Keywords: S&P/ASX 200 Index, index effects, S&P game, strategic trading.

S&P/ASX 200:
Does change in membership matter?

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Studies over recent decades of the return effects for the stocks added to and deleted from the S&P 500 have documented the so-called 'S&P game', where traders could profit from stock price reactions to changes in the index's composition. Studies on the All Ordinaries Index covering the 1990s also found profitable trading opportunities over the pre-announcement period. Our study of the effects of changes in the composition of the S&P/ASX 200 from its introduction (in April 2000) to June 2009 found these pre-announcement opportunities were eliminated but that potential exists for the 'S&P/ASX 200 game' between announcement and implementation dates.

There is extensive literature on the price reactions to changes in the composition of the S&P 500. The literature was influenced by the emergence of index funds in the late 1970s and the price pressure generated by their trading to rebalance their portfolios when changes to the index are implemented (to minimise their tracking error). The reported average abnormal returns (AARs) on announcement dates ranged around 3 per cent for the period September 1976 to September 1989 (Harris and Gurel 1986; Shleifer 1986; Jain 1987). In October 1989 Standard and Poor's began to pre-announce changes to the composition of the S&P500, which gave rise to the 'S&P game' (Beneish and Whaley 1996); buying on the announcement and selling on implementation dates. Chen, Noronha and Singal (2004) found AARs on announcement dates of 5.4 per cent that increased on a cumulative basis to 8.9 per cent by implementation dates for additions using data for the period October 1989 to December 2000. But Soe and Dash (2008) found that index effects shrank during the 2000s decade. This study reported cumulative average abnormal returns (CAARs) of only 1.75 per cent for additions (between the first day of trading following the announcements and implementation dates) using data for the period September 2003 to August 2008. This finding is attributed in part to the rebalancing of portfolio trading by index (and similar) funds being spread over the days prior to implementation dates rather than being concentrated on implementation dates (Green and Jame 2011).

There are a number of theoretical motivations for the US literature on index effects. These include a test for market efficiency (assuming changes in the composition of the index are information-free events there should be no price effects) and, given the evidence of return effects, what are their main explanations? The latter include the price-pressure hypothesis that portfolio-rebalancing trades by index funds would explain asymmetric effects prior to and after implementation dates (i.e. the CAARs are reversed). However, most studies have found the return effects are not reversed or are only partially reversed. This pattern is explained by various hypotheses, including the *information-content hypothesis* (that membership of the index does matter to share value), the *investor-awareness hypothesis* (which could explain permanent price effects for additions but a reversal in negative abnormal returns for deletions, given the market's continued knowledge of the deleted firms) and the *liquidity hypothesis* (that the supply of free float is diminished by holdings of index funds for additions, and is increased for deleted firms). However, a review of this debate is beyond the scope of this paper (see Chen, Noronha and Singal 2004).

In contrast with the US literature, we were able to find only two published papers on index effects in Australia, along with several working papers. The initial studies (in the late 1990s) of index effects in Australia were based on the previous All Ordinaries Index (AOI). This was an open-ended index comprised of shares that met the selection criteria. During the 1990s the number of shares included in the AOI ranged from 229 to 330.

The selection criteria comprised a minimum market capitalisation (0.022 per cent of the market's total capitalisation) and a liquidity (i.e. trading volume) requirement (the turnover of the shares needed to exceed a specified percentage of the issued capital) over the six-month period prior to each review of the index's composition. Deletions were made when shares failed to satisfy the minimum capitalisation and liquidity requirements, although in July 1998 a system of down-weighting (implemented quarterly) was applied to the market capitalisation of companies with adequate capitalisation (to remain in the index) but inadequate liquidity. The quantitative criteria for additions and deletions would allow investors to make front-running trades in anticipation of upcoming changes to the index. Moreover, changes to the composition of the index were announced in the ASX's monthly publication, *Monthly Index Analysis*, usually two weeks prior to their implementation (Chan and Howard 2002).

Chan and Howard (2002) reported AOI index effects (on a daily basis) over the period January 1995 to July 1998. This study uses a window of -60 days to +60 days around implementation dates. The study reports CAARs of over 10 per cent from day -60 to day 0 for additions (with just over half coming during the latter half of this period) and -30 per cent for deletions over this period (over two-thirds coming during the latter half of this period). The returns data are consistent with both momentum and front-running trades prior to implementation dates. The study found AARs of 2.6 per cent for the additions to the AOI on day -1 (i.e. the day before implementation dates) and -3.3 per cent on day -1 and +2.6 per cent on day 0 for deletions, which is interpreted (along with elevated trading volume data) as evidence of trading by index funds to rebalance their portfolios the day before implementation dates. Finally, the study found the CAARs for additions are partially reversed (to 6 per cent) over the 60-day period following implementation dates, whereas the negative CAARs for deletions stabilised over this period.
An unpublished paper by Aitken and Comerton-Forde (1999) reported index effects over the period December 1993 to December 1998. The study found AARs for additions of 0.96 per cent on day -1 (the day prior to the implementation dates) along with slightly greater AARs for deletions of -1.71 per cent on day -1. Over its day -20 to day +20 window the study found minimal CAARs for additions, whereas the CAARs for deletions were -8.10 per cent from day -20 to day 0 after which they rose to 2.37 per cent by day +20. The complete reversal in the negative CAARs contradicted industry claims at the time that deletion from the AOI would further lower share values. The finding is also at odds with those of Chan and Howard (2002) noted above.

In April 2000 the S&P-designed indices were introduced and the AOI was redesigned to comprise 500 shares. The S&P/ASX 200 was designed to become a tradeable benchmark index with a fixed number of companies and their continuing eligibility to remain in the index is reviewed quarterly by the index committee in terms of float-adjusted market capitalisation and liquidity requirements (over the previous six months). The committee determines first whether any shares should be removed from the index given their capitalisation and liquidity performance. Removal, however, is not automatic; it is dependent on the committee's decision, which also reflects its aims in managing the index's composition. The committee then selects which eligible securities will be included. The changes are announced on the first Friday of each quarter (March, June, September and December) and (usually) implemented on the third Friday (i.e. 10 business days later), (S&P 2010). Consequently, it has become more difficult for the market to anticipate the changes prior to announcement dates.

The principal contribution of our study is to fill the gap in the index effects literature by investigating the S&P/ASX 200 and it does so over a substantial period, from its introduction in April 2000 up to June 2009. An earlier paper (Pinfold and Qiu 2008) presented the findings of a study on the index effects for the S&P/ASX 100 and 300 indices, covering the period from April 2000 to December 2003. It identified modest effects that were not statistically significant.

Data and methodology

Our study used an event window of 61 days evenly distributed around the event date i.e. from -30 to +30 days relative to announcement dates. A data set was developed from Standard and Poor's website and from its press releases. There were 237 additions to, and 239 deletions from, the S&P/ASX 200 over the period of the study. Firms were deleted from the study's data set if they had listed on the ASX within six months prior to the event date, had been added to the indices due to consolidation or firm spin-offs or had been removed from the indices for reasons other than breach of the size or liquidity conditions (such as corporate events). In addition, firms which had delisted within the event period, subsequent to removal from either index, were not included even though this introduces a potential survivorship bias. As a result, the study's sample comprises 126 additions to, and 109 deletions from the S&P/ASX 200.

Price histories, trading volumes and the number of each company's shares were obtained from Bloomberg and DataStream. Specifically, the daily adjusted closing prices were utilised, which accounts for all corporate actions such as stock splits, dividends/distributions and rights offerings. This is appropriate when analysing

historical stock returns as it provides an accurate representation of the firm's share value beyond the simple market price.

We use a control firm (CF) approach to measure the impact of the index events on the returns of the added and deleted firms. The methodology measures abnormal returns as the movement in a firm's share price relative to a CF's share price. The CF is selected from the firms in the same industry that are of a comparable size (i.e. market capitalisation). The abnormal returns are calculated on a daily basis as follows:

$$AR_{i,t} = R_{i,t} - R_{ic,t}$$

where:

$R_{i,t}$ = the rate of return on the stock of sample firm i on day t,

$R_{ic,t}$ = the rate of return on the stock of the control firm for firm i on day t

Where possible, the control firms were in the same industry within the Global Industry Classification System (GICS) code. The GICS codes comprise four levels: sector, industry group, industry and sub-industry, with each level denoted by two digits. The firms were not matched based on their sub-industry as this identification system is extremely narrow.

The average market capitalisation was determined for each sample firm under examination, based on its historical market capitalisation over the six months prior to the event period (which we define as -30 to +30 days either side of the index event day). An appropriate match was determined using upper and lower bounds of 70 per cent and 130 per cent of the sample firm's market capitalisation. Approximately 75 per cent of the control firms were selected on this basis. If a firm within this range did not exist then the industry basis was broadened to a list of all firms within the same industry group (the four-digit GICS codes). The remaining CFs (approximately 20 per cent) were those with the closest market capitalisation value to the sample firm; provided the CFs had not been added to, or deleted from the index in the eight months prior to, or after the event period (to ensure the abnormal return calculations were not biased by their upward or downward price movement that influenced their addition or deletion from the index). Moreover, the CFs for both additions and deletions had very similar mean market capitalisations to those for the firms in the study.

Results and their interpretation

The CAARs for additions over the study's overall event window, from day -30 to day 30 (relative to announcement dates) are presented in Figure 1. Observe that the CAARs for the period day -30 to day 0 amounted to just over 1 per cent (although they rose to 3 per cent during this period). Such a small movement indicates that the upcoming additions to the index were not anticipated by the market. This finding contrasts with CAARs found by Chan and Howard (2002) over the same window for additions to the AOI and supports the conclusion that the selection of shares to be added to the S&P/ASX 200 has eliminated the 'risk-arbitrage' trading opportunities provided by the AOI. This conclusion is consistent with the findings of Pinfold and Qiu (2008) for the S&P/ASX 300.

Daily AARs are presented in Table 1 for the period day -10 to day 10 (i.e. to announcement dates). We found AARs of 1.66 per cent (statistically significant at the 5 per cent level utilising a *t*-test and at the 1 per cent level according to the Rank Test) on announcement dates and on the following day (significant at the 1 per cent level using either statistical test). These abnormal price increases are consistent with front running trades that are anticipating further price increases due to portfolio rebalancing trades by index funds and other institutional investors closer to implementation dates. Observe the spike in CAARs in

TABLE 1: S&P/ASX 200 additions announcement date stock price effects, 2000 to 2009

Day	AAR (%)	*t*-statistic	Rank Test
-10	0.69	1.62	5.05***
-9	-0.45	-1.14	-1.43
-8	-0.34	-0.87	-1.06
-7	-0.25	-0.75	0.23
-6	0.26	0.59	-0.04
-5	-0.42	-1.00	-3.02***
-4	0.47	1.08	2.93***
-3	0.13	0.31	0.85
-2	-0.96	-1.68*	-5.30***
-1	-0.34	-0.90	-1.56
0	1.66	1.99**	10.86***
1	1.66	4.28***	9.85***
2	-0.22	-0.47	-1.11
3	0.06	0.14	0.65
4	0.02	0.05	0.91
5	0.06	0.12	0.30
6	0.30	0.93	2.97***
7	0.28	0.82	2.64***
8	1.13	3.27***	7.79***
9	0.66	1.71*	2.85***
10	0.30	0.62	-0.91

This table reports the average abnormal returns (AAR) for the period day -10 to day +10 relative to the announcement date of additions to the S&P/ASX 200 index during 2000 to 2009.

*Statistical significance at the 1%, 5% and 10% levels is indicated by ***, ** and *, respectively, for two-tailed tests using either the Student's t-test or the non-parametric Wilcoxin-Signed Rank Test.*

FIGURE 1: Additions to the S&P/ASX 200 – This figure shows the CAAR for the period day -30 to day 30 relative to the announcement dates

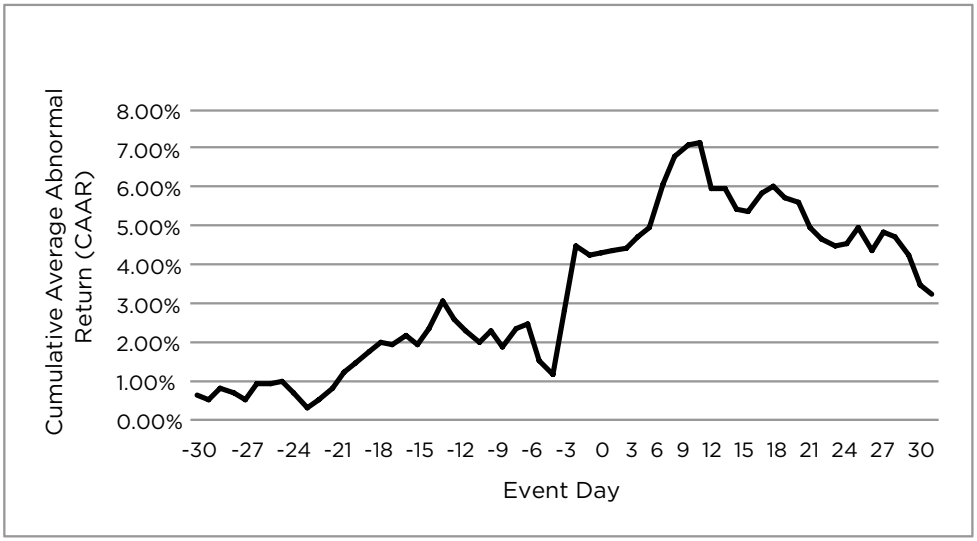

FIGURE 2: Trading volumes for additions to the S&P/ASX 200 for the period day -30 to day 30 relative to the announcement dates

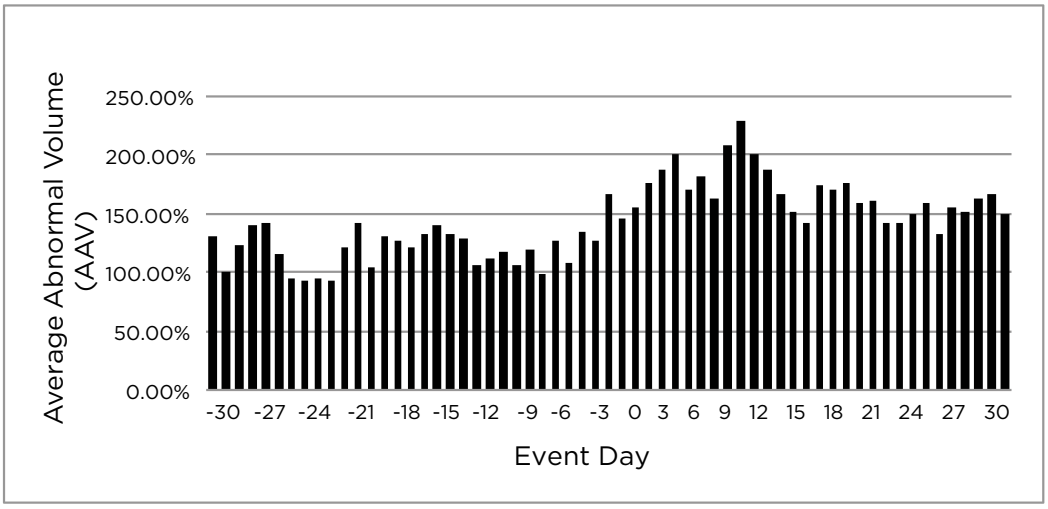

TABLE 2: S&P/ASX 200 additions announcement date stock price effects for windows within the event period, 2000 to 2009

Window	CAAR (%)	*t*-statistic
(-20,-1)	0.85	0.48
(-10,-1)	-1.21	-0.94
(-1,+1)	2.98***	3.22
Announcement		
Day	1.66**	1.99
(+1,+10)	4.25***	3.31
(+1,+20)	2.15	1.39
(-30,+30)	3.27	1.10

This table reports the cumulative average abnormal returns (CAAR) for windows within the period day -30 to day +30 relative to the announcement date of additions to the S&P/ASX 200 during 2000 to 2009.

*Statistical significance at the 1%, 5% and 10% levels is indicated by ***, ** and *, respectively, for two-tailed tests using the Student's t-test.*

TABLE 3: S&P/ASX 200 additions implementation date stock price effects, 2000 to 2009

Day	AAR (%)	*t*-statistic	Rank Test
-1	2.15	4.09***	8.93***
0	-0.76	-1.66*	-3.62***
1	-0.33	-0.85	-1.82*

This table reports the average abnormal returns (AAR) for the period day -1 to day +1 relative to the implementation date of additions to the S&P/ASX 200 index during 2000 to 2009.

*Statistical significance at the 1%, 5% and 10% levels is indicated by ***, ** and *, respectively, for two-tailed tests using either the Student's t-test or the non-parametric Wilcoxin-Signed Rank Test.*

We found CAARs (shown in Table 2) for the period day +1 to day +10 of 4.25 per cent (statistically (significant at the 1 per cent level) on the days prior to the implementation date. These CAARs indicate the potential for the 'S&P/ASX 200 game' of buying on the announcement and selling prior to implementation dates. The pattern is also consistent with portfolio rebalancing trading over the days prior to implementation dates. Evidence of such trading was found by Aitken, Ho and Walter (2000) and by Frino, Gallagher and Oetomo (2005). The latter study of a representative sample of large and enhanced-index funds found their trading in the added and deleted shares commenced five to 12 days prior to implementation dates and were largely completed by implementation dates.

The CAARs data for the last 20 days of our study window partially reversed the level achieved just prior to implementation dates. The findings provide partial support for the price-pressure hypothesis (reflecting the cessation of buying by index funds and selling pressure from frontrunning traders who purchased on or immediately after announcement dates). They also provide partial support for the explanations that the price effects are permanent.

Our study found larger AARs for deletions producing a larger asymmetric pattern of CAARs before and after announcement dates. We found (see Table 4) AARs of -3.11 per cent (statistically significant at the 1 per cent level) on announcement dates. The data in Table 5 show the CAARs over the day -20 to day -1 window of -12.43 per cent (significant at the 1 per cent level). The data in Table 6 show that there were negative abnormal returns on the day before the implementation dates but positive AARs (2.54 per cent) on implementation dates, which marked the beginning of a partial reversal in the returns. This return reversal is displayed by the data in Table 5 for the period day +1 to day +20 relative to announcement dates and, in Figure 3, for the 30-day period after announcement dates. The elevated trading volume data for deletions presented in Figure 4 are consistent with increased selling pressure for the 10-day period starting from announcement dates.

The negative AARs prior to announcement dates could be influenced by market participants front-running the announcements. Alternatively, the negative returns may simply reflect the poor performance of the stocks that are being removed from the index. The negative CAARs between announcement and the day before implementation dates, and the accompanying elevated trading volumes, are consistent with index funds selling deleted shares. The reversal in CAARs from implementation dates is not consistent with industry claims that deletion from the index causes further

TABLE 4: S&P/ASX 200 deletions announcement date stock price effects, 2000 to 2009

Day	AAR (%)	t-statistic	Rank Test
-10	-1.54	-2.93***	-8.79***
-9	-0.87	-1.66*	-3.47***
-8	-0.16	-0.28	-1.85*
-7	-1.19	-2.38**	-5.35***
-6	-0.82	-1.83*	-4.75***
-5	-1.18	-2.33**	-5.31***
-4	-1.27	-1.79*	-4.32***
-3	-1.56	-2.13**	-3.79***
-2	-0.05	-0.09	-1.54
-1	-0.69	-1.23	-2.38**
0	-3.11	-5.72***	-13.43***
1	-1.05	-1.68*	-2.46**
2	-0.15	-0.21	-3.04***
3	-0.58	-0.89	-5.88***
4	-0.29	-0.32	-3.34***
5	1.22	1.29	-0.29
6	-0.39	-0.53	-0.17
7	-0.51	-0.77	-2.36**
8	-0.71	-1.31	-3.28***
9	-1.19	-1.47	-2.95***
10	-2.21	-1.47	-2.32**

This table reports the average abnormal returns (AAR) for the period day -10 to day +10 relative to the announcement date of deletions from the S&P/ASX 200 index during 2000 to 2009.

*Statistical significance at the 1%, 5% and 10% levels is indicated by ***, ** and *, respectively, for two-tailed tests using either the Student's t-test or the non-parametric Wilcoxin-Signed Rank Test.*

TABLE 5: S&P/ASX 200 deletions announcement date stock price effects for windows within the event period, 2000 to 2009

Window	CAAR (%)	*t*-statistic
(-20,-1)	-12.43***	-4.29
(-10,-1)	-9.33***	-4.55
(-1,+1)	-4.85***	-4.56
Announcement Date	-3.11***	-5.72
(+1,+10)	-5.86***	-2.30
(+1,+20)	1.04	0.38
(-30,+30)	-15.20***	-4.01

This table reports the cumulative average abnormal returns (CAAR) for windows within the period day -30 to day +30 relative to the announcement date of deletions from the S&P/ASX 200 during 2000 to 2009.

*Statistical significance at the 1%, 5% and 10% levels is indicated by ***, ** and *, respectively, for two-tailed tests using the Student's t-test.*

FIGURE 3: S&P/ASX deletions – This figure shows the CAAR for the period day -30 to day 30 relative to the announcement dates

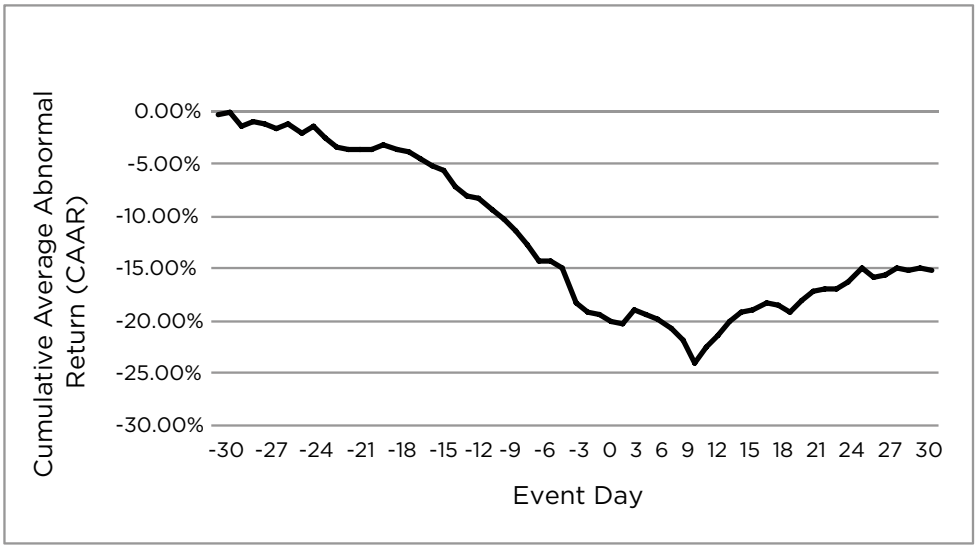

FIGURE 4: S&P/ASX deletions – This figure shows the AAVs for the period day -30 to day 30 relative to the announcement dates

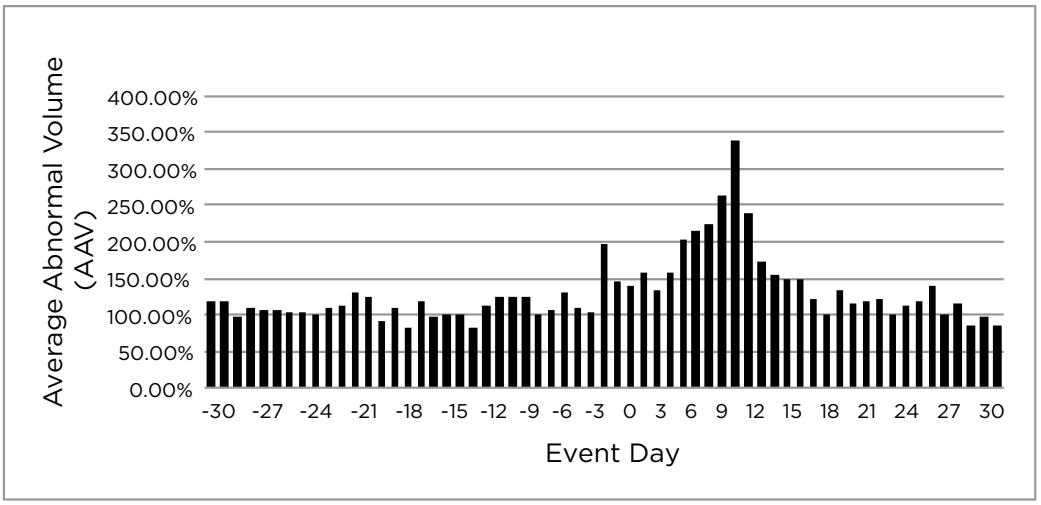

TABLE 6: S&P/ASX 200 deletions implementation date stock price effects, 2000 to 2009

Day	AAR (%)	*t*-statistic	Rank Test
-1	-3.46	-2.34**	-6.83***
0	2.54	1.97*	3.50***
1	0.86	1.47	2.70***

This table reports the average abnormal returns (AAR) for the period day -1 to day +1 relative to the implementation date of deletions from the S&P/ASX 200 index during 2000 to 2009.

*Statistical significance at the 1%, 5% and 10% levels is indicated by ***, ** and *, respectively, for two-tailed tests using either the Student's t-test or the non-parametric Wilcoxin-Signed Rank Test.*

price falls. The finding may be explained by the cessation of selling by funds having rebalanced their portfolios. It may also reflect buying pressure from investors who believed the shares had become undervalued because of their deletion. According to the investor-awareness hypothesis, investors remain aware of recently deleted shares (because they had been in the index) and so recognise any underpricing following their deletion from the index.

Conclusions

There are a number of findings from our study. First, the introduction of the S&P/ASX 200 replaced the potential for profitable front-running trades prior to announcement dates (that were evident with the AOI) with the potential for profitable frontrunning trades following announcement dates and selling prior to implementation dates.

Second, deletions from the index display poor performance prior to their announcement dates but their CAARs are partially reversed following implementation dates. This indicates that the act of deletion does not cause further falls in their price performance.

The recent literature on the S&P 500 indicates its index effects are shrinking and, during the mid-2000s, have become smaller than those reported in our study for the period between announcement and implementation dates. Consequently, we conclude that being added to the index matters (abnormal returns are only partially reversed following implementation dates) whereas being deleted from the index is followed by a partial recovery in returns. ■

Notes

1. Acknowledgements: The authors wish to acknowledge helpful comments from Adrian Lee and Andrew Worthington, and from seminar participants at the University of Technology, Sydney and the 24th Australasian Finance and Banking Conference, along with those from the referee. Any errors are the responsibility of the authors.
2. Funding: This research was financially supported by the Capital Markets Co-operative Research Centre (CMCRC) and the Finance Discipline Group at the University of Technology, Sydney, Australia.

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