The Effect of Changes in Index Constitution: Evidence from the Korean Stock Market

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Abstract

This paper examines the effect of changes in the KOSPI 200 index. We find evidence of permanent price effects and partial return reversal for the event stocks. Trading volumes tend to significantly increase during the event period and remain relatively higher than before the event. We also find some evidence of the existence of anticipatory trading effect before the effective dates and volatility effect. The results show that the abnormal return still exists even after adopting factor models and excluding newly added stocks. The indexing methodology of KOSPI 200 conveys the valuable information that the added stocks showed good performance and better earnings relative to the market average and the deleted stocks showed vice versa. In conclusion, member changes in the KOSPI 200 index are not information-free events.

JEL classification: G12; G14

Keywords: Index Changes; Additions; Deletions; KOSPI 200; Index Inclusion

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Abstract

This paper examines the effect of changes in the KOSPI 200 index. We find evidence of permanent price effects and partial return reversal for the event stocks. Trading volumes tend to significantly increase during the event period and remain relatively higher than before the event. We also find some evidence of the existence of anticipatory trading effect before the effective dates and volatility effect. The results show that the abnormal return still exists even after adopting factor models and excluding newly added stocks. The indexing methodology of KOSPI 200 conveys the valuable information that the added stocks showed good performance and better earnings relative to the market average and the deleted stocks showed vice versa. In conclusion, member changes in the KOSPI 200 index are not information-free events.

1. Introduction

The addition or deletion of a stock from an index is important not only to index basket traders who must rebalance their portfolios, but also to arbitrageurs who exploit these opportunities to make a profit. The index change effect was first investigated by Shleifer (1986), Harris and Gurel (1987) and Jain (1987). The effect has been extensively documented in numerous other studies of abnormal stock price movement around the event period that cannot be explained by the efficient markets hypothesis. However, questions about what drives stock prices and what affects the behavior of individual stocks remain unanswered.

Most research on the index change effect has focused on the S&P 500. Starting in the mid-1990s, some studies began examining other indices (see, e.g., Beneish and Gardner, 1995; Chen, 2006) and in recent years researchers have started to study indices of developed markets outside the U.S. (see, e.g., Liu, 2000; Masse et al., 2000; Masse, 2007; Qiu and Pinfold, 2008). However, research on indices of emerging markets is still in its early stages (see, Elayan et al., 2000; Bildik and Gulay, 2008).

The index change effect is an important and critical issue in Korea since asset size in Korea Stock Exchange Price Index (KOSPI) 200 and the number of index funds are growing quickly (depicted in Figure 1), and the Korean stock market is on the verge of transitioning from an emerging market to a developed market.[2] Moreover, the KOSPI 200 index itself is meaningful to researchers studying derivatives markets since the futures and options contracts underlying KOSPI

[2] FTSE has started to include the Korean stock market in developed market indices beginning in 2009. MSCI is also under reviewing this process.

200 are some of the most active in the world. The KOSPI 200 index effect is therefore deserving of attention from academics and practitioners.

[Insert Figure 1 about here]

This study investigates the index change effect of the KOSPI 200 index in terms of abnormal return, volume and risk. We first calculate abnormal return using a simple model and then comparing the results to those obtained when using one-factor and three-factor models. We examine the abnormal volume effect using relative dollar volume ratio measure. In addition, we attempt to explain the change effect by analyzing the volatility, beta of event stocks, and indexing methodology. We also examine the index change effect by focusing on stocks newly added to the index while excluding the prior constituents. From our results, we conclude that changes in the KOSPI 200 index show the same abnormal return behavior as has been found in data for the U.S. and other developed markets. Moreover, we conclude that changes in the KOSPI 200 index convey favorable information on the added stocks and unfavorable information on the deleted stocks, meaning that they are not information-free events.

Our study is important for several reasons. Firstly, the present study represents the first attempt at providing a comprehensive analysis of index changes effects within the Korea Stock Market. Secondly, the results of this research offer a meaningful counterpoint to results obtained for developed countries, such as analyses involving the S&P 500 by comparing the indexing methodology. Thirdly, we try to explain the abnormal return of event stocks by volatility changes and information contents hypothesis adoption. Fourthly, we analyze the addition effect by restricting part of the analysis to focus solely on newly added stocks. Lastly, we try to the results from the perspectives of ICH(Information Contents Hypothesis) linked with indexing methodology.

The study is organized as follows. In Section 2 we discuss the relevant existing literature and briefly describe the motivations behind our empirical predictions. Section 3 describes the data and methodology. We analyze the index change effect by abnormal return and volume in Section 4. In Section 5 we report results of additional tests and offer some discussion of our findings. Our conclusions are presented in Section 6.

2. **Prior studies of the index change effect**

Prior research on the index change effect can be categorized into two groups by the interested measures. The first group focuses on the return and volume, while the second group on risk measures such as beta and volatility.

The first group attempts to explain price and volume effects by suggesting the new explainable hypotheses. The main differences among these hypotheses involve whether the stock price or volume change is temporary or permanent, what kind of information is revealed with the addition or deletion of a stock, and what are the primary determinants of stock movement and investor's behavior.

The Price Pressure Hypothesis (PPH) argues that if a company is added to the index, the price will temporarily increase by the excess demand for funds following the announcement date, and revert to the original equilibrium price after the event window. The effect on trading volume should behave similarly to the price effect. Harris and Gurel (1986), Woolridge and Ghosh (1986) and Biktimirov, Cowan and Jordan (2004) support the PPH.

The Downward-Sloping Demand Curve for Stocks Hypothesis (DSH) contrasts with the PPH, predicting a permanent price effect due to the non-availability of equivalent stocks. While the PPH assumes a downward-sloping demand curve in the short run, the DSH assumes a downward-sloping demand curve in both the short run and in the long run. DSH was firstly proposed by Shleifer (1986), and has been supported by Beneish and Whaley (1996), Lynch and Mendenhall (1997) and Wurgler and Zhuravskaya (2002).

Amihud and Mendelson (1986) posit that a firm added to the index becomes less expensive for investors to trade since increased liquidity decreases transaction costs and thus receives more interest from market analysts and investors. According to the Liquidity Cost Hypothesis (LCH), inclusion in the index is an event that promises a permanent increase in the stock's liquidity, and therefore both stock price and trading volume should see a permanent increase. Hedge and McDermott (2003) and Becker-Blease and Paul (2006) demonstrate support for LCH.

On the other hand, from the perspective of the Information Content Hypothesis (ICH), when a firm becomes a member of the index, this event conveys a meaningful piece of information such as improved or expected operating performance to the investors. Index change itself is not an information-free event. This information will have a permanent effect on prices and a temporary effect on volume. Analyses by Dhillon and Johnson (1991), Jain (1987), Dennis et al. (2003), Cai (2007) and Platikanova (2008) are consistent with ICH.

According to the Investor Awareness Hypothesis (IAH), if one stock enters into the index, investor awareness of the stock will be higher than before and many investors will more seriously consider buying it. This affects the shadow cost[3] reduced, resulting in the increase in stock price.

[3] According to Merton (1987), investors can be divided into two groups: those who know one subset of stock, and those who do not. Generally, investors know of only a subset of all stocks (for example, KOSPI 200

However, if a company drops out of the index, the awareness of that company will not diminished and shadow cost will not increase quickly. Chen et al. (2004) and Elliot et al. (2006) find support for IAH.

The above hypotheses have been quite controversial and each has been supported by evidence in studies that seek to explain abnormal returns and volumes following the addition or deletion of a stock from an index. Wide variance in findings across studies can be attributed to differences in markets, sample periods and event windows. Past studies mainly focus on the addition effects, and fully explore the deletions effects and differences between constituents that are newly added (new constituents) and constituents that are re-entering the index (previous constituents).[4]

Even though literature on the index change effect has been dominated by a focus on the return and volume, some studies investigated the risk measures and tried to explain index effects by them(see, e.g., Vijh, 1994; Barberis et al., 2005; Masse, 2008).

Vijh (1994) studies changes in the market betas of stocks added to the S&P 500 index, and finds that at both daily and weekly frequencies, stocks added to the index between 1975 and 1989 experience a significant increase in their betas after being added to the index. Barberis et al. (2005) also analyzes the risk change caused by both the fundamental factor view and the non-fundamental factor view. The results of Vijh (1994) and Barberis et al.(2005) lead the authors to argue that while stocks added to the S&P 500 experience an average increase in beta after inclusion during 1976-

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member stocks), and hold only the stocks they are aware of and demand premium (shadow cost) for the non-systematic risk that they bear. The difference in the required rate of return between a completely diversified portfolio and an incompletely diversified portfolio is the shadow cost.

[4] Mase (2008) recently offered insights into the differing behavior of new constituents and previous constituents.

2000, and that this effect is not only present but is in fact larger in more recent data in light of the growing importance of the S&P 500. They also find evidence of a decrease in beta for stocks deleted from the index. They argue that non-fundamental factors explain the effect better than fundamental factors.

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3. Data and methodology

3.1. KOSPI 200 index

As the underlying index for Korean stock index futures and options, the KOSPI 200 consists of 200 constituents selected from all issues listed on the Korea stock exchange. The universe are the compositions of KOSPI index.[5] They are chosen based on factors such as market capitalization, trading value and as representation of their respective industries. The KOSPI 200 has been calculated and published since June 15, 1994 with a base index of 100 set on January 3rd, 1990.

The periodical review occurs at the end of the April and the results are announced by the end of the May. The resulting index changes are effective on the first trading day after the second Thursday in June. In addition to the regular review, special changes in the index can occur if a constituent stock is de-listed or undergoes corporate events such as a merger, bankruptcy, takeover and so forth.[6]

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[5] During the sample period, the ratio of KOSPI 200 to KOSPI is about 80%.

[6] We exclude the samples from special changes because these irregular changes are not driven by index methodology, but by corporate events.

Even prior to the announcement day in May, market participants interested in the outcome of the yearly review should be able to make a fairly accurate forecast of the changes that are likely to happen based on the index methodology.[7]

3.2. Sample

The Sample of KOSPI 200 index changes starts in June 1995 and continues through June 2008. Data about index changes information and free-float ratios are from KRX. Market data such as closing price, trading volume, listed shares and ownerships are collected from FnGuide Inc.

There were 288 regular changes of stocks in KOSPI 200 index between June 9, 1995 and June 12, 2008. The average number of regular changes to the index each year is about 20, the greatest number of changes is over 40 in 1999, and the lowest is 10 in 2007. Among the additions, we remove 23 stocks due to corporate events, the unavailability of previous year data due to spin-offs and newly listed stocks. Among the deletions, we remove 53 stocks due to the corporate events such as mergers and acquisitions (M&A), bankruptcies and irregular changes. Table 1 shows demand shock by index changes and Table 2 shows the refined sample in detail.

[Insert Table 1 about here]

[Insert Table 2 about here]

[7] Although a firm must have substantial market capitalization and sufficient liquidity to be added to the index, there may still be a degree of subjectivity and uncertainty in the choice of newly listed firms, to the extent that the decision might be regarded as conveying information about a firm's prospects.

We divide the sample period into two subsets. The first (period 1) is from 1995 to 2001 and the second (period 2) is from 2002 to 2008. We divide the samples in 2002 because that year marks the first time Exchange Traded Funds (ETFs) tracking the KOSPI 200 were listed in Korea; as Figure 1 shows, index funds then began to grow quickly.

3.3. Event window and methodology for calculating abnormal return and volume

The effective date (ED) is the second Thursday of June in every year, whereas the announcement date (AD) varies in each year, but occurs sometime before the end of the May. Since the announcement of the index changes generally occurs after the market closes, the trading opportunity must be observed after the announcement date (AD); i.e., 1 day after the announcement date (AD+1).[8]

In order to explain the index change effects on stock return and volume behavior, our event window ranges from AD-20 to ED+40, and the short-run event window is defined as ending 20 trading days after the effective date, and the long-run event window is defined as ending 40 trading days after the effective date. The average interval between the announcement and effective dates ("run-up period," hereafter) is 6 days. Figure 2 describes the timeline of the event window.

[Insert Figure 2 about here]

Previous studies have used a variety of methods for calculating abnormal return (AR). There are three conventional methods for calculating the abnormal return, including the simple model, 1-

[8] We define the AD as the date when the regular changes is released and posted on the KRX website.

factor model (or market model) and 3-factor model. These are specified in equations (1) to (3), respectively.

Simple Model:

$$AR^{S}_{i,t} = R_{i,t} - R_{m,t} \tag{1}$$

The 1-Factor Model:

$$AR^{1F}_{i,t} = R_{i,t} - (\hat{\alpha}_i + \hat{\beta}_i \times R_{m,t}) \tag{2}$$

The 3-Factor Model:

$$AR^{3F}_{i,t} = R_{i,t} - R_{f,t} - [\hat{\alpha}_i + \hat{\beta}_{i,1} \times \left(R_{m,t} - R_{f,t}\right) + \hat{\beta}_{i,2} \times SMB_t + \hat{\beta}_{i,3} \times HML_t] \tag{3}$$

where SMB_t is the difference in returns between the FnGuide Mid-Small Cap index and the Large Cap index, and HML_t is the difference in returns between the FnGuide Value index and the Growth index.

According to previous studies, although other more complicated procedures have been developed to measure abnormal return and abnormal volume, none of those methods has improved upon the simple model (Shankar and Miller, 2006; Brown and Warner, 1985). Therefore we will adopt equation (1) as the default method of calculation for simplicity.

The abnormal returns for all event stocks are then averaged against the total number of announcements *N* for each day *t* of the event window to obtain the mean abnormal return (MAR_t):

$$MAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{i,t} \tag{4}$$

The mean abnormal returns are then summed over the event window in order to calculate a cumulative average abnormal return ($CMAR_{I,T}$) for each time period from day *I* to *T*:

$$CMAR_{I,T} = \sum_{t=I}^{T} MAR_t \tag{5}$$

We also examine volume patterns using the mean relative dollar volume ratio (MRDVR) around the events. Most of the previous studies calculate abnormal volume using the volume ratios measure employed by Harris and Gurel (1986) and Beneish and Whaley (1996). However, we adopt the relative dollar volume ratio to get rid of the bias from the corporate events. MRDVR measures each day's relative dollar volume ratio to each stock's past dollar volume to market. The formulas for calculating volume ratios are:

$$BDVR_i = \frac{1}{60}\sum_{t=AD-70}^{t=AD-11}\left(\frac{DV_{i,t}}{DV_{m,t}}\right) \tag{6}$$

$$RDVR_{i,t} = \frac{DV_{i,t} / DV_{m,t}}{BDVR_i} \tag{7}$$

$$MRDVR_t = \frac{1}{N}\sum_{i=1}^{N} RDVR_{i,t} \tag{8}$$

where the base dollar volume ratio $BDVR_i$ is the average stock-to-index trading dollar volume during the 60-trading-day period that begins with AD-70 and extends to AD-11, $DV_{i,t}$ and $DV_{m,t}$ are the trading dollar volume of each stock and the corresponding KOSPI 200 volume at each day t of the even window, respectively, $MRDVR_t$ is the mean relative dollar volume ratio across firms at each day t of the event window and N is the number of firms in the sample.

4. Results

4.1. Abnormal return

Looking at Figure 3, we find that during period 2 the CMAR of the added stocks remains steady prior to the AD, but it shows a considerable increase after the AD, and then losing part of that gain later on. We also see the increasing CMAR before the ED and the decreasing CMAR after the ED for the added stocks. In period 1, no significant change is found for the added stocks, but a considerable decrease and partially reversed CMAR is seen for the deleted stocks after the AD. From the above, during period 1 when index funds are less popular and only account for a small portion of market capitalization, the deletion effect is strong, whereas during the more recent period the addition effect is significant. This result implies that a single hypothesis cannot fully explain the index effect.

[Insert Figure 3 about here]

Panels A and B of Table 3 present the simple MARs for the added and deleted stocks during the event window. The daily MARs for the added stocks observed around the AD (from AD-3 to AD) are positive, implying the possibility that investors anticipate the event.[9] Moreover, we can find a negative abnormal return on AD+1 and AD+2 for the deleted stocks and positive abnormal return on AD+3 and AD+4 for the added stocks, implying that the deleted stocks reflect the event faster than the added stocks. Table 3 displays the positive and significant MAR for the added stocks before the ED, likely a consequence of some pre-trade by index funds and arbitrageurs.[10] We argue that partial price reversals for added stocks during period 2 are observed after the ED and a permanent stock price effect exists for at least two months (as depicted in Figure 3). The MARs of the deleted stocks on the ED is significantly negative both for the full period and for the more recent period. An important characteristic of the deleted stocks is that the significant price reversals are observed during the first 2 days following the ED. Panel C of Table 3 shows the cumulative effects of within event window. The positive (negative) CMARs of added (deleted) stocks are found and the price reversions do not completely erase the initial price increase within the post-ED window. During the run-up period, we can find the abnormal return behavior of event stocks.

[Insert Table 3 about here]

4.2. Abnormal volume

[9] This positive effect is not significant due to difficulties involved in the anticipation of the exact AD.
[10] The pre-trade conjecture is also supported by the volume analysis in the later section.

If there is no abnormal trading activity, the MRDVR will not be statistically different from 1. Otherwise, MRDVR will be more or less than one, indicating that trading activity of the added or deleted stock increased or decreased abnormally as a result of the index change.

Figure 4 and Table 4 contain the volume patterns around announcement dates and effective dates. They show that the volumes of event stocks start to increase after announcement dates and peak around the effective date. Based on these observations, we can make several interesting conjectures. The first is that the significant increases of MRDVR during the run-up period for the added stocks can be attributed to arbitrage traders. Considering the market limitation for short selling the deleted stocks, arbitrage traders can utilize index change effect only for the added stocks by pre-trading before the event. Table 4 shows evidence of this behavior—a significant increase for the added stocks and an insignificant increase for deleted stocks during the run up period.

The second conjecture is that even though most trading of index funds tends to occur on ED, some portion of trading is executed before the ED in practice for event stocks. The reason for this pre-trade pattern occurring before the ED is that most index funds in Korea are not purely index tracking funds but rather enhanced index funds, which means the index fund managers are competing with other index funds in trying to get higher returns by taking some tracing error risks. Because of the tradeoff between enhanced return and tracking error, we can suppose that some index fund managers execute this strategy before (but near) the ED. If index funds follow an exact-replication strategy and rebalance their portfolios on the date of the actual change, this can then result in a profit transferred from index fund investors to arbitrage traders (Chen et al., 2006).

The third conjecture is that the MRDVR of the recent period is larger than that of the earlier period. This trend seems to stem from the increasing size of the index funds as well as active arbitrage trading. Given the fact that most of the event stocks can be forecasted roughly, we can find that pre-trading before the AD tends to start around AD-2.

[Insert Figure 4 about here]

[Insert Table 4 about here]

5. Discussions

5.1. Permanent and temporary effects

We first try to decompose the abnormal return into permanent and temporary components using the approach of Madhavan (2003). The permanent effect is defined as the CMAR from AD to ED excluding temporary return reversal from ED+1 to ED+k by equation (9).

$$CMAR_{permanet} = \sum_{t=AD}^{ED} MAR_t - \sum_{t=ED+1}^{ED+k} (-MAR_t) \tag{9}$$

Table 5 summarizes the permanent and temporary effects on equal-weighted portfolios due to additions or deletions over the period. The positive permanent effect for added stocks exists for additions up to ED+40 only for period 2, but the magnitude decreases as the window of the temporary effect is extended. The negative permanent effect for deleted stocks persists throughout the full sample period.

In addition, to test if the volume effect exists in both the short run and the long run after the ED, we define the short-run period as the period from ED+1 to ED+10 and the long-run period as the period from ED+11 to ED+60. Table 6 indicates that the RDVR of the added stocks is only significant in the short run at 10% significance level and tends to increase for most of the period.

In summary, a permanent price effect exists due to index changes and a significant volume effect is also present in the short-run window.

[Insert Table 5 about here]

5.2. Abnormal return decompositions by factor models

As discussed earlier, there are a variety of methods used to calculate the abnormal return. We analyze the source of abnormal return by utilizing factor models for period 2[11] to ascertain the method to use simple abnormal return calculation from equation (1).[12] Because the event stocks are small in size relative to the overall market and thus give rise to a size effect, calculating the abnormal return using a 3-factor model will to some extent control the size effect.[13] Even though we employ 1-factor and 3-factor models to calculate the abnormal return, the abnormal return is seen

[11] Due to a lack of HML and SML proxy data necessary for equation (3), we estimate abnormal return only for period 2.

[12] There is no significant difference of industry distribution between index members, added stocks or deleted stocks in terms of ratio calculated by equal weighting analysis. This result is due to the index methodology to select individual added stock and deleted stock within the same industry. This also confirms that the method used to calculate abnormal return is not subject to problems due to industry bias.

[13] The market capitalization of the added stocks is on average larger than that of deleted stocks.

during the event window not only on AD-1, ED-1 and ED (Table 6), but can be found in the CAR during the event as depicted in Figure 3.[14]

[Insert Table 6 about here]

5.3. Volatility and beta changes

We begin by conducting a test to check whether the unsystematic risk of event firms changes significantly before and after the event. We employ the methodology used by Kappou et al. (2008) to measure absolute and relative volatility. Absolute volatility is defined as the standard deviation of the daily excess return relative to the KOSPI 200 return for 250 trading days before and 250 trading days after each event. Relative volatility is also calculated as the ratio of the volatility of the event firms to the corresponding market volatility during the same period.

Comparing pre-event volatility to post-event volatility, Table 7 shows a decrease in volatility for added stocks, and an increase in volatility for deleted stocks. An interesting finding for added stocks is that the reduction of volatility is significant for period 2, but insignificant for period 1. These results indicate that volatility changes may be a primary driver of abnormal return behavior. Therefore, on an absolute and relative daily volatility basis, the added stocks become less risky after inclusion, and the deleted stocks become more risky, on average. This result is contradicts those in Cooper and Woglon (2001) and Harris (1989). It is probable that volatility change is caused by the change in the information efficiency of event stocks after additions or deletions.

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[14] To confirm the equality of the simple, 1-factor and 3-factor model, we also conduct equality tests. The results show that there are no significant differences in the results obtained using any of the models.

[Insert Table 7 about here]

We also conduct a test to check whether the betas of the event firms change by using the methodology of Barberis et al. (2005).[15] To do this, we estimate the CAPM beta for each inclusion and deletion using the univariate regression model and bivariate regression, and equations (10) and (11).

$$R_{i,t} = \alpha_i + \beta_{i,KOSPI\,200} \times R_{KOSPI\,200,t} + \beta_{i,non-KOSPI\,200} \times R_{non-KOSPI\,200,t} + \varepsilon_{i,t} \tag{10}$$

where $R_{non-KOSPI\,200,t}$ is from the equation (11) and $R_{KOSPI\,200,t}$ is the daily return of KOSPI200 index.

$$R_{KOSPI,t} = \frac{Cap_{KOSPI,t-1} - Cap_{KOSPI200,t-1}}{Cap_{KOSPI,t-1}} \times R_{non-KOSPI200,t} + \frac{Cap_{KOSPI200,t-1}}{Cap_{KOSPI,t-1}} \times R_{KOSPI200,t} \tag{11}$$

where Cap means market capitalization.

Table 8 indicates that the betas obtained for the added stocks using the univariate model are significantly increased, and that this pattern is stronger in the more recent period. We also find that the added stocks experience a highly significant increase in daily betas of KOSPI 200 and a significant decrease in daily betas of non-KOSPI 200. The results are consistent with Barberis et al. (2005). However, for deleted stocks, we find only an insignificant decrease in the betas using the

[15] Under the friction- or sentiment-based views, stocks added to (deleted from) the KOSPI 200 index will comove more (less) with other members of the index after the addition (deletion) event.

univariate model. Consequently, our results partially support the comovement in prices is delinked from comovement in fundamental considering the beta change of added stocks.

[Insert Table 8 about here]

5.4. Newly added firms

In a more recent study, Masse (2008) takes the analysis a step further by arguing that the return behavior of new constituents can be different from previous constituents, which affects the results of the index effect. Therefore, we conduct further analysis into the samples of newly added stocks to decompose the newly added firms' contribution to abnormal return.

Table 6 also contains the mean abnormal return of newly added stocks. The results in Figure 3 confirm that the behavior of newly added stocks is similar to that of all firms in the sample, and that no significant difference exists between new constituents and earlier constituents.

5.5. Anticipatory trading effect

It is also of interest to determine whether anticipatory trading exists and if this trading has predictive power for future abnormal return. To examine the existence of the anticipatory trading effect, we estimate the following regression for event stocks from AD to ED.[16]

$$NBA_t = \alpha_0 + \sum_{s=-2}^{s=+2} \beta_s R_{KOSPI\,200,t+s} + \delta_0 NBA_{t-1} + \varepsilon_t \quad (12)$$

[16] Due to a lack of net buying amount data, we use estimates from 2005 to 2008.

where NBA_t is the net buying amount of the individual stock on date t. NBA_t is measured in billions of Korean won.

If the net buying amounts have predictive power for future return, the coefficient of β_{+1} and β_{+2} should be statistically different from 0, whereas if there is no anticipatory trading effect, they should be close to zero.

Table 7 shows the results of estimating equation (12). No predictive power for net buying amounts exists, but there are some several intuitive explanations for this. The first one relates to the significance of α_0. Individual investors and foreigners tend to buy the deleted stocks and sell the added stocks while institutional investors – including investment funds – tend to trade inversely due to their rebalancing demands. The second explanation is that institutional investors use a momentum strategy but individual investors execute a reverse-momentum(contrarian) strategy for added stocks according to the signs of β_{-1} and $\beta_{0.}$ The third explanation is that every investor tends to maintain his or her trading direction during the run-up window, which is net buying or net selling expressed by δ_0.

[Insert Table 9 about here]

5.6. Index Methodology Comparison and Information Content Hypothesis

We next compare the indexing methodology between KOSPI 200 and S&P 500 as depicted in Table 10 and find the information content of the indexing methodology.

The most important and distinguished one compared with S&P 500 is that KOSP 200 adopts relative selection standards using market capitalization within the same industry. This methodology implies that the outperforming stock within the same industry during the last 1 year will be added and the underperforming stock will be deleted from the index, because the rank of outperforming stocks will be up and that of underperforming stocks will be down in terms of market capitalization. Moreover, the outperforming stocks will show the better operating performance such as EPS and the underperforming stocks show vice versa.

Therefore, this indexing methodology conveys the valuable information to the investors, implying that the added stocks showed good performance and better earnings relative to the market average and the deleted stocks showed vice versa.

This means that the information expressed by index change effects is the major factor to affect the performance of the event stocks and this market inefficiency can be explained by information hypothesis.

[Insert Table 10 about here]

Following the approach of Dennis et al. (2003), we choose the EPS forecast of changes as the test measure for improved operating performance using the consensus data available from the year 2002. We standardize the EPS forecast change by both prior EPS forecast and share price. To standardize by earnings per share, for those companies that have a positive preannouncement median EPS forecast, we divide the change in the forecast by the preannouncement EPS forecast by Eq. (13). To standardize by share price, we divide the change in the EPS forecast by the company's stock price as of the end of the month prior to the announcement month by using Eq. (14).

$$\%\Delta EPS_i = \frac{EPS_{i,+} - EPS_{i,-}}{EPS_{i,-}} \tag{13}$$

where $\%\Delta EPS_i$ is the change in the EPS forecast for company i standardized by prior EPS forecast, $EPS_{i,-}$ is the pre-Index inclusion EPS forecast for company i, and $EPS_{i,+}$ is the post-Index-inclusion EPS forecast for company i.

$$\%\Delta EPSY_i = \frac{EPS_{i,+} - EPS_{i,-}}{P_{i,-}} \tag{14}$$

where $\%\Delta EPSY_i$ is the change in the EPS forecast for company i standardized by share price, $EPS_{i,-}$ and $EPS_{i,+}$ are as defined above and $P_{i,-}$ is company i stock price as of the end of the month prior to the announcement month.

Table 11 shows positive EPS forecast changes with added firms and negative EPS changes with deleted firms as measured by %ΔEPS in both that and the following year. We also find the similar results measured by %ΔEPSY. These results directly imply that index changes convey favorable information to analysts' expectations.

[Insert Table 11 about here]

6. Conclusion

This study seeks to sketch out the effect of regular changes in the KOSPI 200 index from the perspectives of abnormal return, volume and risk. The evidence obtained here serves as a stepping stone for deeper analysis of the index change effect within emerging markets.

The results show that there is some evidence of permanent price effects but no full return reversal found, particularly during the more recent period studied. We also find the trading volumes tend to significantly increase after the announcement date and remain relatively higher than before the event. We also find that an anticipatory trading effect exists before the effective dates, but that this trading has no predictive power for future return. The results show that the abnormal return still exists after adopting factor models. This abnormal return also remains after excluding newly added stocks. Based on our findings, we can tentatively conclude that changes in the KOSPI 200 index result in the same abnormal return behavior as reported in studies using data from the U.S. and other developed markets. From our results, we conclude that KOSPI 200 index changes convey favorable information on added stocks and unfavorable information on deleted stocks.

References

Amihud, Y., Mendelson, H., 1986. Asset pricing and the bid-ask spread. Journal of Financial Economics 17, 233−249.

Barberis, N., Shleifer, A., Wurgler J., 2005. Comovement. Journal of Financial Economics 75, 283-317.

Becker-Blease J.R., Paul D.L., 2006. Stock liquidity and investment opportunities: Evidence from index additions. Financial Management 35, 35−5.

Beneish, M., Gardner, J.C., 1995. Information costs and liquidity effects from changes in the Dow Jones industrial average list. Journal of Financial and Quantitative Analysis 30, 135−157.

Beneish, M., Whaley, R., 1996. An anatomy of the S&P Game: The effects of changing the rules. Journal of Finance 51, 1909−1930.

Biktimirov, E., Cowan, A., Jordan, B., 2004. Do demand curves for small stocks slope down? Journal of Financial Research 27, 161−178.

Bildik, R., Gulay, G., 2008. The effects of changes in index composition on stock prices and volume: Evidence from the Istanbul stock exchange. International Review of Financial Analysis 17, 178–197.

Brown, S. J., Warner, 1985. Using daily stock returns: the case of event studies. Journal of Financial Economics 14, 3−31.

Cai J., 2007. What's in the News? Information content of S&P 500 additions. Financial Management 36, 113−124.

Chen, H., 2006. On Russell index reconstitution. Review of Quantitative Finance and Accounting 26, 409–430.

Chen, H., Noronha, G., Singal, V., 2004. The price response to S&P 500 index additions and deletions: Evidence of asymmetry and a new explanation. Journal of Finance 49, 1901−1929.

Chen, H., Noronha, G., Singal V., 2006. Index changes and losses to index fund investors. Financial Analysts Journal 62, 31-47.

Cooper, D., Woglom, G., 2001. The S&P 500 effect: Not such good news in the long run. Unpublished working paper, Amherst College.

Denis, D., McConnell, J., Ovtchinnikov, A., Yu, Y., 2003. S&P 500 index additions and earning expectations. Journal of. Finance 58, 1821–1840.

Dhillon, U., Johnson, H.,1991. Changes in the S& P 500 list. Journal of Business, 64, 75−85.

Elayan, F.E., Li, W., Pinfold, J., 2000. Price effects of changes to the composition of New Zealand share indices. New Zealand Investment Analyst 21, 25−30.

Elliott W., Van Ness, B., Walker M.D., Warr R., 2006. What drives the S&P 500 inclusion effect? An analytical survey. Financial Management 35, 31−48.

Harris, L., Gurel E., 1986. Price and volume effects associated with changes in the S&P500 list: New evidence for the existence of price pressures. Journal of Finance 41, 815−829.

Hedge, S., McDermott, J., 2003. The liquidity effects of revisions to the S&P 500 index: An empirical analysis. Journal of Financial Markets 6, 413−459.

Jain, P.C., 1987. The effect on stock price of inclusion in or exclusion from the S&P 500. Financial Analysts Journal 43, 58−65.

Kappou, K., Brooks, C., Ward C., 2008. A re-examination of the index effect: Gambling on additions to and deletions from the S&P 500's 'gold seal'. Research in International Business and Finance 22, 325−350.

Liu, S., 2000. Changes in the Nikkei 500: New evidence for downward slopping demand curves for stocks. International Review of Finance 1, 245−67.

Lynch, A., Mendenhall, R., 1997. New evidence on stock price effects associated with changes in the S&P 500 index. Journal of Business 70, 351–383.

Madhavan, A., 2003. The Russell reconstitution effect. Financial Analysts Journal 59, 51−64.

Mase, K., 1994. What practitioners need to know about event studies. Financial Analyst Journal 50, 17−20.

Mase B., 2008. Comovement in the FTSE 100 index. Applied Financial Economic Letters 4, 9−12.

Masse B., 2007. The Impact of changes in the FTSE 100 index, Financial Review 42, 461−484.

Masse, I., Hanrahan, R., Kushner, J., Martinello, F., 2000. The effect of additions to or deletions from the TSE 300 Index on Canadian share prices. Canadian Journal of Economics 33, 341−59.

Merton, R., 1987. Presidential address: A simple model of capital market equilibrium with incomplete information. Journal of Finance 44, 483–510.

Platikanova P., 2008. Long-term price effect of S&P 500 addition and earnings quality. Financial Analysts Journal 64, 62−76.

Qiu, M., Pinfold, J., 2008, Price and trading volume reactions to index construction changes: The Australian evidence. Managerial Finance 34, 53-69.

Shankar, G., Miller J., 2006. Market reaction to changes in the S&P SmallCap 600 index. The Financial Review 41, 339–360.

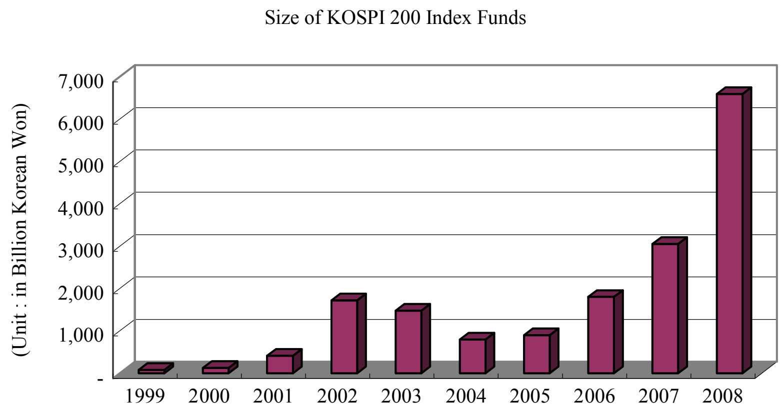
Shleifer, A., 1986. Do demand curves for stocks slope down? Journal of Finance 41, 579-590.

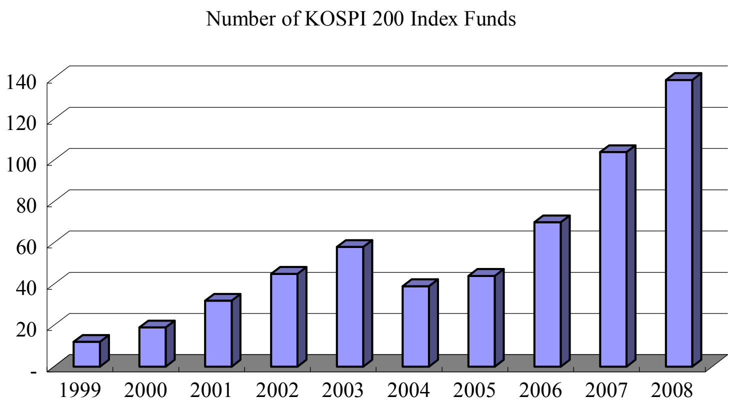
Vijh, A.M., 1994. S&P 500 trading strategies and stock betas., Review of Financial Studies 7, 215−-251.

Woolridge, R., Ghosh, C., 1986. Institutional trading and security prices: The case of changes in the composition of the S&P 500 index. Journal of Financial Research 9, 13–24.

Wurgler, J., Zhuravskaya, K., 2002. Does arbitrage flatten demand curves for stocks?. Journal of Business 75, 583−608.

Figure 1
KOSPI 200 index fund market trend





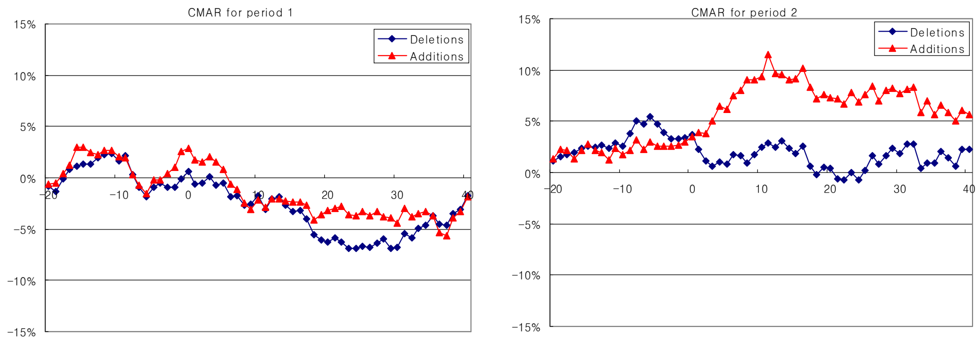
Source: Zeroin Inc. (www.funddoctor.co.kr)

Figure 2
Event window

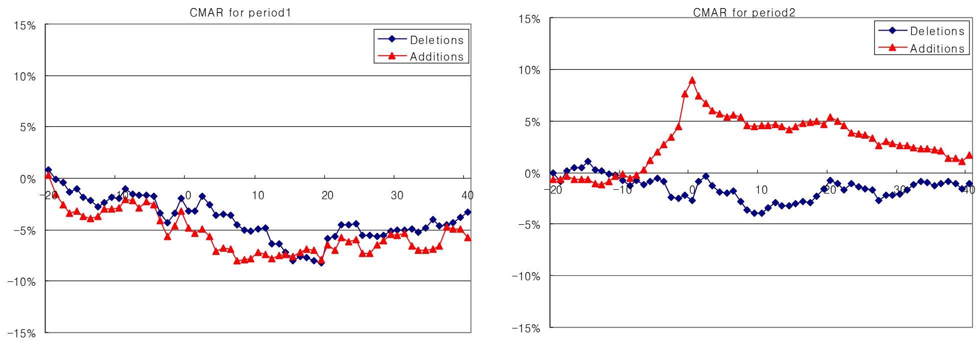
Name	Pre AD	AD	Post AD			
	Pre ED			ED	Post ED	
	Pre AD	AD	Run-up	ED	Post ED1	Post ED2
From	AD-20	AD+0	AD+2	ED+0	ED+1	ED+20
To	AD-1	AD+1	ED-1		ED+20	ED+40

Figure 3
CMAR (Cumulative Mean Abnormal Return) behavior

A. Before and after announcement dates



B. Before and after effective dates



C. CMAR comparison for added stocks

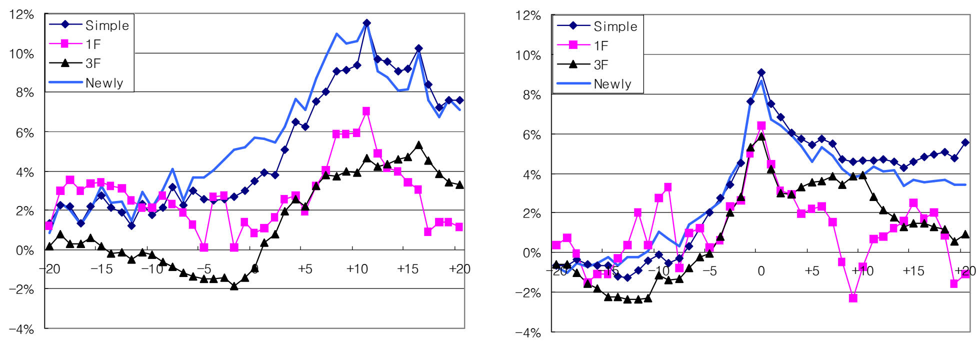
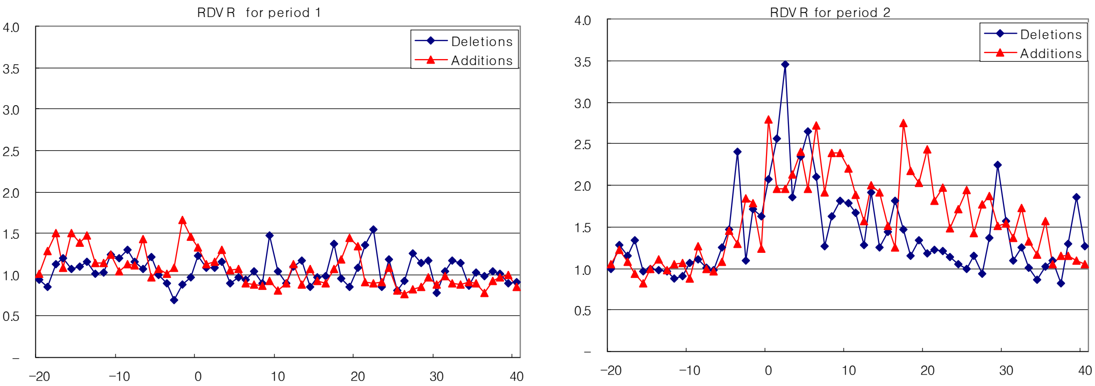


Figure 4
RDVR behaviors

A. Before and after announcement dates



B. Before and after effective dates

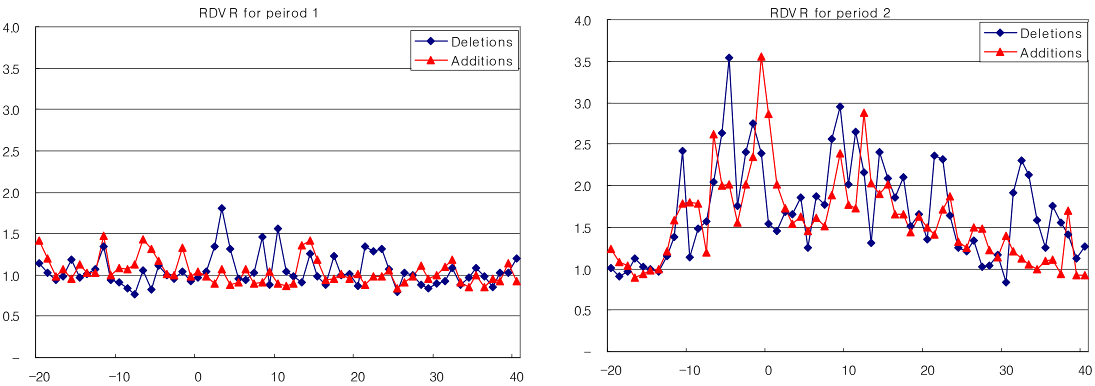


Table 1
Demand shock by index changes
This table reports demand shock size1 (DS1) and demand shock size 2 (DS2). As the KOSPI 200 index is a value-weighted index, DS1 is defined as the ratio of total KOSPI 200 index funds to total KOSPI 200 market capitalization. DS1 represents the percentage of each added (or deleted) stock that is demanded (or supplied) by index funds. DS2, the alternative to DS1, is defined as the each stock's market weight relative to the index.

	2000	2001	2002	2003	2004	2005	2006	2007[1]	2008[2]
KOSPI 200 Index Fund NAV (KRW billion)	137	234	1,409	1,944	1,237	1,008	1,486	2,909	5,368
KOSPI 200 Market Cap (KRW billion)	242,959	184,910	259,287	236,063	286,479	398,676	502,307	631,482	507,004
DS1	0.06%	0.13%	0.54%	0.82%	0.43%	0.25%	0.30%	0.46%	1.06%
Market Cap of Added Stocks (KRW billion)	7,930	3,466	26,647	4,420	20,436	4,607	27,316	5,792	6,248
Market Cap of Deleted Stocks (KRW billion)	2,337	1,921	1,942	1,452	4,755	712	6,568	1,231	1,400
DS2 of additions	3.26%	1.87%	10.28%	1.87%	7.13%	1.16%	5.44%	0.92%	1.23%
DS2 of deletions	-0.96%	-1.04%	-0.75%	-0.62%	-1.66%	-0.18%	-1.31%	-0.19%	-0.28%

[1] Half free-float adjusted
[2] Full free-float adjusted

Table 2

Refined sample additions and deletions

This table presents refined samples for event firms in the KOSPI 200 index from 1995-2008. There are 288 regular changes of index membership between June 9, 1995 and June 12, 2008. The average number of regular changes is about 20 each year, the maximum is over 40 in 1999 and minimum is 10 in 2007. Among the additions, we remove 23 stocks due to corporate events, the unavailability of previous year data due to the spin-offs and newly listed stocks. Among the deletions, we remove 53 stocks due to M&A, bankruptcies and irregular changes.

Sample Constructions	
Panel A. Sample Additions	
All Additions	288
Less:	
Corporate Events[1]	-9
Listing[2]	-9
Others[3]	-5
Total Refined Sample	265

[1] M&A, spin-offs, delisting, etc.

[2] New-listing, movement of exchange

[3] Warning list, irregular deletions

Panel B. Sample Deletions	
All Deletions	288
Less:	
Mergers/Acquisitions	-6
Bankruptcies	-2
Others[4]	-45
Total Refined Sample	235

[4] Irregular additions, delisting

Table 3

Abnormal return of added and deleted stocks, from 1995 to 2008

This table reports the daily and cumulative MARs around AD and ED. We divide the sample period into period 1(1995-2001) and period 2 (2002-2008). Abnormal return (AR) is defined as $AR_{i,t} = R_{i,t} - R_{m,t}$ where $R_{i,t}$ is the simple return of stock i and $R_{m,t}$ is the return of the KOSPI 200 index on date t. The abnormal return for all event stocks are then averaged against the total number of announcements N for each day t of the event window to obtain the mean abnormal return (MAR):

$$MAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{i,t}$$

Columns 1 and 2 show MAR for the added stocks and columns 3 and 4 show MAR for the deleted stocks. We report t-statistics and Wilcoxon rank statistics using a two-tailed test.

	Added stocks						Deleted stocks					
	(1) Full period (n=265)			(2) Period 2 (n=127)			(1) Full period (n=235)			(2) Period 2 (n=116)		
Date	MAR	t-stat.	rank stat.	MAR	t-stat.	rank stat.	MAR	t-stat.	rank stat.	MAR	t-stat.	rank stat.
Panel A. Before and After the AD												
AD-20	0.32%	1.33	0.44	1.34%	4.09***	3.58***	0.17%	0.61	1.04	1.16%	2.98***	3.71***
AD-15	0.26%	1.16	0.43	0.54%	1.57	0.33	0.20%	0.92	0.02	0.16%	0.59	0.27
AD-10	-0.62%	-2.45**	3.97***	-0.55%	-1.81*	2.93***	-0.45%	-1.74*	3.06***	-0.25%	-0.71	1.95*
AD-5	0.46%	1.74*	0.77	-0.47%	-1.29	2.25**	0.13%	0.50	0.38	-0.66%	-2.17**	2.51**
AD-4	0.01%	0.03	0.85	-0.02%	-0.05	0.41	-0.22%	-0.92	1.91*	-0.87%	-3.40***	3.86***
AD-3	0.32%	1.34	0.47	0.03%	0.07	1.23	-0.53%	-2.34**	2.36**	-0.63%	-2.12**	2.24**
AD-2	0.39%	1.76*	0.30	0.15%	0.53	0.47	0.00%	-0.01	1.21	0.00%	0.01	1.45
AD-1	0.94%	4.41***	3.43***	0.27%	1.00	0.26	0.49%	2.05**	0.61	0.11%	0.30	2.40**
AD	0.38%	1.52	0.43	0.49%	1.29	0.50	0.51%	2.00**	0.93	0.36%	0.97	0.11
AD+1	-0.36%	-1.38	3.09***	0.42%	0.98	0.04	-1.32%	-5.15***	6.16***	-1.46%	-4.54***	5.56***
AD+2	-0.18%	-0.85	1.88*	-0.13%	-0.42	1.38	-0.50%	-2.17**	4.33***	-1.12%	-3.63***	5.81***
AD+3	0.87%	3.72***	2.49**	1.31%	3.52***	2.97***	0.01%	0.05	0.02	-0.58%	-1.80*	1.21
AD+4	0.42%	1.57	0.99	1.45%	3.96***	3.73***	-0.20%	-0.90	2.46**	0.40%	1.52	0.46
AD+5	-0.51%	-2.06**	2.86***	-0.30%	-0.82	0.93	-0.01%	-0.04	1.31	-0.20%	-0.49	0.40
Panel B. Before and After the ED												
ED-5	0.21%	0.90	0.15	0.78%	2.09**	1.97**	0.04%	0.20	1.03	0.24%	0.73	0.06
ED-4	-0.43%	-2.05**	3.30***	0.70%	2.34**	1.56	-0.99%	-4.52***	5.09***	-0.33%	-1.29	1.94*
ED-3	-0.49%	-1.98**	2.68***	0.69%	2.05**	1.24	-1.23%	-5.63***	6.26***	-1.52%	-6.25***	5.83***

ED-2	1.06%	4.77***	3.84***	1.12%	3.46***	3.09***	0.43%	1.77*	0.16	-0.10%	-0.31	2.21**
ED-1	2.24%	8.75***	8.44***	3.10%	7.96***	7.81***	0.90%	3.67***	2.42**	0.34%	1.12	0.66
ED	-0.18%	-0.49	1.46	1.43%	2.53**	2.26**	-0.90%	-2.93***	4.09***	-0.50%	-1.76*	2.17**
ED+1	-1.04%	-3.65***	3.69***	-1.56%	-3.71***	3.61***	0.91%	3.06***	3.47***	1.84%	6.39***	5.37***
ED+2	-0.10%	-0.44	0.11	-0.70%	-1.97*	2.10**	1.03%	4.23***	3.61***	0.51%	1.93*	1.85*
ED+3	-0.73%	-3.56***	4.94***	-0.76%	-2.55**	3.76***	-0.88%	-3.44***	5.17***	-0.92%	-2.62**	4.10***
ED+4	-0.93%	-4.58***	5.25***	-0.35%	-1.26	1.97**	-0.82%	-3.55***	4.31***	-0.59%	-1.89*	2.13**
ED+5	0.05%	0.22	0.55	-0.28%	-0.97	2.01**	-0.01%	-0.04	0.53	-0.10%	-0.32	1.80*
ED+10	0.36%	1.80*	1.41	0.03%	0.10	0.02	0.11%	0.49	0.41	-0.03%	-0.08	0.99
ED+15	-0.01%	-0.03	1.54	0.29%	0.82	0.09	-0.31%	-1.59	2.66***	0.22%	0.99	0.39
ED+20	1.15%	5.45***	4.99***	0.76%	2.85***	2.47**	1.54%	5.36***	4.75***	0.80%	2.32**	1.78*
ED+30	-0.18%	-0.79	2.40**	-0.22%	-0.91	1.65*	0.09%	0.38	0.56	0.09%	0.28	0.15
ED+40	-0.14%	-0.61	0.94	0.61%	2.80***	2.25**	0.52%	2.39**	1.06	0.56%	1.87*	0.78
Panel C. Cumulative effects window												
Pre-AD effects:												
[AD-10, AD-1]	0.24%	0.34	0.11	0.63%	0.71	0.49	-0.95%	-1.20	1.96**	0.56%	0.49	0.44
[AD-20, AD-1]	2.72%	2.93***	2.97***	2.90%	2.50**	2.40**	1.63%	1.54	1.40	3.39%	2.27**	2.18**
Post-ED effects:												
[ED+1, ED+10]	-3.31%	-4.96***	5.47***	-4.41%	-3.96***	4.88***	-1.38%	-1.84*	2.82***	-1.16%	-0.98	2.14**
[ED+1, ED+20]	-2.51%	-2.90***	4.22***	-3.50%	-2.42**	4.00***	-0.37%	-0.37	1.03	1.83%	1.61	0.78
[ED+1, ED+40]	-3.88%	-3.50***	3.74***	-7.11%	-4.62***	4.57***	0.74%	0.64	0.12	1.55%	1.03	0.27
Run-up window effects:												
[AD+2, ED-1]	1.67%	2.10**	2.18**	7.12%	6.47***	6.63***	-1.71%	-2.40**	3.69***	-1.59%	-1.66*	3.85***
AD window effects:												
[AD, AD+1]	0.03%	0.07	1.53	0.90%	1.40	0.18	-0.81%	-2.24**	3.63***	-1.10%	-2.26**	3.42***
Total cumulative effects:												
[AD-10, ED+10]	-1.57%	-1.08	1.12	5.69%	3.02***	2.70***	-5.81%	-3.97***	4.53***	-3.87%	-2.14**	3.32***
[AD-10, ED+10]	-0.76%	-0.49	0.53	6.60%	3.06***	2.65***	-4.75%	-3.09***	3.76***	-0.69%	-0.39	1.70*
[AD-20, ED+20]	1.76%	1.15	0.60	8.93%	3.81***	3.53***	-2.17%	-1.28	1.33	2.14%	1.04	0.42
[AD-20, ED+40]	0.38%	0.24	0.12	5.32%	2.20**	1.78*	-1.01%	-0.57	0.41	1.84%	0.79	0.43
[AD-10, AD+10]	0.86%	0.78	0.42	6.89%	4.95***	4.68***	-2.21%	-2.19**	3.11***	-0.34%	-0.26	1.31
[AD-20, AD+20]	1.80%	1.35	0.76	7.15%	3.76***	3.63***	-2.98%	-2.04**	2.38**	0.40%	0.21	0.68
[ED-10, ED+10]	0.20%	0.18	0.15	4.87%	2.96***	2.87***	-3.33%	-2.84***	4.20***	-3.67%	-2.29**	4.52***
[ED-20, ED+20]	-0.70%	-0.49	1.22	5.37%	2.69***	2.14**	-3.36%	-2.55**	3.42***	-0.75%	-0.44	2.04**

*Notes: *, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively, for two-tailed tests.*

Table 4

Mean relative dollar volume ratio (MRDVR) around the announcement and effective dates

This table reports the results of MRDVR. Formulas for this are as follows:

$$BDVR_i = \frac{1}{60}\sum_{t=AD-70}^{t=AD-11}\left(\frac{DV_{i,t}}{DV_{m,t}}\right), \quad RDVR_{i,t} = \frac{DV_{i,t} / DV_{m,t}}{BDVR_i} \quad and \quad MRDVR_t = \frac{1}{N}\sum_{i=1}^{N} RDVR_{i,t}$$

where the base dollar volume ratio $BDVR_i$ is the average stock-to-index trading dollar volume during the 60 trading days from AD-70 to AD-11, $DV_{i,t}$ and $DV_{m,,t}$ are the trading dollar volume of each stock and the corresponding KOSPI 200 volume at each day t of the event window respectively, $MRDVR_t$ is the mean relative dollar volume ratio across firms at each day t of the event window and N is the number of firms in the sample.

	Added stocks				Deleted stocks			
	(1) Full period		(2) Period 2		(1) Full period		(2) Period 2	
Date	MRDVR	t-stat.	MRDVR	t-stat.	MRDVR	t-stat.	MRDVR	t-stat.
Panel A. Before and After the AD								
AD-10	0.96	-0.64	0.88	-1.36	1.14	1.14	1.07	0.45
AD-5	1.25	1.31	1.45	1.19	1.22	0.86	1.47	0.92
AD-4	1.15	0.95	1.30	1.32	1.63	1.04	2.40	1.13
AD-3	1.45	1.52	1.84	1.40	0.89	-1.37	1.09	0.62
AD-2	1.72	2.06**	1.78	1.61	1.29	1.09	1.71	1.34
AD-1	1.35	1.93*	1.24	1.16	1.29	0.99	1.63	1.05
AD	2.04	1.76*	2.80	1.49	1.64	1.82*	2.07	1.54
AD+1	1.52	2.63***	1.96	2.43**	1.79	1.23	2.56	1.17
AD+2	1.53	3.20***	1.95	2.95***	2.23	1.35	3.45	1.31
AD+3	1.69	3.58***	2.12	3.07***	1.50	1.11	1.86	0.95
AD+4	1.70	3.26***	2.41	3.40***	1.60	1.11	2.34	1.21
AD+5	1.49	2.32**	1.96	2.38**	1.79	1.23	2.65	1.26
Panel B. Before and After the ED								
ED-5	1.57	3.26***	2.01	3.18***	2.29	1.42	3.54	1.36
ED-4	1.27	2.23**	1.56	2.49**	1.37	0.83	1.76	0.85
ED-3	1.49	2.66***	2.02	2.84***	1.66	1.22	2.41	1.28
ED-2	1.82	3.62***	2.35	3.22***	1.88	1.37	2.74	1.34
ED-1	2.22	2.75***	3.55	2.85***	1.64	1.68*	2.38	1.81*
ED	1.90	4.00***	2.86	4.36***	1.25	1.29	1.53	1.46
ED+1	1.48	2.44**	2.02	2.63***	1.24	1.14	1.45	1.10
ED+2	1.29	2.28**	1.72	2.95***	1.51	1.58	1.69	1.11
ED+3	1.29	2.14**	1.54	2.11**	1.73	1.68*	1.66	1.15
ED+4	1.24	1.37	1.63	1.81*	1.58	2.08**	1.85	1.63
ED+5	1.17	1.03	1.46	1.45	1.09	0.56	1.25	0.76
ED+10	1.32	1.96*	1.78	2.38**	1.78	1.87*	2.01	1.38

*Notes: *, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively, for two-tailed tests.*

Table 5

Permanent and temporary price effect of KOSPI 200 additions and deletions

This table presents the permanent and temporary price and volume effects for equal-weighted portfolios of additions or deletions over the period. To separate the temporary impact from the permanent return effect, we adopt the approach of Madhavan (2003). The permanent effect is defined as the CMAR from AD to ED, excluding temporary return reversal from ED+1 to ED+k as follows:

$$CMAR_{permanet} = \sum_{t=AD}^{ED} MAR_t - \sum_{t=ED+1}^{ED+k} (-MAR_t)$$

where MAR_t is the mean abnormal return on day t.

To test whether the volume effect persists in both the short run and in the long run after the ED, we define the short-run period as the period from ED+1 to ED+10 and the long-run period as the period from ED+11 to ED+60. We report t-statistics to test whether the RDVR statistics of the added stocks are still significantly different from 1 using a two-tailed test.

Panel A. Price effect decomposition

Sample		Permanent			Temporary		
		k=20	k=40	k=60	k=20	k=40	k=60
Additions	Full	-1.21%	-2.65%	-5.38%	2.55%	3.99%	6.72%
	Period 1	-6.89%	-6.22%	-7.74%	1.63%	0.96%	2.48%
	Period 2	4.95%	1.23%	-2.83%	3.55%	7.28%	11.34%
Deletions	Full	-3.44%	-5.71%	-1.11%	0.39%	-0.77%	-0.36%
	Period 1	-5.83%	-1.22%	-3.17%	2.66%	0.08%	0.03%
	Period 2	-1.05%	-2.99%	-2.99%	-1.94%	-1.65%	-0.76%

Panel B. Volume effect decomposition

Sample		Long run			Short run		
		RDVR	t-statistic	p-value	RDVR	t-statistic	p-value
Additions	Full	1.20	1.40	0.16	1.34	1.83	0.07
	Period 1	1.00	-0.02	0.99	0.95	-0.63	0.53
	Period 2	1.43	1.46	0.15	1.76	2.03	0.04
Deletions	Full	1.33	1.79	0.08	1.58	1.92	0.06
	Period 1	1.07	0.84	0.40	1.27	1.31	0.19
	Period 2	1.59	1.63	0.10	1.90	1.56	0.12

Table 6

Mean Abnormal Return (MAR) comparison

This table presents the results obtained using simple, 1-factor and 3-factor models. The abnormal returns from the 1-factor model are calculated as follows:

$$AR_{i,t}^{1F} = R_{i,t} - (\hat{\alpha}_i + \hat{\beta}_i \times R_{m,t})$$

The abnormal return from the 3-factor model are calculated as follows:

$$AR_{i,t}^{3F} = R_{i,t} - R_{f,t} - [\hat{\alpha}_i + \hat{\beta}_{i,1} \times (R_{m,t} - R_{f,t}) + \hat{\beta}_{i,2} \times SMB_t + \hat{\beta}_{i,3} \times HML_t]$$

where SMB_t is the difference in returns between the FnGuide Mid-Small Cap index and the Large Cap index, and HML_t is the difference in returns between the FnGuide Value index and the Growth index. The abnormal returns for all event stocks are then averaged against the total number of announcements N for each day t of the event window to obtain the mean abnormal return (MAR). Due to a lack of data, the MARs from the 3-factor model are reported only for period 2. We calculate simple abnormal return for newly added stocks (new constituents) to compare with the original sample.

	(1) Full period			(2) Period 2			
Date	Simple	1F	Newly	Simple	1F	3F	Newly
Panel A. Added stocks							
AD-10	-0.62%**	-0.78%***	-0.80%***	-0.55%*	0.02%	-0.11%	-0.84%**
AD-5	0.46%*	-0.11%	0.84%***	-0.47%	-1.16%***	-0.12%	-0.03%
AD-4	0.01%	1.63%***	0.00%	-0.02%	2.58%***	-0.03%	0.37%
AD-3	0.32%	-0.16%	0.58%*	0.03%	0.03%	0.09%	0.55%
AD-2	0.39%*	-2.68%***	0.53%*	0.15%	-2.61%***	-0.46%*	0.53%
AD-1	0.94%***	1.63%***	1.18%***	0.27%	1.30%***	0.43%	0.08%
AD	0.38%	1.07%***	0.39%	0.49%	-0.56%	0.50%	0.50%
AD+1	-0.36%	-0.22%	-0.71%**	0.42%	0.23%	1.25%***	-0.07%
AD+2	-0.18%	0.21%	-0.20%	-0.13%	0.55%*	0.44%	-0.16%
AD+3	0.87%***	0.99%***	0.61%**	1.31%***	0.91%**	1.20%***	0.79%*
AD+4	0.42%	-0.08%	-0.05%	1.45%***	0.22%	0.61%*	1.42%***
AD+5	-0.51%**	-0.42%*	-0.54%*	-0.30%	-0.83%**	-0.37%	-0.53%
ED-5	0.21%	-0.22%	-0.07%	0.78%**	-0.96%***	0.13%	0.34%
ED-4	-0.43%**	0.11%	-0.78%***	0.70%**	0.35%	0.86%***	0.46%
ED-3	-0.49%**	1.18%***	-0.72%**	0.69%**	1.72%***	1.22%***	1.21%**
ED-2	1.06%***	0.56%**	0.87%***	1.12%***	0.31%	0.79%**	0.89%**
ED-1	2.24%***	0.79%***	1.83%***	3.10%***	2.33%***	2.49%***	2.94%***
ED	-0.18%	1.14%***	-0.68%*	1.43%**	1.43%***	0.55%	1.02%
ED+1	-1.04%***	-1.41%***	-0.85%**	-1.56%***	-1.93%***	-1.65%***	-1.91%***
ED+2	-0.10%	-0.91%***	0.12%	-0.70%*	-1.38%***	-1.17%***	-0.31%
ED+3	-0.73%***	-1.41%***	-0.69%***	-0.76%**	-0.15%	-0.06%	-0.47%
ED+4	-0.93%***	-0.94%***	-1.05%***	-0.35%	-0.99%***	0.33%	-0.56%
ED+5	0.05%	0.39%	0.01%	-0.28%	0.25%	0.25%	-0.79%**
ED+10	0.36%*	0.73%***	0.63%***	0.03%	1.60%***	0.05%	0.15%
Panel B. Deleted stocks							
AD-10	-0.45%*	-0.48%*		-0.25%	0.44%	0.78%**	
AD-5	0.13%	-0.38%		-0.66%**	-1.12%***	-0.25%	

AD-4	-0.22%	1.58%***	-0.87%***	2.08%***	-0.69%***
AD-3	-0.53%**	-0.92%***	-0.63%**	-0.56%*	0.37%
AD-2	0.00%	-2.93%***	0.00%	-2.45%***	0.07%
AD-1	0.49%**	1.35%***	0.11%	1.35%***	0.48%
AD	0.51%**	1.14%***	0.36%	-0.58%	-0.81%**
AD+1	-1.32%***	-1.19%***	-1.46%***	-1.49%***	0.08%
AD+2	-0.50%**	-0.02%	-1.12%***	-0.23%	-0.78%***
AD+3	0.01%	0.21%	-0.58%*	-0.86%***	-0.43%
AD+4	-0.20%	-0.59%***	0.40%	-0.64%**	-0.21%
AD+5	-0.01%	0.04%	-0.20%	-0.71%*	0.09%
ED-5	0.04%	-0.47%*	0.24%	-1.45%***	-0.23%
ED-4	-0.99%***	-0.45%**	-0.33%	-0.46%	-0.03%
ED-3	-1.23%***	0.47%**	-1.52%***	-0.22%	-0.83%***
ED-2	0.43%*	0.00%	-0.10%	-0.75%**	-0.22%
ED-1	0.90%***	-0.35%	0.34%	-0.34%	-0.09%
ED	-0.90%***	0.29%	-0.50%*	-0.51%	-1.27%***
ED+1	0.91%***	0.72%***	1.84%***	1.49%***	1.78%***
ED+2	1.03%***	0.35%	0.51%*	-0.02%	0.45%
ED+3	-0.88%***	-1.34%***	-0.92%**	-0.15%	-0.18%
ED+4	-0.82%***	-0.73%***	-0.59%*	-1.01%**	0.33%
ED+5	-0.01%	0.29%	-0.10%	0.60%**	0.50%*
ED+10	0.11%	0.68%***	-0.03%	1.76%***	0.10%

*Notes: *, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively, for two-tailed t tests.*

Table 7

Pre-event and post-event absolute and relative volatility

This table shows the results of volatility changes before and after the event. We employ the methodology of Kappou et al. (2008) to measure absolute and relative volatility. Absolute volatility is defined as the standard deviation of the daily excess return relative to the KOSPI 200 return for 250 trading days before and 250 trading days after each event. Relative volatility is similarly calculated as the ratio of the volatility of the event firms to the KOSPI 200 index volatility during the same period.

Events	Volatility	Period	Pre-event	Post-event	Paired change
Additions	Absolute (%)	Full period	3.78	3.43	-0.36***
		Period1	3.81	3.76	-0.05
		Period2	3.76	3.07	-0.69***
	Relative	Full period	2.02	1.81	-0.21***
		Period1	1.74	1.63	-0.11
		Period2	2.33	2.01	-0.31***
Deletions	Absolute (%)	Full period	3.44	3.67	0.23***
		Period1	3.89	4.10	0.21**
		Period2	2.98	3.23	0.25**
	Relative	Full period	1.85	1.97	0.12**
		Period1	1.85	1.81	-0.03
		Period2	1.85	2.13	0.28***

*Notes: *, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively, for two-tailed tests.*

Table 8

Changes in betas of the stocks added to and deleted from the KOSPI 200 index

This table reports the changes in the slope of stocks added to and deleted from the KOSPI 200 index . The sample includes stocks added to and deleted from the KOSPI 200 between 1995 and 2008 that were not involved in mergers or related events (described in the text) and that have sufficient return data. For each event stock *i*, the univariate model

$$R_{i,t} = \alpha_i + \beta_{i,KOSPI\,200} \times R_{KOSPI\,200,t} + \varepsilon_{i,t}$$

and the bivariate model

$$R_{i,t} = \alpha_i + \beta_{i,KOSPI\,200} \times R_{KOSPI\,200,t} + \beta_{i,non-KOSPI\,200} \times R_{non-KOSPI\,200,t} + \varepsilon_{i,t}$$

are separately estimated before and after the event. Returns on a capitalization-weighted index of the non-KOSPI 200 stocks are inferred from this equation.

$$R_{KOSPI,t} = \frac{Cap_{KOSPI,t-1} - Cap_{KOSPI\,200,t-1}}{Cap_{KOSPI,t-1}} \times R_{non-KOSPI\,200,t} + \frac{Cap_{KOSPI\,200,t-1}}{Cap_{KOSPI,t-1}} \times R_{KOSPI\,200,t}$$

For the univariate regression model, we examine the mean change in slope across the event date $\Delta\beta$. For the bivariate model, we examine the mean changes in the slopes, $\Delta\beta_{KOSPI200}$ and $\Delta\beta_{non\text{-}KOSPI200}$. The pre-event estimation period is the 250 trading days before the event window. The post-event estimation periods is the 250 trading days following the event window.

Events	Period	Univariate	Bivariate	
		$\Delta\beta$	$\Delta\beta_{KOSPI200}$	$\Delta\beta_{non\text{-}KOSPI200}$
Additions	Full Period	0.10***	0.25***	-0.23`
	Period 1	0.04**	0.18***	-0.20***
	Period 2	0.17***	0.33***	-0.27***
Deletions	Full Period	-0.01	0.05*	-0.10***
	Period 1	0.01	0.12***	-0.17***
	Period 2	-0.02	-0.03	-0.02

*Notes: *, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively, for two-tailed tests.*

Table 9

Relationship between net buying amount and event stock return

This table presents the relationship between the net buying amount on event stocks and returns of the KOSPI 200 index to test whether anticipatory trading exists and if this trading has predictive power for future abnormal return. We estimate the following regression from AD to ED using the net buying amount data of each investor group.

$$NBA_t = \alpha_0 + \sum_{s=-2}^{s=+2} \beta_s R_{KOSPI200,t+s} + \delta_0 NBA_{t-1} + \varepsilon_t$$

where NBA_t is the net buying amount of event stocks on date t. NBA_t is measured in billions of Korean won. The sample includes stocks added to and deleted from the KOSPI 200 between 2005 and 2008.

Investor	Parameter Estimates						
Type	α_0	β_{-2}	β_{-1}	β_0	β_{+1}	β_{+2}	δ_0
Panel A. All samples							
Individuals	-0.05	-0.80	-4.56***	-4.22***	-0.62	-0.75	0.38 ***
Foreigners	-0.03	-1.40	0.03	2.80	-0.15	0.11	0.33 ***
Institutions	0.08	2.37	4.63**	1.21	1.79	0.14	0.42 ***
Investment funds	0.03	0.52	1.91**	-0.38	1.09	0.39	0.35 ***
Panel B. Added stocks							
Individuals	-0.04	-1.22	-6.01***	-5.76***	-1.59	-0.70	0.38 ***
Foreigners	-0.24*	-0.24	0.98	3.62	1.40	0.45	0.30 ***
Institutions	0.27*	1.33	5.56**	2.02	1.52	-0.48	0.41 ***
Investment funds	0.12*	0.03	2.06	0.00	1.30	0.08	0.28 ***
Panel C. Deleted stocks							
Individuals	0.02	0.69	-0.29	0.20	1.95**	-1.41	0.29 ***
Foreigners	0.13	-1.03	-0.16	2.62	-2.74	0.67	0.36 ***
Institutions	-0.16*	1.07	-0.40	-2.96	0.81	1.23	0.37 ***
Investment funds	-0.05*	1.07	0.43	-2.00*	-0.35	0.74	0.51 ***

*Notes: *, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively, for two-tailed tests.*

Table 10

Index Methodology Comparison between KOSPI200 and S&P500

This table shows the differences of index construction methodology between KOSPI 200 and S&P 500.

Criteria	KOSPI200	S&P500
Start from	KOSPI	U.S. companies
Screening Out	Preferred stocks	Limited partnerships and Holding companies
	Investment companies	Investment vehicles
	-Close-end mutual funds	-Close-end mutual funds
	- REITs	- Only excluding mortgage REITs
	Less than 1year since listing	- less than 6 months
Excepitions	but, exceptions that stocks more than 1% in Market cap rate & 30 trading days	
Priorities	Non-Manufacturing Priorties	GICS sector maintenance balance
Non-Manufacturing	Construction, Electricity&Gas, Service, Communication, Financial, Service	
	Fisheries(Excluded) & Mining(Excluded) are excluded because of small market cap.	
Observation period	From the end of April of last year to this year	None
Daily Market Cap(All)	within upper 70% by cumulative market cap of each industry(non-manufacturing)	more than US$ 3 Billion(KOSPI200 within 50th)
	Relative	**Absolute**
Liquidity	Trading amount value within upper 85% by cumulative market cap of each industry(must)	The turnover ratio >= 1.0 and 250,000 share per day(6 months)
	Relative	**Abolute**
Daily Market Cap	10% by the rank of each industry	None
	added stocks(90%), deleted stocks(110%)	
Minimun limit	10%	50%
IWF	as needed basis	the 3rd Friday of the last month of each quarter
Periodic review	2nd Thursday in June	No annual reconstitution
Earnings	None	4 conseutive quarters of positive as-reported earnings, BS leverage

Table 11

EPS forecast changes of event stocks

This table reports the results of EPS forecast changes. Following the research method of Dennis et al.(2003), we choose EPS forecast changes as the test measure for improved operating performance using the consensus data available from 2002. We standardize the EPS forecast change by prior EPS forecast and share price each. To standardize by earnings per share, for those companies that have a positive preannouncement median EPS forecast, we divide the change in the forecast by the pre-announcement EPS forecast by the equation

$$\%\Delta EPS_i = \frac{EPS_{i,+} - EPS_{i,-}}{EPS_{i,-}}$$

where $\%\Delta EPS_i$ is the change in the EPS forecast for company i standardized by prior EPS forecast, EPSi,- is the pre-Index inclusion EPS forecast for company i, and EPSi,+ is the post-Index-inclusion EPS forecast for company i.

To standardize by share price, we divide the change in the EPS forecast by the company's stock price as of the end of the month prior to the announcement month by the equation

$$\%\Delta EPSY_i = \frac{EPS_{i,+} - EPS_{i,-}}{P_{i,-}}$$

where. $\%\Delta EPSY_i$ is the change in the EPS forecast for company i standardized by share price, $EPS_{i,-}$ and $EPS_{i,+}$ are as defined above and $P_{i,-}$ is company i stock price as of the end of the month prior to the announcement month.

Sample A[1]	# of Samples	# of Estimates	Current Year			One-Year Ahead
			Mean	Median	Price-adj.	Mean
Additions	70	419	0.72%	0.68%	0.09%	2.46%
Newly added[2]	35	217	0.79%	0.92%	0.01%	2.85%
Deletions	30	92	-3.85%	-4.50%	-0.57%	-0.20%
KOSPI 200[3]	134	1,311	0.09%	0.04%	0.05%	1.23%

Sample B[1]	# of Samples	# of Estimates	Current Year			One-Year Ahead
			Mean	Median	Price-adj.	Mean
Additions	58	406	0.78%	0.73%	0.06%	2.30%
Newly added[2]	32	214	0.77%	0.91%	-0.02%	2.44%
Deletions	16	78	-6.70%	-7.93%	-1.38%	-3.19%
KOSPI 200[3]	124	1,299	0.02%	-0.01%	0.02%	1.24%

[1] Sample A is the basic sample that has the EPS estimate data. Sample B is the samples which have more than 2 estimates.
We only consider the positive EPS estimates to get rid of the calculation problem. The # of negative EPS samples among sample A include only one stock for additions and five stocks for deletions.

[2] Total number of newly added stocks is 92.

[3] KOSPI 200 constituents before regular changes.