconstitution, there have been very few major changes to stock indexes. Any changes that were made took into account the continuity of the index. Although steps have been taken to maintain the continuity of index, there have been significant changes recently to the TOPIX, a major benchmark index in Japan.

This paper focuses on stocks subject to phased exclusion from the TOPIX, a leading stock index in Japan. TOPIX, which started in January 1968 with a base market capitalization of 100, indexes subsequent market values. Until market reforms at the Tokyo Stock Exchange

in April 2022, it included all stocks listed on the former First Section of the market. Since April 2022, the First Section became the Prime Market and TOPIX has been separated from market structure.

Although there are 493 stocks being excluded from TOPIX, many of them are very small in terms of capitalization. Because they are small-cap stocks, they tend to be overlooked, and their exclusion is welcomed as it enhances the usefulness of the stock index. It has been announced by JPX (Japan Exchange) that their impact on TOPIX is less than 1%[3], but no information has been released about the impact on the excluded stocks themselves. As explained in detail in the manuscript, these excluded stocks have their weights in the index reduced each quarter. Depending on the context, we use the terms "gradually excluded" and "weight-reduced" interchangeably.

TOPIX is a major stock index representing Japan's stock market, and its components' stocks have been purchased through index funds and ETFs that track TOPIX. Stocks that were passively bought by such funds and are now being weight-reduced from the index are expected to suffer negative effects. These adverse impacts are not based on fundamentals. This paper examines the effects of losing the index premium[4] on very small-cap stocks that were previously included in the index.

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[3] The following document provides details. "1. TOPIX revisions plan outline" (https://www.jpx.co.jp/english/markets/indices/governance/index-consultation/b5b4pj000003vcm3-att/e_data2.pdf)

[4] The explanation of "the index premium" and related research is surveyed in Section 2.1.

This paper is as follows. The next section surveys related papers. Papers on the revision of major global stock indexes and their impacts, as well as papers focusing on the TOPIX, are surveyed. Section three details recent changes to the TOPIX and discusses the background of the Tokyo Stock Exchange's market reorganization. Section four explains the data and methodology used, and section five discusses the results of the empirical analysis. Section six presents robustness check with addition empirical results. The conclusion is in section seven.

2. Related literature

Stocks added to or excluded from an index are known to impact their prices, and many related papers have been examined on this topic (Shleifer, 1986; Petajisto, 2006; Appel et al., 2016; Chino and Sammon, 2022). In Japan, related literature examined the impacts of being removed from the TOPIX (Nakakuma and Ishii, 2001) but focused on the cases of removal from TOPIX due to delisting caused by bankruptcy or mergers. There are no studies analyzing stocks removed from the index through phased weight reduction method due to index revision. Additionally, there is limited prior research on the impact of stock inclusion in TOPIX.[5]

[5] One reason for the limited analysis on stocks included in TOPIX is that TOPIX was an index comprising all stocks listed on the former First Section of the Tokyo Stock Exchange. Being included in TOPIX was synonymous with being listed on the First Section of the Tokyo Stock Exchange, including newly listed stocks and those upgraded from the Second Section. As a result, the events of entering the index and moving to a higher market overlapped, making it difficult to analyze the impact of index inclusion itself.

Because there has never been a major revision of TOPIX until now.

In the following sections, we review related studies analyzing the effects of stock inclusion and exclusion events in indexes such as the S&P 500, as well as mid- and small-cap stock indexes like the Russell 1000 and Russell 2000.[6] We also briefly survey related research on Japanese stock indices. Since TOPIX is a free float-adjusted index, there are studies that analyze changes in the index due not only to the addition or removal of constituent stocks but also to changes in the free float weight. This paper will survey those related studies.

2.1 Impact of Changes in Index Constituents

Early research on stock index rebalancing includes Shleifer's (1986), which analyzed the impact of new additions to the S&P 500 on the respective stock prices. Shleifer (1986) reported that the stock prices of newly added companies to the index increase, the positive returns last for several days, and there is a correlation between index fund buying and returns. Many other studies also suggest that buying by index funds during S&P 500 rebalancing leads to abnormal price returns (Jain, 1987; Lynch and Mendenhall, 1997; Petajisto, 2006; Kasch and Sarkar, 2012; Patel and Welch, 2017; Chino and Sammon, 2022)

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[6] The Russel 1000 and 2000 are float-adjusted market capitalization-weighted indexes, those include stocks listed on the New York Stock Exchange and NASDAQ with market capitalizations ranking from 1001st to 3000th. Most U.S. small-cap funds use these indexes as their benchmark. It has been calculated since the end of 1986. To maintain continuity as a small-cap index, the constituent stocks are updated once a year. There are also related indexes like the Russell 1000, which includes the top 1000 stocks by market capitalization.

Since 1989, the S&P 500 has started releasing information about stock changes before the effective date. Prior to this change, the announcement date and the effective date were the same, which led to extreme trading concentration on the announcement day as index funds grew. To address this, a five-business-day preparation period was introduced between the announcement and the effective date. After this change, a reversal phenomenon was observed. This phenomenon refers to the relative increase in the stock prices of newly included companies from the announcement date, followed by a relative decrease after the effective date. For excluded stocks, prices tend to fall from the announcement date and rise after the effective date. Petajisto (2006) suggests that this is due to speculators trading ahead between the announcement and the effective date. This situation is known as "the index premium". Since index funds mechanically track an index, the index premium represents costs. When stocks are added to an index, the index funds must buy the stocks on the day they are added at a price that includes the premium. When stocks are removed from an index, the index funds must sell the stocks on the day they are removed at a price that does not include the premium. Investors who are not constrained such as speculators can buy stocks ahead of time and profit by selling them when they are added to the index, resulting in a cost that index funds have to bear.

This phenomenon is observed not only in the S&P 500 but also in the U.S. mid- and small-cap indexes like the Russell 1000 and Russell 2000 (Petajisto, 2006; Appel et al., 2016; Chino and Sammon, 2022). Although the rules for stock changes in the Russell indexes are

different from S&P 500 and are based on market capitalization, making them easier to predict, the index premium is still observed.

2.2 Impact of Changes in FFW and Related Research on the Japanese Market

Major stock indexes use a market capitalization-weighted system that takes into account free float weight (FFW). Each stock's FFW is determined and then multiplied by the number of shares outstanding to integrate it into the index. This means that if a stock's FFW increases, its weight in the index also increases, and if the FFW decreases, its weight in the index decreases. There are some studies examining the impact of changes in FFW (Norges Bank, 2014).

The study by Norges Bank (2014) is interesting. It compares the performance of two similar stock indexes: both are FTSE Global Equity Indexes, but one uses Full Market Weights (FMW) and the other uses Free Float Weights (FFW). By analyzing these indexes, which differ only in their weighting method, they observed that there is a correlation between free float weight and stock liquidity. The index adjusted for free float weight performs better in terms of liquidity because it reduces investments in less liquid stocks. However, they also observed that the FFW index has lower returns compared to the FMW index and shows a reversal phenomenon in stock returns.[7]

[7] Norges Bank (2014) explains that the FMW portfolio outperformed the FFW portfolio by 41 basis points per year over the period 2004-2012.

This paper analyzes stocks subject to phased exclusion from the TOPIX between October 2022 and January 2025. We also review related research focused on the Japanese stock indexes. Nakakuma and Ishii (2001) studied stocks listed on the TSE First Section (and thus included in TOPIX) and examined their excess returns before and after being included in TOPIX. They found positive returns up to the day before inclusion, but negative excess returns after the inclusion date. Nakakuma and Ishii (2001) attribute this to index funds buying at the peak price the day before inclusion. Kurita and Irie (2023) examine the Tokyo Stock Exchange reform of April 2022 and TOPIX revision from multiple perspectives. They discuss issues related to the free float weight and propose improvements to TOPIX as a benchmark. Chattopadhyay et al. (2019) conducted a DID analysis on the relatively new JPX-Nikkei 400 index and reported that the returns of included stocks improved and their ROE increased. They argue that in Japan, being included in a stock index creates reputational incentives that influence managerial behavior. If inclusion in a stock index carries such significance, exclusion may generate negative incentives, which is why our study focuses on excluded stocks.

3. TOPIX revisions

3.1 Global Trends in Stock Indices

Major stock indexes use a weighted average based on market capitalization. There are two main methods for calculating stock indexes: one based on market capitalization and the other

on price averages. The indexes representing the major countries' stock markets, however, are typically weighted by market capitalization. Since the 2000s, stock indexes that use weighting by market capitalization have been changed to a calculation method based on tradable share market capitalization (see **Table 1**)[8]. TOPIX shifted to this method in three stages from October 2005 to June 2006.

Table 1 about here

Similar to major stock indexes in other countries, the TOPIX has also become a free-float adjusted index. This change reflects the diversifying needs required for stock indexes. Not only has there been an expansion in financial products for passive management, but there are also index derivatives such as stock index futures, and the variety of stock indexes has increased, including those differentiated by size, industry, and ESG compliance.

3.2 Summary of TOPIX Revisions

From April 2020 to March 2022, the rules governing TOPIX revisions were gradually formulated and announced. This study employs the event study methodology, and the key announcements are summarized in **Table2**. Two major revisions are particularly relevant to this paper. The first was the redefinition of the free-float ratio. Under the new rules, certain

[8] Tradable market capitalization is the market capitalization of publicly traded shares and this is officially named as "the free-float adjusted market capitalization-weighted" by The Tokyo Stock Exchange. The calculation method based on it is called "the free-float adjusted market capitalization-weighted method".

shares previously classified as free-float were no longer recognized as such, leading to a reduction in the weights of many TOPIX constituent stocks. Since TOPIX is weighted by free-float-adjusted market capitalization, adjustments were implemented to prevent these changes from distorting the index and to maintain continuity. These revisions were carried out in three phases: in April, May, and June of 2022. [9]

Table 2 about here

Historically, TOPIX comprised all stocks listed on the former First Section of the Tokyo Stock Exchange, totaling over 2,000 constituent companies. It served as a broad indicator of overall market movements. Following the market restructuring in April 2022, TOPIX was formally separated from the market segments. However, the separation was not immediate; stocks included in TOPIX as of April 1, 2022, the last day of the old market categories,[10] remained in the index for transitional periods.

Stocks slated for removal from TOPIX are small-cap companies with a free-float market capitalization of less than 10 billion yen. Starting from the end of October 2022, their index weights were gradually reduced over ten quarterly phases, concluding at the end of January 2025. The weight of each affected stock was reduced by 10% in each phase (**Figure 1**).

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[9] The free-float ratio, 5% increments, is reviewed annually based on each company's securities report.

[10] The new market categories started on April 4, 2022, and are now divided into three markets: Prime, Standard, and Growth.

On October 7, 2022, it was announced that 493 stocks would be removed from TOPIX. One year later, on October 6, 2023, this figure was revised to 439 stocks. The reduction in number was due 11 designated stocks being delisted and 43 stocks being retained in the index after reevaluation. For the 43 retained stocks, their weights were being restored at a rate of 0.1 of their original weight per quarter. The listing maintenance criteria for the Prime Market and the requirement for remaining in TOPIX are summarized in **Table 3**. When the weights of the 439 excluded stocks were reduced to zero and they were fully removed from TOPIX, the weights of the 43 retained stocks were fully restored to one. This paper also conducts a separate analysis focusing on these retained stocks.[11]

Figure 1 about here

Table 3 about here

This study conducts an empirical analysis of the TOPIX revision implemented between October 2022 and January 2025. Under this revision—referred to as the first-phase revision—the number of constituent stocks in TOPIX, which had comprised approximately 2,200 companies listed on the former First Section of the Tokyo Stock Exchange, was reduced to about 1,700. In September 2024, the second-phase revision was already announced. Scheduled to begin in October 2026, this second-phase revision will reduce the free-float-

[11] The number of stocks that remained in TOPIX was initially 43, but decreased to 42 on May 30, 2024, when one stock (security code: 9995) was removed. The empirical analysis in this paper is conducted using these 42 stocks.

adjusted weights of designated stocks over eight quarterly steps, to be completed by July 2028. At that point, the number of TOPIX constituents will decline further to around 1,200. The revision process will continue thereafter, with the third regular rebalancing scheduled to commence in October 2028.

The methodology employed in the TOPIX revision may serve as a useful reference for stock indices in other Asian countries that, like TOPIX, are composed of the entire market.[12] By removing illiquid micro-cap stocks from the index, the overall liquidity of the index can be improved, thereby enhancing convenience and efficiency for passive managers and investors in index-linked products.

3.3 Theory framework and Hypothesis building

Previous research used the information theory and index premium assumption to explain the impact of inclusion or exclusion of a stock into/from an index. Index inclusion certified the quality of the company and entailed a price increase (Shleifer, 1986). On the other hand, being removed from the index may damage the image of a firm and entailed a price decrease. Moreover, in stock markets with different market segmentation, certain investors who hold index funds will automatically sell stocks that are excluded from the index. This is because fund managers running index-linked products like mutual funds and ETFs sell them

[12] For example, the Korea Composite Stock Price Index (KOSPI) uses the market capitalization of all companies listed on the Korea Exchange.

mechanically. In our data set, most stocks subject to phased exclusions have small market capitalizations and do not meet the listing maintenance standards of the Prime Market or the criteria to remain in TOPIX. Phased exclusions of a stock from TOPIX are not announced each time and weight-reduction stocks may have a price decrease after each weighting phase passes. These arguments lead to our first hypothesis below:

Hypothesis 1. Gradually weighted stocks have a negative stock return during each weighting phase

In addition, our sample has more than 400 firms subject to index exclusions and we take the advantage of this rich data to extend our analysis using additional information, namely the firms' weight in TOPIX. Among the sample, we focus on the firms having smallest weight in TOPIX. We assume that they will suffer from the largest stock price decline because of their tiny role in the index. According to the theory of investment behavior (Jorgenson, 1967), the investment decision and level of investment are determined by past changes and past values of the stock under consideration. After the announcements by JPX, there might have been a closer scrutiny of weight-reduction firms by analysts and investors. Therefore, there is an increase in public information about these targeted firms. Excluded firms having relatively larger weight will catch attentions from investors more than smallest-weighted firms. As a result, the liquidity will be different from relatively larger-weighted and the smallest-weighted stocks, in which the smallest-weighted ones will suffer from lower liquidity. According to the liquidity theory, if the stock liquidity is low, the bid-ask spread will be larger.

Less liquid assets, such as the smallest weighted stocks will have larger spread and more negative returns during the weighting phases. Therefore, based on these arguments, we build the second hypothesis as follows:

Hypothesis 2. Smallest weighted stocks have a larger negative stock return than the sample average.

4. Data Collection and Methodology

4.1 Preliminary Analysis

We visualize the stock performance of several firms in our sample and find the preliminary results supporting our two hypotheses.

Figure 2 illustrates the stock price trends of TOPIX, TOPIX Small, and the average stock prices of several groups of the smallest-weighted stocks within TOPIX. Specifically, stocks with index weights ranging from 0.0001% to 0.0005% were grouped by weight, and their average stock prices were indexed to 100 as of December 23, 2022. The average stock prices of the smallest-weighted groups show a long-term downward trend.

At the end of January 2025, when the TOPIX revision was completed, TOPIX stood at 145.79 and TOPIX Small at 135.71. In contrast, the average prices of the smallest-weighted groups were 92.70 (0.0001%), 93.23 (0.0002%), 104.47 (0.0003%), 115.64 (0.0004%), and 114.79 (0.0005%), respectively, indicating that stocks with smaller weights experienced

weaker price performance. TOPIX Small is a sub-index of TOPIX that represents small-cap stocks, calculated based on free-float-adjusted market capitalization. It is used to capture the performance of small-cap stocks within the TOPIX universe. Even compared with TOPIX Small, the average stock prices of the smallest-weighted constituents have declined substantially.

Figure 2 about here

4.2 Event study methodology

In this subsection, we use an event study methodology to measure the effects of phased exclusions from TOPIX on stock returns. Most of the studies on the impact of index revision have adopted event study to carry out the analysis. Event studies can be implemented in several ways. MacKinlay (1997) summarized two approaches for carrying out event studies based on the classification of underlying theory of asset prices. The first approach assumes that there is no underlying theory of asset prices. This approach utilizes two models: Average Return Model (using constant-average return) and Market Model[13]. The second approach assumes that there is an underlying theory of asset prices and consists of Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT). The CAPM uses a constant risk-free rate and imposes constraint on the constant term relative to market model while APT model

[13] The market model was first developed by Sharpe (1964) and this is a regression model relating the yield of an asset to the yield of the market.

appeals very theoretically and empirically but difficult to apply in practice.

In this research, we use the market model. The market model operates by comparing performance during event periods to periods of no event. We used a market model with daily adjusted closing prices of target firms. For each event, we defined event windows of (−1,+1), (−5,+5), and (−10,+10) trading days, with a 50-day estimation window preceding the events. We estimated abnormal returns using OLS regressions against TOPIX returns; we also aggregated cumulative average abnormal returns (CARs). We then used statistical tests to evaluate the significance of our findings.

We first collected the stock prices of the firms being weight reduced using Nikkei NEEDs. Initially, we obtained the names of weight-reduced firms from the list announced on October 7, 2022, by the Japan Stock Exchange, which stated that 493 stocks were to be removed from TOPIX. However, a year later, on October 6, 2023, the number of stocks to be removed was updated to 439. The decrease was due to stocks that were delisted after being designated for removal (11 stocks) and stocks that remained in TOPIX after reevaluation (43 stocks). From October 2023 to February 2025, there were more 15 firms delisted. In addition, this study necessitated data on stock prices for each firm spanning from at least 60 trading days before each weighting phase to 20 days after the weighting phase. As a result, eight firms were excluded due to the lack of stock data. Our final sample for event studies therefore consisted of 416 firms.

Our primary objective was to measure the impact of TOPIX index revision on 416

weighted stocks. We measured the aggregated impact of the 10 weighting phases, which were executed from October 2022 to January 2025. As noted above, the weight of the stocks being excluded from the index were gradually reduced by 10% over 10 quarterly phases until the end of January 2025. There were accordingly 10 weighting phases corresponding to 10 component event dates. The event date in this case was the adjustment trading day for index funds, which is the date before the end-of-month trading day. The first weighting reduction date was 28 October 2022, the second was 30 January 2023, the third was 27 April 2023, the fourth was 28 July 2023, the fifth was 30 October 2023, the sixth was 30 January 2024, the seventh was 26 April 2024, the eighth was 30 July 2024, the ninth was 30 October 2024, and the tenth was 30 January 2025.

Daily stock prices were considered in this study. It is the adjusted closing stock price type. The adjusted closing price on a given day of trading is the one that has been amended to include any distributions and corporate actions that occurred at any time prior to the next day's open. Previous research often used the adjusted closing when examining historical returns because it gives analysts an accurate representation of the firm's equity value beyond the simple market price. The return on the Tokyo Stock Exchange TOPIX index serves as the market return.

5. Research results:

5.1 Event Study of the 10 Weighting Phases

We first conducted an event study of the 416 firms subject to phased exclusions. Table 1 summarizes the CARs over ten exclusion announcements. For the (−1,+1) window, the mean(median) CAR was −0.82% (-0.81%); both of these values were statistically significant. Across 4,160 abnormal returns, 2,763 were negative. That number represents about two times the number of positive values. We noted similar results for the (−5,+5) window and the (−10,+10) window. Both the mean and median CARs was negative and statistically significant. These findings confirm Hypothesis 1: the prices of excluded stocks declined after the weighting phases, reflecting the mechanical impact of index rebalancing.

Table 4 about here

5.2 Event Study of the 10 Weighting Phases for the Lowest-Weighted Firms

We further examine the impact of TOPIX index revision on the stocks being weight-reduced by using sub-sample. We breakup firm groups based on the weight of stocks in the index. As mentioned above, TOPIX is a free-float adjusted market capitalization-weighted index. We downloaded the TOPIX component stocks weight from Japan Exchange Group website[14]. As of 28th June 2024. there are 2,137 stocks included in the TOPIX index and the weight of component stocks is very diverse, ranging from very small as 0.000001 to the largest 0.044279. The weight mean of 416 firms in our sample is 0.00000269, showing at most firms subject to index exclusions hold small weight in the index.

[14] https://www.jpx.co.jp/english/markets/indices/topix/

In this session, we aim to examine the stock performance of the firms having smallest weight in TOPIX among the firm sample subjected to exclusion. We assume that they will suffer from the largest stock price decline because of their tiny role in the index. Having tabulate the data, we find eight firms having the weight of zero. These firms are to be delisted or under supervision by TSE to determine whether these firms have fallen under the delisting criteria or not. So, we do not consider these firms for our analysis. As the result, the number of firms having smallest weight in our sample is 109 firm, with the weight of 0.000001, making up roughly 26% of the total firm sample.

We carry out similar event studies for this firm group similar to what we have done in the sub-section 5.1. Table 5 summarizes the results of the market reactions to the announcement of the firms having the smallest weight in TOPIX in the sample of firms being weight-reduced. For the (−1,+1) window, the mean CAR was −1.44% and the median was −1.43%; both numbers are statistically significant (Table 5). Of the 1,090 abnormal returns, 828 were negative. Compared with the full sample, the lowest-weighted firms experienced larger declines, which supports Hypothesis 2. The results for the (−5,+5) and (−10,+10) windows were also negative and statistically significant. These results show that the stock of smallest weight firms declined more compared to the whole sample average over the ten weighting phases, inferring that the index exclusion is more detrimental for the small firms.

Table 5 about here

6. Additional analysis:

6.1 Event study for the announcement of the firms' names to be subject to the TOPIX exclusion

We additionally conducted an event study to examine the impact of the announcement of the firms' names to be subject to the TOPIX exclusion, which is dated 7 October, 2022. This announcement was released on Friday after the market closed, so we use the next trading day as the event date, which is 11 October 2022[15]. Market model CARs were computed using days −170 to −20 as the estimation period for the market model parameters because we do not have the time restraints in estimation windows like the studies using 10 weighting phases. Table 6 summarize the CARs.

Table 6 about here

We expected that the market would react negatively to the firms to be subject to the TOPIX exclusion and we find empirical results supporting our hypotheses. The mean CAR was negative for all three windows. The results of mean and median CAR for the (−5,+5) window were strongly negative and statistically significant. For the (−5,+5) window, the mean (median) CAR was minus 1.39% (minus 1.46%). Across 416 abnormal returns, 272 was negative; 144 were positive. On the other hand, we find no statistical significance for the

[15] 8th October 2022 was Saturday; 9th October 2022 was Sunday and 10th October 2022 was the national holiday.

(−1,+1) window　and the (−10,+10) window although most of mean (median) CARs were found negative.

Overall, the market reacts negatively the announcement of the firms' names to be subject to the TOPIX exclusion. Although the first weighting reduction date was 28 October 2022, the negative CARs in the periods before the first reduction date are likely to be caused by the quick adjustment of several index funds or negative reactions from existing shareholders.

6.2 Event study for the re-included stocks:

So far, we applied event study to our main sample of 416 firms. In this section, we focus on the special group of 42[16] firms, which were to be removed from TOPIX on October 7, 2022 but were re-included a year later, on October 6, 2023. Using event study methodology, we analyze the impact of this contradict, being removed and being re-included in the index. We obtained the adjusted closing stock prices for each firm around the announcement event, including 170 trading days before and 20 trading days after the first exclusion phase. The estimation window is defined as 170 to 20 days before the first exclusion announcement, or a (–170, –20) day window. There is same three event dates for each company.

[16] In the original list, there were 43 firms being reevaluated and re-included to the Topix. However, one firm, namely Glosel, were delisted from 30th May, 2024. As a result, we exclude this firm from the analysis.

Panel A of table 7 summarizes the results of the market reactions to the announcement of the 42 firm group being weight-reduced on 7th October 2022. Similar to the analyses in subsection 6.1., the event date for event study is 11 October 2022. The mean CAR over the three windows (–1, +1), (–5, +5) and (–10, +10) are all negative and statistically significant. The results are similar for the median CARs of the two windows (–5, +5) and (–10, +10).

Table 7 about here

A year later, on October 6, 2023, these stocks were announced to be remained in TOPIX after reevaluation. October 6, 2023 was Friday and the announcement was made after the market closed, so we use the next trading day as the event date, which is 10 October 2023[17]. Panel B of table 7 shows the results of the market reactions to the announcement of this change. The median CAR of the (-1:+1) window is positive 1.09% and statistically significant. However, other mean and median CARs are found statistically insignificant.

In short, similar to the findings in subsection 6.1, market reacts negatively to the announcement of the 42 firm group being weight-reduced and empirical results are significant. On the other hand, market reacts positively to the event of being re-included. A lightly positive return was observed in the short-time window and this finding is statistically significant. Being included in a stock index creates reputational incentives that influence

[17] 7th October 2023 was Saturday; 8th October 2023 was Sunday and 9th October 2023 was the national holiday.

managerial behavior and receive positive reactions from the market. As inclusion in a stock index carries such significance, exclusions generate negative returns. We observed this contradict using the special group of 42 firms in our database.

7. Conclusion

We examined the impact of phased exclusions from TOPIX on stock returns. With the expansion of passive investment, the mechanical selling associated with index revisions has become increasingly important. Using an event study methodology, we analysed more than 400 firms designated for exclusion. Such a phased removal of small-cap stocks was unprecedented among major global stock indexes.

While prior studies have shown that stock prices tend to decline following index exclusions, the unique contribution of this paper lies in demonstrating that significant negative effects on excluded stocks can still be observed even under phased exclusions mechanism. Typically, stocks added to or removed from major indices are large-cap stocks with extensive analyst coverage and investor attention. However, the phased exclusions examined in this study targeted the smallest-cap group of firms—stocks that are generally not covered by analysts and tend to be overlooked by market participants. Highlighting the substantial negative effects on these overlooked firms is, we believe, an important contribution to the literature.

Consistent with prior research on major global indexes such as the S&P 500, we

found statistically significant negative abnormal returns in short event windows, with the effect diminishing over longer time horizons. The excluded stocks were illiquid and characterised by very low index weights. Our results revealed that the mechanical rebalancing of passive funds imposed a particularly heavy burden on these micro-cap firms.

We have documented the distinctive consequences of Japan's unique phased exclusions framework. Even though the overall impact on the index itself was negligible, the market reactions at the individual-stock level were substantial, underscoring an important contrast between index-level stability and firm-level effects.

The findings of this paper also carry policy implications for equity markets in Asia. While the phased exclusions approach may minimize the impact on the index itself, it does not mitigate the adverse effects on the individual excluded stocks. Many Asian equity markets, such as those using the KOSPI (Korea Composite Stock Price Index) and the TAIEX (Taiwan Stock Exchange Weighted Index), rely on indices that include nearly all listed stocks. If similar index reforms are implemented in those markets, similar outcomes are likely to occur.

Future research should extend our analysis beyond the excluded firms to examine firms that were ultimately reinstated. Because index weights, while extremely low, varied across firms, further investigation into heterogeneity by weight is also recommended. In addition, incorporating financial statement variables will help identify how much of the observed stock-return effect can be attributable specifically to phased exclusions.

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Table 1 Key Features of Major Stock Price Indexes				
Stock Index	Country	Calculation method	free-float conversion	Conversion date
TOPIX	Japan	weighted average based on market capitalization	○	October 2005 - June 2006
S&P500	The US	weighted average based on market capitalization	○	March 2005 - September 2005
FTSE100	England	weighted average based on market capitalization	○	June 2001
DAX	Germany	weighted average based on market capitalization	○	June 2006
CAC40	France	weighted average based on market capitalization	○	December 2003
Nikkei225	Japan	Price average		
DOW30	The US	price average		

Source：Authors'creation.

Table2　Major Events in Index Revisions

Date	TOPIX related events
25-Dec-20	Announcement to review TOPIX
1-Jul-21	First Evaluation of components of TOPIX. The minumum criterion is set to 10 billion yen
31-Mar-22	Second Evaluation of components of TOPIX
Apr-22～June-22	Reassessment of TOPIX free-float ratio
7-Oct-22	**Announcement of 493 gradual weight reduction stocks (after market closure)**
End of Oct-22	**Commencement of the first weight reduction date. October 28 (Friday) is the adjustment trading day for index funds, and October 31 (Monday) is the month-end trading day**
End of Jan-23	**Second weight reduction date. January 30 (Monday) is the adjustment trading day for index funds. January 31 (Tuesday) is the month-end trading day**
31-Mar-23	Determination of values (tradable share market capitalization) for TOPIX reevaluation
End of Apr-23	**Third weight reduction. April 27 (Thursday) is the adjustment trading day for index funds, and April 28 (Friday) is the end-of-month trading day**
End of Jul-23	**Fourth weight reduction. July 28 (Friday). July 31 (Monday) is the end-of-month trading day**
22-Oct-23	Determination of values (annual turnover ratio of trading value) for reevaluation. Final evaluation
End of Oct-23	5th Weight Reduction
End of Jan-24	6th Weight Reduction
End of Apr-24	7th Weight Reduction
End of Jul-24	8th Weight Reduction
End of Oct-24	9th Weight Reduction

End of Jan-25	Tenth weight reduction. Gradually weight reduction stocks will be completely excluded from TOPIX.

Source: Author's creation based on various materials from the Tokyo Stock Exchange.

Table 3 Criteria for Phased Exclusion

	Listing maintenance standards for the Prime Market	Adopted as a criterion for exclusion
Number of Shareholders	more than 800	
Number of tradable share	more than 20,000units	
Number of tradable share market capitalization	more than 10 billion yen	○
Free Float Ratio	more than 35%	
Trading volume	An average of more than 0.02 billion yen per day	
Net assets	Net assets must be positive	
Annual turnover ratio of trading volume		○

Source: Created by the author from various materials of the Tokyo Stock Exchange.

Table 4: CARs for the 10 weighting phases for the entire sample

Window	Mean CAR (%)	*t*-statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (p-value)
[-1, +1]	-0.82***	15.52	-0.81***	1397:2763	0.000
[-5, +5]	-0.61***	5.45	-0.36***	1906:2254	0.000
[-10, +10]	-0.33**	2.04	-0.24**	2003:2157	0.017

Notes: This table provides the CARs for 416 firms subject to TOPIX revision for the 10 weighting stages. Market model CARs were computed using days –50 to –11 as the estimation period for the market model parameters. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 5: CARs for the 10 weighting phases of the lowest-weight firms in the TOPIX index

Window	Mean CAR (%)	*t*-statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (p-value)
[-1, +1]	-1.44***	12.93	-1.43***	262:828	0.000
[-5, +5]	-1.18***	4.82	-0.71***	456:634	0.000
[-10, +10]	-0.99***	3.07	-0.73***	495:595	0.002

Notes: This table provides the CARs for 109 firms subject to TOPIX revision and having the lowest weights in TOPIX. Market model CARs were computed using days –50 to –11 as the estimation period for the market model parameters. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 6: CARs for the announcement date of firms being weighted from the TOPIX index

Window	Mean CAR (%)	*t*-statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (p-value)
[-1, +1]	-0.004	0.03	0.17	224:192	0.128
[-5, +5]	-1.39***	5.09	-1.46***	144:272	0.000
[-10, +10]	-0.03	0.10	-0.30	195:221	0.220

Notes: This table presents the impact of the announcement of the firms' names to be subject to the TOPIX exclusion. The event date was 11 October, 2022. The table provides the CARs for 416 firms. Market model CARs were computed using days –170 to –20 as the estimation period for the market model parameters. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 7: Event study for the re-included stocks:

Panel A: CARs for the exclusion date of the 42-firm groups

Window	Mean CAR (%)	*t*-statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (p-value)
[-1, +1]	-1.29*	1.95	-1.47	16:26	0.164
[-5, +5]	-2.33**	2.22	-2.47***	12:30	0.007
[-10, +10]	-3.50*	2.02	-3.92***	12:30	0.000

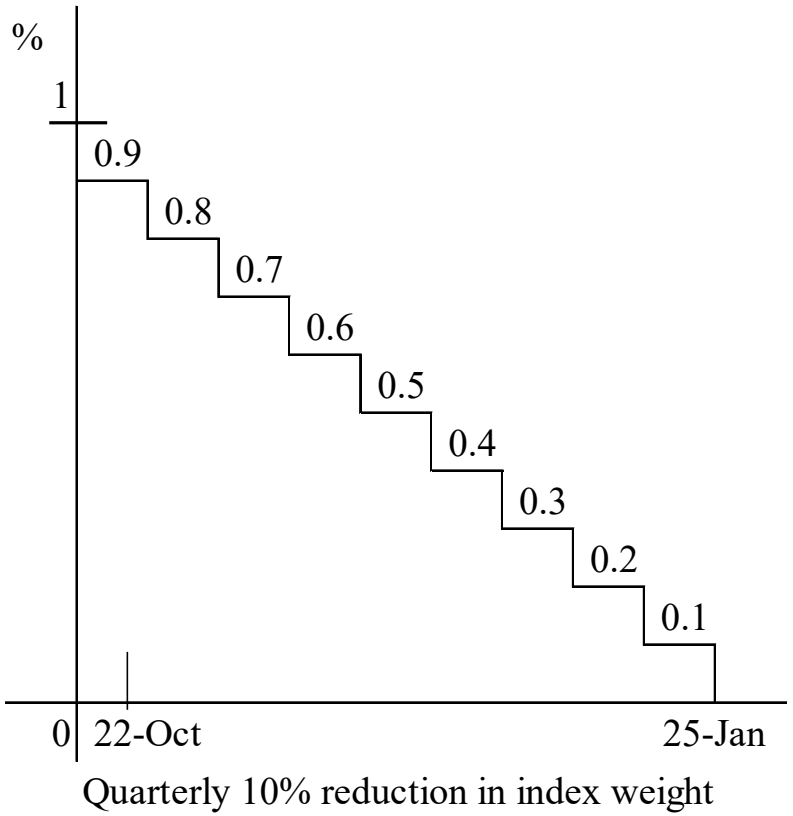
Panel B: CARs for the re-inclusion date of the 42-firm groups

Window	Mean CAR (%)	*t*-statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (p-value)
[-1, +1]	1.42	1.57	1.09**	28:14	0.043
[-5, +5]	-1.02	0.90	-0.55	17:25	0.280
[-10, +10]	-0.08	0.06	-0.47	19:23	0.644

Notes: This table provides the CARs for 42 firms subject to TOPIX revision. Panel A provides the CARs for 42 firms for the announcement date of being excluded. The event date is 11th October 2022. Panel B provides the CARs for 42 firms being re-included to TOPIX from 0ctober 6th 2023 (the event date is 10th October 2023). Market model CARs were computed using days –170 to –20 as the estimation period for the market

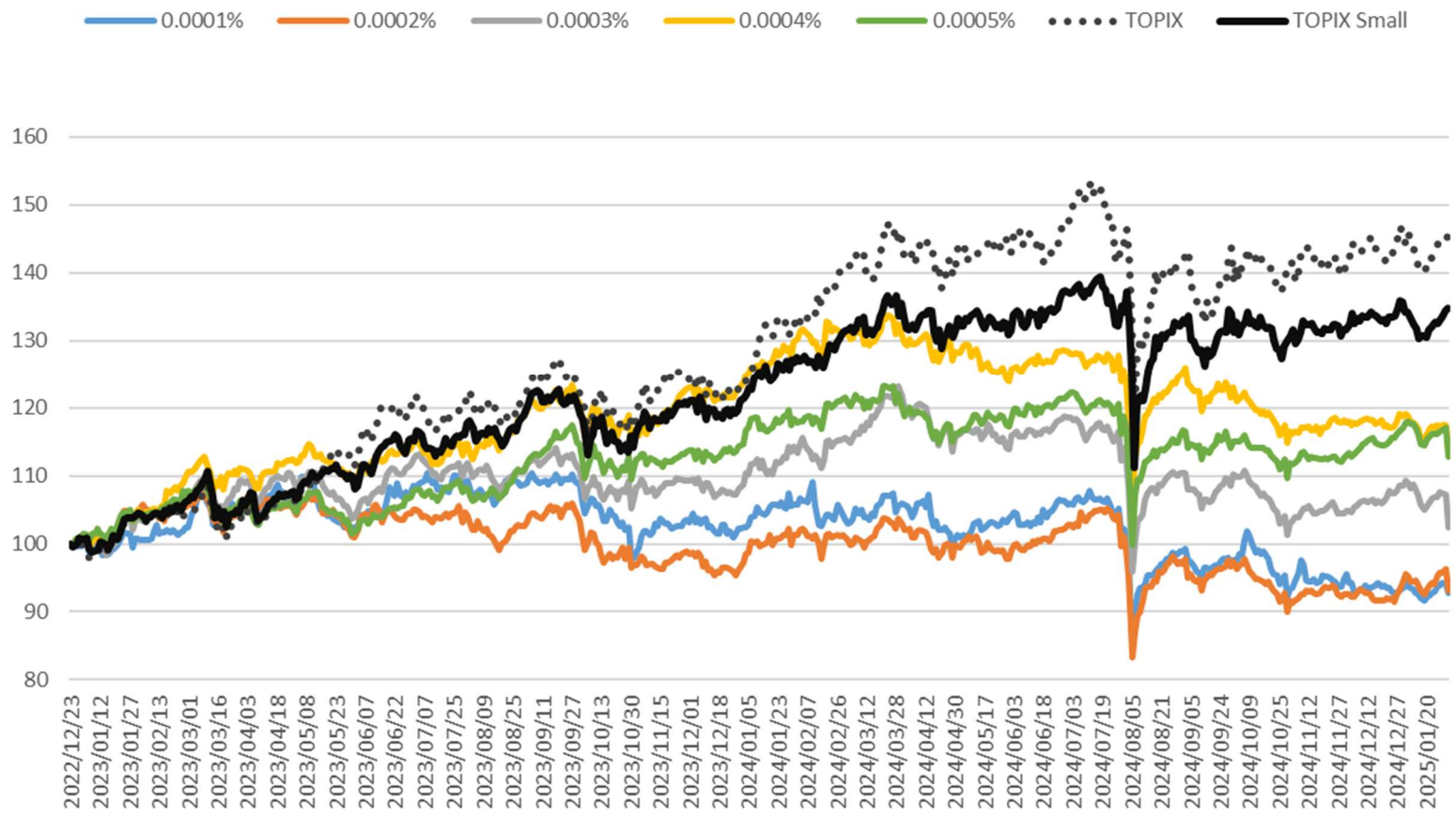
model parameters. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Figure 1 Illustration of Quarterly Weight Reductions



Source:Authors' creation.

Figure 2　Performance of indexes and lowest weighting stocks



Source: Data from the Nikkei Financial Quest database. Author's compilation.