Do Analysts Disclose Cash Flow Forecasts with Earnings Estimates when Earnings Quality is Low?

PAWEL BILINSKI*

Abstract: Cash flows are incrementally useful to earnings in security valuation mainly when earnings quality is low. This suggests that when earnings quality decreases, analysts will be more likely to supplement their earnings forecasts with cash flow estimates. Contrary to this prediction, we find that analysts do not disclose cash flow forecasts when the quality of earnings is low. This is because cash flow forecast accuracy depends on the accuracy of the accrual estimates and the precision of accrual forecasts decreases for firms with low quality earnings. Consequently, as earnings quality decreases, cash flow forecasts become increasingly inaccurate compared to earnings estimates. Cash flow estimates that lack reliability are not useful to investors and, consequently, unlikely to be reported by analysts. This result provides an explanation for why analysts are less likely to report cash flow estimates when earnings quality is low.

Keywords: earnings quality, analyst earnings and cash flow forecasts, cash flow forecast accuracy, price reaction to earnings and cash flow forecast announcements

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Address for correspondence: Pawel Bilinski, Cass Business School, City University London, UK.
e-mail: pawel.bilinski.1@city.ac.uk

1. INTRODUCTION

Over the past decade, analysts have started supplementing their earnings forecasts with cash flow estimates.[1] However, we know little about what determines analysts' choice to report cash flow forecasts with earnings-per-share (EPS) estimates to I/B/E/S, and in particular, the effect earnings quality has on this decision. To date, only DeFond and Hung (2003) have examined analysts' propensity to disclose cash flow forecasts via I/B/E/S.[2] DeFond and Hung report that analysts publish cash flow forecasts when absolute total accruals are high, which they attribute to higher investor demand for cash flow forecasts to help interpret the information contained in earnings when earnings quality is low. Their results are consistent with the notion that cash flows are incrementally useful to earnings in security valuation mainly when earnings quality is low (Ali, 1994; Dechow, 1994; Penman, 2009).

While DeFond and Hung (2003) examine why analysts report cash flow forecasts from the demand side perspective, we consider the supply side explanation. Specifically, DeFond and Hung's "demand hypothesis" ignores the fact that cash flow forecasts are useful only if they are of sufficient quality relative to earnings estimates. We propose that the relative accuracy of cash flow forecasts compared to earnings estimates depends on the accuracy of accrual estimates and that the precision of accrual forecasts reduces for firms with low earnings quality. As cash flow forecasts become increasingly inaccurate compared to earnings estimates when earnings quality is low, their usefulness to investors decreases, which negatively affects analysts' propensity to supply cash flow estimates. Further, issuing inaccurate cash flow estimates can be damaging to the analyst's reputation as investors can perceive the estimates' low quality as a signal of low

[1] The proportion of earnings forecasts accompanied by cash flow estimates in our sample increases from 6.1% over 2000–2003 to 11.6% over 2006–2008.

[2] As in DeFond and Hung (2003), we focus on the analysts' decision to disclose their earnings and cash flow forecasts to I/B/E/S. I/B/E/S forecasts are available to vast investor groups, including important institutional investors. Further, I/B/E/S forecasts are likely to be closely monitored by investors as access to I/B/E/S reduces information search and processing costs for investors as it provides comparable cash flow estimates from a large analyst pool (Ertimur et al. 2011).

analyst quality.[3] In equilibrium, the frequency of cash flow forecast issuance will depend on both investor demand for this forecast and analyst ability to produce quality cash flow estimates.

To examine the effect earnings quality has on analysts' propensity to jointly issue cash flow and earnings forecasts, we use all one-year-ahead annual EPS estimates and the accompanying cash flow forecasts for US firms over the fiscal years 2000–2008.[4] Of the 537,766 individual analyst EPS forecasts in our sample, 9.3% are supplemented by cash flow estimates. Our analysis proceeds in two steps. First, we study the relation between a proxy for earnings quality and the likelihood that an analyst will report a cash flow forecast with the earnings estimate. Second, we examine whether low earnings quality increases the error of analysts' accrual estimates. Low accuracy of accrual estimates, and consequently of cash flow forecasts, when earnings quality decreases can help explain why analysts' propensity to report cash flow estimates decreases when earnings quality is low.

In examining the relation between earnings quality and the analyst propensity to jointly issue cash flow and earnings forecasts, we follow previous literature (e.g. Johnson et al., 2002; Francis et al., 2005; Elliott et al., 2010) and use the variation in discretionary current accruals (McNichols, 2002) as our main earnings quality measure. We find that compared to stand-alone EPS forecasts, the variation in current discretionary accruals is 41% lower when analysts issue cash flow estimates together with EPS forecasts. Multivariate logistic regressions indicate that analysts' propensity to supplement EPS forecasts with cash flow estimates decreases as the variation in discretionary current accruals increases. This result is consistent with the prediction that analysts are unlikely to disclose their cash flow forecasts when earnings quality is low.

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[3] Ertimur et al. (2011) use the intuition that issuing inaccurate revenue forecasts damages the analyst's reputation to examine when analysts disclose their revenue estimates with earnings forecasts.

[4] We focus on earnings quality because (1) previous studies document that cash flows are incrementally useful to earnings in security valuation mainly when earnings quality is low (Ali, 1994; Dechow, 1994; Penman, 2009), (2) DeFond and Hung (2003) argue that analysts issue more cash flow estimates when earnings quality is low, and (3) low earnings quality is likely to negatively affect analysts' ability to accurately forecast accruals, thus reducing cash flow forecast accuracy and consequently the usefulness of cash flow estimates to investors. Low accuracy of cash flow forecasts when earnings quality decreases can help explain why analysts' propensity to report cash flow estimates decreases for firms with low earnings quality.

Our conclusion that analysts are less likely to jointly report cash flow and earnings forecasts when earnings quality is low is robust to a battery of sensitivity tests. The conclusion is unchanged when we consider a number of alternative proxies for earnings quality, including the variation in current accruals and in total accruals, the magnitude of discretionary and innate current accruals, and the variation in total discretionary accruals from the Jones model (Jones, 1991). We find that our results are not attributable to the management earnings guidance, and annual regressions indicate that our results are not confined to specific time periods within our sample period. Our conclusion remains unchanged when we use the Fama–MacBeth approach and random sample selection as alternative controls for inflated *t*-statistics due to the time-series correlation of analyst forecasts (all our regressions use dual clustering of standard errors to control for cross-sectional and time-series dependence of observations, Petersen, 2009). Finally, using the Cox (1972) survival model, we also document that low earnings quality increases the duration between cash flow forecast revisions. Together, our evidence suggests that earnings quality affects both the analysts' decision to supply cash flow forecasts and the duration between cash flow forecast revisions.

In further tests, we also confirm that our results are not driven by the recursive effect that the issuance of a cash flow forecast can have on earnings quality. Cash flow forecasts allow investors to disaggregate earnings into cash flow and accrual components. Disaggregation can increase the cost of accrual management in the presence of cash flow forecasts (McInnis and Collins, 2011), which can have a positive effect on earnings quality. As a result, high earnings quality in the presence of cash flow forecasts can reflect changes in firm reporting induced by the issuance of cash flow forecasts. Using instrumental variables regressions and regressions where we measure earnings quality before analysts start producing cash flow forecasts leave our inferences intact, which corroborates our main conclusions.

As part of the robustness analysis, we address DeFond and Hung's (2003) evidence. They report a positive relation between the absolute magnitude of total accruals and the likelihood that the analyst will disclose the cash flow forecast with the earnings estimate. This result is particularly important because studies commonly rely on DeFond and Hung's (2003) finding as evidence that analysts supply more cash flow forecasts when earnings quality is low.[5] Consistent with DeFond and Hung (2003), we find that analysts' propensity to jointly issue cash flow and earnings forecasts has a positive association with absolute total accruals. However, when we use signed total accruals, signed current accruals, and the variation in total and in current accruals, we find results consistent with our prediction that low earnings quality reduces analysts' propensity to report cash flow forecasts with earnings estimates.

We attribute the discrepancy between our results and those of DeFond and Hung (2003) to their choice to use absolute total accruals as the earnings quality measure. First, the earnings quality measure that we use recognizes that quality of accruals and, consequently, of earnings is decreasing in the magnitude of accruals estimation errors, not necessarily in the magnitude of accruals (Dechow and Dichev, 2002). Consequently, accruals estimation errors have better theoretical and empirical motivation as the earnings quality measure than absolute total accruals. Second, absolute total accruals include current and non-current accruals. Current accruals have lower persistence than non-current accruals, which means that (1) the magnitude and variation in current accruals and (2) the magnitude and variation in discretionary current accruals better reflect the difficulty analysts face forecasting one-year-ahead cash flows. Using earnings quality proxies constructed from current accruals and discretionary current accruals, we find a positive association between earnings quality and analysts' propensity to jointly issue cash flow and earnings forecasts in all cases we investigate.

To provide insights on why analysts do not issue cash flow forecasts when earnings quality is low, our second set of tests examines the relation between earnings quality and analysts' accrual forecast errors. We perform these tests because cash flow forecast accuracy depends on

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[5] For example, Givoly et al. (2009, p. 1879–1880) interpret DeFond and Hung's (2003) finding as evidence "consistent with the notion that analysts have provided more cash flow forecasts in recent years in response to demand by investors who are increasingly concerned about the inherent shortcomings of accrual accounting, such as its subjective nature and its susceptibility to earnings management.".

the accuracy of analyst accruals estimates.[6] A negative relation between earnings quality and accrual forecast errors provides insights about why the accuracy of cash flow forecasts reduces when earnings quality is low, which can explain the negative relation between low earnings quality and analyst propensity to issue cash flow estimates. The mean accrual forecast error is 1.33% of the stock price and together with the mean EPS forecast error of 1.26% explains the average cash flow forecast error of 2.59%. Multivariate regression analysis confirms that accrual forecast errors increase with the variation in current discretionary accruals, consistent with analysts facing a more challenging task forecasting accruals when earnings quality is low. Further, we find that controlling for earnings forecast accuracy, cash flow forecast errors increase for firms with low earnings quality. These results provide evidence consistent with the notion that cash flow forecasts become increasingly inaccurate compared to EPS estimates as earnings quality decreases, which helps explain analysts' lower propensity to report cash flow estimates when earnings quality is low.

Since cash flow forecasts are issued when accruals are relatively easy to predict, investors may find cash flow forecasts of little use in assessing the quality of firm earnings and in valuation. To test this prediction, we examine the price reaction to joint cash flow and earnings forecast announcements. We find no evidence that investors use cash flow estimates to interpret the information contained in analyst earnings forecasts. This evidence is consistent with the proposition that the context in which analysts issue cash flow forecasts, i.e. when earnings quality is high, makes them of little use in assessing the quality of firm earnings and in valuation.

If cash flow forecasts had no economic value, we would not observe them. This study identifies two main factors other than earnings quality that explain why analysts disclose cash flow forecasts with earnings estimates. First, we find that more reputable analysts are more likely to issue cash flow forecasts. This suggests that more reputable analysts may use cash flow

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[6] The evidence in Givoly et al. (2009), Call et al. (2009) and Call et al. (2013a) suggests that analysts adjust their earnings estimate for various accruals components, such as changes in working capital, to arrive at cash flow forecasts. This means that the accuracy of cash flow forecasts compared to earnings estimates depends on the accuracy of accrual estimates.

forecasts to signal their quality to investors and maintain their reputation.[7] Further, we find that analysts are more likely to issue cash flow forecasts for firms in financial distress. This finding is consistent with cash flow forecasts aiding investors in assessing firm's liquidity and solvency when distress risk is high.

This paper contributes to the literature in three major ways. First, it adds to the emerging literature that examines the analyst choice to issue forecasts of other accounting measures, such as cash flow, to complement earnings estimates. The endogeneity in the analyst choice to report a cash flow forecast has received limited research attention to date. The only other study in the area, DeFond and Hung (2003), reports conflicting evidence, which we find is due to their choice of the accrual measure.

Second, the results have important implications for studies on the usefulness of cash flow forecasts in security valuation and on the use of cash flow forecasts as a measure of firm accruals. In particular, Givoly et al. (2009, p. 1877) report that "estimating expected accruals as the difference between analysts' earnings forecasts and their cash flow forecasts does not result in a better detection of earnings management than achieved by commonly used accrual models". This result is not surprising as we report evidence suggesting that analysts do not issue cash flow forecasts when low earnings quality may conceal earnings management. Further, this study helps explain the Call et al.'s (2009) results. They find that analyst earnings forecasts are more accurate when accompanied by cash flow estimates. Call et al. (2009) argue that analysts who produce cash flow forecasts adopt a more structured approach to forecasting that imposes greater discipline on the earnings forecasting process, which leads to higher earnings forecast accuracy. We find that analysts report cash flow forecasts when earnings are of high quality. This evidence suggests that earnings forecasts issued with cash flow estimates will be of high quality considering the positive relation between EPS forecast accuracy and earnings quality in Bradshaw et al. (2001), Hughes et al. (2008) and Bilinski and Eames (2012).

[7] Maintaining reputation with investors is important for analyst remuneration and career outcomes (Hong and Kubik, 2003; Leone and Wu, 2007)

2. PREVIOUS LITERATURE

Earnings are considered a better aggregate indicator of firm periodic performance than other accounting numbers, such as cash flow (Hopwood and McKeown, 1985; Hoskin et al., 1986; Dechow, 1994; Easton et al., 1992; Beyer et al., 2010). This is because accrual accounting alters the timing of cash flow recognition, mitigating the timing and matching problems of cash flows. However, accruals are based on assumptions and estimates and are subject to managerial discretion, which can lead to earnings manipulation. Intentional and unintentional accrual estimation errors lower the usefulness of earnings as a performance measure (Francis and Krishnan 1999; Palepu et al., 2000; Dechow and Dichev, 2002). As a result, low earnings quality may influence investor demand for forecasts of earnings components, such as cash flows, to complement earnings estimates.[8] If analysts are able to accurately forecast accruals, and consequently cash flows, their cash flow estimates can aid investors in firm valuation and in assessing earnings quality. This section reviews previous evidence on the determinants of the analyst choice to issue cash flow forecasts.

(*i*) *Determinants of the choice to issue cash flow forecasts*

Compared to cash flows, earnings are subject to the revenue recognition principle and the matching principle, which make earnings a better measure of firm periodic performance. Consistent with this prediction, Bowen et al. (1987), Wilson (1987) and Dechow (1994) show a higher association between returns and earnings than between returns and cash flows over quarterly and annual reporting periods.

DeFond and Hung (2003) argue that managers have lower discretion to influence cash flows than accruals, which makes cash flow forecasts useful in assessing the information content of earnings. DeFond and Hung (2003) find that the likelihood an analyst will report a cash flow forecast with the EPS estimate increases for firms with large absolute total accruals, controlling

[8] This links our paper with studies that examine the usefulness of information in earnings components (Stark, 1997; Subramanyam and Venkatachalam, 2007; Kumar and Krishnan, 2008).

for firm accounting discretion, investment policy, income volatility, and poor financial health. However, absolute total accruals are a poor proxy for earnings quality (Hribar and Nichols, 2007; Dechow et al., 2010), which means that DeFond and Hung's (2003) results are likely to be sensitive to their choice of the earnings quality measure.[9]

Building on DeFond and Hung's (2003) evidence, a number of studies have explored the market implications of analysts disclosing their cash flow forecasts. Call et al. (2009) find that analysts produce more accurate earnings forecasts when they are complemented by cash flow estimates. They argue that analysts producing cash flow forecasts adopt a more structured approach to forecasting that imposes a greater discipline on the earnings forecasting process, which explains the higher accuracy of earnings forecasts issued with cash flow estimates. Other studies in this area analyze the conditions when firms choose to meet either cash flow or earnings expectations (Brown et al., 2008), and investors' reaction to firms beating analyst cash flow expectations (Zhang, 2008).

Givoly et al. (2009) examine the sophistication of analyst cash flow forecasts and their accuracy relative to the accuracy of analyst earnings forecasts. They find that cash flow forecasts are less accurate, more biased and less frequently revised during the forecast period than earnings forecasts. Givoly et al. report that cash flow forecasts appear to be naïve extensions of analysts' earnings forecasts that can be easily replicated by investors by adding back the depreciation and amortization expenses to analysts' earnings forecast. Further, they document that cash flow forecasts provide limited information on expected changes in working capital and that estimates of expected accruals obtained from earnings and cash flow forecasts work equally well as other commonly used accrual models. Finally, they find evidence suggesting that cash flows only weakly associate with annual stock returns, thus do not appear to be a good surrogate for the unobservable market expectation of cash flows. Givoly et al. conclude that DeFond and Hung's

[9] We address the evidence in DeFond and Hung (2003) in detail in Section 7.

(2003) "demand hypothesis" may have limited use in explaining analysts' propensity to produce cash flow estimates.

Contrary to Givoly et al.'s (2009) results, Call et al. (2013a) argue that cash flow forecasts include meaningful and useful accrual adjustments to analyst earnings estimates. Their main tests rely on the analysis of 90 full-text analyst reports. They find that the majority of cash flow forecasts in the research reports include explicit adjustments for working capital and other accruals. Further, they report that tests that compare the accuracy of analyst cash flow forecasts with time-series cash flow estimates produce evidence supporting the superiority of the former. Finally, they document a significant price reaction to cash flow forecast revisions controlling for earnings forecast revisions. Call et al. (2013a) conclude that cash flow forecasts are useful to investors in the investment decision process.[10]

Prior research indicates lack of consensus on the role that cash flow forecasts play in security valuation and in aiding investors in assessing earnings quality. We contribute to this literature by specifically examining if analysts produce cash flow forecasts when earnings quality is low. Our findings have direct implications for studies that examine cash flow forecast properties, such as sophistication and value-relevance, and for studies that examine the capital markets implications of cash flow forecast issuance, such as studies that use cash flow and earnings forecasts to capture investor accrual expectations or to identify firms that are more likely to engage in earnings management.

(*ii*) *The relation between earnings quality and analyst disclosure of cash flow forecasts with earnings estimates*

DeFond and Hung (2003) study only the demand side explanation for the issuance of analyst cash flow forecasts. This study also examines the supply side explanation for the joint earnings and cash flow forecast reporting. Specifically, we propose that the relative accuracy of cash flow

[10] A rebuttal study by Givoly et al. (2013) argues that results in Call et al. (2013a) arise because of their use of inappropriate and contradictory tests. Call et al. (2013b) response to Givoly et al. (2013) highlights that differences in assumptions on how analysts arrive at cash flow forecasts lead to different choices of empirical tests, which explains the discrepancy in conclusions of Call et al. (2013a) compared to Givoly et al. (2009).

forecasts compared to earnings estimates depends on analysts' ability to accurately estimate accruals. Forecasting accruals should be more challenging if earnings quality is low, which reduces the accuracy of accrual estimates.[11] If cash flow forecasts become increasingly inaccurate compared to earnings estimates as earnings quality decreases, they become less useful to investors in appraising earnings quality and in firm valuation. Further, inaccurate cash flow estimates can damage analyst reputation. As a result, analyst propensity to disclose cash flow forecasts should reduce when earnings quality is low.

3. RESEARCH DESIGN

(*i*) *Measures of earnings quality*

We follow prior research (e.g. Johnson et al., 2002; Francis et al., 2005; Elliott et al., 2010; Bhattacharya et al., 2012; Ecker et al., 2010) and use the variation in discretionary current accruals to measure earnings quality.[12] This measure captures the intuition that quality of accruals and, consequently, of earnings is decreasing in the magnitude of accruals estimation errors. We use the residuals from the McNichols (2002) extension of the Dechow and Dichev (2002) current accruals model to capture discretionary accruals.[13] McNichols's (2002) current accruals model takes the form:

$$CA_{it} = \beta_0 + \beta_1 CFO_{it-1} + \beta_2 CFO_{it} + \beta_3 CFO_{it+1} + \beta_4 \Delta REV_{it} + \beta_5 PPE_{it} + u_{it} \quad (1)$$

where CA_{it} stands for current accruals for firm *i* in year *t*, defined as the change in current assets, less change in cash, less change in current liabilities plus the change in debt in current liabilities. *CFO* is cash flow from operations. The first four components of model (1) form the Dechow and Dichev (2002) model. McNichols' (2002) extension of the Dechow and Dichev (2002) model includes in the current accruals model the gross value of property plant and equipment,

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[11] To illustrate, low earnings quality means that past financial statements are less helpful in forecasting accruals, increasing the difficulty analysts face to accurately estimate current period accruals.

[12] For an in-depth discussion of earnings quality measures, we refer the reader to a number of comprehensive review papers including Dechow et al. (2010), Francis et al. (2006), Lo (2008), Dechow and Schrand (2004), Imhoff (2003), Penman (2003), Nelson et al. (2003), Schipper and Vincent (2003).

[13] The predicted values from the accrual model capture non-discretionary (normal) accruals originating from company operations.

PPE, and changes in firm sales, *ΔREV*. Including *PPE* and *ΔREV* decreases the measurement error and improves the model's explanatory power (McNichols, 2002; Francis et al., 2005). All variables are scaled by average total assets for the current and the previous fiscal year.

The model residuals, u_{it}, measure discretionary current accruals. The current period earnings quality is the standard deviation of the model's residuals for years $t-3$ to t, M_CAQ=STD(u_{it}). Large variation in discretionary accruals means poor mapping of accruals into cash flows, indicating high accruals estimation errors. High accruals estimation errors suggest low current accruals quality and consequently low earnings quality. *M_CAQ* is our main proxy for earnings quality. We estimate model (1) annually for each 2-digit SIC industry with a minimum of 20 firms.

(ii) Predicting the analyst decision to jointly report cash flow and earnings forecasts

We use a multivariate logit model to explain the analyst choice to jointly report cash flow and earnings estimates and the basic model setup is:

$$Pr\left(DCF_{ijt}\right) = \beta_0 + \Phi Demand\ factors + \Pi Supply\ factors + e_{it} \tag{2}$$

where DCF_{ijt} is an indicator variable that takes a value of one if an earnings forecast by analyst *j* for firm *i* issued at time *t* is supplemented by a cash flow forecast, and is zero otherwise. *Demand factors* is a vector of characteristics predicting investor demand for analyst cash flow forecasts and *Supply factors* is a vector of characteristics predicting analyst supply of cash flow forecasts. e_{it} is the error term. Earnings quality is likely to affect both investor demand for cash flow forecasts and analyst supply of cash flow forecasts, which means that model (2) extends to:

$$\begin{aligned} Pr\left(DCF_{ijt}\right) &= \beta_0 + [\varphi M\_CAQ + \Phi' Other\ demand\ factors] \\ &\quad + [\pi M\_CAQ + \Pi' Other\ supply\ factors] + u_{it} \\ &= \beta_0 + \left(\varphi + \pi\right) M\_CAQ \\ &\quad + \Phi' Other\ demand\ factors + \Pi' Other\ supply\ factors + e_{it} \end{aligned} \tag{3}$$

where *Other demand factors* and *Other supply factors* are vectors *Demand factors* and *Supply factors* less the earnings quality measure *M_CAQ*. The demand hypothesis in DeFond and Hung (2003) suggests a positive φ coefficient and the supply hypothesis suggests a negative π. Grouping coefficients φ and π together indicates that the coefficient on *M_CAQ* in a regression explaining the analyst decision to disclose the cash flow forecast captures the net effect of the demand and the supply considerations. Specifically, a positive coefficient on *M_CAQ* suggests that investor demand pressure outweighs analyst reluctance to disclose low quality cash flow estimates. A negative coefficient means that analysts do not respond to investor demand and refrain from disclosing low quality cash flow estimates when earnings quality is low.[14]

The other explanatory variables than the earnings quality measure in model (3) include analyst and broker characteristics associated with analyst forecasting skill and reputation, and firm characteristics that could affect the forecasting difficulty and investor demand for cash flow forecasts. We detail these variables below.

(*iii*) *Analyst and broker characteristics*

We use the analyst's general forecasting experience (*G_experience*) to capture the forecasting knowledge and skill an analyst has gained over time (Clement 1999). Clement (1999) argues that analyst forecasting skill and ability to analyze and interpret financial statements improve as analysts gain experience. We expect joint issuance of cash flow and earnings forecasts to be more common among more experienced analysts who should be better able to produce quality cash flow estimates. Further, we control for the number of firms an analyst follows (*Analyst workload*). Actively following and producing research reports on more companies is likely to discourage an

[14] Our framework is similar to other studies that examine equilibrium supply of management or analyst forecasts. To illustrate, Lansford et al. (2013) examine demand and supply factors that predict managerial revenue guidance. They argue that firm decision to issue revenue guidance is positively affected by investor demand for revenue guidance (the demand explanation for revenue guidance) and negatively affected by the low precision of revenue forecasts (the supply explanation for revenue guidance). Lansford et al. (2013) acknowledge that certain factors, such as difficulties in forecasting revenue, affect both supply and demand for revenue forecasts.

analyst from devoting the time necessary to produce and report complementary cash flow forecasts.

More reputable analysts may use cash flow estimates to signal their higher quality and maintain reputation with investors. Maintaining reputation is important for analysts as reputation directly affects analyst remuneration and career outcomes (Hong and Kubik, 2003; Leone and Wu, 2007). We measure analyst reputation by the analyst inclusion on the All-America Research Team compiled by the Institutional Investor magazine. Specifically, we define a new indicator variable, *Star analyst*, that equals one for analysts classified as members of the All-America Research Team by the Institutional Investor magazine in the most recent annual ranking. We use the Institutional Investor magazine ranking from the October issue of year *t* to identify forecasts issued by star analysts over the next 12-months.[15]

The number of analysts employed by a broker (*Broker size*) reflects broker quality and resources available to analysts. Access to a large resource pool at the broker should help analysts in forecasting cash flows. This access, in return, should positively affect analyst propensity to issue cash flow estimates with earnings forecasts. Further, availability of resources may entice large brokers to introduce policies where analysts are required to disclose their cash flow estimates.

(*iv*) *Firm characteristics*

We control for the firm's cash flow volatility (*CF_STD*) as higher cash flow volatility increases the difficulty analysts face when forecasting cash flows, which can reduce their propensity to report cash flow estimates. However, high uncertainty about cash flow can also increase investor demand for analyst cash flow forecasts. Firm market capitalization (*MV*) and the number of

[15] To cross-reference analyst names from I/B/E/S with the Institutional Investor magazine rankings, we require the I/B/E/S translation file, which is only available for the 2005 I/B/E/S edition. Using the 2005 I/B/E/S translation file could potentially misclassify top ranked analysts that started reporting on I/B/E/S after 2005. We inspected the matching process, but found no evidence that the matching between the Institutional Investor magazine rankings and I/B/E/S is any worse after 2005. More recent versions of the I/B/E/S translation file are unavailable as Thomson-Reuters suspended access to the translation file for academic research.

analysts following a company (*Analyst following*) proxy for the quality of the firm's information environment. A richer information environment should reduce the cost of producing cash flow forecasts, increasing the likelihood an analyst will report the cash flow forecast with the earnings estimate. However, richer information environment may also reduce investor demand for cash flow forecasts if other information sources allow investors to better interpret the information contained in earnings than analyst cash flow estimates.

We control for the book-to-market (*B/M*) ratio as cash flow forecasts may be more valuable in assessing earnings quality and value of high growth firms. Analysts may find forecasting cash flows more difficult for younger firms with shorter time-series of financial information, which is likely to reduce the analysts' propensity to jointly report cash flow and earnings forecasts. However, investor demand for cash flow forecasts may be higher for younger firms. We measure firm age (*Age*) as the number of years between the end-date of the previous fiscal year and the first time the firm is included in CRSP files.

We control for loss-making firms (*Dloss*) as analyst cash flow forecasts may be more helpful in assessing performance of loss-making companies where earnings may not be reflective of firm value (Burgstahler and Dichev, 1997; Collins et al., 1997). We employ the Altman Z-score (*Altman Z*) to measure the firm's financial health. Investors may rely more on cash flow forecasts to examine a firm's ability to meet its financial obligations when distress risk is high, which can incentivize analysts to issue more cash flow estimates. We include an indicator variable for the recent financial-crisis period (*Fin_crisis*) as cash flow forecasts may have been more valuable to investors in assessing firm performance during this period. A set of year dummies (*Year dummies*) and industry dummies (*Industry dummies*) based on 2-digit I/B/E/S SIG codes control for year- and industry-effects. Year dummies are for the EPS forecast issue year. Analyst and broker characteristics and *Analyst following* are measured at the EPS forecast issue. Firm size, book-to-market ratio, age, loss-indicator, and Altman Z-score are measured at the end of the previous fiscal year. The empirical specification of our predictive model is:

$$
\begin{aligned}
Pr\left(DCF_{ijt}\right) &= \beta_0 + \beta_1 M\_CAQ_{it} + \beta_2 Star\ analyst_{ijt} + \beta_3 G\_experience_{ijt} + \beta_4 \ln Broker\ size_{ijt} \\
&+ \beta_5 Analyst\ workload_{ijt} + \beta_6 \ln CF\_STD_{it} + \beta_7 \ln MV_{it} + \beta_8 \ln Analyst\ following_{it} \\
&+ \beta_9 B/M_{it} + \beta_{10} \ln Age_{it} + \beta_{11} Dloss_{it} + \beta_{12} Altman\ Z_{it} + \beta_{13} Fin\_crisis_{it} \\
&+ \sum_{k=0}^{10} \beta_{14+k} Industry\ dummies + \sum_{k=0}^{14} \beta_{25+k} Year\ dummies + e_{it}.
\end{aligned} \tag{4}
$$

Our variable of interest is the proxy for firm earnings quality, *M_CAQ*. If supply considerations have a stronger bearing on the analyst decision to disclose the cash flow estimate, we expect to find a negative correlation between low earnings quality and the analyst decision to disclose the cash flow forecast with the earnings estimate, i.e. $\beta_1 < 0$. If investor demand for cash flow forecasts outweighs analyst reluctance to disclose the cash flow estimate, the coefficient on *M_CAQ* will be positive, i.e. $\beta_1 > 0$, consistent with the conclusions in DeFond and Hung (2003). ln indicates a logarithmic transformation of a variable. Regression standard errors are dual-clustered on analyst and fiscal year to control for the cross-sectional and time-series dependence of observations (Petersen, 2009). Table 1 provides detailed definitions of the variables used in the study.

(v) The relation between the accrual forecast error and earnings quality

In a basic form, a cash flow forecast (*CF*) reflects accrual adjustments (*Accruals*) to the earnings estimate, *CF*=*EPS*+*Accruals*, where all components are expressed on a per-share basis. If the accuracy of analyst accrual estimates reduces when earnings quality is low, cash flow forecasts become increasingly inaccurate compared to earnings estimates, which lowers the usefulness of cash flow estimates to investors. Low quality of cash flow forecasts can explain why analysts do not produce cash flow forecasts when earnings quality is low.

To examine whether the accuracy of accrual forecasts reduces as earnings quality deteriorates, we require a measure of analysts' accrual estimates. The absolute difference between the actual and forecasted cash flow measures the cash flow forecast error, ($|CF\_FE|$), which decomposes into the absolute earnings forecast error ($|EPS\_FE|$) and the absolute accrual forecast error ($|Accruals\_FE|$). The accrual forecast error is then the difference between the earnings and the cash flow forecast errors.

To examine the relation between the accrual forecast error and earnings quality, we estimate the following regression model:

$$|Accruals\_FE| = \varphi_0 + \varphi_1 M\_CAQ + \Theta controls \quad (5)$$

where the last component is a vector of control variables. If analysts do not have the skill to accurately forecast accruals when earnings quality is low, coefficient φ_1 will be significant and positive.

For completeness, we also examine the relation between the cash flow forecast error and earnings quality when we control for the accuracy of analyst's EPS estimates:

$$|CF\_FE| = \omega_0 + \omega_1 M\_CAQ + \omega_2 |EPS\_FE| + \Omega controls. \quad (6)$$

Regression model (6) examines if the accuracy of cash flow forecasts reduces when earnings quality is low without making assumptions on how analysts arrive at cash flow forecasts, i.e. whether analysts use the direct or the indirect method to forecast cash flows.

The controls in models (5) and (6) include analyst and broker characteristics, and firm characteristics from the logit model predicting the analyst decision to jointly report cash flow and earnings forecasts. I include these controls because these variables relate to the analyst forecasting skill and the difficulty of the forecasting task, which should explain both accrual and cash flow forecast errors.[16]

4. DATA AND SAMPLE

We include all one-year-ahead annual EPS and cash flow forecasts, together with their actual values, from I/B/E/S detail files for US ordinary common stocks. To be included in the sample,

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[16] To illustrate, access to a large resource pool at the broker lowers the cost of producing a cash flow forecast, which should positively affect the likelihood an analyst will include the cash flow forecast with the earnings estimate. However, lower information acquisition and processing costs should also positively affect the accuracy of analyst accrual and cash flow estimates.

the cash flow forecast must be issued within a five-day window around the EPS forecast issue date. Financial statement information is from the CRSP/Compustat merged database and stock return information is from CRSP. All variables are winsorized at 1%. The final sample includes 537,766 EPS forecasts and 49,820 cash flow estimates issued during 2000–2008.[17]

(*i*) *Descriptive statistics*

Panel A of Table 2 presents the distribution of EPS and cash flow forecasts across fiscal years in our sample. The total number of EPS forecasts increases by two-thirds, from 43,984 in 2000 to 68,687 in 2008. The proportion of cash flow forecasts accompanying earnings estimates increases from 6.1% over 2000–2003 to 11.6% over 2006–2008.[18] Overall, the results in Table 2 are consistent with previous evidence (DeFond and Hung, 2003 and Givoly et al., 2009) that the number of cash flow forecasts accompanying earnings estimates has increased over time.

Panel B of Table 2 reports the distribution of stand-alone EPS forecasts and of EPS forecasts supplemented by cash flow estimates across 11 industries based on the 2-digit I/B/E/S SIG code. For each industry, we also report the proportion of analysts issuing at least one cash flow forecast for a firm in a year. Cash flow forecasts dominate in the energy sector (coal and oil extraction and refining, gas and energy production and transportation), with 41.2% of all earnings estimates issued together with cash flow forecasts. The energy sector also has the largest proportion of analysts issuing at least one cash flow forecast for a firm in a year.

Panel A of Table 3 presents the descriptive statistics for the dependent variables in the logit model (4) and in the accuracy models (5) and (6). In our sample, 9.26% of all EPS forecasts are issued together with a cash flow estimate. The mean accrual forecast error is 1.32% of the

[17] For comparison, DeFond and Hung (2003) examine 1,623 cash flow forecasts over 1993–1999 and Givoly et al. (2009) use 7,543 cash flow forecasts over 1993–2005. Call et al. (2013a) select analysts' last cash flow forecasts issued before the earnings announcement, which generates a sample of 29,833 cash flow estimates over 1993–2008.

[18] DeYoung et al. (2009) report that 2006 was the peak of a consolidation wave among brokerage firms that started in 2003, with mergers and acquisitions in the industry totalling $100 billion compared to less than $25 billion in 2003. Post-consolidation changes may have a stronger effect on the analysts' discretionary decision to issue cash flow forecasts compared to the issuance of earnings forecasts, which are the main forecasts produced by analysts. This can explains the slight reduction in the proportion of analysts cash flow forecasts issued in 2006.

stock price and the cash flow forecast error is 2.59%. Panel B presents the descriptive statistics for the EPS forecast error and for the earnings quality measure. The pooled sample mean EPS forecast error is 1.33% and reduces to 1.26% when a cash flow forecast complements the EPS estimate.[19] The average cash flow forecast error is significantly higher than the mean EPS forecast error (results untabulated), consistent with the evidence in Givoly et al. (2009). The mean variation in discretionary current accruals is 8.12%.

Panel C presents descriptive statistics for analyst and broker characteristics. Star analysts have issued around 0.4% of the sample earnings forecasts and an average analyst has been present in the sample for over six years.[20] An average analyst follows over 13 companies and the mean number of analysts employed by a broker is over 56. Panel D presents the descriptive statistics for the firm-related explanatory variables. The mean cash flow volatility is 1.222, average firm market capitalization is over $3.8b and an average firm is followed by over 10 analysts. The mean *B/M* ratio is 0.497 and an average firm has been present in our sample for close to 21 years. Close to 18% of companies reported a loss in the previous fiscal year and average Altman Z-score is 5.041. Over 11% of earnings forecasts in our sample were issued during the recent financial crisis.

5. EMPIRICAL RESULTS

(i) The analyst's decision to issue a cash flow forecast with the earnings estimate

To examine the determinants of the analyst choice to issue cash flow forecasts to accompany EPS estimates, we start with non-parametric portfolio analysis, which is followed by multivariate regression analysis.

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[19] In unreported results we find that the mean EPS forecast error for the pooled sample is significantly higher than the mean EPS forecast error for EPS estimates issued with cash flow forecasts. This is consistent with the evidence in Call et al. (2009), who find lower EPS forecast error in the presence of cash flow estimates.

[20] We measure analyst forecasting experience using I/B/E/S detail files on EPS forecasts starting in 1995. This ensures sufficient variation in the analyst experience variable compared to measuring analyst experience starting in the first year of the sample period (Clement, 1999).

(*ii*) *Non-parametric portfolio analysis*

As a simple test of the relation between earnings quality and analyst propensity to disclose cash flow forecasts, Figure 1 plots the frequency of joint issuance of EPS and cash flow forecasts for deciles formed on the variation in discretionary current accruals *M_CAQ*. The proportion of cash flow forecasts that accompany earnings estimates increases from 2.3% to 17.4% when moving from the decile of the lowest earnings quality (*Low Earn. Q*) to the decile of highest earnings quality (*High Earn. Q*). In unreported results, we find that the difference in the frequency of cash flow estimates between the two extreme portfolios sorted on *M_CAQ* is significant at the 1% level. Figure 1 provides preliminary evidence that analysts are more likely to provide cash flow forecasts with EPS estimates when earnings quality is low.

Building on Figure 1, we compute the mean *M_CAQ* for stand-alone EPS forecasts and for joint issuance of EPS and cash flow forecasts (results untabulated). *M_CAQ* is 41% lower when analysts report both earnings and cash flow forecasts than when analysts disclose only earnings estimates. This evidence is consistent with our prediction that analysts may find forecasting accruals more challenging when earnings quality is low, which reduces their propensity to report cash flow estimates.

(*iii*) *Multivariate analysis*

Table 4 reports results from the logistic model (4) that predicts the analyst choice to disclose the cash flow estimate with the earnings forecast. Low quality accruals reduce the likelihood an analyst will report a cash flow forecast. A one standard deviation increase in *M_CAQ* lowers the analyst propensity to report a cash flow forecast by 19.3%. This evidence is consistent with the proposition that poor earnings quality reduces analyst propensity to report cash flow forecasts together with earnings estimates. The regression's pseudo R^2 is 28.07%, which suggests the model has good predictive power.

Looking at the control variables, we find that All-America Research Team analysts and analysts employed by large brokers are more likely to produce cash flow forecasts. The former result suggests that reputable analysts may disclose cash flow estimates to maintain their standing with investors. The later result likely reflects that access to a large resource pool at the broker lowers the cost of producing cash flow forecasts, which has a positive effect on the analyst propensity to jointly issue cash flow and earnings estimates. Larger brokers may also insist that analysts disclose their cash flow forecasts to investors.

High return volatility reduces the likelihood an analyst will report the cash flow estimate. Further, high competition among analysts, as proxied by *Analyst following*, entices analysts to complement their EPS estimates with cash flow forecasts, which suggests that analysts may report cash flow forecasts to distinguish themselves from other analysts. Cash flow forecasts are less common for high B/M firms and for more mature firms. This evidence is consistent with cash flow estimates being more useful in assessing the performance of growth stocks and younger firms with a short history of financial performance. Analysts are less likely to report cash flow forecasts for loss making firms. Cash flow forecasts are more common among distressed firms, which reflects that cash flow forecasts are useful in assessing firm solvency and liquidity when distress risk is high.[21] As energy firms tend to carry high debt levels, higher incidence of cash flow forecasts among firms with low Altman Z-scores helps explain Table 2 results that the energy sector exhibits a high proportion of joint issuance of cash flow and earnings forecasts.[22]

[21] The evidence that controlling for earnings quality, the coefficient on Altman Z-score is negative suggests that among two firms with similar earnings quality, analysts will be more likely to produce cash flow forecasts for the firm in financial distress. This is because cash flow forecasts aid investors in assessing firm's liquidity and solvency when distress risk is high. This result is consistent with the findings in Charitou et al (2011), who document a non-monotonic relation between earnings quality and financial distress. Specifically, Charitou et al. (2011) argue that distressed firms may be subject to higher market scrutiny, which can have a positive effect on earnings quality by reducing firm's ability to manage earnings. As the accuracy of cash flow forecasts is likely to be higher for firms with high earnings quality, their usefulness in assessing solvency and liquidity should increase for firms with high earnings quality.

[22] The review of the key performance measures for the energy sector by Michael Filloon also concludes that high distress risk explains why cash flow forecasts are the key performance metric in this sector (http://www.investopedia.com/university/important-ratios-for-analyzing-oil-and-gas-stocks/measuring-performance.asp, accessed 16.07.2013).

Overall, the results in Table 4 support the prediction that uncertainty about accrual quality reduces analyst propensity to issue cash flow forecasts to complement EPS estimates.[23]

6. SENSITIVITY ANALYSIS

(*i*) *Current accruals volatility*

Table 5 presents the results of sensitivity analysis. The "*Current accruals volatility*" columns report results when we use the variation in current accruals measured over the previous four years, *C_ACC_STD*, as the earnings quality measure. This measure captures the quality of both normal (non-discretionary) and discretionary current accruals. Analysts may find forecasting both accrual components difficult, which is likely to negatively affect their propensity to report cash flow forecasts. Further, *C_ACC_STD* is not subject to the estimation error inherent in *M_CAQ*. The estimation error in discretionary accruals can reduce the power of discretionary accruals to capture earnings quality (Richardson et al., 2005). We find that high variation in current accruals predicts a lower likelihood of the analyst reporting a cash flow forecast to complement the EPS estimate, which corroborates our earlier results.

(*ii*) *Discretionary accruals from the Jones model*

The "*Jones model*" columns present results from model (4) when we use the Jones model (Jones, 1991) to estimate discretionary accruals. The model takes the form:

$$TA_{it} = \alpha_0 \frac{1}{\overline{Assets}_{it}} + \alpha_1 \Delta REV_{it} + \alpha_2 PPE_{it} + \varepsilon_{it} \tag{7}$$

where TA_{it} are total accruals scaled by average of current and previous year assets, $\overline{Assets}_{it}$, and the remaining variables are similar as in equation (1). Using the variation in the Jones model

[23] In unreported results, we repeat Table 4 results for a sample of cash flow forecasts issued over the period 1993–1999, which is the sample period in DeFond and Hung (2003). We continue to find a negative coefficient on *M_CAQ*, consistent with our conclusion that analysts do not disclose cash flow forecasts when the quality of earnings is low. This conclusion is unchanged when we repeat Table 4 results for the sample period 1993–2008. These results are available upon request.

residuals, *J_CAQ*, as the earnings quality measure, we continue to find lower propensity of analysts to disclose cash flow forecasts when earnings quality is low.

(*iii*) *Magnitude of discretionary and non-discretionary current accruals*

The "*Magnitude of current accruals*" column of Table 5 report results when we substitute the signed magnitude of discretionary and non-discretionary current accruals, *MD_ACC* and *nMD_ACC,* for *M_CAQ* in regression model (4). We use *MD_ACC* because previous studies employ both the variation and the level in discretionary accruals as proxies for earnings quality (Dechow et al., 2010; Bilinski and Eames, 2012). We control for innate accruals as this accrual component may be also impacting the analyst decision to supply cash flow estimates. Discretionary and non-discretionary accruals for the previous fiscal year are estimated from the McNichols (2002) model.[24] Analyst propensity to report cash flow forecasts alongside earnings estimates reduces with the magnitude of discretionary and innate current accruals. This evidence reinforces our previous results that poor earnings quality reduces the likelihood of analysts jointly issuing cash flow and earnings forecasts.

(*iv*) *Management guidance*

Management guidance can mitigate the negative effect that low earnings quality has on analysts' ability to accurately forecast cash flows, which can eliminate the negative association between low earnings quality and analyst propensity to report cash flow forecasts. To test this prediction, we include a management guidance dummy (*Guidance*) equal to one if the firm issues earnings guidance in the 14-day period preceding the issuance of the analyst's earnings forecast and the guidance is for the same fiscal period, otherwise *Guidance* is zero.[25] The "*Management guidance*"

[24] The residuals from McNichols (2002) model measure discretionary current accruals and the predicted values measure non-discretionary (innate) current accruals.

[25] We use a 14-day window between management earnings guidance and the analyst earnings forecast issue date because guidance should have a stronger effect on the analyst decision to jointly issue earnings and cash flow

column in Table 5 reports results for regression model (4) after including the *Guidance* indicator variable. The coefficient on *Guidance* is positive, consistent with management guidance reducing forecasting uncertainty and increasing analyst propensity to report cash flow estimates. However, controlling for earnings guidance, we still find a negative coefficient on *M_CAQ*. This evidence suggests that management guidance cannot fully mitigate the negative effect that low earnings quality has on the analyst propensity to jointly report cash flow and earnings estimates.

(v) Other controls from DeFond and Hung (2003)

Next we test if our results remain unchanged when, in addition to management guidance, we include in model (4) three of DeFond and Hung's (2003) control variables. Specifically, we include accounting choice heterogeneity index, *Acc_Het_Ind,* because heterogeneity in accounting choices of a firm compared to the industry peers can reduce earnings comparability, increasing investor demand for cash flow estimates.[26] We include earnings volatility measured over the previous four fiscal years*, EPS_STD,* as highly volatile earnings may be perceived by investors to be of low quality. Finally, we control for the firm's capital intensity, *Capital intensity*, as capital intensive firms may have a higher need for the firm's cash flow. *Capital intensity* is the ratio of gross property, plant and equipment divided by sales revenue in the fiscal year prior to the year for which the analyst forecasts cash flows. The results in the "*DH (2003) controls*" column in Table 5 indicate that after including the three additional controls, the coefficient on *M_CAQ* remains negative and highly significant, which corroborates our main results.

forecasts shortly after the guidance release. Consequently, a two-week window should have more power to isolate the effect of management guidance on the analyst cash flow forecast reporting decision than longer windows.

[26] We follow DeFond and Hung (2003) and compute the index by assigning a value of one to each firm whose accounting choice differs from the most frequently chosen method in that firm's industry group. The index is calculated based on five accounting choices: (1) inventory valuation, (2) investment tax credit, (3) depreciation, (4) successful-efforts vs. full-cost for companies with extraction activities, and (5) purchase vs. pooling. If a firm has no information or a missing value for a given accounting choice, the choice is coded as zero (this assumes the firm selects the most common accounting choice in its industry). We sum the scores for the five accounting choices for each firm and then divide the sum by the number of accounting choices in the industry: 5 for firms in the petroleum and natural gas industry, 3 for firms in banking, insurance, real estate, and trading industries, and 4 for firms in all other industries.

(*vi*) *Annual and Fama–MacBeth regressions*

DeFond and Hung (2003) use annual and Fama–MacBeth regressions (Fama and MacBeth, 1973) to control for inflated *t*-statistics due to the time-series dependence of observations. To test if our conclusions are sensitive to the choice of a research method to control for time-series dependence of observations, Table 6 replicates the analysis from Table 4 for each fiscal year over the sample period.

We find that coefficients on *M_CAQ* are negative and significant in predicting cash flow forecast issuance for all annual regressions but 2004. This evidence suggests the conclusions from Table 4 are not confined to a specific subperiod. This result provides further confirmatory evidence for the main results. Further, Table 6 evidence on a significant relation between earnings quality and analyst propensity to issue cash flow estimates across most fiscal years means that results in Table 4 are unlikely to be driven by better ability of I/B/E/S to collect cash flow forecast data over time.

The last column of Table 6 presents Fama–MacBeth coefficients based on the annual regressions and the corresponding (time-series) adjusted *p*-values. High variation in discretionary current accruals reduces analyst propensity to issue cash flow estimates consistent with our earlier evidence.[27]

(*vii*) *The recursive effect that a cash flow forecast issuance has on earnings quality*

McInnis and Collins (2011) find that accrual quality improves after analysts start producing cash flow forecasts for a firm. They attribute this effect to higher transparency of accruals and, consequently, higher cost of accrual manipulations in the presence of cash flow forecasts, which reduces managers' propensity to manipulate accruals. Improved earnings quality in response to cash flow forecast issuance can explain Table 4 result on the positive association between earnings quality and analyst propensity to report cash flow estimates.

[27] Our main results in Table 4 are based on dual-clustered standard errors as the method is superior to Fama-MacBeth approach because the latter adjusts only for correlated errors across years.

To verify whether the results are influenced by the recursive effect a complementary cash flow forecast issuance may have on earnings quality, we perform two tests. First, we use an instrumental variables regression to estimate model (4). We use earnings quality measured two years before the cash flow forecast issuance as the instrument. Past earnings quality is unaffected by the current-period changes in earnings quality induced by recent cash flow forecast issuance.[28] Second, we estimate model (4) using *M_CAQ* measured before analysts initiate issues of cash flow forecasts for a firm. In this case, the earnings quality measure cannot be impacted by the improvement in earnings quality motivated by the release of a cash flow forecast.

In unreported results we find that the instrumental variables regression continues to show that analysts are less likely to disclose cash flow estimates with earnings forecasts for firms with low earnings quality. Further, the coefficient on *M_CAQ* measured before the first cash flow forecast for a firm has been issued is negative, consistent with low earnings quality reducing analyst propensity to report cash flow forecasts. Together, the results from the two tests support our main conclusions.

In unreported results we perform four further sensitivity tests. First, to offer an alternative test of the sensitivity of our results to cross-sectional correlation of observations, we randomly choose a single forecast for each analyst-firm pair and re-estimate model (4) for this sample. Using only a single forecast for each analyst-firm pair in a year, the sample size falls to 137,382 analyst–firm observations for the nine fiscal years. Replicating the analysis in Table 4 for this subsample, the association between our earnings quality measure and the likelihood an analyst will jointly issue cash flow and earnings forecasts remains unchanged.

Second, we repeat model (4) after including indicator variables for each analyst. Controlling for unobserved analyst heterogeneity using analyst fixed effects, we continue to find a positive association between earnings quality and analyst propensity to report cash flow

[28] If analysts initiated cash flow reporting for a firm longer than two years ago, our instrument may be weakly endogenous. However, Larcker and Rusticus (2010) argue that using weakly endogenous variables as instruments can improve estimation efficiency.

forecasts. To avoid perfect multicollinearity, analysts who only issue cash flow forecasts or only issue earnings forecasts are excluded. Further, controlling for broker fixed effects also leaves our conclusions intact.

Third, we test if analysts issue cash flow forecasts to convey a more favourable signal about the firm prospects than their earnings forecasts would allow. The proportion of positive cash flow forecast revisions is 39.6%, which is close to the proportion of positive earnings forecast revision, which is 41.9% This suggests that it is unlikely that analysts use cash flow forecasts rather than earnings estimates to signal better firm prospects.

Fourth, we repeat the analysis from Table 4 after excluding the energy sector from the sample. Low accrual quality continues to exhibit the negative association with the analyst decision to report cash flow forecasts, which suggests that including the energy industry in the sample does not have unduly effect on the study's conclusions.

(*viii*) *The duration between cash flow forecast revisions*

Our tests so far show that low earnings quality reduces analyst propensity to report cash flow estimates with earnings forecasts. However, low earnings quality may also affect the duration between cash flow forecast revisions. Specifically, when earnings quality is low, analysts may require more time to produce a cash flow forecast of sufficient quality to disclose to investors. To test the prediction that low earnings quality increases the duration between cash flow forecasts revisions, we estimate the non-parametric proportional Cox (1972) model, which has the form:

$$h_j(t : X) = h_{j0}(t)\exp(\beta_j X) \quad (8)$$

where t is the duration between cash flow forecast issuance, X is a vector of explanatory variables from model (4), and $h_j(t: X)$ is the hazard rate conditional on the explanatory set X.[29]

[29] Cash flow forecasts used to calculate revisions are for the same fiscal year. This criterion ensures that cash flow forecast revisions reflect only new information for a fiscal year.

$h_{j0}(t)$ is the baseline hazard.[30] β_j are the coefficients. A positive coefficient indicates that an increase in the explanatory variable shortens the time between cash flow forecast revisions. A negative coefficient signals an increase in duration between cash flow forecast revisions for a unit increase in X.

Table 7 reports results from the Cox model. The coefficient on *M_CAQ* is negative, which means that lower earnings quality increases the duration between cash flow forecasts revisions. Together, the evidence from Tables 7 and 4 show that low earnings quality affects both the analyst decisions to supply cash flow forecasts and the duration between cash flow forecast revisions.

7. THE EVIDENCE ON THE RELATION BETWEEN THE CASH FLOW ISSUANCE DECISION AND ABSOLUTE TOTAL ACCRUALS IN DEFOND AND HUNG (2003)

DeFond and Hung (2003) report a positive association between the magnitude of absolute total accruals and the likelihood an analyst will report a cash flow forecast with the earnings estimate. Givoly et al. (2009, p. 1878) interpret this result as evidence that "[cash flow] forecasts are demanded by investors and supplied by analysts in cases where earnings are likely to be of low quality". This stands in contrast to our evidence that analysts are less likely to issue cash flow forecasts when earnings quality is low.

To address this discrepancy in findings, we replicate the analysis from Table 4 using (a) the absolute value of total accruals (|*T_ACC*|) as in DeFond and Hung (2003), (b) the magnitude of signed total accruals (*T_ACC*), (c) the variation in total accruals (*T_ACC _STD*), and (d) the signed value of current accruals (*C_ACC*).

The "*Absolute total accruals, DH (2003)*" columns in Table 8 present regression results from model (4) when we use absolute total accruals. Consistent with DeFond and Hung (2003), analyst propensity to jointly issue cash flow and earnings forecasts increases with the magnitude

[30] The intercept in Cox (1972) model is subsumed into the baseline hazard $h_{j0}(t)$.

of absolute total accruals. However, when we use signed total accruals, the variation in total accruals, and when we use absolute and signed current accruals, we find results consistent with our earlier finding that low earnings quality reduces the analyst propensity to report cash flows forecast with earnings estimates.[31]

What can explain the discrepancy between our results and those in DeFond and Hung (2003)? First, the Dechow and Dichev (2002) model that is the basis for our earnings quality measure recognizes that quality of accruals and consequently of earnings is decreasing in the magnitude of accruals estimation errors, not necessarily in the magnitude of accruals.[32] This means that our measure has better theoretical and empirical motivations than absolute magnitude of accruals.

Second, absolute total accruals include current and non-current accruals. Non-current accruals include managerial decisions related to asset useful lives and pension liabilities, which have long-lasting and more predictable effects on firm accruals and cash flows. This means that the magnitude and variation in current accruals should better reflect the difficulty analysts face forecasting end-of-year accruals and cash flows. Using earnings quality proxies from current accruals, we find a positive association between analyst propensity to produce cash flow forecasts and earnings quality in all cases we investigate.

This section shows that DeFond and Hung's (2003) result that absolute total accruals predict the issuance of a cash flow forecast is likely due to their choice of the earnings quality measure. Our evidence complements Givoly et al.'s (2009) results. They find only weak support

[31] The sampling procedure in DeFond and Hung (2003) is unclear on whether the authors model the decision that there is at least one cash flow forecast for a firm in a year or the analyst decision to supplement each earnings forecast with a cash flow estimate, which is similar to the setting of this study. However, to ensure that differences in research designs do not affect the study's inferences, in unreported results, we use model (4), without analyst characteristics, to examine the likelihood that there is at least one cash flow estimate issued with the earnings forecast for a firm in a fiscal year. The sample for this analysis reduces to 13,241 firm-year observations. We find that the likelihood of at least one cash flow estimate for a firm in a fiscal year decreases for firms with low earnings quality, which corroborates our earlier findings.

[32] Consider a ship building firm that receives a standard contract to build a vessel where the construction of a vessel takes several accounting periods and the payment occurs on completion of the contract. If cash collection and ship completion rates are reasonably certain, large accruals do not indicate low accrual or earnings quality.

for DeFond and Hung's (2003) prediction that analysts produce cash flow forecasts in response to higher investor demand for cash flow forecasts when earnings quality is low.

8. THE RELATION BETWEEN EARNINGS QUALITY AND THE ACCURACY OF ACCRUAL AND CASH FLOW FORECASTS

Table 9 presents results of our accuracy regressions (5) and (6), which examine if the precision of accrual estimates and of cash flow forecasts reduces when earnings quality is low. Consistent with our prediction, low earnings quality reduces the accuracy of accrual estimates and of cash flow forecasts. Further, higher EPS forecast error has a negative effect on the cash flow forecast precision, consistent with analysts factoring earnings estimates into their cash flow forecasts.

Looking at the control variables, we find that higher cash flow volatility reduces the accuracy of analyst cash flow forecasts. The accrual and the cash flow forecast errors increase for smaller and high B/M stocks. This evidence is consistent with analysts facing a more challenging task forecasting cash flows for more risky stocks.[33] Accrual and cash flow estimates are more precise for distressed stocks, which likely reflects that analysts devote more effort to produce accurate cash flow forecasts when these forecasts are valuable to investors in assessing firm liquidity and solvency. Similarly, we find that accrual estimates are more precise for loss making stocks. Finally, analysts produced more accurate cash flow estimates during the recent financial crisis. This likely reflects that cash flow forecasts were particularly valuable to investors in assessing firm liquidity and solvency during the recent financial crisis, which encouraged analysts to devote more effort to produce accurate cash flow estimates. Table 9 results are consistent with the notion that when earnings quality is low, analysts find forecasting accruals and cash flows more challenging. This evidence helps explain the negative association between low earnings quality and analyst propensity to report cash flow estimates.

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[33] Chan and Chen (1991), Fama and French (1992, 1993) and Vassalou and Xing (2004) explain that stocks with high book-to-market ratios are financially distressed and have high default risk. These stocks have higher earnings volatility making accruals more difficult to forecast.

9. THE PRICE REACTION TO ANALYST CASH FLOW FORECAST ANNOUNCEMENTS

Since cash flow forecasts are issued when accruals are relatively easy to predict, investors may find cash flow forecasts of little use in assessing the quality of firm earnings and in valuation. To test this prediction, we examine the price reaction to cash flow forecast announcements.

To measure the price reaction to analyst cash flow forecast revisions (ΔCF), controlling for earnings forecast revisions (ΔEPS), we calculate a three-day cumulative abnormal return (*CAR*) centered on the EPS forecast announcement date. We use the CRSP value-weighted index as the benchmark to measure abnormal returns. We expect the coefficient on ΔCF to be insignificant if investors do not find cash flow forecasts incrementally informative. Further, we include revisions in revenue forecasts (ΔREV) as Keung (2010), Ertimur et al. (2011) and Bilinski and Eames (2012) find a significant incremental price reaction to revenue forecast revisions, controlling for contemporaneous EPS forecast revisions. We also control for the effect of revisions in stock recommendations on stock prices. We include two indicator variables for the direction of the recommendation revision. *Upgrade* (*Downgrade*) is an indicator variable that equals one if the analyst revises the stock recommendation upwards (downwards) to a more (less) favorable level, and zero otherwise.[34] The resulting regression model is:

$$\begin{aligned} CAR_{ijt} &= \alpha_0 + \alpha_1 \Delta CF_{ijt} + \alpha_2 \Delta EPS_{ijt} + \alpha_3 \Delta REV_{ijt} \\ &+ \alpha_4 Upgrade_{ijt} + \alpha_5 Downgrade_{ijt} + \nu_{ijt} \end{aligned} \tag{9}$$

where the intercept term captures stock recommendation reiterations. Regression standard errors are dual-clustered on firm and announcement date.

[34] We require that the forecasts used to calculate revisions in earnings, cash flows and stock recommendations are no more than 300 days apart. This criterion eliminates infrequently revised forecasts. Further, we require that the revisions in earnings, cash flow and revenue estimates are for the same fiscal year. This ensures forecast revisions reflect only new information for a fiscal year. The additional selection criteria reduce the sample size to 341,861 observations. Similarly to Call et al. (2013a), Keung (2010) and Bilinski and Eames (2012) we assume that cash flow and revenue forecast revisions are zero if the revised earnings forecast is not accompanied by a cash flow or a revenue forecast. As in Brav and Lehavy (2003), we assume an analyst reiterates the stock recommendation if the revised EPS forecast is not accompanied by a stock recommendation.

Panel A of Table 10 reports the descriptive statistics for model (9). The mean abnormal price reaction is negative −0.16%, which reflects negative mean earnings and revenue forecast revisions of −3.95% and −0.13% respectively. The negative average price reaction and revisions in earnings and revenue forecasts are largely due to the inclusion of the recent financial crisis in the sample period. Mean cash flow forecast revision is positive 0.11%, and the proportion of stock recommendation upgrades and downgrades in the sample is 8.42% and 8.80%, respectively.

The "*Call et al. (2013) regression*" columns in Panel B report regressions results for model (9) when we include only revisions in analyst cash flow and earnings estimates. This specification corresponds to the model examined in Call et al. (2013a). Consistent with the evidence in Call et al. (2013a), we find an incremental price reaction to cash flow forecast revisions, which suggests that cash flow forecasts contain valuable information that is incremental to earnings. However, this result does not persist when we control for revisions in revenue forecasts and stock recommendations. Specifically, columns "*Controlling for revenue forecasts*" show model (9) regression results when we include revisions in earnings and cash flow estimates together with the concurrent revisions in revenue estimates. Consistent with previous studies, we find a significant positive coefficient on revenue forecast revisions (Keung, 2010; Ertimur et al., 2011; and Bilinski and Eames, 2012). Controlling for revenue and earnings forecast revisions, we find no evidence that cash flow estimates have any information content.

Columns "*Controlling for stock recommendations*" show results for the full specification of model (9). In line with previous studies, stock recommendation upgrades (downgrades) elicit a significant positive (negative) stock market reaction (Mikhail et al., 2004; Ivkovic and Jegadeesh, 2004) compared to stock reiterations. Controlling for changes in stock recommendations, the coefficient on cash flow forecast revisions remains indistinguishable from zero. Finally, columns "*Interaction terms*" of Table 10 show results for model (9) after including an interaction term between revisions in analyst earnings and in cash flow forecasts, $\Delta EPS*\Delta CF$. If analyst cash flow forecasts aid investors in interpreting earnings estimates, the coefficient on the interaction term should be positive and significant.[35] The results show that the coefficient on the interaction term is indistinguishable from zero, which suggests that investors do not use cash flow estimates to interpret earnings forecast revisions.[36] Together, Table 10 results confirm that cash flow forecasts are of limited use to investors in assessing the quality of firm earnings and in valuation.[37]

10. CONCLUSIONS

This study examines the recent trend of analysts issuing cash flow forecasts to complement their earnings estimates. We find that analysts are less likely to report cash flow forecasts with their earnings estimates when earnings quality is low. Further, we document that the accuracy of analyst cash flow estimates reduces when earnings quality is low. As the relative precision of cash flow forecasts decreases compared to earnings estimates, the usefulness of cash flow forecasts to investors reduces. Cash flow estimates that are not useful to investors are unlikely to be supplied by analysts, which explains low propensity of analysts to produce cash flow estimates when earnings quality is low.

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[35] Intuitively, if cash flow forecasts aid investors in interpreting EPS estimates, a 1% revision in an EPS forecast accompanied by a smaller percentage revision in the cash flow estimate may signal that higher earnings are due to accrual manipulations.

[36] In unreported results we also perform two tests to examine if our conclusion that analysts do not report cash flow forecasts when earnings quality is low is not driven by analysts privately conveying their forecasts to "key" clients. Specifically, we examine if cash flow forecast revisions associate with abnormal returns measured in a three day window ending two days before the public disclosure of the report, CAR(−5, −3). If analysts privately convey their forecasts to key clients, the revisions in analyst cash flows later announced to the public should correlate with CARs(−5, −3). We look at the window (−5, −3) because a long gap between the private and the public report disclosure is likely to erode the trading benefit of the privately disclosed cash flow forecast as new information arrives to the market and other investors may acquire the private information. Our second test examines the distribution of public cash flow forecast announcements over the week. Privately disclosed forecasts should concentrate early in the week to facilitate share trading by "key" investors. Private disclosures late in the week are less likely due to higher uncertainty new information may be revealed over the weekend. We find that cash flow forecasts revisions do not correlate with CARs(−5, −3) and that joint issues of cash flow and earnings forecasts are uniformly distributed across the week. Together, these results suggest that analysts are unlikely to privately target particular investors with their cash flow estimates.

[37] In unreported results we perform two additional tests. First, we find that our conclusions from Table 10 remain unchanged when we repeat model (9) and measure price reaction in a 5-day window around the earnings forecast announcement. Second, we repeat model (9), after including the interaction term $\Delta EPS*\Delta CF$, for a sample of firms with at least one cash flow forecast issued for a firm in a fiscal year. This setting allows us to test more directly if cash flow forecasts aid investors in interpreting earnings forecasts. We find that the coefficient on the interaction term remains indistinguishable from zero for this subsample.

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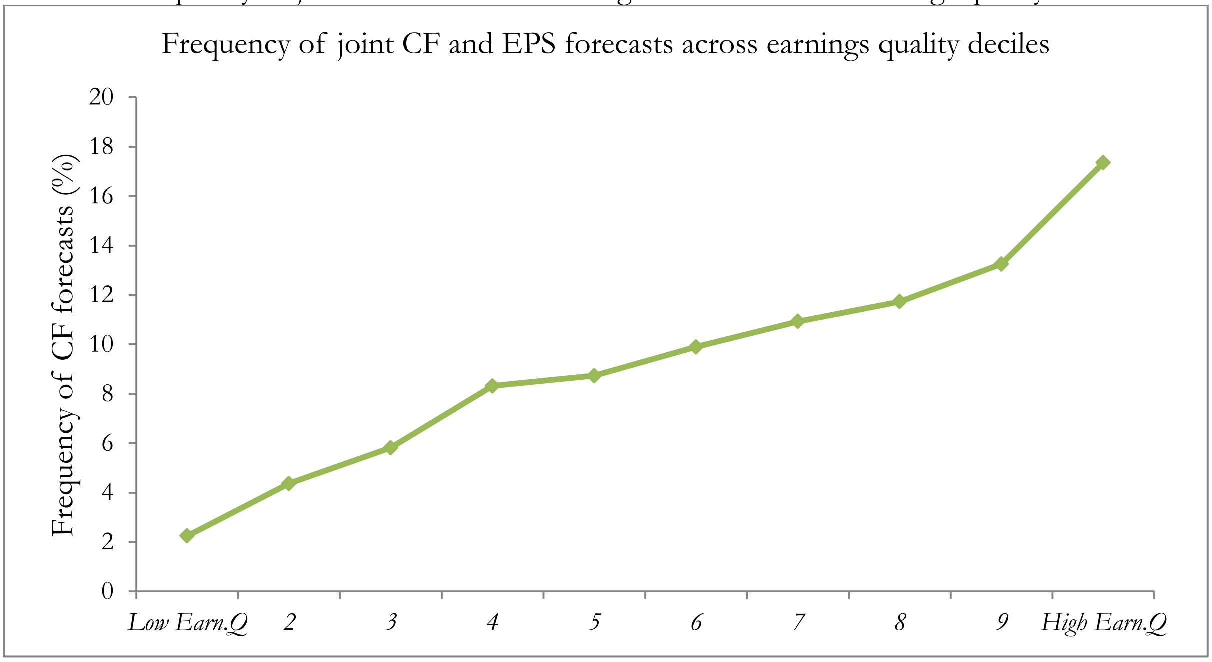
Figure 1

The frequency of joint cash flow and earnings forecasts across earnings quality deciles



Notes:

The figure presents the frequency of joint cash flow forecasts (CF) and earnings forecasts (EPS) issuance across deciles formed on the variation in discretionary current accruals. Portfolio *Low Earn. Q* includes stocks with the highest variation in discretionary current accruals. Portfolio *High Earn. Q* includes stocks with the lowest variation in discretionary current accruals. Discretionary accruals are estimated from the McNichols (2002) model.

Table 1
Variable definitions

Variable	Definition
Panel A: The dependent variables	
DCF	Cash flow forecast dummy, which is an indicator variable that equals one if the analyst reported the cash flow forecast with the earnings estimate, and zero otherwise.
|Accrual_FE|	The accrual forecast error calculated as the difference between errors in the analyst's cash flow and earnings forecasts.
|CF_FE|	The cash flow forecast error, which is the absolute difference between the actual and analyst forecasted cash flows scaled by the stock price at the end of the previous fiscal year.
Panel B: The independent variables: earnings quality measures	
M_CAQ	Earnings quality measure, which is the standard deviation of discretionary current accruals estimated from McNichols's (2002) current accruals model for the previous four fiscal years.
C_ACC_STD	Current accruals volatility, which is the standard deviation of current accruals for the previous four fiscal years. Current accruals are defined as the change in current assets, less change in cash, less change in current liabilities plus the change in debt in current liabilities. We scale current accruals by average total assets for the current and the previous fiscal year.
C_ACC	Signed current accruals for the previous fiscal year.
J_CAQ	Variation in discretionary total accruals form the Jones model (Jones 1991) estimated for the previous four fiscal years.
MD_ACC	The signed magnitude of discretionary current accruals, which is measured by the residual from the McNichols' (2002) accruals model for the firm for the previous fiscal year.
nMD_ACC	The signed magnitude of non-discretionary current accruals, which is measured by the predicted value from the McNichols' (2002) current accruals model for the firm for the previous fiscal year.
|T_ACC|	Absolute total accruals. Total accruals are defined as the change in current assets, less change in cash, less change in current liabilities plus the change in debt in current liabilities less depreciation and amortization expense. We scale total accruals by average total assets for the current and the previous fiscal year.
T_ACC	Signed absolute total accruals.
Panel C: The independent variables: forecast and analyst characteristics	
|EPS_FE|	The earnings-per-share forecast error, computed as the absolute difference between the actual and forecasted earnings scaled by the stock price at the end of the previous fiscal year.
Star analyst	Analyst star ranking, which is an indicator variable that equals one for analysts classified as members of the All-America Research Team by the Institutional Investor magazine in the most recent annual ranking.
G_Experience	Analyst forecasting experience, computed as the number of years an analyst has issued at least one earnings forecast.
Broker size	Broker size, measured by the number of analysts employed by the broker who issued at least one earnings forecast in the previous 12 months.
Analyst workload	Analyst workload, which is the number of companies for which an analyst issued at least one earnings forecast over the previous 12 months.

Table 1, continued

Panel D: The independent variables: firm characteristics

CF_STD	Cash flow volatility, which is the ratio of the cash flows standard deviation scaled by the mean cash flow level measured over the previous four fiscal years.
MV	Firm size, computed as the firm's market capitalization at the end of the previous fiscal year in $ millions.
Analyst following	Intensity of analyst coverage, which is calculated as the number of analysts issuing at least one earnings forecast for the firm over the previous 12 months.
B/M	Book-to-market ratio, measured as the ratio of total common equity over the firm's market capitalization at the end of the previous fiscal year
Age	Firm age, which is the number of years between the firm's first appearance on CRSP files and the end-date of the previous fiscal year.
Dloss	A loss dummy, which is an indicator variable that equals one if the firm's I/B/E/S reported actual earnings are negative, and zero otherwise.
Altman Z	Altman's Z-score, which equals 1.2(Net working capital/Total Assets)+1.4(Retained earnings/Total Assets)+3.3(EBIT/Total Assets)+0.6(Equity market value/Book value of liabilities)+1.0(Sales/Total Assets).
Fin_crisis	A financial crisis dummy, which is an indicator variable that equals one if the EPS forecast has been issued after September 2007, and zero otherwise. September 2007 is the month in which Swiss Bank UBS announced a third quarter pre-tax loss of $690 million and a $3.42 billion write-down of mortgage backed securities. Announcements of losses on mortgage backed securities by other large international banks followed shortly, leading to the subprime crisis.
Industry dummies	11 industry dummies based on the sector code from the I/B/E/S SIG code.
Year dummies	Year dummies based on the calendar year of the earnings forecast issue.

Notes:
The table provides the definitions of the variables used in the study.

Table 2

Distribution of earnings and cash flow forecasts over the sample period and across industries

	Total #	*# EPS*	*(%)*	*# CF&EPS*	*(%)*
Panel A: Distribution of EPS and CF forecasts across fiscal years					
2000	43984	42381	96.4%	1603	3.6%
2001	47446	44873	94.6%	2573	5.4%
2002	50552	47751	94.5%	2801	5.5%
2003	58105	52462	90.3%	5643	9.7%
2004	65752	59875	91.1%	5877	8.9%
2005	67658	60066	88.8%	7592	11.2%
2006	68464	64297	93.9%	4167	6.1%
2007	67118	59417	88.5%	7701	11.5%
2008	68687	56824	82.7%	11863	17.3%
Total	537766	487946	90.7%	49820	9.3%

Panel B: Industry distribution

	Total #	*# EPS*	*(%)*	*# CF&EPS*	*(%)*	*% of analysts issuing CF*
Finance	1100	1069	97.2%	31	2.8%	15.8%
Health	66060	63895	96.7%	2165	3.3%	8.4%
Consumer non-durables	27945	26359	94.3%	1586	5.7%	11.6%
Consumer services	106484	102849	96.6%	3635	3.4%	9.4%
Consumer durables	17351	16766	96.6%	585	3.4%	12.0%
Energy	75206	44244	58.8%	30962	41.2%	51.5%
Transportation	14188	13547	95.5%	641	4.5%	10.2%
Technology	136183	131823	96.8%	4360	3.2%	8.4%
Basic industries	32415	29892	92.2%	2523	7.8%	18.5%
Capital goods	36429	34724	95.3%	1705	4.7%	12.0%
Public utilities	24405	22778	93.3%	1627	6.7%	12.3%

Notes:

Panel A reports the total number of earnings forecasts (*Total* #), the number of stand-alone EPS forecasts (# *EPS*) and the number of EPS forecasts complemented by cash flow forecasts(#*CF&EPS*) across fiscal years 2000–2008. (%) reports corresponding percentages. Row *Total* reports the number of unique observations in each category. Panel B presents the distribution of stand-alone EPS forecasts and of EPS forecasts complemented by cash flow forecasts across 11 industry groups based on the 2-digit I/B/E/S SIG code. Column *% of analysts issuing CF* reports the percentage of analysts issuing at least one cash flow forecast for a firm in a year.

Table 3
Descriptive statistics

Variable	*N*	*Mean*	*Median*	*STD*	*p*
Panel A: The independent variables					
DCF	537766	9.26%	0.00%	28.99%	0.000
|*Accruals_FE*|	49820	1.32%	0.57%	3.36%	0.000
|*CF_FE*|	49820	2.59%	1.33%	3.76%	0.000
Panel B: EPS forecast errors and the earnings quality proxy					
|*EPS_FE*|	537766	1.33%	0.38%	3.00%	0.000
|*EPS_FE*| | *CF*	49820	1.26%	0.50%	2.43%	0.000
M_CAQ	13241	8.12%	5.27%	8.11%	0.000
Panel C: Analyst- and broker-related variables					
Star analyst	537766	0.40%	0.00%	6.31%	0.000
G_experience		6.383	6.000	3.268	0.000
Broker size		56.079	48.000	41.355	0.000
Analyst workload		13.631	13.000	6.558	0.000
Panel D: Firm-related variables					
CF_STD	13241	1.222	0.453	3.205	0.000
MV		3865.560	696.480	9807.990	0.000
Analyst following		10.495	8.000	8.927	0.000
B/M		0.497	0.421	0.395	0.000
Age		20.994	14.334	17.045	0.000
Dloss		17.93%	0.00%	38.36%	0.000
Altman Z		5.041	3.466	5.935	0.000
Fin_crisis		11.31%	0.00%	31.68%	0.000

Notes:
The table reports the number of unique observations (*N*), and mean (*Mean*) and median (*Median*) values of the dependent and explanatory variables used in the study, together with their standard deviations (*STD*) and *p*-values (*p*). Panel A presents the results for the dependent variables. Panel B reports the forecast error of all earnings forecasts in the sample (|*EPS_FE*|) and of earnings forecasts issued with cash flow estimates (|*EPS_FE*| | *CF*), and the earnings quality proxy. Panel C shows the results for analyst- and broker-related explanatory variables. Panel D describes the results for firm-related explanatory variables. Other variable definitions are in Table 1.

Table 4

Predicting the analyst decision to disclose a cash flow forecast with the earnings estimate

	Predicted sign	*Estimate*	*ME*	*p*
Intercept		-4.757		0.000
M_CAQ	Demand (+)/Supply (−)	−2.631	−19.3%	0.000
Star analyst	Supply (+)	0.617	3.9%	0.039
G_experience	Supply (+)	−0.011	−3.5%	0.536
ln *Broker size*	Supply (+)	0.167	17.7%	0.010
Analyst workload	Supply (−)	−0.001	−0.5%	0.933
CF_STD	Demand (+)/Supply (−)	−0.029	−7.0%	0.067
ln *MV*	Demand (−)/Supply (+)	0.070	11.6%	0.311
ln *Analyst following*	Demand (−)/Supply (+)	0.472	32.8%	0.000
B/M	Demand (−)	−0.294	−9.2%	0.047
ln *Age*	Demand (−)/Supply (+)	−0.175	−13.2%	0.002
Dloss	Demand (+)	−0.249	−7.9%	0.031
Altman Z	Demand (−)	−0.045	−26.5%	0.000
Fin_crisis	Demand (+)	0.149	5.5%	0.204
Industry effect		Yes		
Year effect		Yes		
N		537766		
Wald χ^2		2733.34		
$p(\chi^2)$		0.000		
R^2		28.07%		

Notes:

The table presents regression results (*Estimate*) from a logistic model predicting the likelihood an analyst will issue a cash flow forecast to complement the earnings estimate. Variable definitions are in Table 1. Column *Predicted sign* describes the predicted sign of the coefficient. *ME* are the marginal effects, ln is the logarithm, and *p* are *p*-values for regression coefficients based on analyst- and year-clustered standard errors. *N* is the number of observations, *Wald* χ^2 is the Wald χ^2-test for model specification and $p(\chi^2)$ the corresponding *p*-value. R^2 is the pseudo *R*-squared.

Table 5
Sensitivity tests

	Current accruals volatility		*Jones model*		*Magnitude of current accruals*		*Management guidance*		*Other DH (2003) controls*	
	Estimate	*p*	*Estimate*	*p*	*Estimate*	*p*	*Estimate*	*p*	*Estimate*	*p*
Intercept	−4.593	0.001	−4.654	0.001	−5.004	0.000	−4.753	0.000	−6.121	0.000
C_ACC_STD	−4.151	0.000								
J_CAQ			−3.340	0.000						
MD_ACC					−0.648	0.009				
nMD_ACC					−2.650	0.014				
M_CAQ							−2.610	0.000	−1.830	0.000
Guidance							0.118	0.057	0.176	0.008
Acc_Het_Ind									0.004	0.977
EPS_STD									0.004	0.372
Capital intensity									0.296	0.000
Star analyst	0.621	0.039	0.617	0.039	0.616	0.041	0.620	0.038	0.680	0.020
G_experience	−0.011	0.527	−0.011	0.522	−0.011	0.547	−0.011	0.528	−0.007	0.676
ln *Broker size*	0.166	0.011	0.166	0.011	0.167	0.011	0.166	0.011	0.180	0.004
Analyst workload	−0.001	0.906	−0.001	0.929	−0.001	0.944	−0.001	0.928	−0.007	0.445
CF_STD	−0.019	0.229	−0.024	0.116	−0.036	0.039	−0.028	0.067	−0.010	0.443
ln *MV*	0.055	0.427	0.064	0.357	0.098	0.133	0.069	0.319	0.161	0.038
ln *Analyst following*	0.487	0.000	0.479	0.000	0.429	0.000	0.472	0.000	0.260	0.001
B/M	−0.324	0.040	−0.306	0.043	−0.224	0.107	−0.291	0.047	−0.198	0.195
ln *Age*	−0.182	0.001	−0.184	0.001	−0.172	0.002	−0.174	0.002	−0.077	0.141
Dloss	−0.189	0.084	−0.226	0.052	−0.386	0.001	−0.244	0.035	−0.417	0.001
Altman Z	−0.039	0.000	−0.043	0.000	−0.045	0.000	−0.044	0.000	−0.017	0.023
Fin_crisis	0.150	0.205	0.150	0.204	0.146	0.204	0.150	0.201	0.147	0.232
Industry effect	Yes		Yes		Yes		Yes		Yes	
Year effect	Yes		Yes		Yes		Yes		Yes	
N	537766		537766		537766		537766		537766	
Wald χ^2	2754.78		2758.62		2756.46		2881.94		3093.90	
$p(\chi^2)$	0.000		0.000		0.000		0.000		0.000	
R^2	28.26%		28.15%		28.02%		28.08%		29.61%	

Notes:
The table presents results from logistic regressions predicting that an analyst will issue a cash flow forecast to complement the earnings estimate. Columns *Current accruals volatility* report regression results when we use the volatility of current accruals, *C_ACC_STD*, to measure earnings quality. Columns *Jones model* show regression results when we use the variation in discretionary total accruals from the Jones model (Jones 1991), *J_CAQ*, to measure earnings quality. Columns *Magnitude of current accruals* present results when we use the signed level of discretionary and non-discretionary current accruals from the McNichols (2002) accruals model, *MD_ACC* and *nMD_ACC*, to measure earnings quality. Columns *Management guidance* report results for regression model (4) when we include an indicator variable for firm earnings guidance, *Guidance*. Columns *Other DH (2003) controls* show regression results when we include in model (4) three controls from DeFond and Hung (2003) in addition to *Guidance*. *Acc_Het_Ind* is the accounting choice heterogeneity index that captures the comparability of a firm's accounting choices with that of industry's peers. *EPS_STD* is the earnings volatility for the previous four fiscal years. *Capital intensity* is the capital intensity, which is measured as the ratio of gross property, plant and equipment divided by sales revenue. Other variables definitions are in Table 1. ln is the logarithm, *p* are *p*-values for regression coefficients based on analyst- and year-clustered standard errors. *N* is the number of observations, *Wald* χ^2 is the Wald χ^2-test for model specification and $p(\chi^2)$ the corresponding *p*-value. R^2 is the pseudo *R*-squared.

Table 6
Annual and Fama-MacBeth regressions

	2000	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*Fama-MacBeth*
	Estimate	*Estimate*	*Estimate*	*Estimate*	*Estimate*	*Estimate*	*Estimate*	*Estimate*	*Estimate*	*Estimate*
Intercept	−5.090	−3.548	−3.663	−6.475	−7.799	−5.741	−5.799	−2.777	−1.415	−4.701
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.000
M_CAQ	−2.995	−11.166	−2.832	−1.697	−0.733	−2.494	−2.127	−3.914	−2.680	−3.404
p	0.033	0.000	0.049	0.039	0.465	0.001	0.032	0.000	0.000	0.010
Star analyst	0.715	0.731	1.209	0.717	0.317	0.325	0.210	0.111	1.009	0.594
p	0.077	0.345	0.138	0.046	0.481	0.382	0.722	0.872	0.153	0.002
G_experience	−0.062	−0.053	0.017	0.012	0.024	0.016	−0.010	−0.017	−0.034	−0.012
p	0.349	0.344	0.671	0.665	0.395	0.588	0.717	0.481	0.115	0.298
ln *Broker size*	0.474	−0.112	0.085	0.339	0.174	0.184	−0.064	0.102	0.264	0.161
p	0.002	0.253	0.392	0.000	0.040	0.045	0.432	0.190	0.000	0.032
Analyst workload	0.008	0.005	0.007	0.005	0.000	0.008	0.006	−0.005	−0.021	0.001
p	0.626	0.786	0.618	0.746	0.996	0.610	0.667	0.715	0.103	0.680
CF_STD	−0.206	−0.058	−0.009	−0.009	0.012	−0.032	−0.045	−0.012	−0.065	−0.047
p	0.219	0.187	0.708	0.731	0.506	0.323	0.059	0.530	0.039	0.061
ln *MV*	0.142	0.166	−0.281	0.045	0.438	0.216	−0.110	0.001	−0.008	0.068
p	0.086	0.037	0.000	0.356	0.000	0.000	0.074	0.989	0.843	0.353
ln *Analyst following*	0.264	−0.120	1.030	0.618	0.435	0.391	0.946	0.716	0.270	0.506
p	0.169	0.441	0.000	0.000	0.004	0.005	0.000	0.000	0.009	0.003
B/M	−0.019	−0.162	−0.529	0.026	−0.191	−0.502	−1.591	−0.602	−0.256	−0.425
p	0.937	0.467	0.031	0.829	0.422	0.020	0.000	0.000	0.042	0.032
ln *Age*	−0.503	−0.545	−0.125	0.035	−0.183	−0.111	−0.129	−0.286	−0.198	−0.227
p	0.000	0.000	0.050	0.534	0.011	0.091	0.087	0.000	0.001	0.007
Dloss	−0.316	1.133	−1.121	−0.160	−1.284	−0.709	−0.018	−0.162	−0.072	−0.301
p	0.244	0.000	0.000	0.298	0.000	0.001	0.949	0.275	0.516	0.239
Altman Z	−0.082	−0.072	−0.124	−0.039	−0.049	−0.036	−0.029	−0.034	−0.037	−0.056
p	0.003	0.000	0.000	0.012	0.004	0.006	0.058	0.011	0.001	0.001
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	43984	47446	50552	58105	65752	67658	68464	67118	68687	
Wald χ^2	187.09	848.73	435.12	442.50	461.44	560.07	773.34	482.66	280.120	
$p(\chi^2)$	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
R^2	18.13%	45.70%	32.62%	20.74%	25.93%	31.68%	41.54%	29.72%	20.67%	

Notes:
The table reports results from annual and Fama-MacBeth regressions predicting that an analyst will issue a cash flow forecast to complement the earnings estimate. Columns *2000–2008* report results for fiscal-year logistic regressions predicting that an analyst will complement the earnings estimate with a cash flow forecast. Columns *Fama-MacBeth* present results from the Fama-MacBeth analysis. Variables definitions are in Table 1. ln is the logarithm. For annual regressions, *p* are *p*-values based on analyst-clustered standard errors. For Fama-MacBeth regression, *p* are *p*-values corrected for time-series dependence. *N* is the number of observations, *Wald* χ^2 is the Wald χ^2-test for model specification and $p(\chi^2)$ the corresponding *p*-value. R^2 is the pseudo *R*-squared.

Table 7
Durations between cash flow forecast revisions

	Estimate	*Hazard ratio*	*p*
M_CAQ	−0.455	0.634	0.000
Star analyst	0.285	1.329	0.000
G_experience	−0.009	0.991	0.000
ln *Broker size*	−0.008	0.992	0.076
Analyst workload	0.007	1.007	0.000
CF_STD	−0.004	0.996	0.351
ln *MV*	−0.044	0.956	0.000
ln *Analyst following*	0.114	1.121	0.000
B/M	0.020	1.020	0.337
ln *Age*	−0.019	0.981	0.011
Dloss	−0.019	0.981	0.400
Altman Z	−0.012	0.988	0.000
Fin_crisis	0.468	1.597	0.000
Industry effect	Yes		
Year effect	Yes		
N	49810		
Wald χ^2	26985.85		
$p(\chi^2)$	0.000		

Notes:
The table presents results (*Estimate*) from the non-parametric proportional Cox model (Cox, 1972) that examines the durations between cash flow forecast revisions. *Hazard ratio* shows the hazard ratio. Variable definitions are in Table 1. ln is the logarithm, *p* are *p*-values and *N* is the number of observations, *Wald* χ^2 is the Wald χ^2-test for model specification and $p(\chi^2)$ the corresponding *p*-value.

Table 8
Analysis of the results in DeFond and Hung (2003)

	Absolute total accruals, DH (2003)		*Signed total accruals*		*Variation in total accruals*		*Signed current accruals*	
	Estimate	*p*	*Estimate*	*p*	*Estimate*	*p*	*Estimate*	*p*
Intercept	−5.251	0.000	−5.269	0.000	−4.633	0.001	−5.025	0.000
|*T_ACC*|	1.352	0.000						
T_ACC			−2.314	0.000				
T_ACC_STD					−3.554	0.000		
C_ACC							−0.892	0.000
Star analyst	0.618	0.039	0.617	0.041	0.617	0.039	0.615	0.040
G_experience	−0.010	0.567	−0.010	0.580	−0.011	0.522	−0.011	0.548
ln *Broker size*	0.168	0.010	0.167	0.010	0.166	0.011	0.167	0.011
Analyst workload	−0.001	0.943	−0.001	0.892	−0.001	0.927	0.000	0.961
CF_STD	−0.044	0.010	−0.033	0.043	−0.021	0.173	−0.039	0.020
ln *MV*	0.111	0.095	0.114	0.085	0.060	0.385	0.097	0.142
ln *Analyst following*	0.418	0.000	0.404	0.000	0.480	0.000	0.435	0.000
B/M	−0.174	0.185	−0.175	0.200	−0.309	0.042	−0.221	0.108
ln *Age*	−0.160	0.003	−0.167	0.002	−0.184	0.001	−0.171	0.002
Dloss	−0.393	0.001	−0.383	0.001	−0.212	0.067	−0.361	0.002
Altman Z	−0.049	0.000	−0.039	0.000	−0.042	0.000	−0.046	0.000
Fin_crisis	0.152	0.185	0.150	0.186	0.150	0.203	0.149	0.191
Industry effect	Yes		Yes		Yes		Yes	
Year effect	Yes		Yes		Yes		Yes	
N	537766		537766		537766		537766	
Wald χ^2	2771.69		2776.85		2767.38		2743.13	
$p(\chi^2)$	0.000		0.000		0.000		0.000	
R^2	28.01%		28.25%		28.19%		27.98%	

Notes:
The table presents results (*Estimate*) from logistic regressions predicting the likelihood an analyst will issue a cash flow estimate to complement the earnings forecast. Columns *Absolute total accruals, DH (2003)* report results from model (4) when we use absolute total accruals, |*T_ACC*|, as the earnings quality measure. Columns *Signed total accruals* show results for model (4) when we use signed total accruals, *T_ACC*, as the earnings quality measure. Columns *Variation in total accruals* present results for model (4) when we use the variation in total accruals, *T_ACC_STD*, as the earnings quality measure. Columns *Signed current accruals* show results for model (4) when we use signed current accruals, *C_ACC*, as the earnings quality measure. Other variables definitions are in Table 1. ln is the logarithm and *p* are *p*-values for regression coefficients based on analyst- and year-clustered standard errors. *N* is the number of observations, *Wald* χ^2 is the Wald χ^2-test for model specification and $p(\chi^2)$ the corresponding *p*-value. R^2 is the pseudo R-square.

Table 9
Regression results for the accuracy of accruals and cash flow estimates

	Accrual forecast error		*CF forecast error*	
	Estimate	*p*	*Estimate*	*p*
Intercept	0.021	0.000	0.028	0.000
M_CAQ	0.049	0.000	0.042	0.001
|*EPS_FE*|			0.642	0.000
Star analyst	0.003	0.291	0.003	0.309
G_experience	0.000	0.675	0.000	0.882
ln *Broker size*	0.000	0.375	0.000	0.477
Analyst workload	0.000	0.104	0.000	0.512
CF_STD	0.001	0.130	0.001	0.077
ln *MV*	−0.001	0.002	−0.002	0.000
ln *Analyst following*	0.000	0.696	0.000	0.591
B/M	0.014	0.000	0.019	0.000
ln *Age*	0.000	0.450	0.000	0.605
Dloss	−0.018	0.000	−0.002	0.423
Altman Z	−0.001	0.000	−0.001	0.000
Fin_crisis	0.000	0.558	−0.002	0.014
Industry effect	Yes		Yes	
Year effect	Yes		Yes	
N	49820		49820	
F-test	86.980		190.830	
p(F)	0.000		0.000	
R^2	7.17%		29.66%	

Notes:
The table presents regression results (*Estimate*) from the accuracy models where the dependent variable is the accrual forecast error (*Accrual forecast error*) or the cash flow forecast error (*CF forecast error*). Variable definitions are in Table 1. ln is the logarithm and *p* are *p*-values for regression coefficients based on analyst- and year-clustered standard errors. *N* is the number of observations, *F-test* is the *F*-test for the model specification and *p(*F*)* the corresponding *p*-value. R^2 is the *R*-squared.

Table 10
Price reaction regressions

Panel A: Descriptive statistics for the variables in the price reaction model (*N*= 341,861)

	Mean	*Median*	*STD*	*p*
CAR(−1,1)	−0.16%	0.01%	7.53%	0.000
Δ*EPS*	−3.95%	−0.26%	31.30%	0.000
Δ*CF*	0.11%	0.00%	3.63%	0.000
Δ*REV*	−0.13%	0.00%	3.93%	0.000
Upgrade	8.42%	0.00%	27.77%	0.000
Downgrade	8.80%	0.00%	28.32%	0.000

Panel B: Price reaction model regression results

	Call et al. (2013) regression		*Controlling for revenue forecast*		*Controlling for stock recommendations*		*Interaction terms*	
	Estimate	*p*	*Estimate*	*p*	*Estimate*	*p*	*Estimate*	*p*
Intercept	0.000	0.483	0.000	0.404	0.002	0.001	0.002	0.001
Δ*EPS*	0.049	0.000	0.043	0.000	0.039	0.000	0.039	0.000
Δ*CF*	0.019	0.002	0.010	0.102	0.008	0.212	0.008	0.210
Δ*REV*			0.217	0.000	0.194	0.000	0.195	0.000
Upgrade					0.032	0.000	0.032	0.000
Downgrade					−0.045	0.000	−0.045	0.000
Δ*EPS**Δ*CF*							−0.003	0.826
N	341861		341861		341861		341861	
F-test	771.54		630.38		698.05		592.09	
p(F)	0.000		0.000		0.000		0.000	
R^2	4.17%		5.38%		9.95%		9.95%	

Notes:

Panel A reports descriptive statistics for the variables in model (9), which examines the price reaction to analyst cash flow forecast revisions (Δ*CF*). *CAR (−1,1)* is the three-day cumulative abnormal return centered on the earnings forecast announcement date. Δ*EPS* is the analyst's EPS forecast revision and Δ*REV* is the analyst's revenue forecast revision. *Upgrade* is the stock recommendation upgrade and *Downgrade* is the stock recommendation downgrade. Panel B presents the regression results for model (9). Columns *Call et al. (2013) regression* show the regression results for model (9) when we include only revisions in analyst earnings and cash flow forecasts as in Call et al. (2013a). Columns *Controlling for revenue forecast* show the regression results for model (9) when we include revisions in earnings and in cash flow estimates together with the concurrent revisions in revenue estimates. Columns *Controlling for stock recommendations* report results for the full specification of model (9). Columns *Interaction terms* show results when we repeat model (9) after including an interaction term between revisions in analyst earnings and in cash flow forecasts, Δ*EPS**Δ*CF*. *p* are *p*-values for regression coefficients based on firm- and date-clustered standard errors, *N* is the number of observations, *F-test* is the *F*-test for model specification and *p(F)* is the corresponding *p*-value. R^2 is the R-squared.