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# MEMBERSHIP OF THE FTSE 100 INDEX: AN EXPLORATION OF THE INFORMATION COST AND LIQUIDITY HYPOTHESIS

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*ABSTRACT*

*Prior research suggests that a firm's inclusion in an index generates a favourable market reaction. A number of hypotheses are advanced to explain this phenomenon. This paper explores one of these hypotheses, the information cost and liquidity hypothesis, using the FTSE 100 as the benchmark index. We employ two measures of the richness of a firm's information environment and report evidence consistent with the information cost and liquidity hypothesis. The results have implications for researchers conducting studies conditioning proxies for information availability in measuring the price and/or trading volume response to firm specific events such as the release of the preliminary results.*

## INTRODUCTION

A number of hypotheses are suggested in the literature to explain stock price changes and trading volume activity caused by a stock's addition (deletion) to (from) an index. These are the price pressure hypothesis, imperfect substitutes hypothesis, information content hypothesis and information cost and liquidity hypothesis.

This paper makes a contribution to the extant literature by providing some evidence regarding the information cost and liquidity (ICL) hypothesis using the FTSE 100 as the benchmark index. The ICL hypothesis argues that inclusion in an index, such as the FTSE 100 index, generates increased scrutiny by sell-side analysts, investors and other capital market participants. Consequently a firm's information environment will become richer. Given evidence that information availability is priced (Carvell and Strebel, 1984; Arbel, 1985), changes in information availability can lead to price changes by impacting on the costs incurred by investors in collecting, analysing and disseminating firm information.

Beneish and Gardner (1995) is the only extant study that explicitly tests the ICL hypothesis. However, Beneish and Gardner (1995) adopt a very restrictive measure of a firm's information environment to test their hypothesis. Within the set of publicly available information they examine announcements of sales, earnings and dividends only. Specifically, they compare the number of such reported announcements in the *New York Times* for new Dow Jones Industrial Average

(DJIA) firms to that for similar sized firms in the same industry both before and after the DJIA change. Their results point to evidence of increases in financial press coverage for those firms added to the DJIA consistent with the predictions of the ICL hypothesis.

In contrast to Beneish and Gardner (1995) we adopt two broader measures of the richness associated with a firm's information environment: (1) the number of analysts following a stock and (2) the percentage of a firm's "economically significant" price changes that are triggered by reported corporate news. The study investigates whether the richness of the information environment of FTSE 100 firms differs significantly from their equivalents in the FTSE 250 index, after controlling for the impact of firm size[1].

The next section of this paper reviews the theories and empirical evidence on the market effects of a firm's inclusion in an index. This is followed by a discussion of the two empirical proxies for the richness of a firm's information environment that we employ in testing the ICL hypothesis in a UK context. The sample companies and associated descriptive statistics are then presented, after which the results of our empirical tests are discussed. The final section presents a summary and conclusion.

## THEORIES AND EMPIRICAL EVIDENCE ON MARKET EFFECTS OF A FIRM'S INCLUSION IN AN INDEX

As mentioned in the introduction, four theories have been advanced in order to explain price and/or trading volume activity caused by a firm's addition to (deletion from) an index. These are the price pressure hypothesis, imperfect substitutes hypothesis, information content hypothesis, and the information cost and liquidity hypothesis (Sutcliffe, 1993, p. 18). The price pressure hypothesis (PP) proposes that including (excluding) a stock in (from) an index results in a temporary increase (decrease) in its share price and trading volume activity due to demand considerations. Over time, as investors substitute between stocks, these abnormal movements reverse themselves. The imperfect substitutes hypothesis (IS) posits that the demand curve for securities is not perfectly elastic and that substitute assets do not exist for stocks included in the index. Demand curves therefore have to shift to eliminate excess demand and there will be a shift in price which will be non-reversing. The information content hypothesis (IC) suggests that the addition (deletion) of a stock from an index communicates value relevant information to the market about a firm's future prospects. In the context of this hypothesis, trading volume may increase temporarily whilst a permanent increase in a firm's share price may be recorded. The information cost and liquidity hypothesis (ICL) posits that inclusion (exclusion) in (from) an index is followed by increased (decreased) scrutiny by sell-side analysts, private and institutional investors, the firm's information environment becomes richer (poorer) and the stock will be traded more (less) widely and become more (less) liquid. According to this hypothesis, the volume of shares traded will increase permanently when a firm is included in an index, as will the share price.

The weight of the empirical evidence on the stock price and trading volume effects of the addition (deletion) of stocks to (from) an index is largely US-based[2]. Arnott and Vincent (1986), Harris and Gurel (1986), Shleifer (1986), Woolridge and Ghosh (1986), Jain (1987), Lamoureux and Wansley (1987), Dhillon and Johnson (1991) and Beneish and Gardner (1995) report significant positive price reactions to the announcements of new listings on key indices. Arnott and Vincent (1986) do not provide a rationale for their findings. Harris and Gurel (1986) and Shleifer (1986) suggest that changes in institutional fund holdings are responsible for the observed abnormal returns. Whilst Harris and Gurel (1986) report evidence of subsequent price reversals consistent with the PP hypothesis, Shleifer (1986) finds no evidence of subsequent price reversals, thus contradicting the PP hypothesis[3]. It is found that returns are not related to S&P's bond rating changes which it is argued is inconsistent with the returns being associated with communicating information about the future prospects of the firm, that is, the IC hypothesis. Shleifer concludes therefore that by default the returns are consistent with the IS hypothesis. Dhillon and Johnson (1991) report that the PP results of Harris and Gurel (1986) may be time period specific. They extend Harris and Gurel (1986) to a later period and report no evidence of price reversals. They argue that by default their results are consistent with both the IS and IC hypotheses. The study by Beneish and Gardner (1995) is the most comprehensive on the price and trading volume impact of index additions and deletions. While a common finding of the extant research prior to Beneish and Gardner (1995) is that new listing in an index is associated with significant price increases, the interpretation of the findings is not consistent across studies, nor have researchers been able to distinguish adequately between the proposed competing explanations. Beneish and Gardner (1995) adopt a much longer time period than that employed in prior research and, in addition, theirs is the first study to include a set of empirical proxies for all four competing hypotheses. Their evidence is consistent with the ICL hypothesis and is not supportive of the other three hypotheses.

The only UK-based evidence is that of McIlkenny, Opong and Watson (1996). They examine the share price and trading volume reaction of 70 firms entering or leaving the FTSE 100 index over the period March 1984 to December 1992. They report no evidence of price reversals in the 21-day period subsequent to the addition/deletion and conclude that their results are inconsistent with the PP hypothesis. They are, however, unable to reach a conclusion on whether or not their results are consistent with the other three hypotheses, including the ICL hypothesis, as they do not employ empirical proxies for these hypotheses[4].

## THE RICHNESS OF A FIRM'S INFORMATION ENVIRONMENT

In order to test the ICL hypothesis in a UK context we employ two empirical proxies for the richness of a firm's information environment and hence the amount of information available about a firm. The first is the number of analysts following a stock. The second empirical measure we employ is the percentage of companies' "economically significant" market adjusted share returns triggered by "reported"

corporate news. These two empirical proxies are discussed in the next two subsections.

*Analyst following*

A growing literature cites analyst activities as a key source of firm news and hence as an important component of a firm's total information environment. For example, in Shores (1990) study of the preemption of annual earnings surprises by interim disclosures, analyst following is a proxy for the level of interim information available about a firm. Brennan and Hughes (1991) and Bhushan (1989) equate analyst following with the economy-wide amount of information gathering in their models of stock splits and disclosures respectively. Carvell and Strebel (1984) and Arbel (1985) show that investors demand a risk premium, in terms of an increased return, for investing in stocks not closely followed by the community of investment analysts. Merton (1987) argues that the higher returns attributable to such factors as low P/E may be associated with compensation for reduced information availability. In this context, the importance of the analyst as a key component of a firm's information environment is suggested by the dominance of analyst neglect over stock market anomalies - namely size, low P/E and the January seasonal - in explaining returns (Arbel, 1985). Implicit in these studies is that the sell-side analyst has a significant role to play as a conduit for the flow of firm information to the equity markets.

*Reported corporate news and company share price activity*

An alternative measure of the richness of a firm's information environment that we will employ is a variable measuring the extent to which movements in a company's share price can be attributed to publicly available news sources. The data necessary to compile this empirical proxy is drawn from Ryan and Taffler (2004).

Ryan and Taffler (2004) explore the relationship between firm specific information events and companies' "economically significant" prices changes for FTSE 100 and FTSE Mid-250 constituents over the two-year period January 1994 to December 1995. Economically significant price changes are defined as those in the two and a half per cent tails of the return distribution for the sample firms[5]. They then match these price movements, where possible, to publicly available sources of corporate news[6].

In this study, the proportion of each individual firm's "economically significant" price changes driven by reported firm news is taken as the second proxy for the richness of a firm's information environment.

## SAMPLE COMPANIES AND DESCRIPTIVE STATISTICS

The sample consists of all industrial companies in the FTSE 100 and FTSE Mid-250 indices[7] (excluding financials) for the two-year period 1 January 1994 to 31 December 1995, as in Ryan and Taffler (2004). In our empirical tests we compare the amount of information available for FTSE 100 companies versus their FTSE

Mid-250 counterparts. In order to be regarded as a constituent of the FTSE 100 (FTSE 250) for the purpose of our tests the company must be a member of the FTSE 100 (FTSE 250) index for the entire two-year period 1 January 1994 to 31 December 1995. The original sample in Ryan and Taffler (2004), consisting of 254 industrial firms, is narrowed down to 215, with firms in the original list eliminated for the following reasons:

1: *Share price or trading volume data is not available for the firm for the full period*
2: *The firm itself is not in existence for the entire period of the study, or had merged or de-merged.*

The sample companies are drawn from 31 different stock market sectors and there is no obvious sectoral bias.

Summary size statistics for the sample of 215 firms are presented in **Table 1**. A sectoral decomposition is contained in **Table 2**.

**TABLE 1: SUMMARY SIZE STATISTICS (n = 215)**

| | Market capitalisation (£m)* |
|---|---|
| Mean | 2,157 |
| Standard deviation | 3,850 |
| Median | 888 |
| Maximum | 29,328 |
| Minimum | 75 |

**as at 1 January 1994*

**TABLE 2: SECTORAL DECOMPOSITION OF SAMPLE COMPANIES**

| Stock exchange sector | Number of companies |
|---|---|
| Building and Construction | 8 |
| Building Materials | 15 |
| Chemicals | 9 |
| Diversified Industrials | 12 |
| Electronic and Electrical | 5 |
| Engineering | 18 |
| Engineering, Vehicles | 3 |
| Printing, Paper and Packaging | 6 |
| Textiles | 3 |
| Breweries | 8 |
| Spirits, Wines and Ciders | 3 |
| Food Manufacturers | 11 |
| Household Goods | 1 |
| Healthcare | 5 |
| Pharmaceuticals | 2 |
| Tobacco | 1 |

| Stock exchange sector | Number of companies |
|---|---|
| Distributors | 7 |
| Leisure and Hotels | 6 |
| Media | 17 |
| Retailers, Food | 6 |
| Retailers, General | 17 |
| Support Services | 6 |
| Transport | 9 |
| Electricity | 7 |
| Gas Distribution | 2 |
| Telecommunications | 3 |
| Water | 7 |
| Property | 9 |
| Extractive | 2 |
| Oil, Integrated | 3 |
| Oil, Exploration | 4 |
| Total | 215 |

Data on the number of analysts following each of our sample stocks is obtained from the Institutional Brokers Estimates System (IBES).

## EMPIRICAL TESTS ON THE INFORMATION COST AND LIQUIDITY (ICL) HYPOTHESIS

We explore the relationship between the two measures of the richness of a firm's information environment and a firm's index membership.

We run the following six regression equations.

$$\%EXP_i = \alpha + \beta_1 FTSE_i + \varepsilon_i \quad (1)$$

$$\%EXP_i = \alpha + \beta_2 SIZE_i + \varepsilon_i \quad (2)$$

$$\%EXP_i = \alpha + \beta_3 FTSE_i + \beta_4 SIZE_i + \varepsilon_i \quad (3)$$

$$NOA_i = \alpha + \beta_5 FTSE_i + \varepsilon_i \quad (4)$$

$$NOA_i = \alpha + \beta_6 SIZE_i + \varepsilon_i \quad (5)$$

$$NOA_i = \alpha + \beta_7 FTSE_i + \beta_8 SIZE_i + \varepsilon_i \quad (6)$$

The regression variables are as follows:

$\%EXP_i$ represents the percentage (proportion) of a firm's "economically significant" price changes driven by reported firm news over the two-year period 1 January 1994 to 31 December 1995 (drawn from the Ryan and Taffler, 2004 study).
$NOA_i$ is defined as the average number of analysts producing one-year ahead earnings forecasts for firm i. The average is calculated based on the total number of analysts producing one-year ahead forecasts in January 1994 plus the equivalent number for January 1995 divided by two[8]. It is implicit in this approach that analysts do not differ in quality.
$FTSE_i$ is a dummy variable which takes on a value of one if a firm is a member of the FTSE 100 index for the entire two-year period 1 January 1994 to 31 December 1995 and zero otherwise.
Firm size (SIZE) is defined as the average of the natural log of a firm's market capitalisation using the same procedure as that adopted for $NOA_i$ above.

The regression results are reported in **Table 3** and **Table 4**. **Table 3** uses $\%EXP_i$ as a measure of the richness of a firm's information environment and **Table 4** employs $NOA_i$.

**TABLE 3: TEST OF THE INFORMATION COST AND LIQUIDITY (ICL) HYPOTHESIS USING THE ASSOCIATION BETWEEN REPORTED NEWS AND COMPANY SHARE PRICE ACTIVITY AS THE MEASURE OF THE RICHNESS OF A FIRM'S INFORMATION ENVIRONMENT**

**Models employing $\%EXP_i$ as the dependent variable**

(1) $\%EXP_i = \alpha + \beta_1 FTSE_i + \varepsilon_i$

| | | |
|---|---|---|
| coefficients: | 0.67 | 0.24 |
| t-statistics: | 48.92* | 10.24* |
| $R^2 = 0.33$ | | |

(2) $\%EXP_i = \alpha + \beta_2 SIZE_i + \varepsilon_i$

| | | |
|---|---|---|
| coefficients: | –0.02 | 0.11 |
| t-statistics: | –0.34 | 12.55* |
| $R^2 = 0.43$ | | |

(3) $\%EXP_i = \alpha + \beta_3 FTSE_i + \beta_4 SIZE_i + \varepsilon_i$

| | | | |
|---|---|---|---|
| coefficients: | 0.13 | 0.08 | 0.09 |
| t-statistics: | 1.51 | 2.61* | 6.56* |
| $R^2 = 0.44$ | | | |

* = *significant at the 99 per cent level*

**TABLE 4: TEST OF THE INFORMATION COST AND LIQUIDITY (ICL) HYPOTHESIS USING THE NUMBER OF ANALYSTS FOLLOWING (NOA) AS THE MEASURE OF THE RICHNESS OF A FIRM'S INFORMATION ENVIRONMENT**

**Models employing NOA as the dependent variable**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| (4) | $NOA_i$ = | $\alpha$ | + | $\beta_5$ $FTSE_i$ | + | $\varepsilon_i$ | | |
| | coefficients: | 11.87 | | 6.36 | | | | |
| | t-statistics: | 36.38* | | 11.17* | | | | |
| | $R^2$ = 0.37 | | | | | | | |
| (5) | $NOA_i$ = | $\alpha$ | + | $\beta_6$ $SIZE_i$ | + | $\varepsilon_i$ | | |
| | coefficients: | –7.36 | | 3.08 | | | | |
| | t-statistics: | –5.24* | | 15.43* | | | | |
| | $R^2$ = 0.53 | | | | | | | |
| (6) | $NOA_i$ = | $\alpha$ | + | $\beta_7$ $FTSE_i$ | + | $\beta_8$ $SIZE_i$ | + | $\varepsilon_i$ |
| | coefficients: | –4.59 | | 1.57 | | 2.60 | | |
| | t-statistics: | –2.43* | | 2.15* | | 8.80* | | |
| | $R^2$ = 0.54 | | | | | | | |

**significant at the 99 per cent level.*

An examination of regression estimates of model (2) and model (5) indicates that firm size itself is significant (t = 12.55 and t = 15.43 respectively), corroborating earlier findings on the association between size and corporate news (Grant, 1980; Atiase 1985; Freeman, 1987; Thompson, Olsen and Dietrich, 1987). The associated $R^2$s are 0.43 and 0.53 respectively. The results from models (1) and (4) likewise confirm univariate significance for membership of the FTSE 100 index (t = 10.24 and t = 11.17 respectively). The associated $R^2$s are 0.33 and 0.37.

In the multivariate context - models (3) and (6) - a firm's membership of the FTSE 100 index continues to be significant after controlling for firm size. Using $\%EXP_i$ as the measure of the richness associated with a firm's information environment, the slope coefficients are positive and significant. The t-statistics for $FTSE_i$ and $SIZE_i$ are 2.61 and 6.56 respectively. The associated $R^2$ is 0.44. Employing $NOA_i$ as the measure of the richness of a firm's information environment the relationships are also positive and significant. The t-statistics for $FTSE_i$ and $SIZE_i$ are 2.15 and 8.80 respectively. The $R^2$ is 0.54.

The higher reported $R^2$s associated with those models employing analyst coverage as a measure of the richness of a firm's information environment are perhaps not unsurprising. Analysts in arriving at their investment recommendations may have access to information not in the public domain (Holland, 1998). Consequently, the $NOA_i$ variable may represent a more comprehensive and parsimonious measure of a firm's total information set than $\%EXP_i$.

In conclusion, the constituents of the FTSE 100 index attract greater attention from publicly available news sources and the community of sell-side analysts than that predicted on the basis of size alone. Thus, the results are supportive of the ICL hypothesis. These results are important as prior research reports that information availability is priced by the market, and investors demand compensation in terms

of increased returns for firms that are not closely followed by the financial press or sell-side analysts. This compensation takes the form of a higher risk premium for holding "neglected" stocks (e.g. Barry and Brown, 1984).

## CONCLUSION

This article explores the information cost and liquidity (ICL) hypothesis, using the FTSE 100 as the benchmark index. Two measures of information availability are employed: firstly, the number of analysts following a stock and, secondly, a variable capturing the association between company share price activity and reported corporate news. Arguably, the two approaches to defining the richness of a firm's information environment measure two dimensions of the total firm information set available to market participants. The first measure captures the publicly available information set, whereas analyst coverage may also capture non-public information as analysts are often viewed as quasi-insiders because of their potential access to company management (Holland, 1998).

We find, consistent with prior US-based research, that larger firms are more closely monitored by the financial press and by the sell-side analyst community. However, we report that a firm's membership of the FTSE 100 index does more than firm size alone to explain analysts' decisions to follow firms and to provide the financial press and related media with incentives to gather and report corporate news. Our results have important implications, as prior research has shown that investors demand a risk premium for holding stocks that are not closely followed by the financial press and the community of sell-side analysts. An implication for future research is that a firm's index membership should be included as an additional control variable into studies that measure the price response to company news announcements conditional on proxies for predisclosure information availability.

## NOTES

1 A theoretical literature argues that the larger the firm the richer will be its information environment and the more incentives there are for information acquisition by investors. This will in turn trigger information acquisition and dissemination by analysts and greater reporting of the activities of larger companies by the financial press and related media (Atiase, 1985; Freeman, 1987). Grant (1980), Atiase (1985) and Thompson, Olsen and Dietrich (1987) demonstrate empirically that more information is, in fact, generated for larger firms. In this study, we introduce size as a control variable in the regression equations and investigate whether the richness of the information environments of FTSE 100 constituents is greater than their FTSE 250 counterparts once firm size is taken into account.

2 All of the US-based studies that follow, with the exception of Beneish and Gardner (1995) who use the DJIA, deal with the constituents of the S&P 500 index.

3 Woolridge and Ghosh (1986) and Lamoureux and Wansley (1987), covering broadly the same time period as Harris and Gurel (1986), also report evidence consistent with the PP hypothesis.

4 They argue (p. 100) that the share price reaction for their sample is consistent with the IC hypothesis as no subsequent price reversals take place. However, their results in this regard would also be consistent with both the IS and ICL hypotheses.

5 They argue that such price movements, given their size, are likely to be associated with firm specific news releases and not attributable to news events communicating little new market-relevant information, or to noise.

6 For interested readers the full details of the process of matching news to company price movements and associated methodological issues are set out in Ryan and Taffler (2004) on pp. 63–68.

7 These indices represent the largest 350 firms by market capitalisation quoted on the London Stock Exchange.

8 To allow for non-stationarity across time in the distribution of NOA in computing the average, the NOA variable for 1995 is restated in 1994 terms as follows: restated NOAi, 1995 = NOAi, 1995 x median (NOA1994)/median (NOA1995). A similar methodology is adopted to calculate restated SIZEi, 1995.

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