Evidence on Stock Price Effects Associated with Changes in the S&P 600 SmallCap Index

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Two widely recognized indices of the performance of small capitalization stock are the Russell 2000 Index and the S&P 600 SmallCap Index. While there have been many studies on the effect of the addition of a stock to an index, two recent and important studies are Chen, Noronha, and Singal (2004) and Biktimirov, Cowan, and Jordan (2004). Chen et al. (2004) find evidence in support of the investor awareness hypothesis for the S&P 500 Index, while the Biktimirov et al. (2004) study supports the price pressure hypothesis for changes in the Russell 2000 Index. We contribute to the literature by explaining this difference as relating to the manner in which the Standard & Poor's and Russell indices are constructed. In this paper, we examine the returns effects associated with changes in the S&P 600 SmallCap Index and find evidence supporting the investor awareness hypothesis.

Introduction

A large body of literature focuses on the market effects of changes to the S&P 500 Index. These studies consistently show significant, positive (negative) reactions when firms are added to (deleted from) the S&P 500 Index. While previous studies recognize that these market effects occur, disagreement exists as about the explanation for these stock price reactions.[1]

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[1] Several competing theories are offered to explain stock market reactions to changes in the S&P 500 index: price pressure hypothesis (Harris and Gurel, 1986; Woolridge and Ghosh, 1986; Lamoureux and Wansley, 1987; Lynch and Mendenhall, 1997); downward-sloping demand curve hypothesis (Shleifer, 1986; Arnott and Vincent, 1986; Dhillon and Johnson, 1991; Beneish and Whaley, 1996; Lynch and Mendenhall, 1997; Morck and Yang, 2001);

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More recently, a study by Chen, Noronha, and Singal (2004) documents an asymmetric price response to changes in the S&P 500: a permanent increase in the price of added firms, but no permanent decline for deleted firms. Their results support the investor awareness hypothesis that asserts changes in investor awareness contribute to the asymmetric price effects of S&P 500 Index additions and deletions.

According to Biktimirov, Cowan, and Jordan (2004), the inability of these prior studies to differentiate conclusively among the competing theories lies in the use of small sample sizes and other compounding issues. In an attempt to better differentiate among these competing explanations by enlarging the sample size, they examine the effect of index changes to the Russell 2000 Index from 1991 to 2000. As a consequence of using this index, Biktimirov, Cowan, and Jordan (2004) find significant, temporary increases (decreases) in price and volume for additions to (deletions from) the Russell 2000 Index, thus supporting the price pressure hypothesis.

In an attempt to reconcile the results of these two studies, we propose examining an index that captures the essence of both the S&P 500 Index and the Russell 2000 Index: the S&P 600 SmallCap Index. Utilizing the S&P 600 Index is advantageous for several reasons. First, the S&P 600 Index, like the Russell 2000 Index, is designed for tracking the performance of small capitalization stocks. According to Standards & Poor's:

> The S&P SmallCap 600 is fast becoming the preferred small-cap index in the U.S., covering approximately 3% of the U.S. equities market. Measuring a segment of the market that is typically renowned for poor trading liquidity and financial instability, the S&P SmallCap 600 is designed to be an efficient portfolio of companies that meet specific inclusion criteria to ensure that they are investable and financially viable. As a result, the S&P SmallCap 600 is gaining wide acceptance as the benchmark of choice for both active and passive management.[2]

The Russell 2000 covers 2,000 companies comprising approximately 8 percent of total market capitalization, while the S&P 600 constitutes approximately 3 percent of total market capitalization. The average and median capitalization of firms in the two indices are similar.[3]

Second, changes to the S&P 600 Index are made in the same manner as changes to the S&P 500. Changes to S&P Indices are based on screening criteria including liquidity and financial viability. The S&P Index Committee monitors the various

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liquidity hypothesis (Dhillon and Johnson, 1991); and information content hypothesis (Jain, 1987; Denis, McConnell, Ovtchinnikov, and Yu, 2003).

[2] http://www2.standardandpoors.com, May 27, 2005.

[3] As of April 30, 2005, the average and median market capitalization of the 2,000 constituents in the Russell 2000 was $1 billion and $486 million, respectively (www.russell.com). As of March 31, 2005, the average and median market capitalization of the 600 constituents in the S&P 600 was $830 million and $680 million, respectively (www2.standardandpoors.com).

S&P indices components on a continual basis, making decisions concerning which stocks should be removed from, or added to, a particular index. In contrast, the components of the Russell 2000 index are reconstituted on an annual basis based entirely on market capitalization. Changes to the Russell 2000 are made simply because the relative market value of the firm grew or shrank.

In addition, Standard & Poor's pre-announces its index changes. Thus, an announcement effect exists as the period between announcement day and effective change day varies from one day to about one month. In contrast, the Russell 2000 constituents are formulated based on their market value on May 31 each year; however, reconstitution of the index does not occur until June 30, a month after the members are determined. Thus, there is no potential announcement effect on the reconstitution day because changes are known. Consequently, it is arguable that given the differences in methodology, the selection of a stock to or from the S&P 600 signals information to the investing public that is not signaled by inclusion in the Russell 2000.

Only a few studies have focused on the stock price effects of changes to an index comprising small capitalization stocks. Prudential Securities' analysts report that stocks added to the S&P 600 SmallCap Index in 1996 had positive average returns of 2.11 percent and that stocks moving from the S&P 600 to the S&P 400 increase on average 5.42 percent in value from the time of the announcement until the new listing (Napach, 1997). Bos (2000) looks at 403 additions to the S&P 600 index from its inception in 1994 through 1999. He finds that the average adjusted return from the announcement date to the effective change date is 5.40 percent, and from the effective change date to ten days after is -2.73 percent. Neither the Napach (1997) report nor the Bos (2000) study examine deletions from the S&P 600 Index, nor do they present any theoretical context or statistical findings.

Madhaven (2003) examines effects around the annual rebalancing of the Russell 2000 and Russell 3000 indices. He finds that additions to (deletions from) the indices experienced significant positive (negative) abnormal returns. These positive abnormal returns for the additions reversed in the month following the rebalancing. Madhaven (2003) concludes support of a temporary price pressure effect and a permanent liquidity effect.

Biktimirov, Cowan, and Jordan (2004) examine changes to the Russell 2000 indices from 1991 to 2000. They examine two types of additions and two types of deletions: i) Pure additions—additions to the Russell 2000 that were not previously in the Russell 1000, ii) Downward shifts—additions to the Russell 2000 that were downward shifts from the Russell 1000, iii) Pure deletions—deletions from the Russell 2000 that were not shifted to the Russell 1000, and iv) Upward shifts—deletions from the Russell 2000 that were upward shifts to the Russell 1000. Results for pure additions (deletions) reveal a positive (negative) reaction on reconstitution day that reverses completely; thus supporting a temporary price pressure effect. Results for

downward shift additions are negative and permanent. Results for upward shift deletions are positive and permanent.

In summary, our study contributes in two major ways. First, we contribute by providing rigorously developed information concerning the effects of additions to and deletions from the S&P 600 and place those findings into a theoretical context. Second, we attempt to reconcile the conflicting results in the Biktimirov, Cowan, and Jordan (2004) study, which supports the price pressure hypothesis, and the Chen, Noronha, and Singal (2004) study, which supports the investor awareness hypothesis.

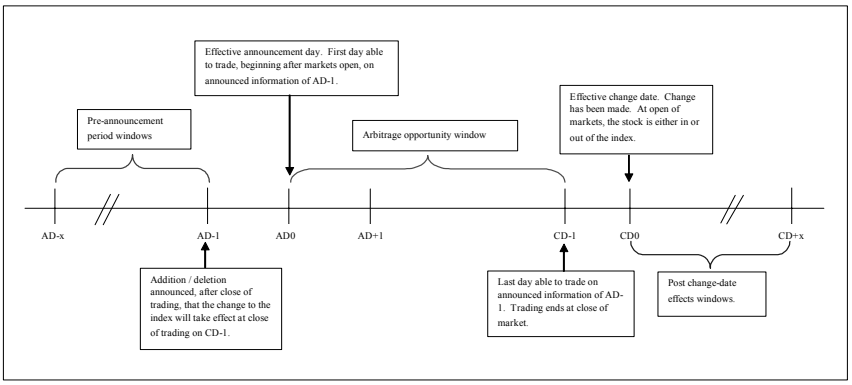
Hypotheses

Authors analyzing index changes have focused on several possible explanations for resulting price movements: downward sloping demand curve hypothesis, liquidity hypothesis, price pressure hypothesis, the information content hypothesis, and the investor awareness hypothesis. These hypotheses are equally applicable to the S&P 600 Index.

The timeline in Figure 1 illustrates the various event dates and windows referred to in the various hypotheses:

1. The effective announcement date (AD0);
2. The *arbitrage opportunity window* which runs from the first day able to trade on information (announcement day, AD0) through last day able to trade on information (CD-1);
3. The effective change date (CD0); and
4. The *post-change date permanent effect window*, which runs from and includes the change day (CD0) to some day in the future (CD+*x*).

Figure 1—Time Line of Announcements and Changes to S&P 600 Index



Downward Sloping Demand Curve Hypothesis and Liquidity Hypothesis. Lynch and Mendenhall (1997) and Shleifer (1986) believe in the possible existence of downward sloping demand curves for stocks. This theory states that, in the case of additions to the S&P 600, buying by index-fund managers attempting to mimic the S&P 600 index removes a substantial fraction of the firm's shares from circulation. This demand by index fund managers reduces the stock's supply for non-indexing investors, causing the market-clearing price to increase permanently. Such buying represents an outward shift of the demand curve for the firm's equity.

If the long-term demand curve were horizontal, inclusion of a stock in an index would not be accompanied by a price increase and no permanent price effect would be expected. In contrast, with a long-run, downward-sloping demand curve, you should observe a price increase on the announcement date that should be permanent in nature persisting past the effective change date (Shleifer, 1986).

For deletions, analogous logic predicts a price decrease: as stocks leave the S&P 600, index-fund selling adds to the number of shares in circulation, which leads to a decrease in demand and an increase in the stock's supply for non-indexing investors, causing the market-clearing price to decrease. Such selling represents an inward shift of the demand curve for the firm's equity.

The liquidity hypothesis states that the addition or deletion of the stock from the index alters the stock's liquidity, which affects its price. Beneish and Whaley (1996) and Shleifer (1986) agree that analysts, investors, and institutions may scrutinize newly added stocks more fully; hence, the firm's information environment becomes richer and its stock trades more actively. This reduces the bid-ask spread on the stock, lowers the required rate of return, and leads to a price increase immediately after inclusion (Shleifer, 1986). Alternatively, deleted stocks may no longer be tracked; hence, public information becomes scarce, liquidity declines, and bid-ask spreads increase. This increases the required rate of return and leads to a price decrease immediately after exclusion.

Furthermore, the liquidity hypothesis implies that an increase (decrease) in stock liquidity may result in a corresponding change in security prices due to lower (higher) transaction costs. If liquidity increases (decreases) permanently because of being added to (deleted from) the Index, stock prices may rise (fall) to reflect the perceived value of liquidity to institutions and other large investors (Woolridge and Ghosh, 1986).

In summary, the downward sloping demand curve hypothesis and the liquidity hypothesis predict for additions (deletions) an increase (decrease) in price on the announcement day, which will continue to increase (decrease) through the effective change date. This price change should be permanent and thus continue after the change date.

Price Pressure Hypothesis. The price pressure effect espoused by Scholes (1972), Harris and Gurel (1986), Lynch and Mendenhall (1997), Madhaven (2003),

and Biktimirov, Cowan, and Jordan (2004) assumes that the long-run demand curve for stocks is perfectly elastic at the full information price, but short-run demand curves are downward sloping. An addition to (deletion from) the index does not reveal new firm-specific information, but demand will change because index-fund managers will buy (sell) the added (deleted) stock simply to rebalance their portfolios (Harris and Gurel, 1986). Price pressure is attributable to index trading because index fund managers must add or delete the stock from their portfolios to avoid unfavorable tracking errors by which they may be evaluated.[4] Reflecting a supply and demand imbalance, security prices adjust to new levels in response to this buying and selling pressure by the index-fund managers.

In summary, the price pressure hypothesis predicts that for additions (deletions), an increase (decrease) in price on the announcement day will result, which will continue to increase (decrease) through the effective change date. This price change is only temporary, however, and post change price reversal will follow.

Information Content Hypothesis. The information content hypothesis is the most consistent with market efficiency. It states that the announcement of the addition or deletion contains valuable, relevant information.

As Shleifer (1986) explains, the S&P's inclusion of a stock into an index may act as a certification of quality leading to a price increase and possibly a volume increase due to trading by index managers.[5] The market is unaware of the appropriate quality level until the announcement.

For these announcements to have information content, S&P must have nonpublic information about firms and use this information to determine the composition of the index. Although S&P's decision to include or exclude a stock may not imply any judgment about its investment appeal, such an announcement may impart information to the investing public that changes its perception of the stock's investment appeal (Jain, 1987). According to Jain (1987), because S&P prefers stable firms for its indexes, investors perceive the inclusion (exclusion) of a firm in an index as a reduction (increase) in the riskiness of the firm's securities. As S&P monitors closely the companies in its indexes, inclusion (exclusion) signals a real or perceived increase (decrease) in the quality of management.

Furthermore, this information enters the market randomly; as a practical matter, the concern is not whether the information is incorporated, but how quickly the information becomes incorporated into the stock price. Thus, according to the information content hypothesis, the inclusion or exclusion of a stock causes prices to adjust immediately and permanently to a new equilibrium level (Woolridge and Ghosh, 1986).

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[4] Tracking error is defined as the standard deviation of the difference between actual portfolio return and the return of the index that is being tracked (Clarke, 1998).

[5] The information content hypothesis assumes that an addition to an index is good news and a deletion from an index is bad news.

In summary, the information content hypothesis predicts an immediate increase (decrease) in price on the announcement day for additions (deletions) to an index. There should be no further price reaction on the effective change date. This price change should be permanent and thus continue after the change date.

Investor Awareness Hypothesis. Building upon Merton's 1987 study, Chen, Noronha, and Singal (2004) investigate the investor awareness hypothesis as an explanation for the observed asymmetry in the market reaction to additions and deletions to the S&P 500. The investor awareness hypothesis holds that because investors cannot invest in a security of which they are unaware, firms have a shadow cost for being unknown. This shadow cost decreases as the firms become better recognized. A stock's addition to an index alerts investors to its existence, increases its number of analysts following, increases information dissemination, and increases the stock's liquidity and breadth of ownership. These factors lead to a reduction in the firm's shadow costs and the investor's required rate of return, which thereby leads to an increase in the firm's stock price and expected stock returns.

When a firm is deleted from an index, investor awareness does not immediately vanish as long as the firm still exists. Exclusion from the index does not imply that the firm becomes immediately unfamiliar to investors and thus does not change the firm's shadow costs. The decrease in price should be only temporary as index fund managers rebalance their portfolios by selling the firm's stock.

In summary, the investor awareness hypothesis predicts an asymmetric price response for index changes. For additions, it predicts a permanent increase in price. For deletions, it predicts a temporary decrease in price that completely reverses after the effective change date.

Because Standards & Poor's methodology for maintaining indices differs in important respects from that used by Russell, we expect that our results will more closely mimic the results of Chen, Noronha, and Singal (2004) than those of Biktimirov, Cowan, and Jordan (2004). Standard & Poor's methodology of reconstructing the index on a more or less continuous basis is more likely to lead to increased investor awareness of a particular firm than is Russell's methodology of reformulating the index only annually. Additionally, Standard & Poor's uses more and richer information in making its composition decisions than does Russell, and investors are aware of this fact.

Data and Methodology

The Sample. S&P's policy is to announce changes to its SmallCap Index at least one day prior to implementation.[6] S&P typically makes these announcements

[6] On occasion, S&P must use a shorter interval due to a bankruptcy filing or uncertainty about the timing of regulatory approval of a merger or acquisition. S&P also may use, at its discretion, an announcement interval longer than five days (Beneish and Whaley, 1996).

after the close of trading on a particular day. S&P announces approximately 69 percent of the changes (224 announcements) two or more days before they become effective, thus allowing sufficient time for arbitrage opportunities. The remaining 31 percent of the announcements have only a one-day trading period.

Standard & Poor's provides the effective date of the changes to the S&P SmallCap 600 Index.[7] All changes go into effect after close of trading of the change date reported by S&P. Consequently, the effective change day (CD0) is the next day of trading (t = 0).[8]

Table 1—Sample Additions and Deletions

This table reports the construction of the samples for index additions and deletions

Panel A: Sample Additions

	At AD0 & CD0
All additions	325
Less:	
Spin-offs[1]	-10
Mergers/acquisitions[2]	-2
Replacements[2]	-2
Useable events (Complete Sample)	311
Less than 1 day between AD0 and CD0	-100
Useable events (Refined Sample):	
Pure Additions	181
Downward Shifts	30
Total Refined Sample	211

[1]No prior year data
[2]Insufficient prior year data

Panel B: Sample Deletions

	At AD0	At CD0
All Deletions	325	325
Less:		
Mergers/acquisitions[3]	-7	-97
Bankruptcies[4]	-3	-3
Useable Events (Complete Sample)	315	225
Less than One Day between AD0 and CD0	-92	-80
Useable Events (Refined Sample):		
Pure Additions	173	95
Downward Shifts	50	50
Total refined sample	223	145

[3] Deletions due to mergers and acquisitions data no longer existing after CD0. Of the 149 total mergers and acquisitions, 52 still trade at CD0
[4]Of the eight bankruptcies and liquidations, five were still trading at CD0

[7] The S&P's website http://www2.standardandpoors.com provides the change dates for changes made from January 1, 2000 through December 31, 2002. PR Newswire's website http://www.prnewswire.com provides the information for changes made from June 15, 1999 through December 31, 1999.
[8] The change date given by S&P is t = -1 since the change is not effective until after close of trading. We note this day as CD-1.

We obtain announcement dates from S&P news releases and PR Newswire services. Because these news services typically announce changes after the close of trading on a particular day, the following day is the announcement day (AD0).[9] We obtain daily stock returns from the Center for Research in Security Prices (CRSP). All price data are adjusted for the effects of stock splits and stock dividends. Some 325 additions and deletions are included.

S&P's index member criteria, as of June 30, 2003, require a firm to be a U.S. company, have market capitalization between $250 million and $900 million, be financially viable with four consecutive quarters of positive earnings, have adequate liquidity, and be representative of its sector. Of the 325 additions, 31 companies or 10 percent are added to the S&P 600 from another index (19 from the S&P 400, 12 from the S&P 500). Eighty-four percent (276 firms) are acceptable companies added to replace a deleted stock. The remaining 6 percent (18 firms) are due to mergers, acquisitions, or spin-offs.

For the 325 deletions, 46 percent or 149 companies are deleted because they are either acquired or merged. Thirty-one percent (102 firms) are removed for lack of representation, meaning they no longer met the inclusion criteria. Twenty percent (64 firms) are transferred to another index (63 to S&P 400, one to S&P 500). The remaining 3 percent (10 firms) are due to spin-offs, bankruptcies, or liquidations.

Table 1, Panel A shows the construction of the testable samples for additions. From the original sample of 325 additions, we delete 14 observations because they have insufficient or no prior year's data. This leaves a complete sample of 311 additions. We construct a more refined sample of 211 additions by requiring a separation between the effective announcement date (AD0) and the effective change date (CD0) of at least one day.[10] We use the refined sample for testing throughout the paper. To be consistent with the sample construction methodology used by Biktimirov, Cowan, and Jordan (2004), we divide the additions into two groups:

1. Pure additions are stocks added to the S&P 600 index that were not previously in the S&P 400 or S&P 500.
2. Downward shifts are stocks that shifted from the S&P 400 or S&P 500 to the S&P 600.

Table 1, Panel B shows the construction of the testable samples for deletions. The two complete sample sizes differ when the event date (t = 0) is the announcement date versus the change date because 90 firms are merged or acquired and hence

[9] The S&P's and PR Newswire websites provide press releases of the changes. The press release announcement date is t = -1 (AD-1) and the following day, the effective announcement date, is t = 0 (AD0).

[10] 101 firms had less than one day between the effective announcement date (AD0) and the effective change date (CD0). In effect, this means that AD0 = CD-1 and only one complete day is available for risk arbitrageurs to trade. This constraint allows for a better delineation between the two event dates and the ability to analyze arbitrage trading opportunities.

no longer exist as of the effective change date. From the original sample of 325 deletions, we have a complete announcement day sample of 315 deletions and a complete change day sample of 225 deletions. Again, we construct a refined sample by requiring at least a one day separation between the announcement date and the change date. This requirement yields 223 deletions for the announcement date and 145 deletions for the change date. Again, for the purpose of brevity, we report only the two refined samples results. Consistent with the sample construction used by Biktimirov, Cowan, and Jordan (2004), we divide the deletions into two groups:

1. Pure deletions are stocks deleted from the S&P 600 index that were not shifted to either the S&P 400 or S&P 500.
2. Upward shifts are stocks that shifted from the S&P 600 to either the S&P 400 or S&P 500.

Methodology. We use an event-study methodology with two event dates for the refined sample: the effective announcement date (AD0) of the addition/deletion and the effective change date (CD0) of the addition/deletion.

We compute the abnormal return for stock j on day t (AR_{jt}) using the market-adjusted returns model over a 150-day estimation period that begins 180 trading days before the event date and ends 31 trading days before the event date, ([AD-180 to AD-31]or [CD-180 to CD-31]):

$$AR_{jt} = R_{jt} - R_{mt} \tag{1}$$

where (R_{jt}) is defined as the raw return of the common stock of the j^{th} firm on day t, and (R_{mt}) is the market's return using a value-weighted index.[11] The average abnormal return (AAR_t) is the sample mean:

$$AAR_t = \frac{\sum_{j=1}^{N} AR_{jt}}{N}, \tag{2}$$

[11] We also test three other models: the single index model, the mean-adjusted returns model, and the raw market returns model. In addition, we also test the single index and market-adjusted returns models using both an equally-weighted and a value-weighted index. These alternative approaches do not affect our major conclusions. We report the market-adjusted returns model with a value-weighted index to be consistent with the method used by Lynch and Mendenhall (1997).

The [CD-180, CD-1] estimation window includes days after the announcement day AD0 for one addition and two deletions. This occurrence has a potential bias implication. To ensure the robustness of our results, we recomputed the study excluding these three events. Little or no change occurs in the results.

We also recomputed results using a post-event estimation period [t+30, t+180] to ensure that results are not sensitive to the use of a pre-event estimation period. Results are robust and available from the authors upon request.

where N is the number of firms in the sample. Over an interval of two or more trading days beginning with day T_1 and ending with T_2, the cumulative average abnormal return ($CAAR_{T1,T2}$) is:

$$CAAR_{T_1,T_2} = \sum_{t=T_1}^{T_2} AAR_t. \tag{3}$$

We calculate t-test statistics using the time series standard deviation method.[12]

This test statistic does not take into account unequal return variances across securities. On the other hand, it does avoid the potential problem of cross-sectional correlation of security returns. Assuming time-series independence, the test statistic for (AAR_t) is:

$$t - stat = \frac{AAR_t}{\hat{\sigma}_{AAR}}, \tag{4}$$

and for ($CAAR_{T1,T2}$) is:

$$t - stat = \frac{CAAR_t}{(T_2 - T_1 + 1)^{\frac{1}{2}} \hat{\sigma}_{AAR}}, \tag{5}$$

where $\hat{\sigma}_{AAR}$ is a single estimate of the standard deviation for the entire portfolio.

Pure Additions and Pure Deletions to S&P 600 SmallCap Index

Table 2 presents the average, cumulative average, and mean cumulative average abnormal returns (AAR, CAAR, and MCAR, respectively) for pure additions and pure deletions around and between the two event days (AD0 and CD0).

Pure Additions. From Panel A of Table 2, we see that effective announcement day (AD0) abnormal returns are positive (AAR = 6.51 percent) and significantly different from zero at the 0.1 percent level. Panel B of Table 2 shows that effective change day (CD0) abnormal returns are negative (AAR = -0.91 percent) and significantly different from zero at the 1 percent level. By comparison, Chen, Noronha, and Singal (2004) show a significant announcement day abnormal return of 5.47 percent for the S&P 500, while Biktimirov, Cowan, and Jordan (2004) find a significant 0.92 percent announcement day abnormal return for the Russell 2000.[13] Panel C of Table 2 and Figure 2 show that post-change day returns continue to decline over the next 30 days but not enough to completely erase the positive announcement day effect

[12] We also calculate T-tests statistics using the cross-sectional standard deviation method. This test statistic is well-specified for event date variance increases, but is not very powerful. No major differences are found in the significance of the means between the two t-test statistics.

[13] Beneish and Whaley (2002) and Lynch and Mendenhall (1997) also find significant, positive announcement day abnormal returns for S&P 500 additions of 5.76 percent and 3.16 percent, respectively.

(MCAR = -4.61 percent (significant at 1 percent level) for the [CD0, CD+30] window). The cumulative abnormal return over the [AD-30, CD+30] window is 7.46 percent (significant at 1 percent level); while, the total cumulative effect around the announcement date [AD-30, AD+30] is 6.81 percent (significant at 1 percent level). These results are similar to those of Chen, Noronha, and Singal (2004).[14] The immediate positive price effect only partially reverses, indicating that some component of the positive price change is permanent.

Table 2—Abnormal Returns for Firms Added to and Deleted from S&P 600 SmallCap Index, Refined Sample June 1999 to December 2002

Abnormal returns for the announcement day, change day, and various windows are reported for firms added to and deleted from the S&P600 SmallCap Index. Average abnormal returns (AAR), cumulative average abnormal returns (CAAR), and mean cumulative abnormal returns (MCAR) are computed using the market-adjusted returns model and a value-weighted index. N is the number of firms used

Panel A: Announcement Day = 0

	Pure Additions (N = 181)		Pure Deletions (N = 173)	
Event Day	AAR	CAAR	AAR	CAAR
-30	-0.17%	-0.17%	0.96%***	0.96%
-20	-0.30%	0.52%	-0.06%	3.03%
-15	-0.66%**	0.82%	-0.31%	3.72%
-10	0.12%	1.96%	-0.20%	2.65%
-9	0.04%	2.00%	-0.29%	2.36%
-8	0.21%	2.21%	-0.76%**	1.60%
-7	0.70%**	2.91%	0.57%*	2.17%
-6	-0.60%**	2.31%	-1.04%***	1.13%
-5	0.09%	2.40%	0.03%	1.16%
-4	0.17%	2.57%	0.42%	1.58%
-3	0.48%*	3.05%	0.01%	1.59%
-2	-0.06%	2.99%	0.24%	1.83%
-1	-0.12%	2.87%	-0.84%**	0.99%
0	6.51%****	9.38%	-2.74%****	-1.75%
1	0.65%**	10.03%	-0.86%**	-2.61%
2	0.13%	10.16%	-0.32%	-2.93%
3	0.82%***	10.98%	-0.25%	-3.18%
4	-0.40%	10.58%	1.04%***	-2.14%
5	0.34%	10.92%	0.18%	-1.96%
6	-0.12%	10.80%	0.37%	-1.59%
7	-0.25%	10.55%	1.16%***	-0.43%
8	0.05%	10.60%	0.08%	-0.35%
9	-0.79%***	9.81%	0.83%**	0.48%
10	-0.09%	9.72%	0.69%**	1.17%
15	-0.43%*	8.72%	0.09%	3.80%
20	-0.43%*	7.41%	-0.86%**	4.81%
30	-0.51%*	6.79%	1.48%****	9.24%

*, **, ***, **** denote significance at the 10 percent, 5 percent, 1 percent, and 0.1 percent levels, respectively, using one-tailed t-statistics adjusted for serial correlation

[14] Chen, Noronha, and Singal (2004) report a significant 6.396 percent for the [AD-1, CD+20] window and a significant 6.189 percent for the [AD-1, CD+60] window.

Table 2 (continued)—Abnormal Returns for Firms Added to and Deleted from S&P 600 SmallCap Index, Refined Sample June 1999 to December 2002

Abnormal returns for the announcement day, change day, and various windows are reported for firms added to and deleted from the S&P600 SmallCap Index. Average abnormal returns (AAR), cumulative average abnormal returns (CAAR), and mean cumulative abnormal returns (MCAR) are computed using the market-adjusted returns model and a value-weighted index. N is the number of firms used

Panel B: Change Day = 0

	Pure Additions (N = 181)		Pure Deletions (N = 95)	
Event Day	AAR	CAAR	AAR	CAAR
-30	-0.06%	-0.06%	0.01%	0.01%
-20	-0.20%	0.99%	0.46%	0.79%
-15	0.03%	1.70%	-0.11%	-1.26%
-10	0.41%	2.40%	-0.59%	-3.76%
-9	0.46%*	2.86%	-0.62%	-4.38%
-8	0.02%	2.88%	-0.84%*	-5.22%
-7	-0.13%	2.75%	-0.98%**	-6.20%
-6	1.03%****	3.78%	0.20%	-6.00%
-5	1.01%****	4.79%	-1.46%***	-7.46%
-4	1.31%****	6.10%	-1.47%***	-8.93%
-3	2.23%****	8.33%	-1.92%****	-10.85%
-2	2.16%****	10.49%	-2.52%****	-13.37%
-1	1.67%****	12.16%	-3.67%****	-17.04%
0	-0.91%***	11.25%	3.46%****	-13.58%
1	-0.23%	11.02%	2.22%****	-11.36%
2	-0.12%	10.90%	-0.04%	-11.40%
3	-0.72%**	10.18%	0.19%	-11.21%
4	0.25%	10.43%	-0.21%	-11.42%
5	-0.19%	10.24%	0.83%*	-10.59%
6	0.17%	10.41%	1.45%**	-9.14%
7	-0.07%	10.34%	0.16%	-8.98%
8	-0.16%	10.18%	1.26%*	-7.72%
9	-0.42%*	9.76%	-0.20%	-7.92%
10	-0.55%**	9.21%	-0.35%	-8.27%
15	-0.33%	7.88%	1.32%**	-6.63%
20	-0.38%	6.93%	-0.30%	-4.28%
30	0.55%**	7.55%	0.81%*	-1.45%

*, **, ***, **** denote significance at the 10 percent, 5 percent, 1 percent, and 0.1 percent levels, respectively, using one-tailed t-statistics adjusted for serial correlation

Pure Deletions. From Panel A of Table 2, we see that effective announcement day (AD0) abnormal returns are negative (AAR = -2.74 percent) and significantly different from zero at the 0.1 percent level. Panel B of Table 2 shows that effective change day (CD0) abnormal returns are significantly positive at the 0.1 percent level (AAR = 3.46 percent). By comparison, Chen, Noronha, and Singal (2004) show a significant announcement day abnormal return of -8.46 percent for the S&P 500; while Biktimirov, Cowan, and Jordan (2004) report an insignificant -0.11% a percent

announcement day abnormal return for the Russell 2000.[15] For pure deletions to the S&P 600, the entire announcement day negative return completely reverses by the effective change date. Panel C of Table 2 and Figure 2 show that post-change day returns continue to increase over the next 30 days (MCAR = 12.16 percent (significant at 0.1 percent level) for the [CD0, CD+30] window). The total cumulative effect around the announcement date [AD-30, AD+30] window is 2.12 percent and insignificant. These results are similar to those of Chen, Noronha, and Singal (2004).[16] There is a complete and permanent reversal of the announcement day negative returns.

Table 2 (continued)—Abnormal Returns for Firms Added to and Deleted from S&P 600 SmallCap Index, Refined Sample: June 1999 to December 2002

Abnormal returns for the announcement day, change day, and various windows are reported for firms added to and deleted from the S&P600 SmallCap Index. Average abnormal returns (AAR), cumulative average abnormal returns (CAAR), and mean cumulative abnormal returns (MCAR) are computed using the market-adjusted returns model and a value-weighted index. N is the number of firms used

Panel C: Arbitrage and Cumulative Effects Windows

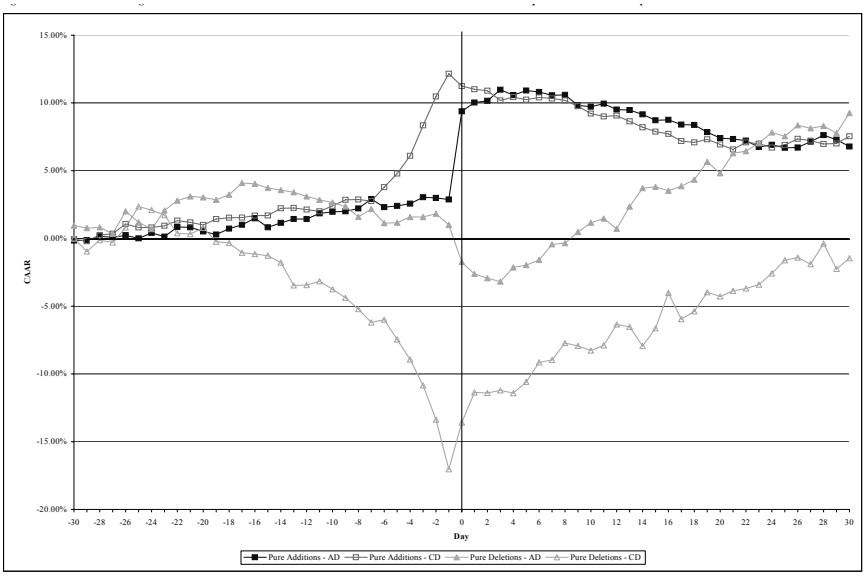
	Pure Additions (N = 181)	Pure Deletions	
Windows	MCAR	N	MCAR
Pre-announcement day effects:			
[AD-10,AD-1]	1.02%	173	-1.86%*
[AD-20,AD-1]	2.05%*	173	-2.10%
[AD-30,AD-1]	2.86%*	173	0.98%
Post-change day effects:			
[CD0,CD+10]	-2.94%***	95	7.63%****
[CD0,CD+20]	-5.22%****	95	10.37%****
[CD0,CD+30]	-4.61%***	95	12.16%****
Arbitrage window effects:			
[AD0,CD-1]	9.21%****	170	-5.71%****
Total cumulative effects:			
[AD-10,CD+10]	7.29%****	65	-10.36%****
[AD-20,CD+20]	6.04%***	63	-12.33%***
[AD-30,CD+30]	7.46%***	59	-16.11%***
[AD-1,AD+1]	7.04%****	173	-4.44%****
[AD-10,AD+10]	7.88%****	173	-3.77%**
[AD-20,AD+20]	6.62%****	173	-2.60%
[AD-30,AD+30]	6.81%***	173	2.12%

*, **, ***, **** denote significance at the 10 percent, 5 percent, 1 percent, and 0.1 percent levels, respectively, using one-tailed t-statistics adjusted for serial correlation

[15] Beneish and Whaley (2002) and Lynch and Mendenhall (1997) also find significant, negative announcement day abnormal returns for S&P 500 deletions of -9.9 percent (as calculated by Chen, Noronha, and Singal, 2004) and -6.26 percent, respectively.

[16] Chen, Noronha, and Singal (2004) report a significant -4.71 percent for the [AD-1, CD+20] window and an insignificant 0.39 percent for the [AD-1, CD+60] window.

Figure 2—Cumulative Average Abnormal Returns for Pure Additions to and Deletions from S&P600 SmallCap Index Refined Sample, June 1999 to December 2002



An inconsistency appears when we examine cumulative abnormal return over the [AD-30, CD+30] window. This MCAR is -16.11 percent and significant. This cumulative negative abnormal return is biased, however as it is based on the 59 surviving firms, while the [AD-30, AD+30] window contains all 173 pure deletions. We investigate this incongruity more thoroughly when we analyze the reasons behind the deletions.

In summary, for changes to the S&P 600 SmallCap Index, there is some permanent price increase for pure additions, but only a temporary price decrease for pure deletions. These results are consistent with those of Chen, Noronha, and Singal (2004) and support the investor awareness hypothesis. We suggest that the continuous-monitoring method used by Standards & Poor's versus the once-annual reformulation method used by Russell to construct their respective indices leads to increased investor awareness of a particular firm.

Additions: Simple Replacements and Downward Shifts

We further divide the pure additions into two groups as to the reason for the addition: simple replacement for a deletion (176 events) and all other reasons (five events). Table 3 and Figure 3 compare results for additions due to simple replacements and those due to downward shifts. Because the all-other-reasons category

includes only five events with various reasons for additions, it is neither presented nor discussed.

Simple Replacement. Because 97.2 percent of the pure additions are simple replacements, we expect synonymous results. Panel A of Table 3 shows that announcement day (AD0) abnormal returns are significantly positive (AAR = 6.66 percent; 0.1 percent significance level); while Panel B, Table 3 reveals a significant negative abnormal return of –1.01 percent (1 percent significance level) on the

Table 3—Abnormal Returns for Firms Added to S&P 600 SmallCap Index by Reason Refined Sample, June 1999 to December 2002

Abnormal returns for the announcement day, change day, and various windows are reported for firms added to the S&P600 SmallCap Index. Average abnormal returns (AAR), cumulative average abnormal returns (CAAR), and mean cumulative abnormal returns (MCAR) are computed using the market-adjusted returns model and a value-weighted index. N is the number of firms used

Panel A: Announcement Day = 0

	Simple Replacements (N = 176)		Downward Shifts (N = 30)	
Event Day	AAR	CAAR	AAR	CAAR
-30	-0.15%	-0.15%	-0.24%	-0.24%
-20	-0.28%	0.61%	0.11%	-0.56%
-15	-0.57%**	1.16%	0.14%	2.71%
-10	0.10%	2.36%	-0.02%	4.13%
-9	0.07%	2.43%	-0.78%*	3.35%
-8	0.10%	2.53%	-0.37%	2.98%
-7	0.57%**	3.10%	1.09%**	4.07%
-6	-0.53%*	2.57%	-0.12%	3.95%
-5	0.06%	2.63%	-0.52%	3.43%
-4	0.19%	2.82%	0.02%	3.45%
-3	0.40%	3.22%	-0.13%	3.32%
-2	-0.06%	3.16%	-0.32%	3.00%
-1	-0.04%	3.12%	-0.12%	2.88%
0	6.66%****	9.78%	-4.17%****	-1.29%
1	0.70%**	10.48%	-1.01%**	-2.30%
2	0.20%	10.68%	0.13%	-2.17%
3	0.89%***	11.57%	-0.72%*	-2.89%
4	-0.51%*	11.06%	3.14%****	0.25%
5	0.32%	11.38%	0.38%	0.63%
6	-0.21%	11.17%	0.25%	0.88%
7	-0.23%	10.94%	-0.16%	0.72%
8	0.05%	10.99%	1.23%**	1.95%
9	-0.86%***	10.13%	0.21%	2.16%
10	0.03%	10.16%	-0.55%	1.61%
15	-0.50%*	9.10%	0.35%	1.09%
20	-0.38%	7.61%	0.13%	2.96%
30	-0.52%**	7.13%	0.66%	3.35%

*, **, ***, **** denote significance at the 10 percent, 5 percent, 1 percent, and 0.1 percent levels, respectively, using one-tailed t-statistics adjusted for serial correlation

Table 3 (continued)—Abnormal Returns for Firms Added to S&P 600 SmallCap Index, Reason Refined Sample June 1999 to December 2002

Abnormal returns for the announcement day, change day, and various windows are reported for firms added to the S&P600 SmallCap Index. Average abnormal returns (AAR), cumulative average abnormal returns (CAAR), and mean cumulative abnormal returns (MCAR) are computed using the market-adjusted returns model and a value-weighted index. N is the number of firms used

Panel B: Change Day = 0

	Simple Replacements (N = 176)		Downward Shifts (N = 30)	
Event Day	AAR	CAAR	AAR	CAAR
-30	-0.02%	-0.02%	0.20%	0.20%
-20	-0.23%	1.15%	0.01%	1.88%
-15	0.02%	2.04%	-0.53%	3.76%
-10	0.36%	2.59%	0.83%*	4.37%
-9	0.46%*	3.05%	-0.54%	3.83%
-8	-0.01%	3.04%	-0.08%	3.75%
-7	-0.07%	2.97%	-0.25%	3.50%
-6	0.96%***	3.93%	-0.68%	2.82%
-5	1.06%****	4.99%	0.25%	3.07%
-4	1.47%****	6.46%	-2.44%****	0.63%
-3	2.26%****	8.72%	-1.07%**	-0.44%
-2	2.26%****	10.98%	-0.45%	-0.89%
-1	1.73%****	12.71%	-3.63%****	-4.52%
0	-1.01%***	11.70%	3.54%****	-0.98%
1	-0.35%	11.35%	2.27%****	1.29%
2	-0.13%	11.22%	-0.11%	1.18%
3	-0.70%**	10.52%	-0.33%	0.85%
4	0.28%	10.80%	1.00%**	1.85%
5	-0.15%	10.65%	-0.29%	1.56%
6	0.15%	10.80%	-0.75%	0.81%
7	-0.15%	10.65%	0.13%	0.94%
8	-0.04%	10.61%	-0.20%	0.74%
9	-0.37%	10.24%	-0.03%	0.71%
10	-0.66%**	9.58%	0.21%	0.92%
15	-0.34%	8.13%	0.67%	2.51%
20	-0.35%	7.18%	0.41%	2.56%
30	0.54%**	7.86%	0.66%	4.61%

*, **, ***, **** denote significance at the 10 percent, 5 percent, 1 percent, and 0.1 percent levels, respectively, using one-tailed t-statistics adjusted for serial correlation

effective change day (CD0). Panel C of Table 3 and Figure 3 show that post-change day returns continue to decline over the next 30 days, but not enough to erase the positive announcement day effect (MCAR = -4.83 percent (significant at 1 percent level) for the [CD0, CD+30] window). The cumulative abnormal return over the [AD-30, CD+30] window is 7.82 percent (significant at 0.1 percent level); while the total cumulative effect around the announcement date [AD-30, AD+30] is 7.14 percent (significant at 1 percent level). Overall, the price effect for additions, which are simply replacements, is positive. While there is some post-change reversal, there is a permanent component to the price change.

Table 3 (continued)—Abnormal Returns for Firms Added to S&P 600 SmallCap Index - by Reason Refined Sample, June 1999 to December 2002

Abnormal returns for the announcement day, change day, and various windows are reported for firms added to the S&P600 SmallCap Index. Average abnormal returns (AAR), cumulative average abnormal returns (CAAR), and mean cumulative abnormal returns (MCAR) are computed using the market-adjusted returns model and a value-weighted index. N is the number of firms used

Panel C: Arbitrage and Cumulative Effects Windows

	Simple Replacements (N = 176)	Downward Shifts (N = 30)
Windows	MCAR	MCAR
Pre-announcement Day Effects		
[AD-10,AD-1]	0.87%	-1.27%
[AD-20,AD-1]	2.23%*	3.55%*
[AD-30,AD-1]	3.13%*	2.88%
Post-change Day Effects		
[CD0,CD+10]	-3.11%***	5.43%***
[CD0,CD+20]	-5.51%****	7.06%***
[CD0,CD+30]	-4.83%***	9.10%***
Arbitrage Window Effects		
[AD0,CD-1]	9.53%****	-7.97%****
Total Cumulative Effects		
[AD-10,CD+10]	7.28%****	-3.81%*
[AD-20,CD+20]	6.25%***	2.64%
[AD-30,CD+30]	7.82%****	4.00%
[AD-1,AD+1]	7.32%****	-5.31%****
[AD-10,AD+10]	7.91%****	-2.52%
[AD-20,AD+20]	6.72%****	3.65%
[AD-30,AD+30]	7.14%***	3.38%

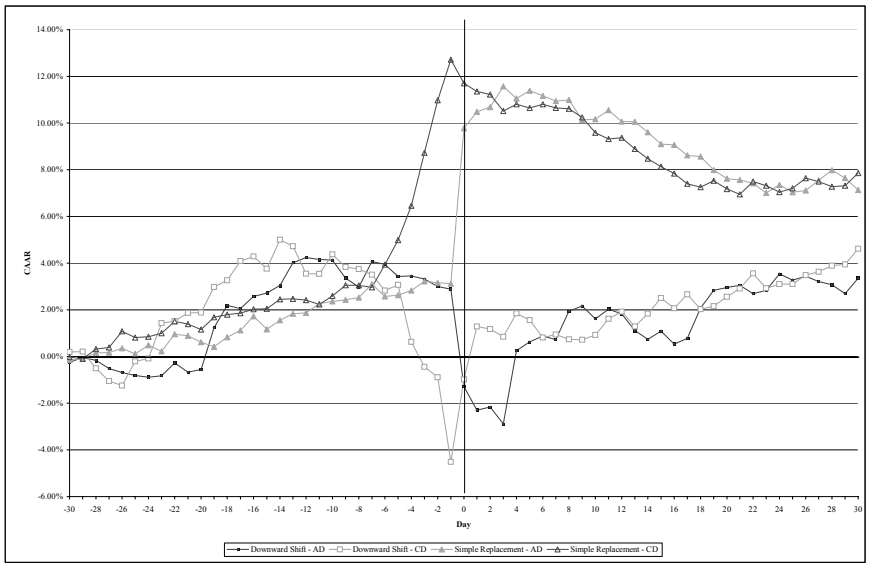
*, **, ***, **** denote significance at the 10 percent, 5 percent, 1 percent, and 0.1 percent levels, respectively, using one-tailed t-statistics adjusted for serial correlation

Downward Shift Additions. Panel A of Table 3 reveals a negative announcement day (AD0) abnormal return of -4.17 percent, which is significant at the 0.1 percent level. Panel B of Table 3 reveals that 85 percent of the initial announcement day loss is recovered by the effective change day (AAR = 3.54 percent; 0.1 percent significance level). Table 3, Panel C shows that post-change day returns continue to increase over the next 30 days, eventually surpassing the initial announcement day loss (MCAR = 9.10 percent (significant at 1 percent level) for the [CD0, CD+30] window). The cumulative abnormal returns over the [AD-30, CD+30] window is 4.00 percent and insignificant. Also, the total cumulative effect surrounding the announcement date [AD-30, AD+30] is an insignificant 3.38 percent. Figure 3 shows that CAARs eventually return to their pre-announcement day levels.

This negative initial reaction and subsequent recovery is consistent with the price pressure hypothesis. Rebalancing occurs as S&P 500 and S&P 400 fund trackers remove these stocks from their portfolios, while simultaneously S&P 600 fund

trackers add them to their portfolios. Our results differ from those of Biktimirov, Cowan, and Jordan (2004) who find that downward-shifts to the Russell 2000 result in a small, permanent decrease in value.[17]

Figure 3—Cumulative Average Abnormal Returns for Additions to S&O 600 SmallCap Index by Reason June 1999 to December 2002



Deletions: Mergers/Acquisitions, Lack of Representation, and Upward Shifts

As mentioned earlier, inconsistencies appear in the CAARs for the [AD-30, CD+30] and [AD-30, AD+30] windows for pure deletions. To better understand this inconsistency, we subdivide the pure deletions into three groups based upon the reason for the deletion: merger or acquisition (125 events), lack of representation (46 events), and all other reasons (two events). Table 4 and Figure 4 compare results for deletions resulting from mergers and acquisitions, lack or representation, and upward shifts. Because the all-other-reasons category includes only two events, it is neither presented nor discussed.

[17] Although not specifically discussed in their paper, Biktimirov, Cowan, and Jordan (2004) report for downward shifts an insignificant announcement day return of 0.47 percent, significant negative CAARs for the [+1,+20] and [+1,+40] windows of -1.73 percent and -1.87 percent, respectively; and significant negative CAARs for the [-20,+20] and [-40,+40] windows of -2.56 percent and -2.82 percent, respectively.

Table 4—Abnormal Returns for Firms Deleted from S&P 600 SmallCap Index by Reason Refined Sample, June 1999 to December 2002

Abnormal returns for the announcement day, change day, and various windows are reported for firms deleted from the S&P600 SmallCap Index. Average abnormal returns (AAR), cumulative average abnormal returns (CAAR), and mean cumulative abnormal returns (MCAR) are computed using the market-adjusted returns model and a value-weighted index. N is the number of firms used

Panel A: Announcement Day = 0

	Merger or Acquisition (N = 125)		Lack of Representation (N = 46)		Upward Shifts (N = 50)	
Event Day	AAR	CAAR	AAR	CAAR	AAR	CAAR
-30	1.50%****	1.50%	-0.47%	-0.47%	0.30%	0.30%
-20	0.00%	9.19%	-0.29%	-13.74%	-0.13%	-0.06%
-15	-0.22%	11.44%	-0.59%	-17.23%	-0.46%	0.11%
-10	0.06%	12.03%	-0.99%	-22.99%	0.03%	0.82%
-9	0.24%	12.27%	-1.88%**	-24.87%	0.29%	1.11%
-8	-0.01%	12.26%	-2.85%****	-27.72%	0.04%	1.15%
-7	0.61%*	12.87%	0.56%	-27.16%	0.00%	1.15%
-6	-0.23%	12.64%	-3.26%****	-30.42%	0.43%	1.58%
-5	0.57%*	13.21%	-1.56%**	-31.98%	-0.77%*	0.81%
-4	-0.24%	12.97%	2.26%***	-29.72%	0.67%	1.48%
-3	0.10%	13.07%	-0.28%	-30.00%	1.20%**	2.68%
-2	0.49%	13.56%	-0.50%	-30.50%	0.58%	3.26%
-1	-0.02%	13.54%	-3.04%****	-33.54%	-0.29%	2.97%
0	0.19%	13.73%	-10.73%****	-44.27%	2.68%****	5.65%
1	0.32%	14.05%	-4.03%****	-48.30%	-1.03%**	4.62%
2	-0.14%	13.91%	-1.02%	-49.32%	1.02%**	5.64%
3	-0.35%	13.56%	-0.45%	-49.77%	0.68%	6.32%
4	-0.11%	13.45%	3.12%****	-46.65%	-0.53%	5.79%
5	-0.42%	13.03%	0.89%	-45.76%	0.44%	6.23%
6	-0.49%	12.54%	0.91%	-44.85%	-0.61%	5.62%
7	-0.43%	12.11%	2.48%***	-42.37%	0.03%	5.65%
8	-0.97%***	11.14%	0.92%	-41.45%	-0.12%	5.53%
9	0.15%	11.29%	0.97%	-40.48%	0.16%	5.69%
10	-0.01%	11.28%	1.25%*	-39.23%	-0.71%	4.98%
15	-0.66%**	11.65%	0.35%	-35.66%	-0.81%*	5.55%
20	-0.46%	11.65%	-0.96%	-34.29%	1.63%***	5.92%
30	0.58%*	11.37%	1.87%**	-28.06%	0.58%	5.97%

*, **, ***, **** denote significance at the 10 percent, 5 percent, 1 percent, and 0.1 percent levels, respectively, using one-tailed t-statistics adjusted for serial correlation

Merger or Acquisition. In analyzing deletions due to merger or acquisition, we suffer from survivorship bias. From Panel A of Table 4 we see that effective announcement day (AD0) abnormal returns for 125 firms are positive (AAR = 0.19 percent), but insignificant. Table 4, Panel B reveals negative, but insignificant, change day (CD0) abnormal returns for the 47 acquired firms that are still trading (AAR = -0.61 percent). As several earlier studies have revealed, it is the period just before the merger announcement date where shareholders of acquired firms achieve

significant positive returns.[18] Panel C of Table 4 and Figure 4 reveal that the pre-announcement day MCARs for the [AD-30, AD-1] window are 13.53 percent and significant at the 0.1 percent level; while post-change day returns are insignificant (MCAR = -3.00 percent for the [CD0, CD+30] window). Only 13 firms are still actively trading 30 days past the effective change date. The MCARs over the [AD-30, CD+30] window for these remaining 13 firms is an insignificant 5.48 percent. The MCAR for the [AD-30, AD+30] window is significant and positive (MCAR = 12.97 percent; 0.1 percent significance level), but most of this gain occurs in the pre-announcement period.

Lack of Representation. Panel A of Table 4, reveals announcement day (AD0) abnormal returns that are negative (AAR = -10.73 percent) and significant at the 0.1 percent level. The change day (CD0) returns revealed in Panel B of Table 4 are positive and significant (AAR = 7.41 percent; 0.1 percent significance level), recovering nearly 69 percent of the initial announcement day loss. As revealed in Panel C of Table 4 and Figure 4, returns are declining prior to the removal announcement (MCAR = -33.75 percent (significant at 0.1 percent level) for the [AD-30, AD-1] pre-announcement window). CAARs then increase after the removal, as evidenced by post-change day returns increasing appreciably beyond the initial announcement day loss to a significant MCAR = 27.65 percent for the [CD0, CD+30] window.

Our findings for firms removed because of lack of representation support the contentions of Arnott and Vincent (1986). They contend that if a change is to be made to the index, it generally is made for reasons that will be apparent to the investing public at the same time they become apparent to S&P; consequently, it is easier to predict which firms will be deleted than to predict which firms will be added in their place. As the securities are sold from the fund index the price decreases. The price eventually returns to an appropriate level due to fundamental factors, recovering much, but not all, of the initial loss. The MCARs for the [AD-30, CD+30] and [AD-30, AD+30] windows are negative and significant (MCARs = -24.20 percent and -28.45 percent, respectively). Overall, the price effect for firms removed because of a lack of representation is negative. While there is some post-change reversal, there is a permanent component to the negative price change.

Upward Shift Deletions. From Panel A of Table 4, we see that announcement day (AD0) abnormal returns are positive (AAR = 2.68 percent) and significant at the 0.1 percent level. The change day (CD0) returns revealed in Panel B of Table 4 are also positive (AAR = 0.21 percent), but insignificant. The announcement day's positive reaction implies that investors view the removal from the S&P 600 Index as good news if the firm moves to a higher S&P index.

[18] See Jensen and Ruback, 1983; Kaplan and Weisbach, 1992; Servaes, 1991; and Morck, Shleifer, and Vishny, 1990 among others.

Table 4 (continued)—Abnormal Returns for Firms Deleted from S&P 600 SmallCap Index by Reason Refined Sample, June 1999 to December 2002

Abnormal returns for the announcement day, change day, and various windows are reported for firms deleted from the S&P600 SmallCap Index. Average abnormal returns (AAR), cumulative average abnormal returns (CAAR), and mean cumulative abnormal returns (MCAR) are computed using the market-adjusted returns model and a value-weighted index. N is the number of firms used

Panel B: Change Day = 0

	Merger or Acquisition (N = 47)		Lack of Representation (N = 46)		Upward Shifts (N = 50)	
Event Day	AAR	CAAR	AAR	CAAR	AAR	CAAR
-30	2.22%***	2.22%	-2.21%***	-2.21%	-0.18%	-0.18%
-20	-0.14%	13.63%	1.03%	-12.33%	0.34%	-2.19%
-15	0.55%	14.99%	-0.84%	-18.11%	0.86%*	-0.53%
-10	-0.02%	15.25%	-1.14%	-23.68%	0.53%	-0.14%
-9	0.08%	15.33%	-1.30%*	-24.98%	-0.03%	-0.17%
-8	-0.21%	15.12%	-1.60%**	-26.58%	0.94%*	0.77%
-7	-0.14%	14.98%	-1.88%**	-28.46%	0.62%	1.39%
-6	0.01%	14.99%	0.34%	-28.12%	-0.25%	1.14%
-5	0.94%*	15.93%	-4.00%****	-32.12%	1.64%***	2.78%
-4	0.22%	16.15%	-3.21%****	-35.33%	1.24%**	4.02%
-3	0.02%	16.17%	-4.00%****	-39.33%	-0.84%*	3.18%
-2	0.16%	16.33%	-5.27%****	-44.60%	0.53%	3.71%
-1	0.50%	16.83%	-8.11%****	-52.71%	1.16%**	4.87%
0	-0.61%	16.22%	7.41%****	-45.30%	0.21%	5.08%
1	-0.66%	15.56%	4.44%****	-40.86%	0.56%	5.64%
2	-0.91%	14.65%	0.81%	-40.05%	-0.73%	4.91%
3	-0.65%	14.00%	0.61%	-39.44%	0.70%	5.61%
4	-0.30%	13.70%	-0.01%	-39.45%	-0.71%	4.90%
5	-0.99%*	12.71%	1.77%**	-37.68%	-0.11%	4.79%
6	-0.35%	12.36%	2.34%***	-35.34%	-1.17%**	3.62%
7	0.09%	12.45%	0.15%	-35.19%	0.44%	4.06%
8	1.11%*	13.56%	1.27%*	-33.92%	-0.76%	3.30%
9	0.00%	13.56%	-0.30%	-34.22%	0.72%	4.02%
10	0.46%	14.02%	-0.62%	-34.84%	0.56%	4.58%
15	-0.34%	13.30%	2.13%**	-32.21%	0.06%	2.72%
20	-0.09%	12.42%	-0.55%	-28.96%	-0.13%	3.93%
30	-0.44%	11.68%	1.38%*	-24.65%	1.76%***	6.71%

*, **, ***, **** denote significance at the 10 percent, 5 percent, 1 percent, and 0.1 percent levels, respectively, using one-tailed t-statistics adjusted for serial correlation

Table 4, Panel C, and Figure 4 show that post-change day returns for the [CD0, CD+30] window are a positive, but insignificant 1.84 percent. Total cumulative effects for the [AD-30, AD+30] window are also positive (AAR = 5.98 percent), but insignificant. Total cumulative effects for the [AD-30, CD+30] window are significant and positive (AAR = 8.17 percent; significant at 5 percent level). Figure 3 shows that CAARs remain relatively constant with only a slight permanent increase in price. The market interprets the transfer of a stock from the S&P 600 to a higher S&P index as good news. There is evidence of a small, permanent increase in value

when a firm shifts to a more prestigious index. This finding is consistent with those of Biktimirov, Cowan, and Jordan (2004).[19]

Table 4 (continued)—Abnormal Returns for Firms Deleted from S&P 600 SmallCap Index by Reason Refined Sample, June 1999 to December 2002

Abnormal returns for the announcement day, change day, and various windows are reported for firms deleted from the S&P600 SmallCap Index. Average abnormal returns (AAR), cumulative average abnormal returns (CAAR), and mean cumulative abnormal returns (MCAR) are computed using the market-adjusted returns model and a value-weighted index. N is the number of firms used

Panel C: Arbitrage and Cumulative Effects Windows

	Merger or Acquisition		Lack of Representation		Upward Shifts	
Windows	N	MCAR	N	MCAR	N	MCAR
Pre-announcement day effects:						
[AD-10,AD-1]	125	1.58%	46	-11.54%****	50	2.17%
[AD-20,AD-1]	125	4.35%***	46	-20.10%****	50	2.90%
[AD-30,AD-1]	125	13.53%****	46	-33.57%****	50	2.97%
Post-change day effects:						
[CD0,CD+10]	47	-2.23%	46	17.77%****	50	-0.29%
[CD0,CD+20]	47	-2.82%	46	23.52%****	50	-0.93%
[CD0,CD+30]	47	-3.00%	46	27.65%****	50	1.84%
Arbitrage window effects:						
[AD0,CD-1]	122	0.52%	46	-22.40%****	50	3.37%***
Total cumulative effects:						
[AD-10,CD+10]	18	-2.49%	45	-14.40%****	50	5.25%**
[AD-20,CD+20]	16	-3.93%	45	-16.93%****	50	5.33%*
[AD-30,CD+30]	13	5.48%	44	-24.20%****	50	8.17%**
[AD-1,AD+1]	125	0.49%	46	-17.80%****	50	1.36%*
[AD-10,AD+10]	125	1.04%	46	-17.30%****	50	4.18%*
[AD-20,AD+20]	125	3.87%*	46	-21.03%****	50	5.84%*
[AD-30,AD+30]	125	12.97%****	46	-28.45%****	50	5.98%

*, **, ***, **** denote significance at the 10 percent, 5 percent, 1 percent, and 0.1 percent levels, respectively, using one-tailed t-statistics adjusted for serial correlation

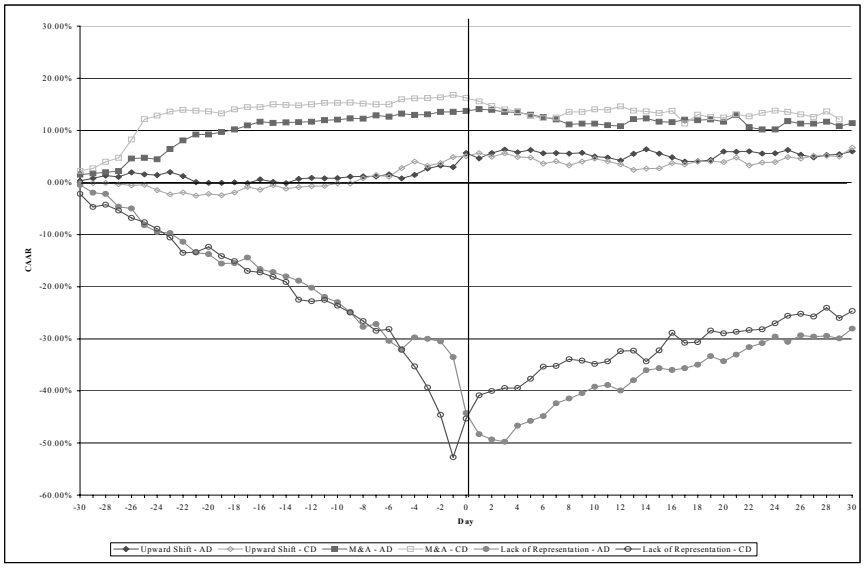
Arbitrage Opportunities

Arbitrage opportunities may exist between the announcement date and the effective change date because index fund managers will attempt to minimize tracking error by delaying the purchase of new stocks in the fund until just before they are added to the index and deferring the sale of deleted stocks until just before they are deleted from the index. This creates trading opportunities for risk-arbitrageurs: traders buy (sell) the newly added (deleted) stock before the index funds step in, then sell (buy) it when index fund trading pressure is at its highest (Beneish and Whaley,

[19] Although not specifically discussed in their paper, Biktimirov, Cowan, and Jordan (2004) report for upward shifts a significant announcement day return of 1.41 percent, an insignificant CAAR for the [+1,+20] window of 1.23 percent, a significant CAAR for the [+1,+40] window of 2.01 percent, and insignificant CAARs for the [-20,+20] and [-40,+40] windows of 0.40 percent and 2.59 percent, respectively.

2002). This explains why additions (deletions) to the index may experience positive (negative) abnormal returns during the arbitrage opportunity period (announcement day to change day). These price changes are temporary because long-run demand curves are elastic; thus, security prices and trading activity should return to pre-change levels (Woolridge and Ghosh, 1986). To see if such arbitrage opportunities exist, we examined the MCARs for the [AD0, CD-1] arbitrage window. These results are found in Panel C of Tables 2, 3, and 4 and are summarized below:

Figure 4—Cumulative Average Abnormal Returns for Deletions from S&P SmallCap Index by Reason, June 1999 to December 2002



Additions. For pure additions, there is a significant and positive arbitrage trading opportunity (MCAR = 9.21 percent; significant at 0.1 percent level). Likewise, for those firms being added to the S&P 600 as simple replacements the [AD0, CD-1] arbitrage window is significant and positive (MCAR = 9.53 percent; significant at 0.1 percent level). Therefore, upon the announcement of an addition at the close of trading on AD-1, investors can buy the stock being added to the index at the opening of trade on AD0 and then sell it at a profit before the end of closing on CD-1.

Panel C of Table 3 reveals an arbitrage window that is significantly negative (MCAR = -7.97 percent; 0.1 percent significance level) for those firms being shifted to the S&P 600 Index from another higher index. Investors could take advantage of this arbitrage window by short selling these stocks on AD0 and buying them at a lower price on CD-1.

Deletions. For pure deletions, a significant and negative MCAR of -5.71 percent exists for the arbitrage window. This arbitrage opportunity only exists for a small subset of the pure deletions: those stocks being removed due to a lack of representation.[20] Panel C of Table 4 discloses a MCAR for the [AD0, CD-1] arbitrage window equal to –22.40 percent and statistically significant at the 0.1 percent level. If the pure deletion is the result of a merger or acquisition, the arbitrage window reveals there is no opportunity to earn a risk-free profit (MCAR = 0.52 percent and insignificant).

In the case of stocks being moved to another index (upward shifts), there is an arbitrage opportunity. Panel C of Table 4 discloses a MCAR for the arbitrage window equal to 3.37 percent that is statistically significant at the 1 percent level. Our result supports Napach's (1997) finding that stocks moving from the S&P 600 to the S&P 400 increase in value from the time of the announcement until the new listing. This arbitrage opportunity disappears as of the effective inclusion in the other index, as cumulative post-change day returns are insignificant.

Conclusions

In this paper, we examine the returns effects associated with changes in the S&P 600 SmallCap Index. In summary, pure additions to the S&P 600 Index result in an overall significant positive abnormal return reaction on the effective announcement date that only partially reverses during the post-change day period. Pure deletions to the S&P 600 Index result in an overall significant negative abnormal return reaction on the effective announcement date that completely reverses on the effective change day. These results support the investor awareness hypothesis espoused by Chen, Noronha, and Singal (2004). We contend that the different index construction methodologies used by Standard & Poor's and Russell explains why changes to the S&P 600 SmallCap Index more closely parallel changes in the S&P 500 than changes in the Russell 2000. The continuous-monitoring method used by Standards & Poor's provides increased investor awareness of a particular firm and signals information to the investing public that is not signaled by inclusion in the Russell 2000.

References

1. Arnott, R.D., and S.J. Vincent, "S&P Additions and Deletions: A Market Anomaly," *Journal of Portfolio Management*, 13, no. 1 (Fall 1986), pp. 29-33.

2. Beneish, M.D., and R.E. Whaley, "S&P 500 Index Replacements," *Journal of Portfolio Management*, 29, no. 1 (Fall 2002), pp. 51-60.

3. Beneish, M.D., and R.E. Whaley, "An Anatomy of the 'S&P Game': The Effects of Changing the Rules," *Journal of Finance*, 51, no. 5 (December 1996), pp. 1909-1930.

[20]Stocks removed for lack of representation because of a lack of liquidity or low price would be extremely risky and nearly impossible to arbitrage.

4. Biktimirov, E.N., A. Cowan, and B. Jordan, "Do Demand Curves for Small Stocks Slope Down?" *Journal of Financial Research*, 27, no. 2 (Summer 2004), pp. 161-178.

5. Bos, R.J., "Event Study: Quantifying the Effect of Being Added to an S&P Index," (September 2000), S&P website: http://www2.standardandpoors.com.

6. Chen, H., G. Noronha, and V. Singal, "The Price Response to S&P 500 Index Additions and Deletions: Evidence of Asymmetry and a New Explanation," *Journal of Finance*, 59, no. 4 (August 2004), pp. 1901-1930.

7. Denis, D.K., J.J. McConnell, A.V. Ovtchinnikov, and Y. Yu, "S&P 500 Index Additions and Earnings Expectations," *Journal of Finance,* 57, no. 5 (October 2003), pp. 1821-1840.

8. Dhillon, U., and H. Johnson, "Changes in the Standard and Poor's 500 List," *Journal of Business*, 64, no. 1 (January 1991), pp. 75-85.

9. Harris, L., and E. Gurel, "Price and Volume Effects Associated with Changes in the S&P 500 List: New Evidence for the Existence of Price Pressures," *Journal of Finance*, 41, no. 4 (September 1986), pp. 815-829.

10. Jain, P.C., "The Effect on Stock Price of Inclusion In or Exclusion from the S&P 500," *Financial Analysts Journal*, 43, no. 1 (Jan/Feb 1987), pp. 58-65.

11. Jensen, M.C., and R.S. Ruback, "The Market for Corporate Control: The Scientific Evidence," *Journal of Financial Economics*, 11, no. 1 (April 1983), pp. 5-50.

12. Kaplan, S.N., and M.S. Weisbach, "The Success of Acquisitions: Evidence from Divestitures," *Journal of Finance*, 47, no. 1 (March 1992), pp. 107-138.

13. Lamoureux, C.G., and J.W. Wansley, "Market Effects of Changes in the Standard & Poor's 500 Index," *Financial Review*, 22, no.1 (February 1987), pp. 53-69.

14. Lynch, A.W., and R.R. Mendenhall, "New Evidence on Stock Price Effects Associated with Changes in the S&P 500 Index," *Journal of Business*, 70, no. 3 (July 1997), pp. 351-383.

15. Madhaven, A, "The Russell Reconstitution Effect," *Financial Analysts Journal*, 59, no. 4 (July/Aug 2003), pp. 51-64.

16. Merton, R.C., "A Simple Model of Capital Market Equilibrium with Incomplete Information," *Journal of Finance*, 42, no. 3 (July 1987), pp. 483-510.

17. Morck, R., A. Shleifer, and R.W. Vishny, "Do Managerial Objectives Drive Bad Acquisitions?" *Journal of Finance*, 45, no. 1 (March 1990), pp. 31-48.

18. Morck, R., and F. Yang, "The Mysterious Growing Value of S&P 500 Membership," *National Bureau of Economic Research*, working paper 8654 (2001), NBER website: http://www.nber.org/papers/w8654.

19. Napach, B., "An Almost Surefire Way to Realize Short-Term Profits," *Medical Economics*, 74, no. 14 (July 14, 1997), pp. 18-20.

20. Scholes, M.S., "The Market for Securities: Substitution Versus Price Pressure and the Effects of Information on Share Prices," *Journal of Business*, 45, no. 2 (April 1972), pp. 179-211.

21. Servaes, H., "Tobin's Q and the Gains from Takeovers," *Journal of Finance*, 46, no. 1 (March 1991), pp. 409-419.

22. Shleifer, A., "Do Demand Curves for Stocks Slope Down?" *Journal of Finance*, 41, no. 3 (July 1986), pp. 579-590.

23. Woolridge, J.R., and C. Ghosh, "Institutional Trading and Security Prices: The Case of Changes in the Composition of the S&P 500 Index," *Journal of Financial Research*, 9, no. 1 (Spring 1986), pp. 13-24.

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