



## The S&P500 index effect reconsidered: Evidence from overnight and intraday stock price performance and volume

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### ABSTRACT

This study focuses on S&P500 inclusions and deletions, examining the impact of potential overnight price adjustment after the announcement of an S&P500 index change. We find evidence of a significant overnight price change that diminishes the returns available to speculators although there are still profits available from the first day after announcement until a few days after the actual event. More importantly, observing the tick-by-tick stock price performance and volume effects on the key days during the event window for the first time, we find evidence of consistent trading patterns during trading hours. A separate analysis of NASDAQ and NYSE listed stocks allows for a detailed examination of the price and volume effect at an intra-day level. We find that index funds appear to cluster their rebalancing activities near to and after the close on the event date, suggesting that they are more concerned with tracking error than profit.

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### 1. Introduction

Over the last 20 years, index funds have become extremely popular, with total worldwide explicitly indexed assets estimated to exceed \$1 trillion. When “trackers” follow a benchmark index, their investment decisions are not based on fundamental analysis. Instead, they make the necessary portfolio adjustments only to reduce tracking error, which ensures that such funds will prefer index member stocks to non-members. Thus the deletion of an existing member-firm from a widely followed benchmark has a significant implication for fund managers. For pure index trackers, the only reason, apart from changing cash flows, for trading stocks will be index composition reviews.

The “index effect” refers to the price pressure that is observed when a stock is added to or deleted from an index. If the index is widely tracked, then profits can be made by buying (selling) the shares of the added (deleted) firm ahead of index funds and selling (buying) them at a later stage, when index fund demand (supply) is satisfied. The more money is tied to the index, the more index portfolio managers will be involved in trading the underlying stocks around index recomposition. Index trackers ensure that demand will increase for added stocks and will reduce for deleted stocks.

For many years, “buying additions and selling deletions” has been a lucrative strategy for investors not involved in index tracking.<sup>1</sup>

This study examines the impact of potential overnight price adjustment after the announcement of an S&P500 index addition as well as the impact on the prices and volumes of the stocks on a tick-by-tick basis. A separate analysis is conducted for additions and deletions and also for NASDAQ listed versus NYSE listed stocks. Previous studies have mainly concentrated on close-to-close abnormal returns and showed that there is a significant price increase between the close on the announcement day and the close on the day after. However, the purchase of the added stock cannot be made at the close of trading on the announcement day because the information is released to the market after the close. The first trading opportunity arises in the morning of the first day after announcement, when the stock usually opens at a considerable price increase, resulting in lower actual trading profits; our study investigates this issue in detail.

The following analysis differs from previous studies in four important areas. First, the results involve not only close-to-close

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<sup>1</sup> Academic research has supported this statement for more than 20 years. The abnormal return reported between announcement and event of an index change has ranged between 3% and 8% depending on the time period studied (Harris and Gurel, 1986; Beneish and Whaley, 1996; Malkiel and Radisich, 2001; Chen et al., 2004). Standard and Poor’s analysts have also reported evidence of significant abnormal returns during periods of recomposition of the main indices (S&P 500, S&P MidCap 400 and S&P SmallCap 600) – see Bos (2000).

abnormal returns but also overnight and open-to-close returns. Second, the tick-by-tick stock price performances and trading volumes of the added stocks are examined for the first time for the years 1999 and 2000. This analysis enables us to provide a more detailed picture of the objectives and actions of index fund managers and arbitrageurs. Third, NYSE and NASDAQ samples are examined separately to determine the impact of trading venue on the index effect.<sup>2</sup> Finally, we make use of a more recent and longer run of data on index additions than was available in previous studies.

The remainder of this study is organized as follows. Section two provides a brief description of the major stock selection criteria and the announcement policies of the Standard and Poor's Index Committee. Section three presents a brief summary of previous relevant studies associated with S&P500 index changes and the prevailing hypotheses that lie behind the companies' post-event performance. Section four examines the stock performance after addition by using overnight and open-to close data and section five provides results using tick-by-tick abnormal returns. Section six presents an analysis of the index effect at the intra-day level and section seven examines the intra-day index effect of a deletions sample. Section eight concludes.

## 2. Index tracking and the S&P500

The S&P500 is a value-weighted index that reflects the market value of all 500 component US stocks relative to a particular base period. The selection and management of the index is determined by the Standard and Poor's Index Committee. Changes in index composition are mainly caused by member companies effectively ceasing to exist in their current form through mergers, takeovers, restructuring or bankruptcies. According to a statement by Standard and Poor's, candidate firms are "monitored carefully and the criteria for inclusion are highly stringent". After screening candidate companies, an S&P500 Replacement Pool is created that contains at least 10 companies. The prevailing company from this Pool is chosen whenever a new entry to the index is required following the deletion of another company. The selection process for S&P500 membership does not simply refer to a typical quantitative ranking system based on market capitalisation. Therefore, it is difficult for institutional investors and fund managers to anticipate the changes. This is in contrast with the procedures that operate for most other major indices. In general, but not exclusively, S&P member companies have the largest market value in their sector and are chosen to represent their industry in the US market. The selection process entails an examination of the firm's trading activity, such as public float<sup>3</sup> and turnover ratios, to ensure high liquidity and to reduce the probability of deviations from the "fair" stock price.

Standard and Poor's changed their announcement policy twice – in September 1976 and more recently in October 1989. The latter change was made in order to alleviate the price pressure on the announcement date that occurred prior to this when index inclusion took place immediately the day after announcement. Changes are now pre-announced an average of five days before the event. The period from the announcement date to the effective date offers time for institutional investors and index fund managers to adjust

their holdings. The announcement, which takes place after the market close, reveals the name of the firm that will be added (deleted) and the exact date that the event will take place.<sup>4</sup> In some instances, however, only the name of the firm and not the exact date of the event is announced.

## 3. Previous literature

The period during which a change in index composition occurs constitutes a useful laboratory for testing the Efficient Market Hypothesis (EMH). According to the semi-strong form of the EMH, the market's historical knowledge of abnormal returns for index additions (deletions) will drive the security's price up (down) to its expected addition (deletion)-day value on the day after the announcement (Cusick, 2002). The profits from buying the stock on the day after the announcement and selling it on the effective date should be fully eliminated and the change in the security's price should happen overnight.

Numerous studies show that the index effect results in stock price behavior during the event period that appears inconsistent with the EMH. Consequently, a number of hypotheses have been proposed to justify this performance. These are the Price Pressure Hypothesis (see Harris and Gurel, 1986; Woolridge and Ghosh, 1986; Malkiel and Radisich, 2001), the Imperfect Substitutes/Downward-Sloping Demand Curve for Stocks Hypothesis (Shleifer, 1986; Denis et al., 2003), the Liquidity Cost Hypothesis (Mikkelson and Partch, 1985; Amihud and Mendelson, 1986), the Information Content/Index Member Certification Hypothesis (Jacques, 1988; Dhillon and Johnson, 1991), and the Market Segmentation/Investor Recognition Hypothesis (Chen et al., 2004). Their main differences concern whether the stock price or volume change is temporary or permanent after the event, what kind of information is revealed by an addition or deletion, and what are the main issues for stock and investor behavior. While the number of papers examining whether these hypotheses receive empirical support is large, with the exception of three, all consider only close-to-close returns. Such research arguably presents a misleading picture of the profitability of trading on changes in index composition since these profits cannot be realized by investors.

Beneish and Whaley (1996, 1997) are the first to examine close-to-open returns to measure the extent of overnight performance that is consistent with market efficiency using index inclusions under both the old and new regimes. The overnight pressure under the old policy was expected to be larger since there was no interval between announcement and event. The major part of the abnormal close-to-close return of added stocks under the old announcement policy was caused overnight (4.37%) and the open-to-close abnormal return of the following day was –0.62% leaving no profitable trading opportunities. Under the new announcement policy, however, an abnormal return that is significant but substantially smaller in magnitude occurs overnight (2.46%) with an insignificant (positive) open-to-close return the next day (0.6%).

Open-to-close returns are also examined by Cusick (2002), who finds evidence of an increase in market efficiency through time, and a decrease in the trading profit available to arbitrageurs who buy additions and sell deletions. By using the size of the overnight abnormal return from the close on the announcement date until the following morning as a proxy for investors' interest, he shows that the potential trading profits available have decreased over time. His main conclusion is that investors' interest will outweigh

<sup>2</sup> This separation may be particularly important where trading volumes are concerned since there is evidence that volumes are considerably over-estimated on the NASDAQ, although in a complex way, so that a simple adjustment for comparability is not possible – see Anderson and Dyl (2005).

<sup>3</sup> In March 2004, Standard and Poor's announced that it would convert all major US indices to a float-adjusted basis and in September 2004, it released details of the methodology used for the free-float calculation. In March 2005, S&P500 became half-float adjusted and in September 2005, full-float adjusted.

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