University of Alberta

Essays on the S&P 500 Index Inclusion Effect – Empirical Evidence

by

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Abstract

The objectives of this thesis are to document, critically evaluate and explain the significant abnormal and permanent returns around the S&P 500 inclusion announcement dates. The introductory chapter describes the significance of this unexplained phenomenon to investors, standard setters and academics, and provides detailed overview of several hypotheses explaining the abnormal returns. In Chapter 2, I test the Price Pressure Hypothesis along with the Risk Reducing Hypotheses around the Index inclusion announcement and effective dates and document positive abnormal returns around announcement dates whereas only temporary premia around effective dates. My analysis of future liquidity and Bid-Ask spread changes surrounding the Index inclusion announcement dates supports the Risk Reducing hypotheses. In Chapter 3, I investigate the Index criteria, along with other publicly available information that potentially enter the Index committee's firm selection process, to identify a potential source of information signal. I confirm that Standard & Poor's reveals no new information about firms' future performance in their inclusion announcements. Despite their claim that the announcements of firm inclusion in the S&P 500 Index contain no information about firms' future performance, recent literature provides evidence that inclusion likely conveys positive information concerning firms' future earnings. In Chapter 4, I re-examine this contention, and while I confirm the positive earnings news, I show that the observed positive earnings

news are not associated with announcement returns; but rather, are entirely attributable to large discretionary accruals, consistent with managerial manipulation of earnings. After analyzing a new sample of Index additions, I further confirm that firm inclusion in the S&P 500 does not contain information about their future operating performance. A growing number of studies find both theoretical and empirical support for downward sloping demand curves for stocks. However, adequate samples to test this prediction are rare. Chapter 5 tests the Downward-sloping demand curve hypothesis using two ostensibly information-free events. In comparison to previous studies, after controlling for previously documented common factors such as limit of arbitrage, liquidity, and changes in Bid-Ask spreads, I find no support for downward sloping demand curves for stocks. The final chapter concludes and provides discussion of the results.

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Chapter 1

The S&P 500 Index Inclusion Effect - Introduction

1.1 The Index Inclusion Premium

Neoclassical finance theory suggests that the slope of the long-run demand curve for stocks is horizontal. In a market with thousands of traded securities, this nearly perfectly elastic demand curve results from possible arbitrage among stocks' close substitutes, whereby arbitrageurs capable of trading large quantities of stocks quickly eliminate potentially mispriced securities. The increasing popularity of indexing[1] creates significant demand shocks around events, where investors need to trade large quantities of stocks at a brief period of time; these events help researchers to test the validity and the magnitude of the shape of the demand curve slope. In particular, announcement changes to the S&P 500 index (as well as to other S&P supplementary indices and major international indices) are arguably unique information-free events that are associated with significant abnormal returns. Over the past twenty years, both academics and practitioners have consistently documented significant positive abnormal returns associated with new index constituents around the inclusion announcement dates and attributed these premia to various hypotheses, mainly the downward-sloping demand curve. What complicates the distinction of all existing theories is the informational assumption behind the Index inclusion announcements. Although claimed by the S&P to be information free-events, recent findings suggest

[1] Commonly defined as a passive investment strategy in which portfolios mirror the performance of certain stock indices.

that various components of stock's pricing formula (cash flows and discount rate) are affected subsequent to Index inclusion and that the downward-sloping demand curve is not likely the dominant explanation for the abnormal permanent returns.

In this chapter I describe the existing empirical evidence surrounding the inclusion effect[2] of the S&P 500 Index, verify the current status of the S&P 500 inclusion premia, and provide motivation and contribution of the overall thesis. I also illustrate the significance of this unexplained phenomenon to investors, standard setters, and academics. The subsequent chapters test the informational nature of the Index inclusion announcements and provide empirical evidence for each existing theory.

1.1.2 Theory and Unexplained Phenomenon

A stock's fundamental value is determined by the expected future cash flows discounted by the cost of capital, which in turn should reflect a firm's systematic risk. Based on the semi-strong form of the Efficient Market Hypothesis, prices reflect publicly available information and should not react to changes in a stock's supply or demand[3], unless the changes reveal news about the firm's fundamental value. One of the objectives of Standard and Poor's with respect to the S&P 500 is to keep the index turnover at minimum. Therefore, if index additions signal changes about the expected longevity of superior financial performance, a higher expected rate of return, or lower systematic risk, the abnormal returns can be rationally explained. What creates a puzzle, however, is that the S&P Committee explicitly states that "Judgments as to the investment appeal of the stocks do not enter into the selection process" (Standard and Poor's, 1996, page 1). In other words, S&P claims that Index changes are ostensibly

[2] I will refer to the Index inclusion effect as positive abnormal returns around Index inclusion announcement dates or Index inclusion premia interchangeably.

[3] Given that both supply and demand are perfectly elastic.

information-free events. Since the 1980's, many researchers documented that changes to major index constituents are often associated with abnormal returns around the inclusion announcement dates. In the context of the S&P 500 index (hereafter Index), studies such as Shleifer (1986) or Harris and Gurel (1986) documented that newly added firms generally experienced about 3% permanent abnormal returns around the announcement dates, whereas Lynch and Mendenhall (1997) documented that Index deletions decreased in value by about 7%. These results are consistent with increases in demand driving prices higher, while decreases in demand driving returns down. More recently, inclusion premia were found to be larger in magnitudes and persist for a longer period (Chen et al., 2004). To explain this phenomenon, researchers have proposed several hypotheses, often focusing on one dominant explanation; yet have been unable to reach a common conclusion to date. This unresolved issue motivates this thesis and the remaining chapters. Overall, this thesis evaluates the validity of four possible reasons for the Index inclusion premium: temporary price pressure, downward slope of the demand curve, information content, and risk reduction.

The rest of this chapter is organized as follows. Section 1.2 provides an overview of the S&P 500 Index and the increasing popularity of fund indexing. In section 1.3, I provide the summary of the four competing hypotheses and findings of previous studies. I also explain the motivation for the topic tested, describe the contribution to accounting and finance literature, and outline objectives for the remaining chapters.

1.2 S&P 500 Background

The S&P 500 is a world-renowned, widely followed index consisting of 500 stocks from leading industries designed to reflect the U.S. equity markets, and consequently the U.S. economy. As of December 31, 2004 (the latest period that I examine in this chapter), the market capitalization of the 500 companies reached over $11 trillion where the two largest sectors represent Financials and Information technology[4]. This value represents over 75% of the total U.S. stock market capitalization. As of September 16, 2005, S&P 500 stocks are weighted based on a market value of their free-float. For the period that I examine in the first four chapters (1989-2004), all stocks are value-weighted based on the total market capitalization of each of the 500 stocks. Standard & Poor's Committee, consisting of professionals such as economists and index analysts, oversees the composition and maintenance of various indices, including the S&P 500 index. While the Committee tries to minimize Index turnover and adds only relatively stable stocks to the S&P 500, it makes no claim about the newly included stocks' future prospects. When an S&P 500 company ceases to meet any of the inclusion criteria, the Index Committee replaces the company with a new candidate from a pool of eligible firms satisfying all Index inclusion criteria (described in detail in Chapter 3 and in Appendices, Exhibit-1).

I use Index additions examined by Denis et al. (2003), so the sample begins in 1987. In subsequent chapters, I will present evidence supporting the Index inclusion effect from 1987; however, a more detailed analysis involving liquidity and informational consequences of inclusion announcements will exploit the Index additions between October 1989 and December 2004. Under the old announcement policy, before October 1989, S&P announced the Index changes after the market closed and executed the additions the next trading day. To ease order imbalances associated with rebalancing needs of Index tracking funds, Standard & Poor's started to pre-announce names of the newly added and deleted Index members along with the dates on which the change will become effective. Starting October 1989, on average, Index changes are known to public approximately one week prior to the date when the actual implementation takes effect.

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[4] Information obtained from www.indices.standardandpoors.com (Blitzer et al., 2004)

Since the 1980s researchers have documented a rapid growth in indexing, which continues to become more popular. Wurgler and Zhuravskaya (2002) document that the percentage of added firm's capitalization demanded by index tracking funds has grown from about 3% in 1976 to more than 8% in 1996, whereas Morck and Yang (2002) estimate that around 10% (1$ trillion) was directly indexed to the S&P 500 in 2001. Index tracking funds actively manage their portfolios to be consistent with S&P 500 performance. Although the S&P 500 focuses on large-cap segment of the market (companies with market capitalization exceeding $3 billion), it is an important proxy for the total market, and as such is frequently used by academics and practitioners as a market benchmark for constructing portfolios' or stocks' abnormal returns. Given the growth of S&P 500 based investments and its use as a market benchmark, the Index inclusion effect is therefore of great importance to both academics and practitioners, and it is important to understand the underlying economic phenomena behind the abnormal premia that arise around index inclusion announcement dates.

1.3 Literature Review

1.3.1 Index Inclusion Premia Hypotheses

The puzzling market reactions to changes in the S&P 500 index constituents have attracted many researchers who offered and tested a variety of explanations both theoretically and empirically. These hypotheses can be divided into four broad groups depending on the predicted duration of the Index inclusion effect, and also depending on the assumptions on the information, if any, contained in Index inclusion announcements. Assuming that Index inclusions are information-free events, any abnormal returns around inclusion announcements should be arbitraged away in a relatively short period of time[5] provided that the S&P 500 stocks have nearly perfectly elastic demand curves. However, given the S&P's objective to keep index turnovers at minimum, Index additions may be viewed as good-news about a firm's expected cash flows or a change in the discount rate applicable to that stock.

The *Price Pressure Hypothesis*, formalized by Harris and Gurel (1986), assumes no changes in variables that would permanently affect the stock price. This explanation predicts that the stock prices of newly added firms will temporarily deviate from their equilibrium levels due to heavy trading caused by Index tracking funds that are required to rebalance their portfolios. Passive sellers attracted by this temporary price increase are compensated for their liquidity when the Index tracking investors achieve the desired portfolio positions, and when stock prices return to their full-information levels shortly after Index inclusion[6]. With respect to the availability of substitutes and arbitrage risk, the Price Pressure Hypothesis assumes that the long-run demand curve for stocks remains perfectly elastic at the full-information price[7]. Biktimirov et al. (2004) or Vespro (2006) find supporting evidence for this hypothesis when analyzing changes to large US and European indices, whereas Beneish & Whaley (1996) or Lynch & Mendenhall (1997) document partial price reversals after additions to the S&P 500 Index. Furthermore, Index deletions are frequently found to be associated with only temporary abnormal returns. I analyze this hypothesis in detail in Chapter 2 and control for the Price Pressure effect throughout the remaining chapters.

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[5] By short period, researchers often assume few business days once the index tracking funds rebalance their portfolios and the demand for stocks returns to its normal levels.

[6] Under the Price Pressure hypothesis, a temporary changes in bid-ask spreads would also be expected as the increase in trading activity reduces order processing costs (one of the bid-ask spread components).

[7] Harris and Gurel (1986) further point out that this hypothesis recognizes that the information about uninformed demand shifts are costly. As a consequence, the short-run demand curve may be less than perfectly elastic.

The *Downward-sloping Demand Curve Hypothesis*, advanced by Shleifer (1986) (hereafter the LRDC Hypothesis), is often called the *Imperfect Substitutes Hypothesis*. As the name implies, this hypothesis predicts that Index additions do not have perfect or close substitutes, which results in limited arbitrage and stocks' demand curves slope downward as a result. This theory relies heavily on the assumption that Index changes are information-free events, which should have no impact on future cash flows or the corresponding discount rates. This explanation predicts that when a stock is added to the Index, the resulting demand shock[8] will affect stock prices permanently. Firms added to the Index are expected to experience increased abnormal returns that are not expected to reverse in the long-run. Apart from Shleifer, studies that have found support for this hypothesis include: Loderer & Jacobs (1995), Kaul et al. (2000) or Wurgler and Zhuravskaya (2002). I provide empirical evidence for this hypothesis in Chapter 2 and analyze it in further detail in Chapter 5 where I consider the re-weighting of Index constituents from market capitalization to free float weights as an alternative 'information free' event.

The next two categories of hypotheses relax the information-free assumption and predict that Index inclusion announcements are associated with either changes in firms' required rates of return or future cash flows. According to the former, firms' inclusion into the S&P 500 Index may trigger a decrease in required return for several reasons. For simplicity, I refer to *Liquidity (Information Cost)* and *Certification* as the *Risk Reducing* hypotheses. First, the Liquidity Hypothesis (sometimes referred to as the Information Cost Reduction Hypothesis), advanced by Amihud and Mendelson (1986), predicts that the S&P Index inclusion leads to greater institutional interest

[8] The demand shocks are driven by the index tracking funds. The elasticity of demand can be identified from supply shocks as well as demand shocks. When Standard and Poor's announces a company to be added (deleted) to the Index, index tracking funds have to rebalance their holdings and buy or sell the corresponding number of shares. These changes trigger the shift in the supply curve (a change in total shares outstanding for an ordinary investor). In the context of Index additions, it is sometimes easier to think about the demand shock as a reduction in public float.

(and consequent increased market scrutiny), a richer information environment, and higher liquidity with a higher trading volume. If either the lower trading costs or the lower costs of acquiring quality information are capitalized into asset prices, abnormal returns around inclusion announcements should be evident. The direction of causality of this explanation runs from Index inclusion leading to a subsequent increase in liquidity. Barberis et al. (2005) provide several sentiment-based theories of co-movement that could explain why higher trading occurs after a firm is included into the S&P 500 index. For example, "the vast popularity of S&P linked investment products, such as S&P mutual funds, futures, and options, suggests that the index is a preferred habitat for some investors and a natural category for many more. When a stock is added to the S&P, it enters a category (habitat) used by many investors and is buffeted by fund flows in and out of that category." This behavioral explanation is not ruled out in this thesis. Graham et al. (1996) and Beneish and Gardner (1995) find supporting evidence for the Liquidity/Cost Reduction Hypothesis when analyzing changes to the S&P 500 and DJIA indexes respectively. A comprehensive examination of this hypothesis is further conducted by Hedge and McDermott (2003) who find a sustained increase in liquidity along with a decrease in direct cost of trading subsequent to Index inclusion.

Along with the Liquidity hypothesis, I analyze a potential certification role of the S&P index committee. I introduce this concept as the Certification Hypothesis, which predicts reduction in information asymmetry among investors as a result of a likely signal of quality, accuracy and completeness of financial information which lead to Index inclusion. This hypothesis has been mainly analyzed in the accounting literature in a context of assurance of information disclosure and relates more to equity risk rather than debt risk[9]. In a recent paper, Chang et al. (2006) document a

[9] Previous studies such as Shleifer (1986) or Kaul et al. (2000) refer to certification as a version of the Information Content Hypothesis (described next) signalizing favourable good-news about firms' future performance and firms' overall quality. Certification (as a part of the Information content hypothesis)

positive effect on the market value of firms whose executives certify their financial statements. Certification in their study relates to increased assurance of accuracy, reliability and completeness of financial information. The information asymmetry is also measured by changes in Bid-Ask spread (not explained by other common factors such as volume or variability) around corresponding event dates. Since S&P rates bonds as its primary business, Index inclusion announcements may be perceived as a form of certification qua confidence about a firm's financial health (not necessarily good-news about future cash-flows). This, in turn, may reduce information asymmetry among investors and lower the corresponding risk premium for S&P 500 stocks. Overall, the Certification hypothesis, as examined by Chang et al. (2006), is similar to the Liquidity/Cost Reduction Hypothesis, in that tests of both theories involve analysis of Bid-Ask spreads and both relate to changes in riskiness of the newly added firms. Chapter 2 analyzes these Risk Reducing hypotheses in detail.

The *Information Content Hypothesis* predicts that the announcements of inclusion into the S&P 500 Index trigger an increase in investors' expectation of future cash flows. This hypothesis, first evaluated by Van Horne (1970) in the context of new NYSE listings, predicts that the abnormal returns around Index inclusion announcements could result from a presumed information content conveyed by the S&P Committee. In their selection, S&P could either exercise judgment about the financial soundness of a company or use non-public available information to determine the Index composition. It is also possible that Index inclusion causes

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has been frequently tested by examining the relationship between the abnormal returns and the bond ratings (see Shleifer, 1986 or Graham et al., 1996). Bond rating tests relate more to firms' financial risk (debt risk) than equity risk (part of the systematic risk). This thesis tests the certification hypothesis by examining the changes in Bid-Ask spreads and refers to certification only as a form of assurance that is associated with lower required rate of returns rather than informational signal about future operating performance. Therefore, I analyze this hypothesis separately from the Information content hypothesis, which analyzes whether future operating performance is superior in terms of earnings and cash flows.

improvement in future economic performance[10]. If the former, the underlying informational signal could reflect changes in either future cash flows or the systematic risk. In a recent study, Chen et al. (2004) suggest that improvement in expected future cash flows may be related to enhanced investor awareness. Subsequent to Index inclusion, firms may be forced to perform more efficiently if market scrutiny becomes more effective. Denis et al. (2003) document increased earnings forecasts, as well as higher future unexpected earnings subsequent to Index inclusion, consistent with the Information Content hypothesis. Lastly, if newly added firms can attract new capital more easily from financial institutions or other investors, they may grow at a higher rate subsequent to Index inclusion. In the remaining chapters, I will refer to the Information Content hypothesis as a theory that predicts positive changes in future cash flows once a stock is added to the Index. I provide initial evidence of this hypothesis in Chapter 3 which analyzes publicly available and private information, and elaborate on the economic drivers behind future operating performance in Chapter 4.

To summarize, these hypotheses offer different explanations for the Index inclusion premia. If Index inclusions signal, or cause, any change in firms' future cash flows or cost of capital (Information Content or Risk Reducing hypotheses), then Index inclusion premia can be justified rationally. If, on the other hand, S&P 500 additions are truly information-free events, only the Price Pressure hypothesis predicts temporary price deviations, whereas the downward sloping LRDC implies permanent price changes. Price Pressure and Downward sloping LRDC hypotheses make a comparable prediction only for short-term abnormal returns. The Risk Reducing hypotheses rely on improvements in Liquidity (Information Cost) or

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[10] Denis et al. (2003) suggest that inclusion may bring closer scrutiny that then leads firms to improve their operations. Whether S&P uses non-public information to select stocks with better future performance and lower risk, or whether Index inclusion causes higher cash flows or lower discount rates should lead to a comparable pricing of the information signal at inclusion so long as the market understands the underlying economics.

Certification that implicitly suggest a decrease in the required return prompts a permanent abnormal return at inclusion. Finally, the Information Content hypothesis predicts improvements in future cash flows and future earnings following inclusion.

It is important to stress that the hypotheses are not mutually exclusive. For example, Lynch & Mendenhall (1997) document partial price reversals and attribute the remaining inclusion premia to the LRDC hypothesis. Others, such as Denis et al. (2003) provide evidence for the information content of Index inclusion announcements; however, they argue that the apparent information effect does not preclude a contemporaneous demand curve shift either. Given that previous studies have interpreted empirical evidence in favour of each hypothesis, it is therefore important for researchers to analyze all explanations. For instance, researchers who attribute the Index inclusion premia solely to the LRDC hypothesis and then approximate the negative demand curve's elasticity may overestimate the slope coefficient (see Petajisto, 2005 or Wurgler and Zhuravskaya, 2002). This is because other hypotheses may explain part of the abnormal returns. The prior literature tends to focus on identifying one dominant hypothesis, and does not adequately review all of the hypotheses together. For example, Denis et al. (2003) or Petajisto (2006) do not conduct any test of liquidity. Shleifer (1986) acknowledges, but downplays, the possibility that other hypotheses may play role in explaining the Index inclusion premia. His rejection of the Information Content hypothesis is based on his bond rating test, but that test alone, while necessary, is insufficient to reject this explanation[11]. Secondly, he also omits analysis of transaction costs and firms' liquidity subsequent to Index inclusion. The remaining chapters, therefore, address all possible explanations.

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[11] Shleifer (1986) examines whether the presence of bond ratings and quality of bonds (proxied by S&P's bond ratings) of newly added firms are correlated with the abnormal returns. This test relates more to a financial risk (certification) rather than to information about firms expected improved performance.

1.3.2 Empirical Findings

As mentioned earlier, the index inclusion effect is not only specific to the S&P 500, but also to other indices across various exchanges. For instance, Jain (1987) and Blitzer and Dash (2004) show that the index inclusion effect is not specific to the S&P 500 index only, rather abnormal returns can be observed for changes to other supplementary indices such as S&P400 and S&P600. Biktimirov et al. (2004) find significant inclusion premia to changes in the *Russell 2000* index. Masse et al. (2000) find similar abnormal returns in Canada when stocks are included in the TSE 300 Index. Outside the North American market, Vespro (2006) finds significant inclusion premia to *CAC 40, SBF 120* & *FTSE 100* (French Indices), as does Greenwood (2005) who studies a unique re-definition of the *Nikkei 225* index in Japan.

Studies that document S&P 500 index inclusion premia include: Shleifer (1986), Harris and Gurel (1986), Dhillon and Johnson (1991) Beneish and Whaley (1996), Graham et al. (1996), Lynch and Mendenhall (1997), and Denis et al. (2003) among others. Studies employ different methodologies to estimate the magnitudes of cumulative abnormal returns, as well as different time intervals to estimate their long-run permanence. Table 1-1 summarizes this evidence. In subsequent chapters, I describe the estimation procedures, sample selection criteria as well as reasons for selecting particular event period intervals. For now, I highlight several important conclusions from this table and other non-referenced studies. First, the Index inclusion effect appears starting in 1980. Prior to this year, Index additions do not seem to be associated with significant permanent abnormal returns. Second, some researchers examining S&P additions prior to 1989 find partial price reversals, which are not evident in samples subsequent to 1989. Third, after 1989 when the S&P started to pre-announce its Index changes, researchers document significant abnormal returns around both Index inclusion announcement dates as well as effective inclusion dates. Lastly, results from Table 1-1 indicate that the S&P 500 Index inclusion effect appears to be permanent and to have strengthened since 1980.[12] I provide evidence of abnormal returns using previously examined samples. Furthermore, I hand-collect data for a period of 2000-2004 and find that significant and permanent Index inclusion premia are likely present to date.

Although much attention has been devoted to analyzing Index additions, research evidence on Index deletions is not as comprehensive. Prior to 1989, Goetzmann and Garry (1986) analyzed seven deletions. In the same year, Harris and Gurel (1986) analyzed thirteen deletions, half of which were in utility industry, causing potential clustering problem. Both studies recognized a permanent drop in prices associated with deletions from the S&P 500. After 1989, Lynch and Mendenhall (1997) document significant and permanent negative abnormal returns for Index deletions during 1990-1995; however, their sample consists of only fifteen firms. Such low numbers of observations are common, as the S&P 500 deletions primarily consist of firms that merge, reorganize or go bankrupt (criteria that researches use to remove unwanted firms from their samples). A recent comprehensive study by Dash (2002) analyzes only price changes associated with S&P 500 deletions during 1998-2002. Using a sample of 53 clean deletions[13], Dash documents only a short-term price decline between the announcement and effective change dates, where the losses are fully recovered within a relatively short time period (six trading days). After controlling for firm size and stock prices, he concludes that the Price Pressure hypothesis is a viable explanation for Index deletions. Similar results are obtained by Chen et al. (2004) who conduct a comprehensive study of 62 deletions during 1989-

[12] The analysis performed by the Standard and Poor's (Blitzer and Dash, 2004) reveals that the excess returns associated with Index addition announcements have actually diminished, especially during 2002-2004. After controlling for trading activity, the median excess returns of additions to S&P 500, S&P MidCap 400 and S&P SmallCap 600 over three time periods (mid-1998 to mid-2000; mid-2000 to mid-2002; and mid-2002 to mid-2004) decreased by about 5% between the announcement and the effective day of change.

[13] Clean deletions refer to firms that did not satisfy the share price, liquidity, market capitalization, company fundamentals or other index inclusion criteria.

2000. Due to generally small sample sizes and given these recent findings, I do not analyze Index deletions any further.

1.3.3 Motivation and Contribution

Standard and Poor's reports increasing Index changes during the more recent years. Given the increasing magnitude of funds indexed to the S&P 500 and the use of S&P 500 as a market benchmark in academic research, the unresolved puzzle about the underlying economics behind the Index inclusion premia motivates this thesis. In the remaining chapters, the objective is to provide an aggregate analysis of all hypotheses (oftentimes jointly), provide empirical evidence for each theory, and critically examine existing literature in order to contribute further insight to the ongoing debate.

My results contribute to both accounting and finance literatures. In the remaining chapters, I corroborate findings of previous studies, offer alternative explanations for their results, analyze a new sample of Index changes and examine unique events by applying different and in some cases more appropriate methodologies. In particular, Chapter 2 analyzes in detail abnormal returns around both Index inclusion announcement dates and effective dates (AD and ED respectively). Abnormal returns are evident on both dates whereby the price increase is only permanent around AD. Chapter 2 further tests the Risk Reduction hypotheses and finds a significant relationship between permanent returns and changes in the Bid-Ask spread. Although not explicitly tested in this chapter, the Downward-sloping LRDC still remains a viable explanation for the initial market reaction. Chapter 3 provides an insight into the Index selection process that has received limited attention by the academic literature and concludes that Index inclusion likelihood can be significantly explained by the publicly available information about firms' risk and historical financial performance. More importantly, while future reported performance may in fact be better for newly added firms, this performance may be already largely captured in stock market prices prior to the inclusion decision, and therefore appears to explain only a marginal increase in the Index inclusion likelihood. Chapter 3 concludes that the Index Committee does not appear to rely significantly on material non-public information in making its Index inclusion selections. Chapter 3 therefore greatly contributes to the informational assumptions that researchers should hold when examining the Index compositions changes. Chapter 4 further tests the Information Content hypothesis and contributes to the earnings management literature through identifying motivations behind discretionary financial reporting. In Chapter 4, I decompose earnings into cash flows, non-discretionary accruals, and discretionary accruals, reject the conclusion by Denis et al. (2003) that the inclusion premia are linked to better future performance. Chapters 1 through 4 examine Index inclusions, which are ostensibly information-free events. Chapter 5 evaluates arbitrage risk and contributes evidence on the general validity of the Downward-sloping demand curve hypothesis by analyzing Standard and Poor's adoption of a new computation of the firm weights in the S&P 500 Index based on market value of Free-Float, rather than market capitalization[14]. Using a methodology by Kaul et al. (2000) who document abnormal returns around similar information-free events on the TSX exchange, I find no abnormal returns around dates with ostensibly significant demand shocks. In all five chapters, I extend findings by previous literature by using a new Index inclusion period. Chapter 6 summarizes the results and concludes.

[14] Old weights prior to September 16, 2005 have been based on the market value of firm's shares outstanding relative to the overall S&P 500 market capitalization.

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1.6 Tables

Table 1-1: Overview of Cumulative abnormal returns for newly added firms into the S&P 500 Index

Authors	Test Period	Sample size	Cumulative abnormal returns		
			(-20, -1)	(0)	(+1, +10)
Shleifer (1986)	1966-1975	144 additions	-2.86%***	-0.19%	-0.07%
	1976-1983	102 additions	-1.49%	2.79%***	-0.86%
			(0)	(0, +5)	(0, +20)
	1976-1980	44 additions	2.27%***	1.58%*	-0.81%
	1981-1983	58 additions	3.19%***	2.70%***	3.77%***

Methodology: Market return (Rm) is represented by value-weighted index. Significance tests are performed using a cross-sectional variance estimator as describes in Ruback (1982). *, ** and *** represent significance from zero at 10%, 5% and 1% respectively. 0 corresponds to the Index inclusion announcement and effective dates.

Authors	Test Period	Sample size			
			(+1)	(+1, +5)	(+2, +30)
Harris and Gurel (1986)	1973-1977	110 additions	0.21%	0.69%	N/A
	1978-1983	84 additions	3.13%***	2.77%***	-2.49%

Methodology: Standard event study methodology - Rm is represented by value-weighted (equally-weighted) index. Market model is estimated using returns from day-250 to day+40 (excluding days 0-10) around the Index announcement date. *** indicates that results are significant at 1%. Zero represents the Index inclusion announcement date, which is same as effective inclusion date.

Authors	Test Period	Sample size			
			(-60, -2)	(0, +1)	(2, +60)
Dhillon and Johnson (1991)	1978-1983	86 additions	-3.71%***	2.38%***	-6.48%***
	1984-1988	101 additions	-2.30%	3.55%***	-1.31%

Methodology: Standard event study methodology - Rm is represented by value-weighted or equally-weighted index. Estimation model period for parameters runs from day -250 to day -121 prior to the Index inclusion announcement date. *** indicates that the results are significant at 1%, 0 represents the announcement date (same as effective Index inclusion date).

Authors	Test Period	Sample size			
			(AD, ED+1)	(AD, ED+20)	(AD, ED+60)
Beneish and Whaley (1996)	1986-1989	70 additions	3.67%***	5.48%***	7.40%***
	1989-1993	33 additions	5.90%***	3.86%***	2.71%

Methodology: Standard event study methodology: Rm is represented by S&P 500 Futures contract. *** indicates that the results are significant at 1%. During 1986-1989, Index inclusion announcement dates (AD) corresponds to the Effective inclusion dates (ED). Subsequent to 1989, AD does not correspond to ED.

Table 1-1: continued

			(AD)	(AD+1)	(AD+2, AD+100)
Graham et al. (1996)	1983-1989	114 additions	0.39%	3.27%***	0.02%

Methodology: Standard event study methodology - Rm is represented by CRSP equal weighted index, including dividends. Market model parameters are estimated using returns from 101 to 300 days after the Index announcement date. *, ** and *** represent significance from zero at 10%, 5% and 1% respectively. Index inclusion announcement date (AD) corresponds to the Effective inclusion date (ED).

			(AD)	(AD+1, ED-1)	(AD, ED+10)
Lynch and Mendenhall (1997)	1990-1995	34 additions	3.16%***	3.81%***	4.86%***

Methodology: Standard event study - Rm is represented by value-weighted index After 1993, daily return on S&P 500 is used as a market return. Market model is estimated using returns from 872 to 673 days prior to the Index announcement date. Significance tests are performed using a cross-sectional variance estimator as describes in Ruback (1982). *** Cumulative abnormal returns > 0 are significantly different from 0.5 using a binominal test with a 5% cutoff. Index inclusion announcement date (AD) corresponds to the Effective inclusion date (ED). Between ED and ED+7, CAR is -2.11%*** which represents the partial reversal.

			(AD)	(AD, ED+20)	(AD, ED+60)
Chen et al. (2004)	1962-1976	279 additions	-0.05%	3.17%***	5.45%***
	1977-1989	263 additions	-0.74%	3.12%***	6.40%***
	1990-2000	218 additions	0.59%	3.56%***	6.12%***

CAR methodology: Abnormal returns are calculated relative to the S&P 500 index's total return. *, ** and *** represent significance from zero at 10%, 5% and 1% respectively. 0 corresponds to the Index inclusion announcement date (AD). During 1962-1989, Index inclusion announcement dates (AD) corresponds to the Effective inclusion dates (ED). Subsequent to 1989, AD does not correspond to ED.

			(AD-1, AD+1)	(AD-1, AD+31)	(AD-1, AD+61)
My results	1987-1988	45 additions	4.47%***	5.67%***	7.30%***
	1989-1999	197 additions	5.20%***	4.87%***	4.78%***
	2000-2004	110 additions	4.36%***	5.35%***	6.93%***

The number of Index additions that I examine is not yet reduced for the missing observations as in the regression analysis. These results just confirm the Index inclusion effect. For results examining the final sample (sample for which all data variables are available), please see Chapter 2. CAR methodology: Standard event study methodology - Rm is represented by return on S&P 500. Market model is estimated using returns from -250 trading days to -10 days prior to the Index announcement date. *, ** and *** represent significance from zero at 10%, 5% and 1% respectively. 0 corresponds to the Index inclusion announcement date (AD). During 1986-1989, Index inclusion announcement dates (AD) corresponds to the Effective inclusion dates (ED). Subsequent to 1989, AD does not correspond to ED.

Chapter 2

The Price, Liquidity, and Information Asymmetry Changes Associated With New S&P 500 Additions

2.1 Introduction

The existence of Index inclusion premia has been puzzling researchers over three decades. To date, researchers have proposed various hypotheses that rationally explain the positive abnormal returns of firms that are announced to be included in the S&P 500 index (hereafter Index). In the absence of any new information about firms future performance, any supply or demand shocks should not impact stock prices, provided that securities have almost perfectly elastic demand curves. Since the majority of the evidence indicates that Index additions are associated with a permanent price increase, the most likely explanation for the Index inclusion effect has been the downward-sloping demand curve (Schleifer, 1986). Over time, the information-free nature of the Index inclusion announcements and the supporting evidence for the Downward-sloping demand curve hypothesis have been challenged by Dhillon and Johnson (1991), Graham et al. (1996) or Chen et al. (2004), among others. The goal of Standard and Poor's Committee is to maintain the Index composition to be representative of the relative importance of each industry in the economy, while minimizing Index turnover (Standard and Poor's, 2004). Researchers have acknowledged that the Committee's Index inclusion announcements may be perceived as good-news events that convey favourable information to investors about firms' expected financial performance (increase in expected future cash flows), lower transaction and information costs, or quality assurance (reduced required return). As such, not all abnormal returns around Index inclusions must necessarily be attributable to a downward-sloping demand curve.

This chapter tests the following hypotheses that may be responsible for the Index inclusion premia: Price Pressure, Downward-sloping Demand Curve, and Risk Reducing hypotheses. I re-examine the time period used in previous studies, such as Wurgler and Zhuravskaya (2002) or Denis et al. (2003), and also analyze the Index additions for a later period (2000-2004) that has received limited attention.

In the first part of this chapter, I provide detailed empirical evidence about the Index inclusion effect on an annual basis. In particular, I present a detailed analysis of cumulative abnormal returns and their corresponding long-run persistence around both the Index inclusion announcement dates (hereafter AD) and the Index inclusion effective dates (hereafter ED). To my knowledge, very few studies comment on these two event dates separately in terms of the magnitude of abnormal returns and their persistence[15]. I analyze them as two event dates that create two individual demand shocks. Blume and Edelen (2003) demonstrate that the large trading activity around ED is likely associated with the mechanical re-balancing needs of index tracking funds, which indicates that the ED resembles more closely an information-free event. Comparable to prior literature, I report trading activity around these two event dates and document significant abnormal price returns and abnormal trading activity around both AD and ED (see for example Lynch and Mendenhall, 1997 or Chen et al., 2004). More importantly, I contribute to this result by finding significant permanent abnormal returns around AD while only significant temporary abnormal returns around ED. Therefore, I find supporting evidence for the Price Pressure hypothesis for abnormal returns around ED, and conclude that the demand shock associated with

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[15] See for example, Lynch and Mendenhall (1997) or Beneish and Whaley (1996)

Index inclusion announcements (AD) is likely attributable to alternative explanations such as information content, downward-sloping demand curve or the risk reduction hypotheses.

In the second part, I analyze hypotheses affecting the firms' discount rate (Liquidity / Information Cost or Certification). I refer to these explanations as Risk Reduction hypotheses. To test these hypotheses, I use methodology employed by Chang et al., (2006) to examine changes in Bid-Ask spreads before and after both AD and ED that are not accounted for by common control variables. My results show a significant decrease in Bid-Ask spread from the six to twelve month period preceding AD or ED to a same length period subsequent to these event dates. In a cross-sectional model, this chapter confirms that the permanent Index inclusion premia (those cumulating over more trading days surrounding the AD) are associated with significant decreases in Bid-Ask spreads.

The reminder of chapter is organized as follows: In section 2.2, I develop the hypotheses and critically examine existing literature. Section 2.3 explains my research design and variable definitions for individual sections. Section 2.4 describes the samples and provides descriptive statistics. I then present the main empirical results, including robustness checks in Section 2.5. Section 2.6 summarizes the chapter and provides discussion of any limitations.

2.1.1 S&P 500 Firm Selection Process

The criteria for Index inclusion consist of liquidity, market capitalization, positive stream of earnings[16], market float, and industry representation (for detailed definition and minimum requirements, see Appendices, Exhibit-1). Although Index membership is not necessarily subject to meeting these specified guidelines, Index removal is generally triggered by companies substantially violating one or more of these

[16] In this dissertation, earnings and net income before extraordinary items are used interchangeably.

inclusion criteria. This is often a result of mergers, acquisitions, significant corporate restructurings or simply poor economic performance.

The Index Committee meets on regular basis. The goal of the Index Committee is to ensure "that the S&P 500 remains a leading indicator of U.S. equities, reflecting the risk and return characteristics of the broader large-cap universe on an on-going basis" while keeping its turnover at a minimum (Standard and Poor's, S&P 500). Whenever a firm is deleted from the S&P 500, the Index Committee identifies a pool of eligible candidates (five to ten on average)[17] and announces publicly the effective date changes along with reasons for Index removal. The list of inclusion candidates is kept secret until the announcement date, and investors are often unaware as to when a particular Index change will take place and the reason for it[18]. What is also not known to the public is the Committee's decision process that identifies the new Index member. The Committee claims it avoids turnover by selecting firms with strong financial health. Accordingly, some suggest this is why Index inclusion announcements may be perceived as good-news events.

The publicly available information regarding the Index composition changes enables mechanical index tracking funds (indexers) and other investors to replicate the S&P 500, thus achieving the same performance as the S&P 500 itself. The indexers follow the replication strategy very closely. In fact, Blume and Edelen (2003) demonstrate that the largest S&P 500 indexers replicate the Index with a tracking error of just several basis points per year and that almost half of indexers always follow an exact replication strategy by rebalancing their S&P 500 holdings on the

[17] This information was obtained from an interview with the S&P Chairman, Dr. David Blitzer.

[18] The awareness of upcoming Index changes likely varies with reasons for Index removal. Investors may in some cases be aware that a firm is in financial distress and try to identify potential candidates for inclusion. When, for example, a firm files Chapter 11 for bankruptcy, that firm is removed from the Index immediately. On the other hand, when a firm undergoes corporate restructuring (spin-offs) or fails to meet one or more inclusion criteria, Index removal is decided by the Committee on case-by-case basis. Overall, authors such as Petajisto (2006) or Kaul et al. (2000) point out that there is a significant uncertainty about Index changes from an investor's point of view.

effective date of inclusion. This provides a powerful explanation for increased trading activity around the effective inclusion dates. The population of funds indexed to the S&P 500 is growing rapidly. As the funds purchase approximately 10% of the S&P 500 outstanding shares, these investors create an economically significant demand shock. Furthermore, the free-float market capitalization of each S&P 500 company is also affected. As of October 1989, the Index Committee started to pre-announce the Index changes several business days prior to actual change implementation. For illustrative purposes, Figure 2-1.A and Figure 2-1.B provide a frequency distributions for number of ordinary days and trading days between the Index inclusion announcement (AD) and effective inclusion (ED) dates respectively; typically, five or fewer trading days.

2.2 Hypotheses Development

Based on the discussion in Chapter 1, researchers have proposed several hypotheses to explain the Index premia. First, the *Price Pressure Hypothesis* predicts that the stock prices of newly added firms will temporarily move from their equilibrium levels due to heavy trading caused by Index tracking funds that are required to rebalance their portfolios[19]. After the abnormal trading activity returns to its normal level, so should stock prices shortly after Index inclusion (reflecting their full-information levels). Second, the *Downward-sloping Demand Curve Hypothesis*, predicts that Index additions do not have perfect or close substitutes, which results in limited arbitrage, so that these stocks' demand curve slopes will downward. As a result, when a stock is added to the Index, the consequent demand shock can affect stock prices

[19] Vespro (2006) points out that investors are willing to accommodate demand shifts without a large influence on share prices. Since the Index inclusion criteria are publicly known, this information-free demand shock by index tracking funds is not expected to change the full information levels, and should not cause any significant share price reactions.

permanently[20]. Third, the *Information Content Hypothesis* predicts that when the abnormal returns around Index inclusion announcements result from the market incorporating inclusion as a positive information signal, or if causality runs opposite, Index inclusions could prompt improved operating performance. Last, I refer to the *Risk Reducing* hypotheses, *Liquidity (Information Cost)* and *Certification*. The *Liquidity Hypothesis* predicts that the S&P Index inclusion leads to greater institutional interest (and consequent increased market scrutiny), a richer information environment, and higher liquidity with a higher trading volume. If either the lower trading costs or the lower costs of acquiring quality information are capitalized into asset prices, abnormal and permanent returns around inclusion announcements should be evident. The direction of causality of this explanation runs from Index inclusion leading to a subsequent increase in liquidity. The *Certification Hypothesis* predicts that Index inclusion announcements can be perceived as a form of certification about a firm's financial health; thereby reducing information asymmetry among investors. As described further below, both these hypotheses predict lower trading costs either directly or through lower information asymmetry, lower Bid-Ask spreads, an implicitly lower discount rate, and a permanent price increase at the inclusion announcement. Accordingly, I group the liquidity and certification hypotheses together as *Risk Reduction.*

The four hypotheses presented above are not necessarily mutually exclusive and may be complementary.

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[20] The elasticity of demand can be identified from supply shocks as well as demand shocks. When Standard and Poor's announces a company to be added (deleted) to the Index, index tracking funds have to rebalance their holdings and buy or sell the corresponding number of shares. These changes effectively trigger the shift in the supply curve (a change in total shares outstanding for an ordinary investor). In the context of Index additions, it is sometimes easier to think about the demand shock as a reduction in public float.

2.2.1 Price Pressure Predictions

Hedge and McDermott (2003) evaluate the liquidity hypothesis; however, they do not focus on both the Index inclusion announcement (AD) and the effective inclusion (ED) event dates. Similar to Beneish and Whaley (1996) and Sui (2003) who analyze the two event dates separately, I document a significant abnormal trading activity around both Index inclusion AD and ED. These two event dates potentially separate the demand shock into two parts; each with significant positive three day cumulative abnormal returns and abnormally high volume.

Although Beneish and Whaley (1996) conclude that indexers could enhance their returns by buying new Index candidates around the announcement dates, Blume and Edelen (2003) show that most indexers (including three largest tracking funds) do not follow this suggested practice; rather they find that indexing managers try to avoid an unacceptable level of tracking error, upon which they are evaluated, by rebalancing their portfolios based on S&P 500 composition around the effective dates of inclusion. If indexing funds then trade on the ED, what types of investors trade around AD that would justify the high abnormal volume? In support of the increased investor awareness, Chen et al. (2004) document an increase in not only the number of shareholders, but also in the fraction of firm's shares held by large financial institutions subsequent to Index inclusion. The Price Pressure hypothesis predicts abnormal price reactions that temporarily deviate from the original price levels and is closely tied to increased trading volume that is highest at ED. Conversely, the other three hypotheses, *Downward-sloping Demand Curve, Risk Reduction,* and *Information Content,* all predict positive permanent price reactions; however, under an assumption of market efficiency they should be more applicable at AD.[21] For example, the effect of a downward-sloping long-run demand curve (hereafter LRDC)

[21] The Price Pressure hypothesis can theoretically apply at both event dates because of volume surge; however, the volume increase is smaller around AD.

should be evident at AD. If retail investors, arbitrageurs or other institutional investors know that the supply of stock available to them will fall, that the substitutes are imperfect, and are aware of the positive inclusion effect, then any LRDC effect should be priced at the announcement dates rather than around the effective dates[22]. With respect to the Information Content hypothesis, if investors perceive the Index inclusion announcements as signals about superior future performance and are efficient in incorporating this belief into prices, any abnormal returns should also occur around AD. Lastly, with regard to the Risk Reduction hypothesis, if institutional and retail investors prefer the superior information environment, greater liquidity, and lower transaction costs putatively associated with S&P 500 inclusion, and correctly anticipate these changes at announcement dates, then they should purchase new S&P stocks at AD creating a significant price and volume effects. To summarize, the three hypotheses, other than Price Pressure, do not predict positive abnormal returns at ED, so long as there is a distinct and clear previous announcement. Only Price Pressure predicts abnormal positive returns at both dates, but these returns are predicted to be temporary.

In this chapter, I am interested, whether the Index inclusion effect is significant and permanent around both event dates and which hypotheses explain the observed returns and trading activity on each date. I hypothesize that the non-information event (ED) is more likely associated with temporary abnormal returns and best understood through price pressure, whereas the Index inclusion announcement dates are more likely associated with the hypotheses that predict permanent abnormal returns. Specifically:

[22] The fact that indexing investors wait until the ED to re-balance their portfolios helps our understanding of the likely causes of abnormal returns around AD; it is the arbitrageurs, other institutions, and retail investors that are buying at AD, where the inclusion premia can be linked to their buying behavior, and accordingly, the index funds only indirectly drive the volume and returns at AD.

H1a: *The announcements of the addition of firms to the S&P 500 Index are likely associated with positive permanent abnormal returns.*

H1b: *The effective inclusion is likely associated with positive, but only temporary abnormal returns.*

2.2.2 Risk Reducing Predictions

The Risk Reduction hypotheses implicitly focus on a valuation model's denominator, the discount rate, and predict that various components of the Bid-Ask spreads should be smaller after inclusion from either directly lower trading costs or lower information asymmetry[23]. The remaining hypotheses (Downward-sloping LRDC, Price Pressure and Information Content) do not predict a reduced Bid-Ask spread. If the downward-sloping LRDC drives the permanent Index inclusion premia, then there should be no impact on Bid-Ask spread or subsequent volume after the Index inclusion. Similarly, the Information Content hypothesis predicts only better future earnings and cash flow performance beyond that predicted by the historical abnormal returns and M/B[24]. The Price Pressure hypothesis predicts a return to normal trading volume once the volume effect from index funds wears off. The source or the implicit risk reduction is not refined here, and could arise from index additions promoting closer market scrutiny (Schleifer, 1986, Denis et al., 2003), an increase in the firm's

[23] In terms of liquidity, the increased trading activity lowers order processing costs as well as decreases the inventory holding risk. The seminal findings by Amihud and Mendelson (1986) that firms with lower spreads have lower average expected returns establish a link between the firms' cost of capital and their trading costs. There is also a large body of literature that examines how accounting information affects information asymmetry. Recent findings further suggest that both quantity and quality of information affect firm prices through a cost of capital. For example, Botosan (1997) report that greater disclosure is associated with a lower cost of capital, whereas Francis et al. (2003) show that lower accrual quality increases firms' discount rate. For a complete survey prior to 1997, see Callahan et al. (1997).

[24] In Chapter 3, I discuss how these variables can be associated with future earnings or cash flows based on prices leading earnings.

information environment (Beneish and Gardner, 1995)[25] or improved market liquidity (Hedge and McDermott, 2003)[26]. All of these predict that inclusion leads to reduced costs of trading and higher liquidity.

Chang et al. (2006) test the Certification hypothesis in the context of firm executives certifying under oath the completeness, accuracy and reliability of their financial statements. The authors use a regression approach to examine changes in Bid-Ask spreads that are not accounted for by common control variables and find that the spread significantly decreases subsequent to the post-certification period. Based on these findings, I consider that the Index Committee's announcements may be perceived as good-news about firms' quality, which reduces information asymmetry among investors[27]. Both Risk Reduction hypotheses are supported by evidence that the Bid-Ask spread significantly decreases during the post-inclusion period. The common prediction is that investors' required rate of return for newly added stocks decreases, which is capitalized into prices around the Index inclusion announcement dates.

If the Index inclusion increases liquidity, reduces information search costs, or provides assurance to investors, thereby reducing perceptions of information

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[25] Beneish and Gardner (1995) find that deletions from the Dow Jones Industrial Average (DJIA) index are associated with a reduced information environment (measured by performance-related announcements consisting of sales, earnings and dividend announcements). When comparing factors that potentially drive the abnormal returns (using a cross-sectional analysis), the authors find that the observed reduction in the information environment is most significantly associated with a decreased price of deleted firms.

[26] Hedge and McDermott document a long-term improvement in liquidity of newly added stocks to the S&P 500. The authors find that the improvement in trading costs stems primarily from a direct decrease cost of trading, as opposed to a decrease in the asymmetric information cost of trading. This suggests that the lower Bid-Ask spread is mostly attributable to the decrease in the direct cost of trading.

[27] Previous studies such as Shleifer (1986) or Kaul et al. (2000) examined certification as a part if the Information content hypothesis, evaluating changes in firm financial risk (bond ratings). Morck and Yang (2002) point out that since the S&P is a bond rating firm with detailed non-public information about fundamental values, Standard and Poor's may have a conspicuous ability to select high quality stocks with large value premiums for Index inclusion. In this chapter, I consider certification as a form of assurance, credibility and completeness of financial information from the equity holders' point of view.

asymmetry, I predict the Bid-Ask spreads to be lower during the post-inclusion period[28]. Second, if the Risk Reducing hypotheses are at least partially responsible for the Index inclusion premia, one would expect a significant association between the reduction in the Bid-Ask spread reduction and the cumulative abnormal returns surrounding the Index inclusion announcement dates. This chapter employs the methodology of Chang et al. (2006) to test *H2a* and by Beneish and Gardner (1995) to test *H2b*, stated formally as follows:

H2a: Increased liquidity, richer information environment and quality certification decrease firms' Bid-Ask spreads subsequent to Index inclusion event dates.

H2b: Risk Reducing hypotheses result in a negative association between Bid-Ask spread changes and cumulative abnormal returns around Index inclusion announcement dates.

2.3 Methodology

2.3.1 Cumulative Abnormal Returns

To identify the Index inclusion effect, I compute the market adjusted cumulative abnormal returns around the Index inclusion announcement (AD) and effective (ED) dates. I further verify these premia by using the OLS market model outlined by Campbell et al. (1992). Brown and Warner (1985) show that alternative measures such as the market adjusted model or OLS (Beta) adjusted model will exhibit similar

[28] I test this prediction by regressing the spread on a dummy variable that corresponds to various time intervals surrounding the event dates. The dummy variable also captures the effective change in Spread. Alternatively, one could test this prediction by using change in spread as a dependent variable; however, it would be difficult to establish a time interval over which the change in spread should be measured. In terms of causality, increased liquidity could lead to a reduced Bid-Ask spread or certification could reduce perceived information asymmetry.

ability to detect abnormal performance when it is present. Mean excess returns based on both models have been shown to follow normality assumption with sample size greater than 50 observations. Furthermore, Daves et al. (2000) have observed smaller standard error in beta estimated using smaller return intervals, such as daily returns. Since the buy-and-hold returns are most relevant to investors, I follow Teoh et al. (1998) and compute the *CARMBH* (market adjusted, buy-and-hold cumulative abnormal returns) by simply deducting the product of market daily returns (R_m, proxied by the return on S&P 500) from the product of firm daily return and average the differences across the corresponding time periods:

$$CARMBH_t = \frac{\sum_{i=1}^{N}\left[\prod_{t=-1}^{t-2}(1+R_{i,t}) - \prod_{t=-1}^{t-2}(1+Rm_t)\right]}{N}$$

The OLS market model assumes a linear relationship between the return of any security and the return of the market portfolio $R_{i,t} = \alpha_i + \beta_i Rm_t + \varepsilon_{i,t}$ where α_i is the intercept term, β_i is the market return slope coefficient, $R_{i,t}$ is a firms *i's* return on day *t*, Rm_t is the market return proxied by the S&P 500 Index return for day *t*, and $\varepsilon_{i,t}$ is the random disturbance term. Then the normal (expected) returns can be obtained from the relation $\hat{R}_{i,t} = \hat{\alpha}_i + \hat{\beta}_i Rm_t$ where the estimation period for this model begins 365 days (approximately 260 trading days) before and ends 10 trading days before the Index inclusion announcement dates. Consequently, the beta-adjusted buy-and-hold cumulative abnormal returns ($CARBBH_t$) can be computed as:

$$CARBBH_t = \frac{\sum_{i=1}^{N}\left[\prod_{t=-1}^{t-2}(1+R_{i,t}) - \prod_{t=-1}^{t-2}(1+\hat{R}_{i,t})\right]}{N}$$

Teoh et al. (1998) point out that the buy-and-hold definitions of CARs may be problematic because their distribution is skewed, small initial differences can be exaggerated through compounding, and time period overlap introduces a cross correlation problem. As a sensitivity analysis, I also compute simple cumulative abnormal returns (market-adjusted *CARM* and beta-adjusted *CARB*) by aggregating the excess returns over the corresponding event windows[29]:

$$CARM_t = \frac{\sum_{i=1}^{N}\left[\sum_{t=-1}^{t-2}(R_{i,t} - Rm_t)\right]}{N} \text{ and } CARB_t = \frac{\sum_{i=1}^{N}\left[\sum_{t=-1}^{t-2}(R_{i,t} - \hat{R}_{i,t})\right]}{N}$$

2.3.2 Abnormal Trading Volume

To provide evidence along the lines of Sui (2003), Chen et al. (2004), or Hedge and McDermott (2003) that document abnormal trading activity around AD and ED and a significant permanent increase in trading volume subsequent to Index inclusion[30], I follow methodology of Sui (2003) to define the excess volume ($EV_{i,t}$) for stock *i* on day *t* as:

$$EV_{i,t} = \frac{V_{i,t} - AV_{i,t}}{AV_{i,t}} - \frac{V_{m,t} - AV_{m,t}}{AV_{m,t}}$$

where $V_{i,t}$ and $V_{m,t}$ are the stock's and market raw volumes on day *t* respectively. The normal firm's volumes ($AV_{i,t}$) and normal market volumes ($AV_{m,t}$) are defined as average daily firm volumes and daily market volumes over the 10 trading days prior to Index inclusion announcements respectively. The definition of $EV_{i,t}$ can be interpreted as the percentage increase in firm *i*'s volume less the percentage increase

[29] Throughout this thesis, I use comparable abnormal return models to compute the Index inclusion premia and ensure that my results are robust to all these definitions.

[30] The liquidity hypothesis finds empirical support in only these more recent, comprehensive studies. Prior to 2000, Kaul et al. (2000) find no significant changes in the Bid-Ask spreads around ostensibly information-free event dates that cause changes in stock supply (based on TSE300 firms). Erwin and Miller (1998) examine S&P 500 index additions and find that stocks that are trading listed options do not experience a significant decrease in Bid-Ask spreads. Even though these stocks experience a significant and permanent increase in trading volume, they experience a significant but only temporary increase in share price. Beneish and Whaley (1996) suggest that the bid-ask spreads are not permanently reduced following S&P addition. Blitzer and Dash (2004) and Jain (1987) find that an index inclusion effect of similar magnitude to the S&P 500 index effect is evident in other indices that are not followed by heavy index tracking funds. These results all provide evidence counter to the liquidity hypothesis.

in market volume on day t. The mean excess volume (MEV_t) for all stocks added into the S&P 500 Index on each trading day is then defined as:

$$MEV_t = \frac{\sum_{i=1}^{n} EV_{i,t}}{N}$$

For illustrative purposes, when I plot the values of daily mean excess returns around AD and ED in Figure 2-3, I add 1 to the mean excess volume definition. To analyze future levels of abnormal volume, I first average a firm's excess volumes over various time intervals and then report the means and medians of the corresponding values. The average excess volume for firm i over an interval t can be defined as:

$$AEV_i = \frac{\sum_{t=1}^{T} EV_t}{T}$$

2.3.3 Risk Reducing Hypotheses

Similar to previous analysis, I find that the long-run trading activity significantly increases from the pre-inclusion to the post-inclusion period for newly added firms. In this chapter, I am further interested whether there is a corresponding decrease in the Bid-Ask spread and whether the spread changes are associated with abnormal returns around Index inclusion announcement dates. I employ a methodology used in Chang et al. (2006) to examine changes in quoted relative Bid-Ask spreads for the S&P 500 newly added firms before and after the Index inclusion announcement dates. I improve the set of control variables (Variability and Volume) in Chang et al.'s cross-sectional analysis by incorporating Price as an additional regressor[31]. Price has been found to significantly account for the variation in a spread. Since the spread was

[31] See for example Glosten and Harris (1988), Stoll (1978) or Benston and Hagerman (1974). Other factors such as insider ownership concentration are positively related to the bid-ask spread whereas average trade frequency and average trade size are negatively related to the spread. In this chapter, I do not examine these variables, just point out their potential significant explanatory power.

quoted in \$1/8 before 2001 (Bid-Ask quotes were changed to decimal pricing on January 29, 2001), low priced shares may have larger relative spreads then high priced shares. Second, since my Bid-Ask definition scales the spread by share price, firms with larger prices may have a lower spread. Lastly, Stoll (1978, 1989) suggests that price is negatively correlated with risk of a stock. As a result, price may include a risk that is not reflected in return variability. I expect the sign of Price to be negative.

Similar to Welker (1995), I do not include any variables representing the effects of competition in the market to provide liquidity (number of market makers that applies only to NASDAQ firms) because both the Added and the Control firms are large firms with high liquidity, for which large variation in the competitiveness in the market for liquidity provision is not expected. In the following regression (1), I include a dummy variable *EventDate* which equals one during the post-Index inclusion event period (starting on the event date) and zero during the pre-inclusion period; both of which are equal in length. This variable is important as its coefficient determines whether firms' spread decreases (negative coefficient) subsequent to the Index inclusion event date. Following Stoll (1978), I use the conventional log-linear specifications of all variables in the following regression to test *H2a*:

$$SPREAD = \alpha_0 + \beta_1 * EventDate + \beta_2 * Volume + \beta_3 * Return\,Variability + \beta_4 * Price + \varepsilon \;\ldots\ldots \; (1)$$

Where *SPREAD*	= the log of [2*(Ask-Bid) / (Ask+Bid)];
Event Date	= a dummy variable equals 1 if t lies in the event window (0+ X month) and zero if it lies outside the event window (-X month,-1 month).
Volume	= the log of total number of shares traded for the company;
Return Variability	= the log of square of stock return;
Price	= the log of the closing day's market price;

I examine various time intervals surrounding the event dates, ranging from one month to one year before and after Index inclusion, and report results of several regressions.

As a next step, I simultaneously consider the effects of abnormal demand shock and increased liquidity (or reduced information asymmetry) in a cross-sectional setting. If known ex ante that Index inclusion results in greater institutional interest (and consequent increased market scrutiny), a richer information environment, and higher liquidity with a higher trading volume, investors would likely capitalize these reduced costs around the announcement dates. To test whether the Risk Reduction hypotheses are collectively potentially responsible for the Index inclusion premia (*H2b*), I examine the association between the Bid-Ask spread changes and the cumulative abnormal returns surrounding the Index inclusion announcement dates. Using the same time intervals over which I define the corresponding changes in spread, I evaluate a cross-sectional test similar to Beneish and Gardner (1995) to test whether the average change in spread is significantly related to the Index inclusion premia after controlling for the current and future trading activity. More specifically:

$$CARMBH_i = \alpha_0 + \beta_1 * AEVAD3_i + \beta_2 * AEVAL_i + \beta_3 * \Delta SPREAD_i + \varepsilon_i \quad \text{(2)}$$

Where $CARMBH_i$ = is a measure of CAR3 (average cumulative abnormal returns during ±1 trading day around the Index inclusion announcement date [AD-1, AD+1]. CAR 33 (63) aggregate additional 30 and 60 trading days to this interval [AD+1, AD+31] and (AD+1, AD+61), respectively.

$AEVAD3$ = three day average excess volume around Index inclusion announcement dates [AD-1, AD+1].

$AEVAL_i$ = is a measure of firm *i*'s average excess volume during 60 days subsequent to Index inclusion effective date [ED+2, ED+62]. This variable represents the aggregate measure of the future trading volume.

$\Delta SPREAD_i$ = is a change in the average Bid-Ask spread (see definition in regression 1) calculated over the 6 months pre- to 6 months post-Index inclusion AD period. A negative *ΔSPREAD* corresponds to a decrease in spread from pre- to a post- Index inclusion period.

As part of the sensitivity analysis, I also estimate the spread averages over shorter (+/- 3 months) as well as longer intervals (+/- 9 months) surrounding the inclusion announcement dates when computing the *ΔSPREAD* variable. If any of the Risk Reduction hypotheses is potentially responsible for the Index inclusion premia, one would expect *ΔSPREAD* coefficient to be negative and significant. The three-day average excess volume around AD (*AEVAD3*) is a proxy for abnormal volume (downward-sloping LRDC). If the abnormal returns are predominantly driven by the abnormal volume around AD, the downward-sloping LRDC would be supported, provided that the three-day abnormal volume also relates to the permanent abnormal returns (CAR33 and CAR63). Otherwise, the permanent abnormal returns are likely attributable to the alternative explanations. Lastly, I include a sixty-day average excess volume (*AEVAL*) as proxy for the future liquidity in regression (2) to test whether the long-run average excess volume alone is responsible for various levels of abnormal returns. Beneish and Gardner (1995) tested a similar regression and found that the three-day market price reaction (proxied by cumulative prediction errors) is not significantly related to proxies for imperfect substitutes (*AEVAD3*), but rather predominantly to the changes in the Bid-Ask spread. Accordingly, the authors reject the downward-sloping LRDC as a viable explanation for abnormal returns associated with deletions from the DJIA index.

2.4 Sample Construction

When analyzing trading volume, Bid-Ask spreads, and price effects around the two event dates, I restrict the sample period for 1989-2004. Starting October 1989, the S&P pre-announces the Index changes and the announcement dates (AD) do not coincide with effective dates of addition (ED). I use the firms from samples identified by Denis et al. (2003) and Wurgler and Zhuravskaya (2002) as "clean" additions[32]. Their samples are only available until 1999. Standard and Poor's provides information on the S&P 500 Index changes from the year 2000 onwards. I have collected a new sample of Index additions from the Standards and Poors' website for the second period (2000-2004). Consistent with prior research, I have searched press releases in Factiva for announcement dates and the reasons for Index changes. After I eliminate Added firms which resulted from spin-offs, name changes or mergers and acquisitions, I am left with 306 Index additions. After all data requirements to compute volume and Bid-Ask spreads are satisfied, I am left with 241 observations for the volume analysis and 239 observations for the Bid-Ask spread analysis. Firms that are considered for Index inclusion by the S&P 500 committee are ideal candidates for a control sample, as they all meet various Index inclusion criteria, and therefore reduce the number of variables that I would have to control for had I used all available firms. In this chapter as well as in Chapters 3 and 4, I compare the abnormal returns of the Added group with abnormal returns of Control firms in the same industry that have met all the Index inclusion criteria, but were not included in the Index. Firms considered for inclusion into the S&P 500 must fulfill all of the inclusion criteria, which are publicly available. My control sample includes firms satisfying all criteria on the relevant dates. The criteria are: U.S. companies, liquidity, size, financial viability, public float, sector balance, seasoned stocks, and operating

[32] "Clean" sample refers to additions that do not result from spin-offs, name changes or mergers and acquisitions (this sample composition is consistent with Denis et al., 2003 and others).

company (see Exhibit-1 in the Appendices). The ratio of Control (eligible) firms to Added firms is approximately four to one. Table 2-1 provides a reconciliation of the firms ultimately included in the Added samples.

2.5 Analysis of Results

2.5.1 Analysis of Cumulative Abnormal Returns

This section documents the inclusion premia surrounding the Index inclusion announcement and effective dates. I am interested in abnormal returns surrounding the Index inclusion dates AD and ED, and their subsequent persistence. I define CAR3 as average cumulative abnormal returns during ± 1 trading day around the event day [D-1, D+1], where D stands for either AD or ED. CAR 30 (60) represents CAR during 30 (60) trading days subsequent to the event day [D+1, D+31] (D+1, D+61), and CAR 33 (63) represents CAR from day -1 to day +31 (+61) around the event date [D-1, D+31] and (D-1, D+61) respectively. This methodology identifies previously documented Index inclusion premia (CAR3 around AD). Table 2-2 compares the Index inclusion premia around AD and around ED on a yearly basis, whereas Table 2-3 compares the yearly abnormal returns around AD between Added and Control firms. Figures 2-2.A and 2-2.B then provide a corresponding graphical illustration of these results. Consistent with Table 1-1 in Chapter 1, Index inclusion premia have been growing over time until 2000 at which point their levels decreased[33]. For a period during 1989-2004, Table 2-2 reports significant abnormal returns of 4.90% that persist not only for 30 days (5.04%, p-value < 0.01) but also for

[33] These ultimate results are robust to alternative definitions of average cumulative abnormal returns (market-adjusted and beta-adjusted CARs as in Teoh et al., 1998) as well as to average abnormal returns defined using alternate proxies for market return (equal-weighted and value-weighted market returns).

60 days (5.55%, p-value < 0.01) subsequent to AD[34]. Then, consistent with Blitzer and Dash (2004), the table shows that the excess returns have actually diminished, especially during 2002-2004. Most importantly, the excess returns around AD remain significantly higher for Added firms than for the Control firms in almost all years (Table 2-3).

A second important result from Table 2-2 are the abnormal returns around ED. Added firms experience significant average CAR3 of 2.87% (p-value < 0.01) that significantly decrease during the next 30-trading days (-1.86%, p-value 0.04). Overall, CAR33 around ED are not statistically significantly different from zero (0.91%, p-value 0.13), which suggests a complete price reversal in the short-run. Therefore, the Price Pressure hypothesis is the most likely explanation for the abnormal returns around ED. The demand shock at ED appears to have no long-term impact on the CAR persistence and the prices return back to the pre-ED levels. CARs around the Index inclusion announcement dates are persistent, however. While the complete price reversal around ED supports the Price Pressure hypothesis; it does not refute the remaining three hypotheses whose predicted permanent positive returns are more likely to be evident at AD[35]. The following sections review evidence that can delineate the appropriateness of the Risk Reduction hypothesis relative to the Long-run Downward Sloping Demand Curve.

2.5.2 Analysis of Trading Activity

I present the trading volume results in Table 2-4 and provide a graphical illustration of daily mean excess volumes around AD and ED in Figures 2-3.A and 2-3.B

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[34] I do not examine any longer return persistence after 60-days subsequent to Index inclusion, Wurgler and Zhuravskaya (2002) point out that a noise added by new fundamental news subsequent to CAR3 makes inferences of the long-run abnormal returns increasingly difficult to interpret.

[35] I acknowledge that the returns around AD and ED are significantly positively correlated with each other. The return reversal around ED could therefore be also related to that of AD.

respectively. I analyze ten-day intervals subsequent to ED and compare them to the normal volume prior to AD. I define *AEVAD3* as the firm's three-day average excess volume (AEV) around Index inclusion announcement dates and *AEVED3* as the three-day AEV around Index inclusion effective dates. AEV10 represents the average excess volume during the first 10 normal trading days subsequent to Index inclusion effective date (ED). AEV20 represents the average excess volume during 12-21 trading days subsequent to ED. *AEV30-60* can be interpreted likewise. *AEVAL* represents the average excess volume during the first 60 trading days subsequent to Index inclusion effective date and represents the aggregate measure of the firm's future trading volume. Results in Table 2-4 and Figure 2-3 show that the trading activity significantly (AEV) increases around AD (mean value 2.641, $p<0.01$) and ED (mean value 7.811, $p<0.01$), although there are larger abnormal returns at AD, the mean excess volume is smaller in magnitude around AD than around ED). Harris and Gurel (1986) attribute these findings of abnormal trading activity around AD and ED to large trades associated with Index fund re-balancing. This result is also consistent with Blume and Edelen (2003) who suggest that indexing investors drive the large trading volume at ED, and if so, the increased trading at AD, and accompanying price effect may anticipate the entry of the index funds. A few days after the ED, the trading activity levels out at trading volume that is significantly larger than prior to AD (40.8% larger for mean values and 27.5% for median of average values)[36]. Index inclusion announcements always occur after the close of trading hours, so it is no surprise to see that the volume increases rapidly one day following the day of announcement. As Index tracking funds buy and hold the newly added stocks, they decrease the overall liquidity by reducing the free-float (number of shares issued

[36] These results are comparable to those by Hedge and McDermott (2003), who document a permanent mean increase of 27% in the post-period standardized trading volume for Index additions.

available to ordinary investors less the strategic holdings). Therefore, the increase in excess volume subsequent to Index inclusions is even stronger given the smaller float.

To summarize, based on the results in Table 2-2 along with the analysis of abnormal volume in Figure 2-3, I find supporting evidence for the Price Pressure hypothesis for abnormal returns around ED. There is a significant abnormal trading activity around both AD and ED that is accompanied by significant abnormal returns around both event dates and that persists in the long run. The abnormal returns around the ED event are completely reversed within 30 days after ED consistent with Price Pressure explanation. Although the trading volume is larger around ED than around AD, the abnormal returns are larger and permanent around AD and lower and temporary around ED. The Downward-sloping LRDC, Price Pressure and the Information Content hypotheses would predict a return to normal volume once the volume effect from index funds wears off (Price Pressure) or once the new information is completely impounded in prices (Information Content). Only Risk Reducing hypotheses would suggest, based on greater liquidity and lower transaction costs, an increase in subsequent volume. The fact that the float is reduced subsequent to ED, the observed increases in volume make the other hypotheses to be even less likely associated with the Index inclusion premia. I do not analyze the Information Content hypothesis in this chapter; the subsequent two chapters provide evidence that Index inclusion announcements convey no fundamental news about firms' future cash flows, thereby rejecting this explanation.

2.5.3 Analysis of Bid-Ask Spread Changes:

The evidence of abnormal price and volume for added firms is so far consistent with previous findings supporting the Risk Reduction hypotheses (Liquidity or Certification). This section examines changes in Bid-Ask spread for the newly added firms. Comparable to Stoll (1978) and McInish and Wood (1992) that spreads decrease with trading volume, I find significantly lower Bid-Ask spread during the post-Index inclusion period. Similar to Chang et al. (2006), I analyze event windows of multiple lengths surrounding the AD and ED dates. Table 2-5 summarizes the results. Every left column corresponding to a different time interval suggests that Bid-Ask spreads significantly decrease subsequent to the particular event date (Panel A for AD and Panel B for ED). Examining the right columns with regression coefficients of each time interval, I document predicted influence of the individual variables components on firms' Bid-Ask spreads. In particular, contrary to Chang et al., I document a negative coefficient on Volume, consistent with its theoretical prediction. More importantly, in the simple regressions without the control variables (all left columns) the quoted relative Bid-Ask spread significantly decreases from the pre-inclusion to the post-inclusion period, regardless of which time interval is chosen. Adding controls, I find that for the shorter time intervals surrounding the event dates, the results actually suggest that the spreads (after controlling for appropriate variables) increase during the three-month period surrounding the event dates. However, when I analyze longer intervals (6-12 months), the coefficient for the dummy variable *EventDate* is negative as predicted and statistically significant at the one percent level, indicating that long-term average spread narrows in the post-inclusion period[37].

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[37] The short term increase in spread may be explained by Kim and Verrecchia (1994) who model information asymmetry on the earnings announcement dates and document a significant post-announcement increase in Bid-Ask spreads. If Index inclusion announcements are perceived as indicators about firms' future performance and if investors differ in their ability to process that information, the spread may temporarily increase around the event dates as some traders with superior information-processing ability exploit a short-term informational advantage. However, as the window around the announcement dates (over which the spreads are measured) widens, the immediate market reaction along with its immediate effect on spread washes out and the overall decrease in spread prevails. Lastly, I have included the interaction terms (EventDate*Price and EventDate*ReturnVariability) to control for the likely variation in the slope coefficient of the variables Price and ReturnVariability that vary for different time intervals. Non-tabulated results are robust to the presented findings.

2.5.4 Relation between CAR, Volume and Bid-Ask Spread

To complete the Bid-Ask spread analysis and to delineate which variables explain the Index inclusion premia, I specify a cross sectional model to simultaneously evaluate the volume and Bid-Ask spread effects on various intervals of cumulative abnormal returns around Index inclusion AD. The estimation results of several specifications of regression (2) are summarized in Table 2-6, Panel A. It is evident that during 1989-2004, the three day abnormal returns (CAR3) around AD are significantly related to the three-day mean excess volume around AD (β_1 coefficient of 0.003 significant at 1% level). As a sensitivity analysis, Panels B and C further confirm this result for shorter and longer time intervals around AD respectively.

However, this result alone does not fully support the Downward-sloping LRDC hypothesis. The downward-sloping demand curve, although arguably supported for CAR3, is likely not a dominant explanation for the permanent Index inclusion premia (CAR33 and CAR63). These permanent abnormal returns measured at AD are not significantly (positively) related to the three-day abnormal mean excess volume (*AEVAD3*) at all. Both CAR33 and CAR63 are driven by the average decreases in subsequent Bid-Ask spreads relative to pre-announcement Bid-Ask spreads measured over six months on either side of AD (approximately -0.09 for CAR33 and -0.19 for CAR63 regressions respectively, both significant at 1% levels). These results hold when using alternative time intervals to define changes in spread (Panels B and C). Similar to Beneish and Gardner (1995), these results suggest that the Risk Reduction hypotheses, rather than the downward-sloping LRDC, are responsible for the permanent Index inclusion premia. These results may appear surprising. A cautionary note arises from the fact that CAR3 are weakly correlated with CAR33 (both Spearman and Pearson about 0.21); and are not correlated with CAR63 at all. CAR33 are correlated strongly with CAR63 (both Spearman and Pearson about 0.70). While the Initial Index inclusion abnormal return may be driven by the initial demand shock, the long-run effect appears to be better linked to the Risk Reduction hypotheses.

Authors, such as Wurgler and Zhuravskaya (2002), point out that the long-run inference of abnormal returns is notoriously difficult and that the initial abnormal return becomes quickly swamped by the noise added by new fundamental news arriving every day subsequent to Index inclusion announcement dates. Therefore, it is difficult to conclude with certainty whether one hypothesis dominates the other for various interval measurements of abnormal returns. The Index inclusion premium puzzle refers to the unexplained permanent effect[38] (effect persisting for at least 30 days (CAR33), not a three-day abnormal return around the AD). Furthermore, given the presence of increased liquidity and lower Bid-Ask spreads (consistent with the view that liquidity affects spread), I attribute evidence in this chapter in favour of the Risk Reducing hypotheses as being the primary explanations behind the abnormal returns, rather than the downward-sloping demand curve. In Chapter 5, I provide further evidence that the abnormal returns do not vary with firms' available substitutes. This result further strengthens the conclusion that the downward-sloping demand curve is not a primary explanation behind the permanent abnormal returns.

2.6 Conclusion and Discussion

This chapter provides a detailed overview of the Index inclusion effect and examines various explanatory hypotheses. Contributing to the unresolved debate explaining the Index inclusion premia, my findings support the Risk Reducing hypotheses. I

[38] If CAR3 were completely unrelated to the long-term abnormal returns (CAR33 and 63), the Price Pressure hypothesis could also be arguably applied in explaining the Index inclusion effect. I acknowledge that the initial market reaction could be quickly arbitraged away and the future permanent abnormal returns (CAR33 and CAR63, unrelated to CAR3) could arise as a consequence of changes to various components of the pricing formula.

document significant abnormal price returns as well as abnormal trading activity around both AD and ED. While the trading activity is higher subsequent to ED, the persistence levels of the abnormal returns differ, however. Positively significant, but temporary, abnormal returns evident at the Index inclusion effective date (ED), appear to be driven directly by Index tracking funds and are consistent with the Price Pressure hypothesis. These abnormal returns at the ED are completely reversed within 30 days. The positive abnormal returns at the inclusion announcement date (AD) appear permanent.

This chapter further analyzes Bid-Ask spread changes relative to the AD event. I find that consistent with the Risk Reduction hypotheses, but contrary to the Long-run Downward Sloping Demand Curve hypothesis, the quoted relative spread decreases subsequent to AD, and that this decrease is positively correlated with the permanent cumulative abnormal returns associated with the Index inclusion. Although the three day abnormal returns (CAR3) around AD are significantly related to the three-day mean excess volume around AD (supporting imperfect substitutes), the permanent abnormal returns (CAR33 and CAR63) around AD are mainly driven by the changes in Bid-Ask spread, whether one controls, or not, for the mean excess volume variables. This decrease in spread may be attributable to either lower direct trading costs or a reduction in perceived information asymmetry. These in turn may be attributable to various factors such as greater institutional interest (and consequent increased market scrutiny), richer information environment, and higher liquidity due to higher trading volume.

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2.8 Tables

Table 2-1: Sample composition of newly added firms to the S&P 500 Index and the Control sample during 1987-2004

	ADDED Firms = Firm-Years		CONTROL Firms / Firm-Years		Total Firm-Years	
Period 1 (1987-1999); Period 2 (2000 - 2004)	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2
Initial search for S&P 500 additions (1987-1999; 2000-2004)	327	138				
Eliminating mergers and takeovers	(31)	(12)				
Eliminating spin-offs	(26)	(14)				
Reconciliation and other (1)	(23)					
Firms included prior to 1989	(53)					
Added firms and firms satisfying all Inclusion criteria (1989-2004)	**194**	**112**	**130 / 685**	**145 / 555**	**879**	**667**
Additional data availability and requirements						
Data missing for the Volume analysis	(65)		N/A			
Data missing for the Bid-Ask spread analysis	(2)		N/A			
Available data for Volume and Bid-Ask spread analysis	**239**		**N/A**		239	

Table 2-2: Cumulative abnormal returns around the Index inclusion announcement and effective inclusion dates

This table compares cumulative abnormal returns (CARs) for the newly added S&P 500 companies on the Index inclusion announcement dates (AD) and Index inclusion effective dates (ED). Using the standard event methodology and market model, the market adjusted, buy-and-hold, cumulative abnormal returns (CARs) are computed using daily firm and market returns from CRSP database (Equation 1). The market return ($Rm_{i,t}$) is represented by the S&P 500 Index return. The average of the differences between CARs (AD) and CARs (ED) are shown in the DIFF columns. CAR 3 represents cumulative abnormal return during ± 1 trading day around the event day [D-1, D+1]; CAR 30 (60) represents CAR during 30 (60) trading days subsequent to the event day [D+1, D+31] and (D+1, D+61); CAR 33 (63) represents CAR from day -1 to day +31 (+61) around the event date [D-1, D+31] and (D-1, D+61).

YEAR	CAR3 AD	CAR3 ED	DIFF	CAR30 AD	CAR30 ED	DIFF	CAR33 AD	CAR33 ED	DIFF	CAR60 AD	CAR60 ED	DIFF	CAR63 AD	CAR63 ED	DIFF	n AD	n ED
1987	5.16%	5.16%	0.00%	0.67%	0.67%	0.00%	5.78%	5.78%	0.00%	6.63%	6.63%	0.00%	11.88%	11.88%	0.00%	21	21
1988	3.86%	3.86%	0.00%	1.66%	1.66%	0.00%	5.57%	5.57%	0.00%	-0.41%	-0.41%	0.00%	3.30%	3.30%	0.00%	24	24
1989	2.80%	3.45%	-0.65%	0.38%	-1.70%	2.08%	3.22%	1.81%	1.41%	3.06%	2.45%	0.61%	5.99%	6.21%	-0.22%	25	26
1990	2.32%	2.23%	0.09%	-1.51%	-4.95%	3.44%	0.80%	-2.79%	3.59%	-8.36%	-10.58%	2.22%	-6.04%	-8.48%	2.44%	9	9
1991	5.88%	5.06%	0.82%	5.35%	0.34%	5.01%*	11.55%	5.42%	6.13%***	0.02%	-5.12%	5.14%*	5.89%	-0.48%	6.37%***	9	9
1992	4.66%	3.38%	1.28%	-0.03%	-4.11%	4.08%*	4.70%	-0.99%	5.69%*	-2.03%	-2.30%	0.27%	2.67%	0.89%	1.78%	6	6
1993	5.81%	4.57%	1.24%	3.48%	1.36%	2.12%	9.24%	6.01%	3.23%	5.82%	2.59%	3.23%	11.52%	7.15%	4.37%	7	7
1994	2.77%	1.02%	1.75%**	-1.13%	-3.25%	2.12%	1.53%	-2.33%	3.86%*	-4.18%	-5.70%	1.52%	-1.74%	-4.95%	3.21%**	13	13
1995	4.98%	2.82%	2.16%**	-2.94%	-3.14%	0.20%	2.02%	-0.35%	2.37%	-2.44%	-4.99%	2.55%	2.42%	-2.46%	4.88%**	20	20
1996	4.13%	2.59%	1.54%	1.46%	-0.52%	1.98%	5.60%	1.85%	3.75%**	3.67%	0.18%	3.49%	7.90%	2.49%	5.41%***	17	17
1997	7.12%	6.20%	0.92%**	-0.18%	-2.03%	1.85%*	6.75%	4.01%	2.74%***	-2.46%	-3.08%	0.62%	4.39%	2.90%	1.49%**	23	23
1998	6.84%	3.89%	2.95%*	-3.03%	-6.11%	3.08%**	3.47%	-2.58%	6.05%***	-4.04%	-7.86%	3.82%**	2.81%	-4.38%	7.19%***	33	33
1999	6.28%	3.38%	2.90%*	1.11%	-1.23%	2.34%	7.22%	2.47%	4.75%**	3.63%	4.13%	-0.50%	9.90%	8.33%	1.57%	34	34
2000	6.75%	2.30%	4.45%***	3.61%	0.94%	2.67%	10.38%	3.02%	7.36%**	4.57%	4.30%	0.27%	11.16%	6.14%	5.02%**	45	45
2001	1.95%	-0.20%	2.15%**	-1.72%	-0.13%	-1.59%	-0.29%	-0.57%	0.28%	2.20%	3.27%	-1.07%	3.47%	2.54%	0.93%	23	23
2002	3.96%	2.51%	1.45%	1.29%	-2.27%	3.56%**	5.19%	0.05%	5.14%***	1.91%	-0.85%	2.76%*	5.75%	1.51%	4.24%***	20	20
2003	1.49%	-0.18%	1.67%	-3.13%	-3.08%	-0.05%	-1.91%	-3.35%	1.44%	-3.46%	-3.04%	-0.42%	-2.19%	-3.26%	1.07%	7	7
2004	2.78%	1.95%	0.83%	-0.27%	-2.59%	2.32%	2.49%	-0.67%	3.16%*	2.50%	0.77%	1.73%	5.37%	2.80%	2.57%	15	15
1989-2004	**4.90%*** **	**2.87%*** **	**2.03%*** **	**0.25%**	**-1.86%** **	**2.11%*** **	**5.04%*** **	**0.91%**	**4.13%*** **	**0.76%**	**-0.63%**	**1.39%** **	**5.55%*** **	**2.11%**	**3.44%*** **	306	307

*, ** and *** in the DIFF column indicate significance from zero (two-tailed paired comparison t-test) at better than 10%, 5% and 1% levels respectively. *, ** and *** in the last row indicate significance from zero (one sample, two-tailed t-test) at better than 10%, 5% and 1% levels respectively.

Table 2-3: Cumulative abnormal returns around the Index inclusion announcement dates for Added and Control firms

This table compares cumulative abnormal returns (CARs) on S&P 500 Index inclusion announcement dates between newly added companies (Added) and other firms (Control) that satisfy all Index inclusion criteria, however, were not added into the Index. Using the standard event methodology and market model, the market adjusted, buy-and-hold, cumulative abnormal returns (CARs) are computed using daily firm and market returns from CRSP database (Equation 1). The market return ($Rm_{i,t}$) is represented by the S&P 500 Index return. CAR 3 represents cumulative abnormal return during ± 1 trading day around the Index inclusion announcement day [AD-1, AD-1]; CAR 30 (60) represents CAR during 30 (60) trading days subsequent to the announcement day [AD+1, AD+31] and (AD+1, AD+61); CAR 33 (63) represents CAR from day -1 to day +31 (+61) around the announcement day [AD-1, AD+31] and (AD-1, AD+61).

YEAR	CAR3 Added	CAR3 Control	Pr > |t|	CAR30 Added	CAR30 Control	Pr > |t|	CAR33 Added	CAR33 Control	Pr > |t|	CAR60 Added	CAR60 Control	Pr > |t|	CAR63 Added	CAR63 Control	Pr > |t|	n A	n C
1987	5.16%	0.50%	0.001	0.67%	-0.16%	0.638	5.78%	0.34%	0.005	6.63%	2.24%	0.114	11.88%	2.74%	0.001	21	57
1988	3.86%	-0.31%	0.001	1.66%	-0.86%	0.155	5.57%	-1.17%	0.001	-0.41%	-1.02%	0.780	3.30%	-1.33%	0.036	24	50
1989	2.80%	0.03%	0.001	0.38%	2.36%	0.365	3.22%	2.41%	0.727	3.06%	0.74%	0.370	5.99%	0.81%	0.064	25	65
1990	2.32%	-0.29%	0.112	-1.51%	-1.33%	0.958	0.80%	-1.63%	0.512	-8.36%	-3.93%	0.410	-6.04%	-4.27%	0.756	9	19
1991	5.88%	0.62%	0.017	5.35%	-3.49%	0.017	11.55%	-2.85%	0.004	0.02%	-4.70%	0.470	5.89%	-4.01%	0.186	9	5
1992	4.66%	-1.33%	0.030	-0.03%	0.08%	0.980	4.70%	-1.15%	0.302	-2.03%	0.58%	0.753	2.67%	-0.67%	0.708	6	10
1993	5.81%	0.81%	0.001	3.48%	-1.33%	0.141	9.24%	-0.51%	0.003	5.82%	-0.69%	0.198	11.52%	0.11%	0.018	7	14
1994	2.77%	-0.49%	0.002	-1.13%	1.04%	0.524	1.53%	0.64%	0.805	-4.18%	1.94%	0.132	-1.74%	1.51%	0.424	13	38
1995	4.98%	0.40%	0.001	-2.94%	0.54%	0.109	2.02%	0.94%	0.639	-2.44%	2.17%	0.117	2.42%	2.58%	0.958	20	94
1996	4.13%	-0.44%	0.001	1.46%	1.77%	0.919	5.60%	1.31%	0.153	3.67%	-0.02%	0.344	7.90%	-0.31%	0.048	17	83
1997	7.12%	-0.24%	0.001	-0.18%	1.05%	0.545	6.75%	0.80%	0.006	-2.46%	3.43%	0.071	4.39%	3.20%	0.719	23	119
1998	6.84%	-1.21%	0.001	-3.03%	-2.71%	0.898	3.47%	-3.89%	0.005	-4.04%	-4.79%	0.837	2.81%	-6.02%	0.021	33	131
1999	6.28%	1.32%	0.001	1.11%	4.94%	0.318	7.22%	6.53%	0.872	3.63%	11.57%	0.258	9.90%	13.64%	0.623	34	113
2000	6.75%	-0.99%	0.001	3.61%	-2.80%	0.116	10.38%	-3.71%	0.001	4.57%	0.44%	0.416	11.16%	-0.94%	0.020	45	283
2001	1.95%	-1.30%	0.020	-1.72%	-3.78%	0.643	-0.29%	-5.29%	0.229	2.20%	-7.03%	0.081	3.47%	-8.58%	0.016	23	77
2002	3.96%	0.98%	0.003	1.29%	-1.53%	0.280	5.19%	-0.65%	0.025	1.91%	-2.04%	0.396	5.75%	-1.20%	0.136	20	60
2003	1.49%	0.02%	0.203	-3.13%	-2.10%	0.690	-1.91%	-2.07%	0.951	-3.46%	-1.51%	0.500	-2.19%	-1.43%	0.813	7	38
2004	2.78%	0.11%	0.001	-0.27%	-2.14%	0.496	2.49%	-2.09%	0.092	2.50%	-1.10%	0.330	5.37%	-1.02%	0.089	15	97
1989-2004	**4.90%*****	**-0.30%**	**0.000**	**0.25%**	**-0.64%**	**0.382**	**5.04%*****	**-0.91%**	**0.000**	**0.76%**	**0.40%**	**0.799**	**5.55%*****	**0.08%**	**0.000**	306	1240

*, ** and *** indicate significance from zero (one sample, two-tailed t-test) at better than 10%, 5% and 1% levels respectively. The p-values test whether the mean for CARs is same for Added and for Control group.

Table 2-4: Volume subsequent to Index inclusion effective dates

This table shows mean and median values of the firms' average excess volumes prior and subsequent to Index inclusion event date for the period 1989-2004. The average excess volume (AEV) for firm *i* over the interval *t* is defined as: $AEV_i = \frac{\sum_{t=1}^{T} EV_t}{T}$ where $EV_{i,t} = \frac{V_{i,t} - AV_{i,t}}{AV_{i,t}} - \frac{V_{m,t} - AV_{m,t}}{AV_{m,t}}$.

$V_{i,t}$ and $V_{m,t}$ are the stock's and market volumes on day *t* respectively, and $AV_{i,t}$ and $AV_{m,t}$ are the ten day averages of normal stock's and market volumes before Index inclusion announcement date (AD) respectively. AEVAD3 represents firm's three-day average excess volume (AEV) around Index inclusion announcement dates whereas AEVED3 represents the three-day AEV around Index inclusion effective dates. AEV10 represents the average excess volume during the first 10 normal trading days subsequent to Index inclusion effective date (ED). AEV20 represents the average excess volume during 12-21 trading days subsequent to ED. *AEV30-60* can be interpreted likewise. *AEVAL* represents the average excess volume during the first 60 trading days subsequent to Index inclusion effective date and represents the aggregate measure of the firm's future trading volume. Figure 2-3.A. then shows the average daily graphical illustration of the mean excess volumes. Column I reports the average values across the 241 observations whereas column II reports the medians. The significance of the mean (median) is tested with a standard t-test (sign test).

	I	II	
Variable [Interval]	Mean	Median	N
Normal [AD-10; AD-1]	0.000	0.000	241
AEVAD3 [AD-1;AD+1]	2.641***	1.043***	241
AEVED3 [ED-1;ED+1]	7.811***	5.667***	241
AEV10 [ED+2; ED+11]	0.725***	0.444***	241
AEV20 [ED+12; ED+21]	0.417***	0.141***	241
AEV30 [ED+22; ED+31]	0.296***	0.138***	241
AEV40 [ED+32; ED+41]	0.331***	0.134***	241
AEV50 [ED+42; ED+51]	0.350***	0.190***	241
AEV60 [ED+52; ED+61]	0.328***	0.226***	241
AEVAL [ED+2; ED+61]	0.408***	0.275***	241

*, ** and *** represent significance from zero at 10%, 5% and 1% respectively.

Table 2-5: Regression analysis of Bid-Ask Spread (Certification) for newly added firms into the S&P 500 Index

Using various event window intervals, this table shows regression results of Bid-Ask spread for newly added firms into the S&P 500 Index around Index inclusion announcement dates (AD) in Panel A and around Index inclusion effective dates (ED) in Panel B for a period during 1989-2004. Before October 1989, AD and ED coincided with the same date. The average number of days represents number of observations for each firm within a particular time interval around the event date. Variables are defined in Panel B.

Panel A: $SPREAD = \alpha_0 + \beta_1{*}AD + \beta_2{*}Volume + \beta_3{*}Return\ Variability + \beta_4{*}Price + \varepsilon$

Event Window		Pred.	(+/-) 1 month		(+/-) 3 months		(+/-) 6 months		(+/-) 9 months		(+/-) 12 months	
Variable	Coeff.	Sign	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Constant	α_0		-5.4652***	4.0804***	-5.4468***	4.2240***	-5.4041***	4.1266***	-5.3788***	4.0129***	-5.2353***	3.1438***
Event Date (AD)	β_1	-	-0.0906***	0.1930***	-0.1136***	0.0658***	-0.1595***	-0.0070	-0.1899***	-0.0357***	-0.2227***	-0.0751***
Volume	β_2	-		-0.4319***		-0.4552***		-0.4593***		-0.4603***		-0.4109***
Return Variability	β_3	+		0.0801***		0.0764***		0.0736***		0.0752***		0.0363***
Price	β_4	-		-0.8069***		-0.7649***		-0.7252***		-0.6881***		-0.6939***
Adj. R-square			0.11%	26.74%	0.19%	28.58%	0.38%	28.34%	0.55%	27.71%	0.88%	29.87%
Number of firms			239	239	239	239	239	239	239	239	239	239
Average number of days			42	42	126	126	252	252	378	378	504	504

*, ** and *** Significant at the 10%, 5% and 1% respectively, using two-tailed tests.

Table 2-5: Continued

Panel B: $SPREAD = \alpha_0 + \beta_1{*}ED + \beta_2{*}Volume + \beta_3{*}Return\ Variability + \beta_4{*}Price + \varepsilon$

Event Window		Pred.	(+/-) 1 month		(+/-) 3 months		(+/-) 6 months		(+/-) 9 months		(+/-) 12 months	
Variable	Coeff.	Sign	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Constant	α_0		-5.4819***	4.0384***	-0.5452***	4.2388***	-5.4121***	4.0736***	-5.3831***	3.9896***	-5.2414***	3.1355***
Event Date (ED)	β_1	-	-0.0692***	0.1203***	-0.1112***	0.0323**	-0.1483***	-0.0189**	-0.1851***	-0.0475***	-0.2192***	-0.0848***
Volume	β_2	-		-0.4290***		-0.4554***		-0.4573***		-0.4598***		-0.4114***
Return Variability	β_3	+		0.0798***		0.0765***		0.0729***		0.0753***		0.0366***
Price	β_4	-		-0.7952***		-0.7639**		-0.7187***		-0.6826***		-0.6881***
Adj. R-square			0.06%	26.77%	0.18%	28.72%	0.33%	28.18%	0.52%	27.60%	0.85%	29.65%
Number of firms			239	239	239	239	239	239	239	239	239	239
Average number of days			42	42	126	126	252	252	378	378	504	504

*, ** and *** Significant at the 10%, 5% and 1% respectively, using two-tailed tests.

SPREAD = the log of [2*(ASK-BID)/(ASK+BID)];
Event Date = a dummy variable equaling 1 if t lies in the event window (0+ X month) and zero if t lies in the event window (-X month,-1);
Volume = the log of total number of shares traded in the company;
Return Variability = the log of the square of stock return;
PRICE = the log of Closing day's Market Price;

Table 2-6: Cross-sectional regression test

Panel A of this table specifies a cross sectional model that simultaneously evaluates the volume and Bid-Ask spread effects on various intervals of cumulative abnormal returns around Index inclusion announcement dates for a period 1989-2004:

$$CARMBH_i = \alpha_0 + \beta_1 {*} AEVAD3_i + \beta_2 {*} AEVAL_i + \beta_3 {*} \Delta SPREAD_i + \varepsilon_i$$

Panel A:

	Coefficient estimates (t-statistic)				Adjusted	Regression F
	α_0	β_1	β_2	β_3	R^2	(p-value)
CAR3	0.0533***			-0.0019	-0.42%	0.04 (0.84)
	(12.87)			(-0.19)		
CAR3	0.0470***	0.0030***		0.0064	4.78%	6.82 (0.00)
	(10.58)	(3.69)		(0.67)		
CAR3	0.0480***	0.0031***	-0.0040	0.0061	4.54%	4.68 (0.00)
	(10.01)	(3.73)	(-0.65)	(0.63)		
CAR33	0.0431***			-0.0866***	4.96%	13.10 (0.00)
	(4.18)			(-3.62)		
CAR33	0.0475***	-0.0020		-0.0922***	4.93%	7.01 (0.00)
	(4.21)	(-0.96)		(-3.74)		
CAR33	0.0436***	-0.0024	0.0131	-0.0912***	4.81%	4.91 (0.00)
	(3.56)	(-1.13)	(0.84)	(-3.70)		
CAR63	0.0255*			-0.1841***	10.23%	27.43 (0.00)
	(1.68)			(-5.24)		
CAR63	0.0334**	-0.0036		-0.1940***	10.38%	14.44 (0.00)
	(2.02)	(-1.18)		(-5.37)		
CAR63	0.0347**	-0.0034	-0.0042	-0.1943***	10.00%	9.59 (0.00)
	(1.93)	(-1.10)	(-0.18)	(-5.36)		

where

$CARMBH_i$ =	is a measure of CAR3 (average cumulative abnormal returns during ±1 trading day around the Index inclusion announcement date [AD-1, AD+1]. CAR 33 (63) aggregate additional 30 and 60 trading days to this interval [AD+1, AD+31] (AD+1, AD+61), respectively.
$AEVAD3_i$ =	three day average excess volume around Index inclusion announcement dates [AD-1, AD+1].
$AEVAL_i$ =	is a measure of firm *i*'s average excess volume during 60 days subsequent to Index inclusion effective date [ED+2, ED+62].
$\Delta SPREAD_i$ =	change in the average Bid-Ask spread calculated over the 6 months pre- to 6 months post- the Index inclusion AD period. A negative of ΔSPREAD corresponds to a decrease in spread from pre- to a post-Index inclusion period.
***, ** and *	Significant at the 1%, 5% and 10% levels (two-tailed test) respectively.

Table 2-6: Continued

As sensitivity analysis to Panel A, Panels B and C provide alternative definitions of *ΔSPREAD* over a different time interval.

$$CARMBH_i = \alpha_0 + \beta_1 * AEVAD3_i + \beta_2 * AEVAL_i + \beta_3 * \Delta SPREAD_i + \varepsilon_i$$

Panel B:

	Coefficient estimates				Adjusted	Regression F
	α_0	β_1	β_2	β_3	R^2	(p-value)
CAR3	0.0528***			-0.0098	-0.04%	0.91 (0.34)
CAR3	0.0461***	0.0029***		-0.0028	4.93%	6.98 (0.00)
CAR3	0.0474***	0.0030***	-0.0042	-0.0028	4.71%	4.80 (0.00)
CAR33	0.0432***			-0.1230***	9.11%	24.16 (0.00)
CAR33	0.0483***	-0.0022		-0.1284***	9.19%	12.69 (0.00)
CAR33	0.0434***	-0.0027	0.0158	-0.1284***	9.23%	8.83 (0.00)
CAR63	0.0308**			-0.2034***	11.00%	29.54 (0.00)
CAR63	0.0382**	-0.0032		-0.2075***	11.03%	15.33 (0.00)
CAR63	0.0377**	-0.0032	0.0016	-0.2110***	10.65%	10.17 (0.00)

Panel C:

	Coefficient estimates				Adjusted	Regression F
	α_0	β_1	β_2	β_3	R^2	(p-value)
CAR3	0.0537***			0.0006	-0.43%	0.01 (0.95)
CAR3	0.0471***	0.0030***		0.0073	4.86%	6.93 (0.00)
CAR3	0.0422***	0.0031***	-0.0038	0.0069	4.61%	4.74 (0.00)
CAR33	0.0445***			-0.0618***	2.65%	7.31 (0.00)
CAR33	0.0475***	-0.0013		-0.0648***	2.40%	3.85 (0.02)
CAR33	0.0438***	-0.0017	0.0126	-0.0635***	2.25%	2.78 (0.04)
CAR63	0.0250			-0.1539***	7.93%	20.99 (0.00)
CAR63	0.0307*	-0.0026		-0.1598***	7.83%	10.85 (0.00)
CAR63	0.0326*	-0.0024	-0.0063	-0.1605***	7.45%	7.23 (0.00)

where

$CARMBH_i$ =	defined as in Panel A
$AEVAD3_i$ =	defined as in Panel A
$AEVAL_i$ =	defined as in Panel A
$\Delta SPREAD_i$ =	change in the average Bid-Ask spread from 3 months pre- to 3 months post- the Index inclusion announcement date (Panel B) and average Bid-Ask spread from 9 months pre- to 9 months post- the Index inclusion announcement date (Panel C) respectively. A negative ΔSPREAD corresponds to a decrease in Spread from pre- to a post- inclusion period.
***, ** and *	Significant at the 1%, 5% and 10% levels (two-tailed test) respectively.

2.9 Figures

Figure 2-1: Frequency of days between AD and ED for Added firms into the S&P 500

Figures A and B show frequency distributions for number of ordinary days and trading days between the Index inclusion announcement (AD) and effective inclusion (ED) dates respectively. The sample consists of 288 additions which occurred between October 1989 and December 2004.

Figure 2-1.A

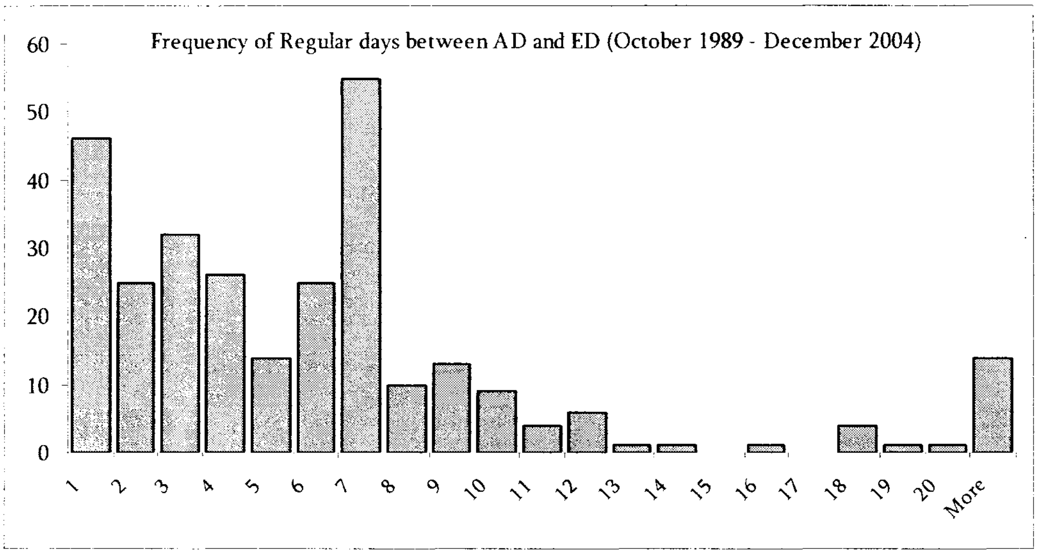


Figure 2-1.B

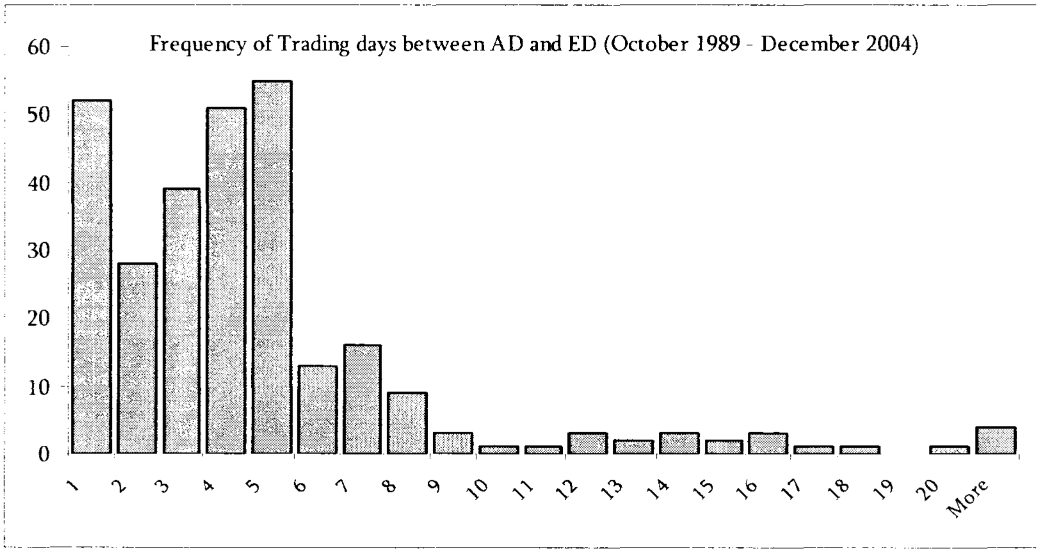


Figure 2-2:

These figures are graphical illustrations of Tables 2-2 and 2-3. Figures 2-2.A-C (relate to Table 2-2) show the cumulative abnormal returns (CARs) around Index announcement (AD) and effective inclusion (ED) dates. Figures 2-2.D-F (relate to Table 2-3) show the cumulative abnormal returns (CARs) around Index inclusion announcement (AD) for Added (A) and Control (C) firms respectively.

Figure 2-2.A

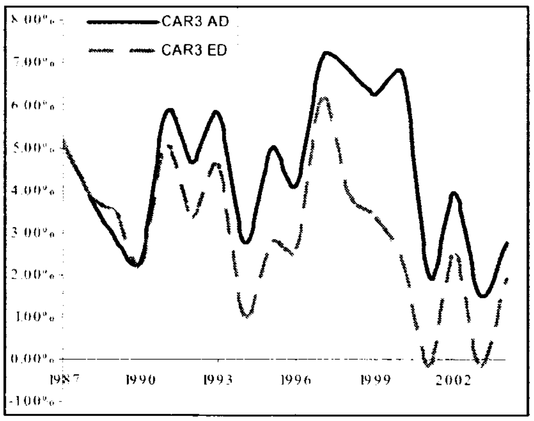


Figure 2-2.D

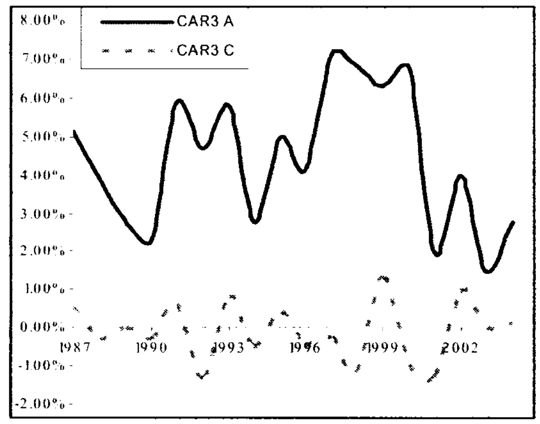


Figure 2-2.B

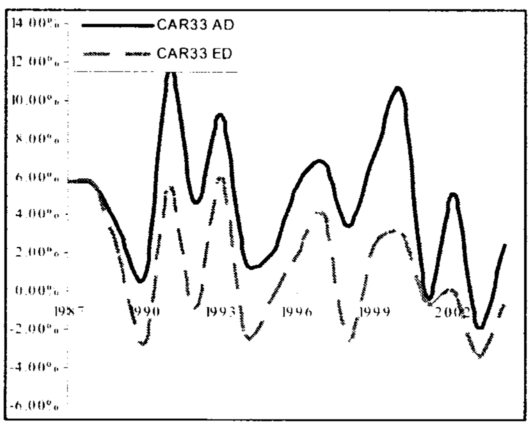


Figure 2-2.E

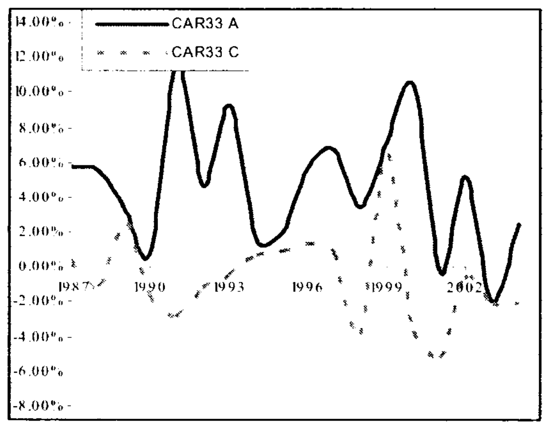


Figure 2-2.C

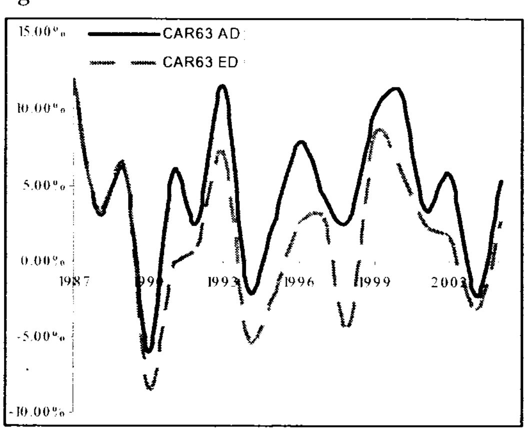


Figure 2-2.F

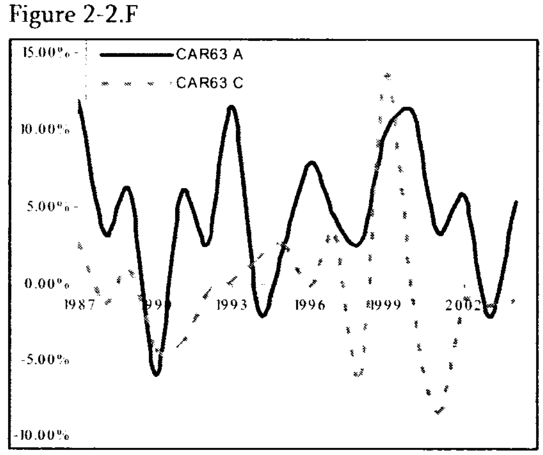


Figure 2-3:

Figures A and B show the frequency distribution of the daily mean excess volume (MEV) around Index announcement (AD) and effective inclusion (ED) dates respectively. The normal average excess volume is computed using 10 trading days prior to AD. For illustrative purposes, I add 1 to the excess volume definition.

Figure 2-3.A

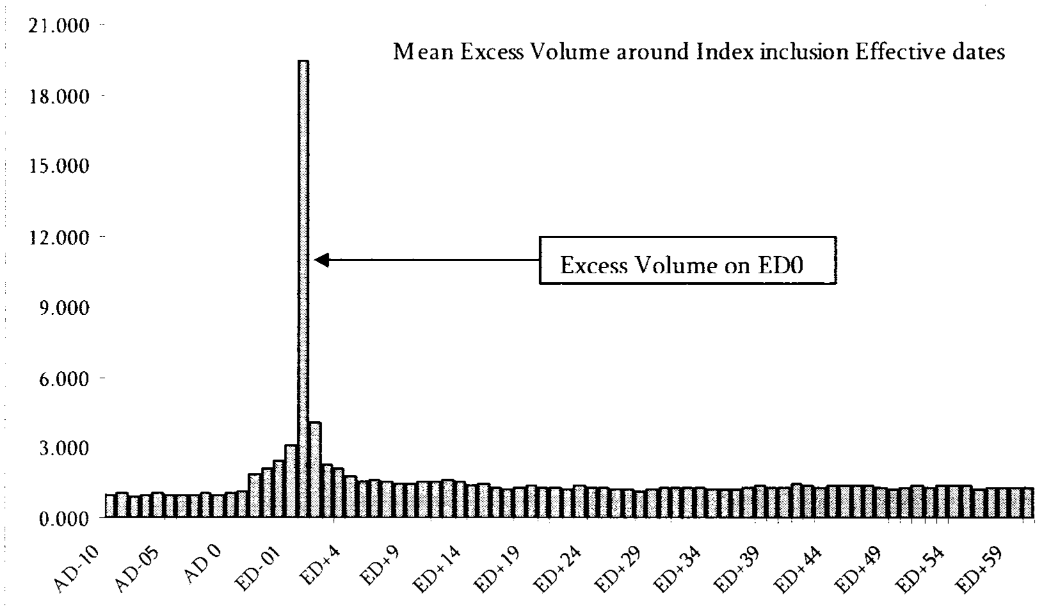
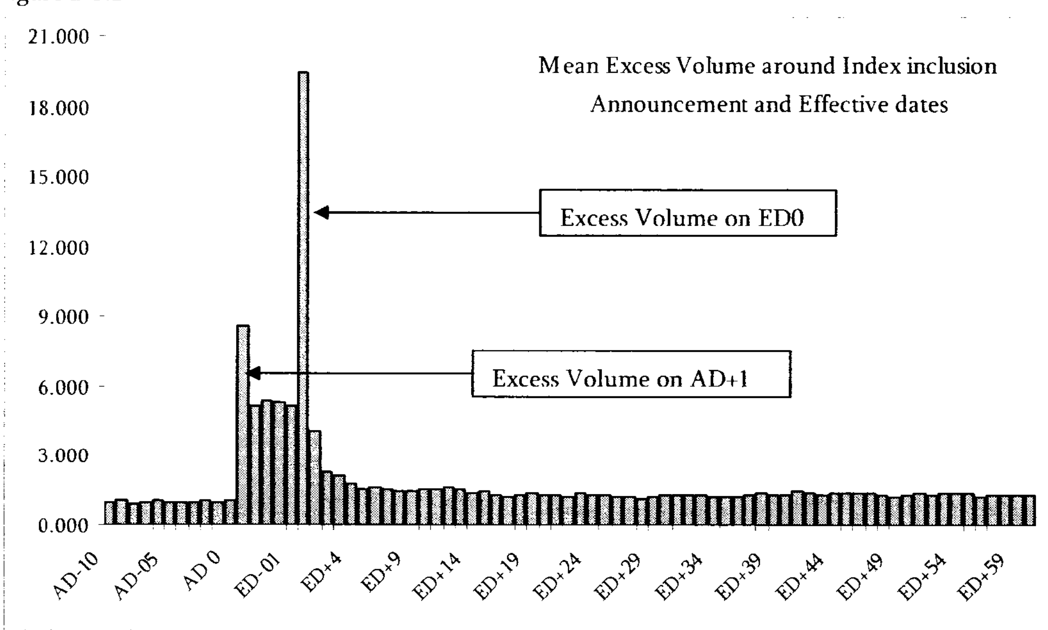


Figure 2-3.B



Chapter 3

S&P 500 Index Inclusion Announcements: Does the S&P Committee Tell us Something New?

3.1 Introduction

The goal of Standard and Poor's Committee is to maintain the Index composition to be representative of current industry importance, while minimizing the Index turnover (Standard and Poor's, 2004). Over time, researchers have acknowledged that the Committee's Index inclusion announcements may be perceived as good-news events that convey favourable information to investors about firms expected financial performance, lower transaction and information costs, or quality assurance. As such, not all abnormal returns around Index inclusions must necessarily be attributable to a downward-sloping demand curve, as argued in many studies (Shleifer 1986, Kaul et al., 2000 or Petajisto 2005). The objective of this chapter is to provide evidence to the debate on whether any new information regarding firm's future cash flows is revealed at inclusion announcements into the S&P 500 Index.

In a recent article by Denis, McConnell, Ovtchinnikov and Yu (2004) (hereafter DMOY), the authors found supporting evidence for the Information Content hypothesis by documenting significant increases in analysts' earnings expectations as well as relatively higher realized earnings for newly added S&P 500 members[39].

[39] Although this study is first to find such evidence, the authors fail to control for other explanations such as the Downward-sloping demand curve and other hypotheses affecting the firms' discount rate (Liquidity/Information Cost or Certification). I have described in previous chapters that controlling for

Researchers and practitioners often assume that the Index Committee must possess non-public information, which they convey to the market in their Index selection announcements. DMOY and Chen et al. (2004) offer an alternative point of view. They conjecture that Index inclusion may lead to changes in firms' future performance, although in the case of DMOY it is difficult to understand how the increased attention paid to the firm's stock performance could translate into improved operating results so quickly. Regardless, causality could flow in either direction and still support the Information Content hypothesis[40]. In this chapter I first evaluate whether the Information Content hypothesis is valid, since if it is invalid the distinction whether new information causes Index inclusion or whether Index inclusion causes better performance becomes moot. Accordingly, here and in the next chapter, I assess whether there is support for the Information Content hypothesis relative to the other hypotheses evaluated in chapter two. To facilitate exposition I describe the Information Content hypothesis in its more traditional form of inclusion signaling the market about future performance.

From an investors' point of view, very little research has been done on the uncertainty about any other selection criteria potentially considered by the Index Committee when identifying candidates for Index inclusion. I identify firms that satisfy all official Index inclusion criteria, and therefore should be considered by the Committee for inclusion. Consistent with basic financial analysis that rests upon risk-return tradeoffs, I consider publicly available risk and performance criteria (variables) that would have been available to the Index Committee when they made their decision. I then consider measures of future performance that may be captured in the

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such other factors is crucial, as the prevailing hypotheses are not necessarily mutually exclusive. The chapters in this thesis evaluate these remaining explanations.

[40] For example, DMOY postulate that the information-free assumption is violated (often supporting the Information Content hypothesis) when the researchers presume that information is relevant if it causes Index inclusion (i.e. expectation about future performance causes inclusion). The authors further point out that the Index inclusion may lead to improvement in future performance (i.e. inclusion causes improvement in performance).

permanent abnormal returns observed at the inclusion announcement.[41] Inclusion of the future performance variables implicitly presumes perfect foresight by the Index Committee; however, the variables should be significant and provide additional explanatory power if the Committee releases at inclusion private information on these variables that is on average correct. I then use both Logistic regression and Factor Analysis to determine, which of these other criteria potentially enter the Index Committee's decision process. The evidence suggests that in addition to the official inclusion criteria, the Index Committee considers financial and equity risk variables, as well as firms' historical financial performance in choosing among potential firms.

The reminder of this chapter is organized as follows: Section 3.2 develops my hypotheses; Section 3.3 explains the research design, variable definitions for individual sections and sample construction. I provide descriptive statistics and main empirical results, including robustness checks in Section 3.4. Section 3.5 summarizes the chapter and provides discussion of any limitations.

3.2 Hypotheses Development

3.2.1 Information Content Predictions

Former studies such as Chen et al. (2004) analyzed in detail various consequence of changes in the S&P 500 index. Along with the risk reducing explanations, researchers acknowledged that Index inclusion announcements may convey information about future performance[42]. However, the Index Committee's decision process itself has not received much attention in the literature. Whether any additional criteria are

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[41] No future stock return variables can be included since it is the stock return announcement return that I am trying to explain.

[42] See for example Dhillon and Johnson (1991) or Jain (1987)

evaluated or whether non-public information is reflected in the selections remains largely unknown.

The criteria for Index inclusion consist of liquidity, market capitalization, positive stream of earnings[43], market float and industry representation (for detailed definition and minimum fulfillment requirements, see Appendices, Exhibit-1). Although Index membership is not necessarily subject to meeting these specified guidelines, Index removal is generally triggered by companies substantially violating one or more of these inclusion criteria. The S&P inclusion criteria (although publicly available) are quite subjective compared to other indices such as Russell 2000 or Wilshire 5000, which include a larger number of firms. Since the objectives of Standard and Poor's with respect to the S&P 500 is to keep the index turnover at minimum, and firms with financial longevity are therefore likely preferred, I hypothesize that the Index Committee considers other factors (in addition to the eight publicly known Index inclusion criteria) that would indicate sound future financial performance.

H1a: In their decision process to identify new S&P 500 constituents, the Index Committee considers other publicly available risk and performance factors in addition to the eight publicly known Index inclusion criteria.

S&P allegedly selects leading firms in leading industries that satisfy all Index inclusion criteria. However, meeting these criteria does not guarantee that the newly added firms will remain strong performers in order to maintain their place in the S&P 500. The Index Committee meets on regular basis and reviews the firms' financial and operating performance. Whenever a firm is deleted from the S&P 500, the Index Committee identifies a pool of eligible candidates (five to ten on average) and announces publicly the effective date changes along with reasons for Index removal. The list of inclusion candidates is kept secret until the announcement date (hereafter

[43] In this dissertation, earnings and net income before extraordinary items are used interchangeably.

AD), and investors are often unaware as to when a particular Index change will take place and the reason for it[44].

What is also not known to the public is the Committee's decision process that identifies the new Index member. Apart from Index maintenance, S&P's primary business consists of establishing bond ratings. The Index Committee consists of professionals with years of experience with both indices and capital markets, so that some have surmised that the Committee members may possess significant material information not available to other investors. This chapter employs a logistic estimation as well as factor analysis to determine which variables/factors are significant in identifying a new S&P 500 member from a pool of eligible candidates. If the Committee selects new candidates for inclusion based on other publicly available criteria, such variables/factors should explain a significant portion of the inclusion likelihood estimation. If on the other hand, the Committee possesses material private information about future performance and uses this variable/factor as a primary reason to include a firm in the Index, then this variable/factor must explain a significant variation in the inclusion likelihood prediction model. Stated as a formal hypothesis:

H1b: The Index inclusion conveys information about future performance which explains a significant variation in the logistic regression model.

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[44] The awareness of upcoming Index changes likely varies with reasons for Index removal. Investors may in some cases be aware that a firm in financial distress and try to identify potential candidates for inclusion. When, for example, a firm files Chapter 11 for bankruptcy, that firm is removed from the Index immediately. On the other hand, when a firm undergoes corporate restructuring (spin-offs) or fails to meet one or few inclusion criteria, Index removal is decided by the Committee on case-by-case basis. Overall, authors such as Petajisto (2006) or Kaul et al. (2000) point out that there is a significant uncertainty about Index changes from an investor's point of view.

3.3 Methodology Design

3.3.1 Factors Influencing Index Inclusion

The goal of this chapter is to identify additional criteria that the Index Committee considers in selecting new firms. The official Index inclusion criteria consist of eight qualitative variables. Namely, each newly added firm has to satisfy: US company, Financial viability, Adequate float, Industry representation, not an IPO, Operating company, and each firm must have adequate Liquidity and certain Market Capitalization (see Appendices for further details and definitions). The Control group of firms consists of all firms that satisfy all the above criteria, and are therefore most likely considered by the S&P Committee as potential inclusion candidates. I describe the Added and Control sample sizes in more detail in the section 3.7. In addition to the eight official Index inclusion criteria, I consider two broad categories of variables that the Committee likely considers when selecting a new firm: Risk and Performance. As a proxy for the good-news signal about firms' operating performance, I consider the firms' actual future financial performance. If the Committee is aware of undisclosed, material improvements in expected financial performance and uses this information as part of their decision process, one should observe a significant explanatory contribution of future performance variables in the Logistic analysis.

All historical (pre-inclusion), publicly available, variables can be obtained from the fiscal year financial statements issued closest to the Index inclusion announcement dates. Since most firms with December 31 fiscal year-end do not announce their earnings until March of the following year, I require that the Index inclusion announcement occurs at least three months after the firms' fiscal year-ends in order to classify most recent financial statements as current. For example, if a company's fiscal year-end is December 31, 1995 and the Index inclusion announcement occurs between January and March of 1996, I treat 1994 financial statement variables as pre-inclusion. If, on the other hand, the announcement takes place after the end of March, I treat 1995 financial statement variables as pre-inclusion. All future variables are then obtained from financial statements issued subsequent to Index inclusion announcement dates. The subscripts ($_{PRE, POST}$) attached to each variable represent the fiscal year ends of periods before and after the Index inclusion announcement dates respectively. The dependent variable, *INCLUDE*, equals one if a firm is selected into the Index, zero otherwise.

3.3.2 Control Variable Definitions

Before describing the three broad categories of variables that likely affect *INCLUDE*, I define four control variables that deserve further clarification. All variables are summarized at the end of this section. First, *NOC* is the number of candidate firms that satisfied all S&P 500 inclusion criteria on the Index inclusion announcement dates. Given the identification procedure for Control firms, *NOC* varies with each Index inclusion announcement date/choice. Likewise, the Index Committee does not always have the same number of eligible candidates for inclusion when a firm is removed from the Index. Industry leaders such as Microsoft (added in June 1994) with no close substitutes would have been selected from a small pool of candidates. The number of available candidates mathematically reduces the odds of any one firm being selected, based on a Committee's preference to select a firm from the same industry. Although this variable is subject to measurement error[45], it is predicted to

[45] In the selection criteria, I clearly do not identify all the firms that are considered for inclusion once a firm is deleted from the S&P 500 Index. I assume that the Committee considers the same 2-GIC digit industry firms as the one officially selected for the Index. In some cases, there are no control firms for a particular addition. This may be due to a fact that some firms are available for inclusion and considered by the Committee; however, my selection procedure eliminates firms with missing observations; or

negatively influence the probability of Index inclusion. As further control variables, I use the three official continuous and quantifiable Index inclusion criteria, Size (*SIZE*), Liquidity (*LIQ*), and Financial Viability (*NOPOS*)[46]. It is not clear whether once the threshold of each of these variables is achieved, that further increases in the variable for a specific firm would improve or reduce its chances for inclusion relative to other firms that have also reached the threshold. For example, it may be that since the Committee requires firms with a certain liquidity threshold, higher liquidity is always preferred, or conversely beyond a certain level more liquidity may be irrelevant. The first control variable *SIZE* is defined as a natural logarithm of the product of the end of period monthly price and shares outstanding, summed over the twelve months prior to the Index inclusion announcement month. The second control variable *LIQ* is defined as product of end period monthly price and share volume, summed over the twelve months prior to the Index inclusion announcement month and divided by a firm's market capitalization.[47] Finally, *NOPOS* represents the number of positive quarterly Earnings (*Compustat #8*) during the 5-year period preceding the Index inclusion announcement dates (for further details on the above variables, see Appendices; the Committee usually considers four consecutive quarters of positive as-reported earnings).[48]

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when the Committee might analyze firms from other industries when establishing a pool of potential candidates. The NOC measure excludes firms from different industries, although the Committee may choose to search more broadly in some cases.

[46] From a publicly available set of Index inclusion criteria, these variables are all technically dummy variables equaling one when a firms satisfies a particular criterion, zero otherwise. From the Index Committee's point of view, these variables may however be considered quantitatively.

[47] Liquidity can also be considered a part of risk (defined next). In fact, Beaver et al. (1970) categorize liquidity as a part of accounting measures of risk that reflect both the systematic and individualistic risk components. As such it would be expected to have a positive sign.

[48] The Financial viability criterion of firms already in the S&P 500 is not as stringent as it seems. According to David Blitzer, chairman of the S&P Committee, if a firm fails to satisfy the four quarters of positive reported earnings, such firm is not automatically deleted from the Index. Rather, if a firm consistently reports frequent negative earnings, then it is considered for Index removal.

3.3.3 Risk Variables

Given its desire for stability, the Committee may consider firms' riskiness as a major decision factor. Common stock systematic risk and the investment quality of long-term debt are widely available market measures of investment risk for individual firms (Schwendiman and Pinches, 1975). I define *BETA*, a measure of systematic risk, as a coefficient from CAPM regressions of firm stock on the S&P 500 Index (see section Chapter 2, section 2.3.1). I hypothesize that lower risk is desirable because the Committee strives to limit Index turnover. Since *BETA* is a proxy for systematic (market) risk, not an idiosyncratic (firm specific) risk, I also consider bond ratings and the total variance of returns as proxies for idiosyncratic risk. *LTD Rank* is the Standard & Poor's Issuer Credit Rating, a current opinion of an issuer's overall creditworthiness, apart from its ability to repay individual obligations. This opinion focuses on the obligor's capacity and willingness to meet its long-term financial commitments (those with maturities of more than one year) as they come due. This variable ranges from 2-representing AAA+ rating to 18-representing B- rating. Therefore, a higher value of *LTD Rank* suggests lower quality of bond ratings; this coefficient is expected to be negatively associated with the Index inclusion likelihood. Second, I consider firms' return variability (*RVAR*). It has been widely documented that firms' volatility of stock returns is positively related to the expected market risk premium (see for example, French et al., 1987) and therefore negatively with market price. The Index Committee may prefer firms with low return volatility, which would be perceived by investors as lower risk firms. I follow French et al. (1987) and define the return variability as a standard deviation of the monthly return variance during the 2-year period preceding the Index inclusion announcement dates. As the previous risk variables, *RVAR* is expected to be negatively associated with the Index inclusion likelihood.

Beaver et al. (1970) examine accounting measures of risk (liquidity, financial leverage, size of assets or earnings variability, among others) and their relation to market risk measures[49]. In particular the leverage ratios can be used as a measure of risk induced by capital structure. Based on the Modigliani and Miller (1958) proposition, all else equal, the earnings stream available to common equity holders becomes more volatile, as debt levels increase. I therefore consider two financial leverage variables; D/E (debt-to-equity) ratio defined as book value of a long term debt (*Compustat #9*) divided by book value of common equity (*Compustat #60*); and D/A (debt-to-assets) ratio defined as book value of a long term debt (*Compustat #9*) divided by book value of a firm's total assets (*Compustat #6*). If the Index Committee is concerned about leverage as a potential source of risk, firms with high leverage are expected to be negatively related to the Index inclusion likelihood.

3.3.4 Historical Performance Variables

In addition to risk, I am interested in whether the Index Committee considers recent financial performance and other variables that would indicate firms' financial soundness. I consider performance in terms of three categories that are not theoretically related to risk[50].

First, I consider four accounting performance measures that can be obtained from firms' financial statements. More specifically, *ROE* represents annual return on equity (*Compustat #123 / Compustat #60*). *E* represents earnings defined as Net Income excluding extraordinary items (*Compustat #123*), deflated by the total assets (*Compustat #6*). This is effectively a leveraged return on assets. *CFO* represents Cash Flow from Operations adjusted for extraordinary items and discontinued operations

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[49] I consider earnings variability in the next category in a context of earnings quality recently examined by Tucker and Zarowin (2006).

[50] For example, Bowman (1979) demonstrates theoretically that systematic risk is not directly related to earnings variability, growth or firm size.

(*Compustat #308-Compustat #124*)[51], deflated by the average total assets. *SALES* represent annual sales (*Compustat #12*), deflated by the total assets. This variable effectively captures the asset turnover. As the Index Committee seeks leading firms in leading industries, strong accounting-based financial performance represented by Earnings, Cash Flows and Sales, is a likely indicator of such firms. All four accounting performance variables are predicted to be positively associated with the Index inclusion likelihood.

Second, I analyze four variables that likely signal strong economic performance; two using market related measures and two accounting-related growth measures. The Index Committee may be particularly interested in firms that have in the past actually outperformed the S&P 500 index, that have a strong growth potential (proxied by M/B) as opposed to being value firms, and that have experienced steady growth in sales as well as in earnings. As the market related economic indicators of historical performance, I consider: *CAR*, which represents cumulative buy-and-hold market adjusted abnormal returns during the 2-year period preceding the Index inclusion announcement dates[52]; and a *M/B* (market-to-book) ratio defined as the product of share price (*Compustat #199*) and common shares outstanding (*#25*), divided by the book value of common equity (*#60*). I employ the *M/B* ratio as a performance variable, but acknowledge that it can also be empirically linked to risk[53]. As other proxies for strong historical performance, I define two accounting related measures: $SALGR3_{PRE}$ as the annualized sales growth during a three-year period preceding the

[51] Both of these variables are analyzed in great detail in Chapter 4 in a context of the Information content Hypothesis.

[52] The CAR definition follows the same formula that is used to define the Index inclusion effect. For further details, see Chapter 2, section 2.3.1.

[53] Empirical researchers have found market-to-book ratio to be negatively associated with systematic firm risk. For example, Fama and French (1992) document empirically in their three-factor model that two particular types of stocks outperform markets on a regular basis: value stocks (those with a high book-to-market value) and small-cap stocks. The authors argue that the excess return must be associated with an extra risk. In other words, if the value or small-cap stocks have a higher excess return, then they must be riskier.

Index inclusion, and *EARGR3*$_{PRE}$ as the annualized earnings growth during the same time interval. All four variables are expected to be positively related to the Index inclusion likelihood.

Before defining the other categories of variables, I review the "price leads earnings" association first documented by Ball and Brown (1968) and its implication for firms' future financial performance. Ball and Brown (1968) showed that most (approximately 85%) of the "news" in annual earnings is incorporated in price prior to the annual earnings announcement. If the future performance is measured using accounting information as a proxy for the ostensible good news to which the market reacts at the announcement dates, then there is a danger that this future news is in fact already publicly available through the variables CAR_{PRE} and M/B that are correlated with future earnings because prices lead earnings. If so, then the recent historical cumulative abnormal returns (CAR_{PRE}), if positive, imply that subsequent earnings will be better than prior earnings. Similarly, M/B generally signals higher future earnings because the market value will be large relative to the book value if prices have risen based on incorporating good news that has yet to flow in to revenues, earnings, and book value. Additionally, firms with large intangible assets that are not capitalized, but which have already expensed items such as R&D spending, will have relatively higher reported earnings when the related cash inflows appear because a significant portion of the costs of generating these revenues will be absent. Thus, subsequent earnings will again be better than prior earnings. Therefore, if this price-leads-earnings association is properly anticipated, an observed subsequent improvement in future earnings, even if foreseen, should not necessarily be considered good news at AD. It would only be improvements in earnings beyond that signaled by the positive CAR_{PRE}, or high M/B that could be good news at AD. Both CAR_{PRE} and M/B are publicly available and are known before AD. These variables might influence S&P selections, however, any improvements in future cash flows relative to current cash flows that are correlated with CAR_{PRE} and M/B will not be news, rather only the part that can not be explained by CAR_{PRE} and M/B would be news. Failure to include CAR_{PRE} and M/B could lead one to overestimate the overall significance of the future variables and the amount of private information (news) they might ostensibly capture.

As a last category of historical performance variables, I analyze earnings quality as a potential factor considered by the Index Committee[54]. Since Standard and Poor's aims for firms' survival in the Index, firms with future profits and persistent earnings are more likely preferred. In a steady state, firms with large positive accruals (difference between Earnings and CFO) will generally experience decreasing earnings compared to those with proportionately more CFO. Total accruals can further be divided into managed accruals (those at the discretion of the managements) and normal (non-discretionary) accruals. CFO portion of Earnings has been shown to be more persistent and less susceptible to manipulation than total accruals (Dechow et al., 2003). Large amounts of discretionary accruals, which firms may use to artificially inflate earnings, are conceptually an indication of low earnings quality. Rather than focusing solely on reported earnings, the Index Committee may consider accounting accrual practices and their relative proportions to overall earnings. I define total accruals as a difference between Earnings and CFO (Hribar and Collins, 2002) and use methodology by Dechow et al. (2003) to estimate *NDACC* and *DACC* (non-discretionary and discretionary accruals, respectively)[55]. In connection with earnings

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[54] Chapter 4 is entirely devoted to analysis of individual components of earnings and how they explain newly added firms' future performance. For more details on the earnings decomposition methodology, please refer to Chapter 4.

[55] Below is the Lagged cross-sectional model (Dechow et al., 2003) from which the estimates of expected accruals are obtained. The regressions are estimated using all companies (by the two-digit SIC code). The level of discretionary accruals (DACC) is represented by the error term from the following regression.

$$\Delta AR_{it} = \alpha + k\Delta REV_{it} + \varepsilon$$

$$TACC_{it} = \alpha_1 + \beta_1((1+\hat{k})\Delta REV_{it} - \Delta AR_{it}) + \beta_2 PPE_{it} + \beta_3 LagTA_{it} + \varepsilon_{it}$$

persistence, Tucker and Zarowin (2006) find that firms reporting smoother income have more informative and persistent earnings. I use this finding to consider another measure of earnings quality. I define *EVAR* (earnings variability)[56] as the natural logarithm of the quarterly earnings (*Compustat quarterly #8*) variance during the 5-year period preceding the Index inclusion announcement dates. I expect that earnings quality should be positively related to Index inclusion. In particular, low levels of DACC and EVAR are more likely to result in Index inclusion.[57]

3.3.5 Future Performance Variables

To test how much potential incremental good news might be conveyed by the Index Committee, I define several future variables as proxies for the information signal conveyed by the S&P's selection decision under the assumption that it has special foresight. If the magnitude of the marginal contribution is large it would suggest that there is a significant news event at inclusion.

To minimize the Index turnover, the S&P Committee desires sustainable earnings profitability, which is often achieved when firms have sustainable future sales. Furthermore, future economic earnings (CFO) have to be high in order to sustain the

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Total accruals are defined as $TACC_t = NI_t - CFO_t$ where NI_t is the earnings before extraordinary items and discontinued operations for period t (*Compustat # 123* from Income statement) and CFO_t is the Cash Flow from Continuing Operations for period t (*Compustat # 308 – Compustat #124* from CF statement). ΔREV is the change in sales (*Compustat #12*) from the previous year to the current year, ΔAR is the difference in accounts receivable (*Compustat #2*) over the same period, and PPE_{it} is the end of year property, plant and equipment (*Compustat #7*). All variables are scaled by average total assets (*Compustat #6*). For further details regarding this methodology are described in Chapter 4, Section 4.4.3.

[56] One can argue that EVAR should be considered part of market risk variables. Beaver et al. (1970) find in a model, where accounting variables forecast market risk, that earnings variability is the most significant variable. Furthermore, Bowman (1979) provides a theoretical overview of previously documented empirical relationships between financial variables and market determined risk, and classifies earnings variability within the risk category. I analyze EVAR in a context of earnings persistence as a measure of earnings quality. Both classification categories are correct.

[57] NDACC alone is difficult to interpret and I therefore analyze this variable in factor analysis in connection with other variables.

accounting earnings. I therefore consider four future performance variables: *AVROE* represents the average ROE (return-on-equity); *AVCFO* represents the average CFO scaled by total assets; *AVROA* is the average Earnings scaled by total assets (ROA); and *AVSAL* represents firms' average Sales. All four variables are defined over a three-year period subsequent to Index inclusion and are predicted to be positively related to the Index inclusion likelihood under the Information Content hypothesis.

Second, in addition to the level of earnings and sales, growth in these variables may be important. As a final set of variables, I consider firms' future growth performance. Similar to historical performance variables, I define $SALGR3_{POST}$ as the annualized sales growth during a three-year period subsequent to Index inclusion, and $EARGR3_{POST}$ as the annualized earnings growth during the same time interval. DMOY finds that newly added firms achieve significantly better operating performance subsequent to Index inclusion. I analyze this result in detail in the next chapter. To connect this paper with analysis in Chapter 4, I also define *DeltaE* as a change in Earnings from the post to pre Index inclusion fiscal year ends. All three variables are predicted to be positively related to the Index inclusion likelihood. The following is a summary of the control, historical and future variable categories:

Control variables category:	NOC, SIZE, LIQ and NOPOS
Risk category:	
1) Market based risk variables:	BETA, LTD Rank and RVAR
2) Financial based risk variables:	D/E and D/A
Historical performance category:	
3) Accounting performance var.:	ROE, E (ROA), CFO and SALES (turnover)
4) Economic performance var.:	CAR, M/B, SALGR3 and EARGR3
5) Earnings quality variables:	DACC, NDACC and EVAR
Future performance category:	
6) Future performance variables:	AVROE, AVSAL, AVCFO and AVROA
7) Future growth variables:	SALGR3, EARGR3 and DeltaE

To explore both present and future potential decision influences, I define logistic equation (3) as:

$$Ln[p/(1-p)]_j = \alpha_0 + \sum_{X=1}^{4} \beta_X CONTROL_{X,j} + \sum_{X=5}^{9} \beta_X RISK_{PRE.X.j} + \\ + \sum_{X=10}^{20} \beta_X PERFORM_{PRE.X.j} + \sum_{X=21}^{27} \beta_X PERFORM_{POST.X.j} + \varepsilon_j \;\ldots\ldots\ldots (3)$$

where p is the probability that the firm j gets included in the S&P 500 Index; and other variables are defined in the summary table above. In examining the marginal contribution of the future performance variables (good-news information), I will first report the explanatory power of the control and all historical variables alone, and then add the future variables.

3.3.6 Factor Analysis Predictions

To confirm my predictions based on the Logistic analysis of all variables alone, I also conduct a factor analysis[58] whose primary purpose is to reduce and summarize the variables. I believe that the factor analysis is more appropriate for the research design than the principal component analysis. I plan to extract a small number of factors that account for the intercorrelations among the 19 observed historical and 7 future variables, and identify the latent dimensions that explain the covariances among them. In a principal component analysis, the objective is to account for the maximum portion of the variance within the original set of variables to identify a minimum number of composite variables. Second, to mitigate the potential measurement error in variables, factor analysis is more appropriate. Principal component is often used

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[58] Unlike the principal component analysis that considers the *total* variance and makes no distinction between common and unique variance, factor analysis analyzes only the *common* variance of the observed variables. Common factor analysis and principal component analysis are similar in the sense that the purpose of both is to reduce the original variables into fewer composite variables, called *factors* or *principal components* (Jobson 1992, Chapter 9).

when the observed variables are measured with relatively small error, or if it is assumed that the error term and its specific variance represent only a small portion of the total variance in the original variables.

Similar to the theoretical classification of all variables identified in the previous section, I would expect to see a similar grouping of variables into common factors. The categories of variables (and sub-categories within risk and performance groups) are likely correlated among each other, and therefore oblique rotation procedures may yield simpler and more interpretable factor patterns[59]. With fewer factors identified, the explanatory power of the Maximum likelihood models is expected to be lower. However, when factors representing future performance (information variables) are added to already publicly available information factors (historical variables), one should observe only a marginal improvement in the explanatory power of the Maximum likelihood models, provided that the Committee does not signal good-news information about firms future performance. After defining the common factors, I select a prediction model using the model selection procedures (Stepwise, Backward elimination and Forward selection) as well as all factors at once. To test my predictions, I estimate the logistic equation (4) as:

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[59] There are five orthogonal rotation methods (EQUAMAX, ORTHOMAX, QUARTIMAX, PARSIMAX, and VARIMAX) and two oblique rotation procedures (PROCRUSTES and PROMAX) that are available from statistical software packages. The simplest case of rotation is an orthogonal rotation (ORTHOMAX) in which the angle between the reference axes of factors are maintained at 90 degrees. More complicated forms of rotation allow the angle between the reference axes to be other than a right angle, i.e., factors are allowed to be correlated with each other. These types of rotational procedures are referred to as oblique rotations. Orthogonal rotation procedures are more commonly used than oblique rotation procedures (VARIMAX being the most commonly used orthogonal rotation procedure). In some situations, theory may mandate that underlying latent constructs be uncorrelated with each other, and therefore oblique rotation procedures will not be appropriate (information obtained from SAS user guide). Since the factors in this chapter are likely correlated with each other, I use the oblique rotation PROMAX.

$$Ln[p/(1-p)]_j = \alpha_0 + \beta_1 NOC + \sum_{X=1}^{n} \beta_X FACTOR_{X,j} + \varepsilon_j \quad (4)$$

where p is the probability that the firm j gets included in the S&P 500 Index; *NOC* is the number of candidate firms that satisfied all S&P 500 inclusion criteria on the Index inclusion announcement dates; and *FACTOR* is defined as a combination of variables that account for the intercorrelations among the explanatory variables. These results complement the logistic regression analysis of all variables without the factor analysis (results are discussed in section 3.4.2).

3.3.7 Sample Construction

For the purpose of identifying the Index inclusion effect and the logistic analysis, I analyze Index additions during 1987-2004. My variable requirements, however, allow examining only the period 1989-2004[60]. As mentioned earlier, starting October 1989, the S&P pre-announces the Index changes and the announcement dates (AD) do not coincide with effective dates of addition (ED). I use the firms from samples identified by DMOY and Wurgler and Zhuravskaya (2002) as "clean" additions[61]. This sample is only available until 1999. Standard and Poor's provides information on the S&P 500 Index changes from the year 2000 onwards. I collected a sample of Index additions from the Standards and Poors' website for a second period (2000-2004). Consistent with prior research, I searched press releases in Factiva for announcement dates and the reasons for Index changes. After I eliminate Added firms which resulted from spin-offs, name changes or mergers and acquisitions, I am left with 306 Index

[60] Hribar and Collins (2002) show that the Income Statement approach to compute discretionary accruals is superior to the Balance Sheet approach, and the necessary data are only available starting in 1988 (the first year in which Compustat reports data from cash flow statements). Therefore, the availability of discretionary accruals restricts the sample only for the 1989-2004 period.

[61] "Clean" sample refers to additions that do not result from spin-offs, name changes or mergers and acquisitions (this sample composition is consistent with Denis et al. 2003).

additions. After all accounting data requirements are satisfied, I am left with 78 observations for the Logistic analysis. Firms that are considered for Index inclusion by the S&P 500 committee are ideal candidates for a control sample, as they all meet various Index inclusion criteria, and therefore reduce a number of variables that I would have to control for had I used all available firms. In this chapter as well as in Chapter 4, I compare the newly included firms to other firms in the same industry that have met all the Index inclusion criteria, but were not included in the Index. Firms considered for inclusion into the S&P 500 must fulfill all of the inclusion criteria, which are publicly available. My control sample includes firms satisfying all criteria on the relevant dates (186 firm year observations). The criteria are: U.S. companies, liquidity, size, financial viability, public float, sector balance, seasoned stocks, and operating company (see Exhibit-1 in the Appendices). The ratio of Eligible firms to Added firms is approximately four to one. Table 3-1 provides a reconciliation of firms included in the Added samples, where the industry breakdowns closely resemble those reported in Table 4-3 of Chapter 4.

3.4 Analysis of Results

3.4.1 Logistic Analysis

Based on my predictions from section 3.2.1, I document supporting results that the Index Committee considers other publicly available risk and performance factors in formulating their decision and that future performance variables do not explain significant variation in the likelihood prediction model. I report these results in four separate tables; Logistic analysis without and including the future performance variables, and factor analysis excluding and including the future performance factors respectively. Before doing so, I provide a discussion of variable differences between the Added and Control firms and examine the corresponding bivariate regressions.

The descriptive statistics for Added and Control firms are summarized in Table 3-2. Of the control variable group, Added firms are smaller in terms of market capitalization (SIZE), are selected from a smaller pool of eligible candidates (NOC), and are more liquid (LIQ). The differences in both means and medians are statistically significant at 1% levels. Out of the risk category, only Beta is significantly lower for the Added group. In terms of performance prior to Index inclusion, earnings measures (E and ROE), CFO, and Sales are all significantly larger for Added firms at 10% levels. Additionally, indicators of growth (M/B, Sales Growth and Earnings Growth) are also significantly larger. Finally, added firms have significantly smoother earnings (mean EVAR of 3.255 compared to 3.953 for Control firms).

When I examine how these differences individually explain the inclusion likelihood, I find similar results. Table 3-3 summarizes the bivariate relationships between INCLUDE and each of the explanatory variables from the following Logistic regressions, where p is the probability that the firm j gets included in the S&P 500 Index:

$$Ln[p/(1-p)] = \alpha_0 + \beta_1 * Variable_{t,j} + \varepsilon_j$$

Coefficient χ^2 relates to the Model Log Likelihood where the significant chi-square statistic indicates a more desirable model. The Hosmer and Lemeshow (H&L) is a goodness of fit test for a binary response model. A small p-value (significant statistic) suggests that the fitted model is not an adequate model. For further details, see Hosmer and Lemeshow (1989)[62]. Interpreting variables that have significant Log

[62] The firms are divided into approximately ten groups of roughly the same size based on the percentiles of the estimated probabilities. The discrepancies between the observed and expected

Likelihood coefficients as well as insignificant H&L statistic, the fitted logistic regression model for INCLUDE indicates that the probability of the firm getting selected into the S&P 500 index increases with Liquidity, Market-to-Book ratio, historical Sales and Earnings growth, and future Sales growth. Similarly, firms are less likely to be added to the Index if they have high Betas (p-values of all of these variable coefficients are smaller than 0.10). I would expect these variables to have significant impact on the inclusion likelihood in a multivariate Logistic regression. The largest explanatory power comes from the control variable NOC (R^2 of 16.75%) and the risk variable EVAR (R^2 of 12.04%).

To determine how all historical explanatory variables together predict p, the following equation shows a logistic model based on the Stepwise selection method.

$$\begin{aligned} Ln\,[p/(1-p)] \; &= 6.171 - 0.372^{*}NOC_{t,j} - 1.234^{*}BETA_{t,j} + 0.572^{*}LIQ_{t,j} - 0.175^{*}NOPOS_{t,j} - \\ &- 1.172^{*}EVAR_{t,j} - 7.813^{*}RVAR_{t,j} + 0.556^{*}CAR_{t,j} + 1.337^{*}SALES_{t,j} + \\ &+ 5.873^{*}D/A_{t,j} + 0.225^{*}M/B_{t,j} + 17.178^{*}EARGR3_{t,j} + \varepsilon_j \end{aligned}$$

Table 3-4 provides further details about the logistic fitted model of historical variables that are likely considered by the Standard and Poor's Committee when selecting new Index candidates. Summary statistics are from logistic regression, Stepwise selection procedure, where a significance level of 0.3 is required for a variable to stay in a model. Identical results can be obtained by using the Backward elimination selection and only marginally different results using the Forward selection procedure. Since there are no interaction terms in this model, the Logistic analysis table lists the coefficient estimates and the results of the Wald test for individual parameters. Consistent with my predictions, the control variable NOC is negative and significant. As per the remaining variables, the above regression indicates that at the margin, the

number of observations in these groups are summarized by the Pearson chi-square statistic, which is then compared to a chi-square distribution with t degrees of freedom (shown in brackets).

probability that a firm will be selected increases with: Liquidity, CAR (better return performance than S&P 500 index itself), most recent fiscal year-end asset turnover (Sales), Market-to-Book and historical Earnings growth. On the other hand, firms with increasing risk, as captured by Beta and Earnings variability, are significantly less likely to be added to the S&P 500 index. Contrary to expectations, the Index Committee is more likely to choose increasingly leveraged firms. All variables are significant at 5% levels with exception of NOPOS and RVAR (p-values are reported in the last column). The above variables fitted in logistic regression model provide concordant predictions of 91.7%, and correctly classify 68.6% of the included firms at the 10% level of significance. The generalized R-Square and Max-Rescaled R-Square are 43.32% and 61.62% respectively, which suggests that current, publicly available information explains a significant portion of the inclusion likelihood among firms that all satisfy the eight public criteria. This logistic regression model results in an insignificant Hosmer and Lemeshow test (p=0.939) which indicates no evidence of a lack of fit in the selected model. Interestingly, both CAR_{PRE} and M/B are significantly positive in this regression, suggesting the Index Committee is influenced by variables that presage subsequent earnings performance. Overall, the results support the hypothesis that the Index Committee considers performance and risk factors in choosing among firms that satisfy the eight publicly known Index inclusion criteria.

In the second regression output, I am interested in the increase in the explanatory power and overall model fit after including proxies for the information signal on future performance that may be incorporated in Index inclusion. If firms' future performance is known implicitly by the Index Committee and becomes generally known through inclusion, then I would expect the future performance variables to be significant and to increase the explanatory power of the Logistic regression. Table 3-5 presents the results of a Logistic analysis, which includes all variables that the S&P 500 committee may incorporate into their selection decision process (including future performance variables). Summary statistics are from Logit regression, Stepwise selection procedure[63]:

$$Ln\,[p/(1-p)] = 18.383 - 0.336*NOC_{t,j} - 1.113*BETA_{t,j} + 0.615*LIQ_{t,j} - 0.285*NOPOS_{t,j} - 0.753*EVAR_{t,j} - 0.602*SIZE_{t,j} + 1.159*SALES_{t,j} + 5.901*D/A_{t,j} + 0.313*M/B_{t,j} + 13.741*AVROA_{t,j} + 4.454*SALGR3_{t,j} + \varepsilon_j$$

The above variables fitted in logistic regression model provide concordant predictions of 92.7%, and correctly classify 73.9% of the included firms in the S&P 500 Index at the 10% level of significance. The model results in an insignificant Hosmer and Lemeshow test (p=0.631) which indicates no evidence of a lack of fit in the selected model. Importantly, the future levels of ROA as well as the three-year future growth in sales are significantly and positively associated with the Index inclusion likelihood (at 1% levels). Such increased operating performance is consistent with the Information content hypothesis; newly added firms generally experience higher performance and growth. The marginal impact is relatively small, however. After including AVROA and SALGR3 as additional regressors, the generalized R-Square increases to 45.17% (compared to 43.32%) and Max-Rescaled R-Square increases to 64.25% (compared to 61.62%).

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[63] Again, identical results can be obtained by using the backward selection and only marginally different results using the forward selection procedure. Although the variable selection methods (stepwise, forward selection and backward elimination) optimize the goodness of fit by minimizing the number of observations, I still examine the collinearity diagnostics through correlation matrix. The presence of multicollinearity does not lead to biased coefficients in a Logistic regression. However, the standard errors of the coefficients will be inflated if multicollinearity is present. Reporting the entire correlation matrix would be exhausting, and therefore I provide few comments on the important result from this non-tabulated analysis. Since many of the variables within each category are intuitively highly correlated, I aim to select only the representative variables. I examine all pair-wise Spearman and Pearson correlations greater than 0.7 and then try to remove the least theoretically important of the two variables. Before employing various selection methods that choose a subset of explanatory variables, I remove variable D/E (due to high correlation with D/A) and AVROE, AVSAL and AVCFO (due to high correlation with AVROA). The results are identical even when I allow the selection model methods to choose from the whole set of variables.

These results suggest that in addition to already publicly available information, the future variables increase marginal explanatory power by only 3%. As mentioned in the previous section, both CAR_{PRE} and M/B_{PRE} variables are likely related to future earnings. If prices lead earnings, then the historical cumulative abnormal returns (CAR_{PRE}), if positive, imply that subsequent earnings will be better than prior earnings and if this earnings-returns association is anticipated, an improvement in future earnings should not necessarily be considered good news at AD. As a sensitivity analysis, I examine correlations between CAR_{PRE}, M/B_{PRE}, and future performance variables (AVROA, SALGR3, EARGR3 and Delta E). The non-tabulated correlations reveal that CAR_{PRE} are significantly positively correlated with the SALGR3, EARGR3 and Delta E (Spearman and Pearson < 0.01), whereas M/B_{PRE} is significantly positively correlated ($p < 0.05$) with all future performance variables except EARGR3 ($p < 0.15$). Thus, much of the improved future performance is likely captured in price beforehand, and was implicitly already publicly available. Overall, results from the second Logistic regression provide only weak evidence that Index inclusion conveys significant information about future operating performance.

3.4.2 Factor Analysis

I have divided the explanatory variables into two categories: risk and performance (historical and future), and several subcategories, in which the variables relate to each other and yield the same predictions for the Index inclusion likelihood. My goal is to reduce this set of observable variables into a small number of latent factors that account for the correlations among observed variables and confirm my results from the previous section.

Table 3-6 shows the factor numbers and corresponding eigenvalues of historical (pre-inclusion, publicly available) variables in Panel A, as well as all variables (pre- and post-inclusion) variables in Panel B, respectively. I employ the most commonly used lower bound ("eigenvalues one criterion", Jobson 1992, page 394) to retain and analyze number of factors that explain significant variance similar to a single variable. Panel A suggests that I retain six factors representing the historical variables, whereas Panel B suggests that I consider eight factors that represent both historical and future variables. Both criteria result in number of factors explaining approximately 75% of the common variance among variables[64].

An oblique rotation method PROMAX provides a matrix of standardized regression coefficients for each of the original variables on the rotated factors. The results are summarized in Table 3-7. I concentrate on the highlighted factors holdings that are greater than 0.50 in absolute value and use these coefficients to infer the meaning of the rotated factors based on their significant loadings[65].

Factor Analysis - Historical Variables

Table 3-7, Panel A presents the first factor structure matrix for six factors (historical variables). The first factor is difficult to interpret and predict its sign for the regression analysis. The variables significantly loaded on the first factor are Market based risk variables (Beta, LTD Rank and Return variability) that are predicted to be negatively associated with the Index inclusion likelihood, and Performance indicator (*CAR* -

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[64] If the factors are doing a good job in explaining the correlations among the original variables, I expect the residual matrix to approximate a null matrix. The off-diagonal elements of the residual correlation matrix are all close to 0.06, indicating that the correlations among the 19 historical and 26 full variable subsets can be reproduced fairly accurately from the retained factors. The root mean squared off-diagonal residual is 0.0666 for the historical variables alone and 0.0525 for all variables.

[65] One downside of an oblique rotation method is that if the correlations among the factors are substantial, then it is sometimes difficult to distinguish among factors by examining the factor loadings. I have found that the correlations among individual factors range from -0.23 to 0.35 for the historical factors and from -0.16 to 0.24 for all factors, and therefore the PROMAX rotation method seems to be appropriate. As a sensitivity analysis, I perform the most commonly employed method VARIMAX and find the results to be almost identical. VARIMAX method results in significant variables loadings in each factor that are marginally different in magnitude than loadings from the PROMAX method. Logistic regressions employing the obtained factors yield identical results regardless of the method used.

Historical abnormal returns) that is predicted to be positively related to *INCLUDE*. The second factor can be identified by the following variables: ROE, Earnings, and the three-year Sales and Earnings growth, all of which represent historical performance. Factor2 is therefore expected to be positively related to *INCLUDE*. The two variables loaded on the third factor are *D/E* and *D/A*, which measure the firms' financial leverage. Factor3 is expected to be negatively related to *INCLUDE*, although I have found positive coefficients of these variables in the previous section. As mentioned earlier, both Earnings variability and Size capture risk and as represented by Factor4 are expected to be negatively related to *INCLUDE*. Factor5 can be again identified as a performance factor, as ROE, CFO and the Growth indicator (*M/B*) have high loadings. Finally, a positive loading for Non-discretionary and a negative loading for Discretionary accruals (*NDACC* and *DACC*) identify the sixth factor, which is predicted to be positively associated with the Index inclusion likelihood based on a preference for higher quality earnings. I use these six rotated factors as explanatory variables in a logistic multiple regression model where the dummy variable *INCLUDE* is a dependant variable. Table 3-8 presents a summary statistics from the following Logit regression that employed the Stepwise selection procedure:

$$Ln\,[p/(1-p)] = 0.647 - 0.267^{*}NOC_{t,j} + 0.439^{*}Factor1_{t,j} + 0.581^{*}Factor2_{t,j} - 0.262^{*}Factor3_{t,j} - 1.042^{*}Factor4_{t,j} + \varepsilon_j$$

The above variables fitted in the logistic regression model provide concordant predictions of 87.2%, and correctly classify 54.9% of the included firms in the S&P 500 Index at the 10% level of significance. This logistic regression model results in an insignificant Hosmer and Lemeshow test ($p=0.143$) which indicates no evidence of a lack of fit in the selected model. The explanatory power of this model is 33.85% (48.16% Max-rescaled R^2). Similar results can be found when I include all six factors in the logistic regression. While Factor6 (earnings quality) is not statistically significant, Factor5 (performance) is positively related to the Inclusion likelihood. The results from this factor analysis confirm the logistic analysis of all historical variables. Next, I examine whether factors represented by historical as well as future variables significantly improve the explanatory power of the Index inclusion likelihood.

Factor Analysis - Historical and Future Variables

Table 3-7, Panel B presents the first factor structure matrix for eight factors (historical as well as future variables), which are used to interpret the meaning of the factors. The non-standardized factor structure is obtained after the oblique PROMAX rotation, which allows the latent factors to be correlated with each other[66]. Inclusion of future variables changes the factor structure only marginally. A similar argument about M/B and historical CAR variables (factors) mapping into future performance can be applied here; the marginal increase in explanatory power due to a pure information effect is even lower, when one considers the prices leading earnings association. With the exception of historical CFO, the variables significantly loaded on the first factor are future performance variables (AVCFO, AVROA and AVROE) that are predicted to be positively associated with the Index inclusion likelihood. Factor2 (identified by ROE, E and EARGR3) relates to performance variables and is predicted to be positively related to *INCLUDE.* Risk variables (BETA, LTDR and RVAR) significantly load on the third factor, which is expected to be negatively related to *INCLUDE.* The two variables loaded on the fourth factor are *D/E.*and *D/A*, both which measure the firms' financial leverage. This factor is expected to be negatively related to *INCLUDE,* although I have found positive coefficients of these variables in the previous section. Factor5 can be identified by Historical abnormal

[66] Non-tabulated results indicate that several factors are significantly correlated with each other ($p<0.01$).

returns and future Sales growth (CAR and SALGR3) which have a positive predicted coefficient. Similar to analysis of historical variables only, Factor6 represents firms' risk (negative prediction), Factor7 is identified by earnings quality (positive prediction), and Factor8 by financial performance (positive prediction). I use these eight rotated factors as explanatory variables in a logistic multiple regression model where the dummy variable *INCLUDE* is a dependant variable. Table 3-9 presents a summary statistics from the following Logit regression that employed the Stepwise selection procedure:

$$Ln\,[p/(1-p)] = 1.109 - 0.359{*}NOC_{t,j} + 1.724{*}Factor5_{t,j} - 0.922{*}Factor6_{t,j} + 0.460{*}Factor7_{t,j} + 1.065{*}Factor8_{t,j} + \varepsilon_j$$

The above variables fitted in logistic regression model provide concordant predictions of 89.6%, and correctly classify 65.2% of the included firms in the S&P 500 Index at the 10% level of significance. This logistic regression model results in an insignificant Hosmer and Lemeshow test (p=0.797) which indicates no evidence of a lack of fit in the selected model. The explanatory power of this model is 39.90% (56.76% Max-rescaled R^2). The only future variable included in the significant factors is SALGR3, which partially forms this factor and thus contributes only a small percentage to the overall explanatory power. Similar results can be found when I include all eight factors in the logistic regression (full model), where the coefficients of Factors 1-4 are not statistically significant. This analysis again confirms findings of the logistic regression analyzing all historical variables without grouping them together. The decision to include a firm in the S&P 500 Index is predominantly based on the currently available information and on the number of candidate firms around each Index inclusion announcement date. To the degree that future performance is better, much of this is captured by CAR_{PRE} and M/B_{PRE}. It is appears unlikely that the Index Committee possesses significant material information about firms' future performance that would outweigh other control, risk and performance variables that appear to be the major drivers in the inclusion decision beyond the eight stated criteria. The significant increase in next period's earnings documented by DMOY and its putative relationship to the Index inclusion premia is analyzed in the next chapter.

3.5 Conclusion and Discussion

Together with a new sample of hand collected Index additions during 2000-2004, this chapter contributes to the Information content hypothesis by establishing an important link between Index inclusion and subsequent improvement in operating performance. I investigate likely factors associated with the Index Committee's decision to select particular firms from pools of eligible candidates to represent the S&P 500 index. I hypothesize that in addition to publicly available criteria, the Index Committee considers other factors such as risk and historical performance that enter the decision process. I also predict that it is highly unlikely that the S&P possesses material, non-public information about firms' future performance; and if so, such information is not the dominant factor in selecting the new Index members. Consistent with these predictions, I find that in addition to the official inclusion criteria, the Index Committee further considers financial and equity risk variables, as well as firms' historical performance. My models explain a large variation in the Index inclusion likelihood, driven primarily by the number of eligible candidates and firms' historical earnings variability. Whether the Index Committee relies heavily on publicly available information or whether the Committee uses non-public information about future performance would greatly enhance our understanding of the information-free nature of inclusion announcements. I find that although the future performance variables (factors) are positively associated with the Index inclusion likelihood, their marginal explanatory power is relatively small.

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3.7 Tables

Table 3-1: Sample composition of newly added firms to the S&P 500 Index and the Control sample during 1987-2004

	ADDED		CONTROL			
	Firms = Firm-Years		Firms / Firm-Years		Total Firm-Years	
Period 1 (1987-1999); Period 2 (2000 - 2004)	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2
Initial search for S&P 500 additions (1987-1999; 2000-2004)	327	138				
Eliminating mergers and takeovers	(31)	(12)				
Eliminating spin-offs	(26)	(14)				
Reconciliation and other (1)	(23)					
Firms included prior to 1989	(53)					
Added firms and firms satisfying all Inclusion criteria (1989-2004)	**194**	**112**	**130 / 685**	**145 / 555**	**879**	**667**
Additional data availability and requirements						
Firms with variables available to estimate abnormal returns	306		275 / 1240		1546	
Missing variables for Logistic analysis	(228)		(197) / (1054)		(1282)	
Sample for the Logistic and Factor Analyses	**78**		**78 / 186**		**264**	

Table 3-2: Logistic Regression - Descriptive Statistics

	Added firms (N=78)			Control Firms (N=186)			p-value	
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	t-test	Mann-Whitney
NOC	4.179	4.000	2.647	9.511	6.000	8.471	0.00	0.00
LIQ *PRE*	1.664	1.185	1.448	1.183	0.681	1.308	0.01	0.00
SIZE *PRE*	22.40	22.36	0.653	22.80	22.49	0.707	0.00	0.00
NOPOS *PRE*	19.69	21.00	2.565	19.49	20.00	2.309	0.54	0.12
BETA *PRE*	0.928	0.749	0.537	1.045	0.954	0.497	0.09	0.03
LTD Rank *PRE*	10.88	11.00	2.923	11.45	12.00	3.428	0.21	0.30
RVAR *PRE*	0.111	0.106	0.047	0.120	0.108	0.065	0.26	0.60
D/E *PRE*	0.741	0.395	0.957	0.552	0.423	0.506	0.04	0.83
D/A *PRE*	0.217	0.197	0.162	0.204	0.180	0.127	0.40	0.72
ROE *PRE*	0.183	0.163	0.123	0.149	0.123	0.120	0.04	0.00
E *PRE*	0.092	0.086	0.064	0.072	0.061	0.068	0.03	0.01
CFO *PRE*	0.134	0.127	0.077	0.110	0.100	0.059	0.01	0.05
SALES *PRE*	0.985	0.806	0.672	0.717	0.660	0.417	0.00	0.02
CAR *PRE*	0.914	0.484	1.380	0.795	0.280	1.428	0.53	0.07
M/B *PRE*	5.940	4.332	5.423	3.566	2.733	2.136	0.00	0.00
SALGR3 *PRE*	0.279	0.195	0.259	0.212	0.127	0.240	0.04	0.00
EARGR3 *PRE*	0.032	0.022	0.048	0.018	0.012	0.032	0.01	0.00
NDACC *PRE*	-0.018	-0.026	0.066	-0.016	-0.011	0.062	0.77	0.45
DACC *PRE*	-0.024	-0.021	0.088	-0.022	-0.024	0.118	0.90	0.54
EVAR *PRE*	3.255	3.097	0.976	3.953	3.708	0.852	0.00	0.00
AVROE *POST*	0.158	0.140	0.125	0.080	0.105	0.116	0.00	0.00
AVCFO *POST*	0.125	0.125	0.070	0.092	0.087	0.050	0.00	0.00
AVROA *POST*	0.069	0.066	0.081	0.028	0.041	0.074	0.00	0.00
AVSAL *POST*	0.925	0.708	0.640	0.665	0.591	0.393	0.00	0.01
SALGR3 *POST*	0.235	0.172	0.271	0.143	0.101	0.186	0.00	0.00
EARGR3 *POST*	0.007	0.008	0.075	0.000	-0.002	0.036	0.28	0.00
Delta E *POST*	0.030	0.016	0.119	0.012	0.005	0.118	0.25	0.00

Added sample includes 78 firms that were announced as S&P 500 Index additions during 1989-2004. The Control group includes 51 firms (186 firm-year observations) that satisfied all Index inclusion criteria during the same period; however, that were not included in the S&P 500 Index. All quantitative variables are winsorised at 1% extreme levels. *PRE, POST* represents the fiscal year ends of periods before and after the Index inclusion announcement dates respectively. NOC is the number of candidate firms that satisfied all S&P 500 inclusion criteria on the Index inclusion announcement dates (validity check variable). LIQ is one of the quantitative S&P Index inclusion criteria variables, defined as product of end period monthly price and share volume, summed over the twelve months prior to the Index inclusion announcement month and divided by a firm's market capitalization.

Table 3-2: Continued

The remaining variables are defined as follows:

SIZE	is another of the S&P Index committee's inclusion criteria, defined as a natural logarithm of product of end period monthly price and shares outstanding, summed over the twelve months prior to the Index inclusion announcement month (for further details, see Appendices).
NOPOS	represents the number of positive quarterly Earnings (*Compustat #8*) during the 5-year period preceding the Index inclusion announcement dates.
BETA	measures systematic risk, defined as a coefficient from CAPM regressions of firm stock on the S&P 500 Index (see section 2.3.1 for further details).
LTD Rank	is the Standard & Poor's Issuer Credit Rating (ICR), a current opinion of an issuer's overall creditworthiness, apart from its ability to repay individual obligations. This opinion focuses on the obligor's capacity and willingness to meet its long-term financial commitments (those with maturities of more than one year) as they come due. This variable ranges from 2-representing AAA+ rating to 18-representing B- rating.
RVAR	represents the return variability defined as a standard deviation of the monthly return variance during the 2-year period preceding the Index inclusion announcement dates.
D/E	is the debt-to-equity ratio defined as book value of a long term debt (*Compustat #9*) divided by book value of common equity (*Compustat #60*).
D/A	is the debt-to-assets ratio defined as book value of a long term debt (*Compustat #9*) divided by book value of a firm's total assets (*Compustat #6*).
ROE	represents annual return on equity (*Compustat #123/Compustat #60*).
E	represents Earnings defined as Net Income excluding extraordinary items (*Compustat #123*), deflated by the total assets (*Compustat #6*). This is effectively firms' return on assets.
CFO	represents Cash Flow from Operations adjusted for extraordinary items and discontinued operations (*Compustat #308-Compustat #124*), deflated by the average total assets.
SALES	represent annual sales (*Compustat #12*), deflated by the total assets (*Compustat #6*).
CAR	represents cumulative buy-and-hold market adjusted abnormal return (*CARMBH*) during the 2-year period preceding the Index inclusion announcement dates.
M/B	is a market-to-book ratio defined a product of share price (*Compustat #199*) and common shares outstanding (Compustat *#25*), divided by the book value of common equity (*#60*).
SALGR3	is the average annual sales growth during a three-year period preceding Index inclusion ($SALGR3_{PRE}$) and subsequent to Index inclusion ($SALGR3_{POST}$).
EARGR3	is the average annual earnings growth during a three-year period preceding Index inclusion ($EARGR3_{PRE}$) and subsequent to Index inclusion ($EARGR3_{POST}$).
NDACC	represents the non-discretionary accruals defined as the difference between TACC and DACC.
DACC	represents discretionary accruals defined as the error term from the regression 4, Chapter 3.
EVAR	represents the earnings variability defined as natural logarithm of the quarterly earnings (*Compustat quarterly #8*) variance during the 5-year period preceding the Index inclusion announcement dates.
AVROE	represents the average ROE during a three-year period subsequent to Index inclusion.
AVCFO	represents the average CFO during a three-year period subsequent to Index inclusion.
AVROA	is the average Earnings (ROA) during a three-year period subsequent to Index inclusion.
AVSAL	represents the average Sales during a three-year period subsequent to Index inclusion.
Delta E	represents change in Earnings from the post to pre Index inclusion fiscal year ends.

Table 3-3: Logistic Regression – Bivariate Analysis

This table summarizes the bivariate relationships between INCLUDE and each of the explanatory variables from the following Logistic regressions, where *p* is the probability that the firm *j* gets included in the S&P 500 Index:

$$Ln[p/(1-p)] = \alpha_0 + \beta_1 * Variable_{t,j} + \varepsilon_j$$

Variable	Intercept	Coefficient	Model Log Likelihood	Coefficient χ^2	χ^2 Hosmer – Lemeshow (df)
NOC	0.803**	-0.297***	-136.042	48.393***	18.857** (8)
LIQ $_{PRE}$	-1.202***	0.239***	-157.048	6.392***	13.529 (8)
SIZE $_{PRE}$	21.831***	-1.005***	-150.216	20.046***	29.646*** (8)
NOPOS $_{PRE}$	-1.591	0.037	-160.042	0.393	9.252** (8)
BETA $_{PRE}$	-0.410	-0.466*	-158.766	2.946*	11.722 (8)
LTD Rank $_{PRE}$	-0.281	-0.053	-159.430	1.618	24.413*** (7)
RVAR $_{PRE}$	-0.555*	-2.710	-159.574	1.330	18.430** (8)
D/E $_{PRE}$	-1.112***	0.383**	-158.224	4.030**	15.984** (8)
D/A $_{PRE}$	-1.013***	0.687	-159.990	0.498	16.150** (8)
ROE $_{PRE}$	-1.221***	2.151**	-158.178	4.121**	29.104*** (8)
E $_{PRE}$	-1.205***	4.182**	-157.978	4.522**	27.410*** (8)
CFO $_{PRE}$	-1.574***	5.776***	-156.430	7.616***	21.947*** (8)
SALES $_{PRE}$	-1.672***	0.959***	-153.212	14.053***	21.290*** (8)
CAR $_{PRE}$	-0.918***	0.058	-160.049	0.380	12.036 (8)
M/B $_{PRE}$	-1.761***	0.202***	-148.513	23.452***	9.559 (8)
SALGR3 $_{PRE}$	-1.121***	1.038**	-158.281	3.915**	9.594 (8)
EARGR3 $_{PRE}$	-1.091***	9.291***	-156.631	7.216***	7.315 (8)
NDACC $_{PRE}$	-0.880***	-0.613	-160.198	0.081	6.402 (8)
DACC $_{PRE}$	-0.873***	-0.156	-160.231	0.016	23.794*** (8)
EVAR $_{PRE}$	2.658***	-0.985***	-143.301	33.875***	27.525*** (8)
AVROE $_{POST}$	-1.623***	6.404***	-148.035	24.407***	17.872** (8)
AVCFO $_{POST}$	-1.943***	9.980***	-151.580	17.318***	14.633* (8)
AVROA $_{POST}$	-1.645***	15.204***	-146.953	26.572***	20.933*** (8)
AVSAL $_{POST}$	-1.675***	1.033***	-152.891	14.696***	16.165** (8)
SALGR3 $_{POST}$	-1.209***	1.885***	-155.622	9.234***	10.254 (8)
EARGR3 $_{POST}$	-0.881***	3.150	-159.616	1.246	25.107*** (8)
Delta E $_{POST}$	-0.899***	1.418	-159.543	1.391	20.587*** (8)
Log Likelihood for constant only			-160.239		

***, ** and * denotes significant at the 1%, 5% and 10% levels. All variables are defined in Table 3-2. The Coefficient χ^2 relates to the Model Log Likelihood where the significant chi-square statistic indicates a more desirable model. The Hosmer and Lemeshow is a goodness of fit test for a binary response model. A small p-value (significant statistic) suggests that the fitted model is not an adequate model. For further details, see Hosmer and Lemeshow (1989).

Table 3-4: Basic Analysis of Logistic regression

This regression presents a Logistic analysis of historical variables that are likely available to an ordinary investor when predicting the Index inclusion. Summary statistics are from Logit regression, Stepwise selection procedure.

$$Ln\,[p/(1-p)] = \alpha_0 + \beta_1 {}^*NOC_{t,j} + \beta_2 {}^*BETA_{t,j} + \beta_3 {}^*LIQ_{t,j} + \beta_4 {}^*NOPOS_{t,j} + \beta_5 {}^*EVAR_{t,j} + \beta_6 {}^*RVAR_{t,j} + \beta_7 {}^*CAR_{t,j} + \beta_8 {}^*SALES_{t,j} + \beta_9 {}^*D/A_{t,j} + \beta_{10} {}^*M/B_{t,j} + \beta_{11} {}^*EARGR3_{t,j} + \varepsilon_j$$

Parameter	Prediction	Coefficient Estimate	Wald χ^2	p-value
Intercept		6.171	3.054	0.081
NOC	-	-0.372	22.580	0.000
BETA $_{PRE}$	-	-1.234	5.761	0.016
LIQ $_{PRE}$	+	0.572	4.192	0.041
NOPOS $_{PRE}$	?	-0.175	1.762	0.184
EVAR $_{PRE}$	-	-1.172	17.009	0.000
RVAR $_{PRE}$	-	-7.813	1.433	0.231
CAR $_{PRE}$	+	0.556	4.016	0.045
SALES $_{PRE}$	+	1.337	9.317	0.002
D/A $_{PRE}$	-	5.873	12.289	0.001
M/B $_{PRE}$	+	0.225	7.041	0.008
EARGR3 $_{PRE}$	+	17.178	4.308	0.038
N		264		
R-Square		43.32%		
Max-Rescaled R-Square		61.62%		
Hosmer Lemeshow χ^2		2.929		
Percent Concordant		91.70%		

where p is the probability that the firm is selected to represent the S&P 500 Index. The dependent variable INCLUDE equals 1 for added firms, zero otherwise. A significance level of 0.3 is required for a variable to stay in a model using the Stepwise selection procedure. Identical results can be obtained sing the backward selection and only marginally different results using the Forward selection procedure. The above variables fitted in logistic regression model correctly classify 68.6% of the included firms in the S&P 500 Index at the 10% level of significance. All variables are defined in Table 3-2. This logistic regression model results in insignificant Hosmer and Lemeshow test (p=0.939) which indicates no evidence of a lack of fit in the selected model (results sensitive to any selection procedure outputs). The association of predicted probabilities and observed responses table also indicates a good model fit. The percent of concordant observations is close to 1. It is the percent of total number of pairs of observations with different outcomes; that is, one observation has outcome 0 and the other 1, with predicted probability (P(Y=1) for observation with observed outcome 0 lower then predicted probability for observation with observed outcome 1).

Table 3-5: Extended Analysis of Logistic regression

This regression presents a Logistic analysis all variables that the S&P 500 committee may incorporate into their selection decision process (including future performance variables). Summary statistics are from Logit regression, Stepwise selection procedure.

$$Ln\,[p/(1-p)] = \alpha_0 + \beta_1{*}NOC_{t,j} + \beta_2{*}BETA_{t,j} + \beta_3{*}LIQ_{t,j} + \beta_4{*}NOPOS_{t,j} + \beta_5{*}EVAR_{t,j} + \beta_6{*}SIZE_{t,j} + \beta_7{*}SALES_{t,j} + \beta_8{*}D/A_{t,j} + \beta_9{*}M/B_{t,j} + \beta_{10}{*}AVROA_{t,j} + \beta_{11}{*}SALGR3_{t,j} + \varepsilon_j$$

Parameter	Prediction	Coefficient Estimate	Wald χ^2	p-value
Intercept		18.383	2.675	0.102
NOC	-	-0.336	15.769	0.000
BETA $_{PRE}$	-	-1.113	4.005	0.045
LIQ $_{PRE}$	+	0.615	5.936	0.015
NOPOS $_{PRE}$	?	-0.285	5.113	0.024
EVAR $_{PRE}$	-	-0.753	4.544	0.033
SIZE $_{PRE}$	?	-0.602	1.263	0.261
SALES $_{PRE}$	+	1.159	6.359	0.012
D/A $_{PRE}$	-	5.901	11.516	0.001
M/B $_{PRE}$	+	0.313	9.721	0.002
AVROA $_{POST}$	+	13.741	7.106	0.007
SALGR3 $_{POST}$	+	4.454	7.696	0.005
N		264		
R-Square		45.17%		
Max-Rescaled R-Square		64.25%		
Hosmer Lemeshow χ^2		6.148		
Percent Concordant		92.70%		

where p is the probability that the firm is selected to represent the S&P 500 Index. The dependent variable INCLUDE equals 1 for added firms, zero otherwise. A significance level of 0.3 is required for a variable to stay in a model using the Stepwise selection procedure. Identical results can be obtained sing the backward selection and only marginally different results using the Forward selection procedure. The above variables fitted in logistic regression model correctly classify 73.9% of the included firms in the S&P 500 Index at the 10% level of significance. All variables are defined in Table 3-2. This logistic regression model results in insignificant Hosmer and Lemeshow test (p=0.631) which indicates no evidence of a lack of fit in the selected model (results sensitive to any selection procedure outputs). The association of predicted probabilities and observed responses table also indicates a good model fit. The percent of concordant observations is close to 1. It is the percent of total number of pairs of observations with different outcomes; that is, one observation has outcome 0 and the other 1, with predicted probability (P(Y=1) for observation with observed outcome 0 lower then predicted probability for observation with observed outcome 1).

Table 3-6: Factor Analysis - Eigenvalues

This table presents the factor numbers and corresponding eigenvalues of historical (pre-inclusion, publicly available) variables in Panel A, as well as all variables (pre- and post-inclusion) variables in Panel B respectively. All variables are defined in Table 3-2. Since a commonly used lower bound is the eigenvalue 1 criterion (where the number of factors is at least as large as the number of eigenvalues), I retain six factors from Panel A and two factors in Panel B respectively.

Panel A (Pre-inclusion, historical variables)

	Eigenvalue	Difference	Proportion	Cumulative
1	4.245	1.565	0.223	0.223
2	2.679	0.375	0.141	0.364
3	2.304	0.477	0.121	0.485
4	1.827	0.278	0.096	0.582
5	1.549	0.394	0.081	0.663
6	1.155	0.160	0.060	0.724
7	0.994	0.144	0.052	0.776
8	0.850	0.110	0.044	0.821
...	...	...	...	...

Panel B (Pre-inclusion and post-inclusion variables)

	Eigenvalue	Difference	Proportion	Cumulative
1	5.011	1.179	0.200	0.200
2	3.831	1.084	0.153	0.353
3	2.746	0.680	0.110	0.463
4	2.066	0.285	0.082	0.546
5	1.780	0.322	0.071	0.617
6	1.458	0.182	0.058	0.675
7	1.276	0.060	0.051	0.726
8	1.215	0.301	0.048	0.775
9	0.914	0.067	0.036	0.812
10	0.847	0.124	0.033	0.846
11	0.722	0.154	0.028	0.874
12	0.568	0.094	0.022	0.897
...	...	...	...	...

Table 3-7: Factor Analysis

Panel A of this table presents the factor pattern matrix of 19 historical variables, which are used to interpret the meaning of the factors. The non-standardize factor structure is obtained after the oblique PROMAX rotation, which allows the latent factors to be correlated with each other. Based on analysis in Table 3-6, I retain 6 factors. All variables are defined in Table 3-2. The values in this matrix are the standardized regression coefficients, which are functionally related to the semi-partial correlation between a variable and the factor when other factors are held constant. Each value represents an individual and non-redundant contribution that each factor is making to predict a subtest. I concentrate on the correlations that are greater than 0.5 (underlined), and use these values in interpreting individual factors. The corresponding Logistic regressions are then reported in Table 3-8.

Panel A (Pre-inclusion, historical variables)

Variable	Fact.1	Fact.2	Fact.3	Fact.4	Fact.5	Fact.6
SIZE *PRE*	0.015	-0.085	-0.014	<u>0.807</u>	0.160	0.291
LIQ *PRE*	<u>0.771</u>	0.163	-0.122	-0.136	0.089	-0.239
NOPOS *PRE*	-0.103	<u>-0.547</u>	-0.074	-0.495	0.241	0.004
BETA *PRE*	<u>0.682</u>	-0.058	0.031	0.173	0.128	0.179
LTDR *PRE*	<u>0.621</u>	-0.179	0.293	-0.020	-0.216	-0.235
RVAR *PRE*	<u>0.898</u>	-0.067	-0.093	-0.026	-0.020	-0.039
D/A *PRE*	-0.112	-0.098	<u>0.984</u>	-0.073	-0.111	0.083
D/E *PRE*	-0.056	-0.050	<u>0.917</u>	0.010	0.143	-0.139
ROE *PRE*	-0.144	<u>0.502</u>	0.212	0.050	<u>0.596</u>	-0.357
E *PRE*	-0.060	<u>0.840</u>	-0.238	-0.069	0.215	-0.051
CFO *PRE*	0.030	-0.150	-0.134	-0.074	<u>0.739</u>	0.189
SALES *PRE*	-0.050	0.042	-0.404	-0.047	0.404	-0.111
CAR *PRE*	<u>0.712</u>	0.053	-0.164	0.064	0.151	0.050
M/B *PRE*	0.420	0.163	0.152	0.067	<u>0.656</u>	0.005
SALGR3 *PRE*	0.297	<u>0.528</u>	0.218	-0.232	-0.125	0.472
EARGR3 *PRE*	0.005	<u>0.948</u>	-0.063	0.008	-0.003	0.208
EVAR *PRE*	-0.001	0.027	-0.044	<u>0.907</u>	-0.109	-0.153
NDACC *PRE*	-0.090	0.184	-0.037	0.047	-0.027	<u>0.834</u>
DACC *PRE*	-0.003	0.435	-0.044	-0.025	-0.295	<u>-0.622</u>
Variance explained by each factor eliminating other factors	2.493	2.248	2.075	1.846	1.788	1.595

Table 3-7: Continued

Panel B of this table presents the factor pattern matrix of all 25 historical and future variables, which are used to interpret the meaning of the factors. The non-standardize factor structure is obtained after the oblique PROMAX rotation, which allows the latent factors to be correlated with each other. Based on analysis in Table 3-6, I retain 8 factors for interpretation. All variables are defined in Table 3-2. The values in this matrix are the standardized regression coefficients, which are functionally related to the semi-partial correlation between a variable and the factor when other factors are held constant. Each value represents an individual and non-redundant contribution that each factor is making to predict a subtest. I concentrate on the correlations that are greater than 0.5 (underlined), and use these values in interpreting individual factors. The corresponding Logistic regressions are then reported in Table 3-9.

Panel B (Post-inclusion, future variables)

Variable	Fact.1	Fact.2	Fact.3	Fact.4	Fact.5	Fact.6	Fact.7	Fact.8
SIZE $_{PRE}$	0.233	-0.060	0.046	0.029	0.087	<u>0.872</u>	0.143	-0.069
LIQ $_{PRE}$	-0.140	0.200	<u>0.688</u>	-0.142	0.085	-0.180	-0.174	0.192
NOPOS $_{PRE}$	0.400	-0.384	-0.061	-0.016	-0.164	-0.428	0.003	-0.115
BETA $_{PRE}$	0.292	0.058	<u>0.788</u>	0.107	-0.079	0.210	0.024	-0.132
LTDR $_{PRE}$	-0.452	-0.215	<u>0.517</u>	0.228	0.030	-0.116	-0.161	0.111
RVAR $_{PRE}$	-0.166	-0.027	<u>0.811</u>	-0.106	0.117	-0.042	-0.033	0.010
D/A $_{PRE}$	-0.077	-0.096	-0.046	<u>0.888</u>	-0.030	-0.052	0.025	-0.145
D/E $_{PRE}$	-0.051	-0.068	-0.068	<u>0.885</u>	0.067	-0.001	-0.147	0.175
ROE $_{PRE}$	0.278	<u>0.579</u>	-0.054	0.193	-0.127	0.008	-0.288	<u>0.514</u>
E $_{PRE}$	0.148	<u>0.887</u>	0.087	-0.227	-0.080	-0.075	-0.054	0.030
CFO $_{PRE}$	<u>0.799</u>	-0.017	0.267	-0.085	-0.254	-0.033	0.110	0.229
SALES $_{PRE}$	0.110	0.033	-0.264	-0.436	0.203	-0.106	0.065	<u>0.547</u>
CAR $_{PRE}$	-0.056	-0.061	0.477	-0.153	<u>0.597</u>	0.103	-0.031	0.124
M/B $_{PRE}$	0.197	0.131	0.318	0.117	0.234	0.039	0.095	<u>0.663</u>
SALGR3 $_{PRE}$	-0.065	0.378	0.223	0.259	0.441	-0.199	0.410	-0.093
EARGR3 $_{PRE}$	0.001	<u>0.778</u>	0.059	-0.040	0.301	0.011	0.097	-0.019
EVAR $_{PRE}$	-0.200	-0.017	-0.040	-0.070	0.036	<u>0.877</u>	-0.194	0.047
NDACC $_{PRE}$	-0.025	0.068	-0.126	-0.110	0.154	-0.036	<u>0.882</u>	0.087
DACC $_{PRE}$	-0.373	0.418	-0.033	-0.025	0.014	-0.005	<u>-0.604</u>	-0.168
AVROE $_{POST}$	<u>0.705</u>	0.099	-0.383	0.150	0.121	0.010	-0.161	0.176
AVCFO $_{POST}$	<u>0.916</u>	0.113	0.104	-0.103	-0.116	0.057	0.019	-0.025
AVROA $_{POST}$	<u>0.680</u>	-0.271	-0.364	0.007	0.205	-0.076	-0.004	-0.028
SALGR3 $_{POST}$	-0.136	0.029	-0.046	0.024	<u>0.905</u>	0.100	0.172	0.116
EARGR $_{POST}$	0.341	0.286	0.032	-0.007	0.273	-0.066	-0.308	<u>-0.577</u>
Delta E	0.316	<u>-0.668</u>	0.205	-0.036	0.461	-0.029	-0.240	-0.068
Variance explained by each factor eliminating other factors	3.192	2.732	2.395	2.020	1.764	1.806	1.592	1.546

Table 3-8: Factor Analysis – Historical variables

This regression presents a Logistic analysis of historical variables that were created using Factor Analysis in Table 3-7, Panel A. Summary statistics are from Stepwise selection procedure (partial model) and full Logit regression (full model).

$$Ln[p/(1-p)] = \alpha_0 + \beta_1 NOC + \sum_{X=1}^{6} \beta_X FACTOR_{X,j} + \varepsilon_j$$

		Partial model - Stepwise			Full model - Logistic		
	Predicted	Coefficient	Wald		Coefficient	Wald	
Parameter	sign	Estimate	χ^2	p-value	Estimate	χ^2	p-value
Intercept		0.647	2.731	0.098	0.667	2.792	0.095
NOC	-	-0.267	19.682	0.000	-0.302	18.961	0.000
Factor1 (*PRE*)	?	0.439	3.875	0.049	0.409	2.861	0.091
Factor2 (*PRE*)	+	0.581	3.697	0.054	0.620	3.497	0.062
Factor3 (*PRE*)	-	0.262	2.157	0.142	0.267	2.249	0.134
Factor4 (*PRE*)	-	-1.042	19.047	0.000	-1.028	18.036	0.000
Factor5 (*PRE*)	+				0.741	11.440	0.000
Factor6 (*PRE*)	+				0.074	0.112	0.738
N		264			264		
R-Square		33.85%			33.88%		
Max-Rescaled R-Square		48.16%			48.20%		
Hosmer Lemeshow χ^2		12.169			10.814		
Percent Concordant		87.20%			87.00%		

where p is the probability that the firm is selected to represent the S&P 500 Index. The dependent variable INCLUDE equals 1 for added firms, zero otherwise. A significance level of 0.3 is required for a variable to stay in a model using the Stepwise selection procedure. Identical results can be obtained sing the backward selection and only marginally different results using the Forward selection procedure. Virtually identical results are also obtained had I employed the factor structure matrix after the VARIMAX rotation. NOC is a control variable representing the number of candidate firms that were selected as a Control group. The above variables fitted in logistic regression model correctly classify 54.90% (partial model) and 54.2% (full model) of the included firms in the S&P 500 Index at the 10% level of significance. This logistic regression model results in insignificant Hosmer and Lemeshow test (p=0.143 for the partial model) and (p=0.213 for the full model), which indicates no evidence of a lack of fit in the selected model. Factor1 represents a combination of performance and risk variables; Factor2 represents historical growth performance; Factor3 represents firms' financial leverage; Factor4 represents equity risk; Factor5 represents historical performance; and Factor6 represents earnings quality;

Table 3-9: Factor Analysis – All variables

This regression presents a Logistic analysis of historical as well as future variables that were created using Factor Analysis in Table 3-7, Panel B. Summary statistics are from Stepwise selection procedure (partial model) and full Logit regression (full model).

$$Ln[p/(1-p)] = \alpha_0 + \beta_1 NOC + \sum_{X=1}^{8} \beta_X FACTOR_{X,j} + \varepsilon_j$$

		Partial model - Stepwise			Full model - Logistic		
	Predicted	Coefficient	Wald		Coefficient	Wald	
Parameter	sign	Estimate	χ^2	p-value	Estimate	χ^2	p-value
Intercept		1.109	6.745	0.009	1.071	5.426	0.019
NOC	-	-0.359	25.454	0.000	-0.349	22.488	0.000
Factor1 (*POST*)	+				0.182	0.369	0.543
Factor2 (*PRE*)	+				-0.015	0.001	0.974
Factor3 (*PRE*)	-				0.127	0.227	0.634
Factor4 (*PRE*)	-				0.225	1.403	0.237
Factor5 (*POST*)	+	1.724	22.337	0.000	1.693	19.217	0.000
Factor6 (*PRE*)	-	-0.922	14.359	0.000	-0.933	13.851	0.000
Factor7 (*PRE*)	+	0.460	3.296	0.069	0.417	2.384	0.123
Factor8 (*PRE*)	+	1.065	21.038	0.001	1.038	14.929	0.000
N		264			264		
R-Square		39.90%			40.32%		
Max-Rescaled R-Square		56.76%			57.36%		
Hosmer Lemeshow χ^2		4.620			8.177		
Percent Concordant		89.60%			89.70%		

where p is the probability that the firm is selected to represent the S&P 500 Index. The dependent variable INCLUDE equals 1 for added firms, zero otherwise. A significance level of 0.3 is required for a variable to stay in a model using the Stepwise selection procedure. Identical results can be obtained sing the backward selection and only marginally different results using the Forward selection procedure. Virtually identical results are also obtained had I employed the factor structure matrix after the VARIMAX rotation. NOC is a control variable representing the number of candidate firms that were selected as a Control group. The above variables fitted in logistic regression model correctly classify 65.2% (partial model) and 64.4% (full model) of the included firms in the S&P 500 Index at the 10% level of significance. This logistic regression model results in insignificant Hosmer and Lemeshow test (p=0.797 for the partial model) and (p=0.416 for the full model), which indicates no evidence of a lack of fit in the selected model (results sensitive to any selection procedure outputs). Factor1 represents future performance; Factor2 represents historical performance; Factor3 represents risk; Factor4 represents firms' financial leverage; Factor5 represents future growth and historical abnormal return performance; Factor6 represents equity risk; Factor7 represents earnings quality; and Factor8 represents historical performance variables.

Chapter 4

Information Hypothesis Revisited: Do Index Inclusion Announcements Convey Information about Firms' Future Performance?

4.1 Introduction

Current explanations for the documented abnormal returns observed at a firm's inclusion in the S&P 500 Index (hereafter Index) include a downward sloping demand curve for firms' stocks (Shleifer, 1986), lower risk, (Graham, Edmister and Pirie, 1996), and information content (Denis, McConnell, Ovtchinnikov, and Yu, 2003, hereafter DMOY). Further, vast majority of studies document that the observed abnormal returns associated with Index additions appear to be permanent rather than temporary. This "Index inclusion effect" is controversial because prices in efficient markets should reflect all publicly available information (i.e. prices should not react to changes in security's supply that are not accompanied by news concerning the security's fundamental value). Contrary to Standard and Poor's claim of a non-informative event,[67] DMOY find that inclusion in the S&P 500 triggers increasing analyst earnings forecasts and higher realized earnings than matched sets of control firms.

[67] In publicly available documents, Standard and Poor's explicitly indicate the following: "Company additions and deletions from an S&P equity index do not in any way reflect an opinion of the investment merits of the company" (Standard and Poor's, 2002b, p.1; Dhillon and Johnson, 1991).

This chapter evaluates why one observes, as reported by DMOY, higher than expected earnings for firms after Index inclusion and whether the unexpectedly higher earnings are associated with the abnormal returns arising at Index inclusion. Comparable to DMOY, I do observe relatively higher earnings following inclusion. Additionally, comparable to DMOY and many other papers, I document that the inclusion effect appears to be permanent, rather than temporary. However, contrary to DMOY's implicit assumption, I find that the observed higher earnings are not associated with the abnormal returns at inclusion. In fact, I demonstrate that the observed higher earnings are related to managerial manipulations of accounting accrùals, rather than improved economic performance. Accordingly, inclusion does not indicate an improvement in the expectations of future performance and is not an information event. I further support this conclusion by analyzing future earnings response coefficients subsequent to Index inclusion and document that Index inclusion garbles information rather than improves earnings informativeness. The analyses in this chapter leave the two pre-existing hypotheses of Downward-sloping LRDC and Risk Reducing hypotheses as viable explanations. I also contribute to the literature on earnings management by documenting this example of earnings management and discussing possible motivations.

This chapter is organized as follows: Section 4.2 reviews the Index inclusion issue and discusses the relevant literatures on the Index inclusion effect, earnings management, and the association of stock returns with earnings. Section 4.3 applies these literatures to the development of the hypotheses. Section 4.4 explains the research design and variable definitions. In section 4.5, I present the samples and provide descriptive statistics. I then present the main empirical results, including robustness checks in Section 4.6. Section 4.7 summarizes the chapter and indicates areas for future research.

4.2 The Index Inclusion Effect: Background and Competing Explanations

The S&P 500 is a widely followed index consisting of stocks representing leading industries in the U.S. economy that are selected by Standard & Poor's 500 Index Committee. The Index Committee consists of Standard & Poor's professionals with years of experience with both indices and capital markets. While the Committee tries to minimize Index turnover and adds only relatively stable stocks to the S&P 500, the Committee explicitly states that their selection procedure does not reflect opinions on the investment merits of any company. When an included stock ceases to meet any of the inclusion criteria, the Index Committee replaces the company with a new candidate. As there is, ostensibly, no new information provided, newly included firms should not experience permanent abnormal returns, yet researchers consistently observe permanent returns to Index changes (Chen et al. 2004).

The Index inclusion effect is the tendency of stocks to permanently increase in price (3% to 6%) when Standard & Poor's announces that they are to be added to the S&P 500 Index. As I have shown in the second chapter, there is considerable trading around the Index inclusion announcement date, followed by trading by Index tracking funds around the effective inclusion date[68]. The permanence of this effect has been confirmed by most studies including Shleifer (1986), Dhillon and Johnson (1991), Beneish and Whaley (1996), Lynch and Mendenhall (1997) and Wurgler and Zhuravskaya (2002); although some studies provide results suggesting that the effect is only temporary (Harris and Gurel, 1986).

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[68] I acknowledge that not all index tracking funds hold 100% of the same stocks of an underlying Index. Some funds engage in statistical sampling of the market and hold only representative securities. Other methods include synthetic indexing. This modern technique uses a combination of equity index futures contracts and investments in low risk bonds and replicates the performance of equities making up the Index. The fact that prices around Index inclusion effective dates results from a buying pressure from Additions (and selling pressure from Deletions) suggests that, on average, index funds collectively hold the Index securities and attempt to mimic the Index in order to minimize their portfolios' tracking errors. This premise is further supported by Blume and Edelen (2003) who demonstrate that the largest S&P 500 indexers replicate the Index with a tracking error of just several basis points per year and that almost half of indexers always follow an exact replication strategy.

There are four proposed explanations for observing a positive return at the time of Index inclusion; only three of which can explain a permanent price effect. If the S&P 500 Index inclusion announcement is indeed an information-free event, a firm's inclusion or exclusion from an Index should have no permanent effect on the share price, provided that the long run demand curve (LRDC) for common shares is perfectly elastic. The *Price Pressure* hypothesis suggests that stock prices may increase in the short run due to higher price pressure caused by heavy Index funds trading; however under this hypothesis, price increases should only be temporary. Shleifer (1986) suggests the *Downward Sloping Long Run Demand Curve* hypothesis to explain the inclusion phenomenon[69]. The permanent price increase stems from the lack of close firm substitutes available to investors. For example, when Microsoft was added to the Index in June 1994, there were no close substitutes that an investor might have used to arbitrage away the announcement effect. An alternative set of hypotheses that also anticipate a permanent price effect are the *Risk Reducing Hypotheses* that attributes the higher stock prices upon Index inclusion to increased institutional interest, greater trading volume and lower Bid-Ask spreads (Amihud and Mendelson, 1986, Graham et al., 1996 and Chen et al. 2004).

The three preceding hypotheses assume that the Index inclusion announcement is an information free event. In contrast, DMOY posit and provide evidence for an *Information Content* hypothesis. Along with the authors' claim that Index inclusion may lead to better operating performance due to closer scrutiny of management (Index inclusion leads to information), the authors do not exclude the possibility that S&P may embed some non-public information into their selection process (information leads to Index inclusion). While the authors contend that there is an

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[69] The premise behind this hypothesis is that when a firm is added into S&P 500, index tracking funds reduce the stock supply for non-indexing investors by purchasing a substantial fraction of shares from circulation. Some authors such as Dhillon and Johnson (1991) refer to the *Imperfect Substitute* hypothesis, which has the same basic intuition as the downward sloping demand curve.

information event at inclusion, their tests cannot tell the degree to which the information content hypothesis complements (there remains a downward sloping long run demand curve (LRDC)), rather than substitutes (the LRDC is horizontal) for the other hypotheses that purport to explain the permanent price effect from Index inclusion. DMOY confirm the Index inclusion effect by finding positive permanent abnormal returns around the Index addition announcement date, where permanent is based upon the 2-day positive cumulative abnormal return continuing to persist for a 30-day trading period. Beneish and Gardner (1995) point out that test of information content hypothesis would ideally be based on variables capturing changes in the market expectation of firm's future prospects. No prior literature found such supporting evidence for Index inclusions. DMOY is the first paper that contributes to the Information content hypothesis by finding that companies newly added to the S&P 500 Index have statistically smaller analysts' forecast revisions and significant positive unexpected realized operating earnings relative to other firms at the subsequent year end.

In this chapter, I assess the merits of the information content hypothesis that rests on the S&P 500 inclusion signaling new information about the firm's future performance through the Index committee *implicitly* incorporating private information into the selection process; in addition to the stated inclusion criteria (see Appendices, Exhibit-1). To do this I will replicate DMOY; however, I will also consider the alternate explanation that the observed positive unexpected earnings may be driven by managers manipulating earnings. I will further test whether the observed positive unexpected earnings are associated with the abnormal returns associated with Index inclusion[70].

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[70] Note that Chapter 3 also provided evidence of significant future performance for Added firms during three years subsequent to Index inclusion. Chapter 4 therefore also indirectly provides evidence whether this increased performance is genuine or achieved through accrual manipulation.

4.3 Hypothesis Development

There are two major potential limitations with DMOY's analysis and conclusion[71]. First, the authors do not consider the possibility that managers may manipulate earnings in response to the greater scrutiny afforded to firms in the S&P 500 as well as the increased earnings expectations. Thus, the observed earnings increase may not represent true improved economic performance. Second, the authors do not reject that the observed positive unexpected earnings are in fact associated with the abnormal returns observed at the inclusion announcement. If Index inclusion is an information event that is captured by positive unexpected earnings at the subsequent earnings announcement, then the news in earnings should be associated with the abnormal returns at inclusion. This chapter will provide evidence regarding both issues.

I draw on the earnings management literature to test the possibility that the observed higher earnings are a function of managerial manipulation rather than economic performance following Index inclusion. Healy and Wahlen (1999) review the earnings management literature and find that the primary focus of earnings management research has been on detecting whether and when earnings

[71] One should be careful when relying on the DMOY's results regarding the smaller analysts' forecasts revisions. Forecasts improve as more information becomes available [Kross et al. (1990)]. Based on the DMOY's analysis, the fact that analysts revise their forecasts for Added firms only by a few basis points downward (revisions are significantly less negative compared to Control firms) suggests that very little (if any) information is contained in the S&P Index inclusion announcements. Bhushan (1989) finds that the number of analysts following a firm is increasing with firm size, institutional ownership and return variability, and Lang and Lundholm (1996) provide evidence that a larger number of analysts follow firms with more informative disclosure policies; analysts tend to forecast more accurately, there is less volatility in forecast revisions, and less dispersion among individual analyst forecasts. DMOY control for these effects by excluding newly appointed analysts. Perhaps more or less economically significant results would have been obtained had the authors incorporated all analysts' forecasts to test the information hypothesis. Lastly, analysts' forecasts may not be the best proxy for earnings expectations. Clement and Tse (2003) examine whether investors appear to extract all of the information that analyst characteristics provide about forecast accuracy (findings suggest that they do not). Their results imply that the market forms earnings expectations using more complex procedures than simply averaging all analysts' forecasts. The more significant and larger in magnitude changes in analyst forecast errors documented by DMOY also capture the change in market expectations.

management takes place, however motives, resource allocation effects, and the magnitude and frequency of earnings management are of greater interest. Earnings management practices can include large management abuses for restructuring charges (big baths), premature revenue recognition, or R&D write-offs, or may involve subtler manipulations of accounting accruals to reach analyst forecasts or other earnings targets (Graham et al., 2005). Motivations include reaching managerial bonus targets (Healy, 1985), remaining on the right side of debt covenants (DeFond and Jiambalvo, 1994), or extracting lower financing costs (Dechow et al., 1996; Teoh et al., 1998). Perry and Williams (1994) provide an example where management understates reported income to facilitate management buyouts. The motivation to avoid earnings decreases or small losses is examined by Burgstahler and Dichev (1997) and Burgstahler and Eames (2003). Additionally, analysts anticipate such actions by managers, and accordingly, are more likely to forecast zero earnings than should be the case if firms did not manage earnings at all. According to the authors, however, analysts are unable to consistently identify specific firms that engage in earnings management practices.

A growing body of research suggests that current common motivation for earnings manipulation is to meet analysts' earnings forecasts. Researchers have found that meeting analysts' or managerial forecasts has become a main driver in management's decision to engage in earning management (Brown 2001; Degeorge et al., 1999; Kasznik 1999). Balsam et al. (2002) demonstrate that the proportion of firms that meet or just beat their earnings forecasts has increased steadily in recent years. Analyzing outstanding stock recommendations as measures of earnings news, Abarbanell and Lehavy (2003) show that firms that are rated Buy (Sell) are more (less) likely to engage in earnings management to meet or exceed analysts' expectations. Based on the survey analysis, Graham et al. (2005) suggest that managers perceive large market penalties when they miss analyst forecasts. Such beliefs can provide managers with strong incentives to meet earnings expectations through either artificially inflating earnings or engaging in expectations management[72]. As an additional incentive for earnings management, Bartov et al. (2002) document significantly larger (in absolute terms) positive abnormal returns (premiums) associated with meeting or beating analyst expectations (MBE) than comparable abnormal returns when firms miss analyst forecasts, holding the magnitude of forecast errors constant. In other words, the rewards for success outweigh the penalties for failure, providing an incentive for managers to manipulate earnings upward to meet or beat expectations. The authors further show that firms become more successful through a MBE strategy, even if achieved in part by managing earnings. Although the market is capable of recognizing the effect of earnings management and appears to partially discount the resulting earnings surprise (non significant economically), the firms that manage earnings to MBE enjoy relatively higher returns than their peers who fail to MBE. All of the above results are based on the sample period before 2000.

Shleifer (1986) and DMOY suggest that newly added firms to the S&P 500 are under closer market scrutiny, as many institutional investors such as mutual or pension funds add new firms' stocks or increase their proportion in their portfolios subsequent to inclusion. The Index Committee also investigates any significant price changes and monitors constituent liquidity of Index firms. Dash (2002) confirms that Index changes affect the level of scrutiny and analyst coverage of the stocks, while Chen et al. (2004) further documents increasing number of shareholders and institutional ownership subsequent to Index inclusion. Under this greater scrutiny, managers may perceive greater pressure to meet or beat analyst forecasts. Thus there are effectively two competing, although not mutually exclusive, reasons to see positive unexpected earnings subsequent to inclusion. The first is the information

[72] The result by DMOY suggest that Added firms do not appear to engage in expectations management as analysts do not walk down their forecasts compared to forecast revisions in the Control sample.

content hypothesis that states that the inclusion decision implicitly captures information about future economic performance that will be realized in earnings. While the second states that the increased scrutiny and increased analysts' optimism arising from inclusion provides managers with an incentive to manage earnings upward. These competing hypotheses stated formally are:

H_{1a}: *Index inclusion is at least partially based on the selection committee implicitly incorporating good economic news yet to appear in either earnings or price, so that firms newly included in the S&P 500 Index are more likely to have positive unexpected earnings in the future.*

H_{1b}: *Index inclusion prompts increased market scrutiny, such that firms newly included in the S&P 500 Index are more likely to manage earnings upward to have positive unexpected earnings in the future.*

To test *Hypotheses 1a* versus *1b*, I need to be able to distinguish unexpected earnings that are attributable to improved economic performance versus those resulting from managerial manipulation. Early studies of managerial accounting choices emphasized discrete policy choices, such as choice of depreciation method for fixed assets or inventory costing method (see for example Hagerman and Zmijewski, 1979); however, more recent work has focused on a firm's collective accounting accruals that capture the multitude of policy choices, assumptions, and estimates that go into accounting numbers. For a given firm, accounting accruals represent the difference between accounting earnings and operating cash flows.[73] The expectation is that managers who want to influence reported earnings on the balance sheet of the firm will avail themselves of all means of influencing reported earnings, especially those that are opaque.

[73] Operating cash flows are a harder number; however, they are also subject to manipulation because what constitutes an investment or financing cash flow relative to an operating cash flow may not be completely clear.

Following Bowen, Burgstahler, and Daley (1987) and Dechow (2003), there has been considerable work on the information content of earnings dichotomized between cash from operations and accruals. Concisely, earnings explain returns better than operating cash flows, but dichotomizing earnings provides more information because, while both cash flows and accruals are value relevant, cash flows are more value relevant than accruals. Furthermore, Sloan (1996) shows that investors appear to fixate on earnings and fail to fully use the information available from dichotomizing earnings. Jones (1991) carried this analysis one step further in her examination of import relief investigations by splitting accruals into non-discretionary and discretionary, and found that managers predictably influenced discretionary accruals. Balsam et al. (2002) examine whether the market can at least partially detect earnings management. In their evaluation of firms that just meet or beat analysts' forecasts, as these are likely candidates for earnings management, they find that firms with unexpected discretionary accruals have a negative cumulative abnormal return, while the opposite holds for firms with low discretionary accruals.[74]

Conceptually, non-discretionary should better capture relevant economic events than discretionary accruals because they are not subject to managerial manipulation, while discretionary accruals are by definition, at the discretion of management. Clearly, any tests of the market's ability to differentially price non-discretionary and discretionary accruals rely on the quality of the method used to separate total accruals into the two components. Bartov et al. (2000) and Dechow et al. (1995) show that both Jones and a modified version of the Jones model are consistently able to detect earnings management. In a more recent paper, Dechow et al. (2003) present and test four models of earnings management. Apart from the modified Jones' model, the authors test the Adapted model by adjusting for the expected increase in credit sales,

[74] Other studies such as Subramanyam (1996), Bartov et al. (2002) and Palmrose et al. (2004) further confirm that discretionary accruals are at least partially priced by the market.

the Lagged model by including the lagged value of total accruals (LagTA), and the Forward Looking model by including a measure of future sales growth. The Lagged and the Forward Looking Models of discretionary accruals have almost twice the explanatory power of the cross-sectional modified Jones Model. In this chapter, I use the Lagged model (adjusting for the expected increase in credit sales and lagged accruals) for my primary analysis, but check the robustness of the results using the more widely used Modified Jones model. The superiority of the Lagged model comes from the fact that while accruals ultimately reverse over time, a proportion of accruals can still be predicted based on the previous year's accruals[75]. Dechow et al. (2003) find that about 22% of last year's accrual persists into the following year. Thus, it should be possible to test *Hypotheses 1a* and *1b* against each other by evaluating whether the observed increase in earnings arises as a result of unexpected positive cash from operations relative to unexpected accruals, and further, that if there are increasing unexpected accruals arising from earnings management, then these should be disproportionately comprised of unexpected discretionary accruals.

Additionally, for DMOY's conclusion to hold true, the unexpected earnings must also be associated with the abnormal returns at inclusion. Therefore, there are closely related hypotheses with respect to the expected association, or lack thereof, between the observed unexpected earnings at the subsequent earnings announcement and the abnormal returns at inclusion. If *Hypothesis 1a* is true and the market is efficient with respect to this information, then one would expect to see a positive association between the abnormal returns at inclusion and the improved operating performance as reflected in the observed positive unexpected earnings of newly added firms. Conversely, if *Hypothesis 1b* is true and the observed positive unexpected earnings of newly added firms reflects manipulation, rather than improved economic performance, then there should be no association between the abnormal returns at

[75] This may take a long time for growing firms.

inclusion and the observed positive unexpected earnings[76]. More formally, the following alternative hypotheses concerning the link between abnormal returns at inclusion and future unexpected earnings are as follows[77]:

H_{2a}: *The observed positive unexpected earnings are predominantly attributable to positive unexpected operating cash flows (rather than to positive unexpected accruals, especially discretionary accruals), which results in a positive association between abnormal returns at inclusion and subsequent unexpected earnings.*

H_{2b}: *The observed positive unexpected earnings are predominantly attributable to accruals, especially discretionary accruals (rather than to operating cash flows), which results no association between abnormal returns at inclusion and subsequent unexpected earnings.*

To test *Hypothesis 2a* I draw upon the literature that deals with the relationship between stock returns and earnings. Ball and Brown (1968) showed that most (approximately 85%) of the "news" in annual earnings is incorporated in price prior to the annual earnings announcement. Nichols and Wahlen (2004) find comparable results for a more recent sample, and also find that approximately 69% of a quarterly earnings announcement is incorporated in price prior to the announcement. Kothari and Sloan (1992) show that, in general, prices begin to capture information three years prior to the relevant earnings announcement and continue to do so up to and

[76] If there is no association, a remote possibility exists that the Index inclusion does capture the future good news in earnings but the market is ignorant until the actual earnings announcement. In this case, the positive returns at Index inclusion can only be attributed to either liquidity or the downward sloping demand curve. If one observes a positive correlation between abnormal returns and unexpected earnings that are driven by discretionary accruals, this could indicate that investors are either inefficient in recognizing earnings management practices or that newly added firms engage in earnings management to justify the Index inclusion premia.

[77] These hypotheses are not necessarily mutually exclusive, as the Index inclusion abnormal returns may be partially attributable to each.

including the earnings announcement.[78] Thus, the information that is available in earnings filters into price gradually over time, so that it is more likely to be observed over longer windows in large cross-sectional samples that can wash out the other idiosyncratic information pertaining to a firm's stock. In this study, if inclusion is a major information event that captures future unexpected earnings, then I would expect to see a large chunk of this information arriving at the announcement relative to the average daily small incremental amount that regularly filters into price. Conversely, if the price increase at inclusion is attributable to a large shift in demand, then one will see, at most, the typical gradual seepage of earnings information into price. In fact, if the large observed price effect at inclusion is solely a result of the demand shift, this large price movement may wash out the gradual inclusion of subsequent earnings information into price and no association will be observed.

Accordingly, I will first confirm that the abnormal returns associated with the Index inclusion effect are indeed permanent and that there are observed positive unexpected earnings. Then, I will test whether firms engage in earnings management following Index inclusion. Finally, I will test whether the association between the Index inclusion (abnormal) returns and the earnings improvement are correlated. I will also review all of these tests with an additional sample period of five years (2000-2004).[79]

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[78] Additionally, there is a small post-announcement drift in the direction of the unexpected earnings that can continue for up to nine months (Bernard and Thomas, 1989).

[79] There are examples of the 2000-2004 period analysis in non-academic journals, such as Standard and Poor's, Blitzer and Dash (2004), where the authors reported the abnormal returns up to June 2004.

4.4 Design of Empirical Tests and Construction of Variables

4.4.1 Unexpected Earnings

In order to test my first hypothesis, I need to corroborate DMOY's results regarding unexpected earnings as captured by analysts' forecast errors. I follow DMOY's methodology and classify current-year's variables depending on when firms were added to the Index. If an Index inclusion announcement for a company occurs during the three months immediately prior to the end of its fiscal year, I treat forecasts for the following fiscal year as current-year forecasts. The monthly median analyst EPS forecasts made closest to the S&P 500 Index inclusion announcement are compared with actual EPS as reported in I/B/E/S to calculate unexpected earnings. I refer to this measure as analyst forecast error (AFE). Similar to DMOY, I evaluate raw analysts' forecast errors, and errors scaled by the most recent year end EPS and by the price as of the most recent month prior to the Index inclusion announcement date. To replicate DMOY's results and confirm that firms newly added to the Index experience positive unexpected earnings, I simply compare the AFEs of Added firms to the Control sample.

To ensure comparability in defining my alternative measure of unexpected earnings, I follow DMOY's methodology in terms of "current year" criteria.[80] DMOY allow time for the hypothesized news in the inclusion announcement to show in earnings, so that they examine earnings in the current fiscal year only if a firm has been added to the Index at least three months prior to the end of the current fiscal year. Otherwise they examine earnings from the next fiscal year. For example, a firm with a fiscal year-end of December 31, 19x9, which releases its 19x9 earnings three months after the year-end, must have been announced as included to Index prior to

[80] I frequently use the term "Post-inclusion" year which relates to the "current year" used by DMOY.

October 19x9 in order for year end earnings to be considered current earnings[81]. If a firm with a fiscal year end of December 31, 19x9 is announced to be included in the Index during October-December 19x9, they consider next year's earnings as the current year's realized earnings to compute analysts forecast errors.

I replicate DMOY and use I/B/E/S to compute AFE as a proxy for unexpected earnings. However, in order to decompose earnings into cash flow, non-discretionary accruals and discretionary accruals, I need to use variables from Compustat that allow such decomposition. I analyze change in earnings based on a random walk (Ball and Watts, 1972) as a proxy for unexpected earnings. A random walk model is frequently used as an annual earnings expectation and research has shown that the market's true expectation of earnings reflects both analysts' forecasts and earnings' time series (Brown, Hagerman, Griffin, and Zmijewski, 1987). Thus, a second proxy for unexpected earnings is the annual change in earnings before extraordinary items (ΔE). Since both earnings management models used in this study scale the earnings components by average total assets, I scale ΔE accordingly.

4.4.2 Cumulative Abnormal Returns

Following Denis et al. (2003) and Teoh at al. (1998), and using standard event methodology, I compute the market-adjusted and beta-adjusted buy-and-hold cumulative abnormal returns around the Index inclusion announcement date[82]. For the market-adjusted abnormal returns ($CARMBH_t$), I simply deduct the product of

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[81] Current year's earnings correspond to post-inclusion earnings (earnings subsequent to the Index inclusion announcement date).

[82] For the reasons outlined in Chapter 2 with respect to the problematic nature of buy-an-hold cumulative abnormal returns, I also conduct a sensitivity analysis of abnormal returns by computing simple cumulative abnormal returns (market-adjusted and beta-adjusted) defined as:

$$CARM_t = \frac{\sum_{i=1}^{N}\left[\sum_{t=-1}^{t-2}(R_{i,t} - Rm_t)\right]}{N} \quad CARB_t = \frac{\sum_{i=1}^{N}\left[\sum_{t=-1}^{t-2}(R_{i,t} - \hat{R}_{i,t})\right]}{N}$$

market daily returns (R_m, proxied by the return on S&P 500) from the product of firm daily return and average the differences across the corresponding time periods.

$$CARMBH_t = \frac{\sum_{i=1}^{N}\left[\prod_{t=-1}^{t-2}(1+R_{i,t}) - \prod_{t=-1}^{t-2}(1+Rm_t)\right]}{N}$$

The market model assumes a linear relationship between the return of any security and the return of the market portfolio $R_{i,t} = \alpha_i + \beta_i Rm_t + \varepsilon_{i,t}$ where α_i is the intercept term, β_i is the market return slope coefficient, $R_{i,t}$ is a firms *i's* return on day t and Rm_t is the market return proxied by the S&P 500 Index return for day t, and $\varepsilon_{i,t}$ is the random disturbance term. By using the Index return, I effectively control for size, liquidity, financial viability and float. The normal (expected) returns can be obtained from the relation $\hat{R}_{i,t} = \hat{\alpha}_i + \hat{\beta}_i Rm_t$ where the estimation period for this model begins 365 days (approximately 260 trading days) before and ends 10 trading days before the Index inclusion announcement dates. Consequently, the beta-adjusted buy-and-hold abnormal returns ($CARBBH_t$) follow the same formula.

$$CARBBH_t = \frac{\sum_{i=1}^{N}\left[\prod_{t=-1}^{t-2}(1+R_{i,t}) - \prod_{t=-1}^{t-2}(1+\hat{R}_{i,t})\right]}{N}$$

My ultimate results are robust to alternative definitions of average cumulative abnormal returns (market-adjusted and beta-adjusted CARs as in Teoh et al., 1998) as well as to average abnormal returns defined using alternate proxies for market return (equal-weighted and value-weighted market returns).

4.4.3 Earnings Management

To test the first hypothesis, I need to decompose earnings into non-managed (non-discretionary) and managed (discretionary) components. I follow Hribar and Collins (2002) and first decompose unexpected earnings as captured by ΔE into cash flow and accruals components. Using *Compustat* data, total accruals (TACC) can be computed from the cash flow statement given the relationship $NI_t = CFO_t + TACC_t$ where NI_t is the earnings before extraordinary items and discontinued operations for period t (*Compustat #123*) and CFO_t is the cash flow from continuing operations for period t (*Compustat #308-Compustat #124*)[83].

To distinguish between discretionary and non-discretionary accruals I employ the Modified Jones' model as well as the Lagged model, as the described earlier. Equation (1) illustrates the Modified cross-sectional Jones' model which, compared to simple Jones model, backs out the credit sales from the change in revenues.

$$TACC_{it} = \alpha + \beta_1(\Delta REV - \Delta AR) + \beta_2 PPE_{it} + \varepsilon_{it} \qquad (1)$$

ΔREV is the change in sales (*Compustat #12*) from the previous year to the current year, ΔAR is the difference in accounts receivable (*Compustat #2*) over the same period, and PPE_{it} is the end of year property, plant and equipment (*Compustat #7*). Following Dechow et al. (2003) I scale all variables by average total assets (*Compustat #6*). Given that total accruals (TACC) can be decomposed into non-discretionary (NDACC) and the discretionary or unexpected (DACC) accruals by $TACC_{it} = NDACC_{it} + DACC_{it}$, the error term from equation (1) can be estimated by subtracting the estimates of normal accruals from total accruals.

$$DACC_{it} = TACC_{it} - \hat{\alpha}_1 - \hat{\beta}_1(\Delta REV - \Delta AR) - \hat{\beta}_2 PPE_{it} \qquad (2)$$

[83] This definition of total accruals differs from the definition used by Dechow et al. (2003) where the CFO is not adjusted for the cash portion of discontinued operations and extraordinary items (*Compustat #124*). The cash flow definition including this adjustment is more consistent with the definition of Net Income (Hribar and Collins, 2002). If CFO is not adjusted for *Compustat #124*, one could use Net Income (defined by *Compustat #172*, rather than by *Compustat #123*) which is consistent with including cash from discontinued operations in the measure of operating cash flow.

The Lagged model offers several advantages over the Modified Jones' model, which has been subject to much criticism. First, not all changes in credit sales in each period are necessarily discretionary. The Modified Jones' model classifies an increase in accounts receivable (resulting from increased sales) as a discretionary accrual. The Lagged model adds the expected component to the change in sales and therefore effectively controls for future sales performance. Second, Kothari et al. (2005) suggest that a portion of firms' growth often results from transitory component of earnings due to neutral application of GAAP. Therefore, part of next period's performance is expected and may not be due to discretionary accruals. Therefore, to estimate the Lagged model, I first estimate the following regression for each two-digit SIC year grouping:

$$\Delta AR_{it} = \alpha + k\Delta REV_{it} + \varepsilon \qquad (3)$$

where the slope coefficient (k) captures the expected change in accounts receivable for a given change in sales. To include only the unexpected portion of the ΔAR in discretionary accruals, Dechow et al. subtract the full amount of the change and add back the expected change in Sales. Since accruals are known to reverse over time, they are less persistent than cash flows. Lastly, Dechow et al. (2003) included the lagged value of total accruals, as some proportion of current total accruals is predictable based on last year's accruals. Therefore, the Lagged model can be estimated as follows[84]:

$$TACC_{it} = \alpha_1 + \beta_1((1+\hat{k})\Delta REV_{it} - \Delta AR_{it}) + \beta_2 PPE_{it} + \beta_3 LagTA_{it} + \varepsilon_{it} \qquad (4)$$

[84] I do not include ROA as an additional regressor in the Modified Jones' model (as suggested by Kothari et al., 2005), as I believe that the Lagged model is effective in controlling for the discretionary accruals resulting from future performance. Kothari et al.'s analysis does not criticize the Lagged model, rather suggests that researchers should control for performance on measured discretionary accruals.

$$DACC_{it} = TACC_{it} - \hat{\alpha}_1 - \hat{\beta}_1((1+\hat{k})\Delta REV_{it} - \Delta AR_{it}) - \hat{\beta}_2 PPE_{it} - \hat{\beta}_3 LagTA_{it} \quad (5)$$

Both accrual models are estimated by industry-year using all companies from *Compustat* (by the two-digit SIC code groupings), given that there are at least 10 observations in each industry group in a given year. To be consistent with prior literature (DeFond and Subramanyam 1998), I exclude financial institutions (with an SIC codes between 6000-6999) from the sample, as these institutions are subject to tighter reporting standards and are less likely to manage earnings. I measure pre-inclusion and post-inclusion announcement levels of accruals for both Added and Control firms corresponding to the most recent fiscal year end prior to the inclusion announcement date (last year) and the most recent fiscal year end after the inclusion announcement date to measure changes in accruals (current). To confirm the validity of the accrual model methods, I follow Dechow et al. (2003) and decompose earnings into cash flow from continuing operations (*CFO*), nondiscretionary accruals (*NDACC*) and discretionary accruals (*DACC*) all scaled by average total assets.

$$Earnings_{t+1} = \alpha_1 + \beta_1 CFO_t + \beta_2 NDACC_t + \beta_3 DACC_t + \varepsilon_{it} \quad (6)$$

I regress future earnings ($Earnings_{t+1}$) on the current year's decomposed earnings variables. The results for 1988-1999 presented in Table 4-1 confirm that, comparable to Dechow et al. (2003), the cash flow component has the highest coefficient (most persistent) followed by the non-discretionary component, and then the discretionary component.

4.4.4 Positive Earnings - Economic Performance or Earnings Manipulation

To test the competing versions of hypothesis H1, I decompose the unexpected earnings as measured by ΔE into operating cash flows, non-discretionary accruals, and discretionary accruals described above, all scaled by average total assets. I will then evaluate ΔE, by examining changes in its components: operating cash flows (CFO), total accruals (TACC), non-discretionary accruals (NDACC), and discretionary accruals (DACC). I will examine these changes both post versus pre inclusion and relative to the control sample. If economic performance drives the positive unexpected earnings (*Hypothesis 1a* is true), then I would expect to see a significant positive increase in operating cash flows for Added firms. One would also expect that this increase be significantly larger than any increase observed for the Control firms. Conversely, if discretionary accruals drive the positive unexpected earnings (*Hypothesis 1b* is true), then for Added firms, I would expect to see a significant positive increase in total accruals, rather than cash flows, especially the discretionary accruals component. Again, one would expect that this increase would be significantly larger for the Added firms than any increase observed for the Control firms.

4.4.5 Are Inclusion Abnormal Returns Associated with Unexpected Earnings

To test hypothesis H2, I regress permanent cumulative abnormal returns (CARs) around the Index inclusion announcement date on unexpected earnings. Similar to Petajisto (2006), since the S&P 500 inclusion announcements are randomly distributed across years and months, the cross-correlations of inclusion premia are not likely to be a problem and I can regress all observations on the explanatory variables in one cross-section.

$$CARMBH_t = \alpha_0 + \beta_1 UE + \beta_2 ADD + \beta_3 ADD * UE + \varepsilon_t \quad \text{.................................} (7)$$

$CARMBH_t$ represents CARs during window dates around the Index inclusion announcement date. ADD is a dummy variable equal to one when a firm is added into the Index during the current year (zero otherwise) and UE is unexpected earnings, for which I use both AFE and ΔE as proxies. In equation (7), β_1 should capture the normal seepage of earnings into price and should be positive in large samples (and increasing with CAR window); β_2 should capture the main effect of inclusion independent of any news concerning future earnings (and be decreasing with CAR window). In this regard, it captures the effect of either the downward sloping demand curve or the greater liquidity hypothesis. β_3 should capture the information about future earnings for added firms that Denis et al. (2003) hypothesize is implicitly captured in the decision to include a firm in the Index. If DMOY are correct, β_3 should be positive and significant. If not, then only β_2 will be positive, and β_3 will be insignificant. To better explain which group drives the ordinary mapping of earnings into prices and to confirm my predictions, I also run the following sub-regressions (7a) for the Added group and the Control group, individually.

$$CARMBH_t = \alpha_0 + \beta_1 UE + \varepsilon_t \quad \text{..} (7a)$$

In (7a), if Denis et al. (2003) are correct, then β_1 should be positive and significant in the Added sample, and much larger than β_1 in the Control sample. Conversely, if the authors are wrong, α_0 should be positive and significant in the Added sample, and much larger than α_0 in the Control sample, since it will capture the large positive returns, while β_1 in the Added sample should be no larger than β_1 in the Control sample.

I further evaluate the relationship of the cumulative abnormal returns (CARs) around the Index inclusion announcement with unexpected earnings by decomposing ΔE into its components of ΔCFO and $\Delta TACC$, and $\Delta TACC$ further into $\Delta NDACC$ and $\Delta DACC$ in each of the Added and Control samples. If *Hypothesis 1b* is true (the observed positive unexpected earnings of newly added firms occur as a results of earnings manipulation, rather than improved economic performance), then I expect no association between the CARs and the UE in the Added sample. From (7b) and (7c), I am interested whether, if at all, changes in CFO (good news) or discretionary accruals (manipulation) drive the CARs. If Denis et al. (2003) are correct and there is positive economic news in the inclusion announcement, then β_2 should be positive and significant in the Added sample, and much larger than β_2 in the Control sample.

$$CARMBH_t = \alpha_0 + \beta_2 \Delta CFO + \beta_3 \Delta TACC + \varepsilon_t \quad \text{(7b)}$$

$$CARMBH_t = \alpha_0 + \beta_2 \Delta CFO + \beta_4 \Delta NDACC + \beta_5 \Delta DACC + \varepsilon_t \quad \text{(7c)}$$

4.5 Sample

Although, DMOY analyze Index additions from 1987-1999, the first sample period begins in 1989 and ends in 1999. I exclude 1987-1988 because Hribar and Collins (2002) show that the Income Statement approach to compute discretionary accruals is superior to the Balance Sheet approach, and the necessary data are only available starting in 1988 (the first year in which Compustat reports data from cash flow statements).

Firms that were considered for Index inclusion by the S&P 500 committee are ideal candidates for a control sample, as they all meet various Index inclusion criteria. DMOY use two benchmarks for comparison purposes with newly added firms; one being all other firms and the other matched firms based on industry, size and liquidity (ILS). Their results are still significant, yet weaker, when an ILS matched sample is used. For the purpose of this analysis, I compare the newly included firms to other firms in the same industry that have met all the Index inclusion criteria, but were not included in the Index. This more stringent matching procedure, which controls for additional variables, strengthens the analysis since there is less chance of omitted variables. Only a few companies (about five to ten) are typically considered for Index inclusion in any one case because of the numerous Index criteria.[85]

Standard and Poor's provides information on the S&P 500 Index changes from the year 2000 onwards. To obtain the Index changes information prior to 2000, I use the firms from samples identified by DMOY and Wurgler and Zhuravskaya (2002) as "clean" additions.[86] Comparing DMOY's sample to one in Wurgler and Zruravskaya (2002) revealed some differences for approximately eleven additional firms. I test my ultimate results for robustness and find no significant differences in results when using either of these two samples. Since the analysis requires variables necessary to evaluate earnings management, I lose some observations and are left with a smaller number of observations than DMOY; 92 observations for the first period.[87]

Having more recent publicly available data, I collected a sample of Index additions from the Standards and Poors' website for a second period (2000-2004). Consistent with prior research, I searched press releases in Factiva for announcement dates and the reasons for Index changes. After I eliminate Added firms which resulted from spin-offs, name changes or mergers and acquisitions, I am left with 62 Index additions in the second period. I replicate all my tests on this new sample. If Denis at al. (2003)

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[85] This information has been obtained from an interview with the S&P 500 chairman, Dr. David Blitzer.

[86] "Clean" sample refers to additions that do not result from spin-offs, name changes or mergers and acquisitions (this sample composition is consistent with Denis et al. 2003).

[87] I test whether newly included firms also satisfy all inclusion criteria in order to confirm the control sample definition. I find that new additions to the S&P 500 satisfy all eight Index inclusion criteria in more than 80% of cases (results are not tabulated).

have identified a general result, then I should see positive unexpected earnings during the second period as well, and *Hypotheses 1a* and *2a* should also hold. If these hypotheses are rejected in the first period sample because firms manipulated earnings, then changes in discretionary accruals should likely also explain any changes in unexpected earnings during the new period.

Firms considered for inclusion into the S&P 500 must fulfill all of the inclusion criteria, which are publicly available.[88] The control sample includes firms satisfying all criteria on the relevant dates. The criteria are: U.S. companies, liquidity, size, financial viability, public float, sector balance, seasoned stocks, and operating company (see Exhibit-1 in the Appendices). The ratio of Eligible firms to Added firms is approximately four to one. Table 4-2 provides a reconciliation of firms included in the Added samples, while Table 4-3 provides an industry breakdown that indicates that the Added and Control samples seem to contain similar proportions of firms in corresponding industries with a majority from the manufacturing industry.

Table 4-4 provides descriptive statistics for relevant variables for both the Added and Control samples for the first and second periods, respectively. The variables SIZE (LogSIZE) and liquidity (LIQ) are also presented since they represent the only two quantitative criteria of the S&P Index inclusion criteria. Analysis of differences in various current and future variables (including liquidity) is included in Chapter 2.

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[88] For more details, please visit Standard and Poor's website: www.indeces.standardandpoors.com or see Blitzer et al. (2004). Definitions in the Appendices (Exhibit-1) represent the criteria as specified by Standard and Poor's.

4.6 Results and Analysis

4.6.1 Confirming Permanent Abnormal Returns to Index Inclusion

Table 4-5 provides both the cumulative abnormal returns and cumulative beta-adjusted abnormal returns (CARs) for various periods surrounding the Index inclusion announcement dates. The results indicate that for a sample of 92 companies added to the S&P 500 Index over the period 1989 to 1999 (Period 1) and for 62 companies from 2000 to 2004 (Period 2), the CARs are positive and significant at conventional levels. The Index inclusion effect is between 4% - 5% and appears to be permanent for both periods, in that the effect persists for sixty days. The differences between the CARs of the newly added firms and the control firms are shown in the last column with both parametric (comparison of means) and non-parametric (test of medians using Mann-Whitney[89]) tests of the differences. The CARs are significantly higher for the Added group, with an even stronger difference in the second period. This confirms the results of earlier work including DMOY's that is summarized in Chapter 1, Table 1-1.

4.6.2 Confirming Positive Unexpected Earnings for Added Firms

Table 4-6 presents and contrasts the unexpected earnings of Added firms with Control firms for both periods. In the first period, consistent with DMOY, column 4 shows that unexpected earnings are significantly more positive (less negative) for Added than for Control firms, whether measured using analyst forecast errors or the

[89] I use the Wilcoxon-Mann-Whitney test of medians, which is the non-parametric version of the independent samples t-test and can be used when researchers do not assume that the dependent variable is a normally distributed interval variable. An alternative analysis using Kolmogorov-Smirnov test (which is sensitive to differences in both location and shape of the empirical cumulative distribution functions) shows very similar significance levels.

random walk model of annual earnings[90]. This holds for both parametric and non-parametric comparisons. In contrast, even though there is a significant Index inclusion effect during the second period, there are no significant differences between unexpected earnings of Added and Control firms, regardless of measure or significance test. If inclusion is a true information event, the DMOY's result should hold over an alternative time period; however, it is possible that their result is only specific to the first period. So far, my results indicate that during the second period, the Index inclusion premia can be attributed to either the Liquidity or the Downward-sloping LRDC hypotheses (or their combination).

4.6.3 Observed Unexpected Earnings: Economic Performance or EM

Table 4-7 provides mean differences of earnings (net income) and its components, estimated using the Lagged model for the first (panel A) and second (panel B) period. Figures 4-1 and 4-2 provide a corresponding graphical depiction of the same data. Consistent with results in Table 4-6, column 3 of Table 4-7 shows that current year's earnings (NI) are significantly greater than the prior year's earnings for Added firms, but not for Control firms. Cross-sectionally, column 6 confirms that the Added firms have significantly higher unexpected earnings than Control firms during 1989-1999. Contrary to the information content hypothesis, the increase in earnings is not attributable to increases in operating cash flows. The CFO for Added firms is neither significantly greater post-inclusion than pre-inclusion, nor is the change in CFO for Added firms greater than for the Control firms. Rather, the unexpected earnings are almost completely attributable to total accruals (TACC) being absolutely greater for Added firms post versus pre-inclusion (column 3), and the change in total accruals being greater for Added firms after inclusion compared to the Control firms (column

[90] The two proxies for unexpected earnings AFE and ΔE correlate at 0.49 (0.33) for Spearman (Pearson) correlations. Both correlations are statistically significant at $p < 0.01$.

6). Examining the Table 6 further, I see that the change in total accruals can, in turn, be completely attributed to the similar changes in the discretionary accruals (DACC). As sensitivity analysis, similar results are obtained when I substitute earnings components derived using the modified Jones model. Thus, Table 4-7 (panel A) provides strong evidence that the first period's observed positive unexpected earnings arise from managerial manipulations, rather than economic performance. Furthermore, while I corroborate DMOY's finding of higher unexpected earnings during the first period, I show that all of this increase can be attributed to higher discretionary accruals.

In the second period (panel B), since there are not any significant positive unexpected earnings for the Added firms, it is not surprising that the components of the change in earnings are all insignificant as well. This may result from the generally higher regulatory assessment of the quality and legitimacy of earnings in this period. Although the Index inclusion premia are significantly positive and permanent, newly Added firms do not experience high unexpected earnings. Therefore, future unexpected earnings (proxy for operating performance) do not seem to be associated with the abnormal returns around the announcement dates during 2000-2004.

If positive unexpected earnings that arise from earnings manipulations are observed in the first period, this may not necessarily be the case in the second period. Due to financial scandals in early 2000 that have been cited as reasons for the stock market crash in 2002, Securities and Exchange Commission (SEC) introduced several new regulations to restore investor confidence in accounting profession. For example, on October 23, 2000, SEC adopted the Regulation Fair Disclosure (FD), which was designed to promote the full and fair disclosure of information by issuers, and to clarify and enhance existing prohibitions against insider trading. This regulation has proven to be useful in terms of increasing transparency and timeliness of financial information, thereby increasing the investors' ability to detect earnings management practices. Gintschel and Markov (2004) document that the absolute price impact of information disseminated by financial analysts significantly decreased during the post-regulation FD period. Others find that analysts forecast dispersion increased suggesting a greater difficulty for analysts to form forecasts beyond the current quarter (Bailey et al., 2003). Cotter et al. (2006) further document increased earnings guidance during post-Regulation FD period, which suggests that firms may be shifting more to expectations management rather than earnings management. As another example, the US Congress passed the Sarbanes-Oxley Act (SOX) in July 2002. Apart from regulating the auditing profession, the SOX Act is aimed to improve corporate governance, increase criminal and civil liability for violations of securities laws, and enhance the quality of financial reports. Some of its provisions such as CEOs and CFOs certification of their financial statements under oath may be successful in reducing incentives to manage earnings. Chang et al. (2006) show that investors' confidence increases when financial statements are certified. More importantly, Koh et al. (2005) find that subsequent to SOX, the incentive to meet or beat (MBE) earnings expectations decreases, as investors no longer attach premium to the MBE strategy and penalize firms that constantly exceed analyst expectations. As a last potential explanation that the general level of earnings management activity may decrease subsequent to 2000 is a voluntary adoption of more conservative accounting policies. For example, Aboody et al. (2004) report that due to a pressure to increase earnings transparency, firms' voluntarily recognized a stock-option expense when it was not mandated by FASB standards. The authors show that early adopters of such voluntarily expense recognition experienced positive market reaction. Overall the above results suggest that the increased accounting conservatism along with the tougher new provisions such as Regulation FD or SOX (designed to improve disclosure and to deter and punish corporate and accounting fraud) are effective in reducing management motivation to manipulate earnings.

4.6.4 Discretionary Accruals: Time-series

Although I do not prove in this chapter that the increasing regulation and more conservative accounting policies reduce earnings management practices, the above examples are likely explanation for why Added firms' unexpected earnings are not higher in the second period. For illustration purposes, I report the time series of cumulative discretionary accruals during 1988-2004 for the whole population of firms. I use the quarterly financial statements data and the same methodology (Lagged model) to estimate the discretionary accruals[91]. I plot the results in Figure 4-3; it seems that firms manage earnings to a lesser extent in a more recent period. The cumulative figures suggest that there is a significant drop in DACC after the year 2000, which would explain the decreased earnings management and no unexpected earnings during the second period test (2000-2004). Results from Figure 4-3 suggest that tighter accounting standards such as SOX or increased disclosure under the Regulation FD may be effective in reducing the earnings management practices (Koh et al., 2005).

4.6.5 Relation between Cumulative Abnormal Returns and Unexpected Earnings

I first present simple Pearson and Spearman correlations of relevant variables for both the first period (Tables 4-8, Panel A and 4-9, Panels A and B) and the second period (Tables 4-8, Panel B and 4-9, Panels C and D). Table 4-8, Panel A simply confirms the above result that Added firms have higher unexpected earnings as a result of discretionary accruals but not higher subsequent operating cash flows. Table 4-9,

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[91] When I estimate the discretionary accruals, the average number of firms in a particular year-quarter is 3,640. Analysis of CFO and Accrual components shows similar results when 4-digit GIC industry classification codes are used to classify firms for a regression analysis. I also examine DACC based on the Modified Jones' model. The more significant differences are between Lagged and Modified Jones' models as opposed between SIC or GIC industry classification. Nonetheless, the cumulative decrease in DACC is also evident for the post 2000 period based on the Modified Jones' model.

Panel A presents a simple correlation test of *Hypothesis 2*. These correlations indicate that there is no significant Pearson or Spearman correlation between the three-day CARs for newly added firms and unexpected earnings. This is contrary to the hypothesis that the inclusion event returns include any news from the observed positive unexpected earnings. Given the previous evidence that the unexpected earnings arise from earnings manipulations rather than economic performance, this is not surprising. In Table 4-9, Panel B (Control group) one can see a modest positive and significant relationship between all CARs and the two proxies for unexpected earnings. This result is consistent with prices leading earnings, whereby there is a general slow seepage of the news in unexpected earnings into price before the actual earnings announcement.

In the second period, Table 4-9 again shows a strong correlation between the inclusion event and contemporaneous cumulative abnormal returns. Table 4-8 (Panel B) also shows that firms selected for inclusion are comparably sized, and only mildly more liquid than those firms passed over. In this period, where I previously demonstrated that there is no evidence of earnings manipulation for Added firms, Table 4-9 (Panel C) shows that there is no significant positive association between unexpected earnings, or any components of unexpected earnings, and the inclusion announcement abnormal returns (CAR3). In fact, the association between unexpected earnings and inclusion announcement abnormal returns is negative. In this period, for both sets of firms, the longer window CARs are positively associated with unexpected earnings, consistent with the view that prices generally lead earnings.

For completeness in Table 4-10, I run regressions to confirm these univariate results for the first period only (using both proxies for unexpected earnings). In the combined sample (Panel A), I test DMOY's information content hypothesis by regressing abnormal returns (CARs) on unexpected earnings (UE) (β_1), ADD (β_2) and UE*ADD (β_3) variables. If DMOY's analysis is correct, then the interaction coefficient

β_3 should be positive and significant. This is not the case, however. The CAR3 results are explained by prices generally leading earnings through a significant β_1 between CAR3 and unexpected earnings for all firms. There is a large main effect for Added firms; β_2 is highly significant, consistent with either the downward sloping demand curve hypothesis or the liquidity hypothesis. Confirming the previous analyses, β_3 is negative rather than being positive and significant, as predicted by the information content hypothesis. This holds for both unexpected earnings proxies. When I examine the Added sample alone (Panel B), I find the same result. The intercept that captures the general effect of being added is positive and significant, and the coefficient on unexpected earnings is negative, rather than positive. These results are contrary to the information hypothesis. As the CAR window increases (CAR3 to CAR63), I see the β_1 becoming positive and more significant. The Control sample has positive signs on unexpected earnings that increase with longer windows, consistent with prices leading earnings and this information seeping into prices over time.

In Table 4-11, I decompose ΔE into changes in cash flow, non-discretionary accruals and discretionary accruals for Added (*Panel A*) and Control (*Panel B*) firms. The analysis of the Control firms again confirms that prices lead earnings and that that the abnormal returns are driven primarily by information about future operating cash flow changes. Analyzing the Added firms (*Panel A*), I find in the first period that none of the components is significantly correlated with abnormal returns. This may be because of the higher cross-sectional volatility of three-day CARs in this sample that leads to a much higher mean squared error to be explained, so that the price-earnings effect is washed away. The important result for this chapter remains that the inclusion abnormal returns are not driven by information about future earnings (cash flows). Lastly, the fact that there is no correlation between changes in discretionary accruals and Index inclusion premia further suggests that managers of newly added firms do not attempt to justify the price increase at inclusion with future improved earnings.

As a sensitivity check (results not tabulated), I rerun the regressions using only AFEs as a proxy for unexpected earnings so that I do not lose observations by estimating accruals. This sample contains more observations (181 for the Added sample and 510 for the Control sample) and I find very similar results to those in Table 4-11.

4.6.6 Relation between Returns and Future Performance - Sensitivity Analysis

The information content explanation behind the abnormal returns around Index inclusion announcement dates can still be plausible if future earnings (longer than one year) can be related to the current abnormal returns. DMOY's results may still hold if the earnings information allegedly contained in Index inclusion announcements appears in earnings beyond one year. Put another way, DMOY may have just examined a wrong time period. As a sensitivity analysis, I therefore examine long-term earnings (three years beyond the current earnings) and test whether this long term economic performance can explain the abnormal returns. Due to data availability, I consider only basic earnings per share excluding extraordinary items (hereafter EPS). I consider various measures of future earnings performance, such as EPS levels, changes and averages where all measures are scaled by the fiscal year-end price. Non-tabulated results reveal that despite the future earnings measures are on average higher for the Added group, none of the earnings measure is significantly correlated to the CARs around Index inclusion announcement dates. More surprisingly, the correlation coefficients are mostly negative. These results confirm that newly added firms show no information in earnings for up to four years subsequent to being added in the Index.

As another sensitivity analysis, I have repeated my empirical analysis using different time periods. Similar to DMOY, I relaxed the assumption that the announcement of an Index inclusion has to take place at least three months prior to a company's fiscal year-end in order for the analyst forecast errors for that year to be considered a proxy for the current year's unexpected earnings. For example, in a year when a firm was announced to be included in the Index, I treat all analyst forecast errors in that year as current. My results are robust to this alternative inclusion criterion.

4.6.7 Earnings Informativeness (Analysis of ERC and FERC)

To provide a complete examination of the information content hypothesis, I conclude this paper with analysis of earnings informativeness subsequent to Index inclusion. Tucker and Zarowin (2006) use a new approach to test whether earnings management practices used to smooth income garble accounting information or whether they improve the informativeness of firm's current and past earnings about their future earnings. This return-earnings analysis can be used to identify yet another potential explanation for the Index inclusion effect. Specifically, if the Index inclusion prompts newly added firms to meet or exceed analysts' expectations and if this earnings management strategy makes earnings more informative, investors may attach a premium to S&P 500 stocks despite the newly added firms achieve the MBE strategy through earnings manipulation[92]. To my knowledge, this explanation has not been analyzed in the context of Index additions. Even though increasing manipulation may indicate lower earnings quality, certain earnings management practices may yield higher earnings informativeness by reducing information asymmetry between current returns and future earnings. I have already documented in this chapter that newly

[92] Past research has shown that investors value attributes of earnings that equal or exceed analysts' forecasts, despite being achieved through earnings management. See for example Bartov et al. (2002).

added firms have lower managed accruals during the pre-index inclusion period, and hence have more room to manipulate earnings in future years to satisfy various reporting objectives. I have further documented in this chapter that newly added firms increase discretionary accruals in the year following their inclusion into the Index to meet or beat increased analysts' expectations. In this section, I use the same methodology outlined by Tucker and Zarowin (2006) and Collins et al. (1994) to test whether such increased use of discretionary accruals by newly added firms improved the current and past earnings informativeness of future earnings.

There is no theory to predict that managers would suddenly increase communicating information about future earnings subsequent to Index inclusion. To this point, I have documented that newly added firms have more predictable earnings (lower AFE) subsequent to Index inclusion which is due to increased manipulation. Therefore, the test in this section is actually a joined test of whether the MBE strategy or the Index inclusion improves earnings informativeness. My predictions are as follows. Index inclusion (or MBE strategy) improves earnings informativeness if managers communicate their assessment of future earnings to a higher extent than control firms. Alternatively, Index inclusion makes earnings noisier if managers intentionally inflate earnings to meet analysts' forecasts (garble information) without conveying limited information about future earnings.

Accounting literature often used the earnings persistence model to examine earnings informativeness (see for example Johnson et al. 2002). Rather than estimating the direct relation between the firm's future earnings and its current and past earnings (Earnings Persistence model), the Collins et al.'s approach (hereafter CKSS approach) investigates the association between the current-year stock returns and future earnings for Added and Control firms[93]. The degree of informativeness is

[93] I refer the reader to Tucker and Zarowin (2006) and CKSS (1994) for the complete theory behind the proxies for earnings expectations in the return-earnings model. Also, the authors provide the following two reasons for more adequate suitability of the CKSS approach over the Earnings-Persistence model.

represented by the future earnings response coefficient (FERC), which indicates how much information about future earnings is reflected in the current stock returns. Kothari (2001) provides an excellent review of econometric consequences of return-earnings association and suggests that researchers include future earnings and future returns to mitigate the errors-in-variables and omitted-variable problems often associated with the return-earnings regressions[94]. Therefore, I estimate the CKSS approach by the following Regression (8) and expand the regression by adding a dummy variable (to identify newly added firms) and interaction variables with the existing independent variables (Regression 8a):

$$R_t = \alpha_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \varepsilon_t \quad \text{(8a)}$$

$$R_t = \alpha_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \beta_5 ADDED + \beta_6 ADDED^* X_{t-1} + \beta_7 ADDED^* X_t + \beta_8 ADDED^* X_{t3} + \beta_9 ADDED^* R_{t3} + \varepsilon_t. \quad \text{(8b)}$$

where t represents the fiscal year during which the sampled firms were added to the Index; R_t is the ex-dividend stock return for Fiscal Year t; X_t and X_{t-1} are the earnings per share (Compustat Data58, adjusted for stock splits and stock dividends, deflated by the stock price at the beginning of Fiscal Year t) for fiscal year t and t-1 respectively. X_{t3} is the sum of earnings per share for fiscal years t+1 through t+3, deflated by the

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"First, although realized earnings are often used to directly predict future earnings, the earnings information can be indirectly used by investors in earnings predictions when investors combine it with information from other sources. By using stock price, which aggregates all publicly available information, the CKSS approach considers both the direct and the indirect roles of realized earnings. Second, the change in (expected) future earnings may be due to a shock that has no effect on current earnings. Such information will not be captured by current earnings, but will be impounded in current stock price" (Tucker and Zarowin 2006, pg: 252).

[94] *"The econometric consequence of price leading earnings is that arises when returns are correlated with contemporaneous earnings changes, only a portion of the earnings change is a surprise to the market. In an efficient market, the anticipated portion of the earnings change is irrelevant in explaining contemporaneous returns. This informationally irrelevant portion of earnings change contributes to a standard errors-in-variable problem, which biases downward the earnings response coefficients and reduces the explanatory power of the return-earnings regression" (Kothari 2001, pg: 130).*

stock price at the beginning of Fiscal Year t. R_{t3} is the annually compounded stock return for Fiscal Years t+1 through t+3; and *ADDED* is a dummy variable equaling 1 if a firm is added into the Index, zero otherwise. In Regression (8a), past-period earnings (X_{t-1}) are predicted to be negatively associated with returns; Earnings response coefficient (ERC) and FERC represented by β_2 and by β_3 respectively are predicted to be positive, while the coefficient on future returns (R_{t3}) is expected to be negative[95]. If the MBE strategy associated with Index inclusion signals information about the firms' future performance, then one would expect the β_8 coefficient in Regression (8b) to be positive and significant. On the other hand, if Index inclusion results in earnings distortion as a result of the MBE strategy, then this coefficient should be negative.

For completeness, financial reporting quality can also be measured by the Earnings-Persistence model given by:

$$EPS_{t+1} = \alpha_0 + \alpha_1 EPS_t + \alpha_2 ADDED + \alpha_3 ADDED^{*}EPS_t + \varepsilon_t \qquad (9)$$

where t represents the fiscal year during which the sampled firms were added to the Index, EPS_t and EPS_{t+1} are the earnings per share (Compustat Data58, adjusted for stock splits and stock dividends, undeflated) figures for Fiscal Year t and t+1 respectively. The slope coefficient α_1 in this frequently studied relationship represents the extent to which earnings performance in the year of Index inclusion (t) is expected to persist in subsequent period earnings. When current earnings are purely transitory, α_1 is expected to equal zero whereas when current-period earnings follow

[95] While the rationale for the expected signs of coefficients β_1, β_2 and β_3 is fairly intuitive the negative prediction for the β_4 in regression (8) component deserved further elaboration. As mentioned earlier, the inclusion of future returns in return-earning regression is to reduce the measurement error problem. If a firm has high unexpected earnings, the future return (from $t+1$ to $t+k$) is likely going to increase. This positive relationship between unexpected earnings and future returns causes a negative loading on the R_{t3}.

a random walk, the slope coefficient will equal to one. In the context of earnings quality, α_1 is expected to decrease in instances when managers artificially inflate (distort) earnings using high discretionary accruals, while α_1 is expected to be higher for Added firms if managers use accruals to signal private information[96]. Since this Earnings-Persistence model and CKSS approach are related, the results from the Regression (9) should confirm findings in Regression (8); I expect the coefficient of the interaction variable to be negative. I report the results using firm-year observations, for which I have data to estimate the return-earnings regressions. As a consequence, the Added and Control samples have more observations compared to my previous analysis that required more variables that were not available for every firm.

Table 4-12, Panel A, presents the benchmark CKSS model separately for Added and Control groups, as well as the combined OLS panel regressions. Regression (8b) in Panel B includes an additional interaction variable, ADDED, and provides a complete test for the differences in earnings informativeness. Lastly, Panel C presents a traditional earnings persistence model testing the earnings quality between the Added and Control groups.

Results in Table 4-12 provide evidence that earnings informativeness is actually lower for the newly added firms subsequent to Index inclusion. The regression output for the combined sample in Panel A confirms the predicted loadings of individual components on firms' yearly returns. A closer examination of regression ran separately on the Added and Control samples or the examination of interaction variables in Panel B further suggest that unlike income smoothing achieved by earnings management, MBE strategy does not result in more informative earnings. Therefore, newly included firms into the S&P 500 Index do not have more informative earnings that could have been a viable explanation for the Index

[96] See Johnson et al. (2002) for an example about the information signal

inclusion premia. The coefficient β_8 is negative, however, not statistically significant. Therefore, I cannot reject the hypothesis that newly added firms' earnings are equally informative. Further examination of Panel C rejects, however, the equality of earnings quality. Similar to prior research, I find the slope coefficient α_1 to be between zero and one, which confirms that earnings are mean reverting. More importantly, the coefficient α_3 suggests opportunistic use of accruals to inflate earnings for newly added firms does not convey information to investors about the firms' future performance. Overall, the analysis in this section further confirms that the information content hypothesis is not the likely explanation behind the Index inclusion premia.

4.7 Conclusion

Denis et al. (2003) conclude that addition to the S&P 500 is an information event based on evidence that subsequent earnings forecasts and realizations are relatively higher for added firms than for appropriate control samples. This paper re-examines this information content hypothesis and rejects it based on three factors. First, the observed unexpected positive earnings identified by DMOY are driven by discretionary accounting accruals rather than operating cash flows. Second, during this time period there is no association between the inclusion date abnormal returns and the observed unexpected earnings. Third, I do not observe positive unexpected earnings following inclusion in a subsequent time period.

In re-examining Denis et al.'s conclusions, I am able to confirm that the abnormal returns associated with the Index inclusion effect are indeed permanent and I do observe relatively higher earnings following inclusion in a similar time period and sample. However, when I test a competing hypothesis that the observed positive unexpected earnings result from earnings manipulation, rather than improved economic performance I find that the positive unexpected earnings can be attributed to positive unexpected discretionary accruals alone. Neither the operating cash flow component of earnings nor the non-discretionary accrual component of earnings is higher following inclusion, when compared to either the prior period earnings components or the earnings components of a control group of firms. I also test whether there is the positive association between the unexpected earnings and the inclusion date abnormal returns implied by Denis et al. (2003). Consistent with the positive unexpected earnings being driven by higher discretionary accruals through accounting manipulation, I find no observed association between the reported positive unexpected earnings and inclusion announcement abnormal returns.

In the first period (1989-1999), the observed higher earnings are related to managerial manipulations of accounting accruals, rather than improved economic performance. In the second period (2000-2004), there are no consistently positive unexpected earnings following inclusion, and there is no association between inclusion period abnormal returns and unexpected earnings. Thus, the second period analysis confirms that inclusion is not an information event; however, there is also not the confusing earnings manipulation that led to the positive unexpected earnings observed by Denis et al. It may be that the higher scrutiny of financial statements following the SEC's adoption of regulation FD in October 2000 and SOX in June 2002 combined with accounting scandals arising from the collapse of the Tech bubble, Enron, and WorldCom led to managers being more cautious in manipulating financial statements. Regardless, in neither period do I see an increase in earnings subsequent to inclusion that can be reliably attributed to improved economic performance. Lastly, the analysis of earnings informativeness reveals that Index inclusion makes earnings noisier when managers distort the earnings numbers to meet the analysts' expectations.

Overall, the evidence presented in this chapter further confirms that the information hypothesis regarding future earnings is not a valid explanation of the positive abnormal returns that occur upon inclusion in the S&P 500. The pre-existing explanations of a downward sloping demand curve and the Risk reducing hypothesis remain viable hypotheses for explaining the inclusion effect. Developing appropriate measures to differentiate these hypotheses and confirm each one's validity are important tasks that I address in previous and following chapters.

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4.9 Tables

Table 4-1: Persistence of earnings components using 34,754 firm-years from 1988-1999.

$$Earnings_{t+1} = \beta(Earnings_t) = \beta(CFO_t, NDACC_t, DACC_t)$$

	Intercept	$Earnings_t$	CFO_t	$TACC_t$	$NDACC_t$	$DACC_t$	Adj. R^2
Modified Jones' model	-0.015	0.742					0.201
	(-6.10)	(93.28)					
	-0.031		0.808	0.510			0.207
	(-11.91)		(90.68)	(31.31)			
	-0.030		0.808		0.526	0.507	0.207
	(-11.56)		(90.59)		(30.65)	(31.15)	
Lagged model	-0.015	0.738					0.196
	(-5.82)	(89.37)					
	-0.030		0.800	0.521			0.202
	(-11.00)		(86.31)	(30.56)			
	-0.030		0.800		0.535	0.518	0.202
	(-10.90)		(86.26)		(30.39)	(30.48)	

t-statistics are reported in parentheses below parameter estimates. The method of earnings decomposition follows Dechow et al. (2003):

Modified Jones' model: $TACC = \alpha + \beta_1(\Delta Rev - \Delta AR) + \beta_2 PPE + \varepsilon$

Lagged model: $TACC = \alpha + \beta_1((1+\hat{k})\Delta Rev - \Delta AR) + \beta_2 PPE + \beta_3 LagTA + \varepsilon$

TACC is computed as a difference between cash flow from continuing operations (Compustat #308-Compustat #124) and earnings before extraordinary items and discontinued operations (Compustat #123). TACC can be further decomposed into DACC (discretionary component – error term from the respective accrual model) and NDACC (non-discretionary component – difference between TACC and DACC). Other variables can be obtained from Compustat database as follows: ΔRev is change in Sales for the year (Compustat #12), ΔAR is change in receivables (Compustat #302), *PPE* is the gross amount of property, plat and equipment (Compustat #7) and *LagTA* is the value of last year's total accruals. All variables are scaled by average total assets (Compustat #6).

Table 4-2: Sample composition of newly added firms to the S&P 500 Index and the Control sample over 1989-2004

	ADDED		CONTROL			
	Firms = Firm-Years		Firms / Firm-Years*		Total Firm-Years	
Period 1 (1989-1999); Period 2 (2000 – 2004)	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2
Initial search for S&P 500 additions (1987-1999; 2000-2004)	327	138				
Eliminating mergers and takeovers	(31)	(12)				
Eliminating spin-offs	(26)	(14)				
Reconciliation and other (1)	(23)					
Firms included prior to 1989	(53)					
Added firms and firms satisfying all Inclusion criteria (1989-2004)	194	112	130 / 685	145 / 555	879	667
Additional data availability and requirements						
Not available from CRSP to compute CARs	(4)	(0)	(0) / (1)	(1) / (2)	(5)	(2)
Not available from I/B/E/S to estimate AFEs variables	(35)	(17)	(33) / (234)	(28) / (103)	(269)	(120)
Available for EM models estimation (the following is subject to Compustat availability):	155	95	97 / 450	116 / 450	605	545
Missing variables for Accruals estimation	(44)	(27)	(25) / (194)	(32) / (150)	(238)	(177)
Omit firms with SIC codes 6000-6999	(19)	(6)	(6) / (42)	(11) / (49)	(61)	(55)
Omit firms with less than 10 observations in each year-group	(0)	(0)	(0) / (1)	(1) / (1)	(1)	(1)
Final sample	92	62	53 / 213	72 / 250	305	312

(1) Sample of firms has been reconciled with the sample used by Wurgler and Zhuravskaya (2002). The DMOY sample differs from the one used by Wurgler and Zhuravskaya (2002) by about eleven firms. Robustness tests show that the results hold when I perform analysis just on firms only identified by Denis et al. (2003). Other omissions include name changes (4 firms), exchange changes (2 firms) and reorganization, restructuring and other (28 firms)

* Firms in the Control sample were eligible for inclusion in multiple periods. Firms considered for inclusion trade on AMEX, NYSE or NASDAQ and fulfill all 8 Index inclusion criteria specified by Standard and Poor's.

Table 4-3: Distribution of sample by Industry (SIC codes)

Period 1 (1989-1999)

	SIC codes	Added	%	Control	%
Agriculture, mining & construction	0-1999	6	7%	4	2%
Manufacturing*	2000-3999	33	36%	107	50%
Technology	3570-3579	10	11%	11	5%
	7370-7379	12	13%	15	7%
Transportation	4000-4799	1	1%	14	7%
Communication	4800-4899	5	5%	28	13%
Utilities	4900-4999	6	7%	6	3%
Wholesale and retail	5000-5999	12	13%	13	6%
Financial services	6000-6999	0	0%	0	0%
Services*	7000-8999	7	8%	15	7%
Total		92	100%	213	100%

* Except codes assigned to technology

Period 2 (2000-2004)

	SIC codes	Added	%	Control	%
Agriculture, mining & construction	0-1999	2	3%	7	3%
Manufacturing*	2000-3999	32	52%	142	57%
Technology	3570-3579	2	3%	14	6%
	7370-7379	9	15%	42	17%
Transportation	4000-4799	1	2%	11	4%
Communication	4800-4899	2	3%	18	7%
Utilities	4900-4999	5	8%	0	0%
Wholesale and retail	5000-5999	4	6%	8	3%
Financial services	6000-6999	0	0%	0	0%
Services*	7000-8999	5	8%	8	3%
Total		62	100%	250	100%

* Except codes assigned to technology

Table 4-4: Descriptive statistics of data used in the regression analysis

	Period 1 (1989-1999) - Added group (92 observations)						
Variable	Mean	Std. dev.	Min. obs.	Q1	Median	Q3	Max. obs.
CAR3	0.0461	0.0523	-0.0976	0.0144	0.0480	0.0773	0.1831
CAR30	0.0097	0.1485	-0.3679	-0.0693	-0.0021	0.0787	0.5115
CAR33	0.0560	0.1549	-0.3251	-0.0239	0.0712	0.1229	0.6267
CAR60	-0.0050	0.2235	-0.5029	-0.1238	-0.0334	0.1095	0.7936
CAR63	0.0405	0.2341	-0.4935	-0.0925	0.0340	0.1550	0.9482
AFE‡	-0.0017	0.0093	-0.0593	-0.0018	0.0003	0.0012	0.0189
ΔE	0.0135	0.0519	-0.0774	-0.0087	0.0008	0.0237	0.2532
E(NI)*	0.1162	0.0935	-0.1460	0.0468	0.1069	0.1642	0.3922
CFO*	0.1625	0.1015	-0.0714	0.0873	0.1460	0.2220	0.4827
NDACC*	-0.0272	0.0637	-0.2389	-0.0565	-0.0199	0.0069	0.1107
DACC*	-0.0191	0.0765	-0.2347	-0.0573	-0.0180	0.0174	0.1864
ΔCFO	0.0003	0.0591	-0.1951	-0.0315	0.0001	0.0249	0.1729
ΔTACC‡‡	0.0132	0.0690	-0.1613	-0.0224	0.0060	0.0397	0.2959
ΔNDACC	-0.0155	0.0920	-0.3951	-0.0520	-0.0032	0.0257	0.2556
ΔDACC	0.0287	0.1175	-0.2973	-0.0272	0.0073	0.0861	0.3944
LogSIZE	9.6356	0.3542	8.7676	9.5197	9.6781	9.8062	10.6734
LIQ	1.7037	1.5527	0.2321	0.6393	1.1331	2.2632	8.7925

	Period 1 (1989-1999) - Control group (213 observations)						
Variable	Mean	Std. dev.	Min. obs.	Q1	Median	Q3	Max. obs.
CAR3	-0.0026	0.0356	-0.1606	-0.0201	-0.0006	0.0170	0.1258
CAR30	0.0064	0.1120	-0.5073	-0.0620	0.0046	0.0650	0.4861
CAR33	0.0041	0.1164	-0.4824	-0.0596	0.0103	0.0676	0.4889
CAR60	0.0050	0.1985	-0.6077	-0.0914	-0.0116	0.0828	0.7936
CAR63	0.0035	0.2063	-0.6104	-0.0949	0.0010	0.0798	0.8691
AFE‡	-0.0055	0.0144	-0.0831	-0.0085	-0.0004	0.0011	0.0231
ΔE	-0.0231	0.1115	-0.5405	-0.0230	-0.0029	0.0101	0.3718
E(NI)*	0.0554	0.0952	-0.4079	0.0300	0.0636	0.0926	0.3849
CFO*	0.1202	0.0733	-0.0530	0.0720	0.1175	0.1698	0.3957
NDACC*	-0.0350	0.0594	-0.3173	-0.0666	-0.0299	0.0018	0.1340
DACC*	-0.0298	0.0884	-0.4481	-0.0645	-0.0233	0.0076	0.2709
ΔCFO	-0.0134	0.0683	-0.2992	-0.0241	-0.0013	0.0179	0.1696
ΔTACC‡‡	-0.0097	0.1023	-0.5012	-0.0317	-0.0008	0.0247	0.3128
ΔNDACC	-0.0015	0.0679	-0.3035	-0.0307	0.0020	0.0380	0.1954
ΔDACC	-0.0082	0.1273	-0.6748	-0.0618	-0.0100	0.0341	0.5533
LogSIZE	9.9120	0.3019	9.6028	9.6764	9.8202	10.0256	10.8882
LIQ	0.9754	1.0005	0.3025	0.4890	0.6615	1.0160	8.9048

* Post-inclusion (current) values, scaled by average total assets; E(NI) = CFO+TACC = CFO+NDACC+DACC; ‡ This variable has been winsorised at 1%; ‡‡ Observations with TACC exceeding 1 in absolute value have been deleted from the sample.

Table 4-4: Continued

	Period 2 (2000-2004) - Added group (62 observations)						
Variable	Mean	Std. dev.	Min. obs.	Q1	Median	Q3	Max. obs.
CAR3	0.0452	0.0751	-0.1606	0.0057	0.0306	0.0787	0.1940
CAR30	0.0338	0.1745	-0.4139	-0.0594	0.0338	0.1108	0.5115
CAR33	0.0826	0.1901	-0.4207	-0.0077	0.0560	0.1713	0.5971
CAR60	0.0441	0.2674	-0.6078	-0.0893	0.0517	0.2034	0.7262
CAR63	0.0899	0.2717	-0.6104	-0.0468	0.0782	0.2558	0.7342
AFE‡	-0.0014	0.0104	-0.0415	-0.0021	0.0005	0.0018	0.0231
ΔE	-0.0284	0.1361	-0.7476	-0.033	-0.0002	0.0229	0.2929
E(NI)*	0.0649	0.1388	-0.6450	0.0382	0.0940	0.1335	0.2886
CFO*	0.1479	0.1051	-0.0537	0.0615	0.1366	0.2207	0.4283
NDACC*	-0.0571	0.1681	-0.8198	-0.0937	-0.0323	0.0006	0.3560
DACC*	-0.0259	0.1864	-0.4888	-0.1138	-0.0162	0.0391	0.6820
ΔCFO	-0.0059	0.0901	-0.3023	-0.0398	0.0021	0.0524	0.1684
ΔTACC‡‡	-0.0225	0.1272	-0.5137	-0.0457	-0.0075	0.0337	0.2245
ΔNDACC	-0.0240	0.1943	-0.6821	-0.1026	-0.0256	0.0518	0.6505
ΔDACC	0.0016	0.2253	-0.6417	-0.1124	0.0176	0.1141	0.6040
LogSIZE	9.8711	0.2495	9.4591	9.6793	9.8101	10.0368	10.7099
LIQ	3.5289	4.8215	0.5304	1.4287	2.2542	3.5577	34.6769

	Period 2 (2000-2004) - Control group (250 observations)						
Variable	Mean	Std. dev.	Min. obs.	Q1	Median	Q3	Max. obs.
CAR3	-0.0050	0.0696	-0.1606	-0.0445	-0.0039	0.0367	0.1940
CAR30	-0.0251	0.2147	-0.5073	-0.1498	-0.0285	0.0978	0.5115
CAR33	-0.0270	0.2302	-0.4824	-0.1698	-0.0285	0.1074	0.6267
CAR60	-0.0262	0.2748	-0.6077	-0.2216	-0.0369	0.1172	0.7936
CAR63	-0.0314	0.2855	-0.6104	-0.2245	-0.0392	0.1106	0.9482
AFE‡	-0.0035	0.0163	-0.0831	-0.0043	0.0001	0.0022	0.0231
ΔE	-0.0161	0.1253	-0.8688	-0.0423	-0.0010	0.0303	0.2901
E(NI)*	0.0880	0.1178	-0.2365	0.0238	0.0656	0.1466	0.3775
CFO*	0.1501	0.1220	-0.0943	0.0775	0.1248	0.2211	0.5387
NDACC*	-0.0689	0.1820	-1.1142	-0.1250	-0.0566	0.0079	0.5067
DACC*	0.0069	0.1727	-0.5800	-0.0554	0.0008	0.0655	0.9779
ΔCFO	-0.0066	0.0876	-0.3096	-0.0617	0.0035	0.0416	0.2156
ΔTACC‡‡	-0.0095	0.0965	-0.9391	-0.0520	-0.0010	0.0295	0.2212
ΔNDACC	-0.0316	0.2374	-1.3503	-0.1116	-0.0327	0.0427	1.0894
ΔDACC	0.0221	0.2521	-1.1131	-0.0633	0.0200	0.1067	1.3342
LogSIZE	9.8778	0.3117	9.6033	9.6715	9.7553	9.9655	10.8956
LIQ	2.7219	3.1794	0.3095	0.8236	1.9396	3.2337	20.3820

* Post-inclusion (current) values, scaled by average total assets; E(NI) = CFO+TACC = CFO+NDACC+DACC; ‡ This variable has been winsorised at 1%; ‡‡ Observations with TACC exceeding 1 in absolute value have been deleted from the sample.

Table 4-5: Cumulative abnormal returns around the Index inclusion announcement dates

Using the standard event methodology and market model, I compute the abnormal returns around the Index inclusion announcement date. Cumulative abnormal returns (CARs) are computed using daily returns from CRSP database. For a sample of 92 companies added to the S&P 500 Index over the period 1989 to 1999 (Period 1) and for 62 companies from 2000 to 2004 (Period 2), I report market-adjusted and beta-adjusted buy-and-hold CARs. Beta adjusted CARs use the preceding one year of data to estimate the slope and intercept coefficients from the regression of firm returns on market returns. The market return ($Rm_{i,t}$) is represented by the S&P 500 Index return, which effectively controls for size, liquidity and other Index inclusion criteria. Robustness checks reveal that equal-weighted and value-weighted market returns as well as various definitions of CARs produce similar results. As a benchmark, I report the CARs for the "Control" sample, matched on eight Index inclusion criteria, such as size, industry, liquidity, viability or float. The average of the differences between CARs of the newly added firms and their benchmark sample firms are shown in the last column. All values have been winsorised at the top and bottom 1% levels. The p-values test whether the means of Added firms' CARs are significantly different from Control group CARs. I use the Mann Whitney two-sample test to compute the p-values for differences in medians and confirm the significance at the conventional levels. The abnormal returns are obtained from the following formula:

$$CARMBH_t = \frac{\sum_{i=1}^{N}\left[\prod_{t=-1}^{t-2}(1+R_{i,t}) - \prod_{t=-1}^{t-2}(1+Rm_t)\right]}{N} \quad \text{and} \quad CARBBH_t = \frac{\sum_{i=1}^{N}\left[\prod_{t=-1}^{t-2}(1+R_{i,t}) - \prod_{t=-1}^{t-2}(1+\hat{R}_{i,t})\right]}{N} \quad \text{where}$$

$R_{i,t}$ is a firms *i's* return on day t, $Rm_{i,t}$ is the market return and $\hat{R}_{i,t}$ is the beta adjusted market return.

CAR (days) (Period 1) (1989-1999)	Added firms (CAR %) Simple *($CARMBH_t$)*	Added firms (CAR %) Beta Adjusted *($CARBBH_t$)*	Control firms (CAR %) Simple *($CARMBH_t$)*	Control firms (CAR %) Beta Adjusted *($CARBBH_t$)*	Differences (Added x Control) Pr > |t| / Pr > |Z|
3	**4.61*****	**4.67*****	-0.26	-0.19	**< 0.001 / < 0.001**
30	0.97	0.61	0.64	0.40	> 0.500 / > 0.500
33	**5.56*****	**5.19*****	0.41	0.21	**< 0.001 / < 0.001**
60	-0.50	-0.65	0.50	0.20	> 0.400 / > 0.400
63	**4.05***	**3.76***	0.35	0.11	< 0.160 / **< 0.100**
# of obs.	92	92	213	213	

CAR (days) (Period 2) (2000-2004)	Added firms (CAR %) Simple *($CARMBH_t$)*	Added firms (CAR %) Beta Adjusted *($CARBBH_t$)*	Control firms (CAR %) Simple *($CARMBH_t$)*	Control firms (CAR %) Beta Adjusted *($CARBBH_t$)*	Differences (Added x Control) Pr > |t| / Pr > |Z|
3	**4.52*****	**5.23*****	-0.50	-0.76	**< 0.001 / < 0.001**
30	3.38	3.61	-2.51*	-1.64	**< 0.050 / < 0.050**
33	**8.26*****	**8.96*****	-2.70*	-2.42	**< 0.001 / < 0.001**
60	4.41	4.70	-2.62	-2.00	**< 0.100 / < 0.050**
63	**8.99*****	**9.91*****	-3.14*	-2.87	**< 0.001 / < 0.001**
# of obs.	62	62	250	250	

*, ** and *** indicate significance from zero (two-tailed test) at better than 10%, 5% and 1% levels respectively.
CAR 3 represents cumulative abnormal return during ± 1 trading day around the announcement day (AD-1, AD+1)
CAR 30 represents CAR during 30 trading days subsequent to the announcement day (AD+1, AD+31)
CAR 33 represents CAR from day -1 to day +31 around the announcement date (AD-1, AD+31)
CAR 60 represents CAR during 60 trading days subsequent to the announcement day (AD+1, AD+61)
CAR 63 represents CAR from day -1 to day +61 around the announcement date (AD-1, AD+61)

Table 4-6: Unexpected earnings for Companies Added to the S&P 500 Index

Forecasts of EPS and Actual EPS are obtained from Institutional Brokers' Estimates System International, Inc. (I/B/E/S) for a sample of 92 companies added to the S&P 500 Index over the period 1989 to 1999 (Period 1) and for 62 companies from 2000 to 2004 (Period 2). Monthly median EPS forecasts made closest to the S&P 500 Index inclusion announcement are compared with actual EPS to calculate the current EPS forecast error. As a benchmark, I report the EPS forecast errors for the "Control" sample, matched on eight Index inclusion criteria, such as size, industry, liquidity, viability or float. The proxy for the unexpected earnings is the deltaE, calculated as post inclusion year-end net income (E) minus the pre-inclusion fiscal year-end net income (E) (Compustat item #123). Net income (E) is scaled by average total assets (Compustat #6) to be consistent with earnings management models. The "Mean difference" is the average of the differences between the newly added firms' EPS mean forecast errors and the mean of their benchmark sample EPS forecast errors. The p-values in parentheses test whether the means in EPS forecast errors are significantly different from between Added and Control groups. I use non-parametric tests to compute the p-values for the differences in medians (Mann Whitney two-sample t-test) and find that the differences are significant at the conventional levels.

Comparison with Added sample with the Control Sample

	1	2	3	4
Panel A: Current-Year EPS Forecast Errors for Period 1 (1989-1999)				
	Sample Size Added / Control	Mean Forecast Error for Added firms	Mean Forecast Error for Control firms	Mean difference (col. 2 - col. 3) Pr > |t| / Pr > |Z|
EPS forecast error (AFE)	92 / 213	-$0.035	-$0.319	$0.284
				(0.001 / 0.001)
EPS forecast error scaled by EPS	92 / 213	-2.58%	-8.87%	6.29%
				(0.111 / 0.031)
EPS forecast error scaled by price	92 / 213	-0.17%	-0.55%	0.38%
				(0.022 / 0.018)
	Sample Size Added / Control	deltaE for Added firms	deltaE for Control firms	Mean difference (col. 2 - col. 3) Pr > |t| / Pr > |Z|
Change in Earnings (E_{post} - E_{pre}) scaled by Average Total Assets	92 / 213	1.35%	-2.31%	3.67%
				(0.003 / 0.016)
Panel B: Current-Year EPS Forecast Errors for Period 2 (2000-2004)				
	Sample Size Added / Control	Mean Forecast Error for Added firms	Mean Forecast Error for Control firms	Mean difference (col. 2 - col. 3) Pr > |t| / Pr > |Z|
EPS forecast error (AFE)	62 / 250	-$0.014	-$0.135	$0.121
				(0.230 / 0.705)
EPS forecast error scaled by EPS	62 / 250	-4.37%	-4.56%	0.20%
				(0.974 / 0.885)
EPS forecast error scaled by price	62 / 250	-0.14%	-0.35%	0.21%
				(0.346 / 0.614)
	Sample Size Added / Control	deltaE for Added firms	deltaE for Control firms	Mean difference (col. 2 - col. 3) Pr > |t| / Pr > |Z|
Change in Earnings (E_{post} - E_{pre}) scaled by Average Total Assets	62 / 250	-2.84%	-1.61%	-1.23%
				(0.496 / 0.823)

Table 4-7: Univariate analysis of decomposed earnings variables

Comparison with Added sample with the Control Sample (based on annual data)

	1	2	3	4	5	6	
Panel A: Components of Earnings for Period 1 (1989-1999)							
Added firms (n = 92)	Mean (Post-Inclusion)	Mean (Pre-Inclusion)	Mean difference (col. 1 - col. 2)	Mean difference Added vs. Control (col. 1) Post-incl.	Mean difference Added vs. Control (col. 2) Pre-incl.	Mean difference Added vs. Control (col. 3) (Pr > |t| / Pr > |Z|)	
E(NI)	0.1162***	0.1026***	0.0136**	0.0608***	0.024**	**0.0368**	**(0.003 / 0.017)**
CFO	0.1625***	0.1622***	0.0003	0.0423***	0.0285**	0.0138	(0.094 / 0.677)
TACC	-0.0463***	-0.0595***	0.0132*	0.0185	-0.0044	**0.0229**	**(0.050 / 0.032)**
NDACC	-0.0272*	-0.0117***	-0.0155	0.0078	0.0218***	-0.0140	(0.142 / 0.199)
DACC	-0.0191**	-0.0478***	0.0287**	0.0107	-0.0261**	**0.0368**	**(0.018 / 0.005)**
Control Firms (n = 213)	Mean (Post-Inclusion)	Mean (Pre-Inclusion)	Mean difference (col. 1 - col. 2)				
E(NI)	0.0554***	0.0786***	-0.0232***				
CFO	0.1202***	0.1337***	-0.0135***				
TACC	-0.0648***	-0.0551***	-0.0097				
NDACC	-0.0350***	-0.0335***	-0.0015				
DACC	-0.0298***	-0.0217***	-0.0081				

*, **, *** indicate the significance from zero (one-sample t-test for columns 1-2; paired t-test for column 3; and two independent sample t-test for columns 4-5) at the 10%, 5%, and 1% levels for columns 1-3. Column 6 shows the mean differences between the Added and Control groups and the corresponding significance levels using both p-values of a two-sample t-test and Mann-Whitney test scores.

Post-inclusion relates to the fiscal year end subsequent to a firm's Index inclusion announcement. Pre-inclusion relates to the fiscal year end prior to joining the S&P 500 Index. E(NI) represents Income Before Extraordinary Items (*Compustat item #123*), CFO is cash flow from continuing operations (*Compustat #308-Compustat #124*), TACC is computed as a difference between cash flow from continuing operations and net income before extraordinary items, DACC represents the error term from the regression equation (4) and NDACC is then the difference between TACC and DACC. All the data variables are scaled by average total assets (*Compustat #6*) in order to be consistent with the Earnings management methodology.

Table 4-7: Continued

Comparison with Added sample with the Control Sample (based on annual data)

	1	2	3	4	5	6	
Panel B: Components of Earnings for Period 2 (2000-2004)							
Added firms (n = 62)	Mean (Post-Inclusion)	Mean (Pre-Inclusion)	Mean difference (col. 1 - col. 2)	Mean difference Added vs. Control (col. 1) Post-incl.	Mean difference Added vs. Control (col. 2) Pre-incl.	Mean difference Added vs. Control (col. 3) (Pr > |t| / Pr > |Z|)	
E(NI)	0.0649***	0.0933***	-0.0284	-0.0231	-0.0108	-0.0123	(0.496 / 0.824)
CFO	0.1479***	0.1538***	-0.0059	-0.0022	-0.0029	-0.0007	(0.958 / 0.728)
TACC	-0.0830***	-0.0605***	-0.0225	-0.0209	-0.0079	-0.0130	(0.376 / 0.979)
NDACC	-0.0571***	-0.0330*	-0.0241	0.0118	0.0043	0.0075	(0.816 / 0.551)
DACC	-0.0260	-0.0275	0.0015	-0.0329	-0.0122	-0.0206	(0.558 / 0.415)
Control Firms (n = 250)	Mean (Post-Inclusion)	Mean (Pre-Inclusion)	Mean difference (col. 1 - col. 2)				
E(NI)	0.0880***	0.1041***	-0.0161**				
CFO	0.1501***	0.1567***	-0.0066				
TACC	-0.0621***	-0.0526***	-0.0095				
NDACC	-0.0689***	-0.0373***	-0.0316**				
DACC	0.0069	-0.0153	0.0221				

*, **, *** indicate the significance from zero (one-sample t-test for columns 1-2; paired t-test for column 3; and two independent sample t-test for columns 4-5) at the 10%, 5%, and 1% levels for columns 1-3. Column 6 shows the mean differences between the Added and Control groups and the corresponding significance levels using both p-values of a two-sample t-test and Mann-Whitney test scores.

Post-inclusion relates to the fiscal year end subsequent to a firm's Index inclusion announcement. Pre-inclusion relates to the fiscal year end prior to joining the S&P 500 Index. E(NI) represents Income Before Extraordinary Items (*Compustat item #123*), CFO is cash flow from continuing operations (*Compustat #308-Compustat #124*), TACC is computed as a difference between cash flow from continuing operations and net income before extraordinary items, DACC represents the error term from the regression equation (4) and NDACC is then the difference between TACC and DACC. All the data variables are scaled by average total assets (*Compustat #6*) in order to be consistent with the Earnings management methodology.

Table 4-8: Correlation matrices for the period: 1989-1999 and 2000-2004

Panels A and B show the correlations between the variable ADD (dummy variable equal to 1 when a firm was added to the S&P 500 Index, 0 otherwise) and other variables used in my analysis for the period examined by Denis et al. (2003). Significance levels based on t-statistics are reported in parentheses. Variables CAR3, CAR30, CAR33, CAR60, CAR63 and AFE have been winsorised at the top and bottom 1% level.

PANEL A: Spearman (top), Pearson (bottom) correlation coefficients, 1989-1999; (305 obs)

	ADD	CAR3	CAR33	CAR30	CAR63	CAR60	AFE	ΔE	ΔCFO	ΔTACC	ΔDACC	LogSIZE	LIQ
ADD	1.00	0.47	0.18	-0.02	0.09	-0.05	0.14	0.14	0.02	0.12	0.16	-0.34	0.31
		(0.00)	(0.00)	(0.72)	(0.11)	(0.41)	(0.02)	(0.02)	(0.68)	(0.03)	(0.00)	(0.00)	(0.00)
ADD	1.00	0.48	0.18	0.01	0.08	-0.02	0.13	0.17	0.10	0.11	0.14	-0.37	0.27
		(0.00)	(0.00)	(0.83)	(0.17)	(0.70)	(0.02)	(0.00)	(0.09)	(0.05)	(0.02)	(0.00)	(0.00)

PANEL B: Spearman (top), Pearson (bottom) correlation coefficients, 2000-2004; (312 obs)

	ADD	CAR3	CAR33	CAR30	CAR63	CAR60	AFE	ΔE	ΔCFO	ΔTACC	ΔDACC	LogSIZE	LIQ
ADD	1.00	0.28	0.22	0.12	0.20	0.14	0.03	-0.01	0.02	0.00	-0.05	0.06	0.11
		(0.00)	(0.00)	(0.03)	(0.11)	(0.01)	(0.62)	(0.82)	(0.73)	(0.98)	(0.42)	(0.30)	(0.05)
ADD	1.00	0.27	0.19	0.11	0.17	0.10	0.05	-0.04	0.00	-0.05	-0.03	-0.01	0.09
		(0.00)	(0.00)	(0.05)	(0.00)	(0.07)	(0.35)	(0.50)	(0.96)	(0.38)	(0.56)	(0.87)	(0.11)

Table 4-9: Correlation matrices for the period: 1989-1999 and 2000-2004

Panel A and Panel B show the correlation matrices for the Added and Control firms respectively. Significance levels based on t-statistics are reported in parentheses. Variables CAR3, CAR30, CAR33, CAR60, CAR63 and AFE have been winsorised at the top and bottom 1% level.

PANEL A: Spearman (top part), Pearson (bottom part) correlations, 1989-1999, Added firms; (92 obs)

	CAR3	CAR33	CAR30	CAR63	CAR60	AFE	ΔE	ΔCFO	ΔTACC	ΔNDACC	ΔDACC
CAR3	1.00	0.17	-0.19	0.09	-0.14	0.06	0.06	0.12	-0.08	-0.22	0.13
		(0.10)	(0.06)	(0.39)	(0.19)	(0.60)	(0.58)	(0.24)	(0.44)	(0.03)	(0.21)
CAR33	0.15	1.00	0.91	0.80	0.74	0.24	0.09	0.09	-0.03	-0.10	0.01
	(0.14)		(0.00)	(0.00)	(0.00)	(0.02)	(0.41)	(0.39)	(0.74)	(0.40)	(0.93)
CAR30	-0.18	0.94	1.00	0.76	0.80	0.25	0.09	0.02	0.02	0.04	-0.06
	(0.09)	(0.00)		(0.00)	(0.00)	(0.02)	(0.41)	(0.85)	(0.88)	(0.72)	(0.59)
CAR63	0.10	0.81	0.77	1.00	0.96	0.34	0.12	0.04	0.02	-0.03	0.01
	(0.37)	(0.00)	(0.00)		(0.00)	(0.00)	(0.27)	(0.73)	(0.83)	(0.75)	(0.90)
CAR60	-0.12	0.77	0.80	0.98	1.00	0.33	0.11	0.00	0.05	0.03	-0.02
	(0.26)	(0.00)	(0.00)	(0.00)		(0.00)	(0.29)	(0.99)	(0.63)	(0.74)	(0.84)
AFE	-0.07	0.12	0.14	0.18	0.20	1.00	0.49	0.27	0.09	-0.09	0.18
	(0.53)	(0.27)	(0.17)	(0.09)	(0.06)		(0.00)	(0.01)	(0.42)	(0.41)	(0.09)
ΔE	0.00	0.04	0.05	0.06	0.07	0.33	1.00	0.34	0.34	-0.09	0.33
	(0.98)	(0.73)	(0.62)	(0.58)	(0.51)	(0.00)		(0.00)	(0.00)	(0.41)	(0.00)
ΔCFO	0.11	0.10	0.07	0.09	0.08	0.14	0.23	1.00	-0.65	-0.12	-0.28
	(0.28)	(0.33)	(0.48)	(0.37)	(0.47)	(0.18)	(0.03)		(0.00)	(0.25)	(0.01)
ΔTACC	-0.10	-0.06	-0.02	-0.04	-0.01	0.13	0.55	-0.68	1.00	0.03	0.53
	(0.36)	(0.56)	(0.82)	(0.73)	(0.91)	(0.22)	(0.00)	(0.00)		(0.75)	(0.00)
ΔNDAC	-0.21	0.01	0.08	0.06	0.11	-0.03	-0.01	0.04	-0.05	1.00	-0.76
	(0.04)	(0.93)	(0.43)	(0.56)	(0.28)	(0.78)	(0.89)	(0.68)	(0.65)		(0.00)
ΔDACC	0.11	-0.04	-0.08	-0.07	-0.10	0.10	0.34	-0.43	0.62	-0.81	1.00
	(0.30)	(0.68)	(0.45)	(0.51)	(0.37)	(0.35)	(0.00)	(0.00)	(0.00)	(0.00)	

CAR 3 represents cumulative abnormal return during ± 1 trading day around the announcement day (AD-1, AD-1)
CAR 30 represents CAR during 30 trading days subsequent to the announcement day (AD+1, AD+31)
CAR 33 represents CAR from day -1 to day +31 around the announcement date (AD-1, AD+31)
CAR 60 represents CAR during 60 trading days subsequent to the announcement day (AD+1, AD+61)
CAR 63 represents CAR from day -1 to day +61 around the announcement date (AD-1, AD+61)

Table 4-9: Continued

PANEL B: Spearman (top part), Pearson (bottom part) correlations, 1989-1999, Control firms; (213 obs)

	CAR3	CAR33	CAR30	CAR63	CAR60	AFE	ΔE	ΔCFO	ΔTACC	ΔNDACC	ΔDACC
CAR3	1.00	0.37	0.09	0.27	0.09	0.12	0.12	0.03	0.13	-0.02	0.16
		(0.00)	(0.17)	(0.00)	(0.21)	(0.09)	(0.09)	(0.64)	(0.05)	(0.76)	(0.02)
CAR33	0.35	1.00	0.94	0.75	0.70	0.30	0.16	0.14	0.09	-0.07	0.18
	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.04)	(0.22)	(0.28)	(0.01)
CAR30	0.04	0.95	1.00	0.73	0.74	0.30	0.14	0.15	0.05	-0.07	0.16
	(0.60)	(0.00)		(0.00)	(0.00)	(0.00)	(0.04)	(0.03)	(0.43)	(0.28)	(0.02)
CAR63	0.29	0.74	0.69	1.00	0.97	0.42	0.17	0.08	0.09	-0.03	0.17
	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.01)	(0.22)	(0.19)	(0.71)	(0.01)
CAR60	0.12	0.72	0.72	0.98	1.00	0.41	0.16	0.09	0.08	-0.02	0.15
	(0.07)	(0.00)	(0.00)	(0.00)		(0.00)	(0.02)	(0.21)	(0.27)	(0.79)	(0.03)
AFE	0.15	0.37	0.35	0.40	0.40	1.00	0.47	0.20	0.16	-0.01	0.19
	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.02)	(0.93)	(0.00)
ΔE	0.18	0.30	0.27	0.30	0.29	0.39	1.00	0.35	0.53	0.03	0.40
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.67)	(0.00)
ΔCFO	0.13	0.27	0.24	0.14	0.13	0.17	0.44	1.00	-0.44	0.12	-0.21
	(0.07)	(0.00)	(0.00)	(0.04)	(0.05)	(0.01)	(0.00)		(0.00)	(0.08)	(0.00)
ΔTACC	0.11	0.14	0.13	0.23	0.23	0.31	0.80	-0.19	1.00	0.01	0.65
	(0.10)	(0.04)	(0.05)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		(0.91)	(0.00)
ΔNDAC	0.06	-0.09	-0.12	-0.08	-0.08	-0.12	0.07	0.24	-0.08	1.00	-0.64
	(0.38)	(0.19)	(0.08)	(0.28)	(0.22)	(0.08)	(0.29)	(0.00)	(0.24)		(0.00)
ΔDACC	0.06	0.16	0.17	0.23	0.23	0.31	0.60	-0.28	0.85	-0.60	1.00
	(0.39)	(0.02)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	

AFE is current analysts' forecast error computed as a difference between monthly median EPS forecasts made closest to the S&P 500 Index inclusion announcement and the actual EPS. ΔE is change in Income Before Extraordinary Items (Compustat item #123) from pre-inclusion fiscal year (last year) to the post-inclusion fiscal year. All the data variables are scaled by average total assets (Compustat #6) in order to be consistent with the Earnings management methodology. ΔCFO is change in cash flow from continuing operations (Compustat #308-Compustat #124) between the post-inclusion and pre-inclusion fiscal year. TACC is computed as a difference between cash flow from continuing operations and net income before extraordinary items. ΔTACC represents the change between the levels of total accruals between the current and prior year. DACC equals to the error term from the regression equation (4). NDACC is then the difference between TACC and DACC. ΔNDACC and ΔDACC represent the changes between the levels of total non-discretionary and discretionary accruals between the current and prior year. LogSIZE is the log of size (representing market capitalization) and LIQ is the liquidity, computed as suggested in Exhibit-1 in the appendices (S&P 500 Index inclusion criteria).

Table 4-9: Continued

Panel C and Panel D show the correlation matrices for the Added and Control firms respectively. Significance levels based on t-statistics are reported in parentheses. Variables CAR3, CAR30, CAR33, CAR60, CAR63 and AFE have been winsorised at the top and bottom 1% level.

PANEL C: Spearman (top part), Pearson (bottom part) correlations, 2000-2004, Added firms; (62 obs)

	CAR3	CAR33	CAR30	CAR63	CAR60	AFE	ΔE	ΔCFO	ΔTACC	ΔNDACC	ΔDACC
CAR3	1.00	0.33	-0.10	0.03	-0.20	-0.15	-0.36	-0.15	-0.08	0.00	-0.17
	(0.01)	(0.43)	(0.83)	(0.12)	(0.25)	(0.00)	(0.24)	(0.52)	(0.99)	(0.19)	
CAR33	0.24	1.00	0.84	0.49	0.40	0.07	-0.19	-0.11	0.07	-0.12	0.19
	(0.06)		(0.00)	(0.00)	(0.00)	(0.59)	(0.14)	(0.41)	(0.57)	(0.34)	(0.36)
CAR30	-0.17	0.91	1.00	0.45	0.49	0.08	-0.13	-0.12	0.07	-0.15	0.15
	(0.18)	(0.00)		(0.00)	(0.00)	(0.55)	(0.32)	(0.39)	(0.58)	(0.25)	(0.23)
CAR63	0.06	0.56	0.54	1.00	0.95	0.30	0.17	0.20	-0.04	-0.07	0.08
	(0.65)	(0.00)	(0.00)		(0.00)	(0.02)	(0.19)	(0.12)	(0.75)	(0.59)	(0.51)
CAR60	-0.20	0.48	0.57	0.96	1.00	0.36	0.23	0.18	0.02	-0.08	0.16
	(0.12)	(0.00)	(0.00)	(0.00)		(0.00)	(0.07)	(0.17)	(0.90)	(0.53)	(0.22)
AFE	-0.16	0.01	0.08	0.22	0.24	1.00	0.35	0.11	0.14	-0.02	0.14
	(0.21)	(0.91)	(0.56)	(0.09)	(0.06)		(0.01)	(0.39)	(0.27)	(0.87)	(0.29)
ΔE	-0.35	0.04	0.16	0.25	0.33	0.22	1.00	0.34	0.38	0.08	0.22
	(0.00)	(0.77)	(0.22)	(0.05)	(0.01)	(0.08)		(0.01)	(0.00)	(0.54)	(0.09)
ΔCFO	-0.17	-0.07	-0.03	0.25	0.27	0.08	0.43	1.00	-0.59	0.05	-0.24
	(0.19)	(0.59)	(0.83)	(0.05)	(0.03)	(0.56)	(0.00)		(0.00)	(0.71)	(0.06)
ΔTACC	-0.26	0.09	0.19	0.09	0.16	0.18	0.77	-0.25	1.00	0.14	0.41
	(0.04)	(0.48)	(0.14)	(0.50)	(0.22)	(0.15)	(0.00)	(0.05)		(0.27)	(0.00)
ΔNDAC	0.09	0.00	-0.04	-0.05	-0.08	0.07	0.05	-0.01	0.06	1.00	-0.77
	(0.49)	(0.99)	(0.76)	(0.67)	(0.54)	(0.60)	(0.69)	(0.92)	(0.62)		(0.00)
ΔDACC	-0.22	0.05	0.14	0.10	0.16	0.05	0.39	-0.13	0.51	-0.83	1.00
	(0.08)	(0.69)	(0.26)	(0.46)	(0.22)	(0.72)	(0.00)	(0.31)	(0.00)	(0.00)	

CAR 3 represents cumulative abnormal return during ± 1 trading day around the announcement day (AD-1, AD-1)
CAR 30 represents CAR during 30 trading days subsequent to the announcement day (AD+1, AD+31)
CAR 33 represents CAR from day -1 to day +31 around the announcement date (AD-1, AD+31)
CAR 60 represents CAR during 60 trading days subsequent to the announcement day (AD+1, AD+61)
CAR 63 represents CAR from day -1 to day +61 around the announcement date (AD-1, AD+61)

Table 4-9: Continued

PANEL D: Spearman (top part). Pearson (bottom part) correlations, 2000-2004, Control firms; (250 obs)

	CAR3	CAR33	CAR30	CAR63	CAR60	AFE	ΔE	ΔCFO	ΔTACC	ΔNDACC	ΔDACC
CAR3	1.00	0.25	-0.02	0.16	-0.05	-0.06	-0.02	-0.12	0.11	0.10	-0.01
	(0.00)	(0.78)	(0.01)	(0.46)	(0.32)	(0.80)	(0.05)	(0.10)	(0.12)	(0.88)	
CAR33	0.25	1.00	0.94	0.69	0.64	0.06	0.13	0.04	0.16	0.01	0.09
	(0.00)		(0.00)	(0.00)	(0.00)	(0.36)	(0.05)	(0.56)	(0.01)	(0.93)	(0.15)
CAR30	-0.02	0.95	1.00	0.65	0.66	0.07	0.13	0.08	0.13	-0.03	0.10
	(0.70)	(0.00)		(0.00)	(0.00)	(0.28)	(0.04)	(0.27)	(0.04)	(0.69)	(0.13)
CAR63	0.14	0.67	0.67	1.00	0.97	0.18	0.21	0.11	0.12	0.07	0.01
	(0.03)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.08)	(0.07)	(0.28)	(0.94)
CAR60	-0.07	0.62	0.68	0.97	1.00	0.19	0.21	0.14	0.09	0.04	0.01
	(0.26)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.03)	(0.17)	(0.48)	(0.90)
AFE	-0.08	-0.06	-0.06	0.01	0.02	1.00	0.57	0.45	0.20	-0.08	0.18
	(0.24)	(0.32)	(0.37)	(0.87)	(0.79)		(0.00)	(0.00)	(0.00)	(0.21)	(0.01)
ΔE	-0.01	0.13	0.14	0.19	0.19	0.37	1.00	0.67	0.50	-0.02	0.29
	(0.91)	(0.05)	(0.03)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.77)	(0.00)
ΔCFO	-0.15	0.02	0.05	0.07	0.10	0.42	0.64	1.00	-0.17	-0.13	0.05
	(0.02)	(0.77)	(0.42)	(0.24)	(0.12)	(0.00)	(0.00)		(0.01)	(0.05)	(0.42)
ΔTACC	0.12	0.15	0.13	0.18	0.16	0.10	0.72	-0.07	1.00	0.08	0.42
	(0.05)	(0.02)	(0.04)	(0.00)	(0.01)	(0.11)	(0.00)	(0.24)		(0.20)	(0.00)
ΔNDAC	-0.02	-0.04	-0.02	0.07	0.09	0.02	0.02	-0.02	0.04	1.00	-0.81
	(0.74)	(0.51)	(0.70)	(0.24)	(0.16)	(0.70)	(0.75)	(0.73)	(0.47)		(0.00)
ΔDACC	0.07	0.10	0.07	0.00	-0.02	0.02	0.25	-0.01	0.34	-0.92	1.00
	(0.29)	(0.13)	(0.25)	(0.99)	(0.70)	(0.81)	(0.00)	(0.90)	(0.00)	(0.00)	

AFE is current analysts' forecast error computed as a difference between monthly median EPS forecasts made closest to the S&P 500 Index inclusion announcement and the actual EPS. ΔE is change in Income Before Extraordinary Items (Compustat item #123) from pre-inclusion fiscal year (last year) to the post-inclusion fiscal year. All the data variables are scaled by average total assets (Compustat #6) in order to be consistent with the Earnings management methodology. ΔCFO is change in cash flow from continuing operations (Compustat #308-Compustat #124) between the post-inclusion and pre-inclusion fiscal year. TACC is computed as a difference between cash flow from continuing operations and net income before extraordinary items. ΔTACC represents the change between the levels of total accruals between the current and prior year. DACC equals to the error term from the regression equation (4). NDACC is then the difference between TACC and DACC. ΔNDACC and ΔDACC represent the changes between the levels of total non-discretionary and discretionary accruals between the current and prior year. LogSIZE is the log of size (representing market capitalization) and LIQ is the liquidity, computed as suggested by S&P 500 Index inclusion criteria (Exhibit-1 in the appendices).

Table 4-10: Regression Results

This table displays regression results of Cumulative abnormal returns (CAR3-CAR63) on unexpected earnings (UE) for a period 1989-1999. I use analysts' forecast errors (AFEs) and change in Earnings (ΔE) as a proxy for UE. Panel A results are based on the combined sample (Additions + Non-additions) whereas Panel B and Panel C show results for sample specific regressions. Estimated coefficients (where *, ** and *** represent significance from zero at 10%, 5% and 1% respectively) are based on the following OLS (pooled regressions) models:

$$CARMBH_{\tau} = \alpha_0 + \beta_1 UE + \beta_2 ADD + \beta_3 ADD * UE + \varepsilon_t$$

$$CARMBH_{\tau} = \alpha_0 + \beta_1 UE + \varepsilon_t$$

Panel A (Combined sample)			AFE	ΔE	ADD	ADD*AFE	ADD*ΔE	Adjusted
(n=305)	m	α	β_1	β_1	β_2	β_3	β_3	R^2
CAR3	m1:	0.014***	0.470**					0.014
CAR3	m2:	-0.001	0.253		0.048***			0.226
CAR3	m3:	-0.001	0.365*		0.046***	-0.741		0.230
CAR33	m4:	0.020**	2.961***		0.039**	-0.987		0.103
CAR63	m5:	0.035**	5.698***		0.014 ‡	-1.202		0.110
CAR3	m6:	0.013***		0.090***				0.033
CAR3	m7:	-0.001		0.053**	0.047***			0.234
CAR3	m8:	-0.001		0.058**	0.047***		-0.055	0.233
CAR33	m9:	0.011		0.311***	0.043***		-0.203	0.073
CAR63	m10:	0.016		0.555***	0.021 ‡‡		-0.292	0.056

Panel B (Added sample)			AFE	ΔE	Adjusted
(n=92)	m	α	β_1	β_1	R^2
CAR3	m1a:	0.045***	-0.376 i		-0.007
CAR33	m4a:	0.059***	1.974 ii		0.003
CAR63	m5a:	0.048**	4.496*		0.021
CAR3	m6a:	0.046***		0.003 iii	-0.011
CAR33	m9a:	0.054***		0.107 iv	-0.010
CAR63	m10a:	0.037***		0.263 v	-0.007

Panel C (Control sample)			AFE	ΔE	Adjusted
(n=213)	m	α	β_1	β_1	R^2
CAR3	m1b:	-0.001	0.365**		0.017
CAR33	m4b:	0.020**	2.951***		0.129
CAR63	m5b:	0.035**	5.698***		0.155
CAR3	m6b:	-0.001		0.058***	0.028
CAR33	m9b:	0.011		0.311***	0.084
CAR63	m10b:	0.016		0.555***	0.086

‡ and ‡‡ correspond to p-values of 0.62 and 0.43 respectively

i, ii, iii, iv and v correspond to p-values of 0.53, 0.27, 0.98, 0.73 and 0.58 respectively

Table 4-11: Regression Results

This table shows regression results of Cumulative abnormal returns (CAR3-CAR63) on unexpected earnings (UE) for a period 1989-1999. I use change in Earnings (ΔE) as a proxy for UE and its decomposed elements. Panel B results are based on the Additions firm sample whereas Panel C shows results for Control (Non-added) firm sample. Estimated coefficients (*, ** and *** represent significance from zero at 10%, 5% and 1% respectively) are based on the following OLS (pooled regressions) models:

$$CARMBH_{\tau} = \alpha_0 + \beta_1 \Delta E + \varepsilon_t$$
$$CARMBH_{\tau} = \alpha_0 + \beta_2 \Delta CFO + \beta_3 \Delta TACC + \varepsilon_t$$
$$CARMBH_{\tau} = \alpha_0 + \beta_2 \Delta CFO + \beta_4 \Delta NDACC + \beta_5 \Delta DACC + \varepsilon_t$$

Panel B (Added sample)

(n=92)	α_0	β_1	β_2	β_3	β_4	β_5	Adjusted R^2
CAR3	0.046***	0.003 i					-0.011
CAR3	0.046***		0.081	-0.025			-0.009
CAR3	0.045***		0.085		-0.155	-0.031	0.029
CAR33	0.054***	0.107 ii					-0.010
CAR33	0.055***		0.300	0.038			-0.011
CAR33	0.055***		0.300		0.048	0.038	-0.023
CAR63	0.037***	0.263 iii					-0.007
CAR63	0.038***		0.508	0.174			-0.012
CAR63	0.040***		0.504		0.329	0.181	-0.020

Panel C (Control sample)

(n=213)	α_0	β_1	β_2	β_3	β_4	β_5	Adjusted R^2
CAR3	-0.001	0.058***					0.028
CAR3	-0.001		0.080**	0.050**			0.026
CAR3	-0.001		0.075**		0.070	0.050**	0.023
CAR33	0.011	0.311***					0.084
CAR33	0.013*		0.527***	0.232***			0.104
CAR33	0.014*		0.590***		-0.046	0.225***	0.124
CAR63	0.016	0.555***					0.086
CAR63	0.017		0.574***	0.547***			0.081
CAR63	0.017		0.649***		0.218	0.540***	0.088

i, ii, and iii correspond to p-values of 0.98, 0.73 and 0.58 respectively

ΔCFO is defined as a change in Cash Flow from continuing operations (*Compustat #308-Compustat #124*) and ΔTACC is change in total accruals defined as $TACC_t = NI_t - CFO_t$. Delta (Δ) represents the change in variable from the last (pre-inclusion) year to the current (post-inclusion) year end. ΔNDACC and ΔDACC are defined as non-discretionary and discretionary components of Accruals based on the following relationship $TACC_t = NDACC_t + DACC_t$ from the pre-inclusion year to the post-inclusion year end.

Table 4-12: Cross- sectional Analysis of Earnings Informativeness

This table presents additional analysis of earnings informativeness between the Added and Control firms during the period 1989-2004. I follow analysis by Tucker and Zarowin (2006). In Panel A, I present the benchmark CKSS model separately for Added and Control groups, as well as the combined OLS panel regressions. Regression in Panel B includes an additional interaction variable, ADDED, and provides a complete test for the differences in earnings informativeness. Lastly, Panel C presents a traditional earnings persistence model testing the earnings quality between the Added and Control groups.

Panel A: Benchmark CKSS Model

$R_t = \alpha_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \varepsilon_t$

	α_0	β_1	β_2	β_3	β_4	# obs	Adjusted R^2
Predicted sign		-	+	+	-		
Added firms	0.079	0.324	1.326***	0.128	-0.014	192	6.96%
Control firms	-0.042	0.501	1.542***	0.312***	-0.121***	287	12.80%
All firms	0.013	0.344	1.340***	0.272***	-0.059***	479	9.41%

Panel B: Primary Model

$R_t = \alpha_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} +$
$+ \beta_5 ADDED + \beta_6 ADDED^* X_{t-1} + \beta_7 ADDED^* X_t + \beta_8 ADDED^* X_{t3} + \beta_9 ADDED^* R_{t3} + \varepsilon_t$

	α_0	β_1	β_2	β_3	β_4	# obs	Adjusted R^2
Predicted sign		-	+	+	-		
All firms	-0.042	0.501	1.542***	0.312***	-0.121***		
	β_5	β_6	β_7	β_8	β_9		
Predicted sign				?			
All firms	0.121*	-0.177	-0.216	-0.184	0.108**	479	10.72%

Panel C: Earnings-Persistence Model

$EPS_{t+1} = \alpha_0 + \alpha_1 EPS_t + \alpha_2 ADDED + \alpha_3 ADDED^* EPS_t + \varepsilon_t$

	α_0	α_1	α_2	α_3	# obs	Adjusted R^2
Predicted sign		+		?		
Post-inclusion	-0.412***	0.844***	0.380*	-0.322***	479	35.23%

Table 4-12: Continued

Variable in the above regressions are defined as follows:

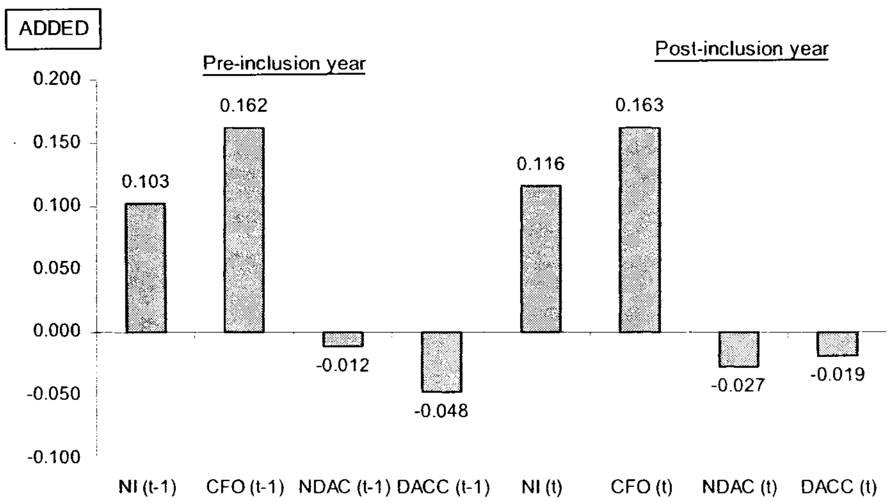
t	= represents the fiscal year during which the sampled firms were added to the Index;
R_t	= the ex-dividend stock return for Fiscal Year t;
EPS_t	= the earnings per share (Compustat Data58, adjusted for stock splits and stock dividends, undeflated) for Fiscal Year t;
EPS_{t-1}	= the earnings (Compustat Data58, adjusted for stock splits and stock dividends, undeflated) per share for Fiscal Years t+1;
X_{t-1}	= the earnings per share (Compustat Data58, adjusted for stock splits and stock dividends, deflated by the stock price at the beginning of Fiscal Year t) for Fiscal Year t-1.
X_t	= the earnings per share (Compustat Data58, adjusted for stock splits and stock dividends, deflated by the stock price at the beginning of Fiscal Year t) for Fiscal Year t.
X_{t3}	= the sum of earnings per share for Fiscal Years t+1 through t+3, deflated by the stock price at the beginning of Fiscal Year t.
R_{t3}	= the annually compounded stock return for Fiscal Years t+1 through t+3;
ADDED	= dummy variable equaling 1 if a firm is added into the Index, zero otherwise

*, ** and *** represent significance from zero at 10%, 5% and 1% respectively. All variables have been winsorised at 1% levels.

4.10 Figures

Figure 4-1: Graphical representation of Table 4-7 (Panel A)

This figure graphically depicts mean values of NI (earnings), CFO (Cash flow from continuing operations) and Accrual (and its decomposed components) values for the first sample period (1989-1999) for the Added and the Control sample. Pre-inclusion (last) year relates to the fiscal year end prior to the Index inclusion announcement whereas the post-inclusion year (current) relates to the fiscal year end in which the Index inclusion announcement took place.



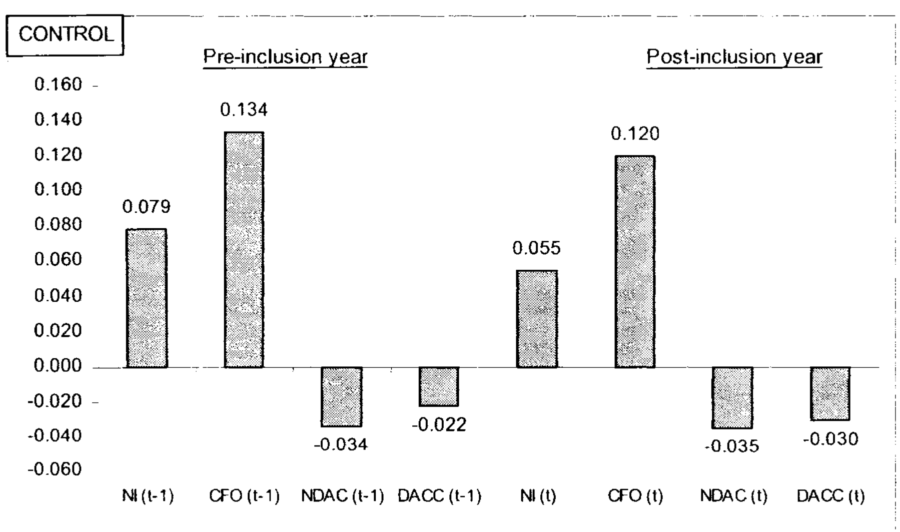


Figure 4-2: Graphical representation of Table 4-7 (Panel B)

This figure graphically depicts mean values of NI (Earnings), CFO (Cash flow from continuing operations) and Accrual (and its decomposed components) values for the second sample period (2000-2004) for the Added and the Control sample. Pre-inclusion (last) year relates to the fiscal year end prior to the Index inclusion announcement whereas the post-inclusion year (current) relates to the fiscal year end in which the Index inclusion announcement took place.

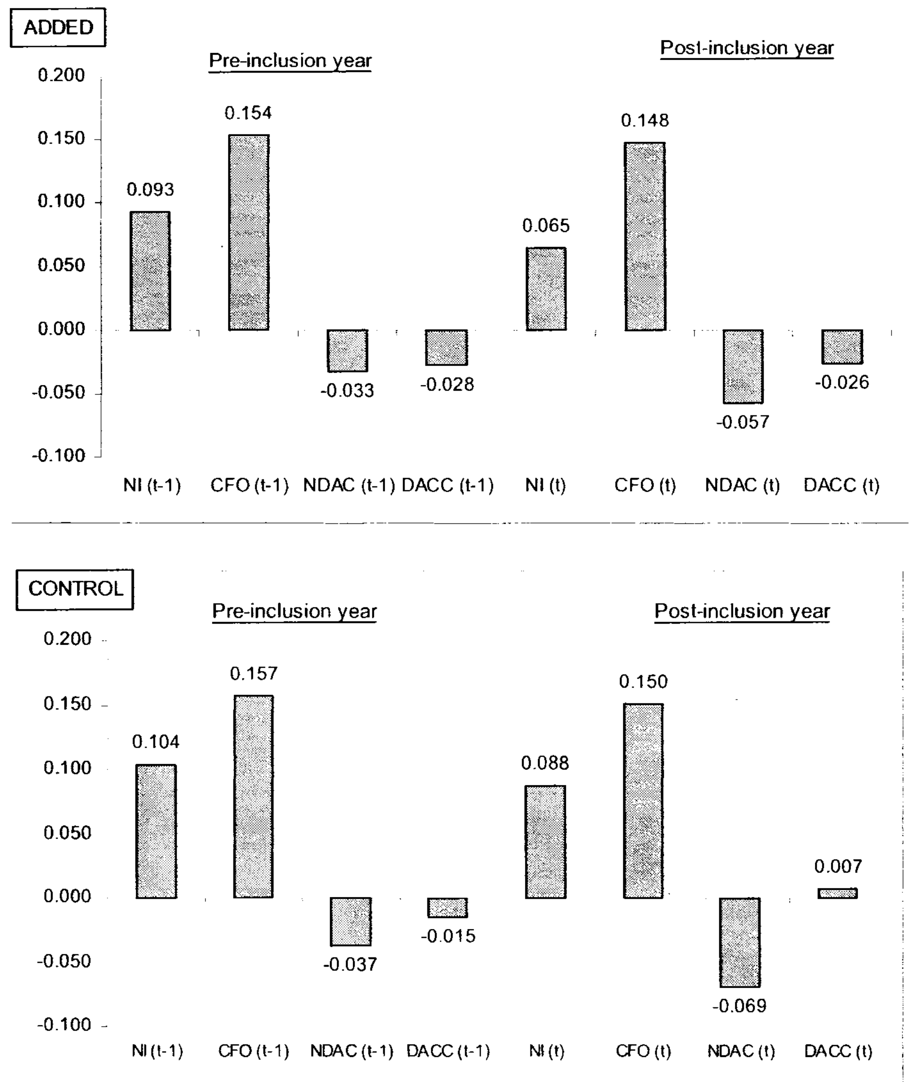
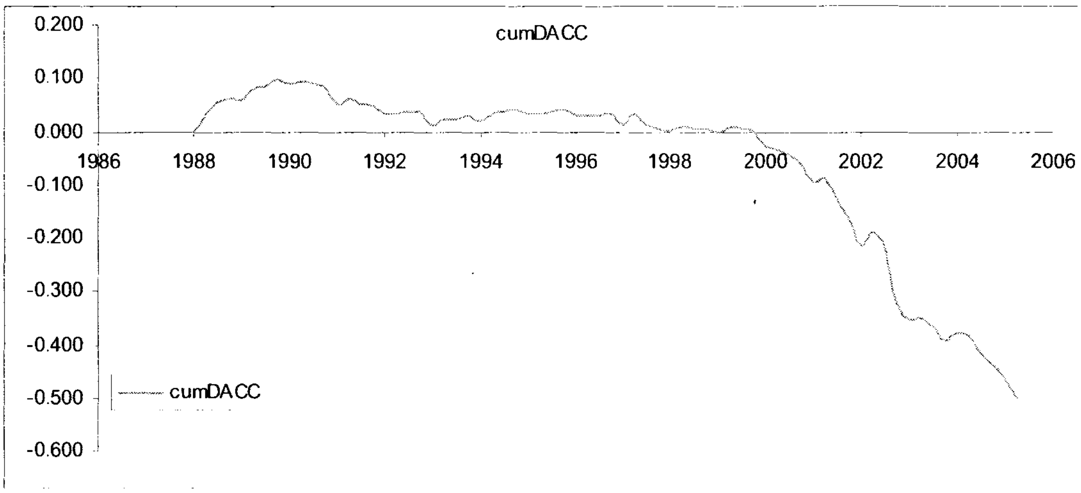


Figure 4-3: Cumulative Discretionary Accruals

This figure graphically depicts Cumulative Discretionary Accruals during 1988-2004. I use the quarterly financial statements data and same methodology (Lagged model) to estimate the discretionary accruals. The average levels of discretionary accruals are based on an average number of firms in a particular year-quarter of 3,640.



Chapter 5

Demand Curves for Stocks *Are* Flat: New Evidence from S&P 500 Weight Adjustments

5.1 Introduction

Based on neoclassical finance theory, the slope of the long-run demand curve (hereafter LRDC) for stocks is horizontal. The perfectly elastic LRDC results from possible arbitrage among stocks' perfect substitutes. Scholes (1972) argues that "the market will price assets such that the expected rates of return on assets of similar risk are equal." To the extent that stocks have close substitutes, if there is any deviation from a stock's fundamental value (expected future cash flows discounted by the cost of capital, which in turn should reflect systematic risk), arbitrageurs would quickly eliminate the mispricing. This can be accomplished by either buying close substitutes and simultaneously selling the overpriced security, or by shorting close substitutes and buying an underpriced stock. This type of arbitrage is one of the most fundamental assumptions underlying the theory of efficient markets. Many researchers have tested this conjecture and found evidence for the downward-sloping LRDC (Shleifer 1986, Bagwell 1992, and Wurgler & Zhuravskaya 2002 among others). In particular, composition changes to various indices remain popular event studies, as index changes arguably offer an information-free environment. This is a desired attribute for samples testing market efficiency of arbitrage. However, over time, researchers[97] have acknowledged that information-free events rarely occur, and that changes to various index constituents may convey information. As a result, analyzing index changes may shed doubt on the validity of the downward-sloping LRDC.

This chapter empirically tests the slope of the long-run demand curves for S&P 500 index (hereafter Index) firms using two independent tests and ostensibly information-free samples. I am motivated by the unresolved issue of the slope of stocks' LRDC and by a unique information-free event that affected demand for S&P 500 stocks. Clean experiments offering uninformed supply shocks to test stocks' demand shocks have been examined and provided evidence for a definite demand elasticity. For instance, Kaul, Morck and Mehrotra (2000) analyze the redefinition of the public float for the TSE 300 firms, which is a truly unique event, free from any potential informativeness or certification effect. While this event provides only a small sample of affected firms, the results provide significant evidence for the downward-sloping LRDC in a Canadian setting. In the first part of this chapter, I conduct a comparable test by examining demand shocks resulting from Standard & Poor's redefinition of S&P 500 weightings from market-based to free-float-based Index weightings[98]. Due to its late occurrence in 2005, this event has received little

[97] Kaul et al. (2000) point out that "The findings of Dhillon and Johnson (1991) and Jain (1987) [who examine S&P 500 index additions] are consistent with a certification role for S&P and with index inclusion conveying favourable news about the included company's prospects. Therefore, the evidence from index inclusions cannot be said to unambiguously support downward sloping demand curves", as the authors only provide evidence contrary to the information hypothesis, and not the certification story. Wurgler and Zhuravskaya (2002) acknowledge the limitation of their sample by stating: "A stumbling block for studies like these [dealing with S&P 500 index addition], however, is the difficulty of controlling for new information associated with the shock. Experiments as informationally clean as S&P 500 are hard to find." Certification hypothesis is described in detail in Chapter 2.

[98] The elasticity of demand can be estimated from supply shocks as well as demand shocks. When Standard and Poor's redefined its Index weightings, index tracking funds have to rebalance their holding and buy (sell) the corresponding number of shares. These changes trigger the shift in the supply curve (a change in total shares outstanding for an ordinary investor). In the context of Index weight redefinition, it is sometimes easier to think about the demand shock as a reduction in public float. In the context of Index additions, when a company is announced to be added (deleted) to the Index, index tracking funds and investors increase (decrease) their demand accordingly. For the reminder of this chapter, I will refer to my two samples as events that affect demand for firms' shares.

attention by the academic literature[99]. This event is unique as it involves no changes to the index constituents; but rather, changes to firms' weights in the indices. As a result, other hypotheses that explain Index premia are less likely to be present. If the previously documented downward-sloping demand curve explanation still holds, and given that the number of indexing funds has increased over time (Morck and Yang, 2002 and Wurgler and Zhuravskaya 2002), one can predict that abnormal returns associated with the demand shock should be more pronounced in a more recent period.

My second test of the demand curve's slope involves Index additions and their substitutes. Wurgler and Zhuravskaya (2002) propose a model and test empirically the slope of long-run demand curves for the newly added stocks to the Index during 1976-1989. They find significantly increasing inclusion premiums for stocks with increasing arbitrage risk. Similar results for a period 1989-2000 are obtained by Petajisto (2006) who finds that idiosyncratic risk is positively related to the price impact of an S&P 500 induced uninformed demand shock. These results clearly support the downward sloping demand curve for common stocks. My contribution to this result is to evaluate the arbitrage risk using a more recent period, and examine directly the available substitutes, as defined by Standard and Poor's[100]. Therefore, the second part of this chapter analyzes arbitrage risk (measured by the number of firm's close substitutes) and demand shocks resulting from the S&P 500 Index inclusion announcements for the period 1989-2004.

Regardless of the slope of the supply curve, abnormal returns should be evident provided that the demand curves slope down, although largest premia should be observed when the supply curve is vertical.

[99] After searching ABI Inform Global for S&P and Float I found zero matches on this topic. There are also no working papers on SSRN as of this date.

[100] A replication of Wurgler and Zhuravskaya (2002) is still an open avenue to pursue; however, I believe that their sample selection is not appropriate to analyze the Downward-sloping LRDC hypothesis (reasons discussed later). The only contribution of replicating their analysis would be the new period 1989-2004, which I examine by using a truly information free-event.

This chapter contributes to the empirical evidence supporting Scholes' assumption of arbitrage during efficient markets. My first set of results involving S&P's redefinition of Index weights contradicts the downward-sloping demand curve hypothesis. Standard and Poor's redefined the Index weights from a market value base to a free-float base, which was implemented in two phases: in March 2005 and September 2005. I analyze abnormal returns attached to individual firms' free-float changes on the two implementation dates, as well as on three preceding announcement dates. I find no permanent abnormal returns around the event dates as well as around the announcement dates for firms with extreme demand shocks. My results are robust to a variety of alternative definitions of abnormal returns and their permanence. Similar to Kaul et al. (2000), I examine other factors such as excess turnover and changes in Bid-Ask spreads to control for transaction costs and information effects. I find excess trading volume around the proposed event dates, consistent with the rebalancing needs of index tracking funds, and document no changes in Bid-Ask spreads over time. The latter is consistent with no change in investors' degree of consensus, which normally suggests no new information around the event date[101]. My second set of results tests the magnitude of abnormal returns around Index inclusion announcement dates after controlling for the number of available substitutes (firms satisfying S&P Index inclusion criteria). While I confirm the existence of abnormal returns around Index inclusion announcement dates, I find that the abnormal returns are not significantly different for stocks with at least one available substitute compared to stocks with no substitutes. Furthermore, firms with

[101] This is not a sufficient condition. I acknowledge that an information event could lead to unchanged Bid-Ask spreads, as long as all investors correctly interpret the information and move the Bid-Ask spread in the same direction.

an increasing number of substitutes do not experience decreasing Index inclusion premia[102].

The remainder of this chapter is organized as follows: Section 5.2 presents the hypotheses and summarizes evidence supporting the slope of the demand curves for stocks. Section 5.3 explains the sample, event dates and methodology. In section 5.4, I present the main empirical results, and include robustness checks. Section 5.5 summarizes the chapter and outlines potential limitations.

5.2 Hypotheses and Prior Evidence

Event study methodology is usually employed to test the demand curves for stocks. Researchers attempt to examine events that are ostensibly free from any information, such as changes to the composition of the S&P 500 Index. When an existing stock in the S&P 500 ceases to meet any of the inclusion criteria, the Index Committee replaces that company with a new candidate. However, Denis et al. (2003) postulate that Index addition conveys "information" to investors. Therefore, researchers have also offered other alternative explanations of abnormal positive returns attached to Index inclusion, and have provided supporting evidence for these other hypotheses, such as Price Pressure (Harris and Gurel 1986 or Lynch and Mendenhall 1997), Liquidity (Graham et al. 1996 or Beneish and Gardner 1995), or Information Effect (Dhillon and Johnson 1991, Jain 1987 or Denis et al. 2003). Clearly, testing the Downward-sloping LRDC (Imperfect Substitute) Hypothesis implies finding tests and/or samples that can differentiate among the LRDC and these above alternate

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[102] I conduct both discrete (no substitutes versus at least one substitute) and continuous (no substitutes versus increasing substitutes) tests to control for the quality and quantity of available substitutes respectively. In cases where I find no substitutes available for Index additions, I effectively control for size, quality of substitutes, as well as the number of substitutes available. When I identify firms with several substitutes, problems may arise with regards to their quality (see section 5.2.2 for further details).

explanations. I use two independent samples and events to test the downward-sloping LRDC Hypothesis, indicating where and how I can delineate relative to the alternative hypotheses that are fully described in Chapter 1.

5.2.1 Hypothesis 1 – Index Weight Redefinition

Of the studies examining the slope of LRDC, Kaul, Mehrotra and Morck, 2000 (hereafter KMM) provide the clearest evidence for the downward-sloping LRDC in their examination of the TSE's (Toronto Stock Exchange) redefinition of public float, and its impact on prices of the most affected firms (hereafter TSE event). In this chapter, I examine an event where Standard and Poor's adopts a new weighting (hereafter S&P Event) to compute the firm weights[103] in the S&P 500 Index based on market value of Free-Float, rather than market capitalization. This information-free event is very similar to the TSE Event, as neither involves changes to the index constituents; but rather, changes to firms' weights in the indices. The Free-Float weighting for S&P's U.S. equity indices was announced one year prior to its implementation and did not involve changes to the Index composition. Furthermore, the publicly available data to compute the new and ongoing weights were available six months prior to the actual implementation of Free-Float weightings. Therefore, new information or certification should not be responsible for potential excess returns.

The Liquidity Hypothesis predicts that inclusion into a widely followed index leads to higher attention by the public and analysts, which, in turn, may lead to greater institutional interest and trading volume. Being already included in the S&P 500 index, changes in Index re-weightings should be associated with increased liquidity only around the implementation dates, when Index tracking funds are

[103] Old weights have been based on the market value of firm's shares outstanding relative to the overall S&P 500 market capitalization.

required to rebalance their portfolios[104]. Standard and Poor's point out that reduction in weight for stocks (with a significant portion of the shares outstanding that are not available to ordinary investors) reduces cost of low liquidity for small and medium stocks[105]. This argument applies more to other auxiliary S&P indices. For the S&P 500 Index, the weight redefinition can be interpreted as a reduction (increase) in supply relative to demand for common shares for weight gainers (losers). I therefore emphasize in my analysis firms with both extreme increases and decreases in Index weights, although I examine all firms affected by the new S&P's weight re-definition. I address the issue of liquidity in more detail in the analysis section. Examining weekly abnormal returns around the announcement and implementation dates can provide evidence for both Price Pressure and Downward-sloping LRDC hypotheses. I am interested whether any abnormal returns arise as a result of Index re-weightings and whether such abnormal returns are temporary, or persist in the long-run.

In terms of the sample, I believe that the S&P Event offers two advantages relative to the TSE Event. First, KMM only examine a small sample size of the 31 most affected firms in the TSE index, and therefore analyze the positive demand shock only. My larger sample should provide more robust evidence regarding the slope of the LRDC. Further, the S&P Event provides an opportunity to study both the positive and negative extreme demand shocks, and their corresponding effects on excess returns. Examining both extremes is useful because LRDC should hold for both ends

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[104] Blume and Edelen (2003) demonstrate that the largest S&P 500 indexers replicate the Index with a tracking error of just several basis points per year and that almost half of indexers always follow an exact replication strategy.

[105] Standard and Poor's change to full float adjustment was prompted by the following reason: "After 2000-2002 bear market and associated declines in trading volume, there is more concern about liquidity. Further, as the S&P MidCap 400 and S&P SmallCap 600 have grown in popularity, liquidity among medium and small stocks has become a concern for institutional investors. The growing use of derivatives based on equity indices has also increased the importance of liquidity and the need for investors' portfolio to closely track indices." "If the stocks in an index are not liquid, index funds may have trouble acquiring them in the necessary quantities without artificially running up the price, hence damaging index funds and making indices less representative and reliable." (Source: *Standard and Poor's*, Float Adjustment FAQ, September 28, 2004).

of distribution. Second, part of the empirical evidence supporting the downward-sloping LRDC comes from analyzing the changes in S&P 500 index constituents. Given the recent occurrence of the S&P Event and its limited data availability, very little research has been done on the impact of Index re-weighting on firm share prices. If downward-sloping LRDC is responsible for abnormal returns around S&P 500 additions, one should also observe abnormal returns around Index re-weightings. My predictions about the existence and persistence of abnormal returns respectively are as follows:

H_{1a}: *Firms with extreme positive (negative) demand shocks around the Index re-weighting implementation dates should experience significantly higher (lower) abnormal returns compared to the least affected firms, and significantly different abnormal returns from each other.*

H_{2a}: *In a presence of a downward-sloping demand curve, any observed abnormal returns will persist in the long-run.*

5.2.2 Hypothesis 2 – Index Additions

The downward-sloping LRDC hypothesis is often called the Imperfect Substitution Hypothesis. As the name implies, the inelasticity of demand results from limited arbitrage, where perfect substitutes are not available for arbitrageurs to correct mispricing. Wurgler and Zhuravskaya (2002) build a model in which they introduce a risk between "perfect" substitutes that limits arbitrage. They directly test the quality and magnitude of available substitutes, and their effect on Index inclusion premia. They find that, during 1976-1989, individual stocks do not have perfect substitutes, Index inclusion premia increase with high arbitrage risk stocks, and that the magnitude of demand shock (associated with Index tracking funds rebalancing their portfolios) is also correlated with the magnitude of excess returns. One should interpret these results with caution, however.

First, when the authors select an appropriately restricted set of potential substitutes, they analyze all stocks, including those already in the S&P 500. This selection procedure may include incorrect substitutes and provide misleading results about the arbitrage risk. For example, assuming that the Index inclusion effect is permanent, investors may not consider "allegedly overpriced" stocks (recent additions to the S&P 500 Index) for arbitrage opportunities. Therefore, analyzing S&P 500 stocks as potential substitutes may result in incorrect measurement of arbitrage risk. Second, Wurgler and Zhuravskaya measure arbitrage risk as the unexplained historical variance of a zero-net-investment portfolio that holds $1 of the stock and short $1 in a portfolio of close substitutes. This procedure uses the top three stock matches based on portfolios sorted into Industry, Size and B/M. This measure of arbitrage does not specifically deal with the number of substitutes available, but rather with quality of substitutes proxied by the unexplained variance of a two-factor model controlling for industry. Third, despite having the available sample and data, the authors do not examine the period when S&P pre-announced the Index inclusion changes. The later period may present confounding results due to a possible reaction at the earlier date, as Index inclusion changes started to be announced several days prior to their actual inclusion. However, as the magnitude of the demand shock increases significantly over time, the long-term mispricing should still be evident, provided that the arbitrage remains limited after 1989[106]. Lastly, neither Wurgler & Zhuravskaya (2002), nor Petajisto (2005), conduct a formal empirical test of other alternative explanations (such as the Liquidity or Information hypotheses) that may wash out the significance levels of the arbitrage risk on the Index inclusion premia. It is worth noting that the arbitrage risk (in the absence of other legitimate regressors)

[106] This point is addressed by Petajisto (2006) who finds similar results for period 1989-2000.

explains only 4% of the cumulative abnormal returns during 1976-1989 (WZ 2000) and about 10% of the premia during 1989-2000 (Petajisto, 2005).

As my second analysis of arbitrage risk, I conduct a simpler procedure to select firms' available substitutes; I exclude firms in the S&P 500 as potential substitutes[107], examine the most likely number of available substitutes (rather than differences among explanatory power of three most likely substitutes), and compare the Index inclusion premia across various groups and periods subsequent to 1989[108]. Since this analysis involves additions to the S&P 500 index, alternative explanations may be responsible for abnormal returns around Index inclusion announcement dates[109]. According to their model of demand curves for stocks, Wurgler and Zhuravskaya predict that high-arbitrage risk stocks have steeper aggregate demand curves than low-arbitrage risk stocks, and that stocks with higher arbitrage risk should therefore have a larger price response to a demand shock. I measure arbitrage risk as the number of substitutes available at the time of Index inclusions. Furthermore, as the number of Index tracking funds increases over time, one should observe larger abnormal returns during a more recent period (2000-2004 compared to 1987-1999 and to 1976-1989). Assuming that Index inclusions are information-free events and that the demand curve for stocks is downward-sloping, my predictions about the magnitude and persistence of abnormal returns around Index inclusion announcement dates, after controlling for substitute availability, are as follows:

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[107] Assuming that arbitrageurs perceive newly added firms (and hence firms in the S&P 500) as overpriced, then they will not likely consider other stocks in the S&P 500 for the arbitrage portfolios. As a sensitivity analysis, I include firms in the S&P 500 index as potential substitutes. The results are robust to this alternative definition.

[108] The matching procedure controls for Industry, Size, liquidity, financial viability and float.

[109] As mentioned earlier, this chapter focuses on a direct test of the Downward-sloping LRDC Hypothesis. The Price Pressure, Information Content and Risk Reducing Hypotheses are addressed in previous chapters.

H_{3a}: *Firms with an increasing number of available substitutes should experience lower magnitude and persistence of abnormal returns around Index inclusion announcement dates.*

H_{4a}: *The magnitude of abnormal returns after controlling for substitute availability should be more pronounced in the more recent period.*

Although the above hypotheses only address the issue of magnitude of substitutes, quality of substitutes also plays an important role in arbitrage. In cases where I find no substitutes available for Index additions, I effectively control for size, quality of substitutes, as well as availability of substitutes. When I identify firms with several substitutes, problems may arise with regards to their quality. For example, three substitutes for one Index addition could be of higher quality (more closely matched on B/M, Size, Beta, Liquidity or Profitability) than seven substitutes identified for another Index added firm. As a sensitivity analysis, I examine abnormal returns of firms with at least one substitute compared to firms with zero substitutes. This case assumes no differentiation in quality of available substitutes. The last hypothesis is as follows:

H_{5a}: *Firms with at least one available substitute should experience significantly lower and less persistent abnormal returns around Index inclusion announcement dates than newly added firms with no substitutes available.*

5.2.3 Downward-sloping LRDC Empirical Evidence

Scholes (1972) points out that the elasticity of demand for common stocks can be determined only by empirical tests. Since then, many researchers have proposed various models to justify the existence of the downward-sloping LRDC, and have estimated the elasticity of demand using various samples and time periods.

Wurgler and Zhuravskaya (2002) provide an excellent review of the literature that examines price elasticity of demand (p. 602). The empirical evidence does not uniformly support the downward-sloping LRDC, although this hypothesis finds support in most of the studies. Researchers that find nearly perfectly elastic slopes include: Scholes (1972), who reports the closest estimate to negative infinity using secondary distributions of large blocks on the NYSE; Vespro (2006), who finds support for Price Pressure Hypothesis for changes to *CAC 40*, *SBF 120* & *FTSE 100* (French Indices); and Biktimirov et al. (2004), who also find a short-term price reversal subsequent to *Russell 2000* Index changes. The two latter studies are important, as the authors document temporary abnormal returns around both index additions, as well as deletions that reverse back to their normal price levels in a relatively short period. Most other studies dealing with S&P 500 Index changes do not find reversals.

Studies that find support for the downward-sloping LRDC by examining events, other than changes to S&P 500, include: Loderer et al. (1991), who investigate announcements of equity issues by regulated firms; Bagwell (1992), who tests Dutch auction repurchases; Kandel et al. (1999), who observe finite demand elasticity for 27 Israeli IPO auctions; Loderer & Jacobs (1995), who examine excess returns around announcements to allow foreign ownership of Nestlé (traded on the Zürich Stock Exchange); and Greenwood (2005), who studies a unique re-definition of the *Nikkei 225* index in Japan. Most of these studies also estimate demand elasticity, which is far from infinitely negative. Although the above authors examine allegedly information-free events, a form of information signaling is still possible. For example, Loderer et al. (1991) point out that the decision to issue stock in regulated industry is often anticipated and could convey information about future cash flows. As a consequence, the authors have to control for the information content hypothesis. As another example, Greenwood's analysis of Nikkei 225 redefinition involved replacement of 30 small index stocks with 30 high-tech stocks, which also resulted in weight decrease for the remaining 195 securities. As this study involves changes to index constituents, information content type hypotheses have to be controlled for. As the competing hypotheses are not necessarily mutually exclusive (downward-sloping LRDC may still be responsible for a certain portion of abnormal returns), researchers have to attribute certain portion of abnormal returns to other explanations before estimating the demand's elasticity. In contrast, the information-free attribute seems to be most clearly achieved in KMM's samples, as well as in my samples.

The downward-sloping LRDC has found support in various studies examining S&P 500 Index changes. Shleifer (1986) is the first author to estimate moderately strong inelasticity of demand. He documents S&P 500 Index inclusion premia to be around 3%, which he attributes to the equal increase in demand from index tracking funds. Petajisto (2006) examines changes to *Russell 2000*, as well as the S&P 500, and concludes that significant Index inclusion premia are likely present[110]. Together with his other two papers (Petajisto 2004, 2005), he presents both theoretical and empirical evidence for the downward-sloping LRDC. His models incorporate recurring costs (associated with Index rebalancing), and examine two separate classes of investors (individual versus active money managers) to reconcile the large magnitude of the Index inclusion effect with asset pricing theory. His results suggest that the existing

[110] I should clarify the different conclusions reached by Biktimirov et al. (2004) and Petajisto (2006) who both examine changes in Russell 2000 index, however, conclude different permanence for inclusion effects, which supports different hypotheses. Both studies use similar time period to identify changes into Russell 2000 and both correctly distinguish among four different kinds of event stocks. Although the studies use different methodologies in estimating CARs, their results are actually very similar. While Petajisto reports CARs that appear to be significantly abnormal for up to 10 days subsequent to inclusion into the Russell 2000, his estimation procedure does not allow him to confirm the permanence during a longer event window. On the other hand, Biktimirov et al. (2004) examine longer time intervals around Russell 2000 index inclusions. While the authors confirm the significant CARs for both index additions and deletions during first two weeks around the event dates, they reject this permanence based on price reversals that take place during 15-40 trading days subsequent to index inclusions. Therefore, researchers must exercise caution when relying on conclusions by previous studies. While the results may be similar in nature, their interpretations could differ significantly.

equilibrium models underestimate the actual slopes of demand curves for Index changes, as well for stocks in the whole economy. Similar to Wurgler and Zhuravskaya, Petajisto does not address other potential explanations for the Index inclusion premia which suggests that his assessments of the demand elasticity may be overestimated. The Downward-sloping demand curve has not been uniformly supported by studies of S&P 500 changes across time. Generally, when researchers find weak or no supporting evidence for other hypotheses explaining the Index inclusion effect, the LRDC hypothesis is strengthened by the process of elimination.

5.3 The Event Dates and Methodology

5.3.1 Standard and Poor's adoption of Free-Float weights for the S&P 500

This chapter provides an in-depth analysis of two dates when Standard and Poor's implemented the Free-Float Index weighting changes in two stages: the Half-Float adjustments for each constituent were made on March 18, 2005 (hereafter Date1), and the following Full-Float adjustments on September 16, 2005 (hereafter Date2). I can confidently assume that this event is free of any information, as the adoption of a Free-Float weighting for S&P's U.S. equity indices was announced on March 1, 2004; one year before its actual implementation. Further announcements regarding the float implementation occurred on: August 12, 2004, when S&P announced a schedule of the Free-Float adjustment effects; on September 28, 2004, when S&P released the Free-Float adjustment weight methodology for the U.S. indices (hereafter Announcement Dates); and on October 15, 2004, when the S&P commenced calculation of two separate indices for each S&P U.S. Index (hereafter Date0). For visual illustration and more details, please refer to Exhibit-3 in the Appendices.

5.3.2 Variable Definition and Descriptive Statistics

I use Bloomberg to identify S&P 500 Index constituents at various event dates, C/R/S/P to obtain volume and Bid & Ask quotes data[111], and DataStream to determine the Index weight changes. DataStream provides Market-Capitalization values as well as Free-Float (FF) values for each Index constituent on each announcement and implementation dates (Date0-2). I follow Standard and Poor's methodology and analyze the magnitudes of firms' market value and Free-Float weights to determine the corresponding changes in the Index share gains & losses (see Appendices, Exhibit-4 for illustrative purpose). For example, Wal-Mart, a large firm with a low percentage of shares available to ordinary investors, experienced a large loss in the Index share. On the other hand, large firms with a negligible percentage of institutional holdings, such as Exxon, experienced a large gain in the Index share. I rank firms based on Index share changes and assign them into deciles. Schwartz (1988) argues that the spread widens at the time of substantial information change. Therefore, as a validity check, I analyze trading activity and Bid-Ask spreads to control for transaction costs and information effects.

DataStream defines Free-Float market capitalization as the number of shares in issue available to ordinary investors less the strategic holdings, multiplied by the latest available share price. Firm size is measured as the total number of shares outstanding, multiplied by the latest share price. Table 5-1, Panels A-D present data for top Index decile (N=50) gainers, other gainers (N=141), other losers (N=259) and top losers (N=50) on a date when the S&P switched a full float Index weights (Date2). The pre-definition weight represents firms' percentage shares in the S&P 500 Index as

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[111] Data reported by C/R/S/P represent closing values of Bid-Ask Spreads. McInish and Woods (1992) indicate the daily ending values may not be the best values to use, as the intraday pattern of Bid-Ask spreads resembles a reverse J-shaped pattern; i.e. the values are higher at the beginning and end of the trading day, suggesting that additional determinants of spread may need to be analyzed. For the purpose of this chapter, I only analyze the ending values of the Bid-Ask spread, and acknowledge this limitation.

of the event date based on the market values and half adjusted free-float values, while the post-definition weight represents firms' percentage shares in the S&P 500 Index as of the event date based on the fully adjusted free float values. Weight changes for Date1 and Date2 are calculated as follows:

$$\Delta Weight_{t=1} = \frac{(MV_{i,t} + FFMV_{i,t})/2}{\sum_{i=1}^{500}[(MV_{,ti} + FFMV_{i,t})/2]} - \frac{MV_{i,t}}{\sum_{i=1}^{500} MV_{i,t}}$$

$$\Delta Weight_{t=2} = \frac{FFMV_{i,t}}{\sum_{i=1}^{500} FFMV_{i,t}} - \frac{(MV_{i,t} + FFMV_{i,t})/2}{\sum_{i=1}^{500}[(MV_{i,t} + FFMV_{i,t})/2]}$$

where MV and FFMV are the market value and Free-Float market value of firm i at time t respectively. For example, a company with a 70% float factor is first adjusted to an 85% factor – half way from 70% and 100%, and then compared to a market value based weight. On Date2, the change in weight is determined as the difference between the Free-Float based weight compared to half-float Index weight. Lastly, Δ Decile indicates the firm movement (by decile) from previous date to an event date. For example, Δ Decile on Date2 reports by how many deciles did the extreme Index gainers and losers moved from Date1. Decile 1 represents top 50 Index gainers, while Decile 10 consists of top 50 Index losers. I do not tabulate the descriptive statistics for the half-float adjustment date (Date1) due to data limitation discusses in the next section.

Table 5-1 indicates that top Index gainers (Panel A) consist of larger firms than firms who lose the greatest share in the Index (Panel D). Furthermore, weights for Index gainers and losers are statistically and economically significant, which indicates that Index tracking funds have to buy and sell additional shares to rebalance their portfolios. Panels B and C indicate that the 400 remaining companies, that is those least affected by the S&P Event, are significantly smaller in terms of market capitalization than either the top 50 Index gainers or losers. This is of no surprise, as the S&P identifies gainers and losers as firms with the largest percentage change as of the overall S&P 500 weight.

One plausible argument for not finding excess returns around the S&P Event dates is the magnitude of the demand shock. If the magnitude is too small (not significantly different from average trading volume), noise in my data may give misleading results. For this reason, I compare the top extreme Index gainer / loser deciles. Compared to KMM, my top Index gainers on Date2 (Full-float adjustment) do indeed experience much smaller change in weight (ΔWeight/Pre-definition weight of 0.049 compared to KMM's 0.2872 for the Test Sample of 31 top TSE 300 gainers). However, KMM compare the top gainers to the remaining 261 firms, with a total change in weight of only -0.0291 (KMM Table I, page 899). I compare my top Index decile gainers, with an average weight change of 0.049, to top Index decile losers, with an average weight change of -0.214. The magnitude of weight changes is more comparable to that in the TSE event. I similarly analyze magnitudes for Date1.

5.3.3 Limitation of Data

Standard and Poor's uses their own database (Index Alert) and classification criteria to determine significant shareholders whose holdings are presumed to be for control, and are thus subject to float adjustments (see Exhibit-2 in the Appendices). The Free-Float data may consequently be different from those reported by DataStream, which considers strategic holdings to be those of insiders in excess of 5% of the total shares outstanding. Despite these differences, my final rankings are very similar to those reported by Standard and Poor's on September 28, 2004 (see Exhibit-4 in the Appendices). Furthermore, DataStream reports very low Free-Float values on Date1 compared to Index Alert; for that reason, I do not analyze in detail the descriptive statistics. However, DataStream's Free-Float values are more consistent with those reported by Index Alert on Date2. In this chapter, I examine both phases of the S&P Event (weight changes from Date0-Date1 and from Date1-Date2), and as a sensitivity analysis, I control for changes in Index weights based on the full-float adjustment only (weight changes from Date0-Date2).

The large changes in Free Float (FF) data between Half-float adjusted (Date1) to Full-float adjusted (Date2) weightings reported by DataStream signals that firms either heavily engaged in share repurchases from strategic holders[112], or that FF data may have been based on a different definition one year ago. It would be interesting to conduct an analysis of changes in capital structure (share repurchases) during the three implementation dates to test whether there has been significantly higher trading activity to minimize the impact of FF methodology on the "alleged" threat of downward-sloping LRDC[113]. However, I feel that it would be inadequate to examine the changes in capital structure in more detail, unless the Free-Float levels were obtained directly from Standard and Poor's Index Alert.

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[112] It is unlikely that firms (on average) experienced such a large magnitude of Free-Float changes. Some articles point out that share repurchase programs are announced as a result of an increased selling pressure that was forthcoming in 2005. However, such programs would only reduce the actively traded shares, not increase it. Furthermore, the reason for share repurchase programs announce by firms such as Wal-mart should be given a second thought. Firms repurchasing shares from ordinary [non-strategic] investors could theoretically offset the immediate decrease in demand shock; however, this action would also decrease the firms' actively traded shares and consequently their percentage share in the S&P 500 Index. This of course would trigger additional selling pressure from the Index tracking funds and would not accomplish the strategy to reduce the excess returns in the long-run.

[113] Non-tabulated results reveal that before Date1, the average FF values are quite low (around 50%). Between Date1 and Date2, there is a large shift of FF values back to their more credible levels (approaching 95% = 92,383 / 94,252). This alone indicates that firms do not engage in share repurchases to offset selling pressure from the Free-Float adjustment between Date1 and Date2. Based on decile changes in Table 5-1, more significant movements between deciles occur on Date2, for both Index gainers and losers. Because all firms increase their free float on average on Date2, it seems that the large changes in free-float are triggered by the desire to have the largest positive demand shock.

5.3.4 What Constitutes a Perfect Substitute?

My second test of the LRDC slope deals with the analysis of eligible substitutes for newly added stocks into the S&P 500 Index. As new Index additions during 1987-1999, I use sample of 230 firms identified by both Denis et al. (2003) and Wurgler and Zhuravskaya (2002) as "clean" additions (excluding additions resulting from mergers & acquisitions, spin-offs and name changes). For a period 2000-2004, I collect all Index additions from the Standards and Poors' website and search press releases in Factiva for announcement dates, as well as reasons for Index composition changes. My search results in 110 clean additions after eliminating 12 firms due to mergers & takeovers, and 14 due to spin-offs.

I follow a different methodology regarding the definition of a substitute for new Index additions. Unlike Wurgler and Zhuravskaya (2002), who examine the residual variance of a portfolio consisting of three firms matched on Industry, Size and B/M, I define "eligible" substitutes as firms that meet all Index inclusion criteria[114], and are not included in the Index, at the time of Index inclusion announcements. My matching procedure controls for size and industry (as in Wurgler and Zhuravskaya, 2002), as well as for financial viability and liquidity. I match industry on GIC codes (as opposed to SIC), which have been shown to better explain stock return comovements, as well as cross-sectional variations in valuation multiples (Bhojraj et al. 2003). Overall, I believe that using the S&P Index inclusion criteria effectively helps to select firms with similar risk. At each Index inclusion announcement date, I count the number of firms that satisfy all eight criteria, and should hence be considered by Standard and Poor's as potential candidates. Table 5-6 and Figure 5-2 report the frequencies of eligible substitutes for newly added firms into the S&P 500 Index during 1987-2004. I combine the frequencies of substitutes into groups with at least 31 observations, and examine the corresponding excess returns. I also control for

[114] For the complete set of Index inclusion criteria, see Exhibit-1 in the appendices.

various periods, as the magnitude of demand shock has been shown to increase over time (Wurgler and Zhuravskaya, 2002 and Morck and Yang, 2002). Dash (2002) estimates that in 2002, Index tracking investors held about 10% of S&P 500 Index value. If arbitrage is more effective with an increasing number of substitutes and the downward-sloping LRDC explains a significant portion of the Index inclusion premia, one should observe decreasing abnormal returns around Index inclusion announcement dates with the availability of substitutes. After controlling for the quality of substitutes, my results do not support this prediction[115].

5.4 Analysis and Results

Using the standard event methodology and market model, I follow Teoh et al. (1998) and compute the Market-adjusted (*CARM*) and Beta-adjusted (*CARB*), cumulative abnormal returns based on daily returns from the C/R/S/P database. The market return (Rm_t) is represented by the S&P 500 Index return. I follow the same definition of abnormal returns from previous chapters and obtain the cumulative abnormal returns from the following formulas, where $R_{i,t}$ is a firms *i's* return on day t and Rm_t is the market return, and $\hat{R}_{i,t}$ is the beta adjusted market return estimate obtained from regressions of firm returns on market returns represented by S&P 500:

$$CARM_t = \frac{\sum_{i=1}^{N}\left[\sum_{t=-1}^{t-2}(R_{i,t} - Rm_t)\right]}{N} \text{ and } CARB_t = \frac{\sum_{i=1}^{N}\left[\sum_{t=-1}^{t-2}(R_{i,t} - \hat{R}_{i,t})\right]}{N} \quad \ldots\ldots (1)$$

[115] A replication of Wurgler and Zhuravskaya (2002) is still an open avenue to pursue, but their sample section is not appropriate to analyze this hypothesis. The only contribution of replicating their analysis would be the new period 1989-2004, which has already been conducted by Petajisto (2006).

In Chapter 2, I have documented that abnormal trading volume associated with Index additions increases during one day prior to, and remains abnormally high for two days following, the effective inclusion date. Similarly to KMM, I analyze CARs during several weeks surrounding the S&P events and denote the week during which the weight implementations occurred as Week0.

5.4.1 Confirming no CARs between Top Movers based on Shift to Float Weights

In Table 5-2, I compare the weekly abnormal returns (both means and medians) of the S&P 500 Index companies most affected by the S&P's redefinition of the Index weightings on two event dates (Half and Full float adjustments). The Top (Bottom) Decile consists of firms with the largest demand increase (decrease) by the S&P 500 Index tracking investors. As evident from the table, none of the abnormal returns are statistically different from zero. When I compare the extreme weight gainers to extreme weight losers, both their market-adjusted, as well as beta-adjusted, abnormal returns are not statistically significantly different from each other. For the implementation date involving half-float adjustments, the mean market adjusted CAR during Week0 is -0.51% for the Top Decile. This return is not statistically different from -0.24% for the Bottom Decile (p-value 0.658). For the implementation date involving full-float adjustments, the mean market adjusted CAR during Week0 is 0.41% for the Top Decile. Again, this return is not statistically different from 0.06% for the Bottom Decile (p-value 0.427). Future CARs between the two deciles are further not significantly higher for the Top Decile firm gainers. The last two columns in Table 5-2 display the p-values of a Mann-Whitney two-sample median test[116],

[116] In this Chapter, I use the Wilcoxon-Mann-Whitney test of medians, which is the non-parametric version of the independent samples t-test and can be used when researchers do not assume that the dependent variable is a normally distributed interval variable. An alternative analysis using Kolmogorov-Smirnov test (which is sensitive to differences in both location and shape of the empirical cumulative distribution functions) shows very similar significance levels.

confirming the non-significance in median abnormal returns for the extreme deciles. The only significant difference in abnormal returns between deciles occurs during week 1, when S&P switched to full-float adjusted weightings. However, this sign of excess returns is opposite from what is predicted. During this period, top Index movers actually experienced negative abnormal returns, whereas Index losers showed positive returns. Non-tabulated results further indicate that the remaining 400 firms in deciles 2-9 (smaller and least affected firms) also experience similarly distributed abnormal returns around zero that are not statistically different from the extreme deciles' returns. For completeness, I inspect the abnormal returns on the three announcement dates, as well as returns on Date0 (when the S&P commenced calculation of two additional indices for each S&P U.S. Index). The non-tabulated results confirm that the cumulative abnormal returns are not statistically different between extreme deciles on any week surrounding the tested dates. These results are contrary to the downward-sloping LRDC as well as the competing Price Pressure and Information Content Hypotheses. To assure that I have correctly identified firms with the largest demand shocks, and to control for transaction costs or other information effects, I turn into analyzing the excess turnover and Bid-Ask spreads.

5.4.2 Excess Turnover Analysis

Similar to KMM, I expect a higher trading volume around the Free-Float implementation dates, as the Index tracing funds have to rebalance their holdings. Provided that S&P redefinition causes only temporary abnormal trading and contain no information, Bid-Ask spread should remain constant during the post-announcement and post-implementation dates. I use the procedure suggested by KMM to estimate the excess turnover for S&P 500 companies during one week prior, and several weeks following the implemented float weightings.

Table 5-3 compares weekly excess turnovers (means and medians) for S&P 500 companies surrounding the S&P's redefinition of the Index weightings on two implementation dates. Turnover is calculated as the ratio of weekly trading volume to the number of shares outstanding. Excess turnover is then calculated as the ratio of turnover in any week to the stock's normal weekly turnover (median weekly turnover in week -5 through week -2) less one. For example, excess turnover ratio of 0.3 indicates that the turnover in a particular week is 30% higher than the median turnover during week -5 through week-2[117]. The Top Decile (Decile1) represents firms with the largest demand increase by the S&P 500 Index tracking investors, while the Bottom Decile (Decile10) represents firms with the largest demand decrease. Other Firms are represented by Deciles 2-9. The implementation dates (half-float and full-float adjustments) occur during Week0. For the two implementation event dates, I document significant excess turnover in Week0. On Date 1, the mean weekly turnover for the two extreme deciles is 30% higher than normal, whereas on Date 2, firms' abnormal trading reaches 50% of their normal levels[118]. Both tests of means and medians indicate that excess turnovers of extreme deciles are significantly higher than excess turnovers of other firms. Since the event occurs in the middle of Week0, I do not expect the immediately surrounding weeks to have comparably high excess turnover. Consistent with the liquidity results from Chapter 2, Week0 seems to correctly capture the increased liquidity associated with Index fund rebalancing. Non-tabulated analysis of excess turnovers during the

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[117] Since the new Index weight implementation dates have been announced earlier than the weights in the TSE Event, I consider an alternative definition of normal weekly turnover. As a sensitivity analysis, I consider an earlier period from t-2 months to t-1 month prior to the Index weight implementation dates to determine the normal (median of weekly) turnover. I use this historical normal turnover to compute the excess turnover for a particular implementation dates. My results are robust to this definition of Excess turnover.

[118] For the Gainers group, volume increases because of buyer-initiated trades, whereas for the Losers group, volume changes result from seller-initiated trades. Furthermore, the abnormal volume is not very large as one would expect; this may indicate that the large portion of the portfolio rebalancing occurred before the implementation dates.

announcement dates again confirms no significant differences between extreme deciles and other firms during Week0.

Table 5-4 presents a more detailed analysis of weekly excess turnovers for individual deciles. Figures 5-1.A and 5-1.B then show the corresponding graphical comparison of these excess turnovers for S&P 500 companies surrounding the S&P's redefinition of the Index weightings on two implementation dates and by deciles. As is evident from this table, both Top index gainers (Decile 1) and losers (Decile 10) experience significantly larger excess turnovers than any other decile during the event week (significance results are not tabulated). This holds for both event dates, where more significant differences occur during the Full-Float adjustment event.

5.4.3 Bid-Ask Spread Analysis

To assure that the Standard and Poor's redefinition of Index weightings does not contain information or transaction cost effects, I also analyze changes in Bid-Ask spreads. I follow McInish and Wood (1992) and define the Spread as the absolute value of *2*(Ask-Bid)/(Ask+Bid)*, as I found limited instances when the Ask closing price was lower than the Bid closing price[119]. In their model dealing with how spreads respond to market generated and other public information, Glosten and Milgrom (1985) show that average spread from sources other than informational asymmetries declines over the average volume of trade. Therefore, if the redefinition of Index weightings increases S&P 500 popularity and thus leads to a higher trading volume, I would expect that the average Bid-Ask spread narrows subsequent to the implementation dates. On the other hand, if Index weightings redefinition is a source of information, I would expect the spread to widen during the announcement and/or

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[119] Average prices for Date 1 (March 18, 2005) are: Decile 1 (Gainers) - $42.83, Deciles 2-9 (Least affected firms) - $41.08 and Decile 10 (Losers) - $56.74. Average prices for Date 2 (September 16, 2005) are: Decile 1 - $49.66, Deciles 2-9 - $42.36 and Decile 10 - $52.78. Note that firms in Decile 1 on the on March 18, 2005 are not all included in Decile 1 on September 16, 2005.

implementation periods. Table 5-5 depicts the medians of Bid-Ask spreads for S&P 500 companies surrounding the S&P's redefinition of the S&P 500 Index weightings on the two implementation dates. Based on the univariate analysis, firms in the Decile 1 have the largest market values, followed by firms in Decile 10. The remaining, least affected, firms have smallest market capitalization values. This can explain the magnitude of Bid-Ask spreads reported in Table 5-5.

Similarly to KMM, I document that the Bid-Ask spreads do not change significantly during the twelve week period and that the Bid-Ask spreads do not increase significantly during the event weeks (Week0). These results hold for the most affected firms as well as for the comparison samples (remaining 400 least affected firms). Changes between each week's Bid-Ask spread between columns 1-2 and 1-3 are statistically significant (differences and their significance not tabulated). Since I scale the difference between Bid and Ask quotes by their corresponding sums, large firms with generally higher prices will exhibit relatively smaller spreads. The important result in this table, however, involves changes in the spread over time. The redefinition of Index weights is neither associated with permanent nor with temporary changes in Bid-Ask spreads. Differences in spread between weeks do not experience monotonic increases or decreases over time for either event date, suggesting that S&P's redefinition caused only a temporary increase in trading volume attributable to re-balancing by index funds, but neither transaction costs nor information effects are present in my results. Similar to findings of Chapter 3, this finding also suggests that the Index weight re-definition is not associated with any changes in investors' perception about firms' riskiness.

5.4.4 Sensitivity Analysis (The S&P Event)

This chapter presents evidence supporting market efficiency in terms of effective arbitrage and rejects the downward sloping LRDC for S&P 500 stocks. Contrary to

KMM results, I find that there are no permanent abnormal returns around the key announcement and effective dates for top and bottom deciles (Index weight gainers versus losers respectively). I validate these results through several sensitivity analyses. More specifically, I define alternative measures for cumulative abnormal returns, examine alternate time periods around Index weight changes, compare the abnormal returns for various top movers, and replicate the analysis using alternative weight rank changes based on a percentage change rather than the magnitude of a demand shock.

As my first robustness test, I define abnormal (excess) returns as the deviation of a stock's raw return from that of the market represented by value-weighted and equal-weighted market returns. The analysis of all CAR definitions reveals that they do not differ among the tested groups and in no case do I observe positive abnormal returns for firms in extreme deciles.

Secondly, as an alternative period for cumulating returns, I examine the excess returns during one day subsequent to the implementation date, three days around the implementation dates, and thirty days subsequent to the implementation dates (event windows analyzed by Denis et al. 2003). The results again reveal no significant differences amongst the different tested groups and no abnormal returns.

Thirdly, I analyze excess returns for top quintile, quartile and fiftieth percentile Index weight movers. I also examine CARs for the top ten weight changes identified by Standard and Poor's on September 17, 2004 as top Index weight gainers and losers (see Exhibit-4 in the Appendices). Non-tabulated results reveal that there are no significant excess returns for any definition of extreme Index movers. When I compare alternate groups with more than fifty observations (extreme quintiles or quartiles), I notice that the significance of the excess turnover disappears. For instance, although excess turnover for top 100 Index gainers is higher than that of 300 least affected firms, this result is not significant. My results further confirm that on the three announcement dates prior to Index re-weighting, no significant abnormal returns occurred. For all sensitivity tests, I control for various CAR definitions and magnitudes of extreme movers. Since demand elasticity is generally associated with trading volume, number of substitutes and firm size, the sensitivity tests control for these variables[120].

So far, I have only examined the Index weight movers based on the magnitude of change within the S&P 500 (see Exhibit-4 in the Appendices). Therefore, I discuss alternate rankings and group definitions based on the percentage change of demand shock. For example, Firm A with a market capitalization of $100 million may have experienced an increase in demand (by Index tracking funds) for its stock by $5 million. Since S&P 500's market capitalization is around $11 trillion, $5 million represents almost a zero percentage change based on S&P's definition of extreme Index movers. I therefore rank firms into extreme Index movers deciles based on the percentage change in demand shock from its original level. For example, previously mentioned Firm A would be ranked based on a 5% increase in demand shock, which could place the company into a higher decile than if it was ranked based on S&P methodology. Replicating all of the above tests, I find neither significant excess returns nor significant trading activity around the tested dates.

As a last sensitivity test, I completely omit Date1 (when the half-float adjustment took effect) and determine the rankings based on a change from a Market-Value based weight to a Free-Float based weight as of September 16, 2005 (compared to Free-Float based weights as of October 15, 2004). My rankings closely resemble those that are used in the tabulated analysis. I find again no significant differences in excess return between extreme Index movers. Overall, I feel confident in correctly

[120] Magnitude of available substitutes and its effect on demand elasticity is examined separately in Section 5.4.5

identifying firms with the largest demand changes for their shares based on the DataStream's definition of Free-Float.

As mentioned earlier, abnormal returns around Index inclusion dates have been mainly analyzed in a context of S&P 500 changes, assuming that Index inclusions convey no information signal by the S&P committee. When researchers find abnormal returns around Index inclusion announcement dates, several explanations apply. However, when there are no abnormal returns to be explained in a first place, this suggests that the U.S. market is efficient with respect to pricing those securities during Index re-weightings. Studies that have analyzed information-free events generally examined non-U.S. indices and stock exchanges, such as TSE 300 in Canada, Zürich Stock Exchange in Switzerland, or Japan's Nikkei 225. These indices are smaller than the S&P 500 (representing the U.S. market) and generally contain a smaller number of stocks with possibly higher arbitrage risk.

Differences between S&P 500 and TSX

To reconcile my findings with those by KMM, I comment on differences between TSX and S&P 500 that may have caused insignificant abnormal returns in the U.S. market. Since demand elasticity is generally associated with greater trading volume, larger firm sizes and number of substitutes, the S&P 500 Index with its significantly larger size, trading volume and more registered firms has likely more elastic demand for its stocks. Furthermore, a significantly larger percentage of S&P 500 firms (than TSX firms) have options listed, which further facilitates arbitrage activity. I have analyzed whether S&P 500 and TSX stocks have options traded on CBOE and Bourse de Montreal respectively. While over 90% of all S&P 500 have options traded, all firms in Decile 1 and Decile 10 have traded options. When I examine data from Bourse de Montreal Inc., I find that while about a quarter of all TSX firms have options traded, 85% of firms in the top decile have options traded. This suggests that although the arbitrage is not likely to work effectively for TSX firms (unaffected by the demand shock), the presence of options traded is not a likely explanation for the differences in abnormal returns for largest firms in TSX and S&P 500.

5.4.5 Confirming no CARs with Increasing Number of Substitutes

My final analysis of stocks' LRDC from a point of view of available substitutes turns the focus on the Index addition sample. I combine frequencies of "close" substitutes into groups with at least 31 observations and compare the resulting cumulative abnormal returns over time. I use the same definition of cumulative abnormal returns as is used in the first test; however, I examine different date intervals in order to be consistent with previous chapters. CAR 3 represents cumulative abnormal returns during ± 1 trading day around the Index inclusion announcement day [AD-1, AD+1], while CAR 33 (63) represents CAR from day -1 to day +31 (+61) around the Index inclusion announcement dates [AD-1, AD+31] (AD-1, AD+61). By examining these event windows, I am able to analyze the permanence of abnormal returns subsequent to announcement dates. Table 5-7 reports the mean CARs for various frequencies, and Figure 5-3 provides the graphical illustration of the same excess returns. Confirming the Index inclusion Effect, Table 5-7.A shows positive and permanent cumulative abnormal returns around Index inclusion announcement dates (firms with no close substitutes experience 5.14% CAR during three days surrounding Index inclusion announcement dates). At first, it seems that CARs are decreasing with the number of available substitutes; however, firms that have more than ten available substitutes experience higher excess returns (5.80%). If the LRDC is downward-sloping and this explains a majority of variation in inclusion premia, one would expect that the abnormal returns vary with the arbitrage risk (measured by number of available substitutes). Therefore, results in Table 5-7.A reject Hypothesis H_{3a}. To Analyze H_{5a}, I simply consider firms with at least one substitute, and compare the excess returns to those firms with no substitutes (results presented in Table 5-8). A closer examination reveals that firms with more than one substitute experience an average CAR3 of 4.72% (median 4.11%) returns that is not statistically different from average CAR3 of 5.14% (median 4.46%) for firms with no close substitutes. Based on results in Table 5-8, although all definitions of average CARs are higher for firms with no available substitutes, firms at least one available substitute have not significantly lower corresponding abnormal returns (based on both means and medians).

Assuming that a stock's demand is not perfectly elastic and its slope remains constant over time, increasing numbers of Index tracking funds cause a larger demand (supply) shock. As a result, abnormal returns may differ among time periods. I divide the sample into two groups based on different time periods; 1989-1999 (Table 5-7.B) and 2000-2004 (Table 5-7.C) to test H_{4a}. In Chapter 1, Table 1-1, I have demonstrated that cumulative abnormal returns do not substantially differ between these two time periods. When I control for the magnitude and quality of available substitutes between the two periods, I do not find uniformly decreasing CARs for firms with increasing number of substitutes in neither period. While all CAR definitions seems to be lowest for firms with 5-9 close substitutes during either period, CARs are significantly higher for firms with more than 10 close substitutes. Other non-tabulated results confirms that when firms are divided into only two groups (zero and more than one close substitutes) during individual periods CARs are not significantly lower for firms with at least one substitute, compared to firms with no substitutes. These results are again robust to a variety of definitions of excess returns, where I substitute value-weighted and equal-weighted for the S&P 500 return, and where I compute beta adjusted CARs based on the CAPM model. Since the increasing demand (supply) shock has no impact on CARs over time, these results again suggests that the stocks' demand is nearly perfectly elastic.

5.4.6 Alternative interpretations of LRDC's slope

Although I find support for high demand elasticity in this chapter, the results from the S&P Event could be interpreted from a different point of view and not completely reject the long-run downward sloping demand curve. Changes to S&P 500 Index constituents result in relatively larger demand shocks than changes of weightings within the S&P 500 Index. As indexing funds hold approximately 10% of the S&P's 500 outstanding shares, they have to purchase about 10% of the newly added firm's outstanding shares upon inclusion. The corresponding demand shock is therefore about 10% for an individual firm's outstanding shares. Index re-weightings for firms already in the S&P 500 also results in a demand shock, which is significantly smaller from when firms enter the Index. This is because the index tracking funds have to adjust their holdings of individual companies, rather than purchase a new company for their portfolio, and furthermore, because the Index re-weighting occurred in two phases. My alternative definition of decile rankings (definitions based on the percentage change of demand shock rather than absolute magnitude, discussed in Section 5.4.4) reveals that the average demand shock for the Top Decile firms is about 1.35% and 0.7% on Date1 and Date2 respectively. For the Bottom Decile firms, the average percentage demand shocks for the individual firm's outstanding shares are about -1.6% and -2.3% respectively. Since I compare the top Index weight changes to the bottom weight changes, the overall demand shock percentages are approximately 3% on both event dates. It is therefore possible that I have identified support for the elastic demand curve for smaller demand shocks, whereas downward-sloping demand curve may exist for large demand shocks. In comparison to KMM, however, the magnitudes of demand shocks associated with the S&P Event are comparable in size to demand shocks associated with the TSE Event.

Second, results presented in Section 5.4.5 may also not completely reject the downward-sloping demand curve. Even though the abnormal returns around Index additions do not vary with the number of close substitutes, the demand curve may still be downward-sloping; however, its impact is insufficient to explain the significant variation in the Index inclusion premia. As discussed in previous chapters, other hypotheses such as Liquidity, Certification or Information Content may be more strongly associated with Index inclusion premia.

5.5 Conclusion and Discussion:

This chapter contributes to the unresolved issue about the elasticity of the LRDC slope and its effect on the abnormal returns. In particular, I empirically test the slope of the long-run demand curves for the S&P 500 stocks using two separate analyses. First, I examine Standard & Poor's redefinition of S&P 500 weightings from market-based to free-float-based Index; an event that should be information-free. In particular, analyzing the S&P 500 Event that does not involve changes to its constituents, explanations such the Information content hypothesis should not be attributed to any observed abnormal returns. My first set of results involving S&P redefinition of Index weights contradicts the downward-sloping demand curve hypothesis. I find that there are no permanent abnormal returns around the key announcement and effective dates for firms with extreme changes in Index weights. These results are robust for a variety of alternative definitions of abnormal returns and their permanence. Similar to Kaul et al. (2000), I examine other factors such as excess turnover and changes in Bid-Ask spread. I find excess trading turnover around the proposed event dates, consistent with the rebalancing needs of index tracking funds, but document no changes in the bid-ask spreads, consistent with there being no information attached to re-weighting and no changes in transaction costs associated with the temporary excess trading.

Second, I examine the frequencies of eligible substitutes of newly added firms to the S&P 500 Index. I observe the usual abnormal returns attached to inclusion in the S&P 500, as documented by previous chapters. I then test whether these premia are inversely related to the number of available substitutes, as the Downward-sloping LRDC hypothesis would predict. My second set of results reveals that the abnormal returns are not significantly different for stocks with at least one available substitute. Furthermore, firms with an increasing number of substitutes do not experience monotonically decreasing Index inclusion premia. Since I have found no supporting evidence for the Information Content hypothesis in Chapters 3 and 4, the Downward-sloping LRDC may still partially contribute to the S&P 500 Index inclusion premia along with the most dominant Risk Reducing theories.

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5.7 Tables

Table 5-1: Free Float data and S&P 500 Index weights surrounding the S&P's newly proposed Index weights changes

DataStream defines free float market capitalization as the number of shares in issue available to ordinary investors less the strategic holdings multiplied by the latest available share price. Firm size is measures as the total number of shares outstanding multiplied by the latest share price. Panels A-D present data for top Index decile (N=50) gainers, other gainers (N=141), other losers (N=259) and Top (extreme) losers (N=50) on a date when the S&P switched a full float Index weights. Pre-definition weight represents firms' percentage shares in the S&P 500 Index as of the event date based on the market values and half adjusted free-float values, while Post-definition weight represents firms' percentage shares in the S&P 500 Index as of the event date based on the fully adjusted free float values. Change in Weights is computed using the following formulas:

$$\Delta Weight_{t=2} = \frac{FFMV_{i,t}}{\sum_{i=1}^{500} FFMV_{i,t}} - \frac{(MV_{i,t} + FFMV_{i,t})/2}{\sum_{i=1}^{500} [(MV_{i,t} + FFMV_{i,t})/2]}$$

where MV and FFMV are the market value and Free Float market value of firm i at time t respectively. Lastly, Δ Decile indicates the firm movement (by decile) from previous date to an event date. For example, Δ Decile on Date2 reports by how many deciles did the top and bottom Index movers changed from Date1. Decile 1 represents top 50 Index gainers, while Decile 10 consists of bottom 50 Index losers.

Table 5-1: Continued

	Mean	First Quartile	Median	Third Quartile
Panel A: Top Index gainers; Date: 09/16/05 - S&P switches to a full float adjustment (N=50)				
Firm size (market value, $million)	94,252	30,398	69,830	122,914
Free float (market value, $million)	92,383	30,378	68,510	120,498
Pre-definition weight, x 10^{-2}	0.864	0.281	0.639	1.140
Post-definition weight, x 10^{-2}	0.905	0.298	0.671	1.180
Δ Weight/Pre-definition weight	0.049	0.041	0.054	0.057
	(0.000)		(0.000)	
Δ Decile rank	-2.04	-3.00	0.00	0.00
Panel B: Other Index gainers; Date: 09/16/05 - S&P switches to a full float adjustment (N=141)				
Firm size (market value, $million)	13,765	6,250	10,664	16,626
Free float (market value, $million)	12,843	5,687	9,980	15,035
Pre-definition weight, x 10^{-2}	0.122	0.054	0.092	0.143
Post-definition weight, x 10^{-2}	0.126	0.056	0.098	0.147
Δ Weight/Pre-definition weight	0.035	0.015	0.029	0.057
	(0.000)		(0.000)	
Δ Decile rank	-1.33	-3.00	0.00	1.00
Panel C: Other Index losers; Date: 09/16/05 - S&P switches to a full float adjustment (N=259)				
Firm size (market value, $million)	12,021	4,377	8,572	14,896
Free float (market value, $million)	9,814	3,408	6,805	11,673
Pre-definition weight, x 10^{-2}	0.101	0.036	0.071	0.121
Post-definition weight, x 10^{-2}	0.096	0.033	0.067	0.114
Δ Weight/Pre-definition weight	-0.069	-0.088	-0.046	-0.027
	(0.000)		(0.000)	
Δ Decile rank	0.64	-1.00	1.00	2.00
Panel D: Top Index losers; Date: 09/16/05 - S&P switches to a full float adjustment (N=50)				
Firm size (market value, $million)	33,449	13,506	23,729	48,247
Free float (market value, $million)	24,742	8,049	15,989	39,772
Pre-definition weight, x 10^{-2}	0.270	0.100	0.179	0.409
Post-definition weight, x 10^{-2}	0.242	0.079	0.157	0.390
Δ Weight/Pre-definition weight	-0.214	-0.255	-0.134	-0.063
	(0.000)		(0.000)	
Δ Decile rank	2.30	0.00	1.00	3.00

Table 5-2: Weekly Abnormal Returns

This table compares weekly abnormal returns (Market Adjusted – CAR(M) and Beta Adjusted – CAR(B) from Equation 1) of the S&P 500 Index Companies most affected by the S&P's redefinition of the Index weightings on two event dates. Top (Bottom) Decile consists of firms with largest demand increases (decreases) by the S&P 500 Index tracking investors. The event date occurs in the middle of the Week0. The last four columns show the p-values from two-sample differences in means and medians tests (Wilcoxon-Mann-Whitney two-sample t-test).

Week	Period	Top Decile		Bottom Decile		Pr > |t| (mean diffs.) / Pr > |Z| (median diffs.)			
		CAR(M) (Market)	CAR(B) (Beta Adjusted)	CAR(M) (Market)	CAR(B) (Beta Adjusted)	CAR(M) Means	CAR(B) Means	CAR(M) Medians	CAR(B) Medians
W-1	09/03/05 - 15/03/05	0.69%	0.72%	0.64%	0.59%	0.922	0.820	0.811	0.719
W 0	**16/03/05 - 22/03/05**	**-0.51%**	**-0.48%**	**-0.24%**	**-0.31%**	**0.658**	**0.473**	**0.762**	**0.418**
W+1	23/03/05 - 30/03/05	0.08%	0.07%	0.05%	0.06%	0.945	0.750	0.995	0.847
W+2	31/03/05 - 06/04/05	-0.38%	-0.38%	-0.01%	0.00%	0.468	0.847	0.460	0.891
W+3	07/03/05 - 13/04/05	-0.19%	-0.19%	-0.57%	-0.59%	0.539	0.563	0.504	0.517
W+4	14/04/05 - 20/04/05	-0.09%	-0.06%	-0.34%	-0.42%	0.689	0.168	0.556	0.182
W+5	21/03/05 - 27/04/05	0.12%	0.12%	0.37%	0.42%	0.586	0.761	0.523	0.573
W+6	28/04/05 - 04/05/05	0.74%	0.72%	0.13%	0.18%	0.377	0.189	0.423	0.249
Date - March 18, 2005: S&P switches to a half float adjustment									
W-1	07/09/05 - 13/09/05	-0.61%	-0.61%	0.13%	0.12%	0.147	0.203	0.153	0.205
W 0	**14/09/05 - 20/09/05**	**0.41%**	**0.39%**	**0.06%**	**-0.11%**	**0.429**	**0.468**	**0.391**	**0.437**
W+1	21/09/05 - 27/09/05	-0.39%	-0.39%	0.57%	0.54%	0.028	0.039	0.031	0.032
W+2	28/09/05 - 04/10/05	0.42%	0.41%	-0.21%	-0.20%	0.256	0.515	0.262	0.556
W+3	05/10/05 - 11/10/05	0.19%	0.13%	-0.21%	-0.36%	0.393	0.434	0.278	0.335
W+4	12/10/05 - 18/10/05	0.31%	0.29%	0.22%	0.18%	0.887	0.613	0.861	0.576
W+5	19/10/05 - 25/10/05	0.14%	0.18%	0.42%	0.52%	0.672	0.962	0.595	0.917
W+6	26/10/05 - 01/11/05	0.15%	0.15%	0.25%	0.28%	0.879	0.865	0.851	0.877
Date - September 16, 2005: S&P switches to a full float adjustment									

Table 5-3: Excess Turnover for S&P 500 Companies

This table compares weekly excess turnovers for S&P 500 companies surrounding the S&P's redefinition of the Index weightings on the two event dates (Date1 and Date2). I follow KMM's methodology and calculate the Turnover as the ratio of weekly trading volume to the number of shares outstanding. Excess Turnover is defined as the ratio of turnover (weekly volume / number of shares outstanding) in any week to the stock's normal weekly turnover (median weekly turnover in week -5 through week -2) less one. For example, Excess Turnover of 0.3 indicates that the turnover in that week is 30% higher than the median turnover during week -5 through week-2. Top (Bottom) Deciles consist of firms with largest demand increases (decreases) by the S&P 500 Index tracking investors. Event date (half float and full float adjustments) occur during Week0.

Week	Period	Top/Bottom Deciles		Other firms		Difference	
		Means	Medians	Means	Medians	(Pr > |t| / Pr > |Z|)	
W-1	09/03/05 - 15/03/05	0.034	-0.038	0.042	-0.023	-0.008	-0.015
W 0	**16/03/05 - 22/03/05**	**0.301**	**0.207**	**0.200**	**0.122**	**0.101****	**0.085***
W+1	23/03/05 - 30/03/05	0.091	0.024	0.112	0.048	-0.021	-0.024
W+2	31/03/05 - 06/04/05	0.136	0.043	0.105	0.027	0.031	0.016
W+3	07/03/05 - 13/04/05	-0.014	-0.104	0.010	-0.074	-0.024	-0.030
W+4	14/04/05 - 20/04/05	0.305	0.204	0.316	0.249	-0.011	-0.045
W+5	21/03/05 - 27/04/05	0.104	-0.001	0.219	0.099	-0.115**	-0.100*
W+6	28/04/05 - 04/05/05	0.242	0.174	0.261	0.174	-0.019	0.000
Date - March 18, 2005: S&P switches to a half float adjustment							
W-1	07/09/05 - 13/09/05	0.211	0.083	0.194	0.101	0.017	-0.018
W 0	**14/09/05 - 20/09/05**	**0.553**	**0.345**	**0.383**	**0.272**	**0.170*****	**0.073*****
W+1	21/09/05 - 27/09/05	0.308	0.221	0.310	0.196	-0.002	0.025
W+2	28/09/05 - 04/10/05	0.368	0.253	0.267	0.173	0.101*	0.080*
W+3	05/10/05 - 11/10/05	0.365	0.260	0.352	0.260	0.013	0.000
W+4	12/10/05 - 18/10/05	0.471	0.309	0.339	0.246	0.132*	0.063*
W+5	19/10/05 - 25/10/05	0.620	0.440	0.504	0.456	0.116*	-0.016
W+6	26/10/05 - 01/11/05	0.581	0.410	0.536	0.454	0.045	-0.044
Date - September 16, 2005: S&P switches to a full float adjustment							

*, ** and *** represent significance from zero at 10%, 5% and 1% respectively (based on two independent sample t-test and Wilcoxon-Mann-Whitney test respectively).

Table 5-4: Weekly Excess Turnover (by Deciles)

This table compares weekly excess turnovers (means) for S&P 500 Companies surrounding the S&P's redefinition of the Index weightings on two event dates by deciles. This is a more detailed version of table 5-3. I follow KMM's methodology and calculate the Excess Turnover as the ratio of turnover (weekly volume / number of shares outstanding) in any week to the stock's normal weekly turnover (median weekly turnover in week -5 through week -2) less one. For example, Excess Turnover of 0.3 indicates that the turnover in that week is 30% higher than the median turnover during week -5 through week-2. Decile 1 represents firms with largest demand increases by the S&P 500 Index tracking investors while Decile 10 represents firms with largest demand decreases. Event date (half float and full float adjustments) occur during Week0.

WEEK	DECILE1	DECILE2	DECILE3	DECILE4	DECILE5	DECILE6	DECILE7	DECILE8	DECILE9	DECILE10
-1	0.064	0.011	-0.003	0.095	0.034	0.012	0.079	0.046	0.059	0.029
0	**0.340**	**0.221**	**0.189**	**0.231**	**0.159**	**0.232**	**0.257**	**0.133**	**0.177**	**0.261**
1	0.148	0.073	0.084	0.095	0.159	0.186	0.147	0.063	0.150	0.033
2	0.200	0.045	0.106	0.080	0.085	0.163	0.071	0.052	0.238	0.069
3	0.053	-0.048	-0.043	0.019	0.014	0.044	0.026	-0.079	0.139	-0.081
4	0.394	0.177	0.237	0.332	0.363	0.369	0.333	0.268	0.445	0.216
5	0.170	0.200	0.110	0.202	0.262	0.298	0.174	0.228	0.274	0.037
6	0.229	0.269	0.118	0.343	0.317	0.345	0.182	0.205	0.298	0.255

Date - March 18, 2005: S&P switches to a half float adjustment

WEEK	DECILE1	DECILE2	DECILE3	DECILE4	DECILE5	DECILE6	DECILE7	DECILE8	DECILE9	DECILE10
-1	0.189	0.107	0.132	0.085	0.202	0.316	0.153	0.269	0.279	0.235
0	**0.424**	**0.357**	**0.417**	**0.359**	**0.324**	**0.369**	**0.413**	**0.372**	**0.397**	**0.691**
1	0.281	0.312	0.344	0.412	0.231	0.297	0.276	0.300	0.308	0.337
2	0.291	0.276	0.269	0.357	0.215	0.288	0.222	0.227	0.281	0.451
3	0.302	0.328	0.303	0.400	0.321	0.370	0.364	0.314	0.417	0.434
4	0.393	0.371	0.367	0.310	0.274	0.314	0.408	0.306	0.365	0.557
5	0.587	0.497	0.528	0.507	0.421	0.554	0.493	0.465	0.571	0.655
6	0.531	0.537	0.547	0.580	0.550	0.524	0.609	0.400	0.546	0.636

Date - September 16, 2005: S&P switches to a full float adjustment

Table 5-5: Bid-Ask Spread Analysis

This table depicts Bid-Ask spreads for S&P 500 companies surrounding the S&P's redefinition of the S&P 500 Index weightings on two event dates, on which the redefinition changes took place. B-A spread is calculated as the absolute value of *2*(Ask-Bid)/(Ask+Bid)*. Top (Bottom) Decile consists of firms with largest demand increases (decreases) by the S&P 500 Index tracking investors. The event date occurs in the middle of the Week0.

Week	Period	1 Top Decile Medians	2 Bottom Decile Medians	3 Other Firms Medians	1 Average W-5;W-1 W+1;W+5	2 Average W-5;W-1 W+1;W+5	3 Average W-5;W-1 W+1;W+5
W-5	08/02/05 - 14/02/05	0.000456	0.000546	0.000660			
W-4	15/02/05 - 22/02/05	0.000503	0.000593	0.000753			
W-3	23/02/05 - 01/03/05	0.000534	0.000521	0.000678	0.000490	0.000568	0.000697
W-2	02/03/05 - 08/03/05	0.000498	0.000614	0.000693			
W-1	09/03/05 - 15/03/05	0.000461	0.000564	0.000702			
W 0	16/03/05 - 22/03/05	0.000493	0.000548	0.000754			
W+1	23/03/05 - 30/03/05	0.000573	0.000679	0.000761			
W+2	31/03/05 - 06/04/05	0.000526	0.000533	0.000679			
W+3	07/03/05 - 13/04/05	0.000673	0.000646	0.000777	0.000579	0.000630	0.000760
W+4	14/04/05 - 20/04/05	0.000477	0.000579	0.000763			
W+5	21/03/05 - 27/04/05	0.000644	0.000714	0.000818			
W+6	28/04/05 - 04/05/05	0.000649	0.000681	0.00830			
Wilcoxon signed rank sum test (post vs. pre):							
(Average W+1; W+5 versus W-5; W-1)				Pr > |M|	0.302	0.163	0.430
Date - March 18, 2005: S&P switches to a half float adjustment							
W-5	09/08/05 - 15/08/05	0.000519	0.000496	0.000614			
W-4	16/08/05 - 22/08/05	0.000471	0.000519	0.000573			
W-3	23/08/05 - 29/08/05	0.000474	0.000575	0.000608	0.000461	0.000515	0.000588
W-2	30/08/05 - 06/09/05	0.000474	0.000481	0.000623			
W-1	07/09/05 - 13/09/05	0.000369	0.000504	0.000521			
W 0	14/09/05 - 20/09/05	0.000440	0.000654	0.000668			
W+1	21/09/05 - 27/09/05	0.000530	0.000461	0.000594			
W+2	28/09/05 - 04/10/05	0.000509	0.000554	0.000612			
W+3	05/10/05 - 11/10/05	0.000463	0.000544	0.000685	0.000509	0.000510	0.000635
W+4	12/10/05 - 18/10/05	0.000460	0.000458	0.000635			
W+5	19/10/05 - 25/10/05	0.000581	0.000533	0.000648			
W+6	26/10/05 - 01/11/05	0.000643	0.000614	0.000731			
Wilcoxon signed rank sum test (post vs. pre):							
(Average W+1; W+5 versus W-5; W-1)				Pr > |M|	0.335	0.562	0.144
Date - September 16, 2006: S&P switches to a full float adjustment							

Table 5-6: Frequencies of Eligible Substitutes

This table reports the frequencies of eligible (close) substitutes for newly added firms into the S&P 500 Index during 1987-2004. As eligible substitutes, I consider firms that satisfy all Index inclusion criteria at the Index inclusion announcement dates. For example, there were 107 additions to the S&P 500 Index for which there were no close substitutes.

NOS	*Frequency*	*NOS*	*Frequency*	*NOS*	*Frequency*	*NOS*	*Frequency*
0	107	12	11	24	0	36	0
1	45	13	3	25	0	37	0
2	31	14	14	26	1	38	0
3	18	15	4	27	1	40	0
4	14	16	8	28	2	41	1
5	4	17	6	29	1	42	0
6	9	18	0	30	3	43	0
7	7	19	5	31	1	44	0
8	6	20	4	32	1	45	0
9	6	21	4	33	1	46	1
10	2	22	2	34	1	47	0
11	10	23	1	35	0	48	1

Table 5-7: Excess Returns Analysis

Table 5-7.A reports cumulative abnormal returns (CARs) for firms with various numbers of eligible (close) substitutes (NOS) at the time of Index inclusion announcement dates. Each category has at least 31 observations. CAR3 represents three day returns around the Index inclusion announcement dates (AD). CAR30 and CAR60 represent returns for 30 and 60 days subsequent to CAR3 event window respectively. CAR33 and CAR63 represent returns for 30 and 60 days respectively subsequent and including the CAR3 event window. Table 5-7.B and 5-7.C compare CARs for various levels of substitutes around Index inclusion announcement dates during 1987-1999 and 2000-2004 respectively.

5-7.A

NOS	CAR3	CAR30	CAR33	CAR60	CAR63	n
0	5.14%	1.20%	6.43%	2.32%	7.70%	107
1	4.46%	-1.40%	2.83%	0.77%	5.04%	45
2	5.14%	-0.57%	4.53%	-1.69%	3.19%	31
3-4	3.65%	5.67%	9.31%	3.20%	6.76%	32
5-9	2.85%	-1.62%	1.05%	-4.26%	-1.81%	32
10-14	5.80%	2.16%	7.69%	5.38%	10.92%	40
>=15	5.76%	-0.96%	4.60%	0.90%	6.39%	49

5-7.B

NOS	CAR3	CAR30	CAR33	CAR60	CAR63	n
0	4.45%	0.68%	5.17%	2.85%	7.57%	86
1	4.36%	-0.44%	3.78%	0.30%	4.40%	41
2	4.52%	1.45%	6.12%	0.80%	5.43%	25
3-4	4.80%	4.17%	9.01%	1.35%	6.20%	22
5-9	3.79%	-3.77%	-0.24%	-6.84%	-3.40%	16
10-14	8.37%	1.02%	9.06%	2.89%	10.91%	19
>=15	7.61%	-2.63%	4.57%	-5.83%	1.29%	21

5-7.C

NOS	CAR3	CAR30	CAR33	CAR60	CAR63	n
0	7.97%	3.32%	11.58%	0.14%	8.21%	21
1	5.50%	-11.17%	-6.81%	5.65%	11.60%	4
2	7.72%	-8.95%	-2.10%	-12.10%	-6.13%	6
3-4	1.12%	8.98%	9.96%	7.29%	7.99%	10
5-9	1.91%	0.53%	2.34%	-1.68%	-0.22%	16
10-14	3.47%	3.19%	6.44%	7.63%	10.93%	21
>=15	4.37%	0.30%	4.63%	5.94%	10.23%	28

Table 5-8: Excess Returns Analysis

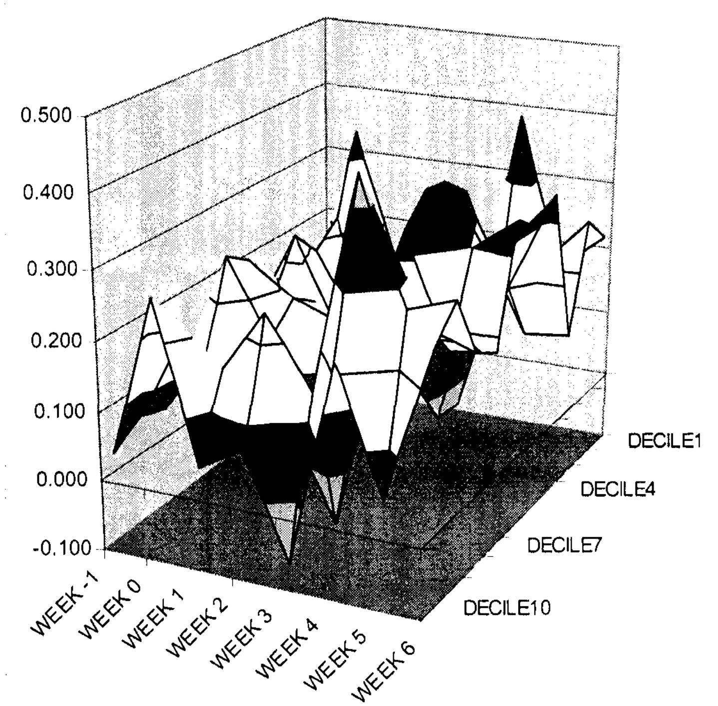
Table 5-8 compares CARs between firms with no substitutes and at least one substitute available at the time of Index inclusion announcement dates. Test in means is based on a two-sample t-test whereas the test of medians is based on the Mann-Whitney two-sided t-test. CAR3 represents three day returns around the Index inclusion announcement dates (AD). CAR30 and CAR60 represent returns for 30 and 60 days subsequent to CAR3 event window respectively. CAR33 and CAR63 represent returns for 30 and 60 days respectively subsequent and including the CAR3 event window.

	1 Means NOS=0	2 Medians NOS=0	3 Means NOS>=1	4 Medians NOS>=1	1-3 Means Pr>|t|	2-4 Medians Pr > |Z|
CAR3	5.14%	4.46%	4.72%	4.11%	0.545	0.734
CAR30	1.20%	0.62%	0.39%	0.03%	0.604	0.586
CAR33	6.43%	5.54%	4.94%	4.55%	0.371	0.562
CAR60	2.32%	-0.27%	0.91%	1.43%	0.557	0.811
CAR63	7.70%	5.62%	5.39%	6.07%	0.364	0.965
n	107	107	229	229		

5.8 Figures

Figure 5-1: Figure 5-1.A and 5-1.B compare weekly excess turnover for S&P 500 Companies surrounding the S&P's redefinition of the Index weightings on two event dates by deciles. I follow KMM's methodology and calculate turnover as the ratio of turnover in any week to the stock's normal weekly turnover (median weekly turnover in week -5 through week -2) less one. Decile 1 represents firms with largest demand increases by the S&P 500 Index tracking investors while Decile 10 represents firms with largest demand decreases. Event date (half float and full float adjustments) occur during Week0. This figure serves as a graphical illustration of Table 5-4.

5-1.A: March 18, 2005 - S&P switches to a half float adjustment



5-1.B: September 16, 2005 - S&P switches to a full float adjustment

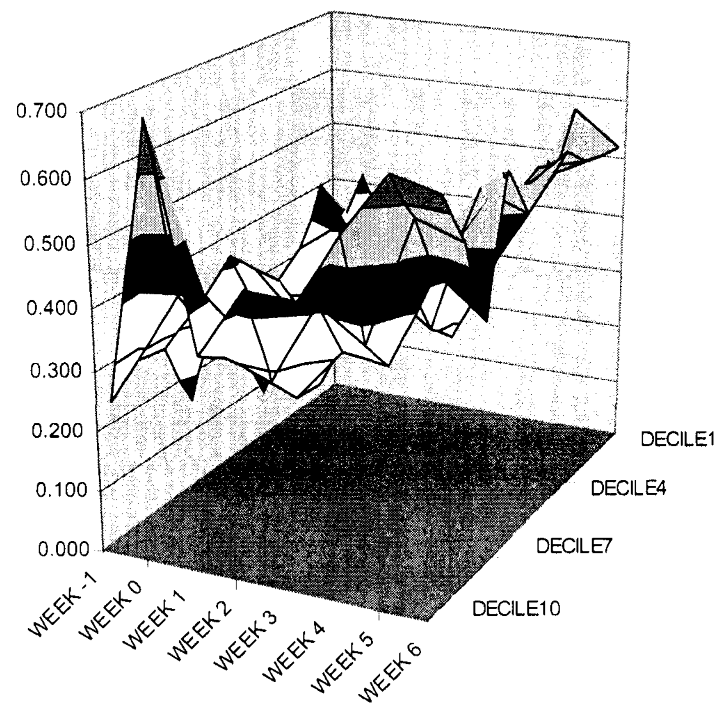


Figure 5-2

Figure 5-2.A illustrates the frequencies of eligible substitutes for newly added firms into the S&P 500 Index during 1987-2004. Figure 5-2.B combines frequencies from Figure 5-2.A into categories with at least 31 observations and shows the corresponding frequencies. This figure serves as a graphical illustration of Table 5-6.

Figure 5-2.A

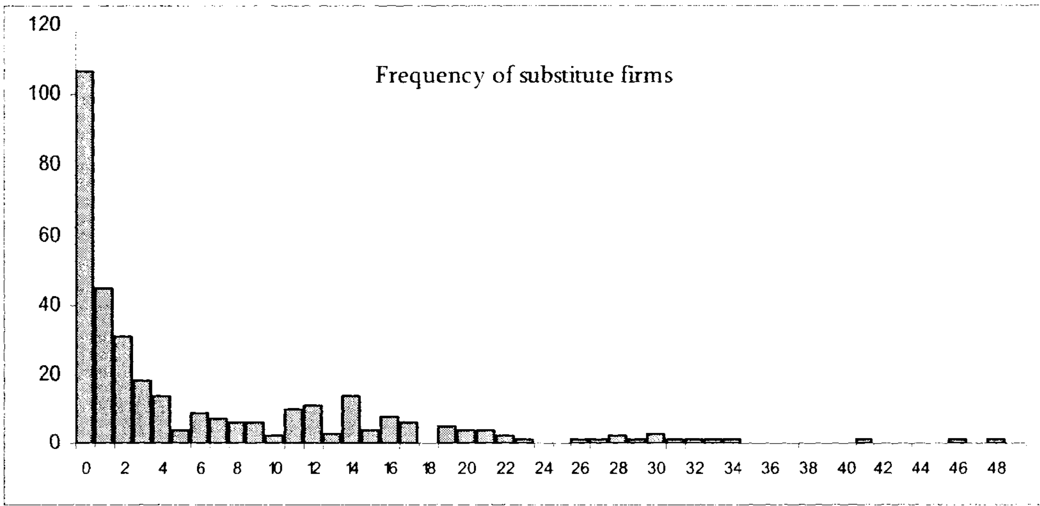


Figure 5-2.B

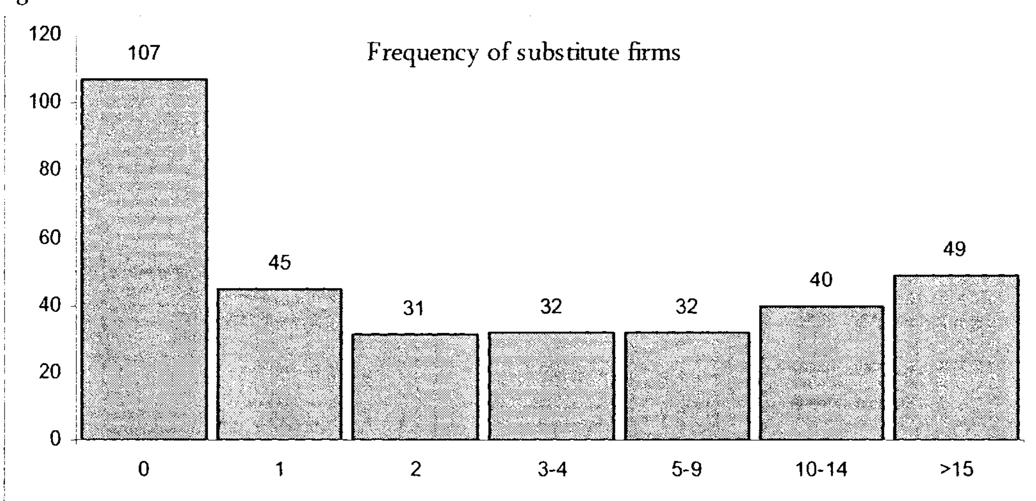
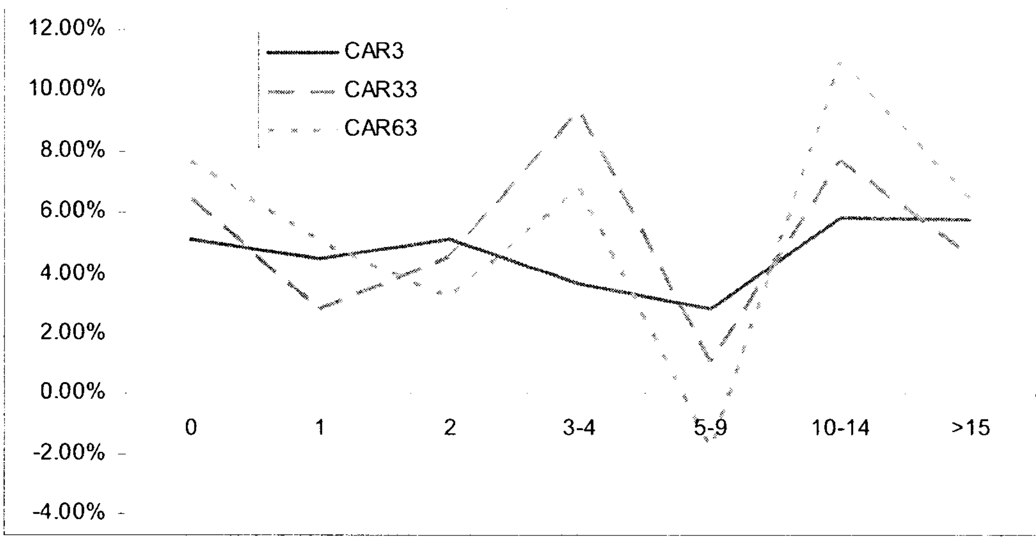


Figure 5-3: Cumulative Abnormal Returns

This figure depicts the Cumulative Abnormal Returns (CARs) surrounding the Index inclusion announcement dates (AD) for each category in Table 5-7.A during 1987-2004. Each category of eligible substitute numbers has at least 31 observations.



Using the standard event methodology and market model, the market adjusted, cumulative abnormal returns are computed using daily returns from C/R/S/P database. The market return ($Rm_{i,t}$) is represented by the S&P 500 Index return. CAR3 represents cumulative abnormal return during ± 1 trading day around the Index inclusion announcement day [AD-1, AD+1], while CAR 33 (63) represents CAR from day -1 to day +31 (+61) around the announcement date [AD-1, AD+31] (AD-1, AD+61). The abnormal returns are obtained from the following formula, where $R_{i,t}$ is a firms *i's* return on day t and $Rm_{i,t}$ is the market return represented by S&P 500:

$$CARM_t = \frac{\sum_{i=1}^{N}\left[\sum_{t=-1}^{t-2}(R_{i,t} - Rm_t)\right]}{N}$$

Chapter 6

Conclusions and Discussion

This chapter summarizes the findings of the four body chapters, how they relate to each other, and to accounting and finance in general. The S&P 500 index return is an ideal proxy for the total market, used primarily as a performance benchmark in evaluating portfolios' performance and in computing unexpected returns. Accordingly, understanding Index inclusion premia is important to both practitioners as well as academics. This thesis helps explain and understand the Index inclusion premia by challenging previous findings, offering new explanations, contrasting hypotheses, and evaluating the degree to which they compete or complement one another. I highlight the most significant explanation of the Index inclusion effect as well as describe limitations regarding the data and methodology.

Previous chapters have provided an overview of existing hypotheses that have been empirically supported by past researchers in explaining the Index inclusion premia. My analysis contributes to capital market research in finance, accounting, and economics. My results suggest that the downward-sloping demand curve does not play the major role in explaining the inclusion premia. Furthermore, it appears that long-run abnormal returns can be rationally justified by implicit changes in firm's discount rates subsequent to Index inclusion. I further contribute by assessing whether Index inclusion announcements convey any significant information about future cash flows. Using widely established accounting methodology, this thesis examines the price-return associations, earnings informativeness and how earnings management practices explain the firms' future performance and the relationship to index inclusion.

Summary of Results

All four body chapters provide evidence that the *Price Pressure Hypothesis* is not a valid explanation for the abnormal returns around the Index inclusion announcement dates (AD). For various sample sizes, I document significant abnormal returns that persist for at least sixty day subsequent to AD. In the second chapter however, I find that abnormal returns around the ED dates when firms are effectively added to the Index reverse in the short term. This finding does not refute the remaining hypotheses; however, since they all predict permanent returns which can be observed at the announcement date. The magnitude of the demand shocks measured by trading varies around AD and ED, with significantly larger trading at both dates, but the largest trading volume is observed around ED; whereas the abnormal returns are larger and permanent at AD and smaller and temporary at ED. Thus, the Price pressure hypothesis applies best to ED, leaving the other hypotheses to explain the permanent initial Index inclusion effect around AD.

The *Downward-sloping LRDC Hypothesis*, and its impact on the inclusion premia, is implicitly tested in Chapters 2, 3 and 4 as a competing or complementary explanation to other hypotheses, and is explicitly tested in Chapter 5. Although this hypothesis has been supported by many researchers, I provide evidence that the slope of stocks' demand curves does not explain a significant portion of the abnormal returns contrary to the prediction of the long-run downward sloping demand curve hypothesis[121]. Chapter 5 examines a unique set of information-free event dates, which

[121] Note that my findings do not reject the downward-sloping demand curve; rather, the slope of the demand curve is not responsible for the premia. My results indicate that the long-run demand curve could be either almost perfectly elastic or downward-sloping, and that other factors are responsible for

result in significant demand shocks that are not associated with abnormal returns. In the same chapter, I further show that firms with varying levels of number of substitutes (an underlying condition for the downward-sloping demand curve to hold) do not experience significantly different abnormal returns.

The *Information Content Hypothesis* posits that inclusion premia are related to previously non-priced improved future firm performance and is examined in Chapters 3 and 4. The evidence in the third chapter, however, suggests that Index inclusion is driven primarily by variables that are publicly available at the Index inclusion announcement dates, rather than by future oriented information that is private. This suggests that it is unlikely that the S&P possesses material, non-public information about firms' future performance; and if so, such information is not the dominant factor in selecting the new Index members. Chapter 4 extends this result further and attributes the better future performance observed in Denis et al. (2003) to earnings manipulation rather than to a true economic improvement. Not surprisingly, I do not observe a positive relation between the positive abnormal returns at Index inclusion and future performance variables. Overall, I conclude that the inclusion of firms in the S&P 500 Index does not contain information about their future performance. Therefore, none of these three above mentioned hypotheses is sufficient explanation for permanent positive abnormal returns observed at the inclusion announcement.

The *Risk Reducing Hypotheses* are examined in Chapter 2 and appear to be the most important explanations for the Index inclusion premia. I document abnormal trading activity around both AD and ED, where the post-ED trading volume is significantly higher than the pre-AD volume. In terms of reduced information asymmetry, I find a decrease in quoted relative Bid-Ask spread subsequent to index

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the premia. I criticize empirical research that solely attributes the abnormal returns to the downward-sloping demand curve and then uses the returns to estimate the slope of the demand curve.

inclusion and relate the corresponding change in spread to long-run abnormal returns. Overall, the initial market reaction (CAR3) appears to be driven by the three-day corresponding volume, is significantly related to its long-run persistence (CAR33) and but not related to CAR63. Both measures of the permanent abnormal Index inclusion premia (CAR33 and CAR63) appear to be driven by the average decreases in subsequent Bid-Ask spreads relative to pre-announcement Bid-Ask spreads. This decrease in spread may be attributable to either lower direct trading costs or a reduction in perceived information asymmetry. These in turn may be attributable to various factors such as greater institutional interest (and consequent increased market scrutiny), a richer information environment, or higher liquidity due to higher trading volume.

Is S&P 500 a Brand Name? An Alternative for Future Research

As mentioned in Chapter 2, Chen et al. (2004) suggest that increased investor awareness most likely explains the Index inclusion premia. The authors' reference to investor awareness as a consequence of Index inclusion relates to both changes in future cash flows as well as to changes in required rate of return. One of their explanations for a price response from a lower required rate of return is derived from increased awareness in Merton's (1987) model of market segmentation[122]. According to this model, inadequately diversified investors require a higher premium for the nonsystematic risk they bear, as they are not aware of all stocks in the market. Once a company becomes part of S&P 500, investors are more aware, increase their breath of ownership and require a lower premium due to increased diversification. It is highly unlikely, however, that prior to Index inclusion, investors would not be aware of

[122] Findings of Easley and O'Hara (2004) are similar to Merton's model. The lower cost of capital does not require the unpalatable assumption of investors being unaware that a stock exists; rather, the discount rate depends simply on the proportion of private versus public information, with public information presumably increasing with analyst following, via S&P inclusion.

companies with over $3 billion in market capitalization traded on major US exchanges. Branding may offer a more plausible explanation with the same consequences as Merton's model.

Despite being aware of all large firms, investors may prefer an S&P 500 firm over another firm for its prestige or status. One does not have to go far to see how people perceive different brand names or changes to rankings. Higher prestige attached to a label of "quality" can be found in areas other than financial indices. An interesting analogy to the Index inclusion effect involves a prestige (brand) of wine rankings. For example in wine industry, Château Mouton Rothschild, regarded as one of the world's greatest wines, was elevated to back to its first growth[123] status in 1973 after decades of intense lobbying by its powerful and influential owner. This was the only change since the original 1855 re-classification. Consequently, prices of Château Mouton Rothschild adjusted accordingly to reflect the higher status of the finest wine class, despite the absence of change in its manufacturing process or number of produced wine barrels; prices rapidly increased when the wine was already calmly aging in bottles.

Marketing and psychology literature suggests that brand names affect demand. Sullivan (1998) provides summary of studies analyzing the brand name phenomenon. He points out that a brand name influences product demand by providing information about quality and creating an appealing image. Using twin cars (identical cars with different label), he shows that some consumers would pay more for a Mitsubishi than a physically identical Dodge, as Mitsubishi has a more appealing brand image. Brand awareness makes it easier for consumers to identify products with

[123] Background Note: "The Bordeaux Classification of 1855 came about when wine brokers were asked to create a classification of the wines of Bordeaux. They only included the top wines of the Medoc. The rating was based (mostly) on the price that the wines were bringing in the market and it divided these top wineries into 5 classifications. These classifications are known as 'Growths'. The only change in this classification of these wineries since that time has been the elevation of Château Mouton Rothschild in 1973 from 2nd Growth to 1st Growth status." Information obtained from: http://www.cellarnotes.net/medoc_classification.htm

well-known brand names. In fact, Wernerfelt (1990) proposes that different brands appeal to a consumer's sense of individuality and make consumers feel as if they belong to a particular social group. In Klein and Leffler's (1981) study, producers invest in brand names to commit to selling high-quality goods, since consumers are willing to pay a price premium. Experimental research in psychology shows that brand names help consumers evaluate good and services and reduce the cognitive effort required to make buying decisions (Boush et al. 1987).

The Index inclusion effect could be justified if investors indeed consider S&P as a brand name and make inferences about the unobservable quality of such stocks. As an alternative to the awareness explanation by Chen et al. (2004), the reader should consider the possibility that the increase in the number of shareholders and the breath of institutional ownership subsequent to Index inclusion could result from brand preference (for which investors are willing to pay higher premium) rather than awareness of a share existence. Neither explanation requires the downward-sloping demand curve as a necessary condition for the abnormal returns to exist. Both Merton's awareness and the brand name explanations are appealing, as they both allow the Index inclusion announcements to be considered information-free events. Similar to the wine example, the change of membership alone could significantly affect stock prices.

6.1 References

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Appendices

Exhibit-1: S&P 500 Index Inclusion Criteria

Firms considered for inclusion into the S&P 500, S&P MidCap 400 and S&P SmallCap 600 must fulfill all of the following publicly available criteria. For more details, please visit Standard and Poors website: www.indeces.standardandpoors.com. Firms satisfying all criteria are included in the Control sample. The ratio of Eligible firms to Added firms is approximately five to one.

Additions to the S&P 500, S&P MidCap 400 and S&P SmallCap 600

(US) *"U.S. companies."*

- For my control sample, I examine only US companies that trade on NYSE, AMEX and NASDAQ and are not included in the S&P 500 Index (ZLIST=04, 05, 25. This code, available from Compustat, identifies the major exchange on which the company's common stock is traded.

(LIQ) *"Adequate liquidity and reasonable per-share price (the ratio of annual dollar value traded to market capitalization should be 0.3 or greater). Very low stock prices can affect a stock's liquidity".*

- Using CRSP monthly data, I compute a firm's liquidity as a product of end period monthly price and volume, summed over the twelve months prior to the Index inclusion announcement month. I divide this annual trading dollar volume by a firm's size and examine firms whose liquidity ratio exceeds 0.3.

(SIZE) *"Market capitalization of $4 Billion or more for the S&P 500, $1 billion - $4 Billion for the S&P MidCap 400 and $300 million - $1 billion for the S&P SmallCap 600. These ranges are reviewed from time to time to assure consistency with market conditions".*

- Using CRSP monthly data, I compute a firm's size as a product of end period monthly price and shares outstanding, summed over the twelve months prior to the Index inclusion announcement month. I examine firms whose size exceeds $4 Billion.

(VIAB) *"Financial viability, usually measured as four consecutive quarters of positive as-reported earnings. As-reported earnings are GAAP Net Income excluding discontinued operations and extraordinary items".*

- I use the Compustat quarterly data to isolate firms who experienced four consecutive quarters of positive, as reported earnings, where the reported earnings are computed as Net Income (item #69) – Extraordinary Items & Discontinued Operations (item #26).

(FLOAT) *"Public float of at least 50% of the stock".*

- This criterion closely corresponds to liquidity. High liquidity generally results from a high share public float. Using ShareWorld database, I have verified that firms' public floats in the Control sample exceeds 50%[124].

(IND) *"Maintaining sector balance for each index, as measured by a comparison of the GICS sectors in each index and in the market, in the relevant market capitalization ranges".*

- I use the two-digit Global Industry Classification Standard – current codes from the Compustat database, to examine an industry from which an S&P 500 firm was removed 2-digit GIC classification is quite broad and I assume that a firm considered for Index inclusion belongs to the same industry from which another S&P 500 Index firm was removed.

(IPO) *"Initial public offerings (IPOs) should be "seasoned" for 6 to 12 months before being considered for addition to indices".*

- I effectively control for this criterion by removing observations with less than one year of data. I require at least one year of observations prior to the Index inclusion announcement date to compute the beta adjusted CARs.

(TYPE) *"Operating company and not a closed-end fund, holding company, partnership, investment vehicle or royalty trust. Real Estate Investment Trusts are eligible for inclusion in Standard & Poor's U.S. indices".*

- Using the CRSP database, I consider firms whose securities are ordinary common shares and Real Estate Investment Trusts (SHRCD # 10, 11, 12 and 18 from CRSP). This procedure removes Securities such as Certificates, ADRs, SBIs and Closed-end Funds.

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[124] For more details about the Float definition, see Exhibit-2

Exhibit-2: S&P 500 Float Adjustment Definitions

"Standard & Poor's defines three groups of shareholders whose holdings are presumed to be for control and are subject to float adjustment. Within each group the holdings are totaled. In cases where holdings in a group exceed 10% of the outstanding shares of a company, the holdings of that group will be excluded from the share count to be used in index calculations. Calculation accuracy will depend on the underlying data; however, investable weight factors will be published to the nearest one percent of share outstanding"

(Source: *Standard and Poor's*, Float Adjustment FAQ, September 28, 2004).

The three groups are:

- Holdings of stock in one corporation by another corporation, or by leveraged buyout groups, venture capital firms, strategic partners or private equity firms

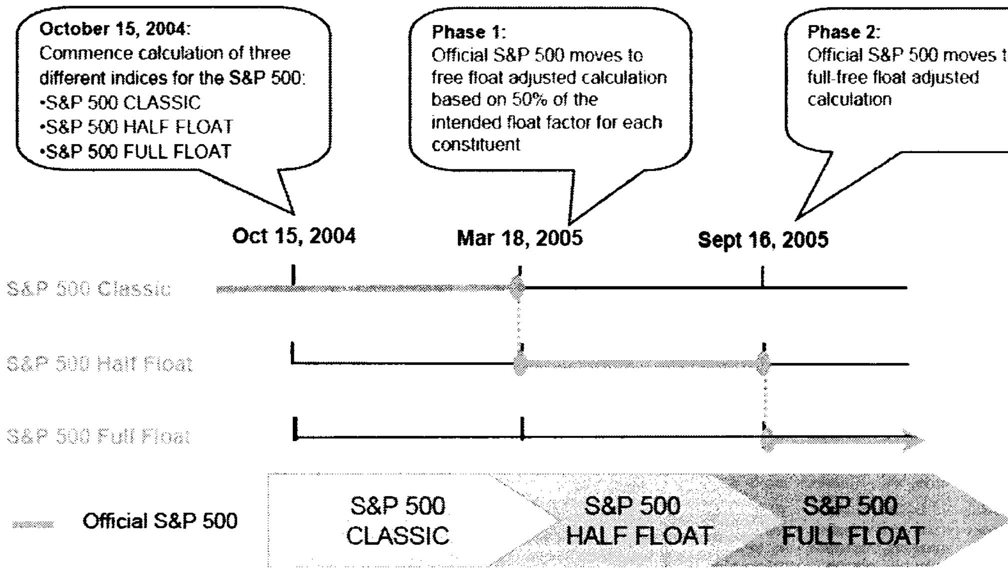
- Government holdings

- Board members, founders, current and former officers and directors and related trusts and foundations

Independent mutual funds, pension funds and other institutional investors are not strategic holders".

Exhibit-3: S&P 500 Float Adjustment Schedule

(Source: Directly taken from "Standard and Poor's Announces Float Adjustment Schedule for S&P 500 and Affiliated Indices" *Standard and Poor's Press Release*, September 28, 2004)



The above time line applies to the following indices and their related sub-indices.

S&P 500, S&P MidCap 400, S&P SmallCap 600, S&P Composite 1500, S&P 100, and S&P Global 1200

Exhibit-4: S&P 500 Extreme Weight Changes

(Source: *Standard and Poor's.* Bendetovitch et al. (2005), www.standardandpoors.com)
As of September 17, 2004

Top S&P 500 Index Weight Losses

Ticker	Company	Final IWF*	Weight in Classic Index	Weight in FF Index	% Weight Change	Rank in Classic Index	Rank in FF Index
WMT	Wal-Mart Stores	0.60	2.11%	1.32%	-0.79%	6	12
MSFT	Microsoft Corp.	0.85	2.84%	2.51%	-0.33%	3	3
GS	Goldman Sachs Group	0.62	0.42%	0.27%	-0.15%	55	78
ORCL	Oracle Corp.	0.72	0.57%	0.42%	-0.14%	40	53
NIKE	Nike Inc.	0.44	0.19%	0.09%	-0.10%	112	247
EBAY	eBay Inc.	0.80	0.58%	0.49%	-0.10%	37	45
CCL	Carnival Corp.	0.66	0.29%	0.20%	-0.09%	75	110
KO	Coca Cola Co.	0.87	0.93%	0.84%	-0.09%	20	22
BSX	Boston Scientific	0.79	0.31%	0.25%	-0.05%	72	86
AXP	American Express	0.88	0.62%	0.57%	-0.05%	31	38

Top S&P 500 Index Weight Gains

Ticker	Company	Final IWF*	Weight in Classic Index	Weight in FF Index	% Weight Change	Rank in Classic Index	Rank in FF Index
GE	General Electric	1.00	3.43%	3.57%	0.14%	1	1
XOM	Exxon Mobil Corp.	1.00	2.99%	3.11%	0.12%	2	2
C	Citigroup Inc.	1.00	2.31%	2.40%	0.09%	4	4
PFE	Pfizer Inc.	1.00	2.27%	2.37%	0.09%	5	5
AIG	America Int'l. Group	1.00	1.77%	1.85%	0.70%	7	6
BAC	Bank of America Corp.	1.00	1.73%	1.80%	0.07%	8	7
JNJ	Johnson & Johnson	1.00	1.65%	1.72%	0.07%	9	8
IBM	IBM	1.00	1.36%	1.42%	0.06%	10	9
PG	Procter & Gamble	1.00	1.36%	1.41%	0.05%	11	10
JPM	J.P. Morgan Chase & Co.	1.00	1.34%	1.40%	0.05%	12	11

* represents Investable Weight Factor, ** represents Float Adjusted