Liquidity Effects due to Information Costs from Changes in the FTSE 100 List

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Abstract

In this paper we examine effect on the returns of firms that have been included to and deleted from the FTSE 100 over the time period of 1984-2001. Like the S&P 500 listing studies, we find that the price and trading volume of newly listed (deleted) firms increases (decreases). The evidence is consistent with the information cost/liquidity explanation. This is because investors hold stocks with more (less) available information, consequently implying that they have lower (higher) trading costs. This explains the increase (decrease) in the stock price and trading volume of newly listed (deleted) stocks to (from) the FTSE 100 List.

JEL Classification: G12, G14, C31

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1 Introduction

The Efficient Market Hypothesis (EMH) predicts that security prices reflect all publicly available information. Therefore, one corollary of the EMH is that "you

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can sell (or buy) large blocks of stock at close to the market price as long as you can convince other investors that you have no private information".[1] This statement assumes that securities are near perfect substitutes for each other. If so, the excess demand for a single security will be very elastic, and the sale or purchase of a large number of shares will have no impact on price. Therefore the prediction of this hypothesis is that quoted prices are independent of whether the stock is listed in some index or not and simply traded in the exchange.

It has been observed that listed stocks tend to be traded more heavily and more frequently than non-listed ones. In contrast to the EMH, Scholes (1972), Kraus and Stoll (1972), Hess and Frost (1982) and others suggest that a large stock sale (purchase) will cause the price to decrease (increase) even if no new information is associated with the transaction. They attribute this effect to portfolio re-balancing as investors mimic the composition of the 'important' index. An alternative explanation of this empirical regularity, that is consistent with the EMH is that listing in the index attracts increased attention thus reducing the information disparity between 'informed' and 'uninformed' traders' that results is lower transactions costs, see for example (Kim and Verrecchia 1994).

The purpose of this paper is establish whether the inclusion or deletion of firm from the FTSE100 (the most frequently traded index in the UK) has a significant effect on both price and traded volume of the stock. In addition we investigate whether the effects if any can be attribute to the reasons mentioned above.

The paper is organised as follows; the theoretical background to the debate is presented in Section 2 along with some discussion of the empirical evidence pertinent to the USA. Section 3 provides details of the data and methodology used

to examine the changes in the FTSE 100 list whilst Section 4 presents the statistical evidence. We discuss the explanations for the empirical results in Section 5. Finally, the conclusions of the study are in Section 6.

To our knowledge this is the first study that examines stock price and volume effects associated with changes in the composition of the FTSE 100 list[2].

2 Theoretical Background

The explanations for the observed price-volume relationship as the 'status[3]' of the stock changes are falling into two broad categories.

The imperfect substitutes hypothesis (ISH) Shleifer (1986), assumes that securities are not close substitutes for each other, and hence, that long-term demand is less than perfectly elastic. Under this hypothesis, equilibrium prices change when demand curves shift to eliminate excess demand. Price reversals are not expected because the new price reflects a new equilibrium distribution of security holders.

The price pressure hypothesis (PPH), Harris and Gurel (1986), assumes that investors who accommodate demand shifts must be compensated for the transaction costs and portfolio risks that they bear when they agree to immediately buy or sell securities which they otherwise would not trade. These passive suppliers of liquidity are attracted by immediate price drop (rises) associated with large sales (purchases). They are compensated for their liquidity service when prices rise (drop) to their full information levels. The PPH like the EMH assumes that long run demand is perfectly elastic at the full information price. It differs from the ISH in that it recognizes that immediate information about non-

information motivated demand shifts may be costly, and hence that short term demand curves may be less then perfectly elastic.

Empirically both Harris and Gurel (1986) and Shleifer (1986) present evidence for a strong positive stock price reaction to the announcement of listing in the Standard and Poor's 500 (S&P 500) Stock Index. Both studies indicate that the price increase is not due to the release of new information but rather to the increased demand resulting from index funds and others adding the stock to their portfolio.[4] Consistent, with this Pruitt and Wei (1989) show that institutional holdings increase when listing occurs.

Although Harris and Gurel (1986) and Shleifer (1986) study the same phenomenon over roughly the same time period, their findings differ. Harris and Gurel (1986) argue that the evidence supports the PPH, which requires that the price go back down, while Shleifer (1986) finds support of the ISH, in which long run demand is not perfectly elastic, so that the price change is permanent. In any event, these studies are an important challenge to the EMH. Dhillon and Johnson (1991) use both stock and option data and argue that their results are inconsistent with the price pressure hypothesis, but are consistent with both the imperfect substitutes and information signaling hypothesis.

Although Harris and Gurel (1986), and Shleifer (1986) both point out that the listing criteria are such that listing per se must be informationless, one can still make an argument that listing conveys information to the market. Harris and Gurel (1986) note that the increased volume makes the added stock more liquid and the expectations of this benefit can account for the … price rise" (p.825). Alternatively, firms in the S&P may receive "closer scrutiny … by analysts and

investors" (Shleifer, 1986; p.588), thereby lowering bid-ask spreads. Further evidence of this is provided by Arbel and Strebel (1982), and Barry and Brown (1984), who find that changes in information availability can lead to price changes by changing the costs borne by investors to collect, analyze, and disseminate information about a stock. Also, Amihud and Mendelson (1986), show that investors require higher expected returns for higher bid-ask spreads, and vice versa. If stocks are not held indefinitely (Amihud and Mendelson (1986) report that the average holding period for NYSE stocks is two years), trading costs represent a cost stream to shareholders.

Empirically, Beneish and Gardner (1995) examine the stock market effect of changes in the composition of the Dow Jones Industrial Average (DJIA). Unlike the S&P 500 findings, they find that the price and the trading volume of newly listed DJIA firms are unaffected. They attribute this result to a lack of index fund rebalancing, since index trading is limited because index funds mimic the S&P 500, not the DJIA. They discover, however that firms removed from the index experience significant price declines. They explain this finding with the use of the information cost/liquidity explanation, which states that investors demand a premium for higher trading costs and for holding securities that have relatively less available information.

3 Data and Methodology

The data for the additions (deletions) to (from) the FTSE 100 list from the time period of 1984-2001, were obtained from Datastream. The full list of all the additions and deletions of the list can be seen in the appendix.[5] We also collect daily stock price data and trading volume data from the same source. Data are

collected for a 121-trading-day period around the date of change.[6] Daily returns are calculated and are adjusted for cash and stock dividends and one stock split. The stock price reaction to changes in the FTSE 100 list is estimated using market-adjusted prediction errors $\left(PE_{it}\right)$,

$$PE_{it} = R_{it} - R_{mt,} \qquad (1)$$

where:

R_{it} = continuously compounded rate of return on the common stock of firm i on day t,

and

R_{mt} = continuously compounded rate of return on the FTSE 100 index on day t.

Following the methodology used in Beneish and Gardner (1995), for each sample observation, calendar time is converted to event time be defining the date on which the London Stock Exchange announces the FTSE 100 list change as event day 0[7]. Prediction errors are estimated over a 121-day period that extends from event days –60 to +60. The prediction errors, $PE_{it,}$ are averaged across the N firms in the sample on each day t to form an average prediction error, APE_t. An estimate of the variance of this series (an equally-weighted portfolio variance), $S^2{}_{APE}$, is calculated over 80 trading days (-61, -21 and +21, +61). The variance estimate is

$$S^2{}_{APE} = \frac{1}{79}\sum_{t=1}^{80}\left(APE_t - \overline{APE}\right),^2 \qquad (2)$$

Where $\overline{APE}$ is the mean average prediction error for the 80-trading-day estimation period.

We cumulate the average prediction errors over intervals of k days from t through $t+k$ to obtain cumulative average prediction errors, $CAPE_{t,t+k,}$ where,

$$CAPE_{t,t+k} = \sum_{T=t}^{t+k} APE_T. \qquad (3)$$

The t-statistic used to test whether cumulative average prediction errors differ significantly from zero is based on the time-series variance of portfolio average prediction errors, $S^2{}_{APE,}$ for the 80-day estimation period, which has 79 degrees of freedom, and incorporates any cross-sectional dependence in the daily prediction errors. The t-statistic is calculated as:

$$t = \frac{CAPE_{t,t+k}}{\left[kS^2{}_{APE}\right]^{\frac{1}{2}}}. \qquad (4)$$

4 Results

The discussion of the empirical results is divided into two sections. Section 4.1 presents tests of stock price effects associated with announcement of changes in the FTSE 100 list. Section 4.2 presents tests of trading volume effects associated with announcement of changes in the FTSE 100 list.

4.1 Stock Price Response to Announcement of FTSE 100 List Changes

We assess the stock price reaction to announcement of FTSE 100 list changes using individual firm estimations.[8] The results are summarised in Table 1.

[INSERT TABLE 1 HERE]

Panel A indicates that stock returns of firms added to the FTSE 100 list are affected by the inclusion. The CAPE from day –1 to +1 of 6.5 is distinguishable

from zero with a t-statistic of 2.52.[9] Moreover, the behaviour of stock prices one to three months subsequent to the announcement suggests that the price increase for FTSE 100 list additions is permanent. This is due to the fact that the CAPE for days +2 to +60 of –14.82 percent is not significant with a t-statistic of –0.64.

Panel B indicates that stock returns of firms deleted from the FTSE 100 list are affected by the deletion. The CAPE from day –1 to +1 of –5.02 is distinguishable from zero with a t-statistic of –2.63. Moreover, the behaviour of stock prices one to three months subsequent to the announcement suggests that the price decline for FTSE 100 list deletions is permanent. This is due to the fact that the CAPE for days +2 to +60 of –13.8 percent is not significant with a t-statistic of –0.75.

From our results we report significant positive stock price reactions to the announcement of new listings on the FTSE 100 list. This agrees with the literature on the S&P 500 since Shleifer (1986), Harris and Gurel (1986) and Dhillon and Johnson (1991) report significant positive stock price reactions to the announcement of new listings on the S&P 500.

We also report significant negative stock price reactions to the announcement of new deletions from the FTSE 100 list. This agrees with the literature on the DJIA since Beneish and Gardner (1995) report significant negative stock price reactions to the announcement of deletions from the DJIA. A further interesting observation from Table 1 is the asymmetry in the results. There is clear evidence of additions having a greater impact on prices around the announcement period than the deletions. Possible explanations for the asymmetric results are explained further on in the paper.

4.2 Trading Volume Response to Announcement of FTSE 100 List Changes

To determine the possible presence of liquidity effects we proceed with the analysis of the impact of listing/de-listing on trading volume. The analysis of the trading volume permits us to establish whether the liquidity explanation can be supported.[10]

To assess whether trading activity changes when a firm is added (deleted) to (from) the FTSE 100 list, trading volumes, adjusted for market volume, are analyzed in event time.[11] Cross-sectional means are computed using the Harris and Gurel (1986) estimation technique, and are as follows:

$$MVR_t = \frac{1}{N}\sum i\ VR_{it}. \qquad (5)$$

Where

$$VR_{it} = \frac{V_{it}}{V_{mt}}. \frac{V_m}{V_i}. \qquad (6)$$

Where V_{it} and V_{mt} are the trading volumes of security i and of the total FTSE 100 Index in event-time period t, respectively, V_i and V_m are the average trading volumes of the security and of the total FTSE 100 Index in the 8 weeks preceding the announcement week. The volume ratio, VR_{it}, is a standarized measure of period t trading volume in security i, adjusted for market variation. The volume ratio has an expected value that is equal to 1, if there is no change in volume in event-period t relative to the prior 8 weeks. Results of tests of trading volume effects are presented in Table 2.

[INSERT TABLE 2 HERE]

Panel A indicates that trading volume increases when firms are added to the FTSE 100 list. This is because on average, trading volume on the first day on which trading is possible after the announcement is 1.21 times as large as the daily mean

volume over the 8 weeks prior to the announcement. Tests of whether these mean volume ratios are equal to 1 reject equality since we obtain a t-statistic of 3.62. Therefore this leads us to conclude that when firms are added to the FTSE 100 list, trading volume increases.

Panel B indicates that trading volume decreases when firms are deleted from the FTSE 100 list. This is because on average, trading volume on the first day on which trading is possible after the announcement is 1.14 times smaller then the daily mean volume over the 8 weeks prior to the announcement. Tests of whether these mean volume ratios are equal to 1 reject equality since we obtain a t-statistic of –2.74. Therefore this leads us to conclude that when firms are deleted from the FTSE 100 list, trading volume decreases.

At this point in this study we have found the following empirical results. First, when firms are added to the FTSE 100 list, the stock price and the trading volume for these firms increase. Second, when firms are deleted from the FTSE 100 list, the stock price and the trading volume for these firms decrease. In addition the impact of inclusion on the price of is more pronounced (in proportional terms) than that of deletion, no such asymmetry was observed for trading volumes.

5 Explanations of the Results

5.1 Price-pressure hypothesis and the imperfect substitutes hypothesis

Previous literature on the S&P 500 found that stock prices increased (decreased) when firms were added (deleted) to (from) the S&P 500. They also found that when firms were added (deleted) to (from) the list, that trading volume for these firms increased (decreased). A number of reasons (discussed in the beginning of the paper) have been offered as a possible explanation to these results. In this

section we discuss these possible explanations with reference to their applicability to our empirical results.

Harris and Gurel (1986) argue in favour of the price-pressure hypothesis. They say that when a firm is added (deleted) the stock price goes up (down) accordingly. Once this initial trading has taken place the price goes back down (up) if a firm is added (deleted).

In our results we find no evidence to suggest that the listings (deletions) to (from) the FTSE 100 list follow a price-pressure hypothesis. The reason for this is that we find the price increase (decrease) for the added (deleted) firms to be permanent.[12] If there was evidence of the price-pressure hypothesis, we would expect the price for the added (deleted) firms to go back down (up) after the change had taken place.

Shleifer (1986) finds evidence of the imperfect substitutes hypothesis. He argues that investor's hold on to stocks that are on the FTSE 100 list and when a firm is deleted from the list they sell the stock in that firm and buy stock in a firm that is on the list. They therefore treat stocks as imperfect substitutes for each other. In the imperfect substitutes hypothesis the long-run demand is not perfectly elastic, implying that the price change is permanent. In our results we find that the price change is permanent, which brings support to the imperfect substitutes hypothesis. However, the problem with the imperfect substitutes hypothesis is that it is assuming that the listing (delisting) per se must be informationless. However, we can make an argument that listing (delisting) conveys information to the market. The reason as to why we can portray such an argument comes from our results with respect to trading volume.

Recall that we find that when a firm is added (deleted) that trading volume increases (decreases). According to Harris and Gurel (1986) the increased (decreased) volume makes the added (deleted) stock more (less) liquid and the expectations of this benefit (loss) can account for the price rise (fall). Alternatively, firms in the FTSE 100 list may receive more attention by analysts and investors' resulting in lower bid-ask spreads. This also applies for deleted firms, since deleted firms will receive less attention by analysts and investors' resulting in higher bid-ask spreads.[13] This analysis leads us to propose an information cost/liquidity explanation for our empirical results.

5.2. An Information Cost/Liquidity Explanation

If inclusion in (exclusion from) the FTSE 100 list is followed by increased (decreased) scrutiny by analysts, investors and institutions, the firm's information environment is richer (poorer) and the stock will be traded more (less) widely and become more (less) liquid. In this section of the paper we discuss various aspects of this possible explanation, namely whether there are changes in the information environments and the liquidity of the added (deleted) FTSE 100 firms.

If changes in the FTSE 100 list are associated with changes in information environment, stock price of FTSE 100 list change firms adjust to reflect changes in future levels of available information.

Given evidence that information availability is priced (Arbel and Strebel (1982), Barry and Brown (1984)), changes in information availability can lead to price changes by changing the costs borne by investors to collect, analyze, and

disseminate information about a stock. Our tests are based on the number of analysts following the stock.[14] Table 3 presents the results of our analysis.

[INSERT TABLE 3 HERE]

In Panel A, we compare the average number of analysts' that follow the stocks before and after the additions take place. We find a significant increase in the number of analysts' that follow the firms once they are added to the FTSE 100 list. In Panel B, we compare the average number of analysts' that follow the stocks before and after the deletions take place. We find a significant decrease in the number of analysts' that follow the firms once they are deleted from the FTSE 100 list. This means that when firms are added to the list, they operate in a richer information environment.

Following Amihud and Mendelson (1986), who show that investors require higher expected returns for higher bid-ask spreads, we examine whether changes in the composition of the FTSE 100 list are associated with changes in bid-ask spreads.

Assessing whether spreads change requires the estimation of effective spreads pre and post changes in the FTSE 100 list. We can calculate the 'effective spread' using two types of methodology. The first method that we can use is the Roll (1984) serial covariance spread estimator. However, this method provides us with a problem because FTSE 100 list firms are large and we observe negative spread estimates that are impossible to interpret. For this reason we calculate effective spreads by using the second method.

The second method uses intraday data to obtain quoted bid-ask spreads. We then calculate estimates of effective spreads with the use of intraday data that is available from Datastream. We are able to collect data on all quotations by FTSE

specialists from Datastream. Using quotation data from a period of 50 trading days before and 50 trading days after the FTSE 100 list change announcement period, we compare actual spreads computed as the difference between ask and bid prices. The results can be seen in Table 4.

[INSERT TABLE 4 HERE]

In Panel A, we compare the average effective bid-ask spread before and after the additions take place. We find a significant decrease in the bid-ask spread after the additions have taken place. This was to be expected, in the light of the discussion above as, when firms are added to the FTSE 100 list they operate in a richer information environment. This new status increases the trade of these stocks, which results in them becoming more liquid (Harris and Gurel (1986)).

In Panel B, we compare the average effective bid-ask spread before and after the deletions take place. We find a significant increase in the bid-ask spread after the deletions have taken place. This is logical since when firms are deleted from the FTSE 100 list investors operate in an environment where information is relatively scarce.

5.3 Cross-Sectional Test

Our analysis would not be complete without a simultaneous consideration of all competing explanations. We specify a cross-sectional model with the event window performance as the dependent variable to simultaneously evaluate the potential competing explanations. Regressors are proxies for change in bid-ask spread (liquidity), abnormal volume (imperfect substitutes) and change in quantity of publicly available information (information costs). The model, similar in spirit to that of Beneish and Gardner (1995) is specified as follows,

$$CPE_i = \alpha_0 + +\alpha_1 \Delta SPREAD_i + \alpha_2 ABVOL_i + \alpha_3 \left(MV_{t+5} / MV_{t-1} \right) + \varepsilon_i, \quad (7)$$

Where

$CPE =$ Cumulative prediction error on days –1 to +1 relative to the date of the announcement of the FTSE 100 list change,

$\Delta SPREAD =$ Change in the effective spread (estimated by using the ask price minus the bid price) in the 50 trading days surrounding and excluding the announcement of the FTSE 100 list change,

$ABVOL =$ Abnormal volume as defined in equation (5) for the three-day period from days –1 to +1 relative to the day of FTSE 100 list change, and

$MV_{t+5} / MV_{t-1} =$ ratio of market value (price x number of common shares) at the end of year $t+5$ verses market value at the end of year $t-1$; used as a proxy for future growth.[15]

[INSERT TABLE 5 IN HERE]

The results of the cross-sectional regression test can be seen in Table 5 along with the appropriate diagnostic tests. We can see that all the explanatory variables in the regression are statistically significant, and that the equation is well specified. These results clarify our previous findings in this paper.

The variable $ABVOL$ is positive and significant since abnormal trading volume explains stock price reaction to changes in the FTSE 100 list. There is evidence of this from Table 2. We find that trading volume increases when firms are added to the FTSE 100 list and we also find that trading volume decreases when firms are deleted from the FTSE 100 list. This result provides empirical evidence of the imperfect substitutes hypothesis proposed by Schleifer (1986).

The variable MV_{t+5} / MV_{t-1} is positive and significant since the amount of publicly available information, effects stock price reaction to changes in the FTSE 100 list. There is evidence of this in Table 3. We found that when a firm is added (deleted) to (from) the FTSE 100 list that the number of analysts' that follow that stock price significantly increases (decreases). The increase (decrease) in the publicly available information on the stock causes a positive (negative) stock price reaction to the announcement of the change. The finding that stock prices increase (decrease) when the quantity of available information increases (decreases) is consistent with evidence in Arbel and Strebel (1982), Barry and Brown (1984), and Merton (1987) that investors demand higher returns for holding stocks with less available information.

The $\Delta SPREAD$ variable is negative and significant. There is evidence of this in Table 4. We found that spreads decreased (increased) when firms were added (deleted) to (from) the FTSE 100 list. This result is consistent with evidence in Amihud and Mendelson (1986) that investors require higher expected returns for higher trading costs.

Overall, the results suggest the positive (negative) stock price reaction to listings (deletions) to (from) the FTSE 100 list is consistent with a decrease (increase) in trading costs. The shareholder wealth gain (loss) represents the present value of the expected change in bid-ask spreads.

Therefore, from our analysis we find that trading costs provide a plausible explanation for the stock price reaction to listings (deletions) to (from) the FTSE 100 list. This provides an explanation for our empirical results. It does not, however, provide an explanation for the asymmetric results that we find in our

analysis. It does not account for why additions to the FTSE 100 list have a greater stock price reaction than the deletions from the FTSE 100 list. A possible source for the asymmetric results will be sought within the specification of equation (7). We re-estimate equation (7) for the additions and for the deletions separately[16]. The results can be seen in Table 6.

[INSERT TABLE 6 HERE]

We can see from Table 6 that all the coefficients in equation (7) are significantly larger for the additions then they are for the deletions. This is because the additions carry more publicly available information than the deletions. Deleted firms up to their date of de-listing were the focus of attention of 'experts'. When de-listed the information about them did not depreciate immediately, only gradually they lost their attractiveness to 'analysts'. So de-listing does not imply an immediate loss of information about the firm, but it acts as a signal that the attention of 'experts' will shift from it, and that informed traders will emerge. For newly listed firms, the opposite occurs as a new investment in information is expected and as a consequence of this increased liquidity, the reaction of the market is more pronounced. This results in the additions having a significantly larger stock price reaction then the deletions.

6 Conclusions

In this paper we find a significant gain (loss) to shareholders of firms added (deleted) to (from) the FTSE 100 list. This is due to the fact that when firms are added/deleted to the index the stock prices rise(fall) significantly. Furthermore we find that added (deleted) firms experience an increase (decrease) in trading volume, and an increase (decline) in the 'quantity' of available information after the FTSE 100 list change, suggesting a decrease (increase) in future trading costs.

This finding does not support either the imperfect substitutes hypothesis, that postulates that the listing (de-listing) per se is informationless, or the price pressure hypothesis as an explanation of our results. Finally we provide evidence of an asymmetric price reaction, since there is clear indication of larger stock price reaction to the additions than to deletions, over a three-day event window.

The evidence in this paper is consistent with an information cost/liquidity explanation for the empirical results. Inclusion (exclusion) in (from) the FTSE 100 list increases (decreases) the likelihood that they will be widely followed. One implication for future research is that it may be more costly for a firm to borrow or issue capital after deletion. Another implication is that researchers should consider changes in trading and holding costs as competing explanations for price reactions associated with changes in index list.

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Tables

TABLE 1. Stock Price Reaction to Announcement of Changes in the FTSE 100 List, between the time period of 1984-2001. Cumulative Average Prediction Errors (CAPE) and t-statistics are reported

Panel A. Additions			Panel B. Deletions		
Days Relative to Event	CAPE (%)	t-statistic	Days Relative to Event	CAPE (%)	t-statistic
-60, -2	1.27	0.32	-60, -2	-3.43	-0.61
-60, -41	1.47	0.39	-60, -41	-2.49	-0.37
-40, -21	-2.23	-0.67	-40, -21	-1.63	-0.94
-20, -11	1.93	0.45	-20, -11	-2.55	-1.12
-10	-0.73	-0.98	-10	-0.52	-0.46
-9	0.54	0.32	-9	1.09	0.97
-8	2.23	1.23	-8	0.81	0.93
-7	0.169	0.47	-7	1.17	0.70
-6	-1.40	-1.23	-6	0.92	0.89
-5	1.03	0.22	-5	0.65	0.59
-4	2.68	1.08	-4	-0.27	-1.12
-3	2.55	1.01	-3	-1.50	1.02
-2	3.41	2.24*	-2	-1.05	-2.01*
-1	2.85	1.99*	-1	-1.74	-2.74*
0	1.26	2.44*	0	-2.33	-3.39*
1	2.39	2.77*	1	-0.95	-2.18*
2	1.09	2.22*	2	-1.35	-2.44*
3	-0.46	-0.80	3	-0.76	-1.23
4	2.06	1.34	4	-1.32	-1.01
5	1.31	0.50	5	-1.09	-1.36
6	-0.92	-0.24	6	-0.09	-1.49
7	0.59	0.53	7	1.35	1.36
8	-0.74	-0.99	8	-0.71	-1.02
9	-0.26	-1.23	9	-0.98	-1.22
10	-1.89	-1.07	10	-0.31	-1.34
+11, +20	-2.87	-1.23	+11, +20	-1.56	-0.64
+21, +40	-3.78	-1.34	+21, +40	1.25	1.30
+41, +60	-3.89	-1.58	+41, +60	-3.86	-1.42
+2, +60	-4.06	-1.60	+2, +60	-4.37	-1.58
CAPE(-1, +1)	6.5	2.52*	CAPE(-1, +1)	-5.02	-2.63*

Notes:

Day 0 is the day on which the changes in the FTSE 100 list are announced on the London Stock Exchange.
* Significant at the 5% level (two-tailed test).

TABLE 2. Trading Volume Reaction to Announcement of Changes in the FTSE 100 List, between the time period of 1984-2001

Panel A. Additions			Panel B. Deletions		
MVR	STD	t-statistic	MVR	STD	t-statistic
1.21	0.78	3.62*	-1.14	0.88	-2.74*

Notes:

We calculate the trading volume effects for days 1 to 5 after the announcement of the change on the London Stock Exchange.
MVR stands for the mean volume ratio.
STD stands for the sample standard deviation of the volume ratios.
The t-statistics are testing whether the mean of the volume ratios is different to 1 (two-tailed test).
Significant at the 5% level (two-tailed test).

TABLE 3. Information Availability Pre and Post FTSE 100 List Changes

	Panel A. Additions	Panel B. Deletions
Mean No of Analysts' following the stock Pre Change	5.92	5.92
Mean No of Analysts' following the stock Post Change	7.24	3.26
t-test of Mean Differences	16.99*	18.26*

Notes:

By Pre change we mean 8 weeks before the announcement of the additions (deletions).
By Post change we mean 8 weeks after the announcement of the additions (deletions).
We use an 8 week time span to make sure that we capture any Pre or Post announcement drift that may occur.
* Significant at the 5% level (two-tailed test).

TABLE 4. Effective Bid-Ask Spreads Pre and Post FTSE 100 List Changes

	Panel A. Additions	Panel B. Deletions
Bid-Ask Spread Pre Change	0.31%	0.34%
Bid-Ask Spread Post Change	0.2%	0.45%
t-test of Mean Differences	2.02*	2.01*

Notes:

The bid-ask spread computed is the Mean Percentage Effective Spread. Mean spread is the mean spread (ask price – bid price) on all quotations by FTSE specialists in that day. The periods before and after refer to a maximum of 50 trading days before (after) and excluding the three-day FTSE 100 list change announcement period. Mean Percentage spread is computed as (ask price – bid price) / (ask price + bid price) / 2 in the same period.
* Significant at the 5% level (two-tailed test).

TABLE 5. A Cross-Section Regression Test of Alternative Explanations for the Stock Price Reaction to Changes in the FTSE 100 List

$$CPE_i = \alpha_0 + +\alpha_1 \Delta SPREAD_i + \alpha_2 ABVOL_i + \alpha_3 \left(MV_{t+5} / MV_{t-1} \right) + \varepsilon_i ,$$

Variable	α_0	α_1	α_2	α_3	$\overline{R}^2$
Coefficient Estimates	-0.04	-0.0066	-0.731	0.0097	10.28%
(t-statistics)	(-1.28)	(-2.48)*	(-2.09)*	(2.34)*	

Notes:

Significant at the 5% level (two-tailed test).

Diagnostic results

Heteroscedasticity Test	Normality Test	Functional Form Test
1.04	3.42	0.74

Notes:

All the diagnostic statistics that are reported are based on the F statistic.
The heteroscedasticity test is based on the test proposed by White (1980).
The normality test is based on the test proposed by Jacque and Bera (1987).
The functional form test is based on the Ramsey (1969) test.

TABLE 6. A Cross-Section Regression Test of Alternative Explanations for the Stock Price Reaction to Additions and Deletions in the FTSE 100 List

$$CPE_i = \alpha_0 + +\alpha_1 \Delta SPREAD_i + \alpha_2 ABVOL_i + \alpha_3 \left(MV_{t+5} / MV_{t-1} \right) + \varepsilon_i ,$$

Coefficient	Additions	Deletions	t-test of Mean Differences
α_1	-0.022	-0.0011	2.21*
α_2	-1.24	-0.64	2.04*
α_3	0.095	0.0032	2.17*

Notes:

Significant at the 5% level (two-tailed test).

Appendix

Date of Change	Firms Added	Firms Deleted	Sample Total
19/01/84	1	1	2
02/04/84	1	1	2
02/07/84	2	2	4
19/07/84	1	1	2
01/10/84	3	3	6
04/12/84	1	1	2
02/01/85	4	4	8
01/02/85	1	1	2
01/04/85	3	3	6
01/07/85	2	2	4
06/08/85	1	1	2
01/10/85	1	1	2
02/01/86	1	1	2
08/01/86	2	2	4
01/04/86	4	4	8
21/04/86	1	1	2
22/04/86	1	1	2
01/07/86	3	3	6
01/10/86	3	3	6
09/12/86	1	1	2
02/01/87	3	3	6
01/04/87	3	3	6
27/04/87	1	1	2
01/07/87	2	2	4
01/10/87	3	3	6
04/01/88	2	2	4
25/02/88	1	1	2
05/04/88	4	4	8
01/07/88	1	1	2
07/07/88	1	1	2
03/10/88	1	1	2
21/12/88	1	1	2
03/01/89	2	2	4
03/04/89	4	4	8
17/07/89	1	1	2
27/07/89	1	1	2

08/08/89	1	1	2
11/09/89	1	1	2
02/11/89	1	1	2
02/01/90	2	2	4
02/04/90	1	1	2
02/07/90	1	1	2
13/07/90	1	1	2
01/10/90	3	3	6
02/11/90	1	1	2
02/01/91	2	2	4
23/01/91	1	1	2
02/04/91	3	3	6
01/07/91	3	3	6
16/09/91	1	1	2
01/10/91	1	1	2
26/11/91	1	1	2
04/12/91	1	1	2
02/01/92	3	3	6
01/04/92	4	4	8
22/06/92	3	3	6
13/07/92	1	1	2
21/09/92	6	6	12
21/12/92	2	2	4
22/03/93	1	1	2
01/06/93	1	1	2
21/06/93	4	4	8
20/09/93	3	3	6
25/10/93	1	1	2
05/11/93	1	1	2
20/12/93	2	2	4
21/03/94	3	3	6
20/06/94	1	1	2
19/09/94	2	2	4
17/03/95	1	1	2
26/07/95	1	1	2
18/09/95	3	3	6
19/09/95	1	1	2
23/10/95	1	1	2
11/12/95	1	1	2
18/12/95	5	5	10

28/12/95	2	2	4
31/01/96	1	1	2
24/06/96	3	3	6
19/07/96	1	1	2
17/08/96	1	1	2
23/09/96	1	1	2
30/09/96	1	1	2
23/12/96	2	2	4
14/02/97	1	1	2
24/02/97	1	1	2
24/03/97	1	1	2
23/06/97	2	2	4
22/09/97	5	5	10
17/12/97	2	2	4
22/12/97	4	4	8
24/12/97	1	1	2
23/03/98	1	1	2
21/05/98	1	1	2
02/06/98	1	1	2
22/06/98	2	2	4
08/09/98	1	1	2
21/09/98	5	5	10
16/12/98	1	1	2
21/12/98	4	4	8
04/02/99	2	2	4
22/03/99	4	4	8
29/03/99	1	1	2
10/05/99	1	1	2
21/06/99	2	2	4
28/07/99	1	1	2
20/09/99	3	3	6
11/11/99	1	1	2
24/11/99	1	1	2
20/12/99	2	2	4
07/03/00	1	1	2
20/03/00	9	9	18
12/05/00	1	1	2
30/05/00	1	1	2
19/06/00	4	4	8
27/07/00	1	1	2

18/09/00	5	5	10
17/10/00	1	1	2
18/12/00	5	5	10
27/12/00	2	2	4
02/02/01	2	2	4
19/03/01	2	2	4
10/04/01	1	1	2
18/06/01	1	1	2
12/07/01	1	1	2
07/08/01	1	1	2
10/09/01	2	2	4
24/09/01	8	8	16
19/11/01	2	2	4
12/12/01	1	1	2
Total	**258**	**258**	**516**

ENDNOTES

[1] Brealey and Myers (1984, p.279).

[2] By changes we are referring to additions (deletions) to (from) the FTSE 100 list.

[3] By status we imply inclusion/deletion from the index

[4] The reason for this is that the key aspect of the S&P's selection mechanism is that the composition of their list does not depend on forecast security returns. Since changes are based only on publicly available information and on well-known criteria, they should not reveal new information about future return distributions.

[5] There were 258 additions (deletions) to (from) the FTSE 100 list during the time period of 1984-2001.

[6] Beneish and Gardner (1995) recommend a 121 trading day period around the date of change since it is long enough to capture any type of pre or post announcement drift that may occur.

[7] The event date is the date on which the London Stock Exchange announces the change and the date at which the change occurs.

[8] Beneish (1991) says that we should form equally-weighted portfolios of all changes occurring on a given day and asses average abnormal performance at the portfolio level. The test based on portfolios is conducted because the prediction errors of firms sharing the same event date in calendar time are likely to be correlated, and the t-statistics on average abnormal performance are likely to be biased away from zero. We perform the portfolio estimations (the results are not reported) and we find no significant difference between the portfolio results and the individual firm results. For this reason we only calculate individual firm estimations.

[9] We use a standard three-day period to assess abnormal performance.

[10] Beneish and Gardner (1995) first discussed the liquidity explanation for changes in trading volume.

[11] We collect the trading volume data with the use of Datastream. When a stock experiences a split, we divide all subsequent volume data by the split factor.

[12] For more details of these results see the explanation of Table 1.

[13] This line of argument comes from Schleifer (1986). The only difference is that he mentions the S&P 500 instead of the FTSE 100 list. We would expect the impact of both lists to be very similar since both lists are traded very frequently.

[14] We are grateful to I/B/E/S for access to their data of analysts' forecasts.

[15] We collect the data for the ratio of market value the use of Datastream.

[16] We re-estimate equation (7) using a three day event window. The reason for this is that from Table 1 we can see that the stock price reaction to the additions and to the deletions is only significant for the three days before and after the addition, or deletion takes place.