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Market Reaction to Changes in the S&P SmallCap 600 Index

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Abstract

Firms added to (deleted from) the S&P 600 index experience a significant price increase (decrease) at announcement. Firms that newly enter (exit) the S&P universe experience a larger price increase (decrease) than firms that move between S&P indexes. Trading volumes are higher after the announcement and institutional ownership increases (decreases) following index additions (deletions). However, the price and volume effects are temporary and are fully reversed within 60 days, in contrast to the permanent effects reported for S&P 500 changes. Our results support the temporary price-pressure hypothesis and are similar to results reported for Russell 2000 index changes.

Keywords: S&P SmallCap 600 index, S&P index, price effects, volume effects, index changes, index reconstitution, price pressure, institutional ownership

JEL Classifications: G12, G14

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1. Introduction

We report the effects of changes in the Standard & Poor's (S&P) SmallCap 600 index between 1995 and 2002 on stock prices, trading volumes, and institutional ownership. Examining a total of 775 index changes, a relatively large sample for index change studies, we find positive (negative) abnormal returns for additions (deletions) at announcement, even though the S&P 600 is not as widely known or tracked as the S&P 500. There is a substantial increase in the trading volumes of all the stocks following the announcement and an increase (decrease) in the institutional ownership of index additions (deletions). We compare new additions (deletions) to the S&P 600 with stocks that move between S&P indexes and find significant differences in the effects on price, volume, and institutional ownership. However, the price and volume effects are temporary and are fully reversed within weeks after the index change.

Studies of S&P 500 index changes consistently show that an index addition (deletion) results in a significant increase (decrease) in security prices on the announcement day, but the evidence on the trend in post-announcement returns is less conclusive. Shleifer (1986) finds that the price increase is permanent and suggests that long-run demand curves may slope downward, rather than being horizontal as the efficient market hypothesis (EMH) predicts. However, Harris and Gurel (1986) report that price increases are temporary and are fully reversed within two weeks after the index change. They support the temporary price-pressure hypothesis, which, like the EMH, holds that long-run demand curves are perfectly elastic but allows short-run demand curves to be less elastic and slope downward temporarily. Other explanations proposed in the literature for the price effects of index inclusion include information signaling, increased investor awareness, and increased liquidity.

Previous studies of the effects of U.S. stock index changes focus almost exclusively on changes in the large-cap S&P 500 index. The effect of changes in small-cap stock indexes has not received similar attention. In the first study of the effects of small-cap stock index changes, Biktimirov, Cowan, and Jordan (2004) examine the effects of the annual small-cap Russell 2000 index reconstitution and find that the price increase (decrease) for index additions (deletions) prior to the index reconstitution date is fully reversed after the reconstitution. Their result differs from the permanent price effects reported for large-cap stock index changes in recent studies (Denis, McConnell, Ovtchinnikov, and Yu, 2003; Chen, Noronha, and Singal, 2004). We find the post-event price reversal intriguing because it implies that small-cap stocks behave differently from large-cap stocks following index changes. Alternatively, the difference could be caused by differences in the methods used to effect changes in the Russell indexes and the S&P indexes.

The S&P SmallCap 600 index, a value-weighted index of 600 small-cap stocks, was introduced by Standard & Poor's in November 1994 to complement the S&P 500 and S&P MidCap 400 indexes. The indexes are formulated and maintained by an internal index committee at Standard & Poor's, Inc. Firms enter the S&P 600 index either by transfer from the S&P 500 or 400 or are drawn from the universe of firms that are not in any S&P index. Similarly, firms dropped from the S&P

600 index are either transferred to another S&P index or are dropped from all S&P indexes.

Standard & Poor's web site states that the S&P 600 index is "designed to be an efficient portfolio of (small-cap) companies that . . . are investable and financially viable."[1] Firms are added to or dropped from the S&P indexes based on published guidelines relating to financial viability, liquidity, price, public ownership, sector representation, and market cap; index changes are also designed to "ensure portfolio trading while keeping index turnover to a minimum." The S&P Index Committee meets monthly to review candidates for addition to an index and to effect index changes. The committee discussions are confidential; S&P does not provide information on how a firm becomes a candidate nor does it discuss how a firm moves from candidacy to actual inclusion in an index. Based on this, Gastineau (2004) concludes that "S&P's index management is an active management process." When announcing index changes, S&P regularly affirms that additions or deletions do not reflect S&P's opinion on the investment merits of the company. However, Denis, McConnell, Ovtchinnikov, and Yu (2003) raise the possibility that "S&P (perhaps unknowingly) embeds some analysis of the future prospects of the candidate companies when it chooses one to be included in the index" and that "S&P (unknowingly) has access to information not available to other market participants" (p. 1838).

In contrast to the closed door, active management approach adopted by S&P, the Russell indexes are passively formulated. The Russell web site states that "we don't pick the stocks in the Russell indexes—the market does. The largest 1,000 U.S. companies (by market capitalization) are the Russell 1000. The next 2,000 are the Russell 2000. Together, they're the Russell 3000."[2] The Russell indexes are reconstituted once every year at the end of June, based on market capitalization at the end of May. Additions to the Russell 2000 index are either small firms whose market value has increased to the top 3,000 in rank or are large firms that are moved down from the Russell 1000 index as a result of their declining market value. Similarly, firms deleted from the Russell 2000 either move upward to the Russell 1000 or drop out of all Russell indexes. The index changes are known at least a month in advance, and do not involve any judgment.

The Russell 2000 index is the better known and more widely followed index of the two small-cap stock indexes. Smith and Lert (2004) of the Russell Investment Group claim that the Russell 2000 is benchmarked by 264 mutual funds and related products with $163 billion in assets, whereas the S&P 600 index is benchmarked by 11 funds with $4.8 billion in assets.[3] Russell 2000 firms had an average market capitalization

[1] S&P SmallCap 600 Index Fact Sheet at: http://www2.standardandpoors.com.

[2] Russell web site: http://www.russell.com/us/indexes/us/followtheleader.asp.

[3] Gastineau (2002) notes that it is difficult to measure the number of indexed portfolios in the U.S. today since managers can track indexes without public acknowledgment and the obligation to pay the index publisher's licence fees.

of $870 million, whereas S&P 600 firms had an average market capitalization of $780 million.[4]

Despite the differences in the index maintenance procedure and the number of mutual funds benchmarked, our study shows that the price, volume effects, and institutional ownership effects of S&P 600 index changes are similar to the effects reported for the Russell 2000 index changes by Biktimirov, Cowan, and Jordan (2004). The effects differ significantly from those reported in the literature for changes in the large-cap S&P 500 index. We find that new additions to the S&P 600 index experience a significant increase in price but, unlike the S&P 500 additions, the increase is fully reversed within weeks after inclusion. Firms dropped from the S&P 600 index experience a significant decrease in price at announcement, but this decrease is quickly reversed; in fact, the survivors among the firms that are dropped from all S&P indexes experience surprisingly large gains in the weeks after they are dropped.

We adopt the sample stratification approach used by Biktimirov, Cowan, and Jordan (2004) and examine separately the subset of index changes arising from transfers of firms from (to) other S&P indexes and the subset of index changes arising from new additions (deletions). We find substantial differences in the price, volume, and institutional ownership effects between these subsets. This sample stratification has not been explored in studies of S&P 500 index changes, but could be used to differentiate the effects of information signaling versus price pressure around index changes, since the two subsets would likely experience different information and price-pressure effects.

Overall, our findings provide strong support for the "price-pressure" hypothesis proposed by Harris and Gurel (1986). For small firms at least, the long-run demand curves appear horizontal, though in the short run, demand may be less than perfectly elastic. To our knowledge, this is the first study to report the price, volume, and institutional ownership effects of changes in the S&P SmallCap 600 index since its inception. It is also among the first after Biktimirov, Cowan, and Jordan (2004) to examine the effects of changes in small-cap stock indexes in the U.S. market.

2. The literature on index changes

Shleifer (1986) and Harris and Gurel (1986), among others, report that inclusion in the S&P 500 results in a significant increase in stock value on the announcement day. Shleifer reports that the price increase appears to be permanent for index additions after 1976 (when S&P started publicly announcing index changes). This permanent effect has long puzzled financial economists. While an index addition can trigger excess demand from index funds, a permanent price increase would appear to violate the central axiom of the EMH, which holds that stocks are (close) substitutes of each

[4] In comparison, the S&P 500 index is benchmarked by 919 funds with $1,432 billion in assets and the S&P 400 is benchmarked by 63 funds with $51 billion in assets. The median S&P 500 index firm has a market cap of $9.5 billion and the median S&P 400 firm has a market cap of $2.3 billion.

other and the demand curve for any particular security is (nearly) horizontal. EMH implies that a security has (almost) perfectly elastic demand and that excess demand would not lead to higher prices, in the absence of new information. However, given the permanent price increase, Shleifer suggests long-run demand curves may be less than perfectly elastic as assumed by the EMH and that demand curves may be "downward sloping." On the other hand, Harris and Gurel report that the price increases following index changes are temporary and are fully reversed two weeks after the change. They argue that this supports the temporary "price-pressure" hypothesis which, like the EMH, holds that *long-run* demand curves are perfectly elastic; however, the price-pressure hypothesis allows that *short-run* demand curves may be less elastic and may slope downward, until the price pressure created by excess demand dissipates over time.

Subsequent studies of S&P 500 additions confirm that the announcement-day increase in stock value appears to be permanent, i.e., it is not fully reversed within a few weeks or months after the event inclusion (Jain, 1987; Dhillon and Johnson, 1991; Beneish and Whaley, 1996; Denis, McConnell, Ovtchinnikov, and Yu, 2003; Chen, Noronha, and Singal, 2004). However, Lynch and Mendenhall (1997) report that prices reverse partially for both additions and deletions; they support both the downward-sloping demand curve hypothesis and price-pressure hypothesis. Erwin and Miller (1998) report full reversal of the price effect for one of the two subsets in their sample. Elliott and Warr (2003) find that the listing day return for S&P 500 additions is fully reversed within two to six days after listing and interpret this is as being consistent with the price-pressure hypothesis. In studies of S&P 500 deletions, Dhillon and Johnson (1991) and Lynch and Mendenhall (1997) report permanent decreases in value after deletion. However, Chen, Noronha, and Singal (2004) find that the negative returns after deletions are reversed within 60 days after the effective date.

Underlying both the downward-sloping demand curve hypothesis and price-pressure hypothesis is the assumption that S&P 500 inclusion is an information-free event. This appears to be based on S&P's claim that index decisions do not reflect opinions on the firm's investment prospects. Jain (1987) expands the discussion of the index inclusion effect by suggesting that S&P decisions convey new information about the firm's prospects. He examines index additions for the S&P 500 as well as other S&P indexes that do not have index fund followings and finds price increases for all index additions, thus raising doubts about excess demand being the only cause of the price effect. He argues that inclusion can be viewed as a signal of a reduction in a stock's riskiness (since S&P prefers stability in stock indexes) or as a signal of confidence in the management. Dhillon and Johnson (1991) and Denis, McConnell, Ovtchinnikov, and Yu (2003) also support the information hypothesis. Dhillon and Johnson show that S&P 500 index additions lead to price increases not only for the stocks but also for other securities such as non-convertible bonds issued by the firms. Denis, McConnell, Ovtchinnikov, and Yu show that S&P 500 inclusion is followed by upward revisions in earnings forecasts

and an improvement in the realized earnings relative to comparable firms. They emphasize that their findings are not inconsistent with the long-run downward-sloping demand curve hypothesis; they simply find that index changes are not information-free events and that index inclusion signals favorable information about the firm to the market.

Other explanations proposed for the index change effects include the liquidity hypothesis that S&P 500 inclusion leads to increased liquidity and lower transaction costs resulting in permanent higher prices (Amihud and Mendelson, 1986; Erwin and Miller, 1998; Hegde and McDermott, 2003) and the investor awareness hypothesis that index inclusion brings increased market scrutiny and reduces unsystematic risk leading to permanent higher prices (Chen, Noronha, and Singal, 2004).

Studies that examine indexes other than the S&P 500 find support for both the downward-sloping demand curve and the temporary price-pressure hypotheses. For example, Masse, Hanrahan, Kushner, and Martinello (2000) study changes in the Toronto Stock Exchange (TSE) 300 index, a large-cap index that was published from 1977 to 2002. They report permanent price effects and support the downward-sloping demand curve hypothesis. Kaul, Mehrotra, and Morck (2000) analyze the effects of changes in the weights of stocks in the TSE 300 index and also find that the price effect is permanent. They argue that their study is free of potential information and liquidity effects and therefore, the permanent price effects can be attributed solely to downward-sloping demand curves. The results of these two studies on the large-cap TSE 300 changes are consistent with the permanent effects reported for the large-cap S&P 500 changes.

Other studies present the price-pressure hypotheses as a viable explanation for index change price effects (Brealey, 2000; Chan and Howard, 2002; Biktimirov, Cowan, and Jordan, 2004). Brealey finds evidence supporting price reversal following additions to the FTSE All-Share and FTSE 100 indexes. Chan and Howard find that the positive returns that precede inclusion in the open-ended Australian All Ordinaries index are fully reversed in the weeks after index addition. Biktimirov, Cowan, and Jordan also study an environment free of potential information effects and directly test the temporary price-pressure hypothesis against the downward-sloping demand curve hypothesis. They find the abnormal gain of 1.89% in the 20 days prior to Russell 2000 reconstitution is almost fully offset by the abnormal losses of 1.63% in the 20 days after reconstitution, thus supporting the temporary price-pressure hypotheses.

3. Data

We obtain from Standard & Poor's a list of all firms that are added to or dropped from the S&P 600 index and the listing day for the index change from January 1995 to December 2002. With this list, we search the LexisNexis database prior to the listing day and obtain a copy of the press release announcing the changes (usually carried by *BusinessWire* or *PR Newswire*). From the press release we ascertain the announcement day, the listing day, and whether the firms involved in the changes are

being moved between S&P indexes or are firms that are entering or exiting the S&P index universe.[5]

There are a total of 659 additions to the S&P 600 over the eight years; of these, 63 are transferred from other S&P indexes, 23 are the result of name changes, and the remaining 573 firms are new to the S&P index universe. We drop 46 of the 659 additions because they were involved in name changes or mergers or because of confounding firm-specific news on the announcement day.[6] We drop 57 other firms due to nonavailability of daily returns data for 240 days before the announcement day and 240 days after the listing day on the Center for Research in Security Prices (CRSP) database. Of the 556 additions left in the final sample, 504 firms are new additions (firms newly added to an S&P index) and 52 firms are downward additions (firms added to the S&P 600 after being dropped from a larger-cap index; 30 from the S&P 400 index and 22 from the S&P 500 index).

Of the 659 firms deleted from the S&P 600 in this period, 123 are moved to other S&P indexes, 26 are deleted because of a name change or merger with another S&P index stock, and the remaining 510 firms are deleted from all S&P indexes. A substantial number of the deletions are accompanied by announcements about these firms being acquired by or merging with other firms. We drop 354 deletions because of these confounding announcements, name changes, or mergers. Another 86 firms are dropped for lack of daily returns data on the CRSP data set; in most cases, the firms stop trading. Our final sample of 219 deletions contains 112 full deletions (firms that are removed from all S&P indexes) and 107 upward deletions (firms moved upward to the larger-cap S&P indexes; 106 firms to the S&P 400 index and one firm to the S&P 500 index).

S&P 600 index additions and deletions take effect throughout the year. In our sample, we have between 31 and 60 additions in any calendar month, with an average of 47 additions in a calendar month; index deletions range from 9 to 33, with an average of 18 deletions in a calendar month.

4. Price effects of index changes

In this section, we examine the price reaction to S&P SmallCap 600 index changes in the presence of both excess demand and potential information effects. A permanent price increase (decrease) for index additions (deletions) would suggest that small stocks react in the same way as large stocks to index changes and that the

[5] Typically, S&P announces index changes after the end of a trading day; additions and deletions are also effected after the end of a trading day. For example, in a press release dated Tuesday, July 9, 2002, S&P announced that Watson Wyatt would replace Pier 1 in the S&P 600 index "after the closing of trading on Friday, July 19, 2002." In our study, we specify Wednesday, July 10 as the "announcement day" and Monday, July 22, 2002 as the "listing day" for this index change.

[6] One example of a confounding announcement is the May 2001 addition of Roxio, Inc., to the index. The S&P press release accompanying the announcement identifies the firm as a wholly owned subsidiary of Adaptec that is being spun-off to Adaptec shareholders.

reaction could be driven by the downward-sloping demand curve hypothesis or the information hypothesis. However, the evidence from Biktimirov, Cowan, and Jordan (2004) suggests that the price increases (decreases) around the small-stock Russell 2000 index additions (deletions) are temporary. Similar evidence of temporary price-pressure effects with S&P 600 index changes would imply that small stocks react differently to index changes than the large-cap stocks in the S&P 500 index.

We examine the abnormal return around the announcement and listing days using three different measures of abnormal returns. First, we calculate the abnormal return as the difference between the stock return and the S&P 600 index return; this measure is similar to the market-adjusted return used by Lynch and Mendenhall (1997) and Chen, Noronha, and Singal (2004), among others. Next, we compute the market-model abnormal return, where the model parameters are estimated from 240 to 61 days prior to the announcement day with the CRSP value-weighted index as the market proxy (Brown and Warner, 1985). The third measure is the abnormal return from the Fama and French (1993) three-factor model. This model is particularly relevant for studies such as this, in which the sample contains only small firms. Following Fama and French, we estimate the abnormal return as α in the following time-series regression:

$$R_{i,t} - \mathrm{RF}_t = \alpha_{i,t} + b_i(\mathrm{RM}_t - \mathrm{RF}_t) + s_i(\mathrm{SMB}_t) + h_i(\mathrm{HML}_t) + \varepsilon_{i,t},$$

where, for day t, $R_{i,t}$ is the return on security i, RF_t is the risk free rate, RM_t is the market return, SMB_t is the difference between the returns of portfolios of small stocks and large stocks, and HML_t is the difference between the returns of portfolios of value stocks and growth stocks.[7] The parameters are estimated by ordinary least squares using daily data from 240 to 61 days before the announcement.[8]

Table 1 summarizes the average market-adjusted cumulative abnormal returns (MACAR), the market model abnormal returns with the CRSP value-weighted index as the proxy for the market portfolio (VWCAR), and the Fama–French model abnormal returns (FFCAR) for index additions.[9] However, the market-adjusted returns (MACAR) and the market model returns (VWCAR) are presented here mainly for comparison and confirmation of our results. In interpreting the abnormal returns, we use FFCAR, the Fama–French model cumulative abnormal returns, because the model

[7] A detailed description of the construction of these factors and daily return data is available on Professor French's web site at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

[8] Using a pre-event window to estimate the model parameters could result in a run-up (or run-down) bias (Edmister, Graham, and Pirie, 1994). To rule out this bias, we test both the market model and the three-factor model using a post-event estimation period and, for the market model, an equal-weighted market index as the market proxy. Our results are robust and are not sensitive to either change.

[9] In computing MACAR, we require returns data for only 60 days prior to the announcement day and 60 days after the listing day, so we are able to get a larger sample of firms for all four subsets in our study. For example, we have 595 additions with this 60-day screen; with a 240-day screen, we only have 556 additions to the index.

Table 1

Price effects for stocks added to the S&P SmallCap 600 Index

The MACAR, VWCAR, and FFCAR are in the first three columns for all stocks added to the S&P 600 index in the 1995–2002 period. In subsequent columns we report the cumulative abnormal returns for subsets of stocks newly added to an S&P index (new additions), and stocks transferred to the SmallCap index from another S&P index (downward additions). Parameters for the market model and the Fama–French model are estimated over a 180-day pre-event period (days −240 to −61 relative to announcement day). T-statistics are in parentheses.

	All additions to index			New additions to index			Downward additions to index		
Period	MACAR	VWCAR	FFCAR	MACAR	VWCAR	FFCAR	MACAR	VWCAR	FFCAR
Number of firms	$N = 595$	$N = 556$	$N = 556$	$N = 539$	$N = 504$	$N = 504$	$N = 56$	$N = 52$	$N = 52$
AD −20 to AD −11	0.66%	−0.80%	0.53%	0.51%	−1.15%	0.47%	2.10%	2.56%**	1.12%
	(1.37)	(−1.63)	(1.14)	(0.98)	(−2.14)	(0.91)	(1.84)	(2.45)	(1.13)
AD −10 to AD −1	0.64%	−1.03%**	0.50%	0.76%	−1.16%	0.60%	−0.51%	0.27%	−0.54%
	(1.36)	(−2.09)	(1.07)	(1.50)	(−2.15)	(1.19)	(−0.48)	(0.26)	(−0.55)
Announcement day (AD)	4.30%***	4.19%***	4.33%***	5.16%***	5.02%***	5.18%***	−4.02%***	−3.69%***	−3.75%***
	(17.59)	(26.95)	(29.49)	(22.04)	(29.36)	(32.18)	(−7.46)	(−11.20)	(−12.01)
AD + 1 to LD −1	2.44%***	2.03%***	2.82%***	3.48%***	3.00%***	3.83%***	−5.30%***	−5.19%***	−4.63%***
	(6.70)	(4.54)	(7.40)	(9.33)	(6.32)	(9.93)	(−7.28)	(−6.57)	(−4.93)
Listing day (LD)	−0.93%***	−1.14%***	−1.02%***	−1.33%***	−1.51%***	−1.38%***	2.92%***	2.49%***	2.42%***
	(−5.87)	(−7.33)	(−6.97)		(−8.86)	(−8.57)	(5.45)	(7.57)	(7.75)
LD + 1 to LD + 10	−1.69%***	−3.00%***	−2.10%***	−1.97%***	−3.45%***	−2.38%***	0.99%	1.33%	0.60%
	(−3.59)	(−6.10)	(−4.52)	(−3.96)	(−6.38)	(−4.67)	(0.72)	(1.28)	(0.61)
LD + 11 to LD +20	−1.55%***	−2.85%***	−1.79%***	−1.83%***	−3.32%***	−2.08%***	1.14%	1.79%	0.95%
	(−3.32)	(−5.79)	−3.86)	(−3.68)	(−6.15)	(−4.08)	(0.90)	(1.72)	(0.97)
LD + 21 to LD +30	0.29%	−1.39%	−0.07%	0.10%	−1.79%***	−0.24%	2.07%	2.49%**	1.64%
	(0.60)	(−2.83)	(−0.14)	(0.20)	(−3.32)	(−0.48)	(1.88)	(2.39)	(1.66)
AD to LD +60	1.82%	−7.38%***	0.53%	1.91%	−8.66%***	0.51%	0.94%	4.85%	0.70%
	(1.79)	(−5.64)	(0.64)	(1.75)	(−6.19)	(0.42)	(0.36)	(1.59)	(0.26)

***Significant at the 1% level.

**Significant at the 5% level.

has a significantly higher coefficient of determination in the parameter estimation period and, more importantly, because the model explicitly accounts for the size factor in generating expected returns.

The average abnormal return (FFCAR) for the 556 firms added to the S&P 600 index is 4.33% on the announcement day. The firms gain an additional 2.82% in the period between the announcement day and the last day before listing.[10] Chen, Noronha, and Singal (2004) report similar abnormal returns for S&P 500 index additions; they find an abnormal return of 5.45% on the announcement day and an additional return of 3.45% in the period between the announcement and listing days. However, in the post-listing day period we find that S&P 600 index additions, unlike S&P 500 index additions, experience a string of negative returns; these negative returns start on the listing day and effectively reverse the pre-listing day gains within 60 days after listing. The cumulative average abnormal return over the period that starts with the announcement day and ends 60 days after the listing day is an insignificant 0.53%, allowing us to conclude that the announcement-day price effects are fully reversed later.

In examining the two subsets of index additions, we find that the price effects for new additions are substantially different from the effects for downward additions. The announcement-day average abnormal gain for the 504 new additions is 5.18%; this is followed by an additional gain of 3.83% in the post-announcement to the last day before the listing day period. The gains are offset by losses on the listing day and in the post-listing period; the cumulative return from the announcement day to 60 days after listing is economically and statistically insignificant. Figure 1 shows that the cumulative abnormal return from the announcement day to the listing day is gradually reversed in the post-listing period.

The 52 downward additions show an inverted trend, as seen in Figure 1. These firms average a negative abnormal return of 3.75% on the announcement day and lose a further 4.63% in the period between the announcement and the last day before listing. If the reaction to downward additions is caused by negative information conveyed by the stock being moved from a large-cap to a small-cap index, we would expect the negative return to be permanent. However, the negative return for downward additions is fully reversed in the post-announcement period and the cumulative return is insignificant 60 days after listing. A closer analysis of downward additions reveals that the 22 firms moved from the S&P 500 experience a return of −5.7%, whereas the 30 firms moved from the S&P 400 experience a return of −2.4%. This difference could be explained if firms moving from the S&P 500 experience larger demand-supply disequilibrium than firms moving from the S&P 400, since investments benchmarked to the S&P 500 index are greater. However, in both samples, the announcement-day price effect is temporary, with the negative returns fully reversed in the post-announcement period.

[10] The number of days between announcement and listing varies from 0 to 107 days. The CAR for the intervening period is an average of the cumulative excess returns of each firm in this period.

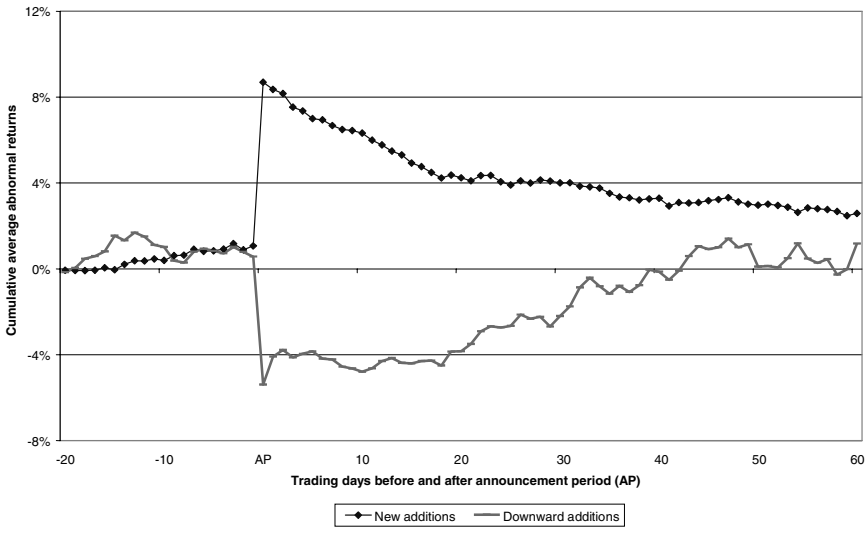

Figure 1

Cumulative average abnormal returns for S&P 600 additions before and after the announcement period. The announcement period (AP) is the cumulative period from the announcement day to the listing day

Firms dropped from the S&P 600 experience the opposite price effects. Table 2 reports the abnormal return for these deleted stocks. The average loss is 3.97% on the announcement day for all deletions and is followed by a further loss of 2.37% in the intervening period between the announcement and the last day before the listing day. Significantly, the deleted firms experience substantial losses even before announcement. This effect is particularly pronounced for the full deletions, which lose a cumulative 23.7% of value in the 20 days prior to announcement and an additional 17.28% in the period between the announcement day and the last day before listing.[11] However, the negative return for the full deletions is rapidly and fully reversed in the post-announcement period; as Figure 2 shows, the reversal starts on the listing day and is complete 10 days later. In fact, firms in this subset have a cumulative gain in excess of 25% in the 30 days starting with the listing day. The announcement-day returns for upward additions are significantly positive, but the cumulative return 60 days after listing is not statistically significant.

The consistent reversal of the announcement-day price effects for S&P 600 index additions and deletions reported above provides strong support for the temporary

[11] In some instances, S&P press releases mention that firms are dropped because they are trading below $2 per share. We test the robustness of the results by dropping all firms that trade at $2 or below on the announcement day. We lose more than half the firms in this subset and the magnitude of the losses is lower, but our conclusions are otherwise unchanged.

Table 2

Price effects for stocks deleted from the S&P SmallCap 600 Index

The MACAR, VWCAR, and FFCAR are in the first three columns for all stocks deleted from the S&P 600 index in the 1995–2002 period. In subsequent columns we report the cumulative abnormal returns for subsets of stocks deleted from all S&P indexes (full deletions) and stocks transferred to other S&P indexes (upward deletions). Parameters for the market model and the Fama–French model are estimated over a 180-day pre-event period (days −240 to −61 relative to announcement day). T-statistics are in parentheses.

	All deletions from the index			Full deletions			Upward deletions		
Period	MACAR	VWCAR	FFCAR	MACAR	VWCAR	FFCAR	MACAR	VWCAR	FFCAR
Number of firms	N =258	N =219	N = 219	N = 145	N = 112	N = 112	N = 113	N = 107	N = 107
AD −20 to AD −11	−5.52%***	−4.05%***	−3.80%***	−9.76%***	−5.55%***	−7.60%***	−0.09%	−2.50%	0.15%
	(−4.95)	(−3.78)	(−3.64)	(−5.43)	(−3.26)	(−4.56)	(−0.08)	(−2.15)	(0.14)
AD −10 to AD −1	−9.71%***	−7.63%***	−7.22%***	−18.10%***	−13.79%***	−16.10%***	1.05%	−1.23%	2.00%
	(−7.01)	(−7.11)	(−6.91)	(−7.87)	(−8.10)	(−9.65)	(1.01)	(−1.06)	(1.78)
Announcement day (AD)	−4.86%***	−3.94%***	−3.97%***	−10.62%***	−10.04%***	−10.35%***	2.54%***	2.38%***	2.65%***
	(−6.68)	(−11.62)	(−12.02)	(−10.33)	(−18.65)	(−19.62)	(6.54)	(6.48)	(7.47)
AD +1 to LD −1	−3.01%***	−2.29%**	−2.37%**	−7.22%***	−5.45%***	−6.93%***	1.16%	0.37%	1.46%
	(−2.95)	(−2.42)	(−2.38)	(−4.01)	(−3.04)	(−3.83)	(1.50)	(0.47)	(1.77)
Listing day (LD)	4.29%***	3.68%***	3.87%***	7.84%***	7.44%***	7.36%***	−0.29%	−0.25%	0.21%
	(4.79)	(10.85)	(11.71)	(5.24)	(13.82)	(13.96)	(−0.70)	(−0.68)	(0.59)
LD +1 to LD + 10	5.03%***	5.82%***	5.62%***	10.17%***	13.87%***	11.25%***	−1.61%	−2.62%**	−0.28%
	(3.40)	(5.42)	(5.38)	(4.14)	(8.15)	(6.74)	(−1.41)	(−2.26)	(−0.25)
LD + 11 to LD + 20	3.30%**	2.75%**	2.80%***	5.40%**	7.68%***	5.51%***	0.58%	−2.41%**	−0.03%
	(2.23)	(2.56)	(2.68)	(2.21)	(4.51)	(3.30)	(0.49)	(−2.08)	(−0.03)
LD + 21 to LD + 30	0.61%	1.63%	1.11%	0.19%	4.01%**	1.25%	1.16%	−0.87%	0.96%
	(0.50)	(1.52)	(1.06)	(0.10)	(2.35)	(0.75)	(0.99)	(−0.75)	(0.86)
AD to LD + 60	9.60%**	6.38%**	8.26%***	10.25%**	29.06%***	14.69%***	1.46%	−10.77%***	1.53%
	(2.36)	(2.94)	(2.96)	(2.35)	(5.63)	(3.10)	(0.57)	(−3.81)	(0.56)

***Significant at the 1% level.

**Significant at the 5% level.

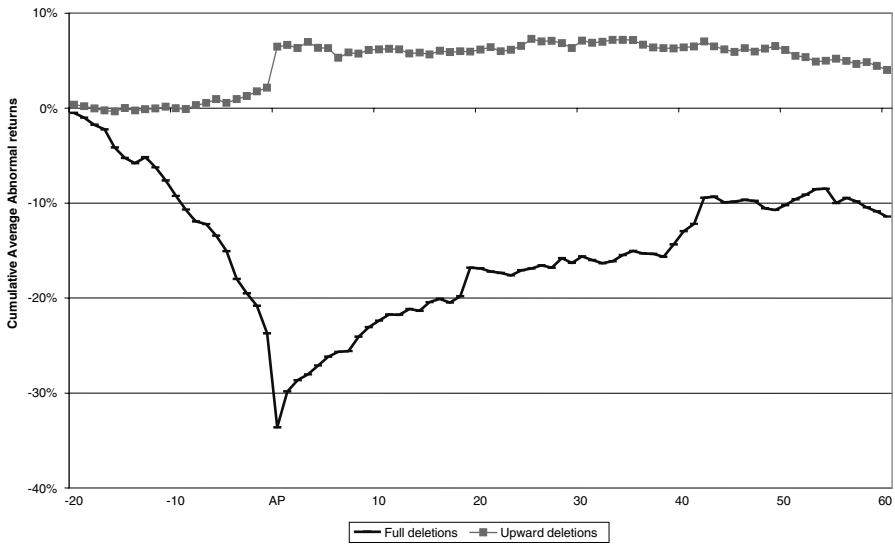

Figure 2

Cumulative average abnormal returns for S&P 600 deletions before and after the announcement period. The announcement period (AP) is the cumulative period from the announcement day to the listing day

price-pressure hypothesis.[12] These findings stand in contrast to the permanent price effects reported for changes in the S&P 500 index (Dhillon and Johnson, 1991; Denis, McConnell, Ovtchinnikov, and Yu, 2003; Chen, Noronha, and Singal, 2004). While the process involved in changes in both indexes is identical and the announcement-day price effects are similar, the post-announcement price reaction is different, with the firms in the smaller-cap S&P 600 index showing a significant reversal. This difference in the price reaction raises the possibility that firm size plays a role in the post-announcement price effects. We investigate this hypothesis by splitting the sample into quartiles by market value and examining the differences between the abnormal returns of the top and bottom quartiles. Table 3 reports the announcement-day abnormal returns and the post-announcement period cumulative abnormal returns by quartile.

Jain (1987), in examining S&P 500 index changes, forms three portfolios of 28 firms each, based on size, and finds no significant difference between the announcement-day returns of small and large firms. However, in the new additions, where we have 126 firms in each quartile, firms in the bottom quartile have a more pronounced positive announcement-day reaction than the firms in the top quartile

[12] Our conclusions about full reversal of the pre-listing day return would be stronger and reversal would occur earlier if we used VWCAR, the abnormal return from the single-factor market model, instead of FFCAR.

Table 3

Differences in price effects by market-value quartiles

This table reports the FFCAR for the top and bottom quartiles. The abnormal return is the 'α' from the time-series regression:

$$R_{i,t} - \mathrm{RF}_t = \alpha_{i,t} + \mathrm{b}_i\,(\mathrm{RM}_t - \mathrm{RF}_t) + \mathrm{s}_i\,(\mathrm{SMB}_t) + \mathrm{h}_i(\mathrm{HML}_t) + \varepsilon_{it}$$

where, for day t, $R_{i,t}$ is the return on security i, RF_t is the risk free rate, RM_t is the market return, SMB_t is the difference between the returns of portfolios of small stocks and large stocks, and HML_t is the difference between the returns of portfolios of value stocks and growth stocks. The parameters are ordinary least squares estimates based on data from 240 to 61 days before the announcement.

Period	FFCAR for the full subset	FFCAR for the top quartile	FFCAR for the bottom quartile	Difference between bottom and top quartiles
New additions to the index (N = 504)				
Announcement day (AD)	5.18%***	4.35%***	5.83%***	1.48%**
AD to LD + 60	0.51%	0.73%	−6.88%***	−7.61%**
Downward additions to index (N = 52)				
Announcement day (AD)	−3.75%***	−3.76%***	−3.59%**	0.16%
AD to LD + 60	0.70%	−6.00%	2.86%	8.86%
Full deletions from the index (N = 112)				
Announcement day (AD)	−10.35%***	−11.31%***	−15.03%***	−3.72%
AD to LD + 60	14.69%***	16.71%**	20.80%*	4.10%
Upward deletions from index (N = 107)				
Announcement day (AD)	2.65%***	3.59%***	3.42%***	−0.17%
AD to LD + 60	1.53%	−0.39%	1.56%	1.95%

***Significant at the 1% level.
**Significant at the 5% level.
*Significant at the 10% level.

and the difference of 1.48% is statistically significant. Similarly, it appears that full deletions in the bottom quartile have a more pronounced negative announcement-day reaction; however, we only have 28 firms in each quartile and the difference of −3.72% is not statistically significant. There is no significant difference in the announcement-day returns in the downward additions and upward deletions subsets.

We find similar differences between the size quartiles in examining the cumulative abnormal returns for the post-announcement period from the announcement day through 60 days after listing. New additions in the bottom quartile have a post-announcement return of −6.88%, which is significantly lower than the 0.73% for the top quartile, even though the bottom quartile firms have a higher announcement-day return at 5.83%. With the full deletions, the difference is not statistically significant, though firms in the bottom quartile have a larger post-announcement return. Overall, it appears that firms in the bottom quartile have a larger reversal of the announcement-day returns in three of the four subsets. These results, while not conclusive in all subsets, suggest that there is a size effect in the post-announcement returns and that small firms experience a larger reversal of the announcement-day returns than large firms.

5. Volume effects

We study the effects of index changes on trading volume using the Campbell and Wasley (1996) approach. We estimate $\text{ABVOL}_{i,t,}$ the market model abnormal trading volume for day t, as

$$\text{ABVOL}_{i,t} = V_{i,t} - (\alpha_i + \beta_i V_{m,t}),$$

where $V_{i,t}$ is the log-transformed percentage of shares traded for security i, $V_{m,t}$ is the corresponding volume measure for the market, and α_i and β_i are ordinary least squares coefficients of the market model estimated with daily volume data from 240 to 61 days prior to the announcement day. Specifically, we compute $V_{i,t}$ as

$$V_{i,t} = \ln[((n_{i,t} \times 100)/S_{i,t}) + 0.000255],$$

where $n_{i,t}$ is the number of shares traded for firm i on day t, $S_{i,t}$ is the firm's outstanding shares on day t, and 0.000255 is a constant added to preclude taking the log of zero in the case of zero trading volume on day t (Cready and Ramanan, 1991). The market volume measure, $V_{m,t}$, is

$$V_{m,t} = \frac{1}{N} \sum_{i=1}^{N} V_{i,t},$$

where N is the number of Nasdaq securities traded on day t for which data are available from the CRSP database.[13]

Panel A in Table 4 reports the daily abnormal trading volumes for additions to the S&P 600. The median trading volume for index additions is 281% higher than the normal volume on the announcement day. In comparison, the median abnormal volumes in the four days prior to announcement are less than 9%. Trading peaks on the day before the listing day and then gradually returns to normal.

For new additions, the announcement-day median trading volume is 287% higher than normal and, on the day preceding the listing day, it is 469% higher than normal. With downward additions, the spike in trading occurs on the day before listing, when the excess trading volume is 17 times normal. This spike in volume appears to be driven by index rebalancing activity, since further analysis of this subset shows that the additions from the S&P 500 have much larger abnormal trading volumes than the additions from the S&P 400. We find that, on the day before listing, the additions from the S&P 500 have an excess volume of 2,209% compared to an excess volume of 1,109% for the additions from the S&P 400. Similarly, on the announcement day, additions from the S&P 500 have an excess volume of 322% compared to an excess volume of 179% for the additions from the S&P 400. However, in both the new

[13] As sensitivity checks, we estimate the regression coefficients α_i and $\beta_{i,}$ using both pre-event and post-event estimation periods. We also use the combined volume of all NYSE, Amex, and Nasdaq firms on CRSP as a proxy for market volume. Our results are robust to the choice of estimation period and the proxy for market volume.

additions and downward additions subsets, trading volumes return to near normal levels within 30 days after listing.

Panel B in Table 4 shows that firms deleted from the index experience similar abnormal trading volumes around the announcement day. Upward deletions (where all firms except one are transferred to the S&P 400 index) are affected less than full deletions on the announcement day. In the two days before announcement, there is significant abnormal trading in the full deletions; this trading, in combination with the significant negative returns in the pre-announcement period, may be foreshadowing the deletion of the stock from the index.

Overall, the trading volumes of firms involved in S&P 600 index changes are significantly higher than normal around the announcement window but revert to normal levels within 30 days after the listing day. The volume effects we observe are consistent with the predictions of the temporary price-pressure hypothesis.

6. Changes in institutional ownership

Pruitt and Wei (1989) and Chen, Noronha, and Singal (2004) report that institutional ownership in S&P 500 stocks increases (decreases) after index additions (deletions). Biktimirov, Cowan, and Jordan (2004) examine ownership changes following reconstitution of the Russell 2000 index and find significant changes in (a) the number of institutional shareholders and (b) the percentage of shares they hold. They find an increase in both these indicators for firms entering the Russell 2000 index and firms moving up to the Russell 1000 index. Firms removed from all Russell indexes or moving down from the Russell 1000 to the Russell 2000 show a decline in institutional ownership.

In this section, we examine whether there are changes in institutional ownership following S&P 600 index additions and deletions. Following the method used by Biktimirov, Cowan, and Jordan (2004), we hand collect data on the number of institutional owners, the number of shares they hold, and the number of outstanding shares from the S&P *Security Owner's Stock Guide* for each of the two months preceding the announcement day and the two months following the listing day. We drop firms where data are not available for all four months, leaving 439 additions and 199 deletions with institutional shareholdings data over the eight-year period.

The results are shown in Table 5. Descriptive statistics for the four subsets in each of the two months preceding the announcement day and the two months following the listing day are in the first four data columns. Prior to the announcement, institutional ownership is highest for the upward deletions subset and ownership in new additions exceeds that in full deletions; this suggests that institutional interest in the new additions and upward deletions precedes the index change announcement.

To study changes in institutional ownership, we measure the change in the number of institutional owners and their percentage of ownership between the two months preceding the announcement and the two months after the listing day for each firm. We show the average change across all the firms in the subset, the *t*-statistic for

Table 4

Abnormal trading volume of stocks added to or dropped from the S&P 600 index

The market model abnormal trading volume (in percentage) is estimated using procedures described in Campbell and Wasley (1996). The market index is an equal-weighted index of all Nasdaq stocks and market model parameters are estimated over a pre-event period of 180 days (day −240 to day −61 before announcement day).

Panel A: S&P 600 additions

	All additions ($N = 556$)			New additions ($N = 504$)			Downward additions ($N = 52$)		
Day	Mean	Median	*t*-Statistic	Mean	Median	*t*-Statistic	Mean	Median	*t*-Statistic
AD − 30	8%	10%	1.45	12%	17%	1.82	−21%	−26%	(2.31)
AD − 20	6%	6%	0.98	7%	6%	1.13	−10%	1%	(0.99)
AD − 10	10%	5%	1.69	12%	8%	1.79	−7%	−14%	(0.69)
AD − 4	12%	8%	1.98	11%	9%	1.68	18%	5%	1.63
AD − 3	6%	9%	1.02	7%	11%	1.03	−1%	−4%	(0.14)
AD − 2	8%	5%	1.31	10%	9%	1.46	−9%	−13%	(0.96)
AD − 1	8%	9%	1.44	9%	10%	1.32	6%	1%	0.56
AD	277%***	281%	23.87	284%***	287%	21.62	215%***	222%	11.33
LD− 1[#]	536%***	574%	33.78	461%***	469%	30.10	1555%***	1712%	26.17
LD	126%***	118%	14.68	113%***	105%	12.13	310%***	375%	13.92
LD + 1	58%***	61%	8.24	53%***	55%	6.87	112%***	109%	7.42
LD + 2	34%***	42%	5.25	29%***	38%	4.11	90%***	91%	6.32
LD + 3	29%***	26%	4.64	25%***	24%	3.63	76%***	68%	5.60
LD + 4	34%***	30%	5.32	32%***	27%	4.44	61%***	66%	4.73
LD + 5	31%***	31%	4.85	29%***	30%	4.13	47%***	41%	3.82
LD +10	27%***	25%	4.24	28%***	27%	3.92	17%	15%	1.53
LD + 20	19%***	20%	3.17	19%***	19%	2.84	19%	25%	1.70
LD + 30	11%	6%	1.91	14%**	9%	2.14	−15%	−20%	(1.55)

Panel B: S&P 600 deletions

	All deletions ($N = 219$)			Full deletions ($N = 112$)			Upward deletions ($N = 107$)		
Day	Mean	Median	*t*-Statistic	Mean	Median	*t*-Statistic	Mean	Median	*t*-Statistic
AD − 30	−3%	−5%	−0.49	−9%	−15%	−1.06	5%	0%	0.52
AD − 20	1%	−1%	0.20	−4%	−3%	−0.46	7%	1%	0.69
AD − 10	−4%	−10%	−0.71	1%	−13%	0.08	−8%	−9%	−0.89
AD − 4	13%**	18%	2.39	12%	14%	1.25	15%	23%	1.46
AD − 3	8%	16%	1.46	9%	15%	0.92	7%	16%	0.73
AD − 2	17%***	18%	2.98	22%**	20%	2.20	12%	17%	1.18
AD − 1	28%***	15%	4.69	39%***	13%	3.55	18%	16%	1.76
AD	327%***	266%	27.48	507%***	524%	19.57	196%***	171%	11.55
LD − 1[#]	616%***	626%	20.69	591%***	632%	10.63	639%***	620%	23.00
LD	161%***	129%	18.20	249%***	263%	13.56	93%***	83%	7.02
LD + 1	92%***	74%	12.33	153%***	132%	10.08	43%***	44%	3.84
LD + 2	54%***	40%	8.16	75%***	66%	6.08	34%***	29%	3.14
LD + 3	53%***	55%	8.09	64%***	65%	5.37	43%***	45%	3.80
LD + 4	46%***	33%	7.15	51%***	33%	4.46	41%***	34%	3.65
LD + 5	44%***	30%	6.85	54%***	28%	4.70	33%***	32%	3.05
LD +10	21%***	13%	3.60	13%	5%	1.37	29%***	22%	2.73
LD + 20	18%***	16%	3.06	11%	10%	1.10	25%**	26%	2.39
LD + 30	5%	9%	0.84	−13%	1%	−1.51	27%**	16%	2.51

[#]The abnormal trading volume for day LD − 1 is computed only when there is at least one intervening day between AD and LD. ***Significant at the 1% level, **significant at the 5% level.

Table 5

Changes in institutional shareholdings

The number of institutional shareholders and the percentage of shares they held in the months prior to the announcement day (AD) and after the listing day (LD) are reported below, along with the changes in the holdings from two months before to two months after the events.

Event		Measure	Two months before AD (AM − 2)	One month before AD (AM − 1)	One month after LD (EM + 1)	Two months after LD (EM + 2)	Changes from AM − 2 to EM + 2	*t*-Statistic	Proportion of positive changes
New additions ($N = 387$)	Number of institutional shareholders	Mean	113	116	124	127	14.4	12.79***	0.78***
		Median	106	110	118	122	12.0		
	Percentage of shares held by institutions	Mean	55.4	56.1	57.8	58.4	2.9	7.29***	0.69***
		Median	55.5	57.0	58.2	58.9	2.2		
Downward additions ($N = 52$)	Number of institutional shareholders	Mean	179	173	174	167	−11.3	−2.83***	0.27***
		Median	167	158	162	163	−9.5		
	Percentage of shares held by institutions	Mean	60.6	60.2	59.6	60.1	−0.6	−0.76	0.54
		Median	63.9	62.7	62.2	61.1	0.8		
Full deletions ($N = 97$)	Number of institutional shareholders	Mean	96	94	89	84	−12.0	−6.43***	0.21***
		Median	80	81	74	71	−10.0		
	Percentage of shares held by institutions	Mean	43.6	42.8	40.6	38.9	−4.7	−6.95***	0.19***
		Median	42.2	40.6	38.0	37.5	−3.7		
Upward deletions ($N = 102$)	Number of institutional shareholders	Mean	263	271	292	297	33.9	8.31***	0.77***
		Median	252	259	279	285	31.5		
	Percentage of shares held by institutions	Mean	62.7	65.9	66.1	65.3	2.6	2.17**	0.55
		Median	66.0	67.6	68.1	67.5	1.5		

***Significant at 1% level.

**Significant at 5% level.

the change, and the proportion of the firms in the subset that experience an increase in institutional ownership in the last three columns of Table 5. We use the parametric *t*-test to assess the significance of the change and a sign test to assess the significance of the proportion of firms that show an increase in institutional ownership.

We find a significant increase in the number of institutional shareholders and the percentage of shares they hold for new additions and upward deletions. We also find a decline in institutional ownership for full deletions and a significant decline in the number of institutional shareholders for downward additions, the smallest of the four subsets. Further analysis of downward additions shows that additions from the S&P 500 are affected more, losing 20 institutions on average compared to a loss of five institutions for the additions from S&P 400, though the percentage of institutional ownership is not significantly different.

In general, these findings suggest that firms involved in S&P 600 index changes experience changes in institutional ownership similar to those reported in studies of S&P 500 and Russell 2000 index changes. However, as predicted by the price-pressure hypothesis, these ownership changes do not affect prices and volumes permanently.

7. A test of the price-pressure hypothesis

In a direct test of the predictions of the price-pressure hypothesis, Kaul, Mehrotra, and Morck (2000) and Biktimirov (2004) estimate the following cross-sectional regression:

$$\text{Post-Announcement day CAR for firm '}j\text{'} = a + b(\text{Announcement day returns}_j) + \text{e}_j.$$

A slope of -1 in this regression would be consistent with the full reversal of event day returns predicted by the price-pressure hypothesis, whereas a slope of zero would indicate that the price effect is permanent as predicted by the downward-sloping demand curve hypothesis.

For their regression, Kaul, Mehrotra, and Morck (2000) first compute the cumulative abnormal weekly returns, starting with the post-event week and progressing iteratively for 15 weeks following the event. The cumulative returns are then regressed on the announcement week returns. Kaul, Mehrotra, and Morck reject the hypothesis that the regression slope is -1 up to nine weeks following the event. In a second test, they are unable to reject the hypothesis that the slope is zero in all their iterations except one. Biktimirov (2004), in a similar test, also rejects the hypothesis that the regression slope is -1 and is unable to reject the hypothesis that the slope is zero for 60 days following the event. Both studies interpret their findings as support for the downward-sloping demand curve hypothesis.

We conduct a similar regression test in which our dependent variable is the cumulative abnormal return for post-event intervals starting with the post-announcement day and extending, in 20-day increments, to 60 days after listing. We regress the

Table 6

A test of the price-pressure hypothesis

The relationship between announcement-day returns and post-announcement returns is estimated with the cross-sectional regression:

Post-announcement-day CAR for firm 'j' $= a + b$ (Announcement-day returns$_j$) $+ e_j$

The dependent variable is the cumulative abnormal returns starting with the day after announcement and ending with the designated days after the listing. An estimate of -1 for the slope is consistent with the price-pressure hypothesis which predicts complete reversal of announcement-day returns. An estimate of zero for the slope is consistent with the prediction of no price reversal.

Dependent variable [Post-announcement-day cumulative abnormal returns]	Estimate for **'a'**	Estimate **'b'**	t-Statistic: $\boldsymbol{b} = -1$	t-Statistic: $\boldsymbol{b} = 0$	R^2
New additions to the S&P 600 Index (N = 504)					
AD + 1 to LD + 20	−0.003	−0.520	3.34***	−3.62***	0.025
AD + 1 to LD + 40	−0.012	−0.542	2.55**	−3.02***	0.018
AD + 1 to LD + 60	−0.011	−0.683	1.45	−3.13***	0.019
Downward additions to S&P 600 Index (N = 52)					
AD + 1 to LD + 20	−0.014	−0.246	1.87	−0.61	0.007
AD + 1 to LD + 40	0.032	0.009	1.77	0.02	0.001
AD + 1 to LD + 60	0.043	−0.041	1.52	−0.07	0.001
Full deletions from the S&P 600 Index (N = 112)					
AD + 1 to LD + 20	0.062	−1.298	−1.04	−4.54***	0.157
AD + 1 to LD + 40	0.059	−1.705	−2.10**	−5.09***	0.189
AD + 1 to LD + 60	0.081	−1.635	−1.65	−4.24***	0.139
Upward deletions from the S&P 600 Index (N = 107)					
AD + 1 to LD + 20	0.018	−0.063	2.61***	−0.18	0.003
AD + 1 to LD + 40	0.030	−0.623	0.77	−1.28	0.016
AD + 1 to LD + 60	0.001	−0.413	0.91	−0.64	0.004

***Significant at the 1% level.
**Significant at the 5% level.

cumulative return on the announcement-day return and present the estimates in Table 6.

We find that the slope estimate for new additions declines from −0.52 in the first post-event interval (AD + 1 to LD + 20) to −0.68 in the last interval (AD + 1 to LD + 60). The slopes are substantially more negative than the estimates in the two studies cited above. We are unable to reject the hypothesis that the slope is −1 for the post-announcement interval that extends to 60 days beyond the listing day. However, we reject the hypothesis that the slope is zero for all the intervals that we consider, despite the fact that, at longer horizons, the low power of the test favors the null of zero or no price reversal (Kaul, Mehrotra, and Morck, 2000).

We find similar results with the full deletions. The slope coefficients are even more negative with this subset and we are unable to reject the hypothesis that the slope is −1 even for the shortest interval that we examine. We reject the hypothesis that the slope is zero for all of the post-announcement intervals with the full deletions subset. The results confirm that announcement-day returns are reversed in the post-announcement period and provide support for the price-pressure hypothesis. With the upward deletions and downward additions subsets, we find that the slopes are negative but are not statistically significant.

8. Conclusion

We examine the changes in stock price, trading volume, and institutional ownership following the S&P 600 index changes. We find that new additions have positive returns and firms transferred to the S&P 600 from other S&P indexes have negative returns on the announcement day, but the announcement period excess returns are fully reversed in both cases. Similarly, we find positive returns at announcement for firms transferred out of the S&P 600 to the larger cap S&P indexes and negative returns for firms dropped from all S&P indexes, but these returns are also subsequently reversed. The price effects are more pronounced for smaller firms in the sample, both at announcement and in the subsequent period. The daily trading volumes in all four subsets in the sample are significantly higher than normal in the period between announcement and listing, but subsequently revert to normal levels. There is a significant increase in institutional ownership of new additions and upward deletions, and a decrease in ownership of downward additions and full deletions. However, as predicted by the price-pressure hypothesis, this shift in the distribution of security holders does not have permanent effects on prices or trading volumes.

Our results are similar to those reported by Biktimirov, Cowan, and Jordan (2004) for changes in the Russell 2000 index, another index of small firms. Consistent with the predictions of the temporary price-pressure hypothesis, we find that firms involved in small-cap index changes do not experience long-term effects on the price or trading volumes.

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