The Effect on Stock Price from Changes to the Russell Indexes

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Abstract

This paper examines the pricing anomalies resulting from the annual reconstitution of the Russell 2000 index and quarterly Initial Public Offering (IPO) additions to the Russell 1000 index and Russell 2000 index. We based our research partly on the earlier work of Biktimirov, Cowan, and Jordan (2004), which was essentially one of the first to examine the effect of index listing on smaller stocks. Our research differs, however, in that we used a later sample period for our tests, investigated the effects of IPOs now being added to the indexes on a quarterly basis, rather than just at the annual reconstitution, and ignored the trading volume analysis as well as the influences of institutional ownership. The results we found were mixed relative to the earlier paper as we obtained evidence of both temporary and permanent price effects stemming from changes to the indexes. In addition, we observed a much greater degree of volatility in the abnormal returns of the affected stocks, most of which were very significant at the various event intervals measured.

Keywords: Russell 1000 index; Russell 2000 index; Pure Additions; Pure Deletions; Upwards Shifts; Downward Shifts; IPO Additions; Abnormal Returns; Temporary Effects; Permanent Effects.

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1. Introduction

When indexing managers rebalance their funds each yeah around the reconstitution of the Russell indexes, or any annually reconstituted index for that matter, they must make a trade-off between minimizing the tracking error of their funds and paying a premium (absorbing a discount) for the stocks they must add to (remove from) their funds at the effective day. The announcement of changes made to the Russell indexes is generally made 20 days in advance of the reconstitution, so indexing managers have a choice on whether they want to rebalance their funds ahead of time. If they decide to rebalance early, they increase their tracking error risk, which would also be the case if they rebalanced following the effective day. Should they look to minimize their tracking error by rebalancing on the effective day, they risk paying a premium for the stock they must add to their funds and selling at a discount the stocks they must remove from their funds. One view is that these premiums and discounts are a result of price pressure, which is essentially a temporary change in the stock price created by supply and demand imbalances around the reconstitution. When a stock is say, added to a Russell index, indexing managers will drive up the demand, and thus the price, for the stock given a constant supply. Following reconstitution, however, the stock price should return to a level that reflects its fundamental value. This phenomenon is a potential problem for indexing managers since it would reduce the performance of their fund, or funds. If the premium or discount remains a permanent component of the stock price though, the indexing manager should be indifferent. Whether these premiums and discounts reduce is the question, or better yet, do these price effects exist at all?

Prior to Biktimirov, Jordan, and Cowan (2004), considerable research has been done with respect to the stock price reactions of large capitalization stocks added to the S&P 500 index. Relatively few studies, however, have examined the stock returns of small capitalization indexes

like the Russell 2000 index. The work done by Biktimirov, Jordan, and Cowan (2004), was one of the first to thoroughly investigate the effect on smaller stocks of index listing. The authors did this by examining the stock returns, trading volume, and institutional ownership of companies added to and deleted from the Russell 2000 index from 1991 to 2000. Our research, in essence, picks up where the aforementioned paper left off in analyzing the stock returns of companies that are added to or deleted from the Russell 2000 index in addition to IPO additions to both the Russell 1000 index and Russell 2000 index using data from 1999 to 2008.

The Russell 2000 index, as well as the Russell 1000 index, is a subset of the Russell 3000 index, a value-weighted index of the largest U.S. stocks by market capitalization. The Russell 3000 index is divided into the Russell 1000 index, which is the large capitalization index of the top 1,000 stocks in the U.S. and the Russell 2000 index, which is the remaining, smaller 2,000 stocks. The Russell 1000 index represents approximately 90 percent of the U.S. equity market, while the Russell 2000 index represents approximately 8 percent of the total market capitalization of the Russell 3000 index. The Russell 2000 index is easily the most common benchmark for mutual funds that classify themselves as small capitalization, as it is constructed to provide a comprehensive and unbiased small capitalization barometer. While there are competing indexes, such as the S&P 600 index from Standard and Poor's, the Russell 2000 index remains the benchmark within the industry in terms of measuring small capitalization performance. As of mid-August 2009, the Russell 2000 index was trading around 572, down from its high in July 2007 of around 855. The average market capitalization of an average company in the Russell 2000 index is approximately $530 million, and the median market capitalization of a company included in the index is approximately $410 million. The largest market capitalization of a company included in the Russell 2000 index is $1.4 billion. The

Russell 2000 index is reconstituted annually to make sure that larger stocks do not misrepresent the performance and characteristics of the true small capitalization opportunity set, and this has made it the most quoted measure of the small capitalization segment of the U.S. equity universe.

The mechanics behind the Russell 2000 index reconstitution are important to be aware of. Basically, a stock is added to the Russell 2000 index if its market value rises sufficiently or because its market value falls enough that it is shifted out of the Russell 1000 index. The same idea applies to stocks that are deleted from the Russell 2000 index or shifted into the top 1,000. If the market value of a stock in the Russell 2000 index falls enough, it is deleted from the index, but if its market value rises enough, it is shifted upward into the Russell 1000 index. Also important to know is that Russell Investments began adding IPOs to its indexes on quarterly basis in the third quarter of 2004, rather than just at the annual reconstitution. This change was meant to better represent the index, and perhaps a secondary objective of the change was to limit the strategies that aimed to profit from price pressure.

Studying the original four groups observed by Biktimirov, Jordan, and Cowan (2004), we find evidence of both temporary and permanent price effects around the reconstitution day. The pure additions group exhibited transitory price effects, while those of the pure deletions group appeared more permanent in nature. When we broke out sample selection into pre- and post-third quarter 2004 periods, our results varied considerably. While the pure deletions group was consistent in displaying permanent price effects, the pure additions group produced results that showed both temporary and permanent price effects in the pre- and post-third quarter 2004 periods. We contribute to the literature by considering two new groups in our study: the Russell 1000 index IPO additions and Russell 2000 index IPO additions. These groups generally

exhibited evidence that discredited the price pressure hypothesis, since price effects tended to be permanent.

2. Literature Review

Papers studying the reconstitution index event can most of the time come to the same conclusion that deleted and added stocks experience significant abnormal returns. Despite similar results, academics do not agree on the hypothesis supporting those abnormal returns. Biktimirov, Jordan, and Cowan (2004) results support the price pressure hypothesis for stocks added to or deleted from the Russell 2000 index. This article is one of the few that studied the price pressure hypothesis using the Russell 2000 index. Combining the Fama-French Daily 3-factors model 1993 (FF93) with the Returns Across Time and Securities (RATS) approach from Ibbotson 1973, Biktimirov, Jordan, and Cowan (2004) ran an Ordinary Least-Squares (OLS) regressions in order to test the null hypothesis that alpha equals zero. Using FF93 factors with the RATS approach has several advantages; it controls for size and book-to-market effects, it provides a large sample size compared to most other estimation methods, and it reduces the effect of any run-up and run-down bias. Controlling for size and book-to-market effects is particularly important for analyzing the price effects at reconstitution for the Russell 2000 index because the index is dominated by small capitalization companies. Once the alphas are calculated, Biktimirov, Jordan, and Cowan (2004) calculate the cumulative average abnormal returns ($\overline{\text{CAR}}_{t1,t2}$) and look at any patterns in the pure additions and pure deletions groups. Biktimirov, Jordan, and Cowan (2004) conclude that additions and deletions returns are temporary and reverse to their normal level a few days after the reconstitution, which is perfectly consistent with the price pressure hypothesis. Biktimirov, Jordan, and Cowan (2004) also support the conclusion reached by Harris and Gurel (1986), even though the latter studied the price effects at reconstitution for the S&P 500 index,

which was observed over a different sample period. The findings of Biktimirov, Jordan, and Cowan (2004) are supported by an abnormal trading volume analysis as well as an investigation into the influences of institutional ownership.

Goetzmann and Garry (1986) concludes that deletions from the S&P 500 index carry information. The analysis was performed for only one year (1983) and was limited to six securities. Excess returns are calculated by subtracting the index returns from the security return for each trading day. Goetzmann and Garry (1986) also examines the daily volume on each stock and found an abnormal volume for those six securities on the reconstitution day. Evidence from the paper suggests that prices drop in anticipation of future decreases in the quality as well as the quantity of information. The effect seems to be permanent. As the authors describe on page 68, "the 'label' or S&P 'seal of approval' seems to carry with it broadly understood implications. Removal of that seal has an adverse effect."

Harris and Gurel (1986) studied the price and volume effects associated with changes in the S&P 500 index from 1973 to 1983. The analysis is done following three different hypotheses:

1. The efficient market hypothesis, which stipulates that the sale or purchase of a large number of shares from one investor will have no impact on the price if the other investors believe the former has no superior skills in evaluating stock prices or significant private information;
2. The imperfect substitute hypothesis, which assumes that securities are not close substitutes for each other and that long-term demand is not perfectly elastic; and
3. The price pressure hypothesis, which assumes that investors are compensated for providing liquidity and passive investors can be attracted to buy or sell stocks if

prices experience a significant change, therefore putting pressure on the price to return to its equilibrium.

The conclusion reached by Harris and Gurel (1986) is consistent with Biktimirov, Jordan, and Cowan (2004) with respect to price pressure observed around the S&P 500 index reconstitution; the volumes increase as well as the prices for added securities. Harris and Gurel (1986) calculate the excess returns by subtracting the index daily returns from the stock daily returns. Their conclusion is that the effect is temporary because price increases are soon reversed afterwards. The methodology employed by Harris and Gurel (1986) includes a trading volume analysis. The findings of the paper, however, are based upon a limited sample size of only 86 additions and 13 deletions.

Jain (1987) suggests that price pressure does not simply come from indexing managers. Data used in the study extends from 1977 to 1983 and the sample size is relatively small with 87 additions and 7 deletions. Jain (1987) uses a two-parameter (alpha and beta) model, similar to the CAPM, to calculate the intercepts. Jain (1987) also formed a control group to determine whether price increases (decreases) are the same in both the control group and the additions (deletions) group. The results strongly reject the price pressure hypothesis because both groups have very similar returns and t-statistics are small. The reasons behind this conclusion are not explicitly discussed, but the author lightly advances the information hypothesis.

Whaley and Beneish (1996) examines whether the new rule of announcing the S&P 500 index reconstitution changes five days before the actual reconstitution day in order to ease order imbalances has changed the overall effect from 1986 to 1994. The conclusions of Whaley and Beneish (1996) do not support the price pressure hypothesis since the increase in price does not disappear even two weeks after the reconstitution. The paper concludes that indexing managers

wait until the reconstitution day to buy new additions to the S&P 500 index. Consequently, stock prices increase after the announcement day and again after the reconstitution day. The price effect is almost equally permanent and temporary. The impact of the new rule, however, is greater because the average price increases are larger than under the former announcement policy. While other papers usually use the Capital Asset Pricing Model (CAPM) or FF93 to compute abnormal returns, Whaley and Beneish (1996) uses a future-based approach because it measures a viable trading strategy. Furthermore, returns are analyzed on a daily, overnight, and intraday basis. Whaley and Beneish (1996) is reinforced by a trading activity analysis, which includes trading volume, trade size, and quoted bid-ask spreads. Conclusions do not support the price pressure hypotheses since the objective of the paper was to examine the impact of changing the rules of the reconstitution for the S&P 500 index.

The paper from Madhavan (2003) specifically examines the Russell index reconstitution from 1996 to 2002. The author calculates the monthly returns (and not the excess returns) between March and July. Madhavan (2003) concludes that a portion of the price pressure effect persists because of the risk and the unavailability of some positions and that the other portion is temporary. Another potential explanation for the observed permanent and temporary effects at the reconstitution day may be that investment banks are able to predict the members in the annual reconstitution list within a range of 90 to 95 percent, according to the author. Madhavan (2003) is reinforced by an intraday effect analysis and an econometric model that accounts for monthly ratios in the previous year and monthly volatility.

Chen (2006) examines the annual reconstitution effect of the Russell 1000 index and Russell 2000 index from 1993 to 2000. Stocks are classified according to their style (value or growth) and index (Russell 2000 index or Russell 1000 index). The author measures the

abnormal return of each stock by subtracting the return of the associated Russell index from the stock return. The paper also analyzes the daily turnover of trading volume. Chen (2006) based its analysis on four different hypotheses:

1. The imperfect substitute hypothesis,
2. The price pressure hypothesis,
3. The liquidity hypothesis, and
4. The information hypothesis.

Each of these hypotheses is thoroughly explained later in this paper. The reason why these hypotheses may hold is that indexing managers have a dilemma: to capture the potential return opportunity when the announcement is made and induce higher tracking error or to wait until the reconstitution day to purchase and sell stocks and minimize tracking error. As explained by the author, proponents of the Efficient Market Hypothesis will expect no abnormal returns between the announcement and reconstitution dates. The proponents of the imperfect substitutes hypothesis will expect a permanent rise in the price of the one added in the index. While the proponents of the liquidity hypothesis reach the same conclusion, they differ in interpreting the cause of those effects. The study aims to examine all the four competing hypotheses *simultaneously*. Chen (2006) suggests that the price pressure hypothesis fails to be validated because of the very weak results of the daily trading turnover. This study supports the imperfect substitutes hypothesis because the results are inconsistent with the price pressure hypothesis and the liquidity hypothesis.

Chen, Noronha, and Singal (2006) found that price pressure is the greatest on the reconstitution day for the S&P 500 index and Russell 2000 index because indexing managers

want to minimize the size and volatility of their tracking error. They believe that indexing managers have no stock picking ability or timing ability and that arbitrageurs can take advantage of that opportunity. To have an arbitrage opportunity at the reconstitution, three conditions must be met:

- Index changes are transparent and predictable,
- The index is heavily used by passive index funds, and
- Fund managers are constrained to trade on the effective day by tracking error metrics.

With that being said, indexing managers must rebalance their portfolios at the reconstitution day or the day after. Chen, Noronha, and Singal (2006) employ a sample from 1989 to 2002 for the S&P 500 index and from 1990 to 2002 for the Russell 2000 index. Excess return measures are relative to the appropriate index. Chen, Noronha, and Singal (2006) conclude that investors in index funds lose money because of the indexing managers have a main goal of minimizing tracking error, and that arbitrageurs act as front-runners and take advantage of this fact. The total amount of money lost by investors in index funds linked to the S&P 500 index and the Russell 2000 index is between $1.0 billion and $2.1 billion each year. The authors believe that the new IPO rule will have "no effect on index arbitrage other than to spread these additions and related index arbitrage."

3. Hypotheses

Studies concerning S&P 500 index reconstitutions mostly see similar patterns, but reasons explaining the price pressure are divergent. Four basic hypotheses can explain a price pressure around an annual reconstitution:

1. The price pressure hypothesis (Harris and Gurel (1986)) advances that demand for stocks increase (decrease) around a significant event, which cause the prices to increase (decrease) as well, compensating market-makers for providing (reducing) liquidity during high-demand (low-demand) periods in order to bring the prices back to their equilibrium level. Price moves should totally reverse because additions to or deletions from the Russell 2000 index do not change the present value of future cash flows.

2. The imperfect substitutes hypothesis (Shleifer (1986)) stipulates that as soon as one of two stocks with similar characteristics is removed from an index, the two stocks are no longer substitutes for each other. At the reconstitution, demand for additions exceeds supply and requires a curve shift to reach a new equilibrium price.

3. The cost reduction hypothesis stipulates that stocks added to (deleted from) the Russell 2000 index become less expensive to trade. Liquidity increases, bid-ask spreads decrease (Amihud and Mendelson (1986)), and the cost of acquiring information about companies decreases (Goetzmann and Garry (1986)). These cost reductions lead to increases (decreases) in value for added (deleted) stocks.

4. The information signalling hypothesis (Jain (1987)) stipulates that additions and deletions carry new and valuable information. This hypothesis is based on the S&P 500 index. The committee chosen to select additions and deletions exercises a judgement and the latter can be based on superior information and expertise in evaluating companies.

The first weakness of studying price pressure due to additions to and deletions from the S&P 500 index is the very small sample sizes. Whaley and Beneish (1996) has a sample size of 103 additions. The article from Goetzmann and Garry (1986) uses only six deletions from the S&P 500 index. Conclusions from Lynch and Mendenhall (1997) were based on sample size of 49 securities. To avoid that problem, we used the Russell 1000 index and Russell 2000 index. Russell Investments rebalances its indexes once a year and hundreds of stocks are either added to or deleted from the indexes. Since our study covers more than ten years of data, our sample size (more than 7,500 index stocks) can produce results that can avoid the criticism that research with less observations might endure.

Another advantage of using Russell 1000 index and Russell 2000 index is that the condition for selecting stocks to add to or delete from the indexes is simple, transparent and not influenced by subjectivity, as opposed to the S&P 500 index where the selection is based on subjective quantitative and qualitative criteria. On the last trading day of May each year, Russell Investments globally ranks all eligible stocks by their total market capitalization. That is, the only criterion is the market capitalization. This methodology removes any ambiguity and makes the reconstitution more predictable. Both the announcement day and the reconstitution day are also known in advance. Therefore, the potential announcement effect on the reconstitution day is not present. Pure additions and pure deletions should not carry new information since the process of selecting stocks is transparent, known in advance, and based on information easily available to all market participants.

The Russell 1000 index and Russell 2000 index have a third advantage in that even though stocks are deleted from the index, they are still trading after the reconstitution day whereas S&P 500 index deletions are very often no longer traded after the index rebalancing.

S&P 500 index deletions are usually due to mergers and acquisitions, bankruptcies, or delisting, which limit the analysis to the days before the reconstitution day.

Russell Investments also rebalances its indexes once a year for deletions and additions due to a change in market capitalization. IPOs are added quarterly to the indexes since the third quarter of 2004. Market participants can thus follow the Russell reconstitutions without investing too much time and money. The predictability of the index also makes it very transparent to all indexing managers.

4. Sample Selection

This study extends from 1999 through 2008. With the information provided by Russell Investments, all securities are classified in one of the six groups as follows:

1. Pure additions are stocks added to the Russell 2000 index that were not previously in the Russell 1000 index.
2. Pure deletions are stocks deleted from the Russell 2000 index that were not previously in the Russell 1000 index.
3. Upward shifts are stocks added to the Russell 1000 index that were previously in the Russell 2000 index.
4. Downward shifts are stocks deleted from the Russell 1000 index that were previously in the Russell 2000 index.
5. Russell 1000 index IPO additions are stocks added to the Russell 1000 index that were not previously in either the Russell 2000 index or Russell 1000 index. The additions are due to recent IPOs that are added to the Russell Indexes on a quarterly basis.

6. Russell 2000 index IPO additions are stocks added to the Russell 2000 index that were not previously in either the Russell 2000 index or Russell 1000 index. The additions are due to recent IPOs that are added to the Russell Indexes on a quarterly basis.

For pure additions, pure deletions, upward shifts, and downward shifts, Russell Investments rebalances its indexes once a year, usually on the last Friday of June. In order to ensure proper liquidity in the markets, when the last Friday in June is the 28th, 29th or 30th, reconstitution will occur on the proceeding Friday. Prior the third quarter of 2004, IPOs were added to the Russell indexes on an annual basis at reconstitution but without differentiation between pure additions and IPOs. Russell Investments modified this rule and began to quarterly reconstitute its indexes for IPOs only beginning in the third quarter of 2004. Consequently, we get ten annual reconstitutions and 17 quarterly reconstitutions from 1999 to 2008 (see Figure 1). Had we been able to get more than ten years worth of data from Russell Investments, we would have replicated the results of Biktimirov, Jordan, and Cowan (2004). We only had data, however, to extend the returns abnormal return analysis of the aforementioned paper.

For each annual reconstitution and quarterly reconstitution, we examined each stock to determine which group it belongs to. In order for a stock to be included in one of the six groups, it must be certain for us to determine in which group the security falls into. The stocks that we were unable to classify into one of the six groups were removed from the study.

We consider our sample size to contain enough observations so that the results can be reasonably relied on. We have 81 daily returns for each of our 7,502 stocks. The fact that Russell Investments makes many additions and deletions every year and every quarter makes the Russell 1000 index and the Russell 2000 index very interesting to study compared to the S&P 500 index,

which is less active in adding and deleting stocks. We get 3,236 and 2,082 observations for pure additions and pure deletions groups, respectively. For the upward shifts and downward shifts groups, we have 912 and 778 observations, respectively. The number of observations we get for the Russell 1000 index IPO additions and Russell 2000 index IPO additions groups are 40 and 454, respectively.

We focused our discussion on the pure additions, pure deletions, Russell 1000 index IPO additions, and Russell 2000 index IPO additions. Less emphasis is placed on the upward shifts and the downward shifts because the impact related to these events are not easily classified in terms of the hypotheses they support. We present our empirical results in six tables, where each table presents the average abnormal returns and the cumulative average abnormal returns for the various groups and time intervals.

5. Methodology

We investigated the stock returns in the periods around the annual reconstitution of the Russell 2000 index as well as the periods surrounding the quarterly IPO additions to the Russell 1000 index and Russell 2000 index. To compute the abnormal returns for each day, we use the RATS along with FF93. The RATS procedure gives the same weight to each observation. Combining RATS with FF93 allows the factors to change over time.

As discussed in Biktimirov, Jordan, and Cowan (2004) using FF93 has several advantages. The first one is that FF93 automatically control for firm size and book-to-market effects. This is very important for our study because the Russell 2000 index is composed of approximately 2000 companies classified as small capitalization. The SMB factor accounts for this characteristic. The second advantage is that the data available on Kenneth R. French's

website provides a large sample size at a daily frequency, which not often the case with other studies. Since we have ten years of data from Russell Investments, an appropriate database covering that period was a necessity. Furthermore, FF93 is generally accepted as an appropriate approach to measure performance and to capture systematic patterns in average returns.

To do this, we estimate the cross-sectional regression and run an OLS regression on each day in event time:

$$R_{jt} - R_{ft} = \alpha_t + \beta_t (R_{mt} - R_{ft}) + s_t SMB_t + h_t HMLt + \varepsilon_{jt}.$$

For day t, R_{jt} is the daily return of the stock j, R_{ft} is the one-month Treasury bill rate, and R_{mt} is the Center for Research in Security Prices (CRSP) value-weighted return on all New York Stock Exchange (NYSE), American Stock Exchange (AMEX), and NASDAQ stocks. ($R_{mt} - R_{ft}$), SMB_t, and HML_t are the Fama-French three factors at day t. The FF93 marketwide factors SMB (small minus big) and HML (high minus low) are constructed using six value-weighted stock portfolios formed on size and book-to-market ratio, respectively. SMB is the average return on the three small-stock portfolios minus the average return on the three big-stock portfolios. HML is the average return on the two high book-to-market stock portfolios minus the average return on the two low book-to-market stock portfolios. The estimate of α_t is the average abnormal return for day t and is equal to zero under the null hypothesis of no abnormal performance. In this procedure, day 0 represents the reconstitution day. The average abnormal returns ($\overline{AR}_t$) are simply averages of the alphas estimated previously with FF93. $\overline{AR}_t$ is calculated using the following formula:

$$\overline{AR}_t = \frac{\sum_{i=1}^{n} \alpha_i}{n}$$

The $\overline{\text{AR}}_t$ t-statistics are calculated using the standard deviation of the daily abnormal returns (i.e. alphas) under the assumption that random variables are uncorrelated:

$$t = \frac{\overline{AR} - \mu}{s/\sqrt{n}}$$

where s is the standard deviation of the sample and n is the sample size. The degrees of freedom used in this test is n − 1.

Testing the null hypothesis that μ= 0, we get

$$t = \frac{\overline{AR}}{s/\sqrt{n}}$$

Daily cumulative average abnormal returns ($\overline{\text{CAR}}_{t1,t2}$) are sums of the average abnormal returns over event time. $\overline{\text{CAR}}_{t1,t2}$ is calculated using the following formula:

$$\overline{CAR}_{t1,t2} = \sum_{t=t1}^{t2} \overline{AR}_t$$

The $\overline{\text{CAR}}_{t1,t2}$ t-statistics are calculated using the standard deviation of the $\overline{\text{AR}}_t$ under the assumption that random variables are uncorrelated. Under the Bienaymé statement, we have:

$$t = \frac{\overline{CAR}_{t1,t2}}{\sqrt{Var\left(\overline{CAR}_{t1,t2}\right)}} \sim N(0,1)$$

where

$$Var\left(\overline{CAR}_{t1,t2}\right) = \sum_{t=t1}^{t2} Var(AR_t)$$

and

$$Var(AR_t) = \frac{1}{N^2}\sum_{i=1}^{N}\sigma_{\varepsilon_i}^2$$

where *N* is the number of securities.

We followed the exact same procedures that Biktimirov, Jordan, and Cowan (2004) did. Unfortunately, we did not replicate their paper due to unavailability of data.

6. Abnormal Returns Analysis

Table 1 and Table 2 present the results of the event studies for pure additions and pure deletions to the Russell 2000 index as well as upward shifts from the Russell 2000 index to the Russell 1000 index and downward shifts from the Russell 1000 index to the Russell 2000 index. Day 0 is the reconstitution day. Table 1 displays the average abnormal returns ($\overline{AR}_t$), and the cumulative abnormal returns ($\overline{CAR}_{t1,t2}$) are displayed in Table 2. In observing the pure additions group, the cumulative abnormal return over the 21-day period running from day -20 to 0 is 1.32% (t = 3.57). Compared to the results of Biktimirov, Jordan, and Cowan (2004), the cumulative abnormal return in the (-20,0) window is very similar 1.89% (*t* = 4.45). It seems though, that a degree of anticipation exists in the market for these stocks being added since over the 41-day period running from day -40 to 0 the cumulative abnormal return is 7.63% (t = 15.04). That is, by successfully speculating as to what stocks will be added to the index before the announcement day, a speculator can realize greater abnormal returns than can be attained by waiting for the announcement by Russell Investments, which happens at approximately day -20. Biktimirov, Jordan, and Cowan (2004), found a cumulative abnormal return of 2.62% (*t* = 4.57) in the (-40,0) window that was also greater than that in the (-20,0) window; however, it was not

as great in magnitude. Interestingly, we found that the average abnormal return was an insignificant -0.40% (t = -1.67) on the reconstitution day. We expected to observe a positive and significant abnormal return on the reconstitution day as indexing managers do the bulk of their buying as to minimize tracking error, and this is consistent with the findings of Biktimirov, Jordan, and Cowan (2004) that observed an average abnormal return of 0.92% (t = 4.36) on day 0. Further, over the six-day period running from day -5 to day 0, the cumulative abnormal return was 0.11% (t = 0.51). This is an event interval that the former authors did not choose to investigate, but we believe that indexing managers willing to take on marginally higher tracking error risk would perhaps choose to do a most of their buying over this six-day period and thus, the cumulative abnormal return over this period would be positive and significant. Past the reconstitution day, Table 2 generally shows negative cumulative abnormal returns. Over the 20-day period running from day +1 to day +20, we observe a cumulative abnormal return of -1.39% (t = -4.09). This result is comparable to that of Biktimirov, Jordan, and Cowan (2004) as the former authors found a cumulative abnormal return of -1.63% (t = -3.96) over the same event interval. In consequence, the positive cumulative abnormal return for the (-20,0) window is virtually offset in the (+1,+20) window in our study, just as it was in Biktimirov, Jordan, and Cowan (2004). The cumulative abnormal return over the (-20,+20) window is an insignificant -0.07% (t = -0.15). This phenomenon provides strong support for the price pressure hypothesis, which suggests price changes around the reconstitution day are transitory in nature.

In looking at the pure deletions group, we do not observe the same temporary price pressure seen with the pure additions group. That is, Table 3 and Table 4 show that the pre-event abnormal returns are generally negative, but these price changes are not reversed in the post-event period and, in fact, the negative abnormal returns in the pre-event period continue in the

post-event period. The cumulative abnormal return over the 21-day period running from day -20 to day 0 is -4.59% (t = -8.10), which was to be expected as investors sell the stocks that are to be deleted from the index once that information is known via the announcement from Russell Investments. This result is consistent with the cumulative abnormal return of -3.47% (t = -5.28) in the (-20,0) window observed by Biktimirov, Jordan, and Cowan (2004). On the reconstitution day, we found an insignificant average abnormal return of -0.50% (t = -1.44), which is consistent with the result corresponding to the pure additions group, but is inconsistent with the result we were expecting. Yet Biktimirov, Jordan, and Cowan (2004) also found an insignificant average abnormal return of -0.11% (t = -0.35) on day 0. For the event interval running from day +1 to day +20, we observed a cumulative abnormal return of -1.29 (t = -2.23), while we can see a cumulative abnormal return of 2.66% (t = 3.87) over the same (+1,+20) window from Biktimirov, Jordan, and Cowan (2004). So, unlike the pattern seen for the pure additions group, the negative cumulative abnormal returns for the (-20,0) window are not offset in the (+1,+20) window, and actually continue in this post-event period. Besides contrasting the pattern observed over the period running from day -20 to day 20 for the pure additions group, the price effect we see for the pure deletions group explicitly disagrees with what we see for the pure deletions group from Biktimirov, Jordan, and Cowan (2004). The trend observed for pure deletions group over the (-20,+20) window lends itself to the imperfect substitutes hypothesis, as well as the cost reduction hypothesis regarding the costs of acquiring quality information as analyst following gets smaller. The price changes for stocks deleted from the index then, seem to take on a permanent rather than temporary effect.

The cumulative abnormal returns for the two pure groups for the (-20,+20) window are plotted in Figure 2. Through this illustration, it is interesting to see the competing patterns of the

two groups. For the pure additions group, we can see a transitory effect on prices; whereas, for the pure deletions group, it is clear that the price effect is permanent. Thus, it is difficult to accept one hypothesis over another in explaining the price changes of these two groups around the annual reconstitution.

As mentioned earlier, we have no explanations for stocks that are shifted between the Russell 1000 index and Russell 2000 index since these stocks merely exchange one index affiliation for another, but we have reported the results for these two groups for the sake of completeness. From Table 2, we observe an insignificant cumulative abnormal return of -0.85% (t = -1.77) for the upward shifts group in the (-20,0) window and a positive cumulative abnormal return of 2.48% (t = 5.08) in the (+1,+20) window. Over the 41-day period running from day -20 to day +20, the upward shifts group experiences a cumulative abnormal return of 1.63% (t = 2.39). The downward shifts group experiences a cumulative abnormal return of -10.41% (t = -10.45) over the (-20,+20) window, which is a large, seemingly permanent change in price. Together, the results observed for the two-shift groups present reasonably strong evidence in support of permanent price effects.

Table 3 and Table 4 show the same four groups from Table 1 and Table 2, only the results here correspond to pre- and post-periods with respect to when Russell Investments introduced the practice of adding IPOs to the Russell 1000 index and Russell 2000 index on a quarterly basis rather than just at the annual reconstitution. This change became effective in the third quarter of 2004. The purpose of this new practice was partly to limit the opportunities for investors to realize profits from the types of transitory price changes that were observed in Biktimirov, Jordan, and Cowan (2004). Table 3 shows that on the reconstitution day, the average abnormal return of -3.72% (t = -8.20) for the pure additions group went from being significant in

the pre-third quarter of 2004 period to being insignificant in the post-third quarter of 2004 period in which the average abnormal return was -0.05% (t = -0.16). A similar price effect change between pre- and post- third quarter of 2004 on the reconstitution day can be seen for the pure deletions group. Pre-third quarter of 2004, the average abnormal return for the pure deletions group on day 0 was 2.26% (t = 3.21); whereas, for the post- third quarter of 2004 time period, the average abnormal return on day 0 was an insignificant 0.37% (t = 0.72). The results from event intervals in Table 4, however, give a more comprehensive view of the outcome that having IPOs added quarterly has had on reducing transitory price effects. For the pure additions group, the cumulative abnormal returns in the pre-Quarter3 2004 period were -10.12% (t = -16.25) in the (-20,+20) window. This result is puzzling, especially when considering the results from Table 2. Instead of realizing the similar positive cumulative abnormal returns over the period running from day -20 to day 0, the group experiences a cumulative abnormal return of -7.47% (t = -16.24), and then for the period running from day +1 to day +20, the group experiences a cumulative abnormal return of -2.65% (t = -6.32). In contrast, the results for the post-Third quarter of 2004 pure additions group exhibit price behaviour that is more similar to that of the all inclusive time period, but much greater in magnitude and with a pattern that suggests the price effects are non-transitory. The cumulative abnormal return for the pure additions group post-third quarter of 2004 was 11.11% (t =15.25) in the (-20,+20) window. Further, in the (-20,0) window, the cumulative abnormal return was 14.00% (t = 27.26) and in the (+1,+20) window it was -2.88% (t = -5.58). For the pure deletions group, the pre-third quarter of 2004 cumulative abnormal return of -0.19% (t = -0.18) for the (-20,+20) window was insignificant, but the post-third quarter of 2004 cumulative abnormal return became a larger, negative number of -29.01% (t = -27.86) that was significant in the (-20,+20) window. Like the price effect observed from the

post-third quarter of 2004 pure additions group, the pure deletions group's price effect was permanent in nature, which is seen as good news for indexing managers.

Table 5 and Table 6 present the abnormal returns for IPOs added to the Russell 1000 index and Russell 2000 index each quarter starting in third quarter of 2004. On day 0, Table 1 shows that the IPO additions to the Russell 1000 index group experience an average abnormal return of 1.98% (t = 3.19), which makes intuitive sense for reasons described above. The average abnormal return on day 0 for the IPO additions to the Russell 2000 index group, on the other hand, experience an abnormal return on -1.94% (t = -9.23). From Table 6, we can see that over the (-20,+20) window the cumulative abnormal return for IPO additions to the Russell 1000 index group are an insignificant 5.22% (t = 1.79). In observing a longer event interval, for example the (-40,+40) window, we can see a significant cumulative abnormal return of 18.41% (t = 4.35). The IPO additions to the Russell 2000 index group exhibit a similar pattern in the (-40,+40) window, but the magnitude of the cumulative abnormal returns of 5.00% (t = 3.72) are much smaller. Further, over the event interval running from day -20 to day +20, the cumulative abnormal returns are 3.55% (*t* = 3.89), which demonstrates the price behaviour that is distinctly non-transitory.

7. Conclusion

Unlike Biktimirov, Jordan, and Cowan (2004), we did not find the same evidence of temporary price effects around the Russell 2000 index reconstitution. Our results were mixed in that for the pure additions group we observed price pressure, however, for the pure deletions group, it seemed as though price effects were permanent. For comparison sake, we cannot disagree nor agree with the hypothesis landed on by the former authors. Instead, we find elements of the price pressure hypothesis as well as the imperfect substitutes hypothesis and cost

reduction hypothesis as per the cost reductions of acquiring quality information of the stocks included in the index.

When our sample selection was broken into pre- and post-event periods regarding the new IPO additions practice introduced by Russell Investments, our results generally displayed price effects that were permanent. Of course, this change was in part made to limit trading strategies aimed at exposing price pressure, so it seems that Russell Investments has achieved their goal. That is, with pure additions for example, indexing managers may need to pay a premium to buy these stocks, but that premium remains as a permanent price effect, so returns are not later reduced as they would be if this premium soon after diminished. Perhaps if this study is later extended to include a larger sample selection post-third quarter of 2004, it could be more obvious if the decision to add IPOs quarterly by Russell Investments has the desired effect, and improves returns prospects for indexing managers.

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Table 1- Abnormal Returns for Four Groups Around the Russell 2000 Index Annual Reconstitution Date from 1999 to 2008

	Pure Additions to the Russell 2000 Index (N = 3236)			Pure Deletions from the Russell 2000 Index (N = 2082)			Upward Shifts from the Russell 2000 to the Russell 1000 Index (N = 912)			Downward Shifts from the Russell 1000 to the Russell 2000 Index (N = 778)		
Trading Day	AR_t	$t(AR_t)$		AR_t	$t(AR_t)$		AR_t	$t(AR_t)$		AR_t	$t(AR_t)$	
-40	0.23	2.28	**	-0.19	-1.28		0.40	2.96	***	-0.01	-0.05	
-30	0.44	5.30	***	-0.49	-3.81	***	0.16	1.58		0.46	2.88	***
-20	0.26	2.54	**	-0.41	-2.84	***	-0.08	-0.50		-0.05	-0.23	
-15	0.29	2.52	**	0.19	1.04		-0.10	-0.75		0.14	0.70	
-10	0.14	1.62		-0.26	-1.92		0.42	3.51	***	-0.63	-3.56	***
-9	0.11	1.14		-0.68	-4.67	***	0.15	0.96		-0.66	-3.32	***
-8	0.12	1.40		-0.61	-4.20	***	0.18	1.57		-0.26	-1.69	
-7	0.29	2.19	**	-0.68	-3.31	***	0.11	0.59		-0.65	-2.43	**
-6	-0.02	-0.18		-0.12	-0.76		-0.40	-2.82	***	0.50	2.74	***
-5	0.49	4.50	***	-0.21	-1.27		0.21	1.30		0.19	0.85	
-4	-0.03	-0.35		0.03	0.25		-0.32	-2.75	***	0.12	0.58	
-3	0.17	1.83		-0.01	-0.06		-0.68	-4.46	***	0.55	2.86	***
-2	-0.65	-4.99	***	0.45	2.35	**	-0.30	-1.72		-0.25	-0.96	
-1	0.54	5.69	***	-0.08	-0.56		-0.62	-4.73	***	0.91	4.35	***
0	-0.40	-1.67		-0.50	-1.44		0.78	3.32	***	-1.69	-3.57	***
1	-0.31	-2.48	**	0.37	1.30		0.36	2.13	**	-0.64	-2.39	**
2	-0.07	-0.87		-0.25	-1.96		0.34	2.71	***	-0.72	-3.86	***
3	0.31	3.72	***	0.02	0.13		0.26	2.57	**	-0.46	-2.78	***
4	0.18	1.37		-0.58	-3.45	***	0.35	1.82		-0.47	-1.82	
5	0.12	1.25		-0.45	-3.06	***	-0.12	-0.85		0.30	1.37	
6	-0.11	-1.17		-0.07	-0.47		-0.02	-0.14		-0.46	-1.77	
7	0.28	3.33	***	0.16	1.19		0.41	3.57	***	-0.19	-1.31	
8	-0.49	-3.77	***	0.58	3.43	***	-0.02	-0.13		-0.21	-0.96	
9	-0.24	-1.58		-0.24	-1.15		0.05	0.28		-0.07	-0.28	
10	0.07	0.86		-0.23	-1.45		-0.10	-0.86		0.15	0.77	
15	-0.04	-0.35		0.21	1.39		0.37	2.00	**	-0.08	-0.30	
20	-0.31	-3.80	***	-0.01	-0.09		0.14	1.11		-0.13	-0.75	
30	-0.08	-0.75		-0.28	-1.81		0.08	0.70		-0.09	-0.50	
40	0.29	3.11	***	0.34596	1.977	**	0.11	1.06		0.12	0.68	

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

Table 2 - Cumulative Abnormal Returns for Four Groups Around the Russell 2000 Index Annual Reconstitution Date from 1999 to 2008

	Pure Additions to the Russell 2000 Index (N = 3236)			Pure Deletions from the Russell 2000 Index (N = 2082)			Upward Shifts from the Russell 2000 to the Russell 1000 Index (N = 912)			Downward Shifts from the Russell 1000 to the Russell 2000 Index (N = 778)		
Event Interval	$CAR_{t1,t2}$	$t(CAR_{t1,t2})$		$CAR_{t1,t2}$	$t(CAR_{t1,t2})$		$CAR_{t1,t2}$	$t(CAR_{t1,t2})$		$CAR_{t1,t2}$	$t(CAR_{t1,t2})$	
-10, -1	1.16	4.87	***	-2.17	-5.72	***	-1.24	-3.72	***	-0.18	-0.39	
-10, 0	0.76	2.73	***	-2.67	-6.14	***	-0.46	-1.27		-1.87	-3.41	***
0, +10	-0.66	-2.35	**	-1.20	-2.60	***	2.28	6.24	***	-4.47	-7.79	***
+1, +10	-0.26	-1.06		-0.70	-1.70		1.50	4.46	***	-2.78	-5.60	***
-10, +10	0.50	1.37		-3.37	-5.64	***	1.04	2.10	**	-4.65	-6.29	***
-20, -1	1.72	5.06	***	-4.09	-7.78	***	-1.63	-3.57	***	-2.29	-3.61	***
-20, 0	1.32	3.57	***	-4.59	-8.10	***	-0.85	-1.77		-3.98	-5.71	***
0, +20	-1.80	-4.87	***	-1.79	-2.90	***	3.26	6.42	***	-8.12	-10.58	***
+1, +20	-1.39	-4.09	***	-1.29	-2.23	**	2.48	5.08	***	-6.43	-9.04	***
-20, +20	-0.07	-0.15		-5.88	-7.26	***	1.63	2.39	**	-10.41	-10.45	***
-40, -1	8.03	16.50	***	-10.54	-14.09	***	1.98	3.08	***	-4.67	-5.25	***
-40, 0	7.63	15.04	***	-11.04	-14.20	***	2.76	4.19	***	-6.36	-6.80	***
0, +40	-1.88	-3.76	***	-2.12	-2.52	**	3.53	5.22	***	-7.58	-7.43	***
+1, +40	-1.48	-3.08	***	-1.62	-1.99	**	2.74	4.16	***	-5.89	-6.02	***
-40, +40	6.15	8.80	***	-12.66	-11.24	***	5.50	5.90	***	-12.25	-9.05	***
-5, -1	0.52	3.07	***	0.18	0.70		-1.71	-7.55	***	1.52	4.49	***
-5, 0	0.11	0.51		-0.32	-0.93		-0.93	-3.46	***	-0.17	-0.38	
0, +5	-0.17	-0.77		-1.39	-3.70	***	1.97	7.05	***	-3.68	-7.98	***
+1, +5	0.23	1.34		-0.89	-2.87	***	1.19	4.96	***	-1.99	-5.52	***
-5, +5	0.34	1.23		-1.21	-2.63	***	0.26	0.73		-2.15	-3.77	***

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

Table 3 - Abnormal Returns for Four Groups Around the Russell 2000 Index Annual Reconstitution Date from Pre- and Post- Third Quarter of 2004

	Pure Additions to the Russell 2000 Index Pre Q4 2004 (N = 2391)			Pure Additions to the Russell 2000 Index Post Q4 2004 (N = 845)			Pure Deletions from the Russell 2000 Index Pre Q4 2004 (N = 1367)			Pure Deletions from the Russell 2000 Index Post Q4 2004 (N = 715)			Upward Shifts from the Russell 2000 to the Russell 1000 Index Pre Q4 2004 (N = 673)			Upward Shifts from the Russell 2000 to the Russell 1000 Index Post Q4 2004 (N = 239)			Downward Shifts from the Russell 1000 to the Russell 2000 Index Pre Q4 2004 (N = 591)			Downward Shifts from the Russell 1000 to the Russell 2000 Index Post Q4 2004 (N = 187)		
Trading Day	AR_t	$t(AR_t)$		AR_t	$t(AR_t)$		AR_t	$t(AR_t)$		AR_t	$t(AR_t)$		AR_t	$t(AR_t)$		AR_t	$t(AR_t)$		AR_t	$t(AR_t)$		AR_t	$t(AR_t)$	
-40	0.99	5.89	***	0.24	1.22		-0.07	-0.26		-0.35	-1.53		0.84	3.71	***	0.24	0.98		-1.50	-4.66	***	-0.44	-0.80	
-30	0.48	4.75	***	0.08	0.06		-0.61	-3.79	***	4.37	2.57	**	0.13	1.09		-1.32	-0.68		0.35	1.86		2.02	0.67	
-20	-0.10	-0.64		9.19	2.95	***	-1.32	-4.95	***	-20.15	-5.20	***	-0.12	-0.59		8.19	2.23	**	0.04	0.14		-3.18	-0.66	
-15	-2.82	-6.66	***	0.20	1.29		3.92	5.20	***	0.19	1.07		0.55	1.19		-0.16	-0.76		0.61	0.98		-0.20	-0.50	
-10	0.16	1.15		0.93	2.64	***	-0.42	-1.74		-0.16	-0.31		0.68	3.35		0.58	0.95		-1.65	-5.72	***	0.47	0.39	
-9	-0.05	-0.28		0.33	2.44	**	-0.98	-3.24	***	-0.21	-1.18		0.30	1.07		-0.35	-1.39		-1.48	-4.31	***	0.52	1.26	
-8	0.10	0.90		5.10	5.86	***	-0.48	-2.36	**	-4.00	-3.75	***	0.22	1.46		2.87	2.17	**	-0.31	-1.61		-2.55	-1.24	
-7	-0.15	-0.74		-2.30	-4.46	***	-1.54	-4.12	***	-0.18	-0.25		0.39	1.52		1.89	2.65	***	-0.94	-2.69	***	-2.49	-2.56	**
-6	0.00	-0.03		-0.39	-2.20	**	-0.41	-2.14	**	-0.54	-1.40		-0.46	-2.53		-0.08	-0.22		0.49	2.22	**	0.12	0.15	
-5	0.52	3.06	***	-0.11	-0.56		-0.30	-1.09		0.99	3.53	***	-0.18	-0.74		0.04	0.12		0.82	2.71	***	-1.16	-1.91	
-4	0.00	-0.03		0.46	2.25	**	0.52	2.20	**	0.45	2.00	**	-0.72	-3.69		-0.35	-1.57		0.75	2.35	**	0.97	2.16	**
-3	0.41	2.24	**	0.17	1.21		-1.13	-3.06	***	0.32	1.63		-0.65	-2.23		-0.23	-0.73		0.39	1.06		0.21	0.40	
-2	-1.73	-7.05	***	-0.23	-2.00	**	2.09	4.92	***	-0.17	-0.96		-0.67	-2.05		0.01	0.06		-0.52	-1.17		0.20	1.04	
-1	-0.14	-0.89		-2.00	-2.78	***	0.87	3.30	***	2.37	3.13	***	0.16	0.77		2.17	1.80		-0.31	-0.89		-1.98	-0.79	
0	-3.72	-8.20	***	-0.05	-0.16		2.26	3.21	***	0.37	0.72		1.02	2.48		1.74	4.02	***	-5.09	-5.92	***	-1.86	-2.77	***
1	-0.62	-3.79	***	0.11	0.61		1.69	3.89	***	-0.84	-3.40	***	0.83	3.73		-0.55	-1.84		-0.35	-1.03		0.81	1.25	
2	0.18	1.78		-0.67	-5.22	***	0.26	1.53		-0.96	-5.30	***	0.38	2.35		0.18	1.29		-0.62	-2.68	***	-0.92	-3.36	***
3	0.63	5.18	***	-0.64	-3.16	***	-0.21	-1.13		1.06	4.03	***	0.49	3.63		0.05	0.27		-0.51	-2.29	**	-0.38	-1.22	
4	0.08	0.33		0.07	0.34		-1.24	-3.33	***	-0.15	-0.68		0.78	1.96		0.03	0.09		-0.41	-0.86		-0.93	-1.04	
5	0.72	4.54	***	-0.05	-0.22		-1.32	-4.78	***	0.08	0.33		0.18	0.86		0.72	2.55	**	-0.43	-1.33		0.01	0.02	
6	-0.40	-2.65	***	0.67	1.16		0.51	2.10	**	-0.85	-0.97		-0.87	-2.78		0.20	0.35		0.01	0.01		0.10	0.05	
7	0.21	2.03	**	0.51	3.55	***	0.11	0.62		0.27	1.40		0.39	2.79		0.06	0.21		-0.36	-2.10	**	0.00	0.00	
8	-0.47	-3.08	***	-0.65	-2.57	**	0.51	2.41	**	1.16	4.07	***	-0.09	-0.45		0.48	1.52		-0.26	-1.03		0.91	1.83	
9	-0.92	-2.41	**	-1.65	-5.29	***	-0.08	-0.13		-0.32	-0.69		-0.07	-0.13		-0.90	-2.49	**	1.32	2.11	**	-0.72	-0.75	
10	0.24	2.06	**	-0.37	-1.77		-0.16	-0.68		-1.04	-2.85	***	0.14	0.89		-1.26	-4.50	***	-0.19	-0.92		0.17	0.21	
15	-0.72	-1.31		-0.38	-1.46		-0.36	-0.39		0.10	0.31		1.57	2.04		-0.13	-0.41		-0.17	-0.16		-0.31	-0.70	
20	-0.49	-3.45	***	0.43	2.37	**	-0.15	-0.54		0.40	1.52		-0.36	-1.46		0.40	1.90		0.10	0.32		-0.55	-1.76	
30	-0.13	-0.99		-0.33	-1.65		-0.24	-1.19		-0.36	-1.50		0.25	1.62		-0.51	-2.82	***	-0.15	-0.70		0.38	0.98	
40	0.36	3.47	***	-0.05	-0.09		0.42	1.88		0.21	0.37		0.12	1.04		4.46	6.02	***	-0.03	-0.15		-1.27	-0.71	

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

Table 4 - Cumulative Abnormal Returns for Four Groups Around the Russell 2000 Index Annual Reconstitution Date from Pre- and Post-Third Quarter of 2004

	Pure Additions to the Russell 2000 Index Pre Q4 2004 (N = 2391)			Pure Additions to the Russell 2000 Index Post Q4 2004 (N = 845)			Pure Deletions from the Russell 2000 Index Pre Q4 2004 (N = 1367)			Pure Deletions from the Russell 2000 Index Post Q4 2004 (N = 715)			Upward Shifts from the Russell 2000 to the Russell 1000 Index Pre Q4 2004 (N = 673)			Upward Shifts from the Russell 2000 to the Russell 1000 Index Post Q4 2004 (N = 239)			Downward Shifts from the Russell 1000 to the Russell 2000 Index Pre Q4 2004 (N = 591)			Downward Shifts from the Russell 1000 to the Russell 2000 Index Post Q4 2004 (N = 187)		
Event Interval	$CAR_{t1,t2}$	$t(CAR_{t1,t2})$		$CAR_{t1,t2}$	$t(CAR_{t1,t2})$		$CAR_{t1,t2}$	$t(CAR_{t1,t2})$		$CAR_{t1,t2}$	$t(CAR_{t1,t2})$		$CAR_{t1,t2}$	$t(CAR_{t1,t2})$		$CAR_{t1,t2}$	$t(CAR_{t1,t2})$		$CAR_{t1,t2}$	$t(CAR_{t1,t2})$		$CAR_{t1,t2}$	$t(CAR_{t1,t2})$	
-10, -1	-0.89	-2.97	***	1.96	5.96	***	-1.78	-3.48	***	-1.13	-2.45	**	-0.94	-2.20	**	6.54	16.65	***	-2.77	-4.86	***	-5.68	-9.27	***
-10, 0	-4.60	-13.19	***	1.91	5.36	***	0.48	0.82		-0.77	-1.50		0.09	0.19		8.28	19.75	***	-7.86	-11.67	***	-7.54	-11.69	***
0, +10	-4.08	-11.70	***	-2.73	-7.02	***	2.33	3.81	***	-1.24	-2.23	**	3.19	6.98	***	0.75	1.62		-6.90	-10.16	***	-2.80	-2.96	***
+1, +10	-0.36	-1.22		-2.67	-7.35	***	0.08	0.14		-1.60	-3.14	***	2.17	5.12	***	-0.99	-2.25	**	-1.81	-3.14	***	-0.94	-1.02	
-10, +10	-4.97	-10.82	***	-0.76	-1.50		0.55	0.70		-2.37	-3.28	***	2.26	3.62	***	7.29	12.00	***	-9.67	-10.91	***	-8.49	-7.53	***
-20, -1	-3.75	-8.87	***	14.05	28.37	***	-1.79	-2.52	**	-20.18	-32.06	***	-0.24	-0.41		18.92	33.75	***	-5.85	-7.52	***	-8.15	-9.66	***
-20, 0	-7.47	-16.24	***	14.00	27.26	***	0.47	0.61		-19.81	-29.73	***	0.78	1.30		20.66	35.66	***	-10.94	-12.77	***	-10.01	-11.54	***
0, +20	-6.37	-13.93	***	-2.94	-5.49	***	1.60	1.99	**	-8.83	-10.65	***	5.10	8.09	***	-2.50	-3.49	***	-10.27	-11.41	***	-4.58	-3.38	***
+1, +20	-2.65	-6.32	***	-2.88	-5.58	***	-0.66	-0.88		-9.20	-11.50	***	4.08	6.72	***	-4.24	-6.06	***	-5.18	-6.28	***	-2.72	-2.03	**
-20, +20	-10.12	-16.25	***	11.11	15.25	***	-0.19	-0.18		-29.01	-27.86	***	4.86	5.68	***	16.43	18.08	***	-16.13	-13.56	***	-12.72	-7.97	***
-40, -1	3.30	5.47	***	6.12	8.53	***	-6.23	-6.21	***	-12.62	-13.25	***	2.41	3.00	***	8.69	9.49	***	-9.52	-8.85	***	-8.39	-6.28	***
-40, 0	-0.41	-0.65		6.06	8.30	***	-3.98	-3.81	***	-12.26	-12.54	***	3.43	4.19	***	10.43	11.25	***	-14.61	-12.88	***	-10.25	-7.59	***
0, +40	-8.33	-13.58	***	13.79	17.55	***	3.10	2.84	***	-7.15	-6.24	***	5.22	6.26	***	-30.33	-30.49	***	-9.41	-7.88	***	-17.52	-9.55	***
+1, +40	-4.61	-7.87	***	13.85	17.89	***	0.84	0.80		-7.51	-6.69	***	4.20	5.14	***	-32.08	-32.60	***	-4.32	-3.79	***	-15.65	-8.59	***
-40, +40	-5.02	-5.84	***	19.91	18.71	***	-3.14	-2.12	**	-19.77	-13.28	***	7.63	6.59	***	-21.64	-16.01	***	-18.93	-11.77	***	-25.91	-11.42	***
-5, -1	-0.94	-4.52	***	-1.72	-7.04	***	2.05	5.83	***	3.96	12.03	***	-2.06	-7.32	***	1.64	5.66	***	1.12	2.73	***	-1.75	-3.94	***
-5, 0	-4.65	-16.92	***	-1.77	-6.34	***	4.31	9.52	***	4.32	10.94	***	-1.04	-3.15	***	3.38	10.42	***	-3.97	-7.28	***	-3.61	-7.40	***
0, +5	-2.74	-9.83	***	-1.23	-4.03	***	1.44	2.84	***	-0.45	-1.08		3.70	10.65	***	2.17	6.32	***	-7.41	-13.15	***	-3.27	-5.45	***
+1, +5	0.98	4.63	***	-1.18	-4.31	***	-0.82	-1.96		-0.81	-2.32	**	2.67	8.86	***	0.43	1.38		-2.32	-5.34	***	-1.40	-2.49	**
-5, +5	-3.68	-10.58	***	-2.94	-7.55	***	3.49	5.66	***	3.51	6.65	***	1.63	3.65	***	3.81	8.48	***	-6.28	-9.02	***	-5.02	-6.73	***

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

Table 5 - Abnormal Returns for Two Groups Around the Quarterly Reconstitution Date for the Russell 1000 Index and Russell 2000 Index from the Third Quarter of 2004 to the Third Quarter of 2008

	IPO Additions to the Russell 1000 Index (N = 40)			IPO Additions to the Russell 2000 Index (N = 454)		
Trading Day	AR_t	$t(AR_t)$		AR_t	$t(AR_t)$	
-40	0.15	0.19		-0.06	-0.29	
-30	0.55	1.07		-0.02	-0.11	
-20	0.40	1.22		0.34	2.27	**
-15	0.68	1.08		0.13	0.64	
-10	-0.24	-0.67		0.32	2.59	***
-9	0.40	1.01		0.25	1.54	
-8	0.80	1.66		0.34	1.89	
-7	0.19	0.37		-0.46	-2.36	**
-6	1.01	1.40		-0.02	-0.19	
-5	-0.21	-0.51		0.52	4.10	***
-4	0.16	0.33		-0.05	-0.34	
-3	-0.67	-1.82		-0.14	-1.13	
-2	-0.47	-1.38		0.13	0.88	
-1	-0.10	-0.20		-0.39	-2.54	**
0	1.98	3.19	***	-1.94	-9.23	***
1	1.47	3.45	***	0.98	4.02	***
2	-0.23	-0.56		0.22	1.42	
3	0.74	1.26		0.38	2.26	**
4	-0.55	-1.29		0.18	1.33	
5	-0.35	-1.20		0.46	3.18	***
6	-1.71	-1.36		0.34	2.17	**
7	0.57	1.08		0.46	3.03	***
8	0.79	1.04		0.20	1.21	
9	-1.25	-1.35		0.12	0.65	
10	-0.92	-1.90		-0.05	-0.32	
15	0.29	0.52		0.08	0.51	
20	0.35	0.64		0.25	1.48	
30	-0.43	-0.95		-0.31	-2.13	**
40	0.19	0.44		0.06	0.34	

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

Table 6 - Cumulative Abnormal Returns for Two Groups Around the Quarterly Reconstitution Date for the Russell 1000 Index and Russell 2000 Index from the Third Quarter of 2004 to the Third Quarter of 2008

	IPO Additions to the Russell 1000 Index (N = 40)			IPO Additions to the Russell 2000 Index (N = 454)		
Event Interval	$CAR_{t1,t2}$	$t(CAR_{t1,t2})$		$CAR_{t1,t2}$	$t(CAR_{t1,t2})$	
-10, -1	0.87	0.70		0.50	1.15	
-10, 0	2.85	2.15	**	-1.44	-3.08	***
0, +10	0.53	0.30		1.36	2.78	***
+1, +10	-1.45	-0.84		3.29	7.21	***
-10, +10	1.40	0.65		1.86	2.84	***
-20, -1	1.85	1.08		1.18	1.91	
-20, 0	3.84	2.15	**	-0.76	-1.18	
0, +20	3.37	1.43		2.37	3.53	***
+1, +20	1.38	0.60		4.31	6.64	***
-20, +20	5.22	1.79		3.55	3.89	***
-40, -1	15.87	5.36	***	2.76	2.89	***
-40, 0	17.85	5.95	***	0.83	0.85	
0, +40	2.54	0.84		2.24	2.37	**
+1, +40	0.56	0.19		4.18	4.49	***
-40, +40	18.41	4.35	***	5.00	3.72	***
-5, -1	-1.29	-1.54		0.07	0.24	
-5, 0	0.69	0.71		-1.87	-5.53	***
0, +5	3.06	3.35	***	0.28	0.76	
+1, +5	1.08	1.39		2.22	6.88	***
-5, +5	1.76	1.42		0.35	0.75	

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

Figure 1- Reconstitution Dates

Annual Reconstitution	**Quarterly Reconstitution**	
30-Jun-99	30-Sep-04	30-Mar-07
30-Jun-00	17-Dec-04	22-Jun-07
29-Jun-01	31-Mar-05	28-Sep-07
28-Jun-02	24-Jun-05	21-Dec-07
30-Jun-03	30-Sep-05	31-Mar-08
25-Jun-04	16-Dec-05	27-Jun-08
24-Jun-05	31-Mar-06	30-Sep-08
30-Jun-06	30-Jun-06	
22-Jun-07	29-Sep-06	
27-Jun-08	15-Dec-06	

Figure 2 - Cumulative Average Returns for Pure Additions (PA) and Pure Deletions (PD) for the (-20,+20) Window