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Earnings management and the distribution of earnings relative to targets: UK evidence

Pelham Gore, Peter F. Pope, Ashni K. Singh*

Abstract—In this paper we provide new evidence on discontinuities in the distribution of reported earnings, using a large sample of UK firms. We examine the discontinuity phenomenon in the context of earnings management. We report that the empirical distribution of earnings before discretionary working capital accruals does not reflect the unusually high frequencies of small surpluses and unusually low frequencies of small deficits relative to targets found in the distribution of actual (reported) earnings, i.e. after discretionary working capital accruals. We find that discretionary working capital accruals have the effect of significantly increasing the frequencies of firms achieving earnings targets both overall and by small margins. Thus, we document an explicit link between working capital accruals-based earnings management and the discontinuities observed in the empirical distribution of earnings relative to targets. We also examine earnings management before and after the issuance of FRS 3 'Reporting Financial Performance' and find evidence that FRS 3 altered earnings management strategies adopted by companies.

Key words: Accounting manipulation, discretionary accruals, earnings management.

Data availability: Data are available from the public or commercial sources identified in the paper.

1. Introduction

The corporate scandals of the late 1990s and early 2000s seriously undermined public confidence in financial reporting and hence in financial markets. Suspicions that reported earnings numbers cannot be relied upon, and that they are managed, are widespread. Academic interest in this area began before the *causes célèbre* occurred and has since grown, focusing on investigations into why and how earnings management is conducted. One particular line of research centres on the finding that the empirical distribution of earnings relative to basic targets displays discontinuities at zero. In particular, evidence that small negative earnings levels, changes and surprises occur with unexpectedly low frequency and small positive earnings levels, changes and non-negative surprises occur with unexpectedly high frequency (Hayn, 1995; Burgstahler and Dichev, 1997; Degeorge et al., 1999; Burgstahler and Eames, 2003, 2006). One potential explanation of this behaviour is earnings management to beat benchmarks, e.g. to avoid losses. Consistent with this explanation, Burgstahler and Dichev (1997) find that both operating cash flow and working capital accruals (WCA) rise sharply when reported earnings is just above zero.

Evidence on benchmark beating earnings has been used in extensively in subsequent earnings management research (see, for example, Payne and Robb, 2000; Beaver et al., 2003, 2004; Dichev and Skinner, 2002; Beatty et al., 2002; Leuz et al., 2003; Leone and Van Horn, 2005; Phillips et al., 2003; Frank and Rego, 2004; Roychowdhury, 2006). However, recent research has raised doubts about whether earnings management does indeed explain the observed discontinuities in the distribution of earnings (e.g. Dechow et al., 2003; Degeorge et al., 1999; Durtschi and Easton, 2005). In this paper we contribute to this literature in two main ways. First, we analyse an extensive non-US dataset for the first time in the literature, thereby confirming that the discontinuities previously reported in the literature are not specific to the US setting. Second, we introduce new tests lending support to the hypothesis that the discontinuities in earnings distributions are associated with accruals-based earnings management in our sample.

Using a variety of tests, Dechow et al. (2003) are unable to find systematic evidence of accruals management connected to discontinuities in earnings distributions for their US sample. When they compare small profit firm-years with all others, they find that the former have higher average discretionary accruals (DACC), cash flows and total

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accruals than the latter. However, when they compare small profit firm-years with small loss firm-years, they find insignificant differences between the two groups. Dechow et al. (2003) also compare zero earnings surprise firm-years with all others and with small negative surprise firm-years. They find that zero surprise firm-years have higher DACC and WCA than all other firm-years and higher WCA than small negative surprise firm-years. However, Dechow et al. (2003) find that the difference between average DACC for zero and small negative surprise firm-years is statistically insignificant. They conclude that earnings management to achieve targets via real (operating) decisions is a more likely explanation for the discontinuities.

Degeorge et al. (1999) suggest that the distributional irregularities could be a manifestation of scaling earnings. Durtschi and Easton (DE) (2005) also suggest that scaling is important in understanding the discontinuities in the distribution of deflated earnings per share. DE argue that use of beginning of year stock price to deflate earnings per share can induce discontinuities for two reasons. First stock price depends on earnings – the stock prices for firms with small losses are systematically lower than stock prices for small profits. Second, loss firms are more likely to have missing values for beginning of year stock prices in their data, resulting in potential selection bias. DE argue that both these effects can lead to 'spurious' discontinuities in the distribution of scaled earnings that are unconnected to earnings management. Beaver et al. (2004) suggest that the asymmetric treatment of profits and losses and the recognition of special items together might account for up to two thirds of the discontinuity. However, they do not rule out the possibility of other factors being important, including abnormal accruals (p.34). In contrast, Jacob and Jorgensen (2005) show that fourth-quarter earnings are considerably more volatile. While annual earnings measured over the fiscal year display the expected discontinuities, these discontinuities are not evident in different annual periods ending in quarters one, two or there of the fiscal year. Overall, Jacob and Jorgensen (2005) conclude that their results are consistent with manipulation of fiscal year earnings.

In summary, there is no clear consensus in the recent literature as to whether discontinuities in earnings distributions reflect earnings management or are research design biases. In this paper we undertake a detailed examination of earnings management around earnings thresholds, using a large sample of UK firms. We focus on earnings management involving manipulation of working capital accruals. In contrast to Dechow et al. (2003) we present evidence consistent with earnings management to achieve targets. In particular we show that adjustment of earnings for discretionary accruals eliminates the discontinuity around earnings targets.

Accounting manipulation of working capital accruals (WCA) suggests itself as a potentially popular technique for achieving earnings targets. Healy (1985:103) points out that accrual manipulation is less costly and more feasible on a multi-period basis than accounting method changes as a means of transferring earnings between periods. Further, DeFond and Jiambalvo (1994: 158) view WCA as more susceptible to manipulation than non-working capital accruals. In this study, we investigate the links between the discretionary component (termed discretionary accruals, hereafter DACC) of WCA, the frequency of earnings target achievement and the observed discontinuity in the distribution of earnings relative to basic targets.[1] The targets we consider are the achievement of positive earnings levels and changes and the avoidance of negative earnings surprises. Our primary objective is to determine whether DACC, a frequently used proxy for earnings management, contribute significantly to the unexpectedly high frequencies of positive, particularly small positive, earnings levels, changes and surprises.[2] We also wish to obtain an insight into the overall impact of DACC on the distribution of earnings relative to targets, and hence to provide evidence on whether manipulation of the accruals process is an important earnings management tool.

Our paper is novel because it provides specific evidence on the manner in which firms use DACC with reference to basic earnings targets. Prior studies have typically used DACC as a proxy for earnings management without specifying the manner in which firms use DACC to manage earnings. For example, Becker et al. (1998) and Francis et al. (1999), although both hypothesising that Big 5 (then Big 6) auditors constrain earnings management more effectively than non-Big 5 auditors, interpret this prediction differently. Becker et al. (1998) imply that *signed* DACC are negatively associated with the presence of Big 5 auditors while Francis et al. (1999) imply that it is *absolute* DACC that are negatively associated with the presence of Big 5 auditors. This reflects different underlying assumptions about the manner in

[1] We define DACC as the discretionary component of total working capital accruals. DACC are also defined, elsewhere in the literature, as the discretionary component of total accruals including long-term accruals such as depreciation. We use the expression DACC in referring to other studies that use that expression even if they define it differently from us. In Section 3, we explain our definition of DACC and the estimation technique we use.

[2] See footnote 6 for a detailed explanation of our usage of positive and negative.

which firms use DACC to manage earnings.[3]

A further contribution of the paper is to provide evidence on whether the phenomenon of discontinuities in the distribution of earnings extends beyond the US corporate environment and GAAP regime. In recent years, there has been heightened interest in the impact of different economic environments and GAAP regimes on the attributes of accounting earnings (Pope and Walker 1999; Ali and Hwang 2000; Ball et al. 2000), and on the incidence of earnings and forecast management (Brown and Higgins 2001). In addition, Leuz et al. (2003) provide evidence of a correlation between loss avoidance and accruals-based measures of earnings management. This paper extends and deepens this growing international accounting literature by reporting detailed evidence of the links between earnings discontinuities and accruals manipulation based on a large sample of UK firms.

The UK context is interesting for a number of reasons. Firstly, the incentives for earnings management differ from those in the US (the basis of most research to date). Ball et al. (2000: 25–29) point out that the UK has the least regulated and least litigious accounting environment among the common-law countries they study, and that corporate debt is primarily private in the UK. According to Ball et al. (2000), these factors imply a reduced demand for timely incorporation of bad news into accounting earnings reported by UK firms. Such lower demand for timely reporting of bad news allows managers greater flexibility compared to the US to manage earnings through timing of recognition. In seeming contrast, Brown and Higgins (2001) cite evidence that UK managers have vastly smaller holdings of stock options than their U.S. counterparts, and thus suggest that UK managers have less incentive to manipulate earnings to avoid reporting bad news than US managers. However, in their 2005 paper, Brown and Higgins suggest that the impact of differences in expectations management behaviour between countries may partially explain the apparent differences in incentives for earnings management.[4]

Another UK-specific feature is the regime change that occurred regarding the reporting of extraordinary items. Prior to the issuances of FRS 3 (Accounting Standards Board, 1992), the majority of extraordinary debits concerned restructurings of businesses, i.e. seemingly not extraordinary in nature, whereas many apparently extraordinary credits were treated as merely 'exceptional' and taken as 'above the line' income. One of the reasons given for the issuance of FRS 3 was thus to eliminate the use of extraordinary items as a means of earnings management. We are thus able to examine the use of extraordinary items as an earnings management tool, both pre- and post-FRS 3.

Our results indicate that the earnings levels, changes and surprises of UK firms, like those of US firms, are distributed discontinuously around zero. Specifically, we observe unusually low incidence of small negative earnings levels, changes and surprises, and unusually high incidence of small positive earnings levels, changes and surprises. However, non-discretionary earnings levels, changes and surprises for the same sample are distributed without this discontinuity at zero, suggesting that the discontinuity in the earnings distribution is attributable to DACC.[5] We further document that DACC have the effect of significantly increasing the incidence of small positive earnings levels, changes and surprises. DACC also have the effect of reducing the incidence of both positive and negative earnings levels, changes and surprises of large magnitude.

Further, we report evidence that exact zero earnings surprises are associated with unusual variance in DACC, suggesting idiosyncratic use of DACC to meet forecasts exactly. We also find that exact zero earnings surprises are associated with relatively low average extraordinary items, high incidence of negative extraordinary items, and low incidence of positive extraordinary items. This result is consistent with exact zero earnings surprises being achieved with the aid of misclassification of extraordinary items.

The main contributions of this paper can be summarised as follows. Firstly, we provide a previously undocumented general empirical explanation of the discontinuity observed at zero in the distribution of earnings relative to targets. Specifically, we report that accounting manipulation by the generality of (non-financial) companies through DACC is a significant contributor to this discontinuity. Secondly, we quantify the extent to which firms achieve earnings targets with the aid of DACC. The paper thus also contributes further to the methodological debate by providing support for the use of DACC as a proxy for earnings management. However, this evidence also indicates that the extent to which, and direction in which, firms use DACC to manage earnings varies with the relationship between earnings before DACC and basic earnings targets. This has implications for the interpretation of previous studies, and design of future studies, using DACC to proxy for earnings management. The evidence we report also

[3] Alternatively, or additionally, it implies different assumptions on the loss function of auditors.

[4] The literature of which this latter paper forms a part examines the manipulation by company management of analyst expectations, i.e. seeking to guide downwards expectations, rather than having to (or in addition to) managing earnings upwards.

[5] We use the term non-discretionary earnings to mean earnings before DACC, or unmanaged earnings ignoring earnings management effected other than through DACC.

contributes to the literature examining the circumstances under which firms seek to manage earnings (e.g., Nelson et al. 2003).

2. Research design

Prior research has typically approached the question of whether firms use DACC to achieve earnings targets by examining average DACC conditional on either earnings or non-discretionary earnings relative to target. For example, DeFond and Park (1999) report that firms use DACC to achieve earnings in excess of forecasts by 2 to 3 cents per share. They find that DACC are income-increasing on average if the earnings surprise is less than 2 cents, income-decreasing if the earnings surprise is more than 3 cents, and insignificantly different from zero if the earnings surprise is 2 or 3 cents. Cheng (2000) also investigates the relationship between DACC and earnings surprises and observes that firms with non-discretionary earnings below forecasts report positive DACC on average, while firms with non-discretionary earnings above forecasts report negative DACC on average. This approach does not address the extent to which DACC are used successfully to manage earnings from below to above targets. It also does not answer the question of whether the discontinuity in the distribution of earnings relative to targets is specifically caused by DACC. If earnings management underpins observed discontinuities in earnings distributions, then earnings management should be used by more firms to move from below to above target than in the opposite direction. The finding that firms with small profits have higher DACC than firms with small losses does not provide such a demonstration. It is possible that at least as many firms move from non-discretionary (pre-managed) profits to reported (post-managed) losses as move from non-discretionary losses to reported profits while at the same time finding that firms with non-discretionary profits (losses) have negative (positive) DACC.

We first examine whether earnings levels, changes and surprises are distributed with a discontinuity at zero, similar to Burgstahler and Dichev (1997) and Degeorge et al. (1999). Such discontinuities would be consistent with, but not necessarily proof of, earnings management to achieve targets. Thus, we test the following prediction:

H1: The frequency of small negative earnings levels (changes, surprises) is lower than expected and the frequency of small positive earnings levels (changes, surprises) is higher than expected under a smooth distribution[6]

To the extent that DACC cause the discontinuity in the earnings distribution, the removal of DACC from earnings is expected to reduce the discontinuity. Specifically, we predict that the distributions of non-discretionary earnings do not display discontinuities around earnings targets, and test the following prediction:

H2: The frequencies of small negative non-discretionary earnings levels (changes, surprises) and small positive non-discretionary earnings levels (changes, surprises) are equal to the frequencies expected under a smooth distribution

Further, the use of DACC to achieve targets will be reflected in DACC having the effect of increasing the proportion of firm-years achieving earnings targets. This implies the following prediction:

H3: The proportion of firm-years with positive earnings levels (changes, surprises) is larger than the proportion of firm-years with positive non-discretionary earnings levels (changes, surprises)

The previous evidence on the distribution of earnings relative to targets suggests that earnings management to achieve targets occurs most extensively when the shortfall from target is small. In particular, it is suggested that firms seek to manage earnings to transform small deficits into small surpluses relative to targets. Thus, we test the following predictions:

H4: The proportion of firm-years with small positive earnings levels (changes, surprises) is larger than the proportion of firm-years with small positive non-discretionary earnings levels (changes, surprises)

H5: The proportion of firm-years with small negative earnings levels (changes, surprises) is smaller than the proportion of firm-years with small negative non-discretionary earnings levels (changes, surprises)

One important caveat must be noted with respect to the last prediction. It is based on the assumed earnings management objectives of achieving positive earnings levels and changes and avoiding negative earnings surprises. It does not take account of other earnings management strategies,

[6] For the purpose of efficient expression, we use the terms negative and positive to describe earnings and non-discretionary earnings relative to target. Strictly, our usage of positive (negative) in the context of earnings levels, non-discretionary earnings levels, earnings changes and non-discretionary earnings changes refers to observations greater than (less than or equal to) zero. Our usage of positive (negative) in the context of earnings surprises and non-discretionary earnings surprises refers to observations greater than or equal to (less than) zero. This is in accordance with our assumption that firms seek to achieve positive earnings levels and changes and avoid negative earnings surprises, and with the consequential design of our empirical tests.

e.g., reducing the magnitude of earnings changes or surprises, which firms might simultaneously pursue. This would have implications for H5. Specifically, the use of DACC to smooth income might result in DACC increasing the proportion of firm-years with small negative earnings changes and reducing the proportion of firm-years with large negative earnings changes. We regard the question of whether firms use DACC to dampen earnings levels, changes or surprises as an empirical issue to be taken into account when presenting and discussing our results.

3. Sample and data

We test the above empirical predictions, and provide related evidence, on a sample comprising all UK quoted non-financial firms over the years 1989 to 1998.[7] We exclude financial firms because of our interest in working capital accruals, the accrual generating process being considerably different in financial firms (Peasnell et al., 2000:318). We further restrict the sample to accounting periods of approximately one year in duration, defined as not less than 350 or more than 380 days. We impose this requirement because accounting flow variables such as earnings are incomparable if they relate to periods of different duration.[8]

Our primary data source for tests on earnings levels and changes is Datastream. For these tests, we measure earnings (EARN) in a hybrid manner across implementation of an important UK reporting standard, FRS 3.[9] In pre-FRS 3 accounting periods, we measure EARN as earnings before extraordinary items. In post-FRS 3 accounting periods, we measure EARN as earnings before extraordinary and special or non-operating exceptional items.[10] The special items we exclude are items that could have been extraordinary pre-FRS 3, are exceptional post-FRS 3, and are required by FRS 3 to be disclosed separately on the face of the income statement.[11] We measure scaled earnings level (E) as $EARN_t/TA_{t-1}$, and scaled earnings change (ΔE) as $(EARN_t - EARN_{t-1})/TA_{t-1}$.

Our analysis of earnings *before* extraordinary items is consistent with Degeorge et al. (1999) but contrasts with Burgstahler and Dichev (1997) who examine earnings *after* extraordinary items. Theory is unclear about which earnings measure managers seek to manipulate, or how this measure is identified. We focus on earnings before extraordinary items because the investment analyst community would appear to make wider use of earnings measured before extraordinary items.[12] This increases the incentive for firms to manage earnings before extraordinary items relative to basic targets. Further, there is UK evidence that earnings before extraordinary items is less timely in reflecting bad news than earnings after extraordinary items (Pope and Walker, 1999). The fact that classification of extraordinary items can be used as a means to manage earnings before extraordinary items makes it especially interesting to study whether DACC are also used to manage this earnings measure. For completeness, we also report evidence on pre- and post-FRS 3 periods, on using earnings after extraordinary items (EAXI) and on the use of extraordinary and special items to achieve earnings targets (see Section 5).

For the purposes of tests on earnings surprises, we obtain actual and forecasted earnings from I/B/E/S.[13] We restrict the sample to those consensus forecasts based on at least three individual forecasts, and use the median forecast from the last available month before the earnings announcement as the proxy for forecasted earnings. We require at least three individual forecasts so as to ensure that the median is a reliable measure.[14] We use the median instead of the mean so as to minimise the effect of individual forecasts with unusual errors having excessive influence on the

[7] We use Datastream live and dead UK quoted equity lists, UKQI and DEADUK. These lists are based on issued securities and include a number of instances where individual firms are listed more than once as a result of multiple issues. We identify these cases and retain in the sample only one equity class per firm-year.

[8] Of our final earnings level sample of 10,197 firm-years, 1,561 (15.3%) observations have less than 365 or more than 366 days.

[9] FRS 3 was issued on 29 October 1992, voluntary compliance being immediately optional and mandatory compliance required in relation to accounting periods ending on or after 22 June 1993. FRS 3 redefined ordinary and extraordinary activities with the effect of abolishing extraordinary items in the UK.

[10] Our pre-FRS 3 EARN is Datastream account code (DS) 625, and our post-FRS 3 EARN is DS625-(DS1083-DS1094-DS1097). We measure other variables in terms of Datastream account codes as follows. WCA is Δ(DS376-DS375)-Δ(DS389-DS309), REV is DS104, TA is DS392, XI is DS193 and SI is DS1083-DS1094-DS1097.

[11] These items, listed in para. 20 of FRS 3, are profits or losses on sale or termination of operations, costs of fundamental reorganisations or restructuring, and profits or losses on sale of fixed assets. Ernst & Young (1999) uses the terminology non-operating exceptional to describe these items. Exclusion of these items from our post-FRS 3 measure of earnings closely resembles the adjustments made by Lin and Walker (2000) in their post-FRS 3 construct of headline earnings.

[12] I/B/E/S International Inc. (1996:6) points out that analysts generally make forecasts of earnings on a continuing basis, i.e., excluding extraordinary and other non-operating items. Similarly, SIP 1 (1993) excludes extraordinary and several other non-maintainable items from the definition of headline earnings. Lin and Walker (2000) report that, in terms of explaining stock prices, headline or maintainable earnings performs generally better than FRS 3 earnings, which includes non-operating exceptional or formerly extraordinary items.

[13] We only have access to I/B/E/S data for 1990 onwards. Perhaps because of this and contrary to Brown and Higgins (2001), we do not find a time-dependent bias in the occurrence of exact forecasts.

[14] The median forecast horizon, i.e. period between forecasts and earnings announcements, is 28 days

Table 1
Descriptive statistics

Panel A
Earnings level sample
N=10,197

	Mean	*Median*	*Q3*	*Q1*	*Std. Dev.*
E_t	0.055	0.062	0.101	0.024	0.089
NDE_t	0.055	0.059	0.117	–0.001	0.114
$DACC_t$	0.000	0.000	0.039	–0.040	0.078

Panel B
Earnings change sample
N=10,209

	Mean	*Median*	*Q3*	*Q1*	*Std. Dev.*
ΔE_t	0.007	0.008	0.028	–0.014	0.063
$ND\Delta E_t$	0.007	0.005	0.055	–0.045	0.100
$DACC_t$	0.000	0.000	0.039	–0.041	0.078

Panel C
Earnings surprise sample
N=4,380

	Mean	*Median*	*Q3*	*Q1*	*Std. Dev.*
ES_t	–0.001	0.001	0.003	–0.001	0.013
$NDES_t$	0.002	0.002	0.034	–0.030	0.060
$DACC_t$	–0.003	–0.002	0.029	–0.034	0.058

E = Earnings scaled by opening total assets
NDE = Non-discretionary earnings scaled by opening total assets
ΔE = Change in earnings scaled by opening total assets
NDΔE = Non-discretionary earnings change in earnings scaled by opening total assets
ES = Earnings surprise scaled by opening total assets
NDES = Non-discretionary earnings surprise scaled by opening total assets
DACC = Discretionary working capital accruals scaled by opening total assets, estimated using Jones (1991) model

measure of central tendency. Thus, we measure the earnings surprise (ES) as actual earnings minus the median forecast scaled by opening TA.

We estimate DACC by applying a cross-sectional version of the Jones (1991) model to working capital accruals. Under this model, normal or non-discretionary accruals are assumed to be a function of designated factors or drivers. The component of accruals not explained by these drivers is denoted as abnormal or discretionary. In the original Jones (1991) formulation, total accruals are modeled as a function of the change in total sales (ΔREV) and gross property, plant and equipment (PPE). The former is argued to drive short term accruals or WCA and the latter to drive long term accruals, most notably depreciation.

Our focus is on the discretionary component of WCA. We believe that long term accruals such as depreciation are unlikely to be an effective means of managing earnings given their visibility and the ability of the market to observe, and unwind the earnings implications of, any attempt to manipulate them (Young 1999:842). We measure total WCA as the change in non-cash working capital.[15] We then estimate the following cross-sectional OLS regression for each Datastream level-6 industry-year, using all valid firm-years with available

[15] Collins and Hribar (2002) express the concern that measuring accruals as the change in balance sheet accounts introduces measurement error into total accruals, primarily as a result of mergers, acquisitions and discontinued operations. They state that the error in total accruals measured through the balance sheet approach is unlikely to be correlated with the assumed drivers of accruals in the Jones (1991) model, resulting in the measurement error being captured entirely by the residual or discretionary accruals estimate. We believe their conjecture on the correlation between the measurement error and change in revenue, in particular, is counter-intuitive. Change in total consolidated revenue is, a priori, no less susceptible to influence by mergers, acquisitions and discontinued operations than change in working capital balances. In any case, measuring total accruals using the cash flow statement, which is the approach preferred by Collins and Hribar (2002), is itself not unproblematic. The difference between operating profit and operating cash flow usually includes a number of idiosyncratic accruals that cannot be classified systematically as either discretionary or non-discretionary.

data but requiring a minimum of six observations per regression:[16]

$$WCA_{ijt}/TA_{ijt-1} = \beta_{0jt} + \beta_{1jt}\Delta REV_{ijt}/TA_{ijt-1} + \varepsilon_{ijt} \quad (1)$$

where i, j and t are firm, industry and time subscripts respectively. This regression facilitates partitioning of WCA into non-discretionary accruals (NDACC) and DACC. NDACC are measured as the predicted component of WCA and DACC as the residual resulting from this regression. Thus:

$$DACC_{ijt} = WCA_{ijt}/TA_{ijt-1} - NDACC_{ijt} \quad (2)$$
$$= WCA_{ijt}/TA_{ijt-1} - (\hat{\beta}_{0jt} + \hat{\beta}_{1jt}\Delta REV_{ijt}/TA_{ijt-1})$$

where $\hat{\beta}_0$ and $\hat{\beta}_1$ are the industry-year OLS parameters estimated above.

In our use of the Jones (1991) model rather than available alternatives, we are guided by Peasnell et al. (2000). They evaluate the specification and power of alternative methods of estimating DACC using UK data. The results they report suggest that, on the whole, alternative models currently available are not superior to the Jones (1991) model in terms of ability to detect plausible levels of earnings management. Our measure of WCA and the DACC estimation technique closely resemble those used by Peasnell et al. (2000).

Having estimated DACC as described above, we measure non-discretionary earnings (NDE), non-discretionary earnings change (NDΔE) and non-discretionary earnings surprise (NDES) as E-DACC, ΔE-DACC and ES-DACC respectively. Our earnings levels tests are conducted on an earnings level sample defined as all observations from the above-described main sample for which E, NDE and DACC are available, and having deleted the extreme%iles of E, NDE and DACC. Our earnings change and surprise samples are defined in a similar manner, with E (NDE) being replaced by ΔE (NDΔE) and ES (NDES) respectively.

These criteria result in earnings level, change and surprise samples of 10,197, 10,209 and 4,380 observations respectively. Basic descriptive statistics on these samples are presented in Table 1. Mean (median) E, ΔE and ES are 0.055 (0.062), 0.007 (0.008) and –0.001 (0.001) for the earnings level, change and surprise samples respectively. As expected, mean (median) DACC is zero (zero) for both the earnings level and change samples.[17] However, the earnings surprise sample has mean (median) DACC of –0.003 (–0.002).

4. Results

4.1. Distribution of earnings and non-discretionary earnings relative to target

We predict in H1 that earnings relative to targets will be distributed discontinuously around zero, consistent with firms managing earnings to avoid small deficits and achieve small surpluses. We further predict in H2 that the exclusion of discretionary accruals from current period earnings will cause the discontinuity around zero to disappear. The evidence on these hypotheses is reported in Figure 1 and Table 2. Figure 1 presents histograms of reported and non-discretionary earnings levels, changes and surprises. It also shows the differences between the frequency of reported earnings and non-discretionary earnings relative to target in each class, thus illustrating the impact that DACC have on the distribution of earnings relative to targets.[18] Table 2 reports the Burgstahler and Dichev (1997) standardised difference statistics relating to the classes at both immediate sides of zero in the distributions reported in Figure 1.[19]

The distribution of earnings levels, shown in Figure 1 Panel A1 reveals a distinct discontinuity at zero. The frequency at the immediate left of zero is low and that on the immediate right of zero is high relative to expected frequencies under a smooth distribution. As predicted, Panel A2 shows that the distribution of non-discretionary earnings levels is relatively smooth around zero. There is little disparity between the frequencies immediately adjacent to zero. Panel A3 confirms that DACC have the effect of increasing the frequency of small positive earnings and decreasing the frequency of small negative earnings. In addition, DACC have the effect of reducing the frequency of both large positive and large negative earnings.

Table 2 Panels A1 and A2 confirm the visual impressions regarding the impact of DACC around zero earnings. Panel A1 indicates that the actual frequency of the class to the immediate left of zero in the earnings distribution is significantly less than the expected frequency of that class under the null hypothesis of a smooth distribution. On the other hand, Panel A2 indicates that the actual frequency of the class to the immediate left of zero in the non-discretionary earnings distribution is insignificantly different from its expected frequency. This confirms our H1 and H2 predictions that earnings is distributed discontinuously around zero, while non-discretionary earnings is not.

Figure 1 Panel B1 shows the distribution of earnings changes. This histogram reveals a discontinuity at zero, caused by the frequency at the immediate right of zero appearing to be higher and that at the immediate left of zero lower than ex-

[16] DeFond and Jiambalvo (1994) and Young (1999) also require a minimum of six observations.

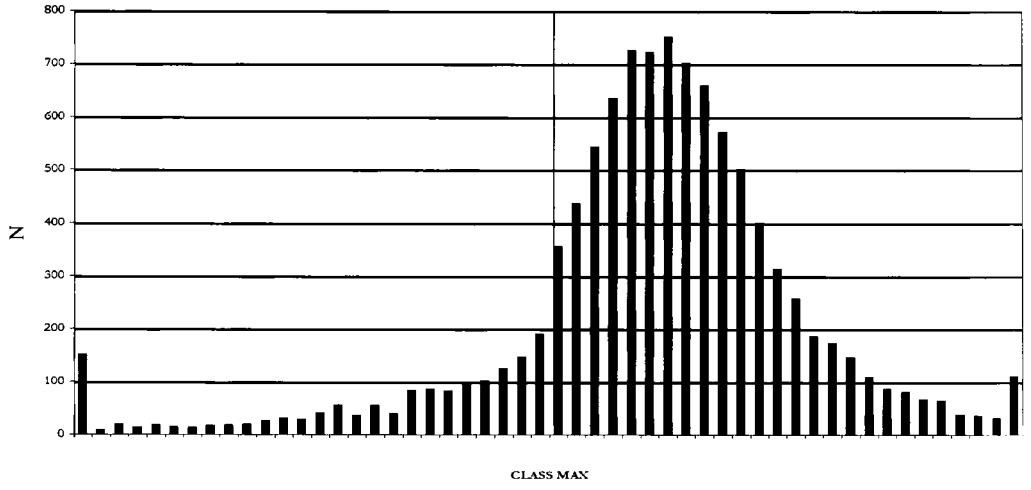
[17] Given that DACC is estimated as an OLS residual, the population average is zero by construction.

[18] The high frequencies shown in the extreme upper and lower bins in all panels of Figure 1 are a result of truncating the range of the graphs and combining the remaining bins.

[19] We use increasingly narrow bands or bin widths as we move from earnings levels to changes to surprises because of the degree of concentration around zero in these respective distributions.

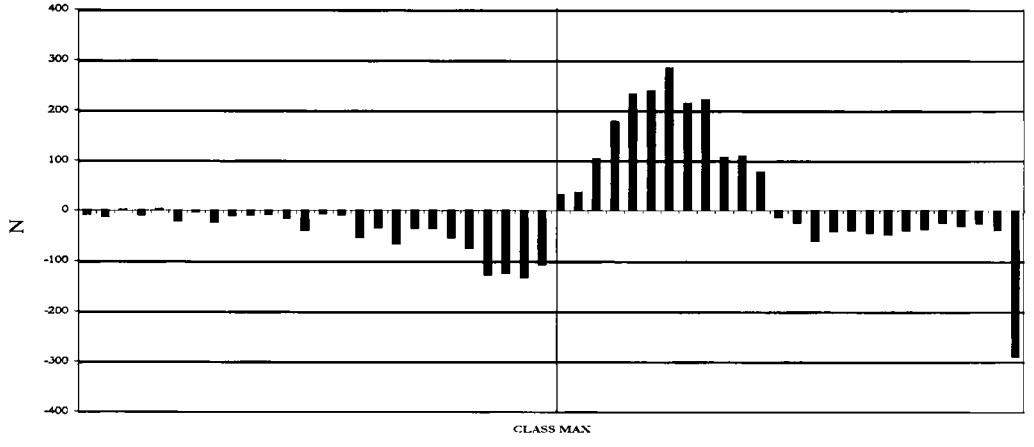
Figure 1 (Panel A)
Histograms of earnings and non-discretionary earnings levels

Panel A1 Earnings levels



Panel A2 Non-discretionary earnings levels

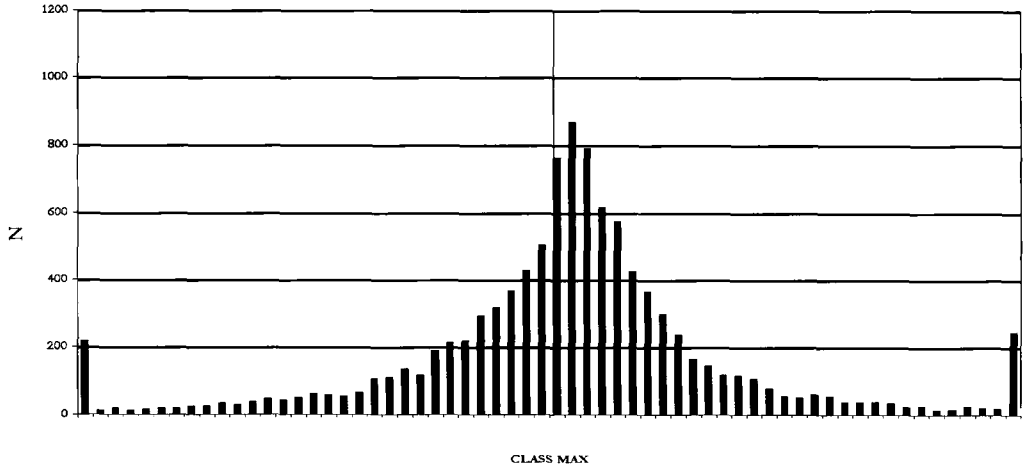
Panel A3 Difference in frequency of earnings and non-discretionary earnings level



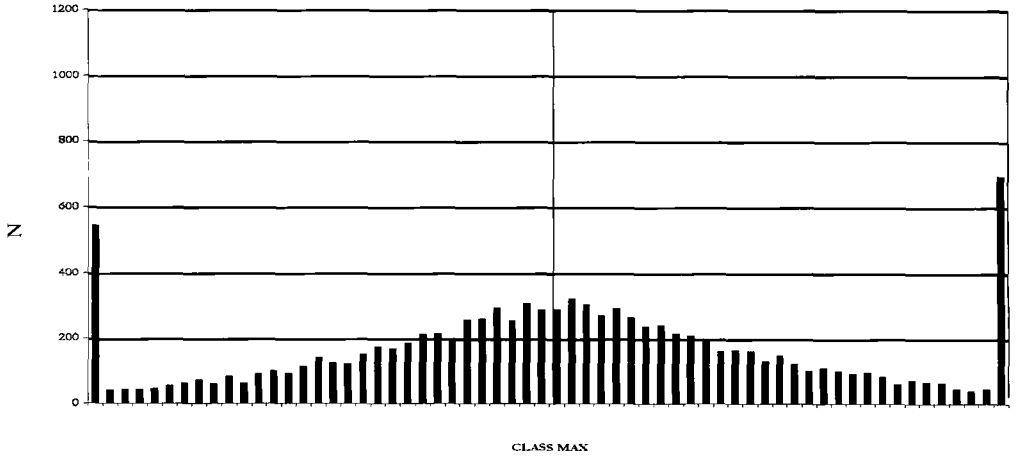
N=10,197 Class width 0.01

Figure 1 (Panel B)
Histograms of earnings and non-discretionary earnings changes

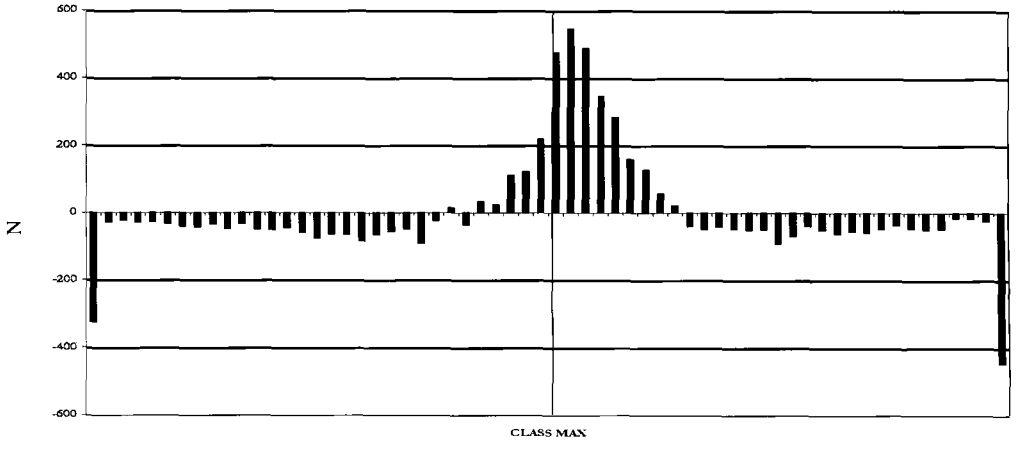
Panel B1 Earnings changes



Panel B2 Non-discretionary earnings changes



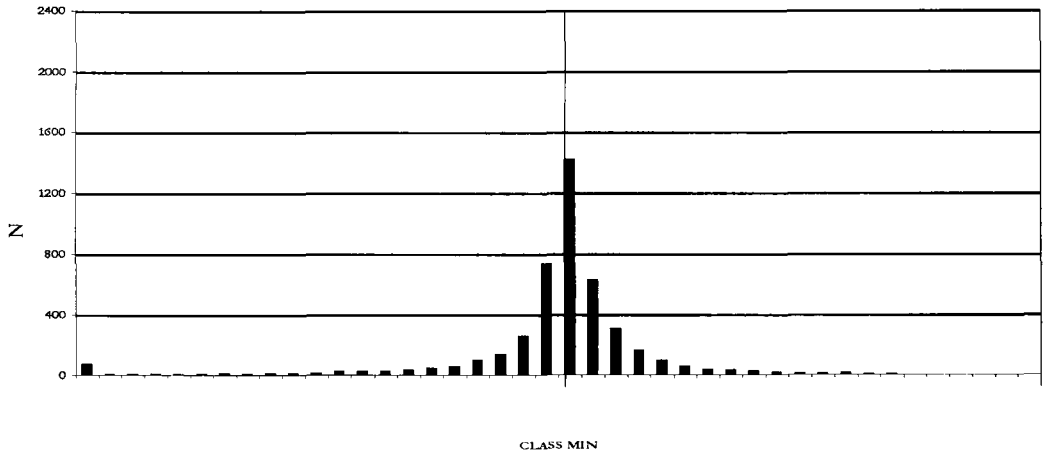
Panel B3 Difference in frequency of earnings change and non-discretionary earnings change



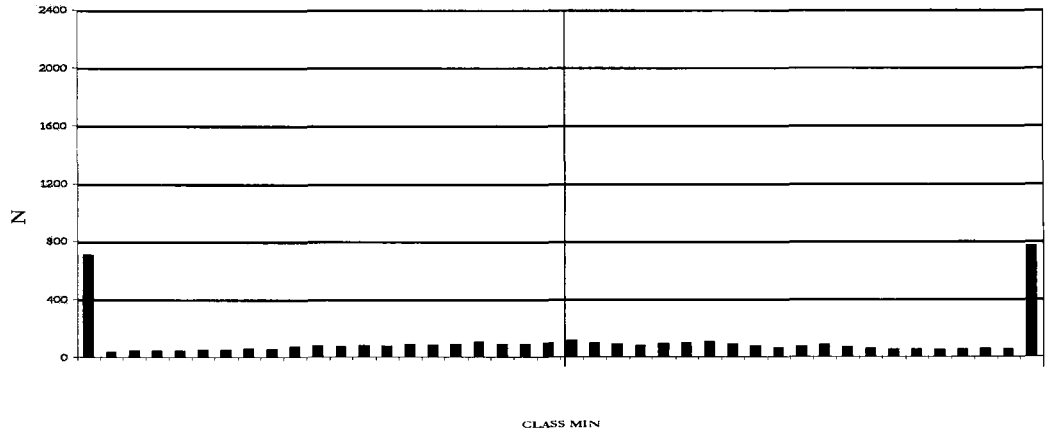
N=10,209 Class width 0.005

Figure 1 (Panel C)
Histograms of earnings and non-discretionary earnings surprises

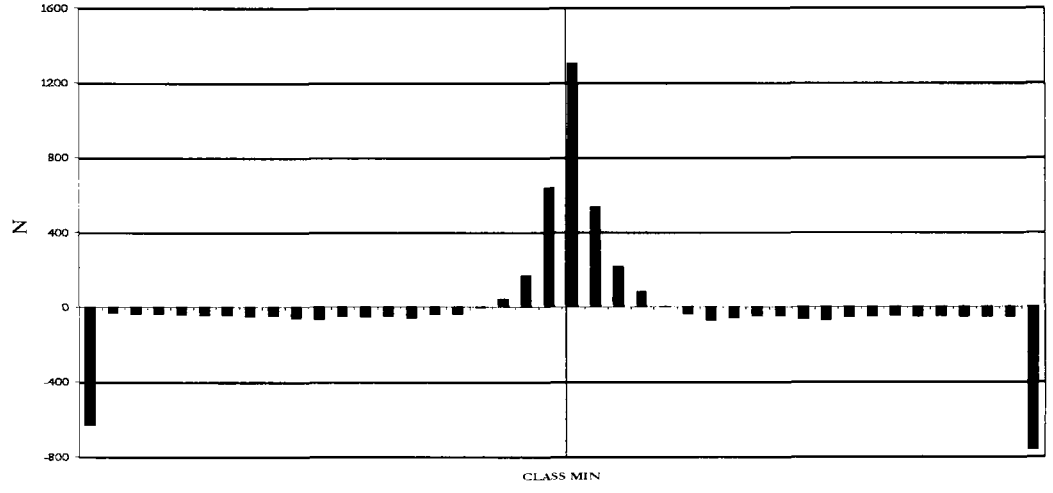
Panel C1 Earnings surprises



Panel C2 Non-discretionary earnings surprises



Panel C3 Difference in frequency of earnings surprise and non-discretionary earnings surprises



N=4,380 Class width 0.0025

Table 2
Distribution of near-zero earnings and non-discretionary earnings relative to targets

Panel A1
Earnings level
N=10,197

Class	$-0.01<E_t\leq 0$	$0<E_t\leq 0.01$
n	190	356
Std. Diff.	–3.516	1.942
p value	0.000	0.052

Panel A2
Non-discretionary earnings level
N=10,197

Class	$-0.01<NDE_t\leq 0$	$0<NDE_t\leq 0.01$
n	300	325
Std. Diff.	–0.144	–1.144
p value	0.885	0.253

Panel B1
Earnings change
N=10,209

Class	$-0.005<\Delta E_t\leq 0$	$0<\Delta E_t\leq 0.005$
n	503	763
Std. Diff.	–3.380	2.463
p value	0.001	0.014

Panel B2
Non-discretionary earnings change
N=10,209

Class	$-0.005<ND\Delta E_t\leq 0$	$0<ND\Delta E_t\leq 0.005$
n	286	289
Std. Diff.	–0.538	–0.705
p value	0.590	0.481

Panel C1
Earnings surprise
N=4,380

Class	$-0.0025\leq ES_t<0$	$0\leq ES_t<0.0025$
n	734	1415
Std. Diff.	–3.442	21.225
p value	0.001	0.000

Panel C2
Non-discretionary earnings surprise
N=4,380

Class	$-0.0025\leq NDES_t<0$	$0\leq NDES_t<0.0025$
n	98	111
Std. Diff.	–0.209	1.085
p value	0.835	0.278

a E = Earnings scaled by opening total assets
NDE = Non-discretionary earnings scaled by opening total assets
ΔE = Change in earnings scaled by opening total assets
NDΔE = Non-discretionary earnings change in earnings scaled by opening total assets
ES = Earnings surprise scaled by opening total assets
NDES = Non-discretionary earnings surprise scaled by opening total assets
DACC = Discretionary working capital accruals scaled by opening total assets, estimated using Jones (1991) model

b This table shows the Burgstahler and Dichev (1997) standardised difference statistic for the classes at the immediate left and right of zero in the distributions of actual and non-discretionary earnings levels, changes and surprises scaled by opening total assets. This statistic is measured as the difference between the actual and expected frequencies in the class concerned, standardised by the standard deviation of this difference. The expected frequency of each class is assumed to be the mean of the two immediately adjacent classes. In other words, if the number of observations in class i is denoted by ni, the probability of an observation occurring in class i denoted by pi, and the total number of observations in the sample denoted by N, the test statistic for class i is given by:

$$\frac{n_i - \frac{(n_{i-1} + n_{i+1})}{2}}{\sqrt{Np_i(1-p_i) + \frac{N(p_{i-1} + p_{i+1})(1 - p_{i-1} - p_{i+1})}{4}}}$$

c This statistic is evaluated against the standardised normal distribution.

d All *p values* reported are two-tailed.

pected. As predicted, the distribution of non-discretionary earnings changes shown in Panel B2 does not have a similar discontinuity at zero. The frequencies at the immediate sides of zero appear indistinguishable from each other, and the entire distribution appears symmetrical around zero. The distribution of actual earnings changes has relatively heavy density over a range of small positive earnings changes. Panel B3 shows that DACC have the effect of increasing the frequency of small positive earnings changes, increasing the frequency of small negative earnings changes to a lesser extent, and reducing the frequency of large positive and negative earnings changes.

Evidence confirming our H1 and H2 predictions regarding the effect of DACC on the discontinuity in the distribution of earnings changes is presented in Table 2. Panel B1 indicates that the frequency of the class to the immediate left of zero in the earnings change distribution is significantly less than expected had the distribution been smooth. However, this is not the case in the distribution of non-discretionary earnings changes. Panel B2 shows that the frequency to the immediate left of zero is insignificantly different from that expected under a smooth distribution.

In Figure 1 Panel C1, we present the distribution of earnings surprises. This distribution reveals high concentration around zero, with more than 85% of all firm-years reporting earnings surprises within a 1.25% of TA band around zero. Consistent with our H1 prediction the frequency to the immediate right of zero is markedly greater than that at the immediate left of zero. Panel C2 reports the distribution of non-discretionary earnings surprises, with little observable disparity between frequencies immediately either side of zero. This distribution is dispersed over a wide range, consistent with DACC being used to manage earnings towards forecast and with analysts anticipating a significant part of DACC. This is confirmed in Panel C3, which indicates that DACC have the effect of causing convergence of earnings and forecasts. Specifically, DACC increase the frequency of small magnitude surprises and reduce the frequency of large magnitude surprises. It is also clear from this panel that DACC increase the frequency of small positive surprises to a greater extent than small negative surprises.

Table 2 Panel C1 confirms that the frequency of the class to the immediate left of zero in the earnings surprise distribution is significantly less than expected under the null hypothesis of a smooth distribution. In contrast, the actual frequency of this class in the non-discretionary earnings surprise distribution (Panel C2) is insignificantly different from the expected frequency. This is consistent with our H1 and H2 predictions that earnings surprises are distributed discontinuously around zero while non-discretionary earnings surprises are not.

In summary, therefore, we find that earnings levels, changes and surprises are distributed with visible and statistically significant discontinuities around zero. Specifically, in each of these distributions, the frequency to the immediate right of zero is greater than expected and the frequency to the immediate left of zero lower than expected under a smooth distribution. We find, further, that the distributions of non-discretionary earnings levels, changes and surprises are not discontinuous in this manner around zero. This suggests that the discontinuity in the distribution of earnings relative to basic targets is caused by DACC.

4.2. Proportions of firm-years achieving and missing earnings targets as a result of DACC

We predict in H3 that DACC have the effect of increasing the proportion of firm-years reporting positive earnings levels, changes and surprises. We further predict in H4 and H5 that DACC increase the proportion of small positive earnings levels, changes and surprises, and reduce the proportion of small negative earnings levels, changes and surprises. These predictions are based on the hypothesised use of DACC to achieve basic earnings targets.

Preliminary evidence on these predictions is obtained from Figure 1 as discussed above. This figure indicates that DACC increase the proportion of positive and, particularly, small positive earnings levels, changes and surprises, consistent with prediction. Also consistent with prediction, DACC reduce the proportion of small negative earnings levels. However, contrary to prediction, DACC increase the proportion of small negative earnings changes and surprises. While the graphical evidence in Figure 1 clearly illustrates the effects of DACC, it does not indicate the statistical significance of these effects.

Table 3 reports the results of formal tests of the predictions we make in H3, H4 and H5. Panel A shows that DACC (which are mean zero: see footnote 17) have the effect of significantly increasing the proportion of positive earnings levels from 74.8 to 85.2%. DACC also significantly change the proportions of firm-years with positive and negative earnings levels within 0.05 of opening TA. In the case of positive earnings levels within this range, the proportion increases from 20.8 to 26.4%. In the case of negative earnings levels within the same range, the proportion decreases from 12.1 to 6.5%. These changes are consistent with the prediction that DACC are used to manage earnings to achieve positive earnings levels and, in particular, to transform small negative earnings into small positive earnings.

Table 4 shows the impact of DACC in arriving at

Table 3
Proportions of observations achieving and missing earnings targets before and after discretionary accruals

Panel A
Earnings levels
N=10,197

	Proportion	*Z*	*p value*
$NDE_t>0$ $E_t>0$	0.748 0.852	25.718	0.000
$0<NDE_t\leq0.05$ $0<E_t\leq0.05$	0.208 0.264	10.832	0.000
$-0.05<NDE_t\leq0$ $-0.05<E_t\leq0$	0.121 0.065	−15.075	0.000

Panel B
Earnings changes
N=10,209

	Proportion	*Z*	*p value*
$ND\Delta E_t>0$ $\Delta E_t>0$	0.527 0.626	18.480	0.000
$0<ND\Delta E_t\leq0.025$ $0<\Delta E_t\leq0.025$	0.144 0.353	38.461	0.000
$-0.025<ND\Delta E_t\leq0$ $-0.025<\Delta E_t\leq0$	0.137 0.186	10.170	0.000

Panel C
Earnings surprises
N=4,380

	Proportion	*Z*	*p value*
$NDES_t\geq0$ $ES_t\geq0$	0.518 0.593	7.168	0.000
$0\leq NDES_t<0.0125$ $0\leq ES_t<0.0125$	0.108 0.553	51.101	0.000
$-0.0125\leq NDES_t<0$ $-0.0125\leq ES_t<0$	0.108 0.317	24.647	0.000

a E = Earnings scaled by opening total assets
NDE = Non-discretionary earnings scaled by opening total assets
ΔE = Change in earnings scaled by opening total assets
NDΔE = Non-discretionary earnings change in earnings scaled by opening total assets
ES = Earnings surprise scaled by opening total assets
NDES = Non-discretionary earnings surprise scaled by opening total assets
DACC = Discretionary working capital accruals scaled by opening total assets, estimated using Jones (1991) model

b This table evaluates the impact of DACC on the frequency of observations of positive, small positive and small negative earnings levels, changes and surprises. The Z statistic shown relates to the Z test for correlated proportions described by Kanji (1993, 48–49). This test evaluates the impact of a given intervention on the proportion of observations satisfying a given criterion by measuring and comparing the proportion before and after the intervention. If the number of observations moving from no to yes relative to the criterion of interest is denoted by b, the number moving from yes to no denoted by c, and the total number of observations denoted by N, the test statistic is given by:

$$\frac{(b-c)/N}{\sqrt{\dfrac{(b+c)-(b-c)^2/N}{N(N-1)}}}$$

c This statistic is evaluated against the standardised normal distribution.

d All *p values* reported are two-tailed.

the earnings reported by firms. It takes the form of transition matrices (one each for levels, changes and surprises): rows show broad classes of non-discretionary (pre-managed) earnings, columns show such classes of reported earnings. Intersections of rows and columns show the number of firm-years (and proportion of the total) moving from a particular NDE_t ($ND\Delta E_t$, $NDES_t$) class to a particular E_t (ΔE_t, ES_t) class.

Panel A presents details of the frequency with which firms move from specific classes of non-discretionary earnings, e.g. NDE ≤ –0.1, to specific classes of actual reported earnings, e.g. $0 < E_t \leq 0.05$. We would expect that firms use DACC to move from negative non-discretionary earnings to positive reported earnings, and for this to be particularly so for firm-years close to targets. Panel A reveals that 14% of the entire sample move from negative non-discretionary earnings to positive earnings as a result of DACC. This compares to only 3.6% of the sample moving in the opposite direction, i.e. from positive non-discretionary earnings to negative earnings as a result of DACC,[20] thus emphasising the directionality in the use of DACC. Focusing specifically on those firms falling just short of target, i.e. in the range $-0.05 < NDE_t \leq 0$, the effect is even more pronounced: 72.8% of such firms report positive actual (post DACC) earnings ((550 + 261 + 88) / 1,235), whereas only 11.1% of those firms with NDE_t just above break even, i.e. $0 < NDE_t \leq 0.05$, move to negative earnings ((20 +49 + 166) / 2,117). Of particular interest is the movement of firms closest to break even. Here 5.4% of the entire sample moves from negative non-discretionary earnings within 0.05 of opening TA to positive earnings within the same range, (i.e. the 550 firm-years in the lower left corner of the upper right quadrant). Although only a small proportion of the total sample, these 550 firm-years represent 44.5% of the 1,235 firm-years within this range.

Table 4 Panel B reports the impact of DACC on the proportion of firm-years achieving and missing positive earnings changes. DACC significantly increase the proportion of firm-years achieving positive earnings changes from 52.7% based on $ND\Delta E_t$ to 62.6% based on reported earnings, i.e. row totals 1,473 + 1,161 + 2,742 as a proportion of the total of 10,209 compared to the proportion represented by the column totals 3,606 + 1,484 + 1,299. As with earnings levels, focusing specifically on those firms falling just short of target, i.e. $-0.025 < ND\Delta E_t \leq 0$, reveals that 58.5% of such firms report positive actual (post DACC) earnings changes ((629 + 126 + 61) / 1,395, whereas only 29% of those firms with $ND\Delta E_t$ just above target, i.e. $0 < ND\Delta E_t \leq 0.025$, move to negative actual earnings changes ((49 + 80 + 298) / 1,473), again confirming a clear directional bias in movements. DACC also significantly increase the proportion of firm-years with small positive earnings changes, i.e. within 0.025 of opening TA from 14.4 to 35.3%, i.e. row total of 1,473 for $0 < ND\Delta E_t \leq 0.025$ compared to column total of 3,606 for $0 < \Delta E_t \leq 0.025$.

These results are consistent with DACC being used to achieve positive earnings changes. However, contrary to prediction, DACC significantly increase the proportion of negative earnings changes within 0.025 of opening TA from 13.7% (row total of 1,395 for $-0.025 < ND\Delta E_t \leq 0$ to 18.6% (equivalent ΔE_t column total of 1,903). This result reflects the visual impression conveyed by Figure 1.

One potential reason for DACC increasing the proportion of firm-years with small negative earnings changes is the use of DACC to smooth earnings. Smoothing would be reflected by the use of DACC to dampen fluctuations in earnings, i.e., to reduce the magnitude of earnings changes. Table 4 Panel B shows that 789 (i.e. 468 + 321), or 41.5%, of the 1,903 firm-years with actual negative earnings changes within 0.025 of opening TA use DACC to reduce the magnitude of a larger negative earnings change. If these observations were excluded, the proportion of firm-years with small negative earnings change would move from 13.7 (row total, as before) to 10.9% (the $-0.025 < \Delta E_t \leq$) column total of 1,903 minus the 789 firm-years specified above) as a result of DACC. In other words, if firm-years dampening the magnitude of large negative earnings change are excluded, DACC have the effect of reducing the proportion of firm-years with small negative earnings changes, as predicted.

It is important to note that, even if firm-years dampening the magnitude of large positive earnings change are excluded, DACC still have the predicted effect of increasing the proportion of firm-years with small positive earnings changes. In this case, the proportion concerned increases from 14.4 to 22.3% (compare row total of 1,473 as before with column total 3,606 minus 789 + 543, the firms reducing large NDE changes by the use of DACC).

Table 4 Panel B also indicates that 20.2% of the entire sample use DACC to move from negative to positive earnings changes, i.e. the cases in the top right-hand quadrant. These 2,059 firm-years represent 42.6% of all firm-years with negative non-discretionary earnings changes, i.e. 2,059 as a

[20] The 14 % comprise those observations in the upper right quadrant of the panel, i.e., those firms having negative NDE but reporting positive E (113 + 191 + 550 + 65 + 84 +2 61 + 42 + 36 + 88) / 10197. The 3.6 % comprise those observations in the lower left quadrant, i.e. those having positive NDE but reporting negative E (20 + 7 + 7 + 49 + 14 + 13 + 166 + 5 7+ 39) / 10197.

Table 4
Transition matrices indicating the frequency of movement of observations from classes of non-discretionary earnings to classes of earnings relative to target

Panel A
Earnings level sample

	$E_t \le -0.1$	$-0.1 < E_t \le -0.05$	$-0.05 < E_t \le 0$	$0 < E_t \le 0.05$	$0.05 < E_t \le 0.1$	$E_t > 0.1$	Total
$NDE_t \le -0.1$	362	88	82	113	65	42	752
	0.036	0.009	0.008	0.011	0.006	0.004	0.074
$-0.1 < NDE_t \le -0.05$	59	98	110	191	84	36	578
	0.006	0.010	0.011	0.019	0.008	0.004	0.057
$-0.05 < NDE_t \le 0$	47	82	207	550	261	88	1235
	0.005	0.008	0.020	0.054	0.026	0.009	0.121
$0 < NDE_t \le 0.05$	20	49	166	957	755	170	2117
	0.002	0.005	0.016	0.094	0.074	0.017	0.208
$0.05 < NDE_t \le 0.1$	7	14	57	587	1248	432	2345
	0.001	0.001	0.006	0.058	0.122	0.042	0.230
$NDE_t > 0.1$	7	13	39	299	995	1817	3170
	0.001	0.001	0.004	0.029	0.098	0.178	0.311
n	502	344	661	2697	3408	2585	10197
proportion	0.049	0.034	0.065	0.264	0.334	0.254	1

Panel B
Earnings change sample

	$\Delta E_t \le -0.05$	$-0.05 < \Delta E_t \le -0.025$	$-0.025 < \Delta E_t \le 0$	$0 < \Delta E_t \le 0.025$	$0.025 < \Delta E_t \le 0.05$	$\Delta E_t > 0.05$	Total
$ND\Delta E_t \le -0.05$	753	390	468	504	153	107	2375
	0.074	0.038	0.046	0.049	0.015	0.010	0.233
$-0.05 < ND\Delta E_t \le -0.025$	102	161	321	362	81	36	1063
	0.010	0.016	0.031	0.035	0.008	0.004	0.104
$-0.025 < ND\Delta E_t \le 0$	69	121	389	629	126	61	1395
	0.007	0.012	0.038	0.062	0.012	0.006	0.137
$0 < ND\Delta E_t \le 0.025$	49	80	298	779	211	56	1473
	0.005	0.008	0.029	0.076	0.021	0.005	0.144
$0.025 < ND\Delta E_t \le 0.05$	28	54	196	543	250	90	1161
	0.003	0.005	0.019	0.053	0.024	0.009	0.114
$ND\Delta E_t > 0.05$	48	62	231	789	663	949	2742
	0.005	0.006	0.023	0.077	0.065	0.093	0.269
n	1049	868	1903	3606	1484	1299	10209
proportion	0.103	0.085	0.186	0.353	0.145	0.127	1

Panel C
Earnings surprise sample

	$ES_t < -0.025$	$-0.025 \le ES_t < -0.0125$	$-0.0125 \le ES_t < 0$	$0 \le ES_t < 0.0125$	$0.0125 \le ES_t < 0.025$	$ES_t \ge 0.025$	Total
$NDES_t < -0.025$	93	65	398	642	28	8	1234
	0.021	0.015	0.091	0.147	0.006	0.002	0.282
$-0.025 \le NDES_t < -0.0125$	14	14	129	243	3	0	403
	0.003	0.003	0.029	0.055	0.001	0.000	0.092
$-0.0125 \le NDES_t < 0$	9	12	147	290	12	4	474
	0.002	0.003	0.034	0.066	0.003	0.001	0.108
$0 \le NDES_t < 0.0125$	6	14	147	286	19	1	473
	0.001	0.003	0.034	0.065	0.004	0.000	0.108
$0.0125 \le NDES_t < 0.025$	5	12	123	281	11	0	432
	0.001	0.003	0.028	0.064	0.003	0.000	0.099
$NDES_t \ge 0.025$	29	120	445	681	67	22	1364
	0.007	0.027	0.101	0.155	0.015	0.005	0.311
n	156	237	1389	2423	140	35	4380
proportion	0.036	0.054	0.317	0.553	0.032	0.008	1

E = Earnings scaled by opening total assets
NDE = Non-discretionary earnings scaled by opening total assets
ΔE = Change in earnings scaled by opening total assets
NDΔE = Non-discretionary earnings change in earnings scaled by opening total assets
ES = Earnings surprise scaled by opening total assets
NDES = Non-discretionary earnings surprise scaled by opening total assets
DACC = Discretionary working capital accruals scaled by opening total assets, estimated using Jones (1991) model

proportion of the relevant row totals of 2,375 + 1,063 + 1,395. Again focusing specifically on those firms close to the target, in this case matching the prior year's result; of the entire sample, 6.2% of all firm-years move from negative non-discretionary earnings changes within 0.025 of opening TA to positive earnings changes within a similar range (i.e. the bottom left figure in the upper right quadrant). Of the 1,395 firm-years with small negative non-discretionary earnings changes within this range, 58.5% actually report positive earnings changes with the aid of DACC ((629 + 126 + 61) / 1,395).

In a similar manner, in Table 4 Panel C, we assess the impact of DACC on the proportion of firm-years meeting and missing analyst forecasts. This panel indicates that DACC significantly increase the proportion of firm-years with positive earnings surprises from 51.8 to 59.3%, i.e. the row totals 473 + 432 + 1,364 (being the firm-years with NDES above zero) compared to the column totals 2,423 + 140 + 35 (the firm-years with ES above zero), both totals being divided by 4,380. Strikingly, and in accordance with our prediction, DACC greatly increase the proportion of firm-years with small positive earnings surprises, within 0.0125 of opening TA, from 10.8 to 55.3% (i.e. the row total for $0 < NDES_t \leq 0.0125$ compared to the column total for $0 < ES_t \leq 0.0125$. However, contrary to prediction, DACC increase the proportion of firm-years with negative earnings surprises within a similar range from 10.8 to 31.7%.

As suggested earlier for earnings, this last point is potentially explained by the use of DACC to reduce the magnitude of large negative earnings surprises. Table 4 Panel C shows that DACC have the effect of facilitating 12% of the sample (398 + 129) moving from a larger negative surprise to one within 0.0125 of opening TA. However, even if these observations are excluded, DACC still have the effect of increasing the proportion of small negative earnings surprises from 10.8% (the row total, as before) to 19.6% (the column total of 1,389 minus 398 + 129), contrary to prediction. Clearly, however, the increase is less dramatic when these observations are excluded.

Table 4 Panel C also indicates that 6.6% of the sample appears to use DACC to move from a negative surprise within 0.0125 of opening TA to a positive surprise within the same range (the bottom left corner of the upper right quadrant). These 290 cases represent 61.2% of all firm-years with negative non-discretionary earnings surprises within 0.0125 of opening TA (the row total of 474). Further, 58.3% of all firm-years with negative non-discretionary earnings surprises report positive actual surprises with the help of DACC, i.e. the total of firm-years in the upper right quadrant divided by the sum of the row totals 1,234 + 403 + 474).

In summary, DACC significantly increase the proportions of firm-years reporting positive earnings levels, changes and surprises, as predicted. DACC also have the effect of significantly increasing the proportion of firm-years reporting small positive earnings levels, changes and surprises, and reducing the proportion of firm-years reporting small negative earnings levels. This is consistent with DACC being used to achieve positive earnings levels, changes and surprises, and with DACC causing the discontinuity in the distribution of earnings. However, contrary to prediction, DACC result in increases in the proportions of firm-years with small negative earnings changes and surprises. We show that this is mainly because DACC also serves the purpose of dampening the magnitude of large negative earnings changes and surprises in significant numbers of firm-years.

4.3. Sensitivity analysis

To assess the robustness of our results to the choice of discretionary accruals model, we re-estimate non-discretionary earnings using five alternative models and recompute the results reported in Figure 1 and Tables 2, 3 and 4. We use two versions of the modified-Jones model (Dechow et al, 1995) based on working capital accruals and three others, versions of both the original Jones and the modified-Jones models, based on total accruals.

The results achieved are consistent with those reported above. Examination of graphical representations of reported and non-discretionary earnings relative to targets, per Figure 1, confirms our main results. Examining the results statistically reveals for reported earnings a discontinuity around zero in all 30 cases, i.e. five discretionary accruals models, each for levels, changes and surprises, examining one bin either side of zero for each. For non-discretionary earnings, no statistically significant discontinuity is found in the 30 cases examined except when using one of the total accruals-based modified-Jones models for surprises (below zero bin p value 0.085). We also achieve qualitatively similar results using market value of equity (rather than total assets) to scale the variables in Equations 1 and 2. Further, our results for earnings surprises are again similar when using unscaled EPS (contrary to Durtschi and Easton's (2005) suggestion).

Replicating for earnings levels, changes and surprises the tests of proportion reported in Table 3, i.e. achieving and missing earnings targets, both overall and for each of small positive and small negative movements, reveals no instances contradicting the main results. Of 45 tests conducted (five discretionary accruals models, each for levels, changes and surprises, and each for overall,

small positive and small negative) only two give results with a p value other than 0.000 and these are each 0.005.

It could be argued that our finding of the disappearance of the discontinuity around zero is a statistical artefact deriving from our approach of removing DACC from reported earnings (changes, surprises) in order to arrive at NDE (changes, surprises). That is, a (smooth) approximation of a normal distribution may be the result of subtracting one distribution from another. To test this, we remove from earnings for each firm-year a randomly determined 'pseudo-accrual' component of earnings (rather than DACC) sampled from a normal distribution with mean and standard deviation set equal to the distribution of DACC for the specific earnings bin, and re-run our tests. We repeat this procedure 1,000 times. Whereas our main results show the removal of DACC almost always leads to the disappearance of the discontinuity from NDE (see above), discontinuities in 'pseudo-NDE' (i.e. earnings after removal of the 'pseudo-accrual' component) remain in 2% of cases. A binomial test, significant at the 1% level, rejects the null of a smooth distribution (as obtained in our main tests).[21]

We therefore conclude that our results are robust to not only different specifications of DACC but also that they represent a real, rather than a statistical, effect.

5. Did FRS 3 alter company earnings management activities?

As documented above, our main analysis concerning discontinuities around zero is based upon samples drawn from the period of 1989–1998. Mid-way through that period, a new financial reporting standard, FRS 3 (Accounting Standards Board, 1992) was introduced, in part to prevent the use of extraordinary items as an earnings management tool. At the time, it had been noted that a large majority of extraordinary items, i.e. those outside the normal course of business and thus shown 'below the line', were income-decreasing while the majority of exceptional items, i.e. within the normal course of business items and thus 'above the line', were income-increasing. This *prima facie* case of the misuse of extraordinary items, i.e. either classifying ordinary expenses as extraordinary expenses or extraordinary revenues as ordinary revenues, led to their virtual elimination by FRS 3.[22] If this basis for the standard was valid, its introduction would have necessitated the alteration of companies' earnings management techniques. We therefore re-run our main tests on pre-FRS 3 and post-FRS 3 sub-samples.[23]

For earnings levels, we find that in the pre-FRS 3 period the discontinuity in earnings noted previously is absent, whereas in the post-FRS 3 period it is present. This suggests that a change of earnings management behaviour did indeed occur around the time of FRS 3's issuance. Our whole-period result thus reflects a weighted averaging of the two sub-period results, with the absence of an effect in the earlier period (about one-third of our observations) serving partially to mask the effect clearly evident in the later period (about two-thirds of our observations), i.e. the results reported for the whole period are a conservative estimate of the post-FRS 3 period effect. In contrast to this, but consistent with our expectations, the absence of a discontinuity for NDE that we find for the whole period sample is also evident for both of the sub-periods.

Also consistent with our prior expectations and our whole period results, our tests of earnings changes show, for both pre-FRS3 and post-FRS 3 sub-periods, a clear discontinuity in ΔE but none in ΔNDE. The differing results for the pre-FRS 3 period earnings levels and changes may be attributed to the (mis)use then of XI to achieve break even, i.e. an absolute target, but the necessity to manage earnings using DACC to achieve the prior year's EXBI result, i.e. a relative target not achievable using XI themselves.

For earnings surprises, the results are again in line with those for the whole period, i.e. both pre- and post-FRS 3 periods show the expected discontinuity in ES, although the results are less clear cut than those for ΔE. Again, this suggests the use of DACC to meet a target not amenable to XI manipulation.

The tests on the two sub-periods described above are, as for those on the whole period, conducted in terms of earnings levels, changes and surprises *before* extraordinary items (as detailed on pages 11–12). This is because we hypothesise that it is earnings before extraordinary items (EBXI) that are the focus of analyst interest and hence of earnings management activities. However, whether this is actually the relevant target is an empirical question. We thus repeat the

[21] We are grateful to one of our reviewers for suggesting this additional test of our results.

[22] Post-FRS 3, most items that previously classified as extraordinary (XI) became special (SI)

[23] We exclude accounting periods ending in the period during which compliance with FRS 3 was voluntary. This is to avoid any bias caused by self-selection in compliance. *Accountancy* (1993) reports that firms were voluntarily adopting FRS 3 in financial statements issued as early as November 1992. It quotes the chairman of one such firm as saying '[Early adoption of FRS 3] does not have a major impact on the results of the company for the half year or for the previous year, but it does have the consequence of increasing marginally our earnings per share in both periods as the result of including within ordinary activities certain items previously classified as extraordinary.'

above tests using earnings levels and changes *after* extraordinary items (EAXI).[24]

When examining earnings levels for the whole sample period, we find that the pattern reported in our main (EBXI) results, i.e. the presence of a discontinuity for earnings and its absence for NDE, is repeated for EAXI. This is may be attributed to the overall effect of XIs being small relative to the larger number of firm-years without XIs. The patterns for the two sub-periods (pre- and post-FRS 3) are also consistent with those reported for EBXI.

For earnings changes, the pattern of results is interesting. Examining ΔE(AXI) for the whole period, the discontinuity is more equivocal, i.e. while the coefficients (standard differences – not reported but see Table 2 for structure) of the bins below zero are significant for all models tested, those just above zero are not (although consistently approaching significant levels). The pattern for ΔNDE(AXI) is similar, i.e. a discontinuity is present, again suggesting that in the pre-FRS 3 period XIs were indeed used for earnings management purposes. Examining the two sub-periods, the pattern for the pre-FRS 3 period is similar to that for earnings levels whilst that for the post-FRS 3 period is as described for the whole period, i.e. again the pre-FRS 3 sub-period effect partially masks the post-FRS 3 effect.

The above results indicate that the use of extraordinary items as an earnings management tool is worthy of further investigation. To provide this, we also examine the distribution of extraordinary (XI) and special items (SI – a post-FRS 3 Datastream defined category capturing items categorised as extraordinary pre-FRS 3) conditional on earnings relative to targets. This enables us to evaluate further whether firms widely used misclassification of XI and SI as a means of achieving earnings targets.

The main prior expectation we have on the relationship between earnings and XI or SI is that large negative earnings would be associated with low average XI or SI and high (low) incidence of negative (positive) XI or SI. This prediction is based on previous evidence that the incidence of negative XI and SI is greater in periods of financial distress or extremely poor performance (Elliott and Shaw, 1988; Hanna, 1999). To the extent that firms transform small deficits into small surpluses by misclassifying XI or SI, we expect small surplus firm-years to have unusually low average XI or SI, unusually high frequency of negative XI or SI, and unusually low frequency of positive XI or SI.

Figure 2 plots average XI and the incidence of negative and positive XI for equal-sized portfolios of firm-years based on ranked negative and positive earnings relative to targets. This figure relates to the pre-FRS 3 period, defined in this section as all accounting periods ending on or before 30 June 1992, FRS 3 having been issued on 29 October 1992. Figure 3 reports the equivalent results for post-FRS 3 accounting periods, i.e. average SI, and the incidence of negative and positive SI. We define post-FRS 3 in this section as those accounting periods ending on or after 22 June 1993, the date from which mandatory compliance with FRS 3 was required.[25] Our earnings levels and changes portfolios comprise 200 observations each, while our pre- and post-FRS 3 earnings surprise portfolios are constructed to have 127 and 118 observations respectively, these being the numbers of exact zero surprises in the samples concerned.

Figure 2 Panel A1 presents a plot of average XI by earnings portfolios. A broadly positive relationship between XI and earnings is clearly observable, indicating that as earnings increase, so too do average XI. Panels A2 and A3 present the plots of the proportion of observations in each portfolio reporting negative and positive XI, respectively. Panel A2 clearly shows that the incidence of negative XI decreases steadily as earnings increase, while Panel A3 shows that the incidence of positive XI is relatively stable over the range of earnings. Examining the region around zero, there is no clear evidence in any of the panels consistent with the use of XI classification to transform small deficits into small surpluses.

Similarly, Panels B1, B2 and B3 present average XI and the incidence of negative and positive XI conditional on earnings change. As before, there is a broadly positive relationship between XI and earnings changes. The incidence of negative XI falls as earnings change increases, but the incidence of positive XI is relatively stable as earnings change varies. This pattern is broadly consistent with the expectation that the incidence of negative XI is associated with poor (or distressed) performance. As with the levels sample, we do not observe around zero earnings changes any clear evidence of variation in XI that suggests the use of XI classification to achieve positive earnings changes. However, it does appear that the smallest negative earnings change portfolio has relatively high incidence of negative XI and low incidence of positive XI. This is consistent with the use of XI classification to minimise earnings decreases.

Panels C1, C2 and C3 present plots of average XI and the incidence of negative and positive XI by earnings surprise portfolio. Extreme negative earnings surprises are associated with extremely low average XI, relatively high incidence of negative XI and relatively low incidence of positive XI, as predicted. Strikingly, with the exception of the extreme negative earnings surprise portfolio, the

[24] We would like to thank one of the reviewers for suggesting that we investigate this issue. Note that we do not conduct this test for earnings surprises as the I/B/E/S data upon which that work is based is not amenable to this.

[25] I.e. the sample is selected per footnote 23.

zero earnings surprise portfolio has the lowest average XI. Further related evidence is presented in Panels C2 and C3. With no exceptions, the zero surprise portfolio has the highest proportion of negative XI and lowest proportion of positive XI. This is again consistent with ordinary expenses being classified as extraordinary and extraordinary revenues being classified as ordinary so as to facilitate achievement of exact zero earnings surprises.

In Figure 3, we conduct a similar analysis of the use of SI subsequent to implementation of FRS 3. Panels A1, A2 and A3 report average SI and the incidence of negative and positive SI by portfolios based on ranked earnings. As expected, and consistent with the results for the pre-FRS 3 period, firm-years with large losses have relatively low average SI, high incidence of negative SI and low incidence of positive SI. We do not observe that small profit firm-years have unusually many negative SI or unusually few positive SI.

Panels B1, B2 and B3 report similar plots but conditional on earnings changes. As with the plots conditional on earnings levels, we do not observe that small positive earnings changes portfolio have unusually many negative SI or unusually few positive SI. However, to the left of zero, we note that the smallest negative earnings change portfolio appears to have relatively many negative SI and few positive SI. This result suggests the use of SI classification as a means of minimising negative earnings changes.

Average SI and the incidence of negative and positive SI are plotted by earnings surprise portfolio in Panels C1, C2 and C3. These plots indicate that the zero earnings surprise portfolio have unusually few negative and positive SI. The low incidence of positive SI would be consistent with firm classifying positive special revenues as ordinary to manage earnings upwards. However, the low incidence of negative SI is contrary to the classification of ordinary expenses as special to manage earnings upward to meet forecasts exactly. One plausible reason for this occurrence is that firms might also be managing earnings downward to meet forecasts exactly. In this case, the low incidence might reflect the presence of firms classifying special expenses as ordinary to manage earnings downward in order to meet forecasts exactly. However, the plausibility of this argument depends on the conjecture that firms managing earnings upward to meet forecasts misclassify special revenues as ordinary, while firms managing earnings downward to meet forecasts misclassify special expenses as ordinary. We are not aware of theoretical support for this conjecture.

In summary, we find some evidence consistent with the achievement of positive earnings levels, changes and surprises being facilitated by misclassification of XI or SI. However, the picture is complex, e.g. we do observe evidence that exact zero earnings surprises are associated with relatively frequent occurrence of negative XI and infrequent occurrence of positive XI. This is consistent with misclassification of positive and negative XI as a means of managing earnings upward to meet forecasts exactly.

6. Conclusion

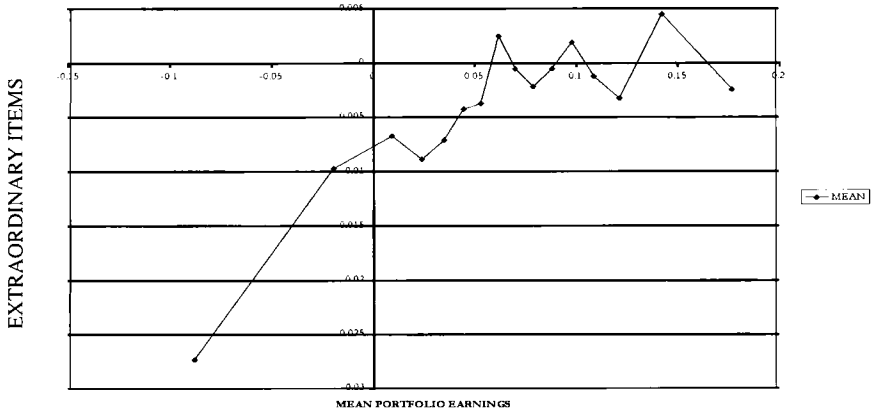
We study a large sample of UK firm-years and document that earnings are distributed discontinuously around basic targets while non-discretionary earnings are not. We report that discretionary accruals have the effect of increasing the frequency of achievement of positive earnings levels, changes and surprises. In particular, discretionary accruals have the effect of increasing the incidence of small positive earnings levels, changes and surprises, and decreasing the incidence of small negative earnings levels. We therefore conclude that discretionary accruals are a significant cause of the discontinuity observed in the distribution of earnings relative to basic targets. In addition, we report evidence consistent with the use of discretionary accruals to reduce the magnitude of large negative and positive earnings changes and surprises.

This evidence confirms that discretionary accruals are used in managing earnings to achieve targets, and validates the use of such accruals as a proxy for earnings management. However, the evidence we report indicates that it is not reasonable to assume that firms invariably seek to increase earnings when using discretionary accruals, an assumption implicit in some of the previous literature. We show that the directional use of discretionary accruals as an earnings management mechanism varies with the relationship between unmanaged earnings and basic earnings targets. The specific manner in which firms use discretionary accruals must be considered when using them to proxy for earnings management.

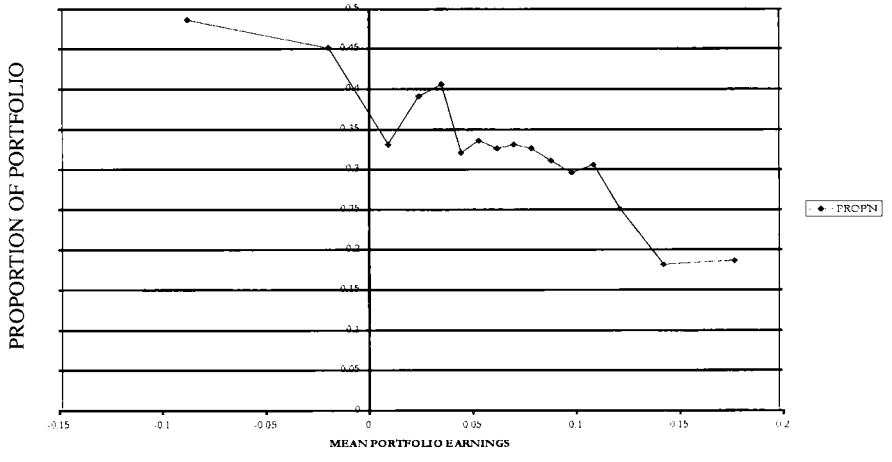
We further report that exact zero earnings surprises are associated with relatively high variance in discretionary accruals. This suggests extensive earnings management to meet forecasts exactly. In addition, we find that exact achievement of forecasts is associated with relatively low average extraordinary items, high incidence of negative extraordinary items and low incidence of positive extraordinary items. This is consistent with misclassification of extraordinary items as a method of managing earnings upward to meet forecasts exactly. In addition, we observe some evidence in the pre-FRS 3 period of misclassification of extraordinary items to facilitate achievement of positive earnings levels or changes. We therefore conclude that since FRS 3 discretionary working capital accruals are prime among methods used by firms to achieve basic earnings targets.

Figure 2
Use of extraordinary items pre-FRS 3
Panel A – Earnings levels portfolios

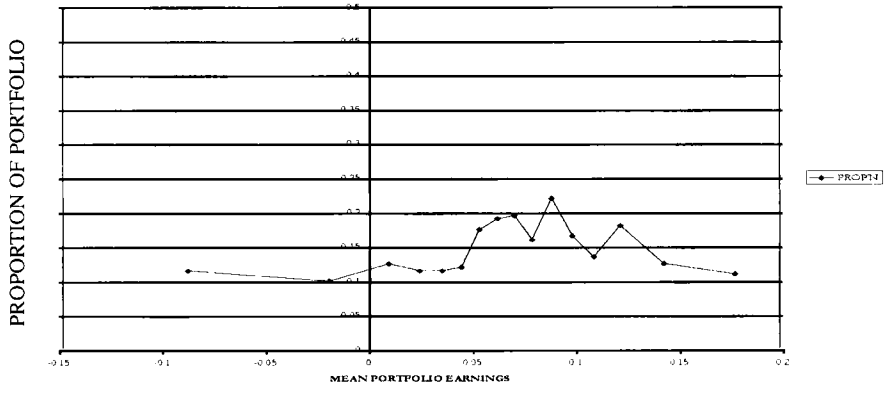
Panel A1 Average extraordinary items



Panel A2 Proportion of observations with negative items



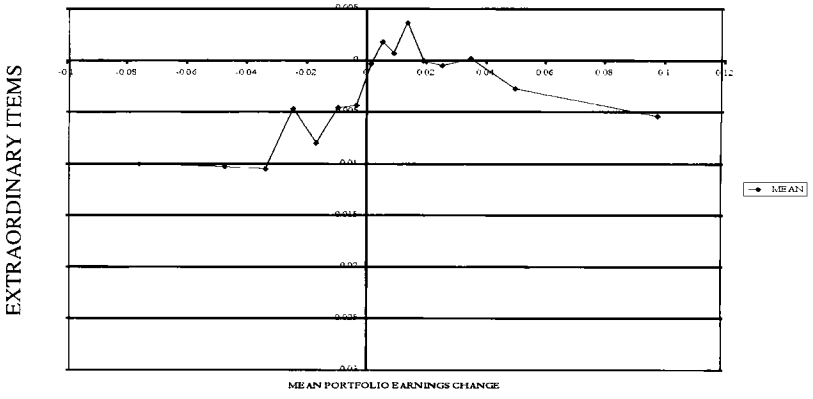
Panel A3 Proportion of observations with positive items



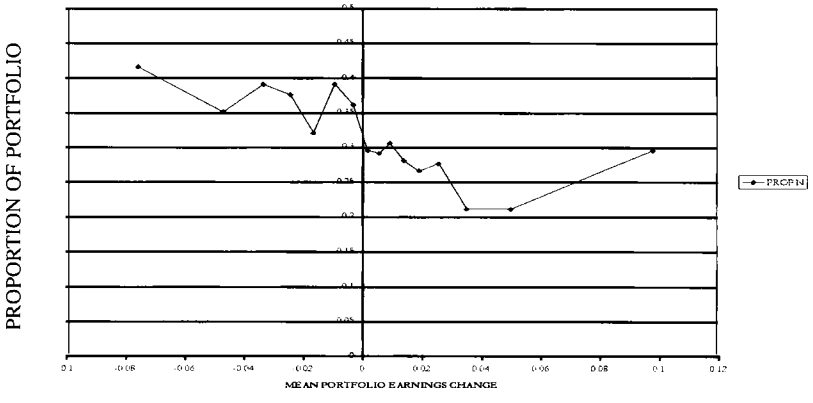
16 portfolios of 200 observations each, based on Earnings before Extraordinary Items

Figure 2
Use of extraordinary items pre-FRS 3
Panel B – Earnings changes portfolios

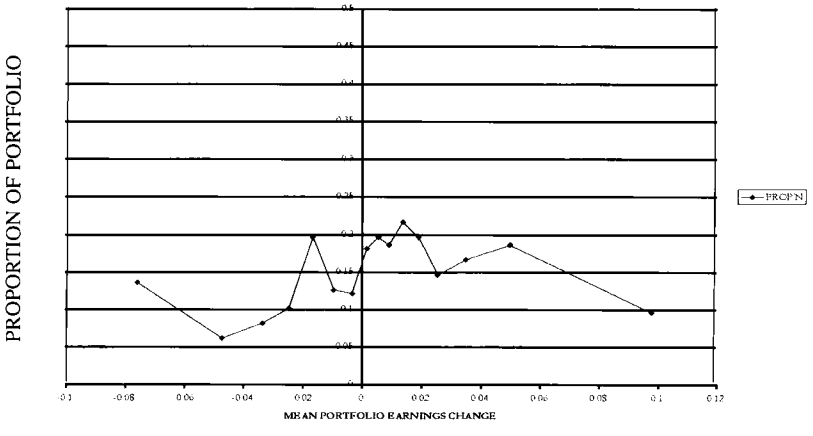
Panel B1 Average extraordinary items



Panel B2 Proportion of observations with negative items



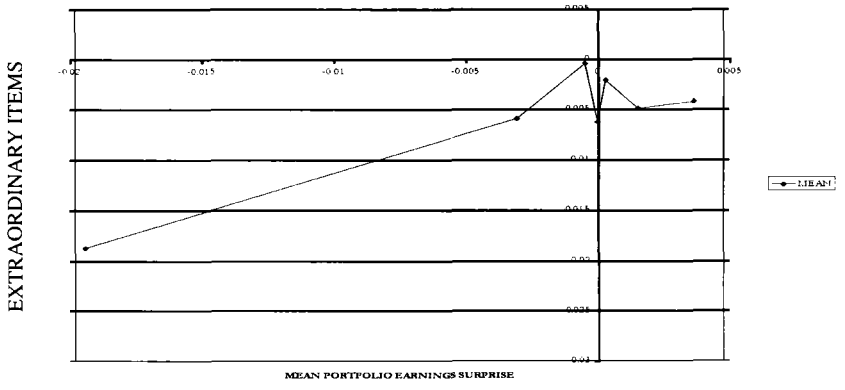
Panel B3 Proportion of observations with positive items



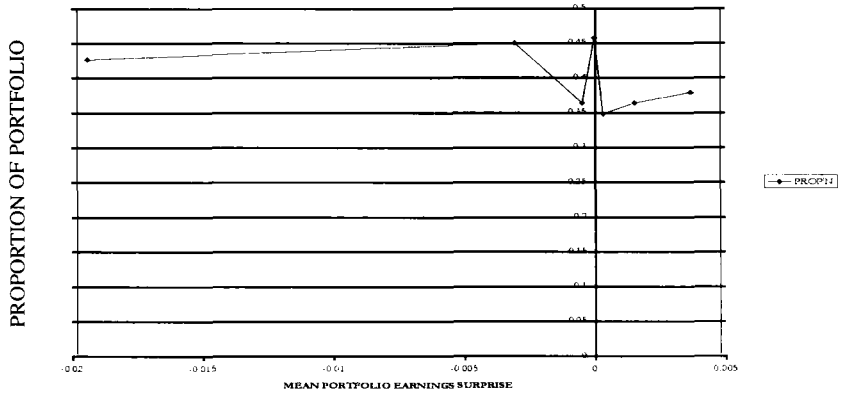
16 portfolios of 200 observations each based on Earnings before Extraordinary Items

Figure 2
Use of extraordinary items pre-FRS 3
Panel C – Earnings surprises portfolios

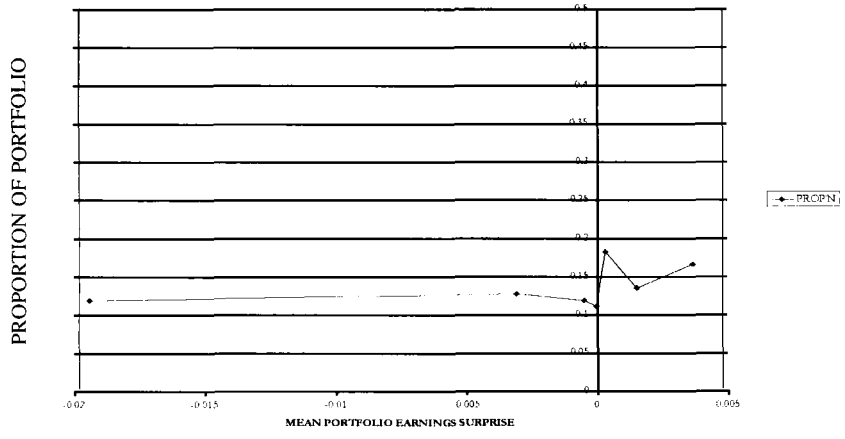
Panel C1 Average extraordinary items



Panel C2 Proportion of observations with negative items



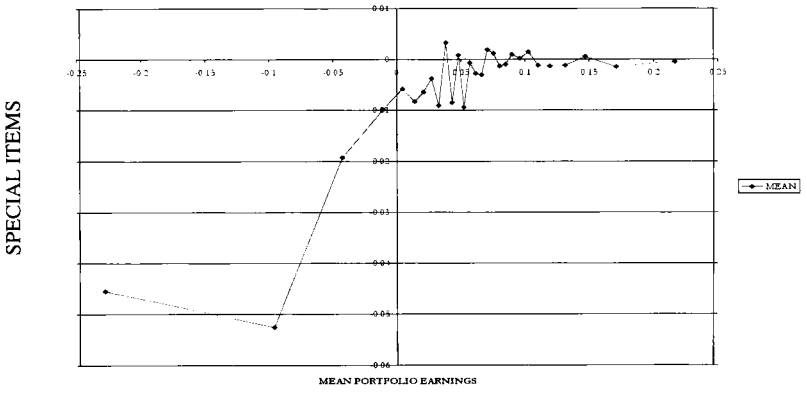
Panel C3 Proportion of observations with positive items



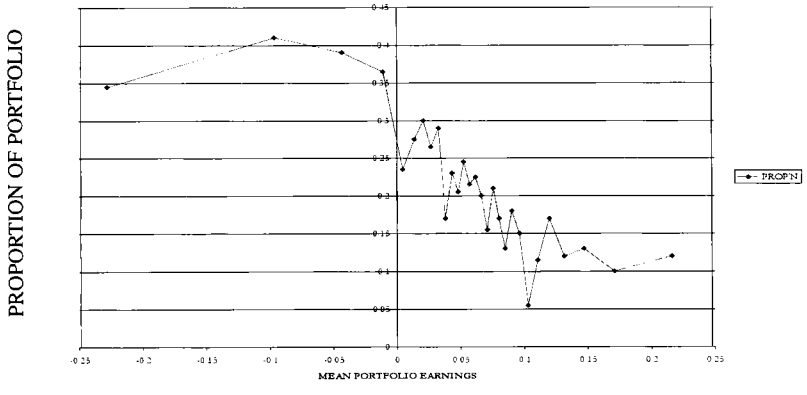
Seven portfolios of 127 observations each based on Earnings before Extraordinary Items

Figure 3
Use of special items post-FRS 3
Panel A – Earnings levels portfolios

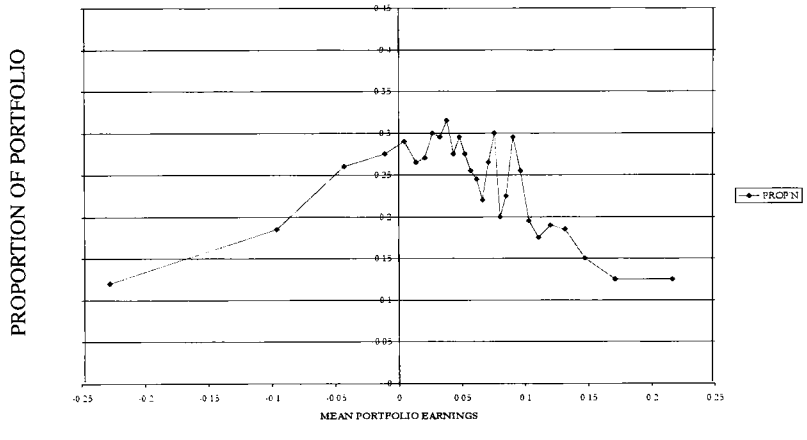
Panel A1 Average special items



Panel A2 Proportion of observations with negative items



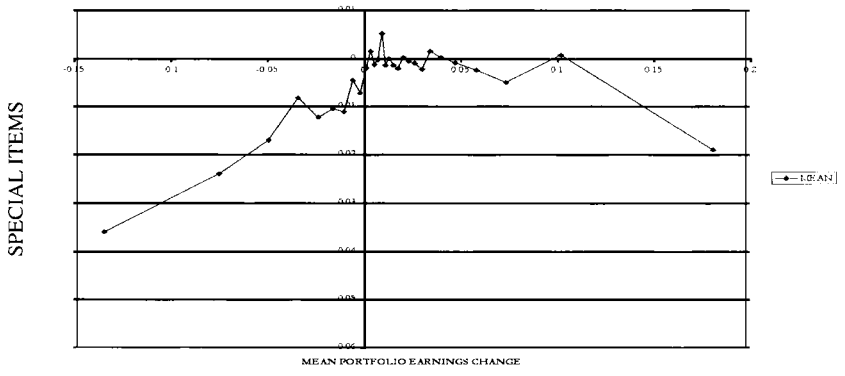
Panel A3 Proportion of observations with positive items



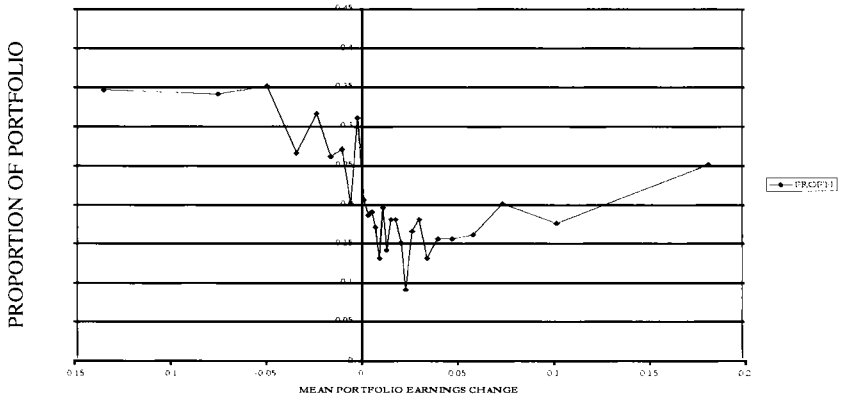
29 portfolios of 200 observations each based on Earnings before Extraordinary Items

Figure 3
Use of special items post-FRS 3
Panel B – Earnings changes portfolios

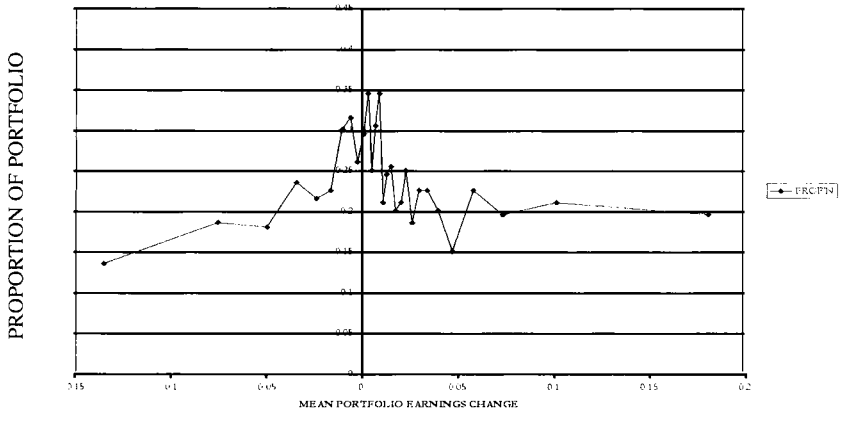
Panel B1 Average special items



Panel B2 Proportion of observations with negative items



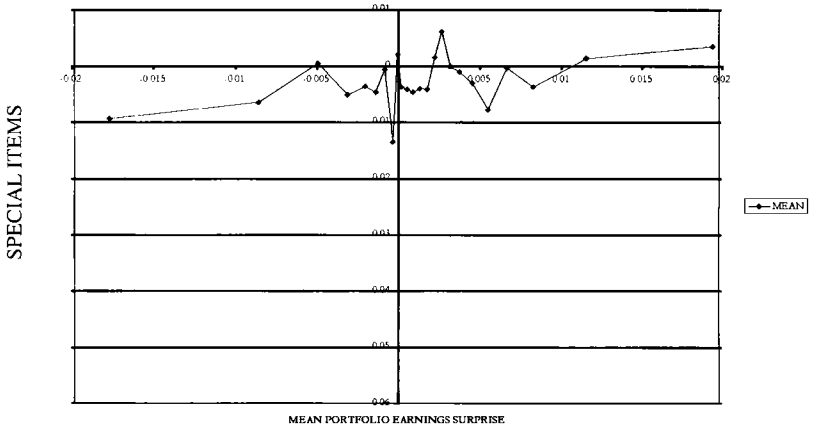
Panel B3 Proportion of observations with positive items



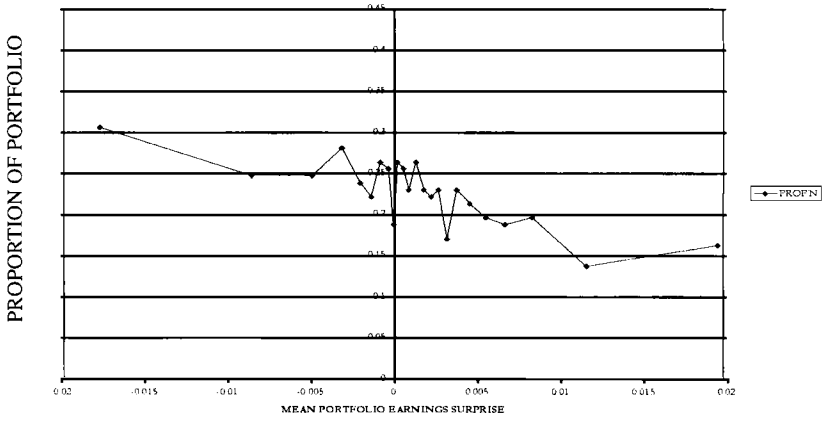
29 portfolios of 200 observations each based on Earnings before Extraordinary Items

Figure 3
Use of special items post-FRS 3
Panel C – Earnings surprises portfolios

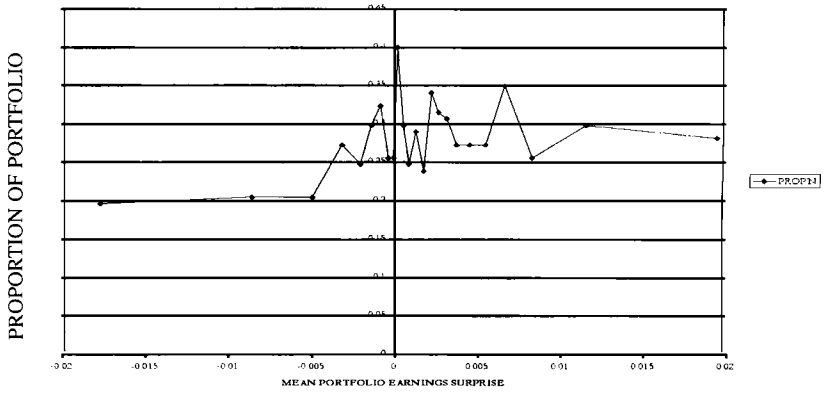
Panel C1 Average special items



Panel C2 Proportion of observations with negative items



Panel C3 Proportion of observations with positive items



24 portfolios of 118 observations each based on Earnings before Extraordinary Items

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