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The impact of accounting information quality on the mispricing of accruals: The case of FRS3 in the UK

Ann L-C Chan [a], Edward Lee [b,*], Stephen Lin [c]

[a] Department of Accounting, National Chengchi University, Taipei, Taiwan
[b] Accounting and Finance Group, Manchester Business School, University of Manchester, Crawford House, Oxford Road, Manchester, M13 9PL, UK
[c] School of Accounting, College of Business Administration, Florida International University, 11200 SW 8 Street, RB 237 B, Miami, FL 33199, USA

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ABSTRACT

We exploit a unique setting of accounting regulation change to examine how accounting information quality affects the well-documented accrual anomaly. We show a significant reduction in the negative return predictability of accruals among UK companies with poorer accounting information quality following the introduction of Financial Reporting Standard No. 3: Reporting Financial Performance (FRS3). While the functional fixation hypothesis attributes the mispricing of accruals to the judgemental error of end-users of information, our findings suggest that the supply side of information also plays a crucial role. Our results provide evidence that regulatory interventions seeking to improve accounting information quality can reduce the mispricing of securities in the capital market.

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1. Introduction

We compare the empirical evidence of accrual anomaly before and after a major change of accounting regulation to examine how it is affected by accounting information quality. Since Sloan (1996) existing literature documents a negative relationship between accruals and subsequent stock returns but has yet to reach a consensus on the underlying cause of this anomaly. We examine this issue by exploiting a unique setting of accounting regulation change in the UK, i.e. the introduction of Financial Reporting Standard No. 3: Reporting Financial Performance (FRS3) in October 1992. In doing so, we

* Corresponding author. Tel.: +44 161 275 4564; fax: +44 161 275 4023.
E-mail address: edward.lee@mbs.ac.uk (E. Lee).

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intersect and contribute to two strands of literature: (a) the effects of information quality on accrual anomaly (e.g., Drake et al., 2007) and (b) the impact of FRS3 in the UK on accounting information quality (e.g., Acker et al., 2002; Athanasakou et al., 2007). There is currently little evidence on the impact of accounting regulatory intervention on stock return anomalies in the capital markets and we fill this gap.

Our study's innovation is to examine whether the accrual anomaly is reduced following regulatory interventions designed to improve market-wide accounting information environment. FRS3 seeks to reduce earnings manipulation and increase the disclosure of earnings performance. It demands UK companies to classify exceptional items more appropriately, eliminate the use of extraordinary items, and disclose additional income components. Existing literature documents improved earnings forecast (Acker et al., 2002; Lin, 2002), reduced earnings management (Athanasakou et al., 2007), and greater value relevance of reported earnings (Lin, 2006) following FRS3. Given the direct relevance of FRS3 on reported earnings information, we believe it may exert an impact to the mispricing of accruals in the UK.

Sloan (1996) attributes the accrual anomaly to the functional fixation hypothesis (e.g., Abdel-khalik and Keller, 1979; Hand, 1990) and suggests that investors overprice accruals because they are unable to distinguish the difference in persistence between the accruals and cash flow components of earnings. Merton (1987) suggests that incomplete information can cause asset pricing anomalies to arise in the capital markets even if it is dominated by rational agents. Brav and Heaton (2002) argue that rational investors would underweight lower precision signals, which leads to temporary mispricing, and correct their original valuation upon arrival of new information, which leads to subsequent abnormal returns. If the accrual anomaly is indeed a manifestation of mispricing and if investors' misjudgements are conditional on the information set available, the anomalous returns should be more pronounced among companies that supply poorer quality information. Existing studies confirm this prediction by documenting cross-sectional variations in accrual anomaly that is conditional on information quality (e.g., Drake et al., 2007).

We compare changes in the magnitude of the accrual anomaly in the UK from pre- (1986–1992) to post- (1995–2002) FRS3 periods. Following existing literature on accrual anomaly, we implement the Mishkin (1983) non-linear test, hedge portfolio return tests, and the Fama and MacBeth (1973) cross-sectional regression approaches. To account for the possibility of such changes arising purely by chance or due to other market-wide confounding reasons such as business cycles and Internet bubble, we identify cross-sectional variations in the degree to which companies are expected to be more sensitive to the FRS3.[1] Since the reduction of earnings management is one of the major objectives of FRS3, its impact should be more pronounced among companies where accounting disclosure quality is lower due to greater managerial discretionary effect. We identify such companies based on the quality of their accruals, following the approach of Francis et al. (2005), Francis et al. (2007) and McNichols (2002). To strengthen the robustness of our findings, we control for other factors that existing literature purports to be associated with accrual anomaly. These include value-growth effect (Beaver, 2002; Desai et al., 2004; Cheng and Thomas, 2006), limits to arbitrage (Mashruwala et al., 2006), and ownership dispersion (LaFond, 2005; Pincus et al., 2007).

We find a significant reduction of accrual anomaly in the UK from the pre- to post-FRS3 periods. For instance, across the whole sample the hedge portfolio tests indicate a significant drop of over 4% in annual abnormal returns between the pre- and post-FRS3 periods. The reduction is driven by the low accounting information quality companies, which experience a significant decline of around 6% in annual abnormal returns. The changes associated with high accounting information quality companies from pre- to post-FRS3 periods are statistically insignificant. These findings are robust to

[1] Pincus et al. (2007) suggest accrual anomaly could be affected by institutional factors such as legal origin, strength of insider trading, extent of accrual accounting, shareholder protection, importance of equity market in a country, and concentration of ownership. However, UK has not experienced systematic changes in these institutional settings over our post-FRS3 test periods and we control for company-specific ownership structure in our analyses. We are also not aware of other changes in UK GAAP or its enforcement that supersedes FRS3 in terms of relevance to reported earnings except for FRS14, which became effective in 1998. However, FRS14 merely amends details under the conceptual framework established by FRS3. Of the two legacy of FRS3, i.e. reduce earnings management and increase disclosure, FRS14 only refines the former aspect. Untabulated results from additional robustness tests indicate that our results are not driven by test periods associated with FRS14.

alternative methodologies and consistent with our prediction that companies with poorer accounting quality are more sensitive to the mandatory accounting regulation change. Our overall inference is that the improvement of accounting information quality due to FRS3, particularly in terms of reported earnings, contributes to the decrease in the mispricing of accruals.

Our approach in studying the accrual anomaly contributes to the literature in a number of ways. First, if accruals are mispriced due to both investors' own fixation bias and companies' accounting information quality, examining the changes in accrual anomaly after an accounting regulatory intervention enables us to separate these two effects. Assuming investors' cognitive bias is not affected by accounting regulation, the significant reduction of accrual anomaly after FRS3 indicates that the mispricing is indeed partially driven by the quality of accounting information from its supply side, i.e. the companies. Second, the information environment of companies is influenced by two sources, i.e. the inherent uncertainty due to operating environment and the uncertainty attributed to managerial discretion. Since FRS3 is a market-wide mandatory accounting regulation change, it is expected to affect mainly the managerial discretionary component of companies' information environment. By observing the impact of FRS3 on accrual anomalies, we are essentially identifying the influence of managerial discretion in reported earnings on the mispricing of accruals. Finally, we address a topical issue of whether regulatory intervention could be socially beneficial to the capital market. This is especially interesting against the backdrop of the on-going mandatory change in accounting standards in many countries to converge toward International Financial Reporting Standards (IFRS). A fundamental debate on this issue is whether or not corporate disclosure improvements are driven by incentives or standards (e.g., Ball et al., 2003; Christensen et al., 2008). Evidence that the well-documented accrual anomaly is reduced following FRS3 adds evidence in support of regulatory intervention.

Our paper is organised as follows. Section 2 reviews the literature and develops the hypotheses. Section 3 describes our sample and methodology. Section 4 presents the empirical findings. Section 5 concludes.

2. Prior literature and hypotheses development

2.1. Institutional background of FRS3

FRS3 was introduced by the UK Accounting Standard Board (ASB) on 29th October, 1992. It significantly affected how UK companies report financial performance in two ways. First, it reduces earnings management by treating previously classified extraordinary items as exceptionals and eliminating the use of extraordinary items to smoothen earnings. It also discourages misclassification of exceptional items since opportunistic behaviour as such could be more easily detected under the rigorous transparency requirements. Thus, it enables end-users to devise more informative indicators of a company's sustainable performance. Second, it eliminates the fixation on a single bottom-line measure of earnings and endorses an "information set" approach to present wider aspects of company performance. Companies are encouraged to supply additional income components in a layered format, provide more informative distinction between recurring and non-recurring income, and disclose alternative earnings measure alongside the basic number. According to the ASB (1992) the objective is to facilitate end-users' interpretation of current performance and improve their assessment of future cash flows. Beaver (1998) suggests that financial reporting regulators are concerned about market efficiency because of its implications for investor welfare and capital formation. Since information can be viewed as an economic commodity, the purpose of disclosure regulation is to ensure the fairness of its distribution.

Due to the aforementioned design, FRS3 was expected to increase disclosure and to improve the transparency of reported earnings. Both effects should have rendered reported earnings more informative and reduced the information asymmetry between insiders and outsiders. Although FRS3 is not designed to directly affect the underlying accounting process and disclosure incentive, the quality of information per se from end-users' perspective is expected to improve. Indeed, existing literature finds that the additional disclosure required by FRS3 increased analysts' ability to identify both permanent and transitory changes of earnings over different horizons (Lin, 2002) and that the additional

performance components demanded by FRS3 are value relevant (Lin, 2006). Acker et al. (2002) document a reduction of analyst forecast error after FRS3 following an initial uncertainty period. Athanasakou et al. (2007) find evidence of declines in earnings management and increases in persistence of sustainable earnings since FRS3. Thus, empirical studies so far consistently depict the introduction of FRS3 as beneficial to investors by improving their ability to assess companies' earnings performance.

2.2. Accrual anomaly and information environment

Sloan (1996) first documents that accruals are associated with lower earnings persistence and subsequent abnormal returns. He suggests that this is due to investors' fixation on earnings numbers as a whole, which leads to the overpricing of the accruals component. Since then different research pathways have been pursued to understand the underlying cause of accrual anomaly and the avenue most relevant to our study is the role of information environment.[2] Collins et al. (2003) show that accrual anomaly is less concentrated among stocks in where there are more institutional investors. They suggest that institutional investors may have either superior ability to interpret information contained in the financial statements or informational advantages such as closer access to the management. Drake et al. (2007) further confirm that better accounting disclosure reduces the mispricing of accruals. They apply analysts' rating of company disclosure quality. Together, empirical results of these cross-sectional studies support the argument that incomplete information could result into deviations of market efficiency and the formulation of asset pricing anomalies (e.g., Merton, 1987; Brav and Heaton, 2002).

2.3. Hypotheses development

The existing research on the economic consequences of FRS3 in UK has yet to draw a link to its impact on the mispricing of accruals. The use of FRS3 as a setting enables us to examine whether accrual mispricing is conditional on information quality over time periods, which is distinct from other studies that examine the same issue over cross-sections. Mandatory regulatory intervention through FRS3 should influence accounting information quality of UK companies mainly in the aspect associated with management-induced effect as opposed to operational reasons. In other words, the more a company's disclosure is affected by managerial discretion, the more should its reported earnings be more sensitive to FRS3. Therefore, we test the following hypotheses:

(i) The accrual anomaly in the UK is reduced following the introduction of FRS3 and (ii) this reduction is more pronounced among companies with poorer accounting information quality due to greater managerial discretionary effect.

3. Sample and methodology

3.1. Sample and descriptive statistics

Table 1 describes our sample selection. We collect all accounting and market-based data from Datastream and obtain analysts' earnings forecast data from I/B/E/S. Our sample period starts from 1986 when I/B/E/S coverage of UK companies begins. To compare the mispricing of accruals in our UK sample before and after the introduction of FRS3, we define the pre-FRS3 period as 1986–1992 and the post-FRS3 period as 1995–2002. We skip the 1993–1994 initial transition period to address the argument put forward by Acker et al. (2002) that it takes two years for the effect of FRS3 on information environment to become fully established. Following existing literature we exclude financial companies due to their different regulatory and operating environment. Finally, we restrict our sample

[2] Alternative research pathways include accrual decomposition (e.g., Xie, 2001; Dechow et al., 2008), value/growth effect (Beaver, 2002; Cheng and Thomas, 2006), truncation bias (Kraft et al., 2006), systematic risk (Khan, 2008), institutional framework (LaFond, 2005; Pincus et al., 2007), financial analysts (Bradshaw et al., 2001; Barth and Hutton, 2004), and institutional investors (Collins et al. 2003; Lev and Nissim, 2006).

Table 1
Sample selection.

Sample reduction criterion	Company-year observations
Original sample (all UK companies 1986–2002, excluding suspended equities)	14,740
Excluding financial companies	13,546
Excluding missing accounting data (earnings, total accruals, discretionary and non-discretionary accruals, book value, current, one-year lead and lag cash flows)	9575
Excluding missing market-based data (stock returns, market value, Fama and French (1996) three-factor model risk loadings and residual variance)	6,951
Excluding missing accruals quality measures and analyst forecast errors	3971
Excluding FRS3 transition years (1993 and 1994)	3462

to observations without missing values for all variables required in our empirical analyses. Our final test sample contains 3,462 company-years of observation.[3]

Table 2 presents descriptive statistics (Panel A) and correlation analyses (Panel B). We winsorize all variables at the 1st and 99th percentiles to reduce the impact of outliers. Due to the difference in sample selection and test period, the distribution of our variables may not be directly comparable with the UK sample in Pincus et al. (2007). Although our sample has higher median earnings, total accruals, and cash flows, the correlation between earnings, total accruals, and cash flows of our sample appears to be similar to Pincus et al. (2007). The median book-to-market value and ownership of our sample also appear to be close. We do not expect these differences to bias our sample in favour of finding results in support of our hypotheses.

3.2. Research methodology

3.2.1. Measuring accruals

Following Sloan (1996), we measure total operating accruals ($ACC_{i,t}$) as change in non-cash working capital after depreciation:

$$ACC_{i,t} = CA_{i,t} - CL_{i,t} - DEP_{i,t} \quad (1)$$

where $CA_{i,t}$ is the sum of changes in stocks, work-in progress, and debtors (non-cash current assets), $CL_{i,t}$ is changes in current liabilities, and $DEP_{i,t}$ is depreciation and amortisation expenses of company i in year t. We use balance sheet method to calculate accruals instead of cash flow statement because such data are not available for UK companies over the entire sample period.[4]

3.2.2. Measuring accounting information quality

To classify companies into high and low accounting information quality in our main tests we estimate the quality of accruals following the approach of Francis et al. (2005) and Francis et al. (2007), which is based on Dechow and Dichev's (2002) model augmented with fundamental variables from the modified Jones (1991) model. We run cross-section regressions of the following model for each industry-year:

$$ACC_{i,t} = \phi_0 + \phi_1 CFO_{i,t-1} + \phi_2 CFO_{i,t} + \phi_3 CFO_{i,t+1} + \phi_4 \Delta REV_{i,t} + \phi_5 PPE_{i,t} + \varepsilon_{i,t} \quad (2)$$

[3] Our UK sample size differs from LaFond (2005) and Pincus et al. (2007) due to the following reasons. First, we require analysts earnings forecast data from I/B/E/S database. Like in the case of US sample, I/B/E/S does not cover the entire cross-section of listed companies in the UK and the level of coverage in UK is also relatively smaller than that of US. Second, we require companies with at least six years of continuous accounting data to estimate accruals quality. Third, our sample period excludes 1993 and 1994, which we classify as initial FRS3 transition years.

[4] Hribar and Collins (2002) suggest that balance sheet method of calculating accruals can lead to estimation errors in cases such as mergers and acquisitions. To address this issue, we conduct additional robustness check by deleting company-year observations associated with merger and acquisitions. This adjustment does not affect the inference from our findings.

Table 2
Descriptive statistics and correlation analyses. This table reports descriptive statistics (Panel A) and Pearson correlations (Panel B). *EARN* is income before extraordinary items scaled by the average of opening and closing total assets; *ACC* is total operating accruals, measured as changes in stocks, plus changes in debtors, less changes in creditors, less depreciation and amortisation, scaled by average total assets; *CFO* is cash flow from operations scaled by average total assets; *ACCERR* is the 5-year standard deviation of the residual from the regression of Dechow and Dichev's (2002) model augmented with variables from the modified Jones (1991) model; *DACC* is discretionary accruals and *NDACC* is non-discretionary accruals based on the modified Jones (1991) model augmented with ROA based on Kothari et al. (2005); *MV* is log market value of equity; *BM* is book to market value; *CP* is the cash flow to price ratio; *OWN* is the percentage of closely-held shares measured at the end of fiscal year; *RVAR* is residual variance estimated from the Fama and French (1996) three-factor model using a 60-month return period ending six months after the fiscal year-end; and *FE* is the absolute value of analyst forecast error calculated as the difference between actual earnings and analysts consensus forecasts scaled by opening share price.

	EARN	ACC	CFO	ACCERR	DACC	NDACC	MV	BM	CP	RVAR	OWN	FE
Panel A: Descriptive statistics												
Mean	0.076	−0.025	0.124	0.060	−0.004	−0.021	4.292	0.665	0.159	0.100	0.219	0.049
Q1	0.039	−0.065	0.076	0.023	−0.041	−0.050	3.106	0.315	0.073	0.067	0.002	0.009
Median	0.076	−0.027	0.131	0.039	−0.001	−0.027	4.222	0.529	0.136	0.087	0.162	0.020
Q3	0.121	0.009	0.188	0.072	0.035	0.003	5.311	0.832	0.214	0.117	0.376	0.041
Stdev	0.127	0.082	0.127	0.071	0.091	0.071	1.630	0.640	0.187	0.049	0.219	0.133
Panel B: Correlation analyses												
EARN	1											
ACC	0.084***	1										
CFO	0.529***	−0.431***	1									
ACCERR	−0.138***	0.011	−0.212***	1								
DACC	0.029	0.652***	−0.316***	−0.021	1							
NDACC	0.080***	0.326***	−0.074***	0.000	−0.481***	1						
MV	0.076***	0.053	0.123***	−0.073***	0.034	0.020	1					
BM	−0.124***	−0.085***	−0.136***	−0.117***	0.006	−0.102***	−0.304***	1				
CP	0.081***	−0.482***	0.460***	−0.154***	−0.301***	−0.162***	−0.183***	0.439***	1			
RVAR	−0.239***	0.012	−0.341***	0.394***	−0.008	0.019	−0.275***	−0.046**	−0.152***	1		
OWN	0.014***	−0.048***	0.028	0.053***	−0.012	−0.039**	−0.288***	0.021	0.008	0.137***	1	
FE	−0.114***	−0.116***	−0.168***	0.107***	−0.068***	−0.051***	−0.213***	0.313***	0.113***	0.213***	0.044**	1

*Indicates statistical significance at 10%.
** Indicates statistical significance at 5%.
*** Indicates statistical significance at 1%.

where $ACC_{i,t}$ is total accruals, $CFO_{i,t}$ is cash flow from operations, $\Delta REV_{i,t}$ is change in revenue, and $PPE_{i,t}$ is gross value of property, plant, and equipment of company i in year t. The industries are categorised according to Financial Times Actuaries classification. The residual term $\varepsilon_{i,t}$ indicates the level of accruals that are related neither (i) to cash flows in current or surrounding time periods nor (ii) to variables from the modified Jones (1991) model that explains non-discretionary accruals.[5] We take the standard deviation of the company- and year-specific residual over the past five years as a proxy for accruals quality in year t ($ACCERR_{i,t}$).[6] Because higher variations of residuals indicate a higher degree of accrual estimation error and thus a greater information uncertainty in reported earnings, we classify companies with $ACCERR_{i,t}$ below (above) the yearly cross-sectional median as high (low) accounting information quality. Since $ACCERR_{i,t}$ captures the quality of accruals attributed to managerial discretion, we expect companies with higher values to be more sensitive to the effect of mandatory accounting regulation changes such as FRS3.

3.2.3. Mishkin tests

The Mishkin test has been used in similar studies (e.g., Sloan, 1996; Collins et al., 2003) as a direct test of whether the market misprices accruals. We apply the Mishkin test by simultaneously estimating the following equations using a generalized nonlinear least squares procedure:

$$EARN_{i,t+1} = \lambda_0 + \lambda_{0PRE}PRE_{i,t} + \lambda_1 ACC_{i,t} + \lambda_{1PRE}PRE_{i,t} \times ACC_{i,t} + \lambda_2 CFO_{i,t} + \lambda_{2PRE}PRE_{i,t} \times CFO_{i,t} + v_{i,t+1} \quad (3)$$

$$AbRET_{i,t+1} = \beta_1[EARN_{i,t+1} - \lambda_0^* - \lambda_{0PRE}^* PRE_{i,t} - \lambda_1^* ACC_{i,t} - \lambda_{1PRE}^* PRE_{i,t} \times ACC_{i,t} - \lambda_2^* CFO_{i,t} - \lambda_{2PRE}^* PRE_{i,t} \times CFO_{i,t}] + \varepsilon_{i,t+1} \quad (4)$$

where $EARN_{i,t+1}$ is one-year-ahead earnings, $ACC_{i,t}$ is total accruals, $CFO_{i,t}$ is cash flows, $PRE_{i,t}$ is pre-FRS3 period dummy, and $AbRET_{i,t+1}$ is one-year-ahead abnormal return measured as annual size-adjusted buy-and-hold returns starting 6 months after the fiscal year end.[7] We run Mishkin tests separately in high and low accounting information quality groups to determine whether the mispricing of accruals is more pronounced in the latter group. Eq. (3) is a forecasting equation where coefficient λ_1 captures the earnings persistence of accruals and during the post-FRS3 period while λ_{1PRE} captures the incremental effect during the pre-FRS3 period. Eq. (4) is a pricing equation where coefficients λ_1^* implies the persistence investors assign to accruals in the post-FRS3 period and coefficient λ_{1PRE}^* captures the incremental effect during the pre-FRS3 period. Mispricing of accruals is indicated if the persistence estimated from the pricing equation is significantly different from the forecast equation. $(\lambda_1^* + \lambda_{1PRE}^*) - (\lambda_1 + \lambda_{1PRE}) > 0$ and $\lambda_1^* - \lambda_1 > 0$ indicate that the market overprices accruals for pre-and post-FRS3 periods respectively. Assuming accounting information quality improves following FRS3, we expect the overpricing of accruals to be more pronounced during the pre-FRS3 period and among lower accounting information quality companies.

3.2.4. Hedge portfolio tests

The hedge portfolio tests mimics trading strategies based on accruals that are implementable to investors. We construct intersection portfolios by independently sorting stocks into terciles based

[5] Kothari et al. (2005) suggest controlling for earnings performance using return on assets (ROA) in the modified Jones (1991) model in estimating discretionary accruals. However, our Equation 2 follows the specification of Francis et al. (2005; 2007) and already contains current, lead, and lag cash flows, which are correlated with performance and could induce multicollinearity if ROA is further included in the model. In Table 6 we separately analyse the return predictability of discretionary accruals, which is estimated from modified Jones (1991) model and augmented with ROA.

[6] We estimate *ACCERR* by a five-year rolling window to ensure information for classifying companies are updated. There are two alternative approaches to compute *ACCERR*. First, it can be estimated separately for the pre- and post-FRS3 period. We replicated all tests using this approach and obtain similar findings. Second, it can be computed once in the pre-FRS3 period and classify companies into the same accounting quality groups in both periods. However, this approach incurs survivorship bias in the analysis.

[7] We cumulate returns of UK companies 6 months after the fiscal year end to ensure financial statement becomes available. This is consistent with Table 4 of Pincus et al. (2007), which shows that the filing deadline for UK is 6 months.

on accruals and into high and low accounting information quality groups based on accrual quality. The hedge portfolio returns within the high and low accounting information quality groups are equivalent to the return spread between the lowest and highest accrual terciles. We measure portfolio abnormal returns using size adjusted returns (SAR) and the Fama and French (1996) three-factor model (FFM). SAR is measured 6 months after the fiscal year and calculated as the raw buy-and-hold annual returns of each company less the size matched benchmark portfolio returns over the same period. We incorporate size-adjusted returns in our analyses for consistency and comparability with other studies of accrual anomaly (e.g. Sloan, 1996; Collins et al., 2003). The abnormal returns based on FFM are equivalent to the intercept of the following time-series regression:

$$R_{p,t} - Rf_t = \alpha_p + \beta_p(Rm_t - Rf_t) + s_p SMB_t + h_p HML_t + \varepsilon_{p,t} \tag{5}$$

where $R_{p,t}$ is the return of tercile portfolio p in month t, Rf_t is the risk-free return in month t proxied by the UK Treasury bill yield, Rm_t is the return of the market portfolio of month t proxied by the Financial Times All Share Index, SMB_t is the month t value-weighted return of the factor-mimicking portfolio constructed by the return of (*S*)mall (*M*)inus (*B*)ig companies, HML_t is the month t value weighted return of the factor-mimicking portfolio constructed by the return of (*H*)igh (*M*)inus (*L*)ow book-to-market value companies, factor loadings β_p, s_p, and h_p capture portfolio risk exposures, and α_p is interpreted as the portfolio abnormal returns. We follow Fama and French (1996) and rebalance the test portfolio as well as *SMB* and *HML* factor-mimicking portfolios from the end of June each year to ensure at least 6 months publication gap after previous fiscal year end for financial statements to become available. FFM has been documented to subsume a wide spectrum of stock market anomalies including the value-growth effect, which some studies (e.g. Beaver, 2002) argue could be driving the accrual anomaly. Although existing literature (e.g. Daniel and Titman, 1997; Brennan et al, 1998) provides evidence that factor models do not explain cross-sectional variations in expected returns as well as directly observable company-specific characteristics, we include Fama and French alpha in our analyses for completeness. Our hypothesis predicts a more pronounced decline in hedge portfolio abnormal returns among low accounting information quality companies.

3.2.5. Fama–MacBeth regressions

The Fama-MacBeth regressions enable us to address time-specific unobservable impact and control for additional factors documented in the literature to be associated with the accrual anomaly. Using the Fama and MacBeth (1973) approach, we implement the following cross-sectional regressions:

$$\begin{aligned} ExRET_{i,t+1} = {} & \gamma_0 + \gamma_1 ACC_{i,t} + \gamma_2 ACC_{i,t} \times LOW_{i,t} + \gamma_3 LOW_{i,t} + \gamma_4 MV_{i,t} + \gamma_5 BM_{i,t} + \gamma_6 CP_{i,t} \\ & + \gamma_7 OWN_{i,t} + \gamma_8 RVAR_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{6}$$

$$\begin{aligned} ExRET_{i,t+1} = {} & \delta_0 + \delta_1 DACC_{i,t} + \delta_2 DACC_{i,t} \times LOW_{i,t} + \delta_3 NDACC + \delta_4 NDACC \times LOW_{i,t} + \delta_5 LOW \\ & + \delta_6 MV_{i,t} + \delta_7 BM_{i,t} + \delta_8 CP_{i,t} + \delta_9 OWN_{i,t} + \delta_{10} RVAR_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{7}$$

where $ExRET_{i,t+1}$ is the annual excess returns of company i measured 6 months after the fiscal year end and calculated as the difference between company raw returns and risk-free return over the same period proxied by UK Treasury bill yield, $ACC_{i,t}$ is total accruals, $DACC_{i,t}$ and $NDACC_{i,t}$ are discretionary and non-discretionary accruals respectively estimated from the modified Jones (1991) model augmented with ROA following Kothari et al. (2005), $MV_{i,t}$ is the log market value, $BM_{i,t}$ is the book to market value, $CP_{i,t}$ is the cash flow to price ratio, $OWN_{i,t}$ is the percentage of closely held shares measured at the end of fiscal year, $RVAR_{i,t}$ is the residual variance estimated from the Fama and French (1996) three-factor model over the 60-months period ending six months after fiscal year end, and $LOW_{i,t}$ is a dummy variable assigned to 1 for low accounting information group. In Eq. (6) we assign $LOW_{i,t}$ to 1 for $ACCERR_{i,t}$ higher than yearly cross-sectional median and 0 otherwise. In Eq. (7) we assign $LOW_{i,t}$ to 1 when the absolute value of analysts' earnings forecast error ($FE_{i,t}$) is above yearly cross-sectional median and 0 otherwise. Coefficient γ_1 (δ_1) indicates the return predictability of total (discretionary) accruals among the high accounting information quality companies and γ_2 (δ_2) indicates the incremental effect among their low accounting information counterparts.

Eqs. (6) and (7) test the return predictability of total and discretionary accruals respectively. Since we already separate the management-induced effects from other effects in estimating discretionary accruals, we apply $FE_{i,t}$ instead of $ACCERR_{i,t}$ as the proxy for accounting information quality to avoid multicollinearity in Eq. (7). We use accounting information quality to identify companies that are expected to be more sensitive to the impact of FRS3. Since cross-sectional variations in accounting information quality captured by $FE_{i,t}$ can be jointly influenced by managerial discretions as well as companies' operational reasons, it should correlate less to discretionary accruals than $ACCERR_{i,t}$.[8]

Our choice of control variables is motivated by prior studies. Size and book-to-market value have been widely documented to explain cross-sectional variations in expected returns (e.g. Fama and French, 1996; Daniel and Titman, 1997). Cash to price ratio seeks to control for the specific value-growth effect associated with accrual anomaly as suggested by Beaver (2002), Desai et al. (2004) and Cheng and Thomas (2006). Closely held shares control for ownership structure, which LaFond (2005) and Pincus et al. (2007) suggest could influence the accrual anomaly through financial reporting incentives. Finally, Mashruwala et al. (2006) argue limits to arbitrage could lead to the accrual anomaly and suggest using residual variance from the factor model as a control, which we also apply in our study. Our hypothesis holds if γ_2 and δ_2 are negative and more pronounced before the implementation of FRS3.

4. Empirical findings

4.1. Mishkin tests

As a direct test of market efficiency we implement the Mishkin (1983) tests and present our findings in Table 3. To avoid using both pre- and post-FRS3 earnings in the same regression, we also exclude year 1992 from the test. Panel A shows the coefficients estimated simultaneously for the forecast and pricing equations using the generalised non-linear least square estimation. Panel B reports the results from the market efficiency tests. Within the whole sample $(\lambda_1^* + \lambda_{1PRE}^*) > (\lambda_1 + \lambda_{1PRE})$ is statistically significant (likelihood ratio statistics = 8.21, p-value = 0.0042). However, λ_1^* is insignificantly different from λ_1. This suggests that there is indeed mispricing of accruals but only during the time period before the implementation of FRS3. If the overpricing of accruals diminishes following FRS3 due to the improvement in disclosure quality it induced, then we expect the effect to be more pronounced among companies that are more sensitive to disclosure reforms, i.e. the low accounting information quality group. Among high accounting information quality companies we cannot reject both $\lambda_1^* = \lambda_1$ and $(\lambda_1^* + \lambda_{1PRE}^*) = (\lambda_1 + \lambda_{1PRE})$, which indicates no mispricing of accruals in both periods. In contrast, among the low accounting information quality companies $\lambda_1^* + \lambda_{1PRE}^*$ is significantly greater than $\lambda_1 + \lambda_{1PRE}$ (likelihood ratio statistics = 13.11, p-value = 0.0003) while λ_1^* is insignificantly different from λ_1, which indicates mispricing of accruals only occurred during the pre-FRS3 period.

The Mishkin tests in Table 3 suggest that UK market misprices accruals only during the pre-FRS3 time period and among companies with poorer accounting information quality. This empirical evidence confirms the prediction of our hypotheses and supports the inference that improved quality of reported earnings attributed to FRS3 enables investors to valuate accruals more accurately. Our findings suggest that between the two possible causes of accrual anomalies, i.e. the fixation bias of end-users and accounting information quality from the supply-side, the latter effect dominates. It also implies that managerial discretionary effect in reported earnings, which FRS3 seeks to reduce, plays a substantial role in inducing the mispricing of accruals.

4.2. Hedge portfolio tests

To assess the impact of FRS3 on the profitability of implementable trading strategies based on accruals, we apply the hedge portfolio tests. Table 4 presents the results based on the annual abnormal returns

[8] Lang and Lundholm (1996) argue that analyst forecast error is a better proxy for disclosure quality than other analysts' forecast derived variables such as forecast dispersion and number of analyst following.

Table 3
Mishkin tests. This table reports the results of Mishkin (1983) tests of earnings components, which estimate the following equations simultaneously using a generalized nonlinear least square estimation procedure:
$EARN_{i,t+1} = \lambda_0 + \lambda_{0PRE}PRE_{i,t} + \lambda_1 ACC_{i,t} + \lambda_{1PRE}PRE_{i,t} \times ACC_{i,t} + \lambda_2 CFO_{i,t} + \lambda_{2PRE}PRE_{i,t} \times CFO_{i,t} + v_{i,t+1}$
$AbRET_{i,t+1} = \beta_1[EARN_{i,t+1} - \lambda_0^* - \lambda_{0PRE}^* PRE_{i,t} - \lambda_1^* ACC_{i,t} - \lambda_{1PRE}^* PRE_{i,t} \times ACC_{i,t} - \lambda_2^* CFO_{i,t} - \lambda_{2PRE}^* PRE_{i,t} \times CFO_{i,t}] + \varepsilon_{i,t+1}$.
$EARN_{i,t}$ is income before extraordinary items of company i in year t scaled by average of opening and closing total assets; $ACC_{i,t}$ is total operating accruals, measured as changes in stocks, plus changes in debtors, less changes in creditors, less depreciation and amortisation, scaled by average total assets; $CFO_{i,t}$ is cash flow from operations scaled by average total assets; $PRE_{i,t}$ is a dummy variable taking the value 1 in the pre-FRS3 period (1986–1991) and 0 in the post-FRS3 period (1995–2002); and $AbRET_{i,t}$ is annual size-adjusted returns measured 6 months after the fiscal year-end. The analyses are conducted separately in the whole sample as well as high and low accounting information quality sub-samples. Companies are classified as high (low) accounting information quality group if their 5-year standard deviation of the residual from the regression of Dechow and Dichev's (2002) model augmented with variables from the modified Jones (1991) model is below (above) annual cross-sectional median. All independent variables (except for $PRE_{i,t}$) are transformed into scaled decile rank, i.e. decile rank (0–9) divided by 9. To avoid having both pre- and post-FRS 3 earnings in the same regression, we also exclude year 1992 in the Mishkin tests. Panel A presents the estimated coefficients (t-statistics). Panel B reports the likelihood ratio statistics along with p-values in brackets for equality tests of forecast and valuation parameters.

	Predicted sign	Whole sample	Accounting information quality	
			High	Low
Panel A: Coefficients				
Obs		3164	1579	1585
λ_1	+	0.126***	0.081***	0.157***
		(13.67)	(6.91)	(11.36)
λ_{1PRE}	−	−0.015	0.039	−0.052**
		(−0.93)	(1.94)	(−2.08)
λ_1^*	+	0.197**	0.270	0.218**
		(2.08)	(0.50)	(2.25)
λ_{1PRE}^*	+	0.306**	−0.133	0.414**
		(1.75)	(−0.15)	(2.16)
Panel B: Market efficiency tests				
$\lambda_1^* = \lambda_1$		0.56	0.14	0.39
		(0.4540)	(0.7071)	(0.5326)
$\lambda_1^* + \lambda_{1PRE}^* = \lambda_1 + \lambda_{1PRE}$		8.21***	0.00	13.11***
		(0.0042)	(0.9803)	(0.0003)

* Indicates statistical significance at 10% level for one-tailed t-test of coefficients with predicted signs and two-tailed t-test of coefficients without predicted signs in Panel A and the asymptotic chi-square test in Panel B.
** Indicates statistical significance at 5% level for one-tailed t-test of coefficients with predicted signs and two-tailed t-test of coefficients without predicted signs in Panel A and the asymptotic chi-square test in Panel B.
*** Indicates statistical significance at 1% level for one-tailed t-test of coefficients with predicted signs and two-tailed t-test of coefficients without predicted signs in Panel A and the asymptotic chi-square test in Panel B.

of hedge portfolios constructed with long position in low accrual tercile and short position in high accrual tercile. Panel A shows that across the whole sample and over the full test period the hedge portfolios yield significantly positive annual abnormal returns robust to different benchmarks we apply, i.e. SAR and FFM. The annual abnormal return differences from pre- to post-FRS3 periods are 4.4% and 5.4% for SAR and FFM alpha respectively and both statistically significant. This suggests that the implementation of FRS3 reduced accrual anomaly by over 40% from pre-FRS3 period. The evidence of accrual anomaly during the post-FRS3 period is sensitive to benchmarks, i.e. it is only significant under FFM.

Panel B (C) analyses companies with high (low) accounting information quality. In Panel B the annual abnormal returns over the full test period are sensitive to benchmark, i.e. only significant based on FFM alpha (6.6%). Moreover, the differences from pre- to post-FRS3 periods are statistically insignificant under both abnormal return metrics. Thus, we are unable to infer any impact of accounting regulatory intervention among high accounting quality companies. In contrast, the findings of low information quality group indicate that annual abnormal returns over the full test period are significant and robust to both metrics (9.6% under SAR and 12.9% under FFM alpha). The differences in annual abnormal returns from the pre- to post-FRS3 periods are 6.5% and 5.7% respectively for SAR and FFM alpha and both are significant. Thus, between the high and low accounting information quality companies, we can only draw the inference that FRS3 reduced mispricing of accruals from the latter group.

Table 4
Hedge portfolio tests. This table reports the annual abnormal returns (*t*-statistics) of hedge portfolios sorted on total operating accruals. Stocks are sorted yearly into tercile portfolios based on the level of total accrual, which is measured as changes in stocks, plus changes in debtors, less changes in creditors, less depreciation and amortisation. Zero-investment hedge portfolio comprises of a long (short) position in the low (high) accrual tercile. The size-adjusted return is measured 6 months after the fiscal year end and calculated as the raw buy-and-hold annual return less the return of a size-matched benchmark portfolio, which comprises of all UK listed companies over the time period. The alpha is the intercept estimated from the time-series regression of hedge portfolio returns on the Fama and French (1996) three-factor model:
$R_{p,t} - Rf_t = \alpha_p + \beta_p(Rm_t - Rf_t) + s_pSMB_t + h_pHML_t + \varepsilon_{p,t}$.
For each month t $R_{P,t}$ is hedge portfolio return, Rf_t is risk-free return proxied by UK T-bill yield, Rm_t is the return of market portfolio proxied by Financial Times All Shares Index, SMB_t is return of factor-mimicking portfolio constructed by the return (*S*)mall (*M*)inus (*B*)ig companies, and HML_t is the return of factor mimicking portfolio constructed by the return of (*H*)igh (*M*)inus (*L*)ow companies. The hedge portfolio and factor mimicking portfolios are rebalanced at the end of June each year following Fama and French (1996) methodology. The alpha is annualized by multiplication of 12. The analyses are conducted separately in the whole sample (Panel A) as well as high (Panel B) and low (Panel C) accounting information quality subsamples. Companies are classified as high (low) accounting information quality group if their 5-year standard deviation of the residual from the regression of Dechow and Dichev (2002) model augmented with variables from the modified Jones (1991) is below (above) annual cross-sectional median.

	Size-adjusted returns(SAR)	Alpha (FFM)
Panel A: Whole sample		
Full period	0.067**	0.100***
	(2.02)	(6.72)
Pre-FRS3	0.090***	0.129***
	(3.78)	(7.58)
Post-FRS3	0.046	0.075***
	(0.71)	(3.59)
Pre-FRS3 – Post-FRS3	0.044*	0.054**
	(1.46)	(2.02)
Panel B: High accounting information quality		
Full period	0.032	0.066***
	(0.80)	(3.02)
Pre-FRS3	0.046	0.084***
	(1.15)	(3.30)
Post-FRS3	0.020	0.036
	(0.18)	(1.13)
Pre-FRS3 – Post-FRS3	0.026	0.048
	(0.53)	(1.12)
Panel C: Low accounting information quality		
Full period	0.096***	0.129***
	(2.66)	(5.67)
Pre-FRS3	0.131***	0.164***
	(5.49)	(5.58)
Post-FRS3	0.066	0.107***
	(0.85)	(3.36)
Pre-FRS3 – Post-FRS3	0.065**	0.057*
	(1.75)	(1.58)

* Indicate statistical significance at 10% level for one-tailed *t*-test of pre- and post-FRS3 differences (we predict pre-FRS3 > post-FRS3) and two-tailed *t*-test otherwise.
** Indicate statistical significance at 5% level for one-tailed *t*-test of pre- and post-FRS3 differences (we predict pre-FRS3 > post-FRS3) and two-tailed *t*-test otherwise.
*** Indicate statistical significance at 1% level for one-tailed *t*-test of pre- and post-FRS3 differences (we predict pre-FRS3 > post-FRS3) and two-tailed *t*-test otherwise.

Assuming the pre- to post-FRS3 differences in hedge portfolio abnormal returns reported in Panels B and C indicate the degree of accrual mispricing attributed to investors' fixation bias and accounting information quality respectively, our findings in Table 4 essentially imply that the latter effect dominates accrual anomaly. Since FRS3 mainly reduces the managerial discretionary component of accounting information quality, our results also suggest that regulatory intervention of such purpose could decrease mispricing of securities in the capital market. In general, Table 4 provides evidence in support of our hypotheses.

4.3. Fama–MacBeth regressions

To examine if our finding is sensitive to time-specific unobservable effects and other factors that may affect the accrual anomaly as identified in the literature, we apply the Fama–MacBeth cross-sectional regressions. Panel A of Table 5 shows that before conditioning on accounting information quality, accruals predict significantly negative abnormal returns that is mainly concentrated in the pre-FRS3 period (−14.9%). Following the introduction of FRS3, the return predictability of accruals becomes statistically insignificant (−1.3%). The difference of 13.6% indicates a reduction of over 91% relative to the pre-FRS3 period. In terms of control variables, only market value yields significant return predictability across the full sample period, which confirms the importance of using size-adjusted returns as a benchmark in our analyses in Tables 3 and 4.

In Table 5 Panel B we interact accruals with low accounting information quality dummy, which is assigned value of 1 (0) to companies with *ACCERR* above (below) yearly cross-sectional median. The coefficient on the interactive term ($ACC \times LOW$) is significantly negative in the pre-FRS3 period (−9.3%), indicating that the negative return predictability of accruals is more pronounced among companies with low accounting information quality prior to FRS3. The difference in the coefficient of this

Table 5
Fama-MacBeth regressions. This table reports the average coefficients (*t*-statistics) from Fama and MacBeth (1973) regressions of the following equation: $ExRET_{i,t+1} = \gamma_0 + \gamma_1 ACC_{i,t} + \gamma_2 ACC_{i,t} \times LOW_{i,t} + \gamma_3 LOW_{i,t} + \gamma_4 MV_{i,t} + \gamma_5 BM_{i,t} + \gamma_6 CP_{i,t} + \gamma_7 OWN_{i,t} + \gamma_8 RVAR_{i,t} + \varepsilon_{i,t}$. $ExRET_{i,t+1}$ is the annual excess return of company i in year t measured as the difference between a company's annual raw return and risk-free rate proxied by UK T-bill yield where the annual raw return is cumulated 6 months after the fiscal year end; $ACC_{i,t}$ is total operating accruals, which is measured as changes in stocks, plus changes in debtors, less changes in creditors, less depreciation and amortisation at the end of previous fiscal year; $LOW_{i,t}$ is a dummy variable assigned to 1 (0) if the company is classified as low (high) accounting information quality group with their 5-year standard deviation of the residual from the regression of Dechow and Dichev's (2002) model augmented with variables from the modified Jones (1991) model above (below) annual cross-sectional median; $MV_{i,t}$ is log market value of equity; $BM_{i,t}$ is book to market value; $CP_{i,t}$ is the cash flow to price ratio; $OWN_{i,t}$ is the percentage of closely-held shares measured at the end of fiscal year; and $RVAR_{i,t}$ is residual variance estimated from the Fama and French (1996) three-factor model using a 60-month return period ending six months after the fiscal year-end. All independent variables (except for $LOW_{i,t}$) are transformed into scaled decile rank, i.e. decile rank (0 to 9) divided by 9.

		Panel A: Unconditional				Panel B: Conditional on accounting information quality			
	Predicted sign	Full period	Pre-FRS3	Post-FRS3	Difference	Full period	Pre-FRS3	Post-FRS3	Difference
Intercept	?	0.063	0.064	0.062	0.002	0.042	0.045	0.039	0.006
		(0.77)	(0.65)	(0.47)	(0.02)	(0.48)	(0.47)	(0.26)	(0.04)
ACC	–	−0.076*	−0.149**	−0.013	−0.135**	−0.048	−0.097	−0.004	−0.093
		(−1.63)	(−2.10)	(−0.37)	(−1.93)	(−0.92)	(−1.39)	(−0.06)	(−0.88)
ACC × LOW	–					−0.051*	−0.093**	−0.014	−0.078*
						(−1.41)	(−2.65)	(−0.40)	(−1.46)
LOW	?					0.041	0.048	0.035	0.014
						(1.70)	(1.66)	(0.88)	(0.31)
MV	–	−0.111***	−0.072	−0.145**	0.073*	−0.109***	−0.075	−0.140**	0.065
		(−2.67)	(−1.26)	(−2.40)	(1.44)	(−2.66)	(−1.27)	(−2.25)	(0.84)
BM	+	0.059	0.119**	0.008	0.111*	0.061	0.117**	0.012	0.105*
		(1.28)	(2.73)	(0.10)	(1.59)	(1.29)	(2.81)	(0.15)	(1.50)
CP	+	0.046	−0.019	0.103	−0.121	0.050	−0.022	0.112	−0.134
		(0.68)	(−0.19)	(1.07)	(−0.86)	(0.70)	(−0.21)	(1.11)	(−0.96)
OWN	?	−0.015	−0.011	−0.019	0.008	−0.015	−0.012	−0.017	0.004
		(−0.43)	(−0.22)	(−0.35)	(0.12)	(−0.41)	(−0.23)	(−0.32)	(0.06)
RVAR	+	−0.003	−0.029	0.021	−0.050	−0.011	−0.036	0.011	−0.046
		(−0.04)	(−0.79)	(0.19)	(−0.42)	(−0.18)	(−1.06)	(0.09)	(−0.38)
Adj R^2 (%)		7.80	6.58	8.86		7.79	6.36	9.04	

* Indicates statistical significance at 10% level respectively for one-tailed *t*-test of coefficients with predicted signs as well as pre- and post-FRS3 differences (we predict pre-FRS3 < post-FRS3) and two-tailed *t*-test otherwise.
** Indicates statistical significance at 5% level respectively for one-tailed *t*-test of coefficients with predicted signs as well as pre- and post-FRS3 differences (we predict pre-FRS3 < post-FRS3) and two-tailed *t*-test otherwise.
*** Indicates statistical significance at 1% level respectively for one-tailed *t*-test of coefficients with predicted signs as well as pre- and post-FRS3 differences (we predict pre-FRS3 < post-FRS3) and two-tailed *t*-test otherwise.

interactive term between the pre- and post-FRS3 period (7.8%) is also statistically significant and amounts to 85% reduction in the incremental effect of low accounting quality companies following FRS3.

If investors' cognitive bias remains unaffected by FRS3, the magnitude of the reduction in the incremental effect of low accounting quality group can be interpreted as the proportion of accrual anomaly attributed to accounting information quality. It can also be interpreted as the impact of managerial discretionary component of corporate disclosure quality on the mispricing of accruals. Thus, despite of the difference in methodology from Tables 3 and 4, the general findings in Table 5 also yield evidence supporting our predictions. It is also robust to the control of market value, book to market value, cash flow to price ratio, residual variance, and percentage of closely held shares. In other words, our finding is not subsumed by value/growth effect, limits to arbitrage, and ownership structure. Notice in both Panels A and B that the adjusted R^2 is consistently lower (higher) before (after) the introduction of the FRS3, which implies that cross-sectional variations in stock returns in the UK market are better captured by our given set fundamental variables in the post-FRS3 period when the mispricing of accruals is reduced.

In Table 6, we decompose total accruals into discretionary and non-discretionary components to determine which of them drives the mispricing. Panel A shows that only discretionary accruals are associated with significantly negative abnormal return predictability, which is mainly concentrated in the pre-FRS3 period (−13.7%). This suggests that the aforementioned evidence of accrual anomaly in our UK sample is driven only by the component affected by managerial discretion, which is consistent with Xie (2001). The observation that management-induced effect on disclosure is the underlying cause further strengthens the inference that the decline of accrual anomaly following FRS3 is due to the reduction of managerial discretion in reported earnings.

In Table 6 Panel B we interact both accrual components with low accounting information quality dummies assigned to 1 (0) for companies with absolute value of analysts' forecast error above (below) median. The interactive term for discretionary accruals ($DACC \times LOW$) is significantly negative over the full test period (−7.9%), which indicates that the return predictability of discretionary accruals is significantly more pronounced among low accounting information quality companies. The incremental effect of low quality group on the negative return predictability of discretionary accruals is statistically significant only during the pre-FRS3 period (−13.9%), which is consistent with our evidence based on total accruals in Table 5.

Unlike Tables 3–5 where we apply the same combination of accruals and accounting information quality proxies but alter in terms of research methodology, we apply in Table 6 a completely different combination of variables, i.e. discretionary accruals and analyst forecast error. Thus, the evidence in support of the prediction in our hypotheses is robust not only to different methodologies but different proxies as well.

4.4. Additional tests

From Tables 3–6 we obtain robust evidence showing that the accrual anomaly in UK declines following FRS3, especially among companies where this regulatory intervention exerts the most impact. The premise of our hypotheses is that FRS3 seeks to improve the quality of reported earnings by reducing earnings management and enriching the information set available to investors. Although such effect is already confirmed by existing empirical studies (Acker et al., 2002; Lin, 2002; Lin, 2006; Athanasakou et al., 2007), we also test whether FRS3 improves accounting quality especially among companies that are more sensitive to its effect to further strengthen our inference. In other words, we seek parallel evidence of accounting quality improvements to corroborate with our findings of a reduction in the mispricing of accruals. If the decline in accrual anomaly following FRS3 is indeed due to improvements in the reported earnings quality, we should observe that the latter effect is more pronounced in low accounting information quality companies.

In Table 7, we examine if there exists accounting quality improvement after FRS3 using different indicators of managerial discretionary effect. Analysts' consensus forecast is a primary target that

Table 6
Fama–MacBeth regressions: discretionary vs non-discretionary accruals. The table reports the average coefficients (*t*-statistics) from Fama and MacBeth (1973) regressions of the following equation:

$$ExRET_{i,t+1} = \delta_0 + \delta_1 DACC_{i,t} + \delta_2 DACC_{i,t} \times LOW_{i,t} + \delta_3 NDACC_{i,t} + \delta_4 NDACC_{i,t} \times LOW_{i,t} + \delta_5 LOW_{i,t} + \delta_6 MV_{i,t} + \delta_7 BM_{i,t} + \delta_8 CP_{i,t} + \delta_9 OWN_{i,t} + \delta_{10} RVAR_{i,t} + \varepsilon_{i,t}$$

$ExRET_{i,t+1}$ is the annual excess return of company i in year t measured as the difference between a company's annual raw return and risk-free rate proxied by UK T-bill yield where the annual raw return is cumulated 6 months after the fiscal year end; $DACC_{i,t}$ is discretionary accruals and $NDACC_{i,t}$ is non-discretionary accruals based on the modified Jones (1991) model augmented with ROA; $LOW_{i,t}$ is a dummy variable assigned to 1 (0) if the company is classified as low (high) accounting information quality group with their absolute value of analysts' earnings forecast error above (below) the annual cross-sectional median, where analysts' forecast error is calculated as the difference between actual earnings and consensus forecasts scaled by opening share price; $MV_{i,t}$ is log market value of equity; $BM_{i,t}$ is book to market value; $CP_{i,t}$ is the cash flow to price ratio; $OWN_{i,t}$ is the percentage of closely-held shares measured at the end of fiscal year; and $RVAR_{i,t}$ is residual variance estimated from the Fama and French (1996) three-factor model using a 60-month return period ending six months after the fiscal year-end. All independent variables (except for $LOW_{i,t}$) are transformed into scaled decile rank, i.e. decile rank (0–9) divided by 9.

		Panel A: Unconditional				Panel B: Conditional on accounting information quality			
	Predicted sign	All	Pre-FRS3	Post-FRS3	Difference	All	Pre-FRS3	Post-FRS3	Difference
Intercept	?	0.058	0.064	0.052	0.012	0.013	0.011	0.015	−0.004
		(0.67)	(0.53)	(0.40)	(0.08)	(0.14)	(0.09)	(0.11)	(−0.03)
DACC	–	−0.068*	−0.137**	−0.008	−0.129*	−0.029	−0.059	−0.003	−0.056
		(−1.69)	(−1.95)	(−0.21)	(−1.86)	(−0.64)	(−0.74)	(−0.05)	(−0.71)
DACC × LOW	–					−0.079*	−0.139*	−0.027	−0.113*
						(−1.55)	(−1.85)	(−0.76)	(−1.61)
NDACC	–	−0.008	−0.029	0.010	−0.039	0.000	−0.042	0.037	−0.079
		(−0.21)	(−0.39)	(0.29)	(−0.56)	(0.00)	(−0.47)	(1.20)	(−0.88)
NDACC × LOW	–					−0.014	0.013	−0.038	0.051
						(−0.33)	(0.18)	(−0.75)	(0.57)
LOW	?					0.084**	0.101	0.068*	0.033
						(2.08)	(1.33)	(1.68)	(0.41)
MV	–	−0.112**	−0.074	−0.146**	0.072	−0.101**	−0.061	−0.135**	0.075
		(−2.60)	(−1.23)	(−2.33)	(1.03)	(−2.33)	(−1.10)	(−2.06)	(0.94)
BM	+	0.054	0.116**	0.001	0.115*	0.056	0.111**	0.008	0.104
		(1.19)	(2.74)	(0.01)	(1.50)	(1.15)	(2.54)	(0.09)	(1.04)
CP	+	0.062	0.001	0.115	−0.114	0.057	−0.003	0.109	−0.112
		(0.97)	(0.01)	(1.33)	(−1.14)	(0.85)	(−0.03)	(1.18)	(−0.86)
OWN	?	−0.016	−0.009	−0.022	0.014	−0.008	0.000	−0.015	0.015
		(−0.45)	(−0.18)	(−0.41)	(0.28)	(−0.22)	(0.00)	(−0.27)	(0.21)
RVAR	+	0.000	−0.030	0.025	−0.055	−0.011	−0.039	0.013	−0.052
		(−0.01)	(−0.80)	(0.23)	(−0.46)	(−0.22)	(−0.88)	(0.14)	(−0.46)
Adj R_2(%)		10.55	7.14	13.54		8.56	8.41	8.69	

* Indicates statistical significance at 10% level for one-tailed *t*-test of coefficients with predicted signs as well as pre- and post-FRS3 differences (we predict pre-FRS3 < post-FRS3) and two-tailed *t*-test otherwise.
** Indicates statistical significance at 5% level for one-tailed *t*-test of coefficients with predicted signs as well as pre- and post-FRS3 differences (we predict pre-FRS3 < post-FRS3) and two-tailed *t*-test otherwise.

managers seek to achieve to avoid suffering stock price decline (e.g., Degeorge et al., 1999). Deliberately meeting and beating analysts' forecasts therefore suggest earnings management. Instead of recognising losses as they occur, managers may seek to reduce its effect by spreading them across multiple periods (e.g., Ball et al., 2000). As a result, timely loss recognition implies less earnings smoothing. To reduce the impact of poor cash flows, managers may increase discretionary accruals (e.g. Myers et al., 2007). Thus, a more negative correlation between discretionary accruals and cash flows indicates greater earnings management.

In Panel A we test if there is a change in management toward earnings target through the following logistic regression:

Table 7
Changes in accounting quality pre- and post- FRS3. This table presents results from tests of accounting quality. Panels A and B report coefficients (*t*-statistics) of the following logistic regressions:

$PRE_{i,t} = \theta_0 + \theta_1 MBE_{i,t} + \theta_2 MBE_{i,t} \times LOW_{i,t} + \theta_3 LOW_{i,t} + \theta_4 MV_{i,t} + \theta_5 BM_{i,t} + \theta_6 CP_{i,t} + \theta_7 OWN_{i,t} + \theta_8 RVAR_{i,t} + \theta_9 FE_{i,t} + \upsilon_{i,t} + \varepsilon_{i,t}$ (Panel A)

$PRE_{i,t} = \varphi_0 + \varphi_1 LNEG_{i,t} + \varphi_2 LNEG_{i,t} \times LOW_{i,t} + \varphi_3 LOW_{i,t} + \varphi_4 MV_{i,t} + \varphi_5 BM_{i,t} + \varphi_6 CP_{i,t} + \varphi_7 OWN_{i,t} + \varphi_8 RVAR_{i,t} + \varphi_9 FE_{i,t} + \upsilon_{i,t} + \varepsilon_{i,t}$ (Panel B).

$PRE_{i,t}$ is assigned the value of 1 in the pre-FRS3 (1986–1992) period and 0 in the post-FRS3 period (1995–2002) for company *i* in year *t*; $LOW_{i,t}$ is a dummy variable assigned to 1 (0) if the company is classified as low (high) accounting information quality group with their 5-year standard deviation of the residual from the regression of Dechow and Dichev's (2002) model augmented with variables from the modified Jones (1991) model above (below) annual cross-sectional median; $MBE_{i,t}$ is an indicator of managing earnings toward target and is assigned to 1 if the reported earnings equal or exceed analysts' earnings forecast by less than three pence and 0 otherwise; $LNEG_{i,t}$ is an indicator of timely loss recognition and is assigned to 1 if net income scaled by total assets is less than −0.20 and 0 otherwise; $MV_{i,t}$ is log market value of equity; $BM_{i,t}$ is book to market value; $CP_{i,t}$ is the cash flow to price ratio; $OWN_{i,t}$ is the percentage of closely-held shares at the end of fiscal year; $RVAR_{i,t}$ is residual variance estimated from the Fama and French (1996) three-factor model using a 60-month return period ending six months after the fiscal year-end; $\upsilon_{i,t}$ is industry fixed effect based on Financial Times Actuaries classification; and $FE_{i,t}$ is the absolute value of analyst forecast error calculated as the difference between actual earnings and consensus forecasts scaled by opening share price. The control variables are winsorised at the top and bottom 1%. Panel C reports the Pearson correlation between *DACC'* and *CFO'*, which are residuals of *DACC* and *CFO* on the control variables including market value, book-to-market ratio, cash flow to price ratio, percentage of closely-held shares, residual variance, and analysts' forecast error. To test for statistical significance between pre- and post-FRS3, we apply *t*-tests based on the empirical distribution of the differences by randomly selecting firm observations, with replacement, and calculate the difference by repeating the procedure 1000 times.

Panel A: Managing toward earnings target

Intercept	MBE	MBE×LOW	LOW	MV	BM	CP	OWN	RVAR	FE
+	+	+	+	?	?	?	?	?	?
1.459***	0.128*			−0.350***	0.129*	0.079	−2.560***	−10.744***	−0.266
(4.20)	(1.30)			(−11.79)	(1.75)	(0.34)	(−13.41)	(−9.83)	(−0.75)
1.499***	−0.117	0.481**	0.046	−0.351***	0.126	0.076	−2.571***	−11.005***	−0.271
(4.30)	(−0.78)	(2.28)	(0.54)	(−11.78)	(1.71)	(0.33)	(−13.43)	(−9.90)	(−0.76)

Panel B: Timely loss recognition

Intercept	LNEG	LNEG×LOW	LOW	MV	BM	CP	OWN	RVAR	FE
+	–	–	+	?	?	?	?	?	?
1.520***	−1.813***			−0.366***	0.096	−0.080	−2.598***	−9.924***	0.223
(4.36)	(−5.07)			(−12.24)	(1.28)	(−0.34)	(−13.55)	(−9.01)	(0.60)
1.526***	−0.623	−1.531**	0.142**	−0.364***	0.097	−0.067	−2.589***	−10.307***	0.176
(4.37)	(−0.99)	(−2.10)	(1.74)	(−12.17)	(1.30)	(−0.28)	(−13.48)	(−9.21)	(0.47)

Panel C: Correlation of DACC' and CFO'

	Pre-FRS3	Post-FRS3	Difference
Whole sample	−0.379***	−0.165***	−0.214***
High information quality	−0.356***	−0.152***	−0.204***
Low information quality	−0.397***	−0.168***	−0.229***

* Indicates statistical significance at 10% level for one-tailed *t*-test of coefficients with predicted signs and two-tailed *t*-test otherwise. In Panel C, we predict the negative correlation between discretionary accruals and cash flow is more pronounced in the pre-FRS3 period (pre-FRS3 < post-FRS3).

** Indicates statistical significance at 5% level for one-tailed *t*-test of coefficients with predicted signs and two-tailed *t*-test otherwise. In Panel C, we predict the negative correlation between discretionary accruals and cash flow is more pronounced in the pre-FRS3 period (pre-FRS3 < post-FRS3).

*** indicates statistical significance at 1% level for one-tailed *t*-test of coefficients with predicted signs and two-tailed *t*-test otherwise. In Panel C, we predict the negative correlation between discretionary accruals and cash flow is more pronounced in the pre-FRS3 period (pre-FRS3 < post-FRS3).

$$PRE_{i,t} = \theta_0 + \theta_1 MBE_{i,t} + \theta_2 MBE_{i,t} \times LOW_{i,t} + \theta_3 LOW_{i,t} + \theta_4 MV_{i,t} + \theta_5 BM_{i,t} + \theta_6 CP_{i,t} + \theta_7 OWN_{i,t} + \theta_8 RVAR_{i,t} + \theta_9 FE_{i,t} + \upsilon_{i,t} + \varepsilon_{i,t} \quad (8)$$

where $PRE_{i,t}$ is a pre-FRS3 dummy set to 1 for pre-FRS3 period (1986–1992) and 0 in the post-FRS3 period (1995–2002), $MBE_{i,t}$ is a meet and beat dummy set to 1 if reported earnings is equal to or less

than three pence of analysts' consensus earnings forecast and 0 otherwise, $LOW_{i,t}$ is a low accounting information quality dummy set to 1 if *ACCERR* is above yearly cross-sectional median and 0 otherwise. The control variables include those applied in Eqs. (6) and (7) as well as industry fixed effect ($\nu_{i,t}$) and analyst forecast error ($FE_{i,t}$), which is calculated as the absolute value of the difference between actual and consensus forecast earnings scaled by opening share price. Since coefficient θ_2 is significantly positive (0.481, $t = 2.28$), we confirm more management toward earnings target among the low accounting information quality group during the pre-FRS3 period. This suggests a reduction of earnings management among such companies after FRS3.

In Panel B we test if there is a change in timely loss recognition through the following logistic regression:

$$PRE_{i,t} = \varphi_0 + \varphi_1 LNEG_{i,t} + \varphi_2 LNEG_{i,t} \times LOW_{i,t} + \varphi_3 LOW_{i,t} + \varphi_4 MV_{i,t} + \varphi_5 BM_{i,t} + \varphi_6 CP_{i,t} + \varphi_7 OWN_{i,t} + \varphi_8 RVAR_{i,t} + \varphi_9 FE_{i,t} + \nu_{i,t} + \varepsilon_{i,t} \quad (9)$$

where $LNEG_{i,t}$ is set to 1 if net income scaled by total asset is less than -0.2 and 0 otherwise. Since coefficient φ_2 is significantly negative (-1.531, $t = -2.10$), we observe less timely loss recognition during the pre-FRS3 period among the low accounting information quality group. In other words, there is relatively less earnings management among such companies following FRS3.

In Panel C we examine the correlation between discretionary accruals (*DACC*) and cash flows (*CFO*) between pre- and post-FRS3 periods. To mitigate the effect of confounding factors, we use the residuals from regressions of *DACC* and *CFO* separately on the same set of control factors. Among both high and low accounting information quality groups, the negative correlation between discretionary accruals and cash flows has significantly reduced in the post-FRS3 period (i.e. less negative correlations) and the latter group appears to be more affected.

The accounting quality indicators in Table 7 consistently indicate improvements following FRS3 and especially among low accounting information quality group. This supports our prediction that FRS3 reduces accrual anomaly in UK through its improvement of reported earnings quality. It is substantiated by the joint observation that following the mandate of a regulation seeking to decrease earnings management, there is reduced mispricing of accruals and improved quality of reported earnings, and these effects are significantly more pronounced among companies with greater managerial discretionary effect on accounting information.

5. Conclusion

We examine if changes in accounting information quality following a mandatory regulatory intervention affect the well-documented accruals anomaly. We expect the accrual anomaly to be more pronounced in poorer information environment. While existing literature provides evidence in support of this prediction through cross-sectional analyses, we exploit the introduction of FRS3 in October 1992 in the UK as our research setting. FRS3, which seeks to reduce earnings management and enrich the information set available to investors, invoked major changes in corporate disclosure of earnings performance. We build on the evidence from prior research that FRS3 improved the accounting information environment in the UK and predict that the mispricing of accruals should be reduced following its enactment.

Consistent with our prediction, we show a significant decline of accrual anomaly in the UK following FRS3. Among companies with poorer accounting information quality, we find more pronounced evidence of accrual anomaly in the pre-FRS3 period as well as a greater reduction in the post-FRS3 period. Our results are robust to different methodologies and controls. The overall inference is that the improvement of reported earnings quality following FRS3 through the reduction of managerial discretionary effects enhances investors' accuracy in valuing accruals.

Our findings may have some important implications for other markets where accrual anomaly also exists. Like the US, the UK has an equity-finance dominated capital market where information asymmetry between insiders and outsiders is bridged by accounting disclosure. As long as managerial discretionary effect on disclosure exists, there will be cross-sectional variations in the quality of accounting information that affects investors' valuation of securities. The evidence from our study suggests that an interesting avenue for future research is to evaluate how other accounting regulatory

intervention such as the ongoing international convergence toward IFRS could mitigate stock return anomalies and information efficiency in the capital market.

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