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DOI:

[10.1016/j.bar.2014.11.002](https://doi.org/10.1016/j.bar.2014.11.002)

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Document Version

Peer reviewed version

Citation for published version (Harvard):

Mak, CY 2014, 'Do market predictions affect its reaction to UK listed industrial firms' corporate refocusing announcements?', *The British Accounting Review*. <https://doi.org/10.1016/j.bar.2014.11.002>

[Link to publication on Research at Birmingham portal](#)

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Accepted Manuscript

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PII: S0890-8389(14)00073-0

DOI: [10.1016/j.bar.2014.11.002](https://doi.org/10.1016/j.bar.2014.11.002)

Reference: YBARE 687

To appear in: *The British Accounting Review*

Received Date: 18 June 2014

Revised Date: 30 October 2014

Accepted Date: 5 November 2014

Please cite this article as: Mak, C.Y., Do market predictions affect its reaction to UK listed industrial firms' corporate refocusing announcements?, *The British Accounting Review* (2014), doi: 10.1016/j.bar.2014.11.002.

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Title of Article: Do market predictions affect its reaction to UK listed industrial firms' corporate refocusing announcements?

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Editor's ref number (if applicable): BAR MS 120660

Date of receipt: 18/06/2014

Date of last revision: 30/10/2014

Date of acceptance: 05/11/2014

No. pages hardcopy: 43

No. pages of figures: 7, one page has three tables and one figure

Notes:

Publication item type (PIT): FLA

Yours sincerely,

Shereen Awan
Editorial Assistant

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Abstract

This paper investigates market reaction to firms' refocusing announcements from the perspective of investors' predicted probability. The results reveal the following: Firstly, the market reaction is significantly positive if managers announce the refocusing in the month when investors' predicted probability is high. Secondly, there is no significant market reaction if managers announce refocusing in the month when investors' predicted probability is low. Thirdly, the association between stock returns and investors' high predicted probability is significantly negative if managers fail to announce refocusing. Fourthly, the association between stock returns and investors' low predicted probability is significantly positive if managers did not announce refocusing.

1. Introduction

Corporate refocusing activities are a source of concern for investors for a number of reasons: (1) Due to the change in the global economic environment during the 2000s, the frequency and magnitude of corporate refocusing activities undertaken by firms is higher and greater than previously experienced (Mulherin and Boone, 2000; Powell and Yawson, 2005; Gaughan 2010; Donelson, Jennings and McInnis, 2011). These are significant changes in firms' business strategies and directly affect the sustainability of and trends in their earnings, cash flows and future dividends. (2) The material restructuring charges influence the timing relation between earnings, share prices and stock returns (Burgstahler and Dichev, 1997; Mak, Strong and Walker, 2011). (3) Refocusing and restructuring charges increase investors' uncertainty in relation to predictions for (and the valuation of) firms, in particular when managers announce refocusing subsequent to the initial announcement (Penman 2012; Wahlen, Stephen, Baginski and Bradshaw, 2011). Therefore, corporate refocusing announcements (relative to other corporate events) provide a unique and challenging opportunity for investigating the ways in which the market interprets and reacts to firms' refocusing announcements. This also has implications for the market efficiency hypothesis.

This paper investigates market reaction to UK firms' refocusing announcements from the perspective of investors' predicted probability. This is achieved through an examination of the association between firms' monthly stock returns and refocusing announcements, and investors' predicted probability prior to a refocusing announcement. Previous studies have revealed that firms' market and accounting performance decline continuously during the two years prior to restructuring announcements (Berger and Ofek, 1999; Mak et al., 2011). This can mean that investors monitor and adjust predicted performance in line with the new

targets. They may also predict the probability of a firm announcing refocusing in order to plan further reaction. On the other hand, managers strategically time information disclosures in order to control investors' expectations and market reaction, i.e. selectively disclosing 'good' and 'bad' news during different scenarios (Zuckerman, 2000; Cheng and Lo, 2006; Kothari, Shu and Wysochi, 2009; Ge and Lenox, 2011).

There is an expectation that the predicted probabilities of investors and the strategic timing of managers in relation to refocusing announcements will influence the market reaction to such announcements. This is due to the fact that the information asymmetry between investors and managers is reflected in the magnitude of investors' predicted probabilities (i.e. high or low) and the timing of the managers' announcements (i.e. early or delayed). The researcher proposes that four possible scenarios exist, with each prompting different market reactions. Firstly, managers may announce refocusing when investors' predicted probabilities are high. This implies that investors already understand the gravity of the issues and, therefore, managers are unable to further delay the announcements. The market reaction can be significantly positive if investors hold a positive view of the efforts of the managers. It can also be significantly negative if the announcement includes incremental bad news that investors do not expect. Secondly, managers may announce refocusing when investors' predicted probabilities are low. This implies that managers announce refocusing prior to the operational issues becoming severe, thereby signalling to investors an ability to turn the firm around. The market reaction can be significantly positive if investors agree with the refocusing plan, but significantly negative if they do not. Thirdly, managers do not announce refocusing, even when investors' predicted probabilities are high. The market

performance of firms will then decline further. Fourthly, managers do not announce refocusing when investors' predicted probabilities are low: this is the normal situation.

Investors' predicted probabilities are determined in this research through the development of a binominal logistic model with the ability to test whether the key factors identified by the takeover prediction literature explain the likelihood of refocusing, and thus assist in predicting the probability of firms announcing refocusing. A new method of cutoff probability is also devised, in order to distinguish investors' predicted probability as being high or low.

The results demonstrate that the market reaction to a refocusing announcement is affected by the investors' predicted probability. Firstly, the market reaction is significantly positive if managers announce refocusing in the month when investors' predicted probability is high. Secondly, there is no significant market reaction if managers announce refocusing in the month when investors' predicted probability is low. Thirdly, the association between stock returns and investors' high predicted probability is significantly negative if managers do not announce the refocusing. Fourthly, the association between stock returns and investors' low predicted probability is significantly positive if managers do not announce refocusing. These results are derived from the researcher's binominal logistic model and the new cutoff probabilities and are highly consistent with those derived from Palepu's (1986) suggested cutoff probability. The result of the binominal logistic model confirms that the significant variables for predicting refocusing announcements consist of the following: (1) market and accounting performance in the previous twelve months; (2) book-to-market value; (3) leverage level; (4) non-routine change in managers during the previous twelve months; and (5) economic recession occurred in the previous twelve months.

This paper contributes to academic research and also assists managers. Firstly, there is currently only limited research examining the market reaction to corporate restructuring announcements from the perspective of investors' predicted probability based on: (1) public information and (2) the information disclosure behaviour of managers¹. Secondly, this paper suggests that managers respond to investors' concerns and reduce information asymmetry in order to avoid a negative market reaction. Finally, it supports the IASB's amendment of IAS 37, which requires firms to disclose in a timely manner any additional details of restructuring charges and related activities.

This study adopts Mak et al.'s (2011) definition of corporate refocusing as a type of asset restructuring, i.e. that a firm disposes of its loss-making business segments in order to focus on its core business or to transfer to a new core area. A firm can undertake refocusing in three ways: Firstly, by downsizing through divesting itself of peripheral, loss-making or unimportant business segments in order to focus on its original core business. Secondly, in addition to divesting it can increase investment in the original core business by acquiring related business segments. Thirdly, it can exit the original core business after a series of divestments, acquiring new businesses in order to enter a new core area.

The remainder of the paper is organised as follows: Section 2 presents the literature review and hypotheses; Section 3 introduces research design; Section 4 presents sample and data. Section 5 analyses the empirical findings. Section 6 reports sensitivity analysis.

¹ Previous research has examined the variations in market reaction to restructuring announcements from different perspectives: (i) the kinds of restructuring activities (Brickely and VanDrunen, 1990; Bartov, Lindahl and Ricks, 1998); (ii) the materiality of the incremental information content of restructuring announcements (Ragothaman and Bublitz, 1996; Bartov et al. 1998); (iii) the uncertainty resulting from restructuring announcements (Bartov et al. 1998); (iv) the association between stock returns and the components of restructuring charges (Ohlson and Penman, 1992; Strong and Walker, 1993, Ragothaman and Bublitz, 1996; Bunsis, 1997); (v) the economic context in which these restructuring charges occur (Chaney, Hogan and Jeter, 2000).

Section 7 tests the binomial logistic model and the new cutoff probability based on a hold-out sample. Section 8 serves as the conclusion of this paper.

2. Literature review and hypotheses

The institutional investors' role in corporate governance is a controversial issue, due to their large proportional share of stock ownership² and their access to both private and public information (Shleifer and Vishny, 1997; Davies, 2002; Yu, 2008). They encourage managers to undertake refocusing and address operational issues before they become too severe (Atiase, Mayew and Xue, 2006). However, individual investors can only observe the behaviour of institutional investors and make an analysis based on public information. They have a tendency to buy stocks which are attracting attention, but take into account both economic and emotional issues when selling stocks (Nofsinger and Sias, 1999; Barber and Odean, 2008; Li, Rhee and Wang, 2009). These differences in the behaviour of these two groups of investors implies that they may be able to predict the probability of a firm announcing refocusing and so prepare their reactions to a firm's future announcements (Ragothaman and Bublitz, 1996; Bartov et al., 1999; Barber and Odean, 2008)³. This implication is consistent with evidence of a continuous decline in a firm's market performance in the two years prior to any restructuring announcements (Berger and Ofek, 1999; Mak et al., 2011).

² According to 'Ownership of UK Quoted Shares 2010', issued by the Office for National Statistics (www.ons.gov.uk) from 1963 to 2010 the ownership of institutional investors increased from 17.3% to 42.4%, while individual investors' ownership reduced from 54% to 11.5%, and overseas investors' ownership increased from 7% to 41.2%. In the US, institutional investors dominate both the ownership and trading of US securities, accounting for 63% of equity holding in 2002. They have become the price-setting marginal investors (Choi and Sias, 2009).

³ This paper focuses solely on the market prediction and reaction, which includes the prediction and reaction derived from both groups of investors. In the following content, the word 'investors' generally means both groups of investors.

The market reaction to corporate announcements may also be affected by the selective disclosure behaviour of managers. An extensive body of literature infers that managers strategically time information disclosures according to different scenarios; i.e. they have a tendency to release good news earlier than bad news: (i) if the disclosure related cost is high (Kothari, Shu and Wysochi, 2009); (ii) if there is high information asymmetry between themselves and the investors (Dye, 1985; Jung and Kwon, 1988); and (iii) when they use their firms' shares to finance acquisitions (Ge and Lennox, 2011). However, managers may choose to release bad news earlier if they wish to (1) control investors' expectations and meet the earnings targets of analysts (Zuckerman, 2000), or (2) release bad news before undertaking a share buyback in order to push down the share price (Chen and Lo, 2006).

The magnitude of investors' predicted probabilities (i.e. high or low) and the timing of managers' announcements (i.e. early or delayed) reflect information asymmetry between investors and managers. The researcher conjectures that these two factors can influence the market's reaction to refocusing announcements. The hypotheses below are developed in relation to the four possible situations and the related market reactions, as discussed.

According to the literature on market reaction to restructuring announcements, a positive (negative) market reaction implies that investors expect that firms' restructuring announcements will (will not) improve future performance. The following hypotheses are employed:

H1a: There is a positive association between firms' monthly stock returns and the refocusing announcement, if investors expect that refocusing can improve future performance.

H1b: There is a negative association between firms' monthly stock returns and the refocusing announcement, if investors expect that refocusing cannot improve future performance.

Market reaction should reflect investors' predicted probability. If managers do not announce refocusing, investors may come to understand the severity of the firm's operational problems by means of the disclosed accounting performance and other public information. Investors' predicted probability would then be high and they would further adjust the firm's stock price downward, so causing the firm's monthly stock return to decline. On the other hand, if managers do not announce the refocusing, and firms do not have any serious operational issues, the investors' predicted probability would be low and the changes to the firms' stock price should be minimal and reflect the investors' predicted probability. Therefore, the researcher hypothesises as follows:

H2a: There is a negative association between firms' monthly stock returns and investors' predicted probability, if investors' prediction is high.

H2b: There is a positive association between firms' monthly stock returns and investors' predicted probability, if investors' prediction is low.

These two hypotheses reflect the third and fourth scenarios discussed earlier.

If managers announce refocusing and investors predict the probability in month t , the market reaction to this announcement may vary, due to the fact that it indicates either that managers are responding to the expectation of investors or that it is a surprise to investors. If managers announce refocusing when investors' predicted probability is high, investors may react positively (negatively) to these announcements if they believe that the refocusing activities can (not) improve future performance. Hence the following hypothesis:

H3a: There is a positive (negative) association between firms' monthly stock returns and the refocusing announcement when investors' predicted probability is high, if investors believe that the refocusing can (not) improve future performance.

If managers announce refocusing when investors' predicted probability is low, investors may react positively if managers can convince them of the need to undertake refocusing in order to address operational problems earlier and so improve future performance. On the other hand, investors may react negatively if they do not agree with the actions of managers or uncover additional bad news. Therefore, the researcher employs the following hypothesis:

H3b: There is a positive (negative) association between firms' monthly stock returns and the refocusing announcement when investors' predicted probability is low, if investors accept (reject) the refocusing plan.

H3a and *H3b* reflect the first and second scenarios discussed previously earlier.

3. Research design

3.1 Modelling the predicted probability of firms announcing refocusing activities

In order to model investors' predicted probability, it is first necessary to identify the factors they are likely to consider, based on the information they possess at the time they derive the prediction, and the sequence of the timeline. Rather than relying on a step-wise procedure to explore statistically significant variables related to firms' refocusing decisions, the researcher has chosen to identify variables to construct a binominal logistic model based on hypotheses from the literature. This is due to the fact that the characteristics of refocusing firms can thus be consistently demonstrated.

A deterioration in performance indicates inefficient management and increases the probability of managers announcing a refocusing plan (see Palepu, 1986; Markides, 1995; Berger and Ofek, 1999; Haynes et al., 2003; Powell and Yawson, 2005; Colak and Whited, 2006; Colak, 2010). Market performance is measured by the cumulative abnormal stock returns of firm i for the twelve months prior to month t ($CAR_{12m_{i,t-12m}}$). This is derived from the market-adjusted CAPM: firm i 's monthly return minus the return on the market index (Financial Times All-Shares at Datastream). Accounting performance is measured by the industry-adjusted return on total assets of firm i in month t ($IndadjROA_{i,t}$)⁴, which is equal to firm i 's ROA in month t minus the industry ROA in the same month. Market performance is the more appropriate measure, as it reflects the market's expectation of a firm's future performance separately from their current performance (see Palepu, 1986).

A key factor causing firms to announce refocusing is financial distress (Berger and Ofek, 1999; Denis and Kruse, 2000; Hillier et al., 2009). This is also one of the main reasons stated by managers for their refocusing announcements. The relationship between the probability of announcing refocusing and the leverage level should be positive. Firm i 's leverage level in month t is measured by debt to equity, $DtoEq_{i,t}$.

Geroski and Gregg (1997) and Haynes et al. (2003) demonstrate that the larger the size of the firm, the larger the scale of refocusing required. The size of firm i in month t is measured by the log of market value, $logMV_{i,t}$.

The growth option of a firm is represented by its book-to-market value (Powell and Yawson, 2007). As the book value becomes closer to the market value, investors'

⁴ The same conclusion and similar results are reached by adopting $IndadjROS_{i,t}$.

expectations of the firm's future earnings performance decline, and the likelihood of managers announcing refocusing increases. Firm i 's book-to-market value in month t , $BTMV_{i,t}$, is equal to its Net Total Assets (NTA) in the six months prior to month t divided by its market value in month t .

Firms are more likely to announce refocusing following corporate controlled events (e.g. non-routine changes in management and takeover threats see Berger and Ofek, 1999; Denis and Kruse, 2000; Hillier et al., 2009). Non-routine changes in management experienced by a firm in the twelve months prior to month t ($Cmag_{i,t-12m}$) include (1) resignation, i.e., leaving before the end of the appointment period without any reason being given, or (2) early retirement i.e., management turnover before retirement age without disclosing any reason. Takeover threats experienced by firm i in the twelve months prior to month t ($TO_{i,t-12m}$) can comprise an unsuccessful takeover bid. These two variables are identified by the full text articles collected from Perfect Information Navigator.

Apart from the above hypotheses concerning a refocusing firm's characteristics, there are two hypotheses concerning industry characteristics. Mulherin and Boone (2000) and Powell and Yawson (2005 and 2007) reveal that the waves of takeovers and divestitures in the 1980s and 1990s in the US and the UK can be explained by industry shocks (e.g. deregulation; foreign competition, technological advances, industry growth, industry concentration, etc.). In other words, a firm's refocusing decisions can be affected by industry shocks. The effects of industry shocks are measured by a dummy ($Indef_{t-6m}$). This is set as 1, if one firm operating in the same industry group as sample firm i announces refocusing in the six months prior to month t . Otherwise, it is set as 0.

Penman (2012) and Colak (2010) demonstrate that an increased number of firms undertake divestitures when economic conditions suffer a downturn (such as due to the bursting of the technology and internet bubbles in 2001 and afterwards). The effect of the economic recession is measured by a dummy related to the Gross Domestic Product in the twelve months prior to month t (GDP_{t-12m}). It is set as 1, if an economic recession occurred in the previous twelve months. Otherwise, it is set as 0.

The above factors shape binominal logistic Model 1 in the following manner:

$$Pr(Refocus_{i,t}) = \alpha_{i,t} + \beta_1 CAR12m_{i,t-12m} + \beta_2 \log MV_{i,t} + \beta_3 BTMV_{i,t} + \beta_4 DtoEq_{i,t} + \beta_5 IndadjROA_{i,t} + \beta_6 TO_{i,t-12m} + \beta_7 Cmag_{i,t-12m} + \beta_8 Indef_{t-6m} + \beta_9 GDP_{t-12m} + \varepsilon_{i,t} \quad (1)$$

where Refocus (1) denotes firm i announcing refocusing in month t ; otherwise it is 0. This includes firms' first and subsequent refocusing announcements during the sample period. Under this data setting, the association between the effects of such announcements and the proposed independent variables can be captured in a timely manner. In order to imitate investors' predicted probability of a firm announcing refocusing in each month, Model 1 is estimated month by month from Jan 2000 to Dec 2010, i.e. 132 months.

Propensity score

The probability of firm i announcing refocusing in month t is measured by its propensity score ($Prob_{i,t}$), which is derived using Model (1) according to the following formula:

$$\hat{p} = \frac{e^{(\hat{\alpha} + \hat{\beta}'x)}}{1 + e^{(\hat{\alpha} + \hat{\beta}'x)}} \quad (2)$$

where $\hat{\alpha}$ denotes the intercept parameter estimate, $\hat{\beta}$ represents the vector of slope parameter estimates, and x is the vector of explanatory variables (Parsons, 2000 and 2001).

Cutoff probability

Scientific studies (in statistics, medical science, pharmacy, etc.) adopt an absolute value of cutoff probability (such as 0.4 or 0.5) in order to classify the propensity scores as high or low probability. However, in the field of social sciences, the frequency of social events is relatively lower (King and Zeng, 2001). Corporate refocusing activities are classified as rare events, due to the fact that there is a low percentage of the number of firms which make refocusing announcements each month in relation to firms which do not. It is therefore inappropriate to adopt any absolute value as the cutoff probability. Moreover, the investors' predicted probability of a firm announcing refocusing in the future changes over time and according to new information obtained; i.e., investors' predictions need to be dynamic rather than static. Hence this research derives a new cutoff probability ($P12m_{i,t-12m}$) which is equal to the number of firms making their first refocusing announcements in the twelve months before month t ($No. of refocus_{s_{icd,t-12m}}$) as a percentage of the number of firms in the same industry group across the same period ($No. of firms_{s_{icd,t-12m}}$).

$$P12m_{i,t-12m} = No.ofrefocus_{s_{icd,t-12m}} / No.offirms_{s_{icd,t-12m}} \quad (3)$$

This cutoff probability can be compared with investors predicted probability of a firm announcing refocusing in month t . If the predicted probability is greater (smaller) than the cutoff probability ($P12m_{i,t-12m}$), the firm-month observation in month t is classified as the one with the high (low) probability of a firm announcing refocusing. The difference is termed the frequency-adjusted propensity score ($FreqadjProb_{i,t}$):

$$FreqadjProb_{i,t} = Prob_{i,t} - P12m_{i,t-12m} \quad (4)$$

where it is high if $FreqadjProb_{i,t} > 0$, and low if $FreqadjProb_{i,t} < 0$.

3.2 The market reaction to refocusing announcements and investors' predicted probability

This research tests the market reaction to the refocusing announcements of firms and investors' predicted probability postulated by the hypotheses via the following model:

$$R_{i,t} = \alpha + \delta_1 Refocus_{i,t} + \delta_2 Prob_{i,t} + \delta_3 Refocus_{i,t} * Prob_{i,t} \quad (5)$$

where $R_{i,t}$ denotes the monthly stock returns of firm i in month t . $Refocus_{i,t}$ is set as 1 when firm i announces refocusing in month t ; otherwise, it is 0. $Prob_{i,t}$ is investors' predicted probability of firm i announcing refocusing in month t , measured by a propensity score derived by estimating Model 1. $Refocus_{i,t} * Prob_{i,t}$ denotes firm i issuing a refocusing announcement during month t , when investors derive a predicted probability in the same month. According to $H2a$ and $H2b$, investors' predicted probability can be either high or low. In order to test these hypotheses, a dummy of high predicted probability $High$ is introduced into Model 5 to form Model 6:

$$R_{i,t} = \alpha + \delta_1 Refocus_{i,t} + \delta_2 Prob_{i,t} + \delta_3 Refocus_{i,t} * Prob_{i,t} + y_1 High + y_2 High * Refocus_{i,t} + y_3 High * Prob_{i,t} + y_4 High * Refocus_{i,t} * Prob_{i,t} + \varepsilon_{i,t} \quad (6)$$

where $High * Refocus_{i,t}$, $High * Prob_{i,t}$ and $High * Refocus_{i,t} * Prob_{i,t}$ measure the market reaction to the refocusing announcements and the investors' predicted probability, when the monthly observations are classified as those having a high predicted probability. On the other hand, $Refocus_{i,t}$, $Prob_{i,t}$ and $Refocus_{i,t} * Prob_{i,t}$ measure the same association for the monthly observations are classified as those having a low predicted probability.

According to *H1a* and *H1b*, the coefficient of either $High * Refocus_{i,t}$ or $Refocus_{i,t}$ is expected to be positive (negative) if investors expect that a firm's refocusing announcements can (not) improve future performance.

$High * Prob_{i,t}$ ($Prob_{i,t}$) denotes that investors' predicted probability for firm i in month t is classified as high (low). According to *H2a*, if managers do not announce refocusing and investors believe that the firm's future performance could further decline due to the severity of any operational problems, the coefficient of $High * Prob_{i,t}$ is expected to be negative. Conversely, the coefficient of $Prob_{i,t}$ is expected to be positive if managers do not announce refocusing and firms do not experience any serious operational issues: investors' predicted probability would then be low due to *H2b*.

$High * Refocus_{i,t} * Prob_{i,t}$ ($Refocus_{i,t} * Prob_{i,t}$) is an interactive variable which represents firm i announcing refocusing in month t , when investors' predicted probability is high (low). According to *H3a*, the coefficient of $High * Refocus_{i,t} * Prob_{i,t}$ is expected to be positive (negative) if investors believe that the refocusing activities can (not) improve future performance. According to *H3b*, if managers announce refocusing when investors' predicted probability is low, the coefficient of $Refocus_{i,t} * Prob_{i,t}$ is expected to be positive if investors accept the refocusing plan. Otherwise, the coefficient of $Refocus_{i,t} * Prob_{i,t}$ is expected to be negative if investors reject the refocusing plan.

In order to control the effects of variations in firms' operating risks and a possible correlation between firms' propensity scores across each month and industry group, dummies of month ($M_{\mu,t}$) and industry group ($SIC_{d,t}$) are introduced into Model 6 as follows:

$$\begin{aligned}
R_{i,t} = & \alpha + \delta_1 Refocus_{i,t} + \delta_2 Prob_{i,t} + \delta_3 Refocus_{i,t} * Prob_{i,t} \\
& + y_1 High + y_2 High * Refocus_{i,t} + y_3 High * Prob_{i,t} + y_4 High * Refocus_{i,t} * Prob_{i,t} \\
& + \sum_{d=0}^6 (\gamma_{1,d} SIC_{d,t} + \gamma_{2,d} SIC_{d,t} * Refocus_{i,t} + \gamma_{3,d} SIC_{d,t} * Prob_{i,t} + \gamma_{4,d} SIC_{d,t} * Refocus_{i,t} * Prob_{i,t}) \\
& + \sum_{\mu=1}^{131} (\rho_{1,\mu} M_{\mu,t} + \rho_{2,\mu} M_{\mu,t} * Refocus_{i,t} + \rho_{3,\mu} M_{\mu,t} * Prob_{i,t} + \rho_{4,\mu} M_{\mu,t} * Refocus_{i,t} * Prob_{i,t}) + \varepsilon_{i,t}
\end{aligned} \tag{7}$$

Greene (2008) and Hill et al. (2012) state that the estimators of the above OLS model are inefficient relative to the maximum likelihood estimators. The usual standard errors and t-statistics produced are incorrect, and it is therefore necessary to calculate an appropriate estimate of standard errors using the Heckit model to run Models 5, 6 and 7.

Propensity score analysis

In order to further confirm the results of Models 6 and 7, an analysis is undertaken based on propensity score matched (PSM) refocusing firms and PSM non-refocusing firms, in which a firm's decision to announce refocusing is analysed as a treatment effect (Lee, 2005; Armstrong et al., 2010). This analysis permits an examination of the existence of any differences in the market reaction to firms' refocusing announcements and investors' predicted probability, based on the datasets of PSM refocusing firms and PSM non-refocusing firms. Investors' predicted probability (Prob) derived from Model 1 is used to match refocusing firms and non-refocusing firms. The matching procedure has been developed according to the work of Guo and Fraser (2010) and Parson's (2000, 2001) 5 to 1 digit Greedy Match Macro. In order to confirm the quality of the matching, the covariate balance between the independent variables (of Model 1) of 505 pairs of PSM refocusing firms and PSM non-refocusing firms is examined by means of a *t*-test of differences in mean, and non-parametric tests of differences in median (Armstrong et al., 2010; Mak et al., 2011).

There is no statistically significant difference between the mean and median of these variables (untabulated⁵).

PSM non-refocusing firms are assigned with the refocusing announcement date of PSM refocusing firms. This approach facilitates a direct comparison of the results of Models 6 and 7 between PSM refocusing firms and PSM non-refocusing firms. These variables are not introduced into Models 6 and 7, due to the fact that the matching procedure already controls for the effects of the following aspects of a firm: size; profitability; book-to-market value; leverage; takeover threats; management turnover; and other firms within the same industry announcing refocusing during an economic recession (Rosenbaum and Rubin, 1983; Hasbrouck, 1985; Strong and Meyer, 1987; Armstrong et al., 2010).

4. Sample and data

4.1 Sampling criteria for identifying refocusing firms

a) UK-listed industrial firms

All firms selected in this study are UK industrial firms quoted on the London Stock Exchange (LSE) and classified according to the Standard Industrial Classification (SIC) (2010 version). Financial institutions and banks are excluded, due to the fact that their accounting policies differ from those of industrial firms. Diversified firms that appear in more than one SIC group are allocated to the SIC group in which their refocused business operates.

b) Sample period and refocusing announcement dates

⁵ These results are available upon request.

Industrial firms' initial and subsequent refocusing announcement dates are required to fall between 1 January 2000 and 31 December 2010. Firms announcing any refocusing activity in the two years prior to 2000 are excluded from the sample.

c) Changes in business direction

A firm must indicate the change in its business direction as one of three types of corporate refocusing activities (presented in Section 2), either on the occasion of the announcement and/or as reported by journalists at press conferences.

All UK industrial firms without a refocusing announcement during the sample period are classified as non-refocusing firms.

4.2 Procedures for identifying refocusing firms

Firstly, a list of names of all UK industrial firms listed on the London Stock Exchange is used, including both listed and delisted (dead) firms from 2000 to 2010 from the London Share Price Database (LSPD) (version 2010). Secondly, refocusing firms are identified by searching for full text articles of their official refocusing announcements, including related news, conference announcements and analysis reports from one website and two databases, as provided by ProQuest ABI/INFORM Global New Platform and Free E-journals, as follows: (1) www.ukbusinesspark.com; (2) Perfect Information Navigator; (3) Financial Times (FT). The functions of the firm name search and the clause text search were used. The keywords are as follows: refocusing; restructuring; asset restructuring; rationalisation; reorganisation; rejuvenation; streamlining; consolidation; cost cutting/reduction/savings; repositioning; shake-up and reshape/reshaping.

4.3 Sample size and composition

Panel A of Table 1 reveals that the above search provided 6,330 full text articles and 4,831 short paragraphs for 841 refocusing firms between 2000 to 2010. Approximately 32 of these were excluded due to a lack of data on Datastream. The final sample size is 809, of which: 368 are classified as downsizing firms; 430 as firms investing in their original core business; and 11 as firms entering a new core business. SIC 4 (comprising wholesale trade; retail trade; transportation and warehousing; information; accommodation and food services; along with further services apart from administration) are the largest group, with a refocusing rate of 34.81%. SIC 2 (comprising mining, quarrying, oil and gas extraction) are the second largest group, with a low refocusing rate of 17.54%. SIC 3 (manufacturing) has a refocusing rate of 30.75%. SICs 1 and 5 are small groups, with high refocusing rate of 47.27% and 51.61%, respectively. SIC 0 is the smallest group, with a refocusing rate of 25.81%. The average refocusing rate across all industry groups is 31.89% and there are 1,796 non-refocusing firms.

Panel B reveals the number of UK-listed industrial firms announcing their first refocusing between 2000 to 2010 as a percentage of all LSE industrial firms in each year (after excluding firms that had announced a refocusing in previous years). It reveals that there were two waves of refocusing: The first was from 5.58% in 2000 to 5.67% in 2004, reaching a peak of 8.01% in 2002 (which may have been due to the 9/11 terrorist attacks in New York). Although during this period UK GDP was stable and increased slightly, a number of industries (including airlines) were deeply affected. The second was from 5.54% in 2008 to 5.57% in 2009. (This may have been due to the credit crunch occurring in mid-2007, with its effects being felt in 2008 and 2009). For the remaining periods, the rate of refocusing was

below 5%. The average annual percentage of firms announcing first time refocusing is 5.65%, implying that the frequency of corporate refocusing activities in the 2000s was higher than in the 1990s, as established by Mulherin and Boone (2000) and Mak et al. (2011).

Panel C displays the timing of refocusing announcements in relation to firms' financial year-ends, month 0. It demonstrates that UK-listed industrial firms tend to announce refocusing during the month at the end of the financial year and during the quarter before the financial year end.

(Insert Table 1 here)

4.4 Data

Monthly market data and annual accounting data were collected from Datastream. This study does not impose any limitations on firms' financial year-ends, in order to avoid any bias towards large firms. Outliers at the top and bottom 1% of the pooled observations of monthly data were excluded.

4.5 Descriptive statistics

Table 2 reports the descriptive statistics of variables for the 809 refocusing firms and 1,796 non-refocusing firms, as defined in Section 3. Panel A demonstrates that the skewness of $CAR12m_{i,t-12m}$, $R_{i,t}$, $\log MV_{i,t}$, $BTMV_{i,t}$, $DtoEq_{i,t}$ and $IndadjROA_{i,t}$ is statistically significant at 1% respectively. This is because the standard error of skewness is small when the number of observations (Obs.) is big. Moreover, the magnitude of skewness of $CAR12m_{i,t-12m}$, $R_{i,t}$ and $\log MV_{i,t}$ is close to zero.

The statistical results of refocusing firms and non-refocusing firms are presented in Panels B and C. The skewness of $CAR12m_{i,t-12m}$, $R_{i,t}$, $\log MV_{i,t}$, $BTMV_{i,t}$, $DtoEq_{i,t}$ and $IndadjROA_{i,t}$ remains similar to the result in Panel A. Furthermore, the means (medians) of $CAR12m_{i,t-12m}$, $R_{i,t}$, $\log MV_{i,t}$, $DtoEq_{i,t}$ and $IndadjROA_{i,t}$ of refocusing firms are, in the main, larger than those of non-refocusing firms. These results reveal that refocusing firms are larger in size and have a higher leverage level than non-refocusing firms. Their performance is also slightly better than those of non-refocusing firms. This makes sense as the operating risk (measured by $BTMV_{i,t}$) of the majority of non-refocusing firms of medium and small size is higher than that of refocusing firms, and therefore their ability to protect themselves from the effects of the economic recession (from mid of 2007 to 2010) is weaker than that of refocusing firms.

(Insert Table 2 here)

5. Results

5.1 Model 1

Panel A of Table 3 reports the summary results of 132 monthly regressions of Model 1 between 2000 and 2010. The results reveal that the coefficients of $CAR12m_{i,t-12m}$ and $IndadjROA_{i,t}$ are negatively significant at 1% level. This implies that a continuing decline in performance may force managers to consider announcing refocusing, due to their awareness of the monitoring undertaken by investors. The coefficients of $\log MV_{i,t}$, $BTMV_{i,t}$, $DtoEq_{i,t}$ and $Cmag_{i,t-12m}$ are all positively significant at 1% level in relation the decision of firms to announce refocusing. The coefficient for GDP_{t-12m} is statistically significant indicating its influence on firm's refocusing decisions. However, the coefficients of

$Indef_{t-6m}$ and $TO_{i,t-12m}$ are statistically insignificant. These results are consistent with the hypotheses in Section 3.1 and with previous studies (i.e. Gibbs 1993; Berger and Ofek 1996; Denis and Kruse 2000; Haynes et al. 2003; Colak and Whited 2006; Colak 2010).

Model 1 also derives firm i 's propensity score for each firm-month. These scores act as a proxy for investors' predicted probability of firms announcing refocusing in the near future. Panel B presents the descriptive statistics of the propensity scores of refocusing and non-refocusing firms. The mean and median of refocusing firms' propensity scores (0.024, 0.014) are higher than those of non-refocusing firms (0.012, 0.007). The range between maximum and minimum values, with standard deviation, 25% percentile (Q1) and 75% percentile (Q3) of refocusing firms' propensity scores are also higher than those of non-refocusing firms. The skewness of propensity scores of both refocusing firms and non-refocusing firms are positively significant at 1% level. This is consistent to the result of Palepu (1986).

(Insert Table 3 here)

Panel A of Table 4 reports the descriptive statistics from 1999 to 2010 of the frequency of firms' first refocusing announcements during the previous twelve months prior to firm-month t ($P12m_{i,t-12m}$). This demonstrates that the frequency of firms announcing refocusing in each firm-month of the pooled sample is 4.8% on average. The highest frequency is 8.9% (in February and March of 2002), 5.2% and 5% (in June and July of 2009) (untabulated⁶). The same trends are found in each SIC group. The frequency varies from 3.5% to 7.9%, in different SIC groups. The skewness of the frequency of the pooled sample and each SIC group are positively significant at 5% and 1% level, except that of the frequency of SIC2 and SIC3. The magnitude of the skewness of all sample groups is close to zero.

⁶ $P12m_{i,t-12m}$ and $FreqadjPro b_{i,t}$ in each month of each SIC group are available upon request.

Panel B displays the descriptive statistics of firms' frequency-adjusted propensity scores in firm-month t ($FreqadjProb_{i,t}$) between 2000 and 2010. They are presented in subgroups of refocusing firms, non-refocusing firms, and all firms. The number of firm-months of refocusing firms classified as high probability is 7,838 (13.44%), in contrast with those classified as low probability, which is 50,472 (86.44%). For non-refocusing firms, 4,562 (5.73%) firms' firm-months are classified as high probability, in contrast with 74,999 (94.27%) classified as low probability. The magnitude of $FreqadjProb_{i,t}$ of refocusing firms' firm-months classified as high probability is the highest among those of the subgroups. The distributions of $FreqadjProb_{i,t}$ of high (low) firm-months are all positively (negatively) skewed and statistically significant at 1% level.

(Insert Table 4 here)

5.2 Results of Models 6 and 7

Table 5 presents the results of Models 6 and 7, based on the datasets of the following: pooled sample (Allfirms); refocusing firms (Refocus); non-refocusing firms (Non-refocus); PSM refocusing firms (PSM Refocus); and PSM non-refocusing firms (PSM non-refocus) from January 2000 to December 2010. December 2010 is treated as the base month by the SAS programme, hence $\mu = 1$ to 131. The total number of firm-months decreases slightly to 136,087 due to the common observations of monthly returns and the propensity scores being counted.

In Model 6, the results found in the column of Allfirms reveal that the coefficient of high (0.016) is positively significant. This indicates that it is significant and meaningful to classify firm-months by investors' predicted probability as high or low. For the firm-months with

high predicted probability, the coefficient of HRefocus (-0.029) is negatively significant at 1%. This implies that investors conclude that refocusing cannot improve future performance, thus, *H1b* is accepted.

The coefficient of HProb (-0.444) is negatively significant at 1%. This suggests that investors' predicted probability is high and that if managers do not announce refocusing, they adjust the firm's stock price downward. This is consistent with the third scenario as discussed on p.4, and hence *H2a* is accepted.

The coefficient of HRefocusProb (0.516) is positively significant at 5%. This suggests that there is a positive and significant market reaction to firms' refocusing announcements in the firm-months when investors' predicted probability is high. Investors accept firms' refocusing announcements, as managers are seen to respond their concerns and to be committed to solving the operational issues. This is consistent with the first scenario discussed earlier, and *H3a* is accepted.

For the firm-months with low investors' predicted probability, the coefficient of Refocus (0.017) is positively significant at 1%. This suggests that investors expect that the announced refocusing can improve future performance. Hence *H1a* is accepted.

The coefficient of Prob (0.38) is positively significant at 1%. This may be due to investors' predicted probability being low and the firms lack of operational issues, and therefore the managers did not undertake the refocusing announcement. This is consistent with the fourth scenario situation discussed on p.5, and hence *H2b* is accepted.

The coefficient of RefocusProb is negatively significant at 10%. This implies that investors do not accept firms' refocusing announcement if managers announced refocusing in the firm-months when investors' predicted probability is low. This may be due to the fact that

refocusing announcements surprise investors when their predicted probability is low and investors do not to agree with the managers' plan. This result is consistent with the second scenario discussed earlier and *H3b* is accepted. The above results need to be further examined based on the other datasets.

When it comes to Model 6, the results in the Refocus column are generally consistent with the above results of Allfirms. The coefficients of HRefocus and HProb are significantly negative at 1%. Thus, *H1b* and *H2a* are accepted. However, the coefficient of HRefocusProb is positively significant at 10% and *H3a* is marginally accepted. On the other hand, for the firm-months with low investors' predicted probability, only the coefficient of Prob is positively significant at 1%, and *H2b* is accepted.

In Model 6, the results in the Non-refocus column reveal that the coefficient of HProb (-0.488) is negatively significant at 1%, and *H2a* is accepted. This is consistent with the third scenario, in which investors' predicted probability is high and they further adjust firms' stock price downwards if managers do not announce refocusing. The coefficient of Prob (0.422) is positively significant, and *H2b* is accepted. This is consistent with the fourth scenario. These results are consistent with those in the Allfirms and Refocus columns.

In order to control for the effects of firm's characteristics, industry factors and economic factors, Model 6 is estimated using the PSM refocus and PSM non-refocus datasets. The results are highly consistent with those in the Refocus and Non-refocus columns. In particular, for the results in the PSM non-refocus column, the coefficients of Refocus, RefocusProb, HRefocus and HRefocusProb are all insignificant, as PSM non-refocusing firms did not announce refocusing in these firm-months, unlike PSM refocusing firms.

In order to control for the effects of variations in firms' operating risks and possible correlation between firms' propensity scores across each month and industry group, Model 7 introduces dummies of M_{μ} , and SIC_d , and is estimated based on the same datasets. The results are highly consistent with those of Model 6. The analysis based on previous results therefore holds.

(Insert Table 5 here)

6. Sensitivity analysis

This section adopts Palepu's (1986) method of setting the cutoff probability to examine the sensitivity of the main results reported in the previous section. Palepu indicates that the optimal cutoff points can be derived by considering the following three factors: (i) the decision context; (ii) an appropriate payoff function; (iii) the previously stated probability. The optimal cutoff probability consists of the intersection point of the estimated probability distributions both for target and non-target samples. Accordingly, in the case of refocusing the optimal cutoff probability is the intersection point of the predicted probability distribution for firms announcing refocusing in month t (R%), and the predicted probability distribution for firms not announcing refocusing in month t (NR%) as demonstrated in Table 6 and Figure 1. This cutoff probability is used to differentiate investors' predicted probability in each firm-month as high or low, in relation to the inputs into Models 6 and 7. The results of Table 6 reveal that 85.23% (95.87%) of refocusing (non-refocusing) firms' firm-months have predicted probabilities below 0.039, and that there is only one refocusing firm's firm-month with a predicted probability above 0.8. For non-refocusing firms, there are two firm-months with predicted probabilities above 0.5. These results are compatible with Panel B of Table 3.

R(%)/NR(%) demonstrates that the optimal cutoff probability lies between 0.039 and 0.044. It is 0.042 with R (%) and NR (%) 14%.

(Insert Table 6 here)

(Insert Figure 1 here)

Table 7 reports the descriptive statistics of frequency-adjusted propensity scores ($\text{FreqadjProb}_{i,t}$) from 2000 to 2010, as derived by the above optimal cutoff probabilities. Approximately 13.86% (3.82%) of refocusing (non-refocusing) firms' firm-months are classified as high probability. The results are similar to those in Panel B of Table 4. However, the distributions of $\text{FreqadjProb}_{i,t}$ of high (low) probability firm-months are all positively skewed and statistically significant at 1% level.

(Insert Table 7 here)

Table 8 reports the results of Models 6 and 7 derived by adopting the above optimal cutoff probability. They are highly consistent with, and slightly stronger than, the main results reported in Table 5. Model 7, in particular, reveals that the results in the Refocus and PSM-refocus columns demonstrate that the coefficients of high, HRefocus, HProb and HRefocusProb are all statistically significant at 1% and 5%. For the firm-months with low investors' predicted probability, the coefficient of Prob is positively significant at 1%, while those of Refocus and RefocusProb remain statistically insignificant.

For the results of Model 7 in the Non-refocus and PSM non-refocus columns, the coefficients of Prob, High and Highprob are all statistically significant at 1%. However, the coefficients of Refocus, RefocusProb, HRefocus and HRefocusProb are statistically insignificant. Therefore, the results in Table 5 and related analysis hold.

(Insert Table 8 here)

7. Predictions on a hold-out sample

The above empirical results are derived from the predictions of binominal logistic Model 1 and the new cutoff probability ($P12m_{i,t-12m}$) Model 3, and the reliability of these results depends on the ability of Models 1 and 3 to predict firms announcing refocusing in advance. According to Palepu (1986), in order to avoid bias, Models 1 and 3 can only be tested based on a separate group of firms rather than relying on the estimation sample. Therefore, 252 industrial firms listed on London Stock Exchange in January 2011 were collected from LSPD version 2011. None of these firms were used in estimating the Model 1 parameters in Table 3, and their market and accounting data in 2010 is available. After searching for refocusing announcements in January 2011 at Perfect Information Navigator, four of 252 firms were identified as refocusing firms according to the sampling criteria presented in Section 4.1.

The dataset of independent variables of these 252 firms are constructed according to the definitions in Section 3.1. The predicted probability of each firm-month was calculated using the coefficients of the estimated variables in Model 1 as shown in Panel A of Table 3. The new cutoff probability was then used to classify each firm-month as a high (low) probability of refocusing announcement, if the predicted probability is higher (lower) than the new cutoff probability.

Table 9 demonstrates that 3 (75%) of 4 actual refocusing firms are correctively predicted by this model, giving Type I error of 25%. 237 (95.56%) of 248 actual non-refocusing firms are correctively predicted by the model, giving Type II error of 4.44%.

Palepu's (1989) optimal cutoff probability of 0.42 is also used in order to derive predictions. The results reveal that 2 (50%) of 4 actual refocusing firms are correctly

predicted by the model, giving Type I error of 50%. 246 (99.19%) of 248 actual non-refocusing firms are correctly predicted by the model, giving Type II error of 0.81%.

(Insert Table 9 here.)

The above results are based on 252 listed industrial firms only. This is because the entire population of the listed industrial firms is used to estimate binominal logistic Model 1 (Table 3). This approach is similar to Olhson's (1980) approach and it can avoid the biases caused by the state-based sample (Palepu, 1986). However, it reduces the size of hold-out sample for testing the predictive usefulness of the Model 1.

8. Conclusion

This paper has examined the market reaction to firms' refocusing announcements from the perspective of investors' predicted probability. This has been achieved by examining the relationship between firms' monthly stock returns, their refocusing announcements and investors' predicted probability prior to a refocusing announcement. The researcher postulates that the magnitude of investors' predicted probability prior to the refocusing announcement along with managers' strategic timing of announcing refocusing reflect the information asymmetry between them. This may have the potential to cause variations in the market reaction to refocusing announcements.

A binominal logistic model and a new cutoff probability have been developed in order to measure investors' predicted probability. The results demonstrate the following: Firstly, that the market reaction is significantly positive if managers announce refocusing in a month when investors' predicted probability is high. Secondly, there is no significant market reaction if managers announce refocusing in a month when investors' predicted probability is

low. Thirdly, the association between stock returns and investors' high predicted probability is significantly negative if managers do not announce refocusing. Fourthly, the association between stock returns and investors' low predicted probability is significantly positive if managers do not announce refocusing.

The result of the binominal logistic model confirms that the significant variables for predicting the likelihood of refocusing are: market and accounting performance in the previous twelve months; book-to-market value; leverage level; non-routine changes of managers in the previous twelve months; and changes to GDP in the previous twelve months.

The study demonstrates the ways in which investors perceive refocusing announcements based on their predicted probability. It also suggests that in order to avoid a negative market reaction managers need to respond to investors' concerns, reduce information asymmetry and resolve operational problems before they become serious. It also implicitly supports IASB's amendment of IAS 37 that requires firms to disclose more details of restructuring charges, and any related activities, in a timely manner.

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Table 1. Sample structure of short paragraphs and full text articles, sample firms, and the distribution of UK listed industrial firms' first corporate refocusing announcements, 2000 - 2010.

Panel A reports the number of short paragraphs and full text articles concerning firms' refocusing announcements collected from www.ukbusinesspark.com, Perfect Information Navigator and Financial Times (FT) from ProQuest ABI/INFORM Global New Platform & Free E-journals for the sample period 2000 – 2010, the number of UK listed industrial firms announcing refocusing, and those without any refocusing announcements. They are classified by Standard Industrial Classification (SIC) groups. SIC0 = agriculture, forestry, fishing and hunting; SIC1 = utilities; SIC2 = mining, quarrying and oil and gas extractions; SIC3 = manufacturing; SIC4 = wholesale trade, retail trade, transportation and warehousing, information, accommodation and food services and other services (except administration); and SIC5 = construction. Panel B presents the number of firms that announced refocusing from 2000 to 2010 as a percentage of the number of firms listed on the London Stock Exchange (LSE) after excluding firms that had announced refocusing in previous years. Panel C displays the months in which firms announced refocusing relative to their financial year-ends (month 0).

Panel A: Distribution of short paragraphs and full text articles and sample firms by industry

SIC	No. of short paragraphs	No. of full text articles	Total	No. of refocusing firms		No. of non-refocusing firms
	ukbuspk.com	Perfect Information Navigator & FT from ProQuest ABI/INFORM Global New Platform & Free E-journals		Initial	Final	Final
0	58	77	135	8	8	23
1	224	265	489	26	26	29
2	583	867	1450	87	87	409
3	681	830	1511	123	123	277
4	3012	3925	6937	533	519	998
5	273	366	639	64	46	60
	4831	6330	11161	841	809	1796

Types of refocusing activities	1	2	3	Total
No. of firms	368	430	11	809

Panel B: Frequency of the first refocusing announcements

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Frequency of first refocusing announcements (%)	5.58	7.77	8.01	6.82	5.67	4.58	3.95	4.78	5.54	5.57	3.88

Panel C: Monthly distribution of refocusing announcements

Financial year end	0	1	2	3	4	5	6	7	8	9	10	11	Total
No. of refocusing firms	84	68	64	66	56	57	58	57	79	77	75	68	809

Table 2. Descriptive statistics for key variables

This table reports descriptive statistics for variables: cumulative abnormal returns in the previous twelve months ($CAR_{i,t-12m}$); monthly returns ($R_{i,t}$); logarithm of market value ($logMV_{i,t}$); book-to-market value ($BTMV_{i,t}$); debt-to-equity ($DtoEq_{i,t}$); industry-adjusted ROA ($IndadjROA_{i,t}$); refocusing variable (Refocus) and variables in the previous twelve months: takeover threats ($TO_{i,t-12m}$), non-routine changes in management ($Cmag_{i,t-12m}$), changes in Gross Domestic Product ($GDP_{i,t-12m}$) and frequency of refocusing in SIC groups ($IndRef_{i,t-6m}$).

	Obs.	Mean	STD	Max	Q3	Median	Q1	Min	Skewness
Panel A :809 refocusing firms and 1,796 non-refocusing firms:									
$CAR_{i,t-12m}$	207,790	-0.018	0.591	2.101	0.300	0.006	-0.317	-1.982	-0.105 ^a
$R_{i,t}$	192,867	0.000	0.147	0.662	0.063	0.000	-0.073	-0.481	0.531 ^a
$logMV_{i,t}$	192,833	1.619	0.886	4.179	2.197	1.520	0.970	-0.268	0.413 ^a
$BTMV_{i,t}$	178,061	0.761	1.012	8.929	0.973	0.518	0.250	-2.938	2.908 ^a
$DtoEq_{i,t}$	206,653	39.671	116.694	924.570	58.070	14.180	0.000	-771.260	1.493 ^a
$IndadjROA_{i,t}$	192,228	-0.097	0.393	0.486	0.066	0.000	-0.107	-3.802	-4.096 ^a
Refocus	375,120			1				0	
$TO_{i,t-12m}$	375,120			1				0	
$Cmag_{i,t-12m}$	375,120			1				0	
$GDP_{i,t-12m}$	375,120			1				0	
$IndRef_{i,t-6m}$	375,120			1				0	
Panel B: 809 refocusing firms:									
$CAR_{i,t-12m}$	82,470	0.003	0.535	2.101	0.291	0.035	-0.249	-1.982	-0.282 ^a
$R_{i,t}$	77,393	0.004	0.135	0.661	0.066	0.000	-0.064	-0.481	0.447 ^a
$logMV_{i,t}$	76,492	1.987	0.933	4.179	2.649	1.981	1.288	-0.268	0.067 ^a
$BTMV_{i,t}$	73,948	0.739	0.869	8.929	0.950	0.532	0.286	-2.932	2.928 ^a
$DtoEq_{i,t}$	76,560	57.049	123.104	924.570	81.580	36.090	4.390	-771.260	1.130 ^a
$IndadjROA_{i,t}$	75,684	-0.026	0.273	0.474	0.071	0.014	-0.046	-3.618	-5.787 ^a
Refocus	122,256			1				0	
$TO_{i,t-12m}$	122,256			1				0	
$Cmag_{i,t-12m}$	122,256			1				0	
$GDP_{i,t-12m}$	122,256			1				0	
$IndRef_{i,t-6m}$	122,256			1				0	
Panel C: 1,796 non-refocusing firms:									
$CAR_{i,t-12m}$	125,320	-0.032	0.625	2.101	0.307	-0.015	-0.366	-1.982	-0.013 ^a
$R_{i,t}$	115,474	-0.002	0.154	0.662	0.061	0.000	-0.080	-0.481	0.576 ^a
$logMV_{i,t}$	116,341	1.377	0.762	4.178	1.845	1.319	0.841	-0.268	0.477 ^a
$BTMV_{i,t}$	104,113	0.777	1.102	8.928	0.993	0.508	0.223	-2.938	2.814 ^a
$DtoEq_{i,t}$	130,093	29.444	111.492	918.010	39.910	4.660	0.000	-760.750	1.762 ^a
$IndadjROA_{i,t}$	116,544	-0.143	0.449	0.486	0.063	-0.017	-0.181	-3.802	-3.510 ^a
Refocus	252,864			0				0	
$TO_{i,t-12m}$	252,864			1				0	
$Cmag_{i,t-12m}$	252,864			1				0	
$GDP_{i,t-12m}$	252,864			1				0	
$IndRef_{i,t-6m}$	252,864			1				0	

Obs. denotes the number of observations, STD is standard deviation. Max represents the maximum value. Q3 is the 75th percentile and Q1 is 25th percentile. Min denotes the minimum value.
a, b and c indicate statistical significance of one-tailed z-test at the 1%, 5% and 10% level respectively.

Table 3. Monthly binominal logistic regressions results

Panel A of the table reports the summary results of 132 monthly regressions of binominal logistic Model 1:

$$\Pr(\text{Refocus } 1,0)_{i,t} = \alpha_{i,t} + \beta_1 \text{CAR}_{i,t-12m} + \beta_2 \log MV_{i,t} + \beta_3 \text{BTMV}_{i,t} + \beta_4 \text{DtoEq}_{i,t} + \beta_5 \text{IndadjROA}_{i,t} + \beta_6 \text{TO}_{i,t-12m} \\ + \beta_7 \text{Cmag}_{i,t-12m} + \beta_8 \text{IndRef}_{t-6m} + \beta_9 \text{GDP}_{t-12m} + \varepsilon_{i,t}$$

where variables are defined in Table 2. The result is obtained by running the above model for 132 months from 2000 to 2010. The above model also gives a firm's i propensity score for each month due to Model 2. These scores proxy for investors' predicted probability of firms announcing refocusing in the near future. Panel B presents the descriptive statistics of these propensity scores of firm-months. They are presented in subgroups of refocusing firms, non-refocusing firms and all firms. Statistical significance of skewness is tested by one-tailed z-test.

Panel A: Summary results of monthly binominal logistic regressions

	$\alpha_{i,t}$	$\text{CAR}_{i,t-12m}$	$\log MV_{i,t}$	$\text{BTMV}_{i,t}$	$\text{DtoEq}_{i,t}$	$\text{IndadjROA}_{i,t}$	$\text{TO}_{i,t-12m}$	$\text{Cmag}_{i,t-12m}$	IndRef_{t-6m}	GDP_{t-12m}
Mean	-6.721	-0.610	1.007	0.237	0.001	-0.514	0.684	1.069	0.099	-0.834
STD	3.250	0.743	0.380	0.329	0.002	0.899	5.702	2.434	2.88	0.249
t-test	(-23.76) ^a	(-9.43) ^a	(30.48) ^a	(8.27) ^a	(5.98) ^a	(-6.57) ^a	(1.38)	(5.05) ^a	(0.4)	(-3.35) ^a
Firm-months	137,871									

Panel B: Descriptive statistic of propensity scores of firm-months

	Firm-months	Mean	STD	Min	Q1	Median	Q3	Max	Skewness
Refocusing firms	58,310	0.024	0.034	4.035E-22	0.007	0.014	0.027	0.888	5.955 ^a
Non-refocusing firms	79,561	0.012	0.019	8.96E-10	0.004	0.007	0.013	0.554	7.627 ^a
All firms	137,871	0.017	0.027	4.035E-22	0.005	0.009	0.019	0.888	6.870 ^a

*a indicates statistical significance at the 1% level.

Table 4. Descriptive statistics of the frequency of UK listed industrial firms' first refocusing announcements in the previous twelve months ($P12m_{i,t-12m}$) and descriptive statistics of frequency-adjusted propensity scores in each month.

Panel A displays the descriptive statistics of frequency of UK listed industrial firms' first refocusing announcements in the twelve months before month t in the pooled sample. The frequency is defined as the number of firms' first refocusing announcements in the twelve months before month t , divided by the total number of firms in the same industry group in the twelve months before month t , shown in Model 3:

$$P12m_{i,t-12m} = \text{No.ofrefocus}_{s_{icd,t-12m}} / \text{No.offirms}_{s_{icd,t-12m}}$$

Panel B reports the descriptive statistics of frequency-adjusted propensity scores of firm-months, $FreqadjProb_{i,t}$, derived by Model 4:

$$FreqadjProb_{i,t} = Prob_{i,t} - P12m_{i,t-12m}$$

Panel A: Descriptive statistics of frequency of UK industrial firms' first refocusing announcements in the 12 months before month t ($P12m_{i,t-12m}$) from 1999 to 2010

Firms/SIC	Firm-months	Mean	STD	Min	Q1	Median	Q3	Max	Skewness
All firms	144	0.048	0.018	0.017	0.035	0.042	0.062	0.089	0.549 ^a
SIC0	144	0.051	0.05	0	0	0.05	0.1	0.158	0.445 ^b
SIC1	144	0.079	0.065	0	0.029	0.054	0.13	0.219	0.755 ^a
SIC2	144	0.035	0.016	0.012	0.02	0.034	0.047	0.078	0.36 ^c
SIC3	144	0.052	0.024	0	0.035	0.048	0.073	0.104	0.10
SIC4	144	0.049	0.019	0.013	0.035	0.047	0.059	0.099	0.562 ^a
SIC5	144	0.058	0.034	0	0.032	0.045	0.082	0.147	0.695 ^a

Panel B: Descriptive statistics of frequency-adjusted propensity scores ($FreqadjProb_{i,t}$) from 2000 to 2010

	Probability	Firm-months	Mean	STD	Min	Q1	Median	Q3	Max	Skewness
Refocusing	High	7,838	0.041	0.059	8.44E-08	0.008	0.021	0.049	0.829	4.085 ^a
	Low	50,472	-0.040	0.024	-0.219	-0.053	-0.037	-0.023	-1.98E-07	-1.418 ^a
		58,310								
Non-refocusing firms	High	4,562	0.028	0.044	8.11E-08	0.005	0.012	0.031	0.517	3.637 ^a
	Low	74,999	-0.039	0.021	-0.216	-0.049	-0.036	-0.024	-1.10E-06	-1.089 ^a
		79,561								
All firms	High	12,400	0.036	0.054	8.11E-08	0.006	0.017	0.042	0.829	4.108 ^a
	Low	125,471	-0.039	0.022	-0.219	-0.051	-0.037	-0.024	-1.98E-07	-1.277 ^a
		137,871								

*a, b and c indicate statistical significance of one-tailed z -test at the 1%, 5% and 10% level, respectively.

Table 5. Results of Models 6 and 7

The table reports the results of Model 6:

$$R_{i,t} = \alpha + \delta_1 Refocus_{i,t} + \delta_2 Prob_{i,t} + \delta_3 Refocus_{i,t} * Prob_{i,t} \\ + y_1 High + y_2 High * Refocus_{i,t} + y_3 High * Prob_{i,t} + y_4 High * Refocus_{i,t} * Prob_{i,t} + \varepsilon_{i,t}$$

and Model 7:

$$R_{i,t} = \alpha + \delta_1 Refocus_{i,t} + \delta_2 Prob_{i,t} + \delta_3 Refocus_{i,t} * Prob_{i,t} \\ + y_1 High + y_2 High * Refocus_{i,t} + y_3 High * Prob_{i,t} + y_4 High * Refocus_{i,t} * Prob_{i,t} \\ + \sum_{d=0}^6 (\gamma_{1,d} SIC_{d,t} + \gamma_{2,d} SIC_{d,t} * Refocus_{i,t} + \gamma_{3,d} SIC_{d,t} * Prob_{i,t} + \gamma_{4,d} SIC_{d,t} * Refocus_{i,t} * Prob_{i,t}) \\ + \sum_{\mu=1}^{131} (\rho_{1,\mu} M_{\mu,t} + \rho_{2,\mu} M_{\mu,t} * Refocus_{i,t} + \rho_{3,\mu} M_{\mu,t} * Prob_{i,t} + \rho_{4,\mu} M_{\mu,t} * Refocus_{i,t} * Prob_{i,t}) + \varepsilon_{i,t}$$

where variables are defined in Tables 2 and 3. Model 6 is Model 5 with the introduction of a dummy of the firm-months classified as having a high predicted probability of announcing refocusing in month t (High) due to its frequency-adjusted propensity score presented in Panel B of Table 4. Model 7 is Model 5 with the introduction of dummies of high, six industry groups (SIC_d , $d = 0$ to 5) and month (M_μ). Models 6 and 7 are estimated based on (i) the pooled sample of all firms (All firms), (ii) the sub-datasets of refocusing firms (Refocus) and non-refocusing firms (Non-refocus), and (iii) the sub-datasets of 505 pairs of propensity score matched refocusing (PSM refocus) and non-refocusing firms (PSM non-refocus). There are 132 months from Jan 2000 to 2010, and Dec 2010 is treated as the base month by the SAS programme. Therefore, $\mu = 1$ to 131. For presentation purposes, the results of dummies of SIC groups and months are not presented, but are available upon request.

	Model 6					Model 7				
	Allfirms	Refocus	Non-refocus	PSM refocus	PSM non-refocus	Allfirms	Refocus	Non-refocus	PSM refocus	PSM non-refocus
Intercept	-0.005	-0.002	-0.006	-0.001	0.0004	0.050	0.067	0.044	0.066	0.063
<i>t</i> -test	(-7.95) ^a	(-2.00) ^b	(-7.56) ^a	(-0.61)	(0.36)	(7.71) ^a	(6.76) ^a	(4.95) ^a	(6.22) ^a	(5.84) ^a
Refocus	0.017	0.014		0.019	-0.010	-0.039	-0.056		-0.002	-0.070
<i>t</i> -test	(2.38) ^b	(0.033)		(2.64) ^a	(-1.46)	(-0.42)	(-0.67)		(-0.02)	(-0.74)
Prob	0.380	0.295	0.422	0.313	0.274	1.460	1.291	1.359	1.624	1.451
<i>t</i> -test	(10.44) ^a	(6.42) ^a	(6.84) ^a	(5.93) ^a	(4.71) ^a	(5.49) ^a	(4.12) ^a	(2.92) ^a	(4.51) ^a	(3.90) ^a
RefocusProb	-0.456	-0.371		-0.469	0.219	-0.846	-0.677		-1.596	0.387
<i>t</i> -test	(-1.85) ^c	(-1.61)		(-1.77) ^c	(0.73)	(-0.37)	(-0.32)		(-0.56)	(0.47)
High	0.016	0.012	0.019	0.009	0.011	0.015	0.014	0.014	0.011	0.016
<i>t</i> -test	(7.45) ^a	(4.28) ^a	(5.70) ^a	(2.94) ^a	(3.56) ^a	(7.01) ^a	(5.17) ^a	(4.13) ^a	(3.47) ^a	(4.66) ^a
Hrefocus	-0.029	-0.024		-0.038	-0.007	-0.028	-0.027		-0.051	-0.0167
<i>t</i> -test	(-2.58) ^a	(-2.34) ^b		(-3.13) ^a	(-0.43)	(-1.98) ^b	(-2.08) ^b		(-3.10) ^a	(-0.63)
HProb	-0.444	-0.352	-0.488	-0.363	-0.319	-0.418	-0.341	-0.438	-0.316	-0.339
<i>t</i> -test	(-10.24) ^a	(-6.56) ^a	(-6.57) ^a	(-5.68) ^a	(-4.84) ^a	(-9.32) ^a	(-6.15) ^a	(-5.52) ^a	(-4.69) ^a	(-4.81) ^a
HRefocusProb	0.516	0.424		0.556	-0.097	0.488	0.411		0.617	0.277
<i>t</i> -test	(2.04) ^b	(1.79) ^c		(2.04) ^b	(-0.29)	(1.65) ^c	(1.51)		(1.79) ^c	(0.53)
Adj R-Sq (%)	0.01	0.08	0.09	0.09	0.06	12.1	14.77	11.06	15.52	15.08
F value	21.37	7.58	24.53	6.83	4.78	36.02	19.73	37.47	16.62	15.54
Firm-months	136,087	57,798	78,289	45,507	45,507	136,087	57,798	78,289	45,507	45,507

*a, b and c indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 6. Distribution of estimated probability of announcing refocusing in firm-months ($Prob_{i,t}$) for refocusing (R) and non-refocusing firms (NR)

This table reports the distribution of estimated probability of announcing refocusing in firm-months ($Prob_{i,t}$) for refocusing (R) and non-refocusing firms (NR) obtained using the binominal logistic Model 1. The first two columns present the range and mid-value of the estimated probability. The third and fourth columns report the number and percentage of refocusing firms' firm-month observations with the estimated probabilities falling within the indicated range and mid-value. The percentage of firm-month observations of each range is equal to the number of firm-month observations falling within the range, divided by the total number of observations. These are 58,630 for refocusing firms and 79,241 for non-refocusing firms. The results of the non-refocusing firms are presented in the same manner. The final column shows the ratio between refocusing firms' percentage to that of non-refocusing firms.

These results are compatible with Panel B of Table 3.

Estimated probability		Refocusing firms (R)		Non-refocusing firms (NR)		
Range	Mid-value	No.	R(%)	No.	NR(%)	R(%) / NR(%)
0 to 0.039	0.0195	49482	85.234	75958	95.874	0.89
0.04 to 0.044	0.042	1293	2.205	593	0.748	2.95
0.045 to 0.049	0.047	1075	1.834	448	0.565	3.24
0.05 to 0.059	0.0545	1654	2.811	606	0.762	3.69
0.06 to 0.069	0.0645	1658	2.818	382	0.480	5.87
0.07 to 0.079	0.0745	778	1.322	287	0.361	3.67
0.08 to 0.119	0.0845	1575	2.702	545	0.685	3.94
0.12 to 0.159	0.1395	541	0.928	199	0.250	3.71
0.16to0.199	0.1795	251	0.431	92	0.116	3.72
0.2to0.239	0.2195	120	0.206	53	0.067	3.09
0.24to0.279	0.2595	72	0.124	39	0.049	2.52
0.28to0.319	0.2995	31	0.053	20	0.025	2.12
0.32to0.359	0.3395	30	0.051	11	0.014	3.72
0.36to0.39	0.375	19	0.033	2	0.003	12.97
0.4 to 0.49	0.445	31	0.053	4	0.005	10.58
0.5 to 0.59	0.545	12	0.021	2	0.003	8.19
0.6 to 0.69	0.645	6	0.010	0	0	
0.7 to 0.79	0.745	1	0.002	0	0	
0.8 to 0.89	0.845	1	0.002	0	0	
Total		58,630	100	79,241	100	
Optimal cutoff point			14%		14%	

Figure 1. Distribution of estimated probability of announcing refocusing in firm-months for refocusing (R) and non-refocusing firms (NR)

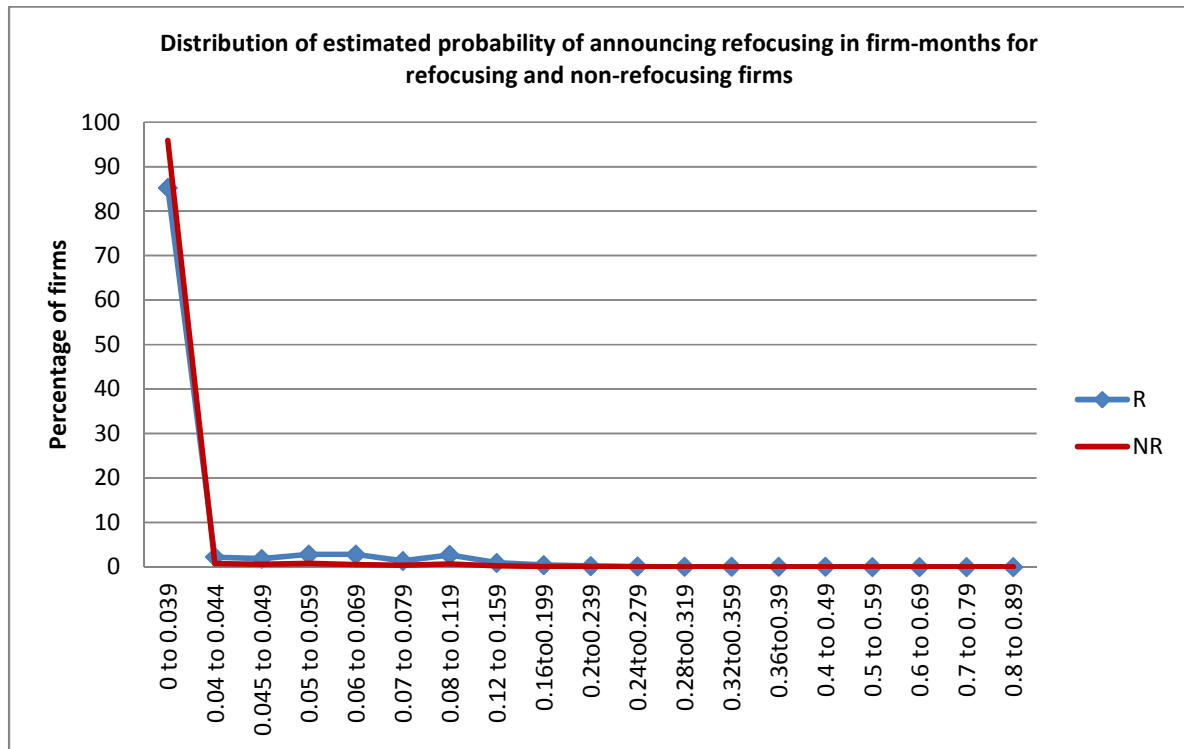


Table 7. Descriptive statistics of frequency-adjusted propensity scores ($FreqadjProb_{i,t}$) from 2000 to 2010 obtained using Palepu's (1986) optimal cutoff probability.

The results of this paper can be compared with those of Panel B of Table 4.

	Probability	Firm-months	Mean	STD	Min	Q1	Median	Q3	Max	Skewness
Refocusing	High	8,087	0.041	0.059	0.000	0.009	0.022	0.050	0.846	4.101 ^a
	Low	50,223	-0.028	0.010	-0.042	-0.036	-0.030	-0.022	0.000	0.775 ^a
		58,310								
Non-refocusing firms	High	3,040	0.039	0.052	0.000	0.007	0.020	0.049	0.512	2.932 ^a
	Low	76,521	-0.033	0.008	-0.042	-0.039	-0.035	-0.030	0.000	1.527 ^a
		79,561								
All firms	High	11,127	0.041	0.057	0.000	0.009	0.022	0.050	0.846	3.875 ^a
	Low	126,744	-0.031	0.009	-0.042	-0.038	-0.033	-0.027	0.000	1.196 ^a
		137,871								

^aa indicates statistical significance of one-tailed z -test at the 1% level.

Table 8. Results of Models 6 and 7 obtained using Palepu's (1986) optimal cutoff probability
The definitions of variables remain the same as those in Table 5.

	Model 6					Model 7				
	Allfirms	Refocus	Non refocus	PSM refocus	PSM non-refocus	Allfirms	Refocus	Non refocus	PSM refocus	PSM non-refocus
Intercept	-0.006	-0.003	-0.007	-0.002	-0.001	0.051	0.069	0.045	0.067	0.0665
<i>t</i> -test	(-9.35) ^a	(-3.12) ^a	(-8.68) ^a	(-1.49)	(-0.46)	(8.04) ^a	(7.05) ^a	(5.10) ^a	(6.39) ^a	(6.25) ^a
Refocus	0.020	0.017		0.022	-0.013	-0.045	-0.063		-0.027	-0.073
<i>t</i> -test	(2.27) ^b	(2.11) ^b		(2.46) ^a	(-1.70) ^c	(-0.49)	(-0.75)		(-0.25)	(-0.77)
Prob	0.546	0.428	0.615	0.416	0.395	1.653	1.466	1.571	1.783	1.588
<i>t</i> -test	(12.25) ^a	(7.17) ^a	(8.77) ^a	(6.28) ^a	(5.45) ^a	(6.21) ^a	(4.66) ^a	(3.38) ^a	(4.93) ^a	(4.27) ^a
RefocusProb	-0.762	-0.644		-0.704	0.334	-1.119	-0.931		-1.637	0.361
<i>t</i> -test	(-1.94) ^c	(-1.76)		(-1.76) ^c	(0.80)	(-0.48)	(-0.44)		(-0.57)	(0.44)
High	0.012	0.011	0.009	0.009	0.006	0.016	0.017	0.011	0.014	0.014
<i>t</i> -test	(4.49) ^a	(3.62) ^a	(1.78) ^c	(2.46) ^a	(1.67) ^c	(5.84) ^a	(5.38) ^a	(2.09) ^b	(3.59) ^a	(3.62) ^a
HRefocus	-0.023	-0.022		-0.033	0.017	-0.028	-0.029		-0.051	-0.0001
<i>t</i> -test	(-1.92) ^c	(-1.96) ^b		(-2.54) ^a	(1.00)	(-1.80) ^c	(-2.03) ^b		(-2.83) ^a	(0.00)
Hprob	-0.571	-0.467	-0.606	-0.447	-0.396	-0.662	-0.565	-0.684	-0.505	-0.520
<i>t</i> -test	(-10.9) ^a	(-6.97) ^a	(-6.91) ^a	(-5.77) ^a	(-4.93) ^a	(-12.14) ^a	(-8.2) ^a	(-7.03) ^a	(-6.16) ^a	(-6.12) ^a
HRefocusProb	0.771	0.667		0.754	-0.347	0.860	0.763		1.048	0.150
<i>t</i> -test	(1.94) ^c	(1.80) ^c		(1.86) ^c	(-0.79)	(2.00) ^b	(1.93) ^b		(2.23) ^b	(0.23)
Adj R-Sq (%)	0.12	0.09	0.10	0.09	0.07	12.14	14.81	11.09	15.54	15.1
F value	23.46	8.30	26.43	6.83	5.15	36.15	19.78	37.59	16.65	15.56
Firm-months	136,087	57,798	78,289	45,507	45,507	136,087	57,798	78,289	45,507	45,507

*a, b and c indicate statistical significance at the 1%, 5% and 10% level respectively.

Table 9. Predictability of binominal logistic model 1 and the new cutoff probability

252 industrial firms listed on the London Stock Exchange in January 2011 from LSPD version 2011 have been collected for this test. Four are identified as refocusing firms, due to the refocusing announcements from Perfect Information Navigator. The predicted probability of each firm-month of 252 industrial firms is computed by using the coefficients of the estimated variables of Model 1 at Panel A of Table 3.

	Cutoff probability		Outcome
	$P12m_{i,t-12m}$	Palepu's (0.042)	
High predicted probability	3	2	(Correct)
Low predicted probability	1	2	(Type I error)
Firms announced refocusing in January 2011	4	4	
High predicted probability	11	2	(Type II error)
Low predicted probability	237	246	(Correct)
Firms did not announce refocusing in January 2011	248	248	

**Do market predictions affect its reaction to UK listed industrial firms' corporate refocusing
announcements?**

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Oct 2014

Keywords: corporate refocusing activities, prediction, rare event, cutoff probability, market reaction.

JEL: G14, G34, M40.