Auditor Quality and the Role of Accounting Information in Explaining UK Stock Returns

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Abstract
In this paper, we examine the relative importance of the cash flow and accruals components of earnings in explaining the variation in UK company equity returns, together with the extent to which these relationships vary by auditor quality. We use a multivariate time-series approach that can be reconciled to a log-linear theoretical valuation model and, unlike the standard linear regression of returns on earnings components, accommodates time varying discount rates. Based on a decomposition of the variance of equity returns, cash flows and accruals, our results indicate that both cash flow news and accruals news are important drivers of equity returns, though cash flows are more influential than accruals. We also find that auditor quality moderates these relationships, since variation in both earnings components has a more significant effect for clients of large auditors. Finally, our results indicate that the impact of auditor quality is highest for the accruals component of earnings.

Keywords: accruals; auditor quality; cash flows; variance decomposition
The Role of Cash Flows and Accruals in Explaining UK Stock Returns and the Impact of Auditor Quality

1. Introduction

This paper examines the relative importance of earnings and cash flows in explaining variation in unexpected UK stock returns. The debate surrounding the importance to equity market participants of accounting information in general, and accruals and cash flows in particular, has an established history in the accounting literature (e.g. Ball and Brown, 1968; Beaver, 1968; Wilson, 1986; Board and Day, 1989; Charitou and Edwards, 1990; Dechow, 1994; Ali and Pope, 1995; and Clubb, 1995). It is generally accepted that earnings play an important part in investors’ valuation models - for example, as part of fundamental analysis based on the price earnings ratio (e.g. Arnold and Moizer, 1984; Barker, 1999). However, standard valuation techniques and models widely used in practice also emphasise the role of cash flow information in valuing companies, and recent evidence points to these models becoming increasingly important (Demirakos et al., 2004; Imam et al., 2008). This is potentially attributable to concerns over the reliability of accruals information (e.g. Dechow, 1994) and/or because of improvements in the quality of cash flow reporting over time, where the emphasis in accounting standards shifted from one of funds flow (which is easily retrieved from the other financial statements) to cash flow, following the introduction of FRS 1: Cash Flow Statements (e.g. Davies et al., 1999).

In the absence of potentially distortive choices, the accruals components of earnings provides useful information to financial statement users in addition to operating cash flows, since accruals capture potentially value-relevant changes in balance sheet components ignored by cash-based accounting. However, since accruals are less persistent than cash flows (Sloan, 1996; Hewitt, 2009) and because preparers of financial statements do not always choose accounting policies that most faithfully represent the company’s true economic performance
(e.g. Graham et al., 2005), the extent to which accruals drive equity prices and returns may be lower than cash flows. In light of the arguments in favour of both accruals and cash flows being relevant in equity valuation, it is perhaps unsurprising that prior research has produced mixed results (Garrod and Hadi, 1998).

Given that the arguments surrounding the relative importance of cash and accruals largely reduce to a relevance-reliability trade off, an interesting question is whether the role of UK firm-level accruals and cash flows in driving equity returns is conditional upon the quality of the firm’s auditor. There is considerable evidence in the literature that high quality auditors are more effective in constraining aggressive accruals (e.g., Becker, 1998; Francis et al., 1999). There is a lack of evidence, however, on the extent to which this leads to differential levels of importance of accruals and cash flows by auditor type. While there are reports based on US data that the pricing of earnings differs according to audit quality (Teoh and Wong, 1993; Krishnan, 2003), there is none on the separate components of earnings.

To address these questions, we employ the recent variance decomposition approach developed by Vuolteenaho (2002) and extended to take account of earnings components by Callen and Segal (2004). This methodology, which is based on a theoretical log-linear valuation model with its roots in the price to book ratio, represents an improvement over the standard approach, which usually draws inferences based on the magnitude of the earnings response coefficient (ERC) from a regression of returns on earnings and cash flows (or accruals and cash flows), by allowing for richer relationships between cash flows, accruals and returns and by accommodating time variation in discount rates (Callen, 2009).

In our empirical analysis, we employ cash flow data retrieved from the cash flow statement rather than the balance sheet, which increases the precision compared to cash flows estimated from balance sheet data (Hribar and Collins, 2002). Importantly, the data we use are
preparing under a common cash flow reporting regime – i.e., *FRS 1: Cash Flow Statements* issued by the UK Accounting Standards Board in 1991.

This paper offers two main contributions. First, this is the first paper to use a multivariate time-series approach to investigate the role of UK accruals and cash flow prepared under a common cash flow regime (*FRS 1 Cash Flow Statements*) with data taken directly from the cash flow statement (as opposed to noisier balance sheet estimates). Our approach has several advantages over more conventional regression approaches, not least the fact that we do not assume inter-temporally constant discount rates. Hence, the model’s ability to accommodate time-varying discount rates overcomes an important limitation of many prior studies (e.g. see Collins and Kothari, 1989; Ali and Pope, 1995; Callen et al., 2005). Furthermore, as shown by Callen (2009), average responses captured by an earnings response coefficient in a linear regression represent an incomplete metric for assessing the extent to which earnings and earnings components influence the variability of returns.

The second contribution of this paper is our examination of the effect of auditor quality on the relationships between returns and cash flow and accruals earnings components. We hypothesise that the relationship between cash flows and accruals and stock returns is stronger for higher quality audit clients, i.e., the contribution of earnings components to the variation in unexpected stock returns of firms audited by a higher quality auditor will be higher than for firms audited by a low quality auditor. We follow Teoh and Wong (1993) and Gul et al. (2003) in using a large auditor classification (big 5/big 4) as a proxy for higher quality auditors, since there is evidence in prior literature suggesting that large (big ‘N’) auditors produce higher quality audits (Davidson and Neu, 1993), are more accurate (Lennox,
1999), constrain earnings management behaviour more (Becker et al., 1998; Francis et al., 1999) and devote more hours to audits than small auditors (Caramanis and Lennox, 2008).¹

Our main findings are that both accruals and cash flows are influential drivers of UK equity returns; however, consistent with evidence that multiperiod cash flow models are more widely used by investors than earnings models (e.g. Imam et al, 2008), we find that cash flow news dominates accruals news. In respect of our second research question, we find these relationships are not constant across firms with different types of auditors: both earnings components explain more of the variation in returns for firms with high quality auditors. Finally, we find that the use of a high quality auditor has more of an impact upon the accruals component of earnings than the cash flow component.

The remainder of the paper is organised as follows. The following section contains a review of the prior literature on the role of earnings and cash flow information in explaining equity returns, outlines the variance decomposition methodology and presents our hypotheses. Section 3 describes our methods and data, while our results are presented in section 4. In the final section, we offer some conclusions, discuss the limitations of our research and suggest areas for further research.

2. Literature and Hypotheses

(i) Usefulness of accruals and cash flow information in stock markets

The use of earnings information in investors’ fundamental valuation models is well documented in the accounting literature. Indeed, Barker (1999) asserts that the prevalence of the price/earnings ratio is among the most pervasive findings in accounting research. A wide

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¹ Consistent with this differential quality, large auditors have also been found to charge higher fees (e.g. McMeeking et al., 2006; 2007). We recognise, however, that audit quality is a multi-dimensional construct and captured not just by the large auditor dichotomy, but also by factors such as industry expertise and ratio of non-audit to audit fees (e.g., Francis, 2004). The large auditor classification is our preferred measure because it has been so widely used in prior empirical research and because the multivariate time-series methodology we use requires a measure of auditor quality that is stable over time.
range of empirical studies dating back to Ball and Brown (1968) offers persuasive evidence that earnings are significantly associated with equity returns. What is less clear, however, is the extent to which analysts and investors rely on the accruals and cash components of earnings individually. Although investors are ultimately concerned with returns in the form of cash, over finite intervals, accruals are not as prone as cash flows to timing and matching problems (Dechow, 1994).

While such arguments suggest that accruals should be more relevant than cash flows and therefore more strongly associated with equity returns, management has more discretion over the measurement of accruals, so the potential increase in relevance is threatened by managers’ opportunistic behaviour. As Dechow (1994: 5) observes, ‘to the extent that managers use their discretion to opportunistically manipulate accruals, earnings will become a less reliable measure of firm performance and cash flows could be preferable.’ The increased relevance of accruals over cash flows therefore comes at the expense of potentially reduced reliability. In the absence of a clear theoretical order of preference, therefore, the question of whether cash flows or accruals are most important in driving equity returns is necessarily addressed via empirical research.

In early research in the US, Govindarajan (1980) finds that analysts emphasise earnings more than cash flows in their reports, whereas Wilson (1986) finds that high (low) cash flow (accruals) components result in a larger stock market response. In a follow-up study, however, Bernard and Stober (1989) find a lack of consistency in these results. In tests of the ability of earnings and cash flows to predict future cash flows, Finger (1994) finds that both have a comparable level of predictability for longer horizons, though cash flows are superior for short term forecasts. More recently, Callen and Segal (2004) find that accruals and cash flows are both significant in driving US returns and find some evidence that accruals
are more important than cash flows; however, the difference between the two earnings components is sometimes marginal and not always statistically significant.

It does not necessarily follow that inferences can be drawn from prior US-based empirical findings and applied to the UK, however. Previous research has found significant international differences in the valuation techniques used by investors (e.g. Pike et al., 1993; Marton, 1998) and in the properties of the inputs into these analysis techniques (e.g. Pope and Walker, 1999). As is the case in the US, prior findings in the UK into the relative importance of cash flow and earnings are mixed. One can find evidence of both accruals (or earnings) and cash flows being relevant, but there are differences over time, perhaps unsurprisingly given the various definitions of cash flows prescribed by different UK accounting standards. Based on data for the period 1962-1977, Board and Day (1989) find that earnings have incremental explanatory power over cash flows, but not vice versa, concluding that cash flow data convey very little information. Ali and Pope (1995) examine data for 1984 to 1990 employing a nonlinear model specification allowing for intertemporal variation parameter estimates. They find that both measures have incremental information content for returns individually, though the coefficients for unexpected cash flows from operations do not have the predicted positive sign over all time periods studied. Based on a multivariate forecasting earnings-cash flow modelling approach using a sample of 48 firms over the period 1955-1984, Clubb (1995) concludes that accruals have information content beyond cash flows, though Clubb found only weak evidence that cash flow data are useful to investors. Charitou and Clubb (1999) adopt a longer horizon approach using UK data from 1985-1992 and conclude that since large increases in explanatory power can be achieved by adding cash flow to earnings as explanatory variables for returns, their results provide strong evidence of the value relevance of cash flow information.
Garrod and Hadi (1998) represents the first study of the market’s response to cash flow data prepared according to FRS 1 - the UK Accounting Standards Board’s first standard to require UK firms to report cash flow statements.\(^2\) FRS 1 overcame the criticism of SSAP 10: Funds Flow Statements - its predecessor - of providing rearranged data from the other financial statements by focusing on changes in cash rather than in funds and was well-received at the time (e.g. Ghosh, 1997). Davies et al. (1999: 1728) note ‘Without doubt the publication of FRS 1 was a quantum leap in the ASB’s financial reporting reform process. It generally worked well in practice and enhanced the quality of financial reporting considerably.’ In contrast to prior UK research by Board and Day (1989), Garrod and Hadi (1998) find that unexpected operating cash flows had a statistically significant (at \(p < 0.001\)) positive response coefficient. They also find that unexpected total accruals were significant and positive in the same regression, though only cash flow data were significant in both levels and changes when included simultaneously.

Consistent with the conclusions of Garrod and Hadi (1998), Al-Attar and Hussain (2004) use data prepared under FRS 1 and find that the disaggregation of earnings into cash flows and accruals generates superior explanatory power for future cash flows (though they do not include equity returns regressions). They conclude (p. 902) that ‘while current cash flow data appears to explain future cash flows better than do current earnings, the combination of cash flow and accruals data generates the greatest explanatory power.’

Interestingly, research studying analysts and their outputs directly also tends to suggest that cash flow information is important to UK investors. In an analysis of 104 UK financial analysts’ reports by Demirakos et al. (2004) find that although the simple price-earnings (P/E) multiple is common, multiperiod models based on discounted cash flows

\(^2\) Since Garrod and Hadi’s (1998) sample period (i.e., 1977-1991) was before FRS 1 was introduced, it is however possible that reconstructed data from other disclosures is not as precise as data taken directly from the cash flow statement itself (Al-Attar and Hussain, 2004: 862).
(DCF) are more popular than earnings-based multiperiod models. Furthermore, in a survey of UK buy-side and sell-side analysts, Imam et al. (2008) find that ‘sophisticated’ (i.e., multiperiod) cash flow models are significantly more important than those based on accruals, and that DCF models are ranked as the most dominant (compared to 12 other valuation models). They also find evidence that operating cash flows are more important than earnings measures and that these findings can be partly attributed to perceived subjectivity in earnings compared to cash flow.  

(ii) Modelling of cash flows and accruals

To investigate whether accruals (i.e., earnings) cash flow information is more important in driving UK equity returns, the basis of the approach we adopt is that shocks (or revisions) to equity returns are related to shocks to earnings components (Callen, 2009). Most prior research into the returns-earnings relationship involves linear regressions of (levels of and/or changes in) stock returns on earnings and their components, with inferences based on the magnitude of the cash flow or earnings response coefficient (e.g. see Habib, 2007 and references therein). As noted by Callen et al. (2005), however, an exclusive focus on mean effects results in an incomplete measure of value relevance and an examination of the relative variance contribution of earnings and their sub-component is beneficial. This is because even if a large and statistically significant response coefficient is found for accruals and/or cash flows, the way returns respond to such factors depends both on the magnitude of the coefficient and the variability of the underlying accruals and cash flows.

To see this, note that the respective earnings response coefficient (ERC) in a regression of returns \( R \) on two earnings components \( E_x \) and \( E_y \) - where the sum of these two

\[ \text{regression of returns on two earnings components} \]

\[ R = \beta_0 + \beta_1 E_x + \beta_2 E_y + \epsilon \]

\[ \text{where } \beta_1 \text{ and } \beta_2 \text{ are the coefficients for } E_x \text{ and } E_y \text{ respectively.} \]

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\[ \text{earnings measures and that these findings can be partly attributed to perceived subjectivity in} \]

\[ \text{earnings compared to cash flow.} \]

\[ \text{A historical analysis of UK valuation techniques by Rutterford (2004) suggests that preferences for cash flow} \]

\[ \text{information can be viewed as part of a long term trend where DCF models have been growing in importance for} \]

\[ \text{decades.} \]
components is aggregate earnings - is equal, respectively, to \( (\text{cov}(R, E_x))/\text{var}(E_x) \) and \( (\text{cov}(R, E_y))/\text{var}(E_y) \), assuming that the covariance between \( E_x \) and \( E_y \) is 0. In general, a higher ERC is interpreted as a more influential earnings component. But, as noted by Callen (2009), this is in incomplete measure of value relevance, because it merely captures how the market responds to that particular component and ignores the properties of the underlying component itself. Thus, where \( \text{ERC}(E_x) > \text{ERC}(E_y) \), it is possible for \( \text{var}(E_y) \) to be higher than \( \text{var}(E_x) \) so that even though the response to a shock in \( E_x \) is greater than for \( E_y \), shocks to \( E_y \) occur more often than to \( E_x \), so the higher the earnings component variance, the higher is its contribution to variation in returns. In summary, it is thus possible that a given earnings component may have a relatively large response coefficient, but if it this component does not vary substantially, \textit{ceteris paribus}, it can have a relatively low impact on unexpected returns and \textit{vice versa}.

The first study to develop a theoretical model for accruals and cash flows variances is Callen and Segal (2004), who extend the model of Vuolteenaho (2002) and demonstrate (\textit{inter alia}) that changes in expected time \( t \) log excess stock returns (i.e., excess returns over the risk free rate, denoted \( r_t \)) can be expressed as a function of changes in expectations of the accruals component of earnings (denoted \( \text{accr}_{t+j} \)), changes in expectations of the cash flow component of earnings (operating cash flows, denoted \( \text{ocf}_{t+j} \)) and changes in expected future returns as follows:

\[
r_t - E_{t-1}(r_t) = \Delta E_t \sum_{j=0}^{\infty} \rho^j (\text{ocf}_{t+j} - f_{t+j}) + \Delta E_t \sum_{j=0}^{\infty} \rho^j \text{accr}_{t+j} - \Delta E_t \sum_{j=1}^{\infty} \rho^j r_{t+j} \quad (1)
\]

Where \( \rho \) is a constant error approximation term taking a value close to 1, emerging from the model’s initial log-linear approximation procedure (e.g. Campbell, 1991). Following on from equation (1) above, the variance of the unexpected returns can then be decomposed thus:
\[
\begin{align*}
\text{var}\{r_t - E_{t-1}(r_t)\} &= \text{var}(N_{r,t}) + \text{var}(N_{ocf,t}) + \text{var}(N_{accr,t}) - 2\text{cov}(N_{r,t}, N_{accr,t}) \\
&- 2\text{cov}(N_{r,t}, N_{ocf,t}) + 2\text{cov}(N_{accr,t}, N_{ocf,t})
\end{align*}
\] (2)

Where \(N_{r,t}\) represents news about future discount rates (i.e., \(\Delta E_{t} \sum_{j=1}^{\infty} \rho^{j} r_{t+j}\)), \(N_{ocf,t}\) represents cash flow news (i.e., \(\Delta E_{t} \sum_{j=0}^{\infty} \rho^{j} (ocf_{t+j} - f_{t+j})\)) and \(N_{accr,t}\) represents accruals news (i.e., \(\Delta E_{t} \sum_{j=0}^{\infty} \rho^{j} accr_{t+j}\)).

Using Campbell’s (1991) log-linear approach as a foundation, equation (2) thus provides an opportunity to estimate how the variance of stock returns is distributed across the main components of what is usually considered the numerator of a typical earnings-based valuation model (i.e., the news related to the cash flow and accruals components of earnings) and what is typically the denominator, in the form of expected future return news.

Using these models and the multivariate time-series empirical approach required to implement them (outlined below), we test the following null hypotheses:

**H1:** The variance of accruals does not contribute to the variance of unexpected returns

**H2:** The variance of cash flows does not contribute to the variance of unexpected returns

**H3:** There is no difference in the variance contribution to unexpected returns between cash flows and accruals

To test these hypotheses, we use a sample of UK listed companies involving data taken directly from the statement of cash flows, as (then) required under FRS I. Unfortunately, our

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\(^4\) As noted by Callen and Segal (2004), this development of Vuolteenaho’s model is based on the approximation \(\ln(1 + x) \approx x\) - an approximation that becomes less reliable the larger the value of \(x\).

\(^5\) Note that while this log-linear linear representation may seem initially unfamiliar, Campbell and Shiller’s (1988a; 1988b) analysis, which is the precursor to Vuolteenaho’s (2002) model, nests the more familiar Gordon growth model as a special case.
multivariate time series methodology does not permit us to examine these relationships across cash flow regimes, so we do not collect IFRS-based (i.e., IAS 7: Statement of Cash Flows) data.

We have no clear prediction of which earnings component will be most influential because even the most recent evidence from the US using this approach may be uninformative about the UK. The UK and US accounting regimes are often considered to be similar: for instance, both regimes are characterised by a heavy reliance on stock market finance, both have a well developed audit profession and both have national private sector accounting standard setting bodies – at least for the period we examine. Nevertheless, research demonstrates that the outputs of each system can differ substantially (e.g., Weetman and Gray, 1990). For instance, Pope and Walker (1999) find important differences between the UK and US in the properties of earnings, which are attributed to greater discretion over the treatment of extraordinary items before the introduction of FRS 3: Reporting Financial Performance, while Soares and Stark (2009) find that investors’ response to differential persistence in accruals differs in magnitude from the US. Furthermore, in an adaption of the US-based value-relevance tests of Easton and Harris (1991) to the UK, Strong (1993) finds differences in the importance of the valuation of earnings on a permanent and transitory basis in linear regressions of returns on earnings changes and levels.

(iii) Accounting information and auditor quality

Hypotheses 1-3 above are based on the premise that the relative importance of cash flow and accruals is constant across firms. Given that prior empirical research has found that the relationship between earnings (and, by implication earnings components) and equity returns is affected by auditor quality, it can be argued that the variance contribution of accruals and cash flow is conditional upon auditor quality.
An important issue in investigating the effect of audit quality on the relationship between accounting and stock market variables is the unobservable nature of audit quality. An empirical proxy for audit quality is therefore necessary in order to operationalise any investigation of auditor quality effects and such proxies generally measure perceived, rather than actual audit quality. As Watkins et al. (2004) note, audit quality consists of two components: reputation (comprising perceived competence and independence) and monitoring strength (comprising actual competence and independence). The former results in a higher degree of user confidence in the financial statements (i.e., the information has a high degree of credibility), while the latter results in a closer correspondence between the information and the true economic circumstances (i.e., higher quality information). In our empirical analysis, we use auditor size as an indicator of audit quality following prior research. We assume that large (big 4/big 5) auditors are associated with higher audit quality than small (non big 4/big 5) auditors, in line with Titman and Trueman (1986), who show that in the context of initial public offerings, firm value is an increasing function of audit quality. This is a readily implementable measure of auditor quality and has been widely used in prior research (see, e.g., Becker et al., 1998; Clarkson, 2000; and Krishnan, 2003). It has also received considerable support as a valid surrogate from prior empirical research. Davidson and Neu (1993), for example, find support for the hypothesis that larger audit firms do indeed produce higher quality audits than smaller audit firms when auditing management earnings forecasts. In addition, Blokdijk et al. (2006) find evidence that the audit programs of large (big 5) audit firms are of a higher quality than those of small (non-big 5) audit firms, even though the amount of audit effort does not differ, while both Becker et al. (1998) and Francis et al. (1999) use a similar dichotomy and find that large (big 5/6) auditors constrain earnings management more than small (non-big 5/6) auditors.
Although there have been no studies of the effect of auditor quality on the contribution of cash flow and accruals to variation in equity returns, there has been related research into the effect of auditor quality on the relationship between returns and earnings. Based on an adaptation of a model by Holthausen and Verrecchia (1998), Teoh and Wong (1993) hypothesise that because investors attach more credibility to financial statements audited by higher quality auditors, the market reaction to earnings depends on the firm used to audit the financial statements. Consistent with this hypothesis, they find that the earnings response coefficient of firms audited by large (big 8) auditors is significantly larger than the corresponding coefficient for firms audited by smaller auditors. These results also hold for a matched sample of big 8 and non-big 8 firms.

Based on the level of non-audit services, Gul et al. (2006) also find that the value relevance of earnings is affected by audit quality. In particular, for a sample of 840 Australian firms, they find that the earnings response coefficient is a decreasing function of non-audit service fees, and this relationship is strongest for small (non-big 6) auditors. They call for more research into these issues in other environments, such as in the UK.

We therefore hypothesise that the quality of a company’s accounting data, which includes the cash flows and accruals information, will be more important in driving equity returns if the financial statements are audited by large audit firms.

H4: Auditor quality has no impact upon the variance contribution of accruals to the variance of unexpected returns

H5: Auditor quality has no impact upon the variance contribution of cash flows to the variance of unexpected returns

In the following section, we describe the sources of data and methodology used in our estimation procedures.
3. Methodology and Data Sources

(i) Variance decomposition estimation

To estimate the contribution of the variance of cash flow news and accruals news to the variance of equity returns, we follow previous research (Campbell, 1991; Vuolteenaho, 2002; Callen and Segal, 2004; and Callen et al., 2005) in using a log-linear vector-auto-regression (VAR). In particular, we use a one-period lagged VAR specification assuming that the vector of firm-specific state variables \( z_{i,t} \) follows a stationary multivariate log-linear vector auto-regressive process:

\[
z_{i,t} = \Gamma z_{i,t-1} + \eta_{i,t}
\]

The VAR coefficient matrix \( \Gamma \) is assumed to be constant over time and across firms (though we allow \( \Gamma \) to vary in our analysis of auditor quality) and where the residuals \( \eta_{i,t} \) are vectors of shocks with a variance-covariance matrix \( \Sigma \).\(^6\) As noted above, this approach assumes that equity returns and their determinants are stationary (or at least cointegrated); however, as noted by Callen (2009), this assumption also underpins many standard tests of value relevance, including univariate time series tests and cross sectional tests with a time-component. Suppressing the firm subscripts, the state variables that constitute \( z_{i,t} \) are log excess returns \( (r_t) \), operating cash flows \( (ocf_t) \), accruals \( (accr_t) \) and the log book/market ratio \( (bm_t) \) as follows (all mean adjusted):

\(^6\) We obtain our estimates using the C programming language; however, since the variance decomposition involves a relatively complex set of procedures, we also our verified results using the Stata code (appropriately modified) recently made available by Callen and Segal (2010). Unlike Callen and Segal (2010), we assume that the state vector is constant across all firms, rather than across industries. Because we confine our analysis to a single cash flow reporting regime and require auditor data as well, we end up with a relatively small number of observations in each industry in our sample.
We use OLS to obtain estimates of the coefficients in $\Gamma$ and obtain standard errors based on the jackknife approach of Shao and Rao (1993). Robustness tests reveal that bootstrapped standard errors based on 10,000 iterations produce similar results.

In line with Callen (2009) and based on equation (1) above, we estimate revisions in cash flows, accruals and expected future returns, respectively, from the following equation:

$$r_t - E_{t-1}(r_t) = (\mathbf{e}_2 + \lambda_2') \mathbf{e}_t + (\mathbf{e}_3 + \lambda_3') \mathbf{e}_t - \lambda_3' \eta_t$$

(7)

We then follow previous research (e.g. Campbell, 1991; Vuolteenaho, 2002; and Callen, 2009) to obtain variance and covariance estimates of the three components based on the following equation:

$$\text{Var}(r_t - E_{t-1}(r_t)) = (\mathbf{e}_2 + \lambda_2') \Sigma (\mathbf{e}_2 + \lambda_2) + (\mathbf{e}_3 + \lambda_3') \Sigma (\mathbf{e}_3 + \lambda_3)
+ \lambda_2' \Sigma \lambda_2 - 2 \lambda_2' \Sigma (\mathbf{e}_2 + \lambda_2) - 2 \lambda_3' \Sigma (\mathbf{e}_3 + \lambda_3) + 2 (\mathbf{e}_2 + \lambda_2') \Sigma (\mathbf{e}_3 + \lambda_3)$$

(8)

Where $\lambda_k' = \mathbf{e}_k' \rho \Gamma (I - \rho \Gamma)^{-1}$ and where $\mathbf{e}_k'$ is a selection vector $[1 \ 0 \ \cdots \ 0]$, where the 1 is in the $k$th position. The variance and covariance terms set out in (8) are obtained from the variance-covariance matrix in the manner set out in Callen (2009).

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7 Note (assuming that $\rho = 1$ for ease of exposition) that the $\Gamma (I - \Gamma)^{-1}$ operation for $\lambda'_k$ performs a similar function (in matrix form) to the capitalisation at time $t$ of an infinite sum of constant returns (commencing at time $t+1$) at a constant rate (as in the valuation of a perpetuity). Thus, note that $(E_t - E_{t-1}) \sum_{j=1}^{\infty} z_{t,j} = \Gamma (I - \Gamma)^{-1} \eta$ (see Froot and Ramadorai, 2005).
(ii) Data sources

Our data are collected from two sources. First, we retrieve equity returns, the risk free rate (3 month Treasury Bill rate) prices, firm size (market value) and the market to book ratio from Datastream. We use both live and dead company return files in order to mitigate the effects of survivorship bias. For the accounting information, i.e., cash flow from operations, accruals and book value data, we use the Financial Analysis Made Easy (FAME) database for the period 1996 – 2004. Firm-years with negative book value are discarded. This period is the longest for which we are able to obtain data due to the general lack of availability of time-series auditor information, cash flow data not being available on FAME before 1996 and the change to International Financial Reporting Standards by listed UK companies in 2005. Importantly, we also use the FAME data as reported on the disks as they were available since this also helps reduce the potential effects of survivorship bias. To mitigate the effects of data input errors, the distributions of the continuous variables are winsorised at the 1st and 99th percentiles, in line with prior research in this area.

As noted in the introduction, an important feature of our data set is that accruals are computed using data taken directly from the cash flow statement and income statement rather than from the balance sheet. We define accruals as the difference between profit after tax and cash flows from operations (as defined by FRS 1: Cash Flow Statements). Our approach is therefore one that captures total accruals, consistent with Hribar and Collins (2002), who note that this approach results in a more precise measurement of accruals than those using balance sheet estimates, since the latter can be seriously affected by non-articulation in the presence of mergers, acquisitions and translation of foreign subsidiary accounts.\(^8\)

\[ \text{Insert Table 1 about here} \]

---

\(^8\) In this context, Hribar and Collins (2002: 133) conclude that results of research into the particular issue of differential capital market effects of cash flows and accruals might be biased against rejection of the null hypothesis by use of balance sheet estimates of accruals.
Table 1 provides descriptive statistics for our main sample of 3,646 firm years (for 792 firms) and for the two sub-groups based on auditor size. Large auditor concentration is high at 81%, consistent with prior research for the UK listed sector (e.g. Pong, 1999; and Clatworthy and Peel, 2007). Table 1 shows that raw annual returns have a mean and median of approximately 16% and 5% respectively, broadly in line with corresponding figures reported by Pope and Walker’s (1999) UK sample of 16% and 9% respectively and also with the US sample of Callen et al. (2005), who report mean and median returns of 17% and 8% respectively.

A comparison of the statistics in Panels B and C shows that there are significant differences between the means of accruals, cash flows and the book to market ratio (these differences are statistically significant at \( p < 0.05 \)). Most notable is the difference in the average size of companies in the two auditor categories, which is significant at \( p < 0.001 \). This difference is potentially important to control for, since it is well known that the relationships we examine are themselves a function of firm size, which could lead to us incorrectly attributing differences in the importance of accounting information to auditor characteristics when they are in fact due to firm size effects. To allow for this, we create a sample of firms audited by large auditors matched on the basis of the probability of selecting a large auditor generated by a probit model, where the choice is a function of (the natural log of) market value. To do this, we use the propensity score matching (psmatch2) routine in Stata to obtain the probabilities of selecting a large auditor (conditioned on firm size) and to find a firm in the large auditor sample with a probability of selecting a large auditor closest to that for the small auditor sample for each individual firm. This produces a sample of 676 companies audited by large auditors where the firms are of a very similar size to the 676 companies in the small auditor sample.
As can be seen in Panel D of Table 1, the distributions of the size variables for the two samples after matching are very similar (and do not differ significantly at p < 0.05) with means of £616m for the small auditor sample and £617m for the large auditor sample.

4. Results

(i) Main variance decomposition results

Our main variance decomposition results are presented in Tables 2 and 3. Table 2 shows the results relating to hypotheses H1 – H3, while Table 3 reports results of tests of hypotheses H4 – H5 for differences between large and small auditors, both with and without matching on the basis of firm size.

Insert Table 2 about here

The VAR coefficient matrix \( \Gamma \), contained in Panel A of Table 2, includes estimates broadly in line with those reported in Callen and Segal (2004), which are based on US firms. The persistence parameter for returns is low and insignificant, whereas lagged values of the book to market ratio are the most important determinants of the current book to market ratio. Furthermore, returns are high when the book to market ratio is high, and interestingly, while the persistence parameter for cash flows of 0.301 is statistically significant and of a similar magnitude to that reported in Callen and Segal (2004) of 0.351 for the same model, accruals are less persistent (persistence parameter of 0.179), contrasting with a corresponding estimate of 0.352 for US firms. The lower persistence of accruals is, however, in line with Sloan (1996).

Although the persistence parameters are a contributory factor to the variance decomposition, it is difficult to predict the effect of individual persistence parameters since, as shown in equation (8) above, the \( \lambda_k \) vectors are a highly non-linear function of the coefficient matrix \( \Gamma \). The main variance decomposition results are presented in Table 3 Panel B and
they indicate that the variance of return news (variance of 0.032) is slightly higher than the US estimate of 0.028 of Callen and Segal (2004), though the total variance is higher. We observe significant differences when we focus on the absolute and relative magnitude of cash flow variances however. First, the accruals news variance of 0.256 is statistically significant at $p < 0.01$; hypothesis H1 is therefore rejected. Table 2 also reveals that cash flow news (with a variance of 0.549) is statistically significant at $p < 0.01$ in driving unexpected current equity returns, so hypothesis H2 is also rejected. Overall, therefore, both earnings components are significant drivers of UK equity returns.\(^9\)

Turning to the relative magnitude of accruals and cash flows, hypothesis H3 posits that there is no difference in the variance contribution to unexpected returns between cash flows and accruals: the results in Table 3 imply a rejection of this hypothesis, since the difference between the variance contributions of cash flows news and accruals news of 0.292 is significant at $p < 0.01$. In summary, therefore, our results share some similarities with the US findings of Callen and Segal (2004) in that all variances (i.e., return news, cash flow news and earnings news) are statistically significant, while the variances of both earnings components dominate the return news variance by a large margin. The main difference is that the variance of cash flow news is significantly higher than for accruals news. Our results also contrast with early UK research based on ERCs which suggests that cash flow plays a less influential role (e.g. Board and Day, 1989). They are, however, in line with more recent research showing cash flows to be superior to accruals in forecasting future cash flows (Al-Attar and Hussain, 2004) and with the reports in the UK literature (e.g. Imam et al., 2008) that UK investors prefer multi-period cash flow models to earnings-based models.

\(^9\) Note that we use the ‘direct’ way of estimating accruals news and cash flow news. As Callen and Segal (2004) and Callen (2009) note, it is also possible to estimate these statistics using an alternative (residual) formulation, yielding results that are theoretically (but not necessarily empirically) equivalent to (7). We use the ‘direct’ approach since Chen and Zhao (2009) demonstrate that the residual formulation may inherit large model misspecification errors.
Insert Table 3 about here

(ii) The impact of auditor quality

In Table 3, the results for the variance decomposition for sub-samples created on the basis of auditor type are presented – both matched and unmatched – in order to test hypotheses H4 and H5. Interestingly, there are noteworthy differences between the coefficients in the $\Gamma$ matrices for clients of small auditors and large auditors. For instance, the persistence parameter for cash flows for small auditor clients of 0.409 is around twice that for large auditor clients, yet the persistence parameters for accruals are higher for large auditor clients (only marginally higher for the matched sample). The latter result is consistent with higher quality accruals found in prior empirical research (e.g. Caramanis and Lennox, 2008).

Turning to the main variance decomposition results, the influence of returns news of the large and small auditees appears similar (0.041 for small audit clients and 0.030 and 0.049 for unmatched and size matched large audit clients respectively), though it is only statistically significant (at the 0.01 level) for large audit firms. In respect of hypotheses H4 and H5, however, we observe significant differences in the variance contributions of both accruals and cash flow between small auditor and large auditor clients, though the matching procedure clearly affects the magnitude of the estimated variance contributions for the large auditor sample.

First, in respect of hypothesis H4, the variance contribution of accruals is significantly higher for large auditor clients, with estimates of 0.306 and 0.203 for unmatched and size-matched samples respectively, compared to 0.105 for small auditor clients (all accruals variances are significant at the 0.01 level). Accruals for clients of higher quality auditors are thus almost twice or three times (depending on whether samples are size matched) as influential upon returns. These results are inconsistent with hypothesis H4, and we reject this hypothesis at the 0.05 level for size-matched firms and at the 0.01 level for unmatched firms.
There is also evidence in Table 3 that cash flow news is also more influential for clients of large auditors. The large auditor (unmatched) sample has a variance of cash flow news (0.616) over twice that of the small auditor sample (0.273). Even though this difference falls when the large and small auditor groups are of similar size, the cash flow news variance of 0.343 for large auditor clients is still considerably higher than for small auditor clients, it is not significantly different. We are able to reject hypothesis H5 only for unmatched firms, though we recognise the likelihood that the difference is attributable to differences in the firms themselves, rather than the auditor characteristics.

In summary, to the extent that accruals and cash flow news is more important for large auditors than small auditors, our findings are broadly supportive of those provided by standard regression-based techniques by Teoh and Wong (1993) for the US and by Gul et al. (2003) for the Shanghai Stock Exchange, who also find that large auditors are associated with higher earnings response coefficients. The finding that only the accruals component of earnings differs significantly across the two samples is worthy of further discussion. The arguments for differences in the returns/earnings relationships in prior literature centre on the earnings numbers more accurately reflecting the true economic activities and performance of the firm; yet there is widespread recognition that the accruals components of earnings are more susceptible to manipulation than cash flows (e.g. Dechow, 1994). It is perhaps to be expected, therefore, that the impact of auditor quality could manifest itself through differing effects on the two earnings components.

5. Discussion and Conclusions

Based on a sample of UK listed companies, this study examines the importance of accruals and cash flow news in driving equity returns, with particular emphasis on the role of auditor size as a proxy for audit quality. In contrast to early UK-based research, news about cash
flows seem relatively more important than accruals in explaining equity returns. In this context, our results are supportive of recent survey and behavioural research into the valuation models used by UK investors which finds that cash flow models have been gaining influence over time relative to earnings-based models (e.g. Imam et al., 2008) and with improvements to the quality of cash flow reporting following on from FRS 1 (Al-Attar and Hussain, 2004). Our results are in part consistent with the recent US-based evidence of Callen and Segal (2004) who are responsible for developing the log-linear model on which our analysis is based (i.e., accruals and cash flow news are both important), yet there are some important differences, particularly that the cash flow component of earnings is more significant than the accruals component. While it is not possible to be certain about the causes of differences between the UK and the US, they may be attributable to the fact that Callen and Segal’s sample spans several different cash flow reporting regimes (their data ranged from 1962-2000), or to more emphasis being placed on cash flow valuation models in the UK than in the US. Consistent with the latter, in a survey of US financial analysts, Block (1999) finds that earnings are ranked as more important than cash flow as a valuation input. Finally, they may be due to differences in the properties of earnings. There is considerable evidence indicating that these apparently similar accounting regimes can produce differences in the accounting/market relationships (e.g. Strong, 1993; Pope and Walker, 1999; and Soares and Stark, 2009). Further research will be necessary to examine the extent to which these relationships are affected by international boundaries and by the respective accounting system/standards used to generate the earnings components.

We also find that auditor type plays an important role in moderating the relationships between equity returns and accounting information. In particular, variances of both cash flow news and accruals news are more influential drivers of returns for clients of large auditors. Since it is highly likely that the differences in our samples are partially attributable to
different characteristics of the firms, as well as auditor effects, we also examine the relationships between cash flow and earnings and returns for similar sized firms. Although firm size plays an important role, the variance of accruals components are statistically larger for clients of large auditors than small auditors.

We note that although the variance decomposition approach has significant advantages over the standard linear regression methodology – particularly by allowing for inter-temporal variation in discount rates – it is not without its limitations. First, the VAR approach constrains the choice of auditor quality measure by requiring stability over time in the chosen measure. Nevertheless, the classification we use has also been found to be a reliable proxy for audit quality. Second, because it is a multivariate time-series approach, we are only able to provide evidence up to 2005 due to the change to IFRS in this year. It will therefore be of interest in the future to examine whether and how these relationships have changed as a result of the introduction of IFRS in general and IAS 7 Statement of Cash Flows in particular.
References


<table>
<thead>
<tr>
<th>Table 1</th>
<th>Descriptive Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A: Full sample (n = 3,646)</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>Annual return</td>
<td>0.158</td>
</tr>
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<td>Log excess returns ($r_t$)</td>
<td>-0.047</td>
</tr>
<tr>
<td>Cash flow (ocft)</td>
<td>0.255</td>
</tr>
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<td>Accruals (accrt)</td>
<td>-0.222</td>
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<td>Book/market ratio</td>
<td>0.816</td>
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<td>Market value (£ million)</td>
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<td><strong>Panel B: Small auditor sample (n = 676)</strong></td>
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</tr>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>Annual return</td>
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</tr>
<tr>
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<td>Cash flow (ocft)</td>
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</tr>
<tr>
<td>Accruals (accrt)</td>
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</tr>
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<td><strong>Panel C: Large auditor sample (n = 2,970)</strong></td>
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<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>Annual return</td>
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<td>Cash flow (ocft)</td>
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</tr>
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<td>Accruals (accrt)</td>
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<tr>
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<tr>
<td><strong>Panel D: Size-matched large auditor sample (n = 676)</strong></td>
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<tr>
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<td>Mean</td>
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<tr>
<td>Log excess returns ($r_t$)</td>
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<tr>
<td>Cash flow (ocft)</td>
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<tr>
<td>Accruals (accrt)</td>
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<td>Book/market ratio</td>
<td>1.070</td>
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<td>Market value (£ million)</td>
<td>617</td>
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**Notes**

Data are for UK firms from 1996-2004 using Datastream (including dead company files) for returns data and FAME for accounting data.

Log excess returns are based on annual returns for the period ended three months after the year end less the risk free rate.

Cash flow is cash flow from operations (from the cash flow statement) scaled by opening book value.

Accruals are defined as profit minus cash flow from operations, scaled by opening book value.

Large auditor is a binary variable taking a value of 1 if the firm is audited by a big 5/big 4 auditor, 0 otherwise.

All variables are winsorised at the 1st and 99th percentiles.
Table 2
Variance decomposition results for total sample (n = 3,646)

Panel A: VAR coefficient matrix $\Gamma$

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<tr>
<th></th>
<th>$r_{t-1}$</th>
<th>$ocf_{t-1}$</th>
<th>$accr_{t-1}$</th>
<th>$bm_{t-1}$</th>
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<tr>
<td>$r_t$</td>
<td>0.009</td>
<td>0.075*</td>
<td>-0.003</td>
<td>0.103**</td>
</tr>
<tr>
<td></td>
<td>(0.076)</td>
<td>(0.034)</td>
<td>(0.040)</td>
<td>(0.018)</td>
</tr>
<tr>
<td>$ocf_{t-1}$</td>
<td>0.001</td>
<td>0.301**</td>
<td>0.062</td>
<td>-0.152**</td>
</tr>
<tr>
<td></td>
<td>(0.026)</td>
<td>(0.043)</td>
<td>(0.039)</td>
<td>(0.015)</td>
</tr>
<tr>
<td>$accr_{t-1}$</td>
<td>0.089**</td>
<td>0.002</td>
<td>0.179**</td>
<td>0.104**</td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
<td>(0.028)</td>
<td>(0.030)</td>
<td>(0.010)</td>
</tr>
<tr>
<td>$bm_t$</td>
<td>-0.151**</td>
<td>0.021</td>
<td>0.165*</td>
<td>0.726**</td>
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<td>(0.055)</td>
<td>(0.049)</td>
<td>(0.066)</td>
<td>(0.014)</td>
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Panel B: Variance decomposition

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<th></th>
<th>$\text{Var}(N_{r,t})$</th>
<th>$\text{Var}(N_{ocf,t})$</th>
<th>$\text{Var}(N_{accr,t})$</th>
<th>$\text{Diff}(N_{ocf,t}, N_{accr,t})$</th>
<th>$\text{Var}(N_{total})$</th>
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<td>0.032**</td>
<td>0.549**</td>
<td>0.256**</td>
<td>0.292**</td>
<td>2.144</td>
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<td></td>
<td>(0.010)</td>
<td>(0.075)</td>
<td>(0.026)</td>
<td>(0.057)</td>
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<td></td>
<td>$\text{Cov}(N_{r,t}, N_{ocf,t})$</td>
<td>$\text{Cov}(N_{r,t}, N_{accr,t})$</td>
<td>$\text{Cov}(N_{ocf,t}, N_{accr,t})$</td>
<td>$\text{Var}(N_{total})$</td>
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<tr>
<td></td>
<td>-0.061**</td>
<td>0.039**</td>
<td>-0.286**</td>
<td>0.309</td>
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<tr>
<td></td>
<td>(0.015)</td>
<td>(0.010)</td>
<td>(0.041)</td>
<td></td>
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</table>

Notes
* *, ** indicate statistical significance at the 0.05 and 0.01 level, respectively.
Shao and Rao (1993) jackknife standard errors are in parentheses.
Data are for UK firms from 1996-2004 using Datastream (including dead company files) for returns data and FAME for accounting data.
Log excess returns $r_t$ are based on annual returns for the period ended three months after the year end, net of the risk free rate.
Cash flow $ocf_t$ is cash flow from operations (from cash flow statement) scaled by opening book value.
Accruals $accr_t$ are defined as profit minus cash flow from operations scaled by opening book value.
$bm_t$ is the log book to market ratio.
All variables are mean-adjusted.
Table 3
Variance Decomposition for Large and Small Auditor Samples

Panel A: VAR Coefficient Matrix Estimates $\Gamma$

<table>
<thead>
<tr>
<th></th>
<th>Small auditors $(n = 676)$</th>
<th></th>
<th>Large auditors $(n = 2,970)$</th>
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<th>Size-matched large auditors $(n = 676)$</th>
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<tr>
<td></td>
<td>$r_{t-1}$</td>
<td>ocf$_{t-1}$</td>
<td>accr$_{t-1}$</td>
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<td>$r_{t}$</td>
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<td>0.011</td>
<td>0.111**</td>
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<td>(0.092)</td>
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<td>ocf$_{t}$</td>
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<td>0.409**</td>
<td>0.165**</td>
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<td>-0.001</td>
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<td>(0.068)</td>
<td>(0.062)</td>
<td>(0.027)</td>
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<tr>
<td>accr$_{t}$</td>
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<td>-0.001</td>
<td>0.094</td>
<td>0.042*</td>
<td>0.103**</td>
</tr>
<tr>
<td>(0.024)</td>
<td>(0.065)</td>
<td>(0.077)</td>
<td>(0.020)</td>
<td></td>
<td>(0.016)</td>
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<td>bm$_{t}$</td>
<td>-0.167**</td>
<td>-0.173</td>
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<td>0.717**</td>
<td>-0.150*</td>
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<td>(0.061)</td>
<td>(0.160)</td>
<td>(0.183)</td>
<td>(0.033)</td>
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Panel B: Variance Decomposition Results

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<th>Var( $N_{ocf}$ )</th>
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<th>Var( $N_{accr}$ )</th>
<th>Var( $N_{bm}$ )</th>
<th>Var( $N_r$ )</th>
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<td></td>
<td>0.041</td>
<td>0.273**</td>
<td>0.105**</td>
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<td>0.030**</td>
<td>0.616**</td>
<td>0.306**</td>
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<td>0.049*</td>
<td>0.343**</td>
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<td></td>
<td>(0.022)</td>
<td>(0.052)</td>
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<td>(0.009)</td>
<td>(0.089)</td>
<td>(0.035)</td>
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<td>(0.080)</td>
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<td>0.168**</td>
<td>2.600</td>
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<td>0.310**</td>
<td>2.013</td>
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<td>0.016</td>
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<td>-0.0069**</td>
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<td>(0.023)</td>
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Notes:
* ** indicate statistical significance at the 0.05 and 0.01 level, respectively.
** ** indicate significant differences between large and small auditors at 0.05 and 0.01 level, respectively.
Shao and Rao (1993) jackknife standard errors are in parentheses.
Data are for UK firms from 1996-2004 using Datastream (including dead company files) for returns data and FAME for accounting data.
Variables are mean adjusted and defined as in Table 2.