

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 daily stock price data for more than 400 excluded firms, we analysed market reactions to 10 sequential index weight reductions that were implemented between 2022 and 2025. The findings indicate significant negative abnormal returns around the weight-reduction dates, with larger effects occurring among the lowest-weighted stocks. Panel regressions were also performed with firm-level clustered standard errors, pre-existing trend and placebo tests were conducted, and firms around the exclusion threshold were compared. The analyses generally support the main findings. The results suggest that mechanical rebalancing by passive funds contributes to the negative stock-price effects associated with phased exclusions. These findings draw attention to an important contrast between index-level stability and firm-level effects and may also be relevant to other broad-market stock indexes in Asia.

JEL classification: G14, G12, G23

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1. Introduction

Stock indexes have multiple expected roles, such as representing the overall market movement and the theoretical market in investment theory as benchmark indexes. For example, the Dow Jones Industrial Average (DJIA) is a globally recognized stock index that has been calculated since 1896 and was initially intended to measure overall stock-market performance. Stock indexes have been used as leading indicators of economic activity, and in the 1970s, stock indexes came to play an important role in investment theory. For instance, stock indexes representing the overall market have been used as proxies for "the market" in theories such as the Capital Asset Pricing Model (CAPM), which illustrates the importance of stock indexes. Because there are many financial products that track stock indexes, it is recognized that changes to these indexes can have significant impacts.

It is believed that stock indexes should not be revised frequently. Apart from regular updates like stock rebalancing or reconstitution, there have been very few major changes to stock indexes. Any changes that have been made have taken into account the continuity of the index. Nevertheless, there have recently been significant changes to the TOPIX, a major benchmark index in Japan, although steps have been taken to maintain the continuity of the index.

This paper focuses on stocks that were subject to phased exclusion from the TOPIX. TOPIX was launched in January 1968 with a base value of 100 and tracks subsequent changes in market capitalization. Until market reforms at the Tokyo Stock Exchange in April 2022, it included all stocks listed on the former First Section of the market. At that time, the Tokyo Stock Exchange reorganized its market segments, and TOPIX was separated from the market classification system.

A total of 493 stocks were initially subject to exclusion from TOPIX, and many of them had very small capitalization. Because they were small-cap stocks, they tended to receive limited attention, and their exclusion was expected to improve the usefulness of the stock index. Japan Exchange Group

(JPX) announced that their impact on TOPIX would be less than 1%,³ but no information has been released about the impact on the excluded stocks. These stocks are being excluded gradually through the reduction of their weights in the index each quarter.

TOPIX represents Japan's stock market, and its component stocks have been purchased through index funds and exchange traded funds (ETFs) that track the index.

Stocks that have been passively bought by such funds and whose weights in the index are now being reduced are expected to experience negative effects. These effects may reflect index-related trading rather than changes in firm fundamentals. This paper examines the effects of losing the index premium⁴ on very-small-cap stocks that were previously included in the index.

The remainder of this paper is organized as follows. The next section surveys related papers. Papers on the revision of major global stock indexes, their impacts, and the TOPIX are surveyed. Section 3 discusses recent changes to the TOPIX and the background of the Tokyo Stock Exchange's market reorganization. Section 4 explains the data and methodology used, and section 5 discusses the results of the empirical analysis. Section 6 presents a robustness check with additional empirical results, and the conclusion is presented in section 7.

2. Related literature

Additions and deletions of stocks in major stock indexes are known to affect stock prices, and a substantial body of literature has examined these effects (Shleifer, 1986; Petajisto, 2011; Appel et al., 2016; Chinc0 and Sammon, 2024). In Japan, however, only a limited number of studies have examined the effects of removal from the TOPIX (Nakaguma and Ishii, 2001). These studies have focused on

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 An explanation of “the index premium” and related research are discussed in Section 2.1.

firms that were removed from TOPIX because of delistings associated with bankruptcy, mergers, or other corporate events. To the best of our knowledge, no study has examined stocks that have been subject to phased exclusion through repeated weight reductions after a major index revision. Limited research has investigated the impact of stock inclusion in TOPIX⁵ because there had been no comparable large-scale constituent revision until recently.

The following subsections review related studies on 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 discuss the limited literature on Japanese stock indexes. Since TOPIX is a free-float-adjusted index, some studies have examined index changes arising from not only stock additions and deletions, but also changes in free-float weights. These studies are also reviewed.

2.1. Impact of changes in index constituents

Shleifer (1986) performed one of the earliest studies on stock-index rebalancing and examined the impact of new additions to the S&P 500 on stock prices. Shleifer (1986) reported that the prices of stocks increase when they are added to the index. The positive returns last for several days, and there is a correlation between index-fund buying and returns. A large body of subsequent

⁵ One reason for the limited analysis on stocks included in TOPIX is that the index comprises 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, 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.

⁶ The Russell 1000 includes approximately the 1,000 largest U.S. stocks by market capitalization, while the Russell 2000 includes approximately the next 2,000 stocks. Both are float-adjusted market-capitalization-weighted indexes and are reconstituted annually. The Russell 2000 is widely used as a benchmark for U.S. small-cap stocks.

research has also shown that index-fund buying during rebalancing of the S&P 500 is associated with abnormal price returns (Jain, 1987; Lynch and Mendenhall, 1997; Petajisto, 2011; Kasch and Sarkar, 2012; Patel and Welch, 2017; Chinco and Sammon, 2024).

Since 1989, the S&P 500 has released information about constituent changes before their effective dates. Before this change, the announcement dates were the same as the effective dates, which led to extreme trading concentration on the announcement day as index funds grew. To address this, a preparation period of five business days was introduced between the announcement and the effective date. After this change, a reversal phenomenon was observed involving a 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 (2011) suggests that this difference is due to speculators trading ahead between the announcement and the effective date. This phenomenon is commonly referred to as the index premium. Since index funds mechanically track an index, the index premium represents costs. When stocks are added to an index, 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. Unconstrained investors, such as speculators, can trade in advance of these predictable index-fund transactions and potentially profit from the associated price pressure.

This phenomenon occurs in the S&P 500 and in U.S. mid- and small-cap indexes like the Russell 1000 and Russell 2000 (Petajisto, 2011; Appel et al., 2016; Chinco and Sammon, 2024). The reconstitution rules of the Russell indexes differ from those of the S&P 500 and are largely based on market capitalization, which makes constituent changes more predictable, but an index premium still occurs. The persistence of the index premium, even in predictable index revisions, suggests that

mechanical trading by passive funds can have significant price effects.

2.2. Impact of changes in free-float weight and related research on the Japanese market

Most major stock indexes are weighted according to market capitalization and incorporate free-float weight (FFW). Each stock's FFW is determined and 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, while if the FFW decreases, its weight in the index decreases. Various studies have examined the impact of changes in FFW (Norges Bank, 2014).

Norges Bank (2014) has provided an interesting analysis of this issue and compared performance of two similar stock indexes. Both indexes were FTSE Global Equity Indexes, but one used full market weights (FMWs), and the other used FFWs. The two indexes differed in only their weighting methodology, and the comparison provides a useful setting for examining the effects of free-float adjustment. The index adjusted for FFW performs better in terms of liquidity because it reduces investments in less liquid stocks. However, the FFW index also had lower returns than the FMW index and showed a reversal phenomenon in stock returns.⁷

Given these findings, the present study focuses on stocks that were subject to phased exclusion from the TOPIX between October 2022 and January 2025. We also review related research on the Japanese stock indexes. Nakaguma and Ishii (2001) examined stocks that were listed on the Tokyo Stock Exchange's First Section (and thus included in TOPIX) and their excess returns before and after being included in TOPIX. They observed positive abnormal returns before inclusion and negative abnormal returns after inclusion, which they attributed to index funds buying at the peak price on the day before inclusion.

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

Kurita and Irie (2023) examine the Tokyo Stock Exchange reform of April 2022 and TOPIX revision from multiple perspectives, discuss issues related to the FFW, and propose improvements to TOPIX as a benchmark. Chattopadhyay et al. (2020) conducted a difference-in-differences (DID) analysis on the relatively new JPX-Nikkei 400 index and observed that the returns of the included stocks improved and that their return on equity (ROE) increased. They argue that being included in a stock index in Japan creates reputational incentives that influence managerial behavior. If index inclusion generates positive reputational incentives, index exclusion may have the opposite effect. This provides an additional motivation for focusing on excluded firms in this study.

3. TOPIX revisions

3.1. Global trends in stock indexes

Most major stock indexes are weighted according to market capitalization. Stock indexes are generally calculated using either market-capitalization weighting or price weighting. Indexes representing major national stock markets, however, are typically weighted according to market capitalization. Since the 2000s, many market-capitalization-weighted indexes have adopted free-float-adjusted methodologies (see Table 1).⁸ TOPIX adopted this methodology in three phases between October 2005 and 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 increasingly diverse roles that stock indexes are expected to play. There has been an expansion in financial products for passive management, there are now index derivatives such as stock index futures, and the variety of stock indexes has increased, including those

⁸ Tradable share market capitalization refers to the market capitalization of shares available for trading. TOPIX uses a free-float-adjusted market capitalization-weighted methodology.

differentiated by size, industry, and environmental, social and governance (ESG) compliance. As a result, index providers have increasingly emphasized investability and liquidity when designing benchmark indexes.

3.2. Summary of TOPIX revisions

From April 2020 to March 2022, the framework for the TOPIX revisions was gradually developed and announced. The key announcements are summarized in Table 2. One major revision relevant to this paper concerned the definition of free float. Under the new rules, certain shares that had previously been classified as free-float were no longer recognized as such, which led 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, and the 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 with over 2,000 constituent companies. It served as a broad indicator of overall market movements. After the market restructuring in April 2022, TOPIX was formally separated from the market segments, but the separation was not immediate: stocks included in TOPIX as of 1 April 2022 (the last day of the old market categories)¹⁰ remained in the index for transitional periods. The stocks that were initially designated for removal from TOPIX were small-cap companies with a free-float market capitalization of less than 10 billion yen. Beginning at the end of October 2022, their index

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

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

weights were reduced in 10 quarterly steps, which concluded at the end of January 2025. The weight of each affected stock was reduced by 10% in each phase (Fig. 1).

On 7 October 2022, it was announced that 493 stocks were initially designated for removal from TOPIX. One year later, on 6 October 2023, this figure was revised to 439 stocks. The reduction was due to 11 designated stocks being delisted and 43 stocks being retained in the index after reevaluation. The weights of the 43 retained stocks were restored at a rate of 0.1 of their original weight per quarter. Table 3 summarizes the listing maintenance criteria for the Prime Market and the requirement for remaining in TOPIX. When the weights of the 439 excluded stocks were reduced to zero and fully removed from TOPIX, the weights of the 43 retained stocks were fully restored to their original levels. A separate analysis focusing on these retained stocks has been performed.¹¹

Fig. 1 about here

Table 3 about here

An empirical analysis was conducted on the TOPIX revision that was implemented between October 2022 and January 2025. This revision is referred to as the first-phase revision, during which the number of constituent stocks in TOPIX was reduced to about 1,700 from the approximately 2,200 companies listed on the former First Section of the Tokyo Stock Exchange. In September 2024, the second-stage revision was announced. Scheduled to begin in October 2026, this phase will reduce the free-float-adjusted weights of designated stocks over eight quarterly steps with plans to be completed by July 2028. At that point, the number of TOPIX constituents will decrease further to around 1,200. The revision process will continue thereafter, and the third regular rebalancing is scheduled to commence in October 2028.

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

The TOPIX revision provides a useful case study for stock indexes for which the goal is to improve index investability by reducing exposure to illiquid micro-cap stocks.¹² The experience with TOPIX may be relevant to other broad-market indexes in Asia that are facing similar challenges. By removing illiquid micro-cap stocks from the index, the overall liquidity of the index can be improved, which increases convenience and efficiency for passive managers and investors in index-linked products.

3.3. Theory framework and hypothesis building

Research has been performed using information theory and the index premium assumption to explain the impact of inclusion or exclusion of a stock in an index. Index inclusion may be interpreted as a certification of firm quality (Shleifer, 1986), while removal from the index may damage the image of a firm and has been associated with negative abnormal returns. In stock markets with different market segmentation, passive funds that track the index are required to reduce or eliminate their holdings because fund managers running index-linked products like mutual funds and ETFs sell them mechanically. In our dataset, most stocks subject to phased exclusions had small market capitalizations and did not meet the listing maintenance standards of the Prime Market or the criteria to remain in TOPIX. Phased exclusions from TOPIX are not announced separately at each stage, and stocks subject to weight reductions may experience price declines around each weight-reduction date.

Hypothesis 1. Stocks subject to phased weight reductions in TOPIX experience negative abnormal returns around the weight-reduction dates.

More than 400 firms in our sample were subject to index exclusions, and we extended our

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

analysis by using the firms' weights in TOPIX as additional information. We focused on the firms in the sample that had the smallest weight in TOPIX. We suspected that they would show the largest stock price decreases because they tend to attract less investor attention and have lower liquidity than other excluded firms. Lower liquidity increases price pressure when passive funds mechanically reduce their holdings, which leads to larger negative returns.

After the announcements by JPX, analysts and investors might have paid closer attention to firms subject to weight reductions, increasing the amount of public information about these firms. Firms with relatively larger index weights may attract more investor attention than the lowest-weighted firms. As a result, the lowest-weighted stocks may have lower liquidity. According to the liquidity argument, lower liquidity is associated with wider bid–ask spreads and greater price pressure when passive funds reduce their holdings. We therefore expect the lowest-weighted stocks to experience larger negative returns during the weight-reduction phases. Based on this context, we arrived at the second hypothesis:

Hypothesis 2. The lowest-weighted stocks experience larger negative abnormal returns than other firms subject to phased exclusion.

4. Data collection and methodology

4.1. Preliminary analysis

As preliminary evidence, we plotted the stock performance of several firms in our sample, and the results were consistent with the hypotheses. Fig. 2 illustrates the trends in stock price of TOPIX, TOPIX Small, and the average stock prices of several groups of low-weight TOPIX constituents. Stocks with index weights ranging from 0.0001% to 0.0005% were grouped by weight, and their average stock prices as of 23 December 2022 were indexed to 100. The average stock prices of the smallest-weighted groups showed a persistent downward trend.

By the end of January 2025, TOPIX and TOPIX Small had respectively risen to 145.79 and 135.71 from their base value of 100. 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%), suggesting that stocks with smaller index weights experienced weaker stock-price performance. TOPIX Small is a sub-index of TOPIX that represents small-cap stocks and is calculated based on free-float-adjusted market capitalization. It is used to capture the performance of small-cap stocks within TOPIX. Even in comparison to TOPIX Small, the average stock prices of the smallest-weighted constituents have decreased substantially.

Fig. 2 about here

4.2. Event study methodology

We measured the effects of phased exclusions from TOPIX on stock returns using an event study methodology, which has been used in most studies examining index revisions. Several approaches for conducting event studies have been proposed. MacKinlay (1997) summarized two approaches for event studies based on the classification of the underlying theory of asset prices. The first approach assumes that there is no underlying theory of asset prices and uses two models: an Average Return Model (using constant-average return) and a Market Model.¹³ The second approach assumes that there is an underlying theory of asset prices and consists of a Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT). The CAPM uses a constant risk-free rate and imposes a constraint on the constant term relative to the market model. Although the APT is theoretically appealing, it is difficult to implement in practice.

We used the market model in this research. The model estimates expected returns during a

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

pre-event estimation period and measures abnormal returns during the event window. We used daily adjusted closing prices and estimated abnormal returns using the market model. For each weight-reduction event, we defined event windows of $(-1, +1)$, $(-5, +5)$, and $(-10, +10)$ trading days, with an estimation period from day -50 to day -11 .

Abnormal returns were estimated using ordinary least squares (OLS) regressions with TOPIX returns as the market benchmark, and we also calculated cumulative average abnormal returns (CARs). We then used statistical tests to evaluate the significance of the findings.

Because the same firms are observed across all 10 weight-reduction phases, regression errors may be correlated within firms across events. Ignoring such within-firm dependence can lead to underestimated standard errors (Moulton, 1990; Bertrand et al., 2004). We later extended our event study framework to a panel regression model and reported standard errors clustered at the firm level, following the cluster-robust inference framework discussed by Cameron and Miller (2015).

We collected the stock prices for firms subject to phased weight reductions using Nikkei NEEDS. We obtained the names of these firms from the list announced by the Tokyo Stock Exchange on 7 October 2022, which initially designated 493 stocks for phased removal from TOPIX. However, one year later, on 6 October 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).

An additional 15 firms were delisted between October 2023 and February 2025. The analyses required data on stock prices for each firm spanning from at least 60 trading days before each weighting phase to 20 days after. Therefore, eight firms were excluded due to a lack of stock data. The final sample for event studies consisted of 416 firms.

The primary objective was to measure the impact of TOPIX index revision on the 416 firms subject to phased weighted reductions. We measured the aggregated impact of the 10 weighting phases

from October 2022 to January 2025. As noted, the weights of the excluded stocks were gradually reduced by 10% over 10 quarterly phases until the end of January 2025. Accordingly, there were 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 weighting reduction dates were 28 October 2022, 30 January 2023, 27 April 2023, 28 July 2023, 30 October 2023, 30 January 2024, 26 April 2024, 30 July 2024, 30 October 2024, and 30 January 2025.

Daily stock prices were considered as the adjusted closing stock price. The adjusted closing price on a given day of trading was the price that has been amended to include any distributions and corporate actions that occurred at any time before the next day's open. Researchers have often used the adjusted closing price when examining historical returns because it gives an accurate representation of a firm's equity value beyond the simple market price. The return on the Tokyo Stock Exchange TOPIX index served as the market return.

5. Results

5.1. Event study of the 10 weight-reduction phases

We first conducted an event study of the 416 firms that were subject to phased exclusions. Table 4 summarizes the CARs over 10 exclusion announcements. For the $(-1, +1)$ window, the mean CAR was -0.82% , the median was -0.81% , and both of these values were statistically significant. Of the 4,160 abnormal returns, 2,763 were negative (more than half). Similar results were observed for the $(-5, +5)$ window and the $(-10, +10)$ window. Both the mean and median CARs were negative and statistically significant. These findings confirm Hypothesis 1: the prices of excluded stocks decreased around the weighting phases, which reflects the mechanical impact of index rebalancing.

To ensure the robustness of the findings, we evaluated the abnormal returns using TOPIX Small as an alternative benchmark index. As shown in panel B of Table 4, the results are largely

consistent with those obtained using the broader TOPIX index for the shorter event windows. For the $(-1, +1)$ window, the mean CAR was -1.11% , and the median was -1.06% , and both were statistically significant at the 1% level. The $(-5, +5)$ window also showed a strongly negative and statistically significant mean CAR of -1.12% and a median CAR of -0.36% . Across the abnormal returns calculated in the $(-5, +5)$ window, 3,013 were negative, which substantially exceeded the 1,147 positive returns.

These negative reactions found in panel B further support Hypothesis 1 and are consistent with adverse effects associated with index rebalancing, even relative to the general performance of the small-cap market segment. Interestingly, the extended $(-10, +10)$ window did not show statistical significance and had a mean CAR of 0.13% and a median of -0.15% . This lack of significance over the longer horizon suggests that the negative pricing impact is heavily concentrated in the days immediately surrounding the weight-reduction phases.

Table 4 about here

5.2. Event study of the 10 weight-reduction phases for the lowest-weighted firms

We also examined the impact of the TOPIX index revision on a sub-sample of the lowest-weighted firms subject to phased weight reductions. As mentioned, TOPIX is a free-float-adjusted market capitalization-weighted index. We downloaded the TOPIX component stocks' weights from the Japan Exchange Group website.¹⁴ As of 28 June 2024, TOPIX included 2,137 stocks, and the weights of constituent stocks were highly dispersed, ranging from as small as 0.000001 to the largest value of 0.044279. The mean weight of the 416 firms in our sample was 0.00000269, which shows that most firms subject to index exclusions have small weights in the index.

We examined the stock performance of firms with smallest weights in TOPIX among the

¹⁴ <https://www.jpx.co.jp/english/markets/indices/topix/>

sample of firms subjected to exclusion. The lowest-weighted firm group consists of the firms having index weight equal or smaller than 0.000001. We suspected that they would show the largest stock-price decreases because they tend to attract less investor attention and have lower liquidity than other excluded firms. Eight firms had an index weight of zero. These firms were either scheduled for delisting or under TSE supervision for possible delisting. We therefore excluded them from this analysis. As a result, 109 firms had the smallest positive index weight of 0.000001, representing approximately 26% of the full sample.

For this firm group, we carried out event studies similar to those discussed in Section 5.1. Table 5 summarizes the market reactions of the 109 lowest-weighted firms across the 10 weight-reduction phases. For the $(-1, +1)$ window, the mean CAR was -1.44% , the median was -1.43% , and both numbers were statistically significant (panel A of Table 5). Of the 1,090 abnormal returns, 828 were negative. Compared with the full sample, the lowest-weighted firms had larger negative CARs, which supports Hypothesis 2. The results for the $(-5, +5)$ and $(-10, +10)$ windows were also negative and statistically significant. These results suggest that the lowest-weighted firms experienced larger negative abnormal returns than the full sample across the 10 weight-reduction phases.

As an additional robustness check against the broader small-cap segment, panel B of Table 5 presents the abnormal returns that occurred when examining TOPIX Small. The results confirm that the lowest-weighted cohort was more vulnerable to the effects of the index revision. The results confirm that vulnerability increased in the lowest-weighted cohort. In the short-term $(-1, +1)$ window, these firms had a mean CAR of -1.69% and a median of -1.57% , which were both significant at the 1% level. In this window, negative abnormal returns heavily outweighed positive ones (863 to 227). This downward pressure persisted robustly through the $(-5, +5)$ window, yielding a statistically significant mean CAR of -1.07% and a median CAR of -0.62% .

However, consistent with the behavior of broader sample, this strong negative reaction

largely dissipated over the extended $(-10, +10)$ horizon. In this longer window, the smallest-weight stocks had a mean CAR of -0.55% , which was only weakly significant at the 10% level, while the median CAR of -0.50% lost statistical significance ($p = 0.122$). The pronounced price drops in the immediate and medium-term windows strongly support Hypothesis 2, suggesting that the impact of mechanical selling associated with index exclusion is more severe for firms with the smallest index weights.

Table 5 about here

6. Additional analysis and robustness check

6.1. Panel regression of stock returns around TOPIX exclusions

To further assess the robustness of our finding, we have extended our event study framework to a panel regression model, which also addresses potential concerns regarding cross-event serial correlation and time-invariant firm characteristics. Table 6A presents the results of this estimation using our comprehensive dataset, which yielded 6,222,090 firm-day observations. The underlying data consist of daily stock returns for 416 firms from January 4, 2019, to February 28, 2025. To analyze the ten distinct weight-reduction phases, we constructed a stacked panel in which the daily observations for each firm were organized separately for each event.

Table 6A about here

Consistent with the CAR analyses, the results show a highly significant average daily abnormal return of -0.36% ($t = -16.24$) during the immediate $(-1, +1)$ event window (Table 6A, column 1). Notably, for all three event-window specifications, the models achieved an adjusted R-squared of 0.148. Given the difficulty of explaining daily stock returns, this level of explanatory power suggests a reasonably strong model fit. These panel estimates are consistent with negative return effects around the weight-reduction dates, even after controlling for market returns and time-invariant

firm characteristics.

To robustly test Hypothesis 2 within a panel framework, we replicated our regression analysis for the sub-sample of the 109 lowest-weighted firms (index weight = 0.000001). Table 6B presents the results based on 1,629,840 firm-day observations. The downward pressure was notably amplified, which is consistent with the heightened vulnerability and lower liquidity of these particular small-cap stocks. The event window dummy for the $(-1, +1)$ window yielded a highly significant negative coefficient of -0.0060 ($t = -14.16$) (Table 6B, column 1). This translates to an average daily abnormal return of -0.60% , which is substantially steeper than the daily return of -0.36% observed in the full sample of 416 firms.

Table 6B about here

More notably, while the selling pressure in the full sample dissipated over longer horizons, the negative impact on this lowest-weighted subset remained highly statistically significant across the extended event windows. The models for the $(-5, +5)$ and $(-10, +10)$ windows yielded significant negative coefficients of -0.0008 ($t = -3.91$) and -0.0004 ($t = -3.45$), respectively. These robust panel estimates maintained an adjusted R -squared of 0.11 across specifications and provide compelling evidence for Hypothesis 2. The results are consistent with greater selling pressure on the smallest and least liquid constituents of the index, leading to larger and more persistent price declines.

6.2. Event study on announcement of firms designated for exclusion from TOPIX

We conducted an event study to examine the impact of the announcement of firms designated for TOPIX exclusion on 7 October 2022. Because the announcement was released after the market closed on Friday, we used the next trading day, 11 October 2022, as the event date. Market-model CARs were computed using days -170 to -20 as the estimation period for the market model parameters because the announcement event is not subject to the same quarterly spacing constraints

as the 10 weight-reduction phases.

Table 7 about here

We expected the market to react negatively to the announcement of firms designated for TOPIX exclusion, and the empirical results were broadly consistent with this expectation. As shown in panel A of Table 7, the mean CAR was negative for all three windows. The mean and median CARs for the $(-5, +5)$ window were strongly negative and statistically significant. For the $(-5, +5)$ window, the mean CAR was -1.39% , and the median was -1.46% . Among 416 abnormal returns, 272 were negative, while 144 were positive. On the other hand, there was no statistical significance for the $(-1, +1)$ window and the $(-10, +10)$ window, although most mean and median CARs were negative.

To ensure the robustness of our findings, we evaluated the abnormal returns using TOPIX Small as an alternative benchmark index, as shown in panel B of Table 7. The results are largely consistent with those obtained using the broader TOPIX index. The mean and median CARs for the $(-5, +5)$ window were -0.66% and -0.89% , respectively, and both were statistically significant. For the shorter $(-1, +1)$ window, the mean CAR was not statistically significant; however, the median CAR was positive at 0.36% and statistically significant at the 1% level, with positive returns outnumbering negative ones (237 to 179). This suggests a slightly positive or mixed initial reaction in the immediate days surrounding the announcement relative to the small-cap segment. However, the extended $(-10, +10)$ window did not exhibit statistical significance, and the pronounced negative reaction in the $(-5, +5)$ window supports the view that the market ultimately reacted adversely to the announcement of the exclusion list.

Overall, the market reacted negatively to the announcement of the firms designated for TOPIX exclusion. Although the first weight-reduction date was 28 October 2022, the negative CARs observed before that date may reflect early portfolio adjustments by some investors and negative reactions from existing shareholders.

6.3. Pre-existing trends

We assessed whether stock price trends had already diverged before the announcement of the firms designated for TOPIX exclusion by conducting a pre-existing trend check using two distinct pre-event windows. The first was an immediate pre-event window ($-19, -2$), designed to capture potential information leakage just before the announcement. The second was an extended pre-event window ($-120, -61$), covering the period around the TOPIX free-float ratio reassessments in April–June 2022. Market-model CARs were computed using days -170 to -20 and -210 to -121 as the corresponding estimation periods to avoid overlap with the event windows. This pre-existing trend check was conducted only for the announcement event (7 October 2022). For the 10 weight-reduction phases from October 2022 to January 2025, the quarterly spacing of the phases makes it difficult to define long, uncontaminated pre-event windows because the exclusion schedule had already been announced.

Table 8 summarizes the CARs for these pre-existing trend checks. In panel A, TOPIX is used as the benchmark, and the mean and median CARs for both the ($-19, -2$) and ($-120, -61$) windows are statistically insignificant. This suggests that, relative to the broader market, there was no clear evidence of a pronounced downward drift or immediate information leakage before the October announcement. However, panel B reveals a different pattern when TOPIX Small is used as the benchmark. The pre-event CARs were negative and statistically significant at the 1% level for both the ($-19, -2$) and ($-120, -61$) windows, and the mean CARs were -1.13% and -3.11% , respectively. This underperformance relative to small-cap peers may suggest some degree of market anticipation.

The framework for the TOPIX reassessment and the minimum criteria of a 10-billion yen tradable share market capitalization was publicly known before the summer of 2022, which means that it is highly likely that investors and passive funds began adjusting their portfolios well in advance

of the official October list release. These results suggest that part of the repricing process may have begun before the formal publication of the exclusion list as investors gradually incorporated the new free-float criteria into their expectations.

Table 8 about here

Furthermore, we conducted a placebo test to ensure that our main findings are driven by the actual execution of the TOPIX revision rather than spurious long-term underperformance of small-cap stocks. The formal list of 493 stocks designated for phased exclusion was announced on 7 October 2022, but the Tokyo Stock Exchange initially published the "First Evaluation" criteria on 1 July 2021, specifically, the minimum tradable share market capitalization requirement of 10 billion yen (Table 2). If the market immediately penalized small-cap firms purely based on regulatory uncertainty, we would expect to see negative abnormal returns surrounding this initial July 2021 announcement. We defined the date of 1 July 2021 as a placebo event date and applied the same market model methodology and computed CARs for the $(-1, +1)$, $(-5, +5)$, and $(-10, +10)$ windows. Market-model CARs were computed using days $(-140, -20)$ as the estimation period for the market-model parameters.

Table 9 presents the results of the placebo test. In panel A, for which TOPIX was used as a benchmark, the mean and median CARs for the short event windows of $(-1, +1)$ and $(-5, +5)$ were statistically insignificant. Similarly, panel B demonstrates that when using TOPIX Small as the benchmark, the CARs for these immediate windows almost remained statistically insignificant. This absence of a significant immediate market reaction suggests that there was no immediate impact of exclusion during the early conceptual phases of the index reform.

The extended $(-10, +10)$ window exhibited statistical significance at the 1% level for both benchmarks, with a mean CAR of -0.43% in panel A and -1.68% in panel B. Nevertheless, this multi-week decrease was likely driven by a systemic, long-term downward drift or sector-specific noise that is characteristic of these small-cap stocks over an extended 21-day period rather than a discrete

information shock from the announcement. This interpretation is strongly supported by the fact that there was no statistical significance in the short event windows, which isolate the precise timing of the announcement. Ultimately, the lack of a sharp localized negative reaction in the immediate days after the first evaluation indicates that the market did not begin systematically discounting these firms until the actual reassessment period and the formal publication of the exclusion list on 7 October 2022. Thus, the causal interpretation of our primary event study findings is supported.

Table 9 about here

6.4. Regression discontinuity design

There may be concerns that the observed negative abnormal returns are merely continuations of pre-existing downward trends among small-cap stocks rather than the causal effect of TOPIX exclusion. To address these concerns, we introduce a regression discontinuity design (RDD) framework.¹⁵ RDD is a quasi-experimental research method used to estimate the causal effects of a treatment (being excluded from TOPIX). It relies on a specific cutoff or threshold on a continuous variable to determine who receives the treatment. The core idea is that treated firms just below the cutoff are nearly identical to those just above it (control firms), creating a natural experiment right at the boundary. Firms subject to exclusion (treated firms) were selected based on a strict criterion: a free-float market capitalization of less than 10 billion yen. To more rigorously isolate the causal impact of the index revision, the excluded firms were compared to a control group of firms that narrowly avoided exclusion (i.e., firms with a free-float market capitalization just above the 10-billion yen threshold). To build the control group, we first collected all firms with a free-float market capitalization just above the 10-billion yen threshold. Then, we excluded stocks with missing data and stocks that were delisted during the sample period. Overall, our control group consists of 97 firms meeting all

¹⁵ We thank a reviewer for this suggestion.

criteria.

Table 10 about here

Table 10 presents the results of this comparison. During the initial exclusion phase (Phase 1), the treated group of 416 firms experienced a strongly negative and statistically significant mean CAR of -1.67% in the $(-1, +1)$ window. In contrast, over the same $(-1, +1)$ window, the control group exhibited a mean CAR of just -0.08% , which lacked statistical significance. The sharp divergence in immediate market reactions between the treated group and firms just above the threshold provides compelling evidence that the negative returns are causally linked to the mechanical selling pressure of the TOPIX exclusion rather than inherent firm characteristics.

6.5. Time-series persistence check and phase comparison

We examined the time-series persistence of this mechanical selling pressure by comparing the market reactions in the first phase with those in the tenth and final phase (Table 11). Interestingly, the immediate downward pressure remained highly robust even after nine previous quarters of phased weight reductions. In Phase 1, the mean CAR for the $(-1, +1)$ window was -1.67% and statistically significant at the 1% level. In Phase 10, the mean CAR for the $(-1, +1)$ window deepened to -2.16% and remained statistically significant at the 1% level. This persistence suggests that the predictable schedule did not eliminate the immediate price effect, which is consistent with continued mechanical rebalancing on the adjustment dates.

Table 11 about here

However, an important shift occurred in the longer event windows during the final phase. Unlike Phase 1, in which the $(-5, +5)$ window yielded a negative mean CAR of -1.27% , Phase 10 exhibited positive mean CARs of 1.31% for the $(-5, +5)$ window and 2.01% for the $(-10, +10)$ window, which were both statistically significant at the 1% level. This suggests a reversal effect following the

final mechanical sell-off. Once the phased exclusion was completed, the selling pressure associated with the rebalancing process may have subsided, allowing the stock prices of these small-cap firms to experience a short-term rebound.

6.6. Event study for the retained stocks

We next focused on a special group of 42 firms that were initially designated for phased exclusion from TOPIX on 7 October 2022 but were subsequently re-included in the index following the reassessment announced on 6 October 2023. Using an event-study methodology, we examined the stock price reactions to these events. For each firm, we obtained adjusted closing prices around each event date. The estimation window was defined as days -170 to -20 relative to each event date.

Table 12 about here

Panel A of Table 12 summarizes the results of the market reactions to the announcement of the 42-firm group for phased weight reductions on 7 October 2022. Similar to the analyses in Section 6.2, the event date was 11 October 2022. The mean CAR over the three windows of $(-1, +1)$, $(-5, +5)$, and $(-10, +10)$ were all negative and statistically significant. The results were similar for the median CARs of the two windows of $(-5, +5)$ and $(-10, +10)$.

After one year, on 6 October 2023, it was announced that these stocks would be retained in TOPIX after reevaluation. The day was a Friday, and the announcement was made after the market closed, so we used the next trading day as the event date, 10 October 2023.¹⁶ Panel B of Table 12 shows the results of the market reactions to the announcement of this change. The median CAR of the $(-1, +1)$ window was positive at 1.09% and statistically significant. However, other mean and median CARs are statistically insignificant.

¹⁶ 7 October 2023 was a Saturday, 8 October 2023 was a Sunday, and 9 October 2023 was a national holiday.

In short, similar to the findings in Section 6.2, the market reacted negatively to the announcement of the 42-firm group being weight-reduced, and the empirical results were significant. On the other hand, the market reacted positively to the announcement that they would be retained in TOPIX. A positive return occurred in the short-time window, and this finding was statistically significant. Being included in a stock index creates reputational incentives that influence managerial behavior and receive positive reactions from the market. As inclusion in a stock index carries such significance, exclusions generate negative returns, and these contrasting reactions were observed in the group of 42 firms.

7. Conclusion

We have 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 daily stock-price data for 416 firms subject to phased weight reductions, we examined market reactions to 10 quarterly weight reductions implemented between October 2022 and January 2025. This phased approach to removing small-cap stocks is unusual among major global stock indexes.

Previous studies have documented negative stock-price reactions to index exclusions, but this paper has shown that significant negative effects can persist even when exclusions are implemented gradually over multiple phases. The firms examined were mostly micro-cap stocks with very low index weights and tended to receive relatively limited investor attention. Our results showed statistically significant negative abnormal returns for these firms, with larger negative returns among the lowest-weighted stocks.

Several additional analyses supported the main event-study results. Panel regressions with firm fixed effects and firm-level clustered standard errors continued to show significant negative

returns around the weight-reduction dates. The pre-existing trend analysis suggested some market anticipation relative to TOPIX Small, while the placebo test showed no significant immediate reaction around the earlier July 2021 announcement. These results help distinguish the effects surrounding the actual exclusion process from broader pre-existing stock-price trends.

The comparison of firms subject to phased weight reductions with firms just above the 10-billion yen threshold showed a clear difference in immediate market reactions, providing further support for the interpretation that TOPIX exclusion and the associated mechanical selling pressure contributed to the observed price declines. The phase-by-phase analysis also showed that the immediate negative reaction persisted through the final weight-reduction phase, even though the exclusion schedule had been known in advance. The analysis of the 42 firms that were initially designated for phased weight reductions but later retained in TOPIX provided complementary evidence: the market reacted negatively when they were designated for weight reductions and positively, at least in the short event window, when their continued inclusion in TOPIX was announced.

These findings highlight an important contrast between index-level stability and firm-level effects. The phased approach limited disruption to TOPIX but did not eliminate the adverse effects on individual stocks subject to exclusion. Therefore, this study shows that phased exclusions can reduce disruption to the index while still imposing substantial costs on affected firms. The results may also be relevant to other broad-market indexes in Asia that include a large share of listed firms and may consider similar index reforms. Future research could extend this analysis by incorporating financial accounting variables, trading volume, and transaction costs, and by further examining heterogeneity across firms. These extensions would help to clarify how firm characteristics and market liquidity interact with mechanical index rebalancing and provide a more complete assessment of the economic effects of phased exclusion from stock indexes.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process.

During the preparation of this work, the author(s) used ChatGPT (OpenAI) for language editing, improving clarity, and refining the presentation of the manuscript. The author(s) reviewed and edited the output as needed and take full responsibility for the content of the published article.

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Table 1

Calculation methods and free-float adjustments for selected major stock indexes

Stock Index	Country	Calculation Method	Free-Float Adjustment	Adjustment Period
TOPIX	Japan	market-capitalization weighted	○	October 2005–June 2006
S&P 500	United States	market-capitalization weighted	○	March 2005–September 2005
FTSE 100	United Kingdom	market-capitalization weighted	○	June 2001
DAX	Germany	market-capitalization weighted	○	June 2006
CAC 40	France	market-capitalization weighted	○	December 2003
Nikkei 225	Japan	price-weighted		
Dow 30	United States	price-weighted		

Source: Authors' compilation.

Table 2

Timeline of key events in the TOPIX revision process and phased weight reductions

Date	TOPIX-Related Events
25 Dec 2020	Announcement of the TOPIX review
1 Jul 2021	First evaluation of TOPIX constituents. The minimum criterion was set at 10 billion yen.
31 Mar 2022	Second evaluation of TOPIX constituents
Apr.–Jun. 2022	Reassessment of the TOPIX free-float ratio
7 Oct 2022	Announcement of 493 stocks subject to gradual weight reductions (after market close)
End of Oct 2022	Commencement of the first weight reduction. 28 October (Friday) is the adjustment trading day for index funds, and 31 October (Monday) is the month-end trading day.
End of Jan 2023	Second weight reduction. January 30 (Monday) is the adjustment trading day for index funds, and 31 January (Tuesday) is the month-end trading day.
31 Mar 2023	Determination of values (tradable share market capitalization) for TOPIX reevaluation
End of Apr 2023	Third weight reduction. 27 April (Thursday) is the adjustment trading day for index funds, and 28 April (Friday) is the month-end trading day.
End of Jul 2023	Fourth weight reduction. 28 July (Friday) is the adjustment trading day for index funds, and 31 July (Monday) is the month-end trading day.
6 Oct 2023	Publication of the re-evaluation results for phased weighting reduction constituents. Final evaluation.
End of Oct 2023	Fifth weight reduction

End of Jan 2024	Sixth weight reduction
End of Apr 2024	Seventh weight reduction
End of Jul 2024	Eighth weight reduction
End of Oct 2024	Ninth weight reduction
End of Jan 2025	Tenth weight reduction. Stocks subject to gradual weight reductions are fully excluded from TOPIX.

Source: Authors' compilation based on various materials from the Tokyo Stock Exchange.

Table 3

Prime Market listing maintenance standards and criteria for remaining in TOPIX

	Listing Maintenance Standards for the Prime Market	Criterion for Remaining in TOPIX
Number of shareholders	800 or more	
Number of tradable shares	20,000 units or more	
Tradable share market capitalization	10 billion yen or more	○
Free-float ratio	35% or more	
Trading volume	Average daily trading value of 20 million yen or more	
Net assets	Net assets must be positive	
Annual turnover ratio of trading value		○

Source: Authors' compilation based on various materials from the Tokyo Stock Exchange.

Table 4

CARs for the 10 weight-reduction phases for the entire sample.

Panel A: CARs for the 10 weight-reduction phases for the entire sample using TOPIX

Window	Mean CAR (%)	<i>t</i> -statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (<i>p</i> -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

Panel B: CARs for the 10 weight-reduction phases for the entire sample using TOPIX Small

Window	Mean CAR (%)	<i>t</i> -statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (<i>p</i> -value)
[-1, +1]	-1.11***	20.85	-1.06***	1224:2936	0.000
[-5, +5]	-1.12***	21.20	-0.36***	1147:3013	0.000
[-10, +10]	0.13	0.81	-0.15	2126:2034	0.158

Notes: This table provides the CARs for 416 firms subject to TOPIX revision for the 10 weight-reduction 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 weight-reduction phases of the lowest-weight firms in the TOPIX index.

Panel A: CARs for the 10 weight-reduction phases for the 109 lowest-weighted firms using TOPIX

Window	Mean CAR (%)	<i>t</i> -statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (<i>p</i> -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

Panel B: CARs for the 10 weight-reduction phases for the 109 lowest-weighted firms using TOPIX Small

Window	Mean CAR (%)	<i>t</i> -statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (<i>p</i> -value)
[-1, +1]	-1.69***	15.08	-1.57***	227:863	0.000
[-5, +5]	-1.07***	4.42	-0.62***	470:620	0.000
[-10, +10]	-0.55*	1.68	-0.50	519:571	0.122

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 6A

Panel regression of stock returns around TOPIX Exclusions for the entire sample.

Variables	(1) (-1, +1)	(2) (-5, +5)	(3) (-10, +10)
Event Window Dummy	-0.0036*** (-16.24)	-0.0002* (-2.10)	-0.0000 (-0.16)
Market Return	0.7774*** (68.48)	0.7771*** (68.46)	0.7771*** (68.46)
Constant	-0.0001*** (-19.78)	-0.0001*** (-20.79)	-0.0001*** (-21.07)
Firm Fixed Effects	Yes	Yes	Yes
Observations	6,222,090	6,222,090	6,222,090
Adj. R^2	0.148	0.148	0.148

Notes: This table presents panel regression results estimating the impact of TOPIX phased weight reductions on daily stock returns. The dependent variable is the daily stock return for the 416 firms subject to phased weight reductions. The Event Window Dummy is an indicator variable equal to 1 during the specified trading day windows (-1, +1), (-5, +5), and (-10, +10) surrounding the quarterly weight reduction dates, and 0 otherwise. Market Return controls for overall daily market movements. All specifications include firm fixed effects to control for time-invariant unobserved heterogeneity. Robust t -statistics clustered at the firm level to account for cross-event serial correlation are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6B

Panel regression of stock returns for the lowest-weighted firms.

Variables	(1) (-1, +1)	(2) (-5, +5)	(3) (-10, +10)
Event Window Dummy	-0.0060*** (-14.16)	-0.0008*** (-3.91)	-0.0004*** (-3.45)
Market Return	0.7423*** (34.53)	0.7420*** (34.52)	0.7420*** (34.52)
Constant	-0.0002*** (-23.97)	-0.0002*** (-24.77)	-0.0002*** (-24.42)
Firm Fixed Effects	Yes	Yes	Yes
Observations	1,629,840	1,629,840	1,629,840
Adjusted R ²	0.111	0.111	0.111

Notes: This table presents panel regression results estimating the impact of TOPIX phased exclusions on daily stock returns. The dependent variable is the daily stock return for the 109 lowest-weighted firms subject to phased weight reductions. The Event Window Dummy is an indicator variable equal to 1 during the specified trading day windows (-1, +1), (-5, +5), and (-10, +10) surrounding the quarterly weight reduction dates, and 0 otherwise. Market Return controls for overall daily market movements. All specifications include firm fixed effects to control for time-invariant unobserved heterogeneity. Robust *t*-statistics clustered at the firm level to account for cross-event serial correlation are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 7

CARs for the announcement of the firms designated for TOPIX exclusion.

Panel A: CARs for the name announcement event using TOPIX

Window	Mean CAR (%)	<i>t</i> -statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (<i>p</i> -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

Panel B: CARs for the name announcement event using TOPIX Small

Window	Mean CAR (%)	<i>t</i> -statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (<i>p</i> -value)
[-1, +1]	0.20	1.31	0.36***	237:179	0.005
[-5, +5]	-0.66**	2.43	-0.89***	171:245	0.000
[-10, +10]	0.33	0.89	-0.003	206:210	0.883

Notes: This table presents the impact of the announcement of the firms' names to be subject to 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 8

Estimation of CAR for pre-event periods (pre-existing trend check).

Panel A: CARs for the pre-event window of the name announcement event using TOPIX

Window	Mean CAR (%)	<i>t</i> -statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (<i>p</i> -value)
[−19, −2]	−0.16	0.52	−0.03	207:209	0.960
[−120, −61]	−0.68	1.08	−0.58	198:218	0.351

Panel B: CARs for the pre-event window of the name announcement event using TOPIX Small

Window	Mean CAR (%)	<i>t</i> -statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (<i>p</i> -value)
[−19, −2]	−1.13***	3.71	−1.04***	160:256	0.000
[−120, −61]	−3.11***	4.86	−2.52***	139:277	0.000

Notes: This table presents the CAR of the pre-event window of the event where the names of the firms to be subject to TOPIX exclusion were announced. The event date was 11 October 2022. The table provides the CARs for 416 firms for the (−19, −2) and (−120, −61) windows. Market-model CARs were computed using days (−170 to −20) and (−210 to −121) correspondingly as the estimation period for the market model parameters. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 9

Placebo test.

Panel A: CARs for the placebo test using TOPIX

Window	Mean CAR (%)	<i>t</i> -statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (<i>p</i> -value)
[-1, +1]	-0.007	0.06	0.05	204:212	0.731
[-5, +5]	-0.18	0.76	-0.09	202:214	0.589
[-10, +10]	-0.43***	3.76	-0.47***	144:272	0.000

Panel B: CARs for the placebo test using TOPIX Small

Window	Mean CAR (%)	<i>t</i> -statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (<i>p</i> -value)
[-1, +1]	-0.004	0.03	0.17	224:192	0.128
[-5, +5]	-0.42*	1.71	-0.21	193:223	0.155
[-10, +10]	-1.68***	4.65	-1.16***	168:248	0.000

Notes: This table presents the results of the placebo test for the announcement date of 1 July 2021. The table provides the CARs for 416 firms. Market-model CARs were computed using days –140 to –20 as the estimation period for the market model parameters. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 10

RDD test: comparison of CARs of Phase 1.

Panel A: CARs for the Phase 1 of the 416-firm groups using TOPIX

Window	Mean CAR (%)	<i>t</i> -statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (<i>p</i> -value)
[–1, +1]	–1.67***	12.60	–1.63***	77:339	0.000
[–5, +5]	–1.27**	5.48	–1.12***	147:269	0.000
[–10, +10]	–0.04	0.11	–0.69*	183:233	0.076

Panel B: CARs for the phase 1 of the control groups using TOPIX

Window	Mean CAR (%)	<i>t</i> -statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (<i>p</i> -value)
[–1, +1]	–0.08	0.25	–0.33	41:56	0.154

[-5, +5]	-3.25***	5.88	-2.29***	22:75	0.000
[-10, +10]	-2.15***	2.98	-2.47***	35:62	0.008

Notes: This table provides the CAR comparison between the control group and the main group of 416 firms subject to TOPIX revision. The event dates are 28 October 2022. 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.

Table 11

Comparison of CARs between Phase 1 and Phase 10.

Panel A: CARs for the Phase 1 of the 416-firm groups using TOPIX

Window	Mean CAR (%)	<i>t</i> -statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (<i>p</i> -value)
[-1, +1]	-1.67***	12.60	-1.63***	77:339	0.000
[-5, +5]	-1.27**	5.48	-1.12***	147:269	0.000
[-10, +10]	-0.04	0.11	-0.69*	183:233	0.076

Panel B: CARs for the Phase 10 of the 416-firm groups using TOPIX

Window	Mean CAR (%)	<i>t</i> -statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR
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					(<i>p</i> -value)
[-1, +1]	-2.16***	12.43	-2.24***	56:360	0.000
[-5, +5]	1.31***	5.29	0.69	248:168	0.000
[-10, +10]	2.01***	5.50	1.34	259:157	0.000

Notes: This table provides the CAR comparison between the first and tenth phases for 416 firms subject to TOPIX revision. The event dates are 28 October 2022 and 30 January 2025. 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.

Table 12

Event study for re-included stocks.

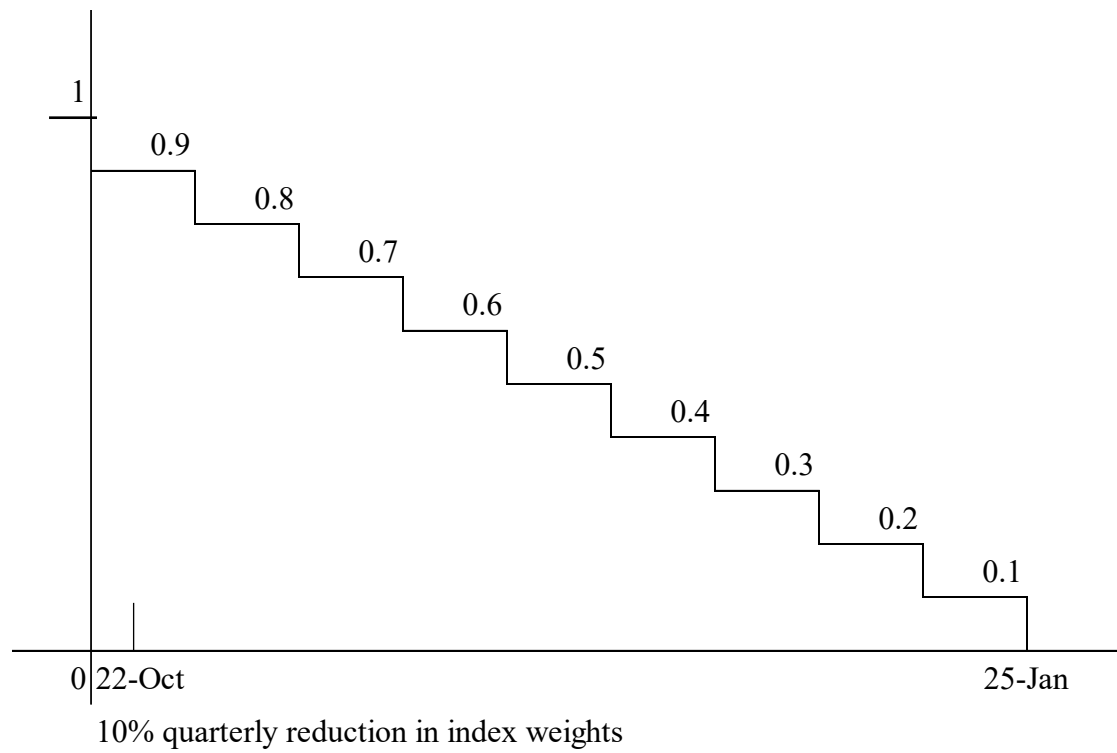
Panel A: CARs for the exclusion date of the 42-firm groups using TOPIX

Window	Mean CAR (%)	<i>t</i> -statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (<i>p</i> -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 retained date of the 42-firm groups using TOPIX

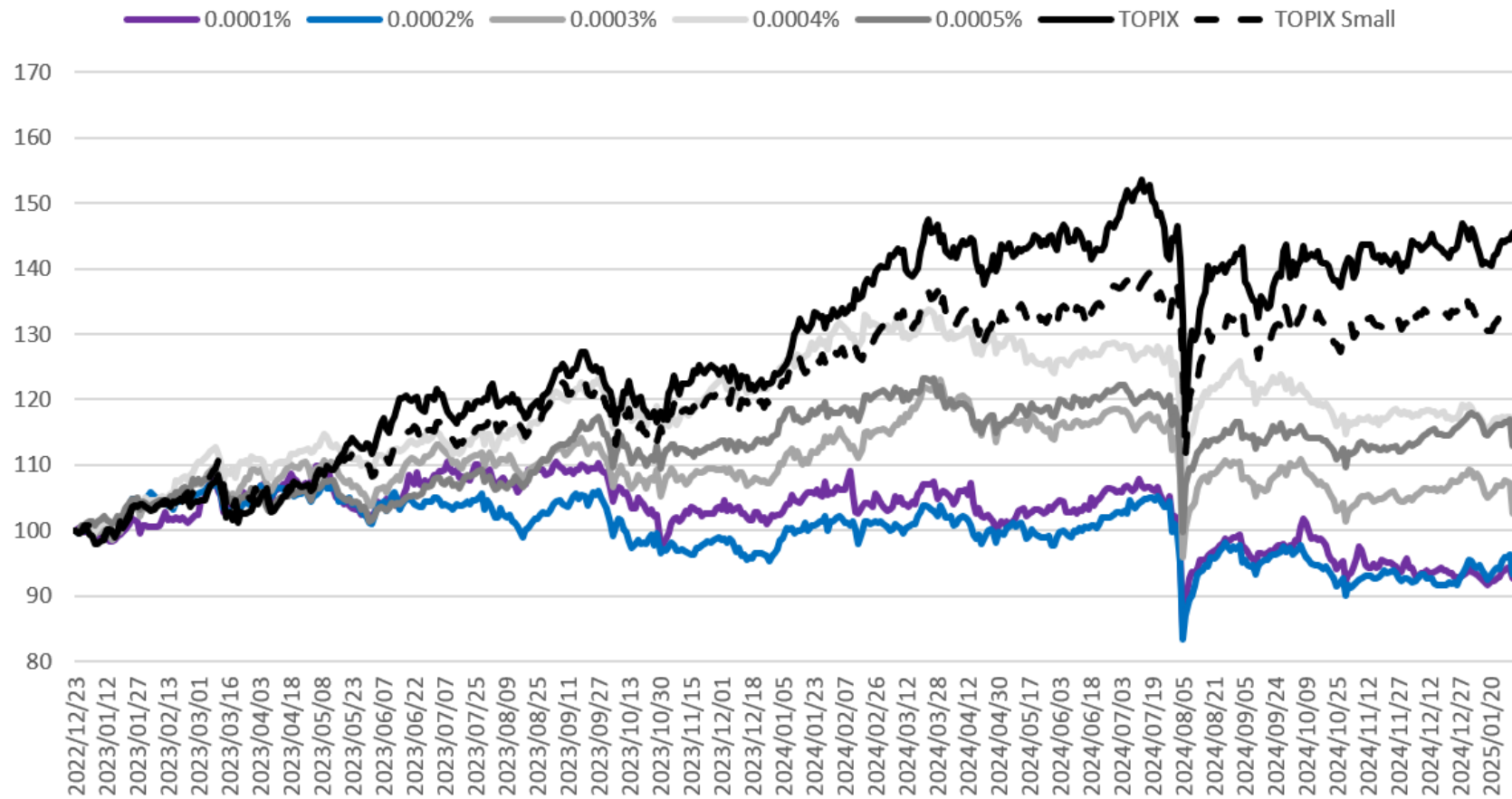
Window	Mean CAR (%)	<i>t</i> -statistic for mean CAR	Median CAR (%)	Number of positive: negative	Sign test for median CAR (<i>p</i> -value)
[-1, +1]	1.42	1.57	1.09**	28:14	0.043
[-5, +5]	-1.02	0.90	-0.55	17:25	0.280
[-10, +10]	-0.08	0.06	-0.47	19:23	0.644

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 11 October 2022. Panel B provides the CARs for 42 firms being re-included to TOPIX from 6 October 2023 (the event date is 10 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.



Source: Authors' creation.

Fig.1. Illustration of quarterly weight reductions.



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

Fig. 2. Trends of indexes and the lowest-weighted stocks.