The Usefulness of Direct Cash Flow Disclosures and the Associated Articulation Errors

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Abstract: The Chinese accounting standards require listed firms to report the statement of cash flows using both the direct method (DM) and indirect method (IM). We investigate (1) whether disclosed operating cash flows (CFO) components from the DM statement of cash flows are useful for predicting future CFO and earnings and (2) the information in and usefulness of the articulation errors between DM and IM statements of cash flows. We find that the superiority of DM disclosures over IM disclosures, both incrementally and relatively, for predicting future CFO and earnings is small. However, we also find that absolute articulation errors contain information about cash flow persistence and information about the risk and uncertainty of future cash flows and earnings. Overall, we conclude that DM disclosures are useful because (1) DM disclosures are modestly superior to IM disclosures for assessing the *amount* of future cash flows and earnings and, more importantly, (2) absolute articulation errors derived from DM disclosures help financial statement users in assessing the risk and *uncertainty* of future cash flows and earnings.

Keywords: Direct Method, Indirect Method, Statement of Cash Flows, Articulation Errors, Uncertainty of Future Cash Flows, Prediction of Future Cash Flows and Earnings.

Data Availability: Data used in this study are available from the sources identified in the study.

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I. INTRODUCTION

Financial accounting standard setters, preparers and users of financial statements, and academics have long debated the advantages and disadvantages of reporting net cash flow from operating activities (CFO) using the direct method (DM) versus the indirect method (IM). The DM statement of cash flows discloses CFO components and CFO. On the other hand, the IM statement of cash flows presents a reconciliation from net income to CFO without disclosing CFO components. Although the Financial Accounting Standards Board (FASB) and International Accounting Standards Board (IASB) both recognize that DM statements of cash flows potentially provide more information than IM statements of cash flows and encourage firms to use DM, both standard setters permit the use of IM.[1] Because both DM and IM are allowed, the vast majority of US firms report IM statements of cash flows and only 2-3% of firms report DM statements of cash flows in recent years (Krishnan and Largay 2000).

We investigate (1) whether disclosed CFO components from the DM statement of cash flows are useful, both incremental and relative to estimated CFO components from the IM statement of cash flows or comparative balance sheets, for predicting future CFO and earnings and (2) the information in and usefulness of the articulation errors between DM and IM statements of cash flows. Our research is motivated by several factors. First, FASB and IASB are deliberating on whether firms should be required to report DM statements of cash flows. On October 16, 2008, FASB and IASB jointly issued a discussion paper asking for public comments on their "Preliminary Views on Financial Statement Presentation," one of which is the proposal

[1] See the Statement of Financial Accounting Standards (SFAS) No. 95, *Statement of Cash Flows* (FASB 1987) and International Accounting Standard (IAS) 7, *Cash Flow Statements* (IASB 1992).

that firms should use the DM to prepare statements of cash flows (para. 3.75).[2] The Boards received 227 comment letters. About two-thirds of respondents (the majority of which are preparers) do not agree that a DM statement of cash flows provides more decision-useful information than an IM statement of cash flows. In fact, many of them believe that the opposite is true.[3] On the other hand, the respondents who agree with requiring a DM statement of cash flows are mostly auditors and users. They believe that a DM statement of cash flows provides information about operating cash flows not available in an IM statement of cash flows. In the "Staff Draft of an Exposure Draft on Financial Statement Presentation" released on July 1, 2010, FASB and IASB re-affirmed their preliminary view to require firms to report DM statements of cash flows based on the inputs from users of financial statements and academic research and despite the opposition from preparers (see BC172-BC181 of the staff draft).

A second motivation for our research is the limited empirical evidence in the literature on the advantages and disadvantages of DM and IM disclosures due, perhaps, to the lack of DM data. Using a small, hand-collected sample of US firms that *voluntarily* report DM statements of cash flows, Orpurt and Zang (2009) show that the articulation errors (= disclosed CFO components – estimated CFO components) for the two largest CFO components, cash received from customers and cash paid to suppliers and employees, are useful for predicting future CFO and earnings incremental to estimated CFO components. In essence, Orpurt and Zang (2009) find that the DM information is useful *incremental* to the IM information. On the other hand, Krishnan and Largay (2000, Table 3), also using a small sample of US firms that voluntarily report the DM statement of cash flows, run a horserace between DM and IM disclosures and find

[2] See FASB Discussion Paper No. 1630-100 at http://www.fasb.org/DP_Financial_Statement_Presentation.pdf.
[3] See "Comment Letter Summary" at http://www.fasb.org/jsp/FASB/FASBContent_C/ProjectUpdatePage&cid=1176156965909.

that the one-year-ahead prediction error for future CFO based on DM disclosures is smaller than that based on IM disclosures, i.e., DM disclosures are *relatively* superior to IM disclosures for predicting one-year-ahead CFO.

Both Orpurt and Zang (2009) and Krishnan and Largay (2000) rely on a small, hand-collected sample of US firms that voluntarily report the DM statement of cash flows. Their conclusions, therefore, are potentially subject to a self-selection bias. That is, US firms whose DM disclosures are more informative for predicting future cash flows and earnings voluntarily disclose the DM statement of cash flows. Whether their findings are generalizable to a regime where firms are mandatorily required to report DM statements of cash flows is an empirical question that we address in this paper.

A final motivation for our research is that prior literature has not fully explored the nature of information in articulation errors. Orpurt and Zang (2009) show that articulation errors are incrementally useful for predicting future CFO and earnings (i.e., for assessing the *amount* of future cash flows and earnings). As we explain more fully in the next section, articulation errors capture a firm's non-recurring and unusual transactions, many of which are noncash and related party transactions. As such, the absolute values of articulation errors contain information about the persistence of disclosed cash received from (paid to) customers (suppliers and employees) and about the risk and *uncertainty* of future cash flows and earnings. The idea that absolute articulation errors are useful for assessing the uncertainty of future CFO and earnings is unexplored in the literature, which we demonstrate in this paper.

While FASB and IASB are still discussing whether firms should be required to report the DM statement of cash flows, Chinese accounting standards have *mandatorily* required Chinese listed firms to report both DM and IM statements of cash flows since 1998. China is one of the

few countries (along with Australia and New Zealand) that require the disclosure of both DM and IM statements of cash flows and thus the Chinese data represent an important opportunity to examine the usefulness of DM disclosures, both incremental and relative to IM disclosures, and the nature and usefulness of articulation errors.

After imposing minimum data requirements, we identify a sample of 9,432 observations during 2002-2009 that have nonmissing DM and IM statement of cash flows data and nonmissing other required data. We address several research questions. First, we examine whether findings in Orpurt and Zang (2009) and Krishnan and Largay (2000) are generalizable to a regime of mandatory reporting of DM statements of cash flows. Consistent with Orpurt and Zang (2009), we find that adding two articulation errors for cash received from customers and for cash paid to suppliers and employees significantly improves the explanatory power of the prediction models for future CFO and earnings when compared to the prediction models using only estimated CFO components. However, we find that the explanatory power (measured by adjusted R^2, the goodness of fit) is increased from 0.141 (using IM disclosures) to 0.146 (using both IM and DM disclosures). Although the increase is statistically significant based on the Vuong (1989) test, it is much smaller than the increase (from 0.4579 to 0.4966) reported in Orpurt and Zang (2009, Table 4). Similarly, we find that disclosed CFO components dominate estimated CFO components, in a one-on-one horserace, for predicting future CFO and marginally so for predicting future earnings. Again, the margin of superiority of the former over the latter is much smaller than what is reported in Krishnan and Largay (2000, Table 3).[4]

[4] Table 3 of Krishnan and Largay (2000) reports that, for the sample period of 1991-1993, the mean prediction errors based on Average Rank and MAPE (mean absolute percentage error) are 2.15 and 0.71, respectively, for the prediction model using IM disclosures (Equation (1a)) whereas the mean prediction errors are 1.80 and 0.62, respectively, for the prediction model using DM disclosures (Equation (2)). If we take the reciprocal of prediction error as a measure of prediction accuracy, then the prediction accuracy of the DM model is 1.194 times (= 2.15/1.80)

Second, we argue that articulation errors capture a firm's non-recurring and unusual transactions that are not or incompletely disclosed in the reported financial statements (see the next section for more detailed discussion). Our examination of a small subset of our sample with medium to large absolute articulation errors supports the above argument. For example, we find that firms sometimes will receive payments from customers whose accounts receivable were written off earlier, making disclosed cash received from customers larger than its estimated counterpart using either the IM statement of cash flows or comparative balance sheets. As another example, firms sometimes endorse their trade notes receivable to pay for inventory purchases or other operating expenses. This noncash transaction makes disclosed cash received from customers smaller than estimated receipt. In these examples, disclosed cash received from customers is larger (smaller) than the estimated amount, resulting in a positive (negative) articulation error. Since the underlying transactions (collection of previously written-off accounts and use of trade notes receivable as payment) are non-recurring or irregular, the high (low) disclosed cash received from customers is less likely to persist. That is, positive (negative) articulation errors are transitory and cause disclosed cash received from customers *temporarily* high (low).

We test whether absolute articulation errors contain information about the persistence of disclosed CFO components by regressing future CFO and future earnings, respectively, on disclosed CFO components and their interactions with absolute articulation errors. We find that the coefficients on the interaction terms are strongly significantly negative. This is, disclosed cash received from (paid to) customers (suppliers and employees) persist less into future CFO and earnings for firms with larger absolute articulation errors, consistent with the notion that

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and 1.145 times (= 0.71/0.62) of that of the IM model. The superiority of the DM prediction model over the IM prediction model documented in Krishnan and Largay (2000), thus, is reasonably large.

absolute articulation errors contain information about the persistence of disclosed CFO components.

Third, we examine whether absolute articulation errors contain information about the uncertainty of future CFO and earnings by regressing the volatility of future CFO and earnings, respectively, on absolute articulation errors and control variables. We find significantly positive coefficients on absolute articulation errors. That is, firms with larger absolute articulation errors have higher future CFO and earnings volatility, consistent with the notion that absolute articulation errors contain information about the uncertainty of future CFO and earnings.

Finally, we examine whether absolute articulation errors contain information about audit risk. It is natural to examine auditors' reaction to absolute articulation errors because auditors are the first outside users and examiners of a firm's financial statements. From their reaction to absolute articulation errors, we can infer about the nature of the information in absolute articulation errors. Our approach is similar in spirit to Francis and Krishnan (1999) who examine the propensity for auditors to issue modified audit opinions in response to large absolute accruals. We argue that firms with larger absolute articulation errors pose higher audit risk because articulation errors arise from non-recurring and irregular transactions that have higher inherent risk and that sometimes involve noncash and related party transactions. To compensate for the higher audit risk, auditors are likely to lower the threshold for issuing modified audit opinions (Francis and Krishnan 1999). We find that auditors are more likely to issue modified audit opinions to firms with larger absolute articulation errors, consistent with the notion that absolute articulation errors contain information about audit risk.

We contribute to the literature in several ways. First, we extend findings in Orpurt and Zang (2009) and Krishnan and Largay (2000) obtained under a voluntary regime of reporting

DM statements of cash flows to a mandatory regime of disclosing DM statements of cash flows. However, we find that the superiority of DM disclosures over IM disclosures, both incrementally and relatively, using Chinese data under the mandatory regime of disclosing DM statements of cash flows is much smaller than that using US data under the voluntary regime of reporting DM statements of cash flows. This seems to imply that, if FASB and IASB require the disclosure of DM statements of cash flows, the superiority of the DM information over IM information for assessing the *amount* of future cash flows and earnings might be small.

Second, we are the first to explore the nature of information in articulation errors and the first to demonstrate that absolute articulation errors contain information about the persistence of reported cash flow components and information about the risk and uncertainty of future CFO and earnings.

Finally, our findings have implications for FASB and IASB in their deliberation for requiring the disclosure of the DM statement of cash flows. The purpose of financial reporting is to provide information to help users in assessing the amount, timing, and uncertainty of future cash flows and earnings.[5] Our findings support the mandatory disclosure of DM statements of cash flows because (1) DM disclosures are modestly superior to IM disclosures for assessing the *amount* of future cash flows and earnings and, more importantly, (2) absolute articulation errors derived from DM disclosures help financial statement users in assessing the risk and *uncertainty* of future cash flows and earnings.

The rest of the paper is organized as follows. Section II reviews the relevant literature and develops the hypotheses. Section III describes the research design, and Section IV presents the empirical results. We conclude in Section V.

[5] See Statement of Financial Accounting Concepts No. 8, *Conceptual Framework for Financial Reporting* (FASB 2010).

II. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Articulation Errors

It has long been recognized that changes in current assets and current liabilities accounts from comparative balance sheets often do not articulate with changes reported on the IM statement of cash flows. For example, Bahnson, Miller, and Budge (1996) examine a large sample of Compustat financial statements and find that about 75% of the firms in their sample present non-articulated changes. Although many non-articulated changes are simply unexplained in financial statements, they find a variety of causes for non-articulation, including aggregation and *unusual* events such as reclassification of noncurrent assets into current assets or vice versa and paying accounts payable via stock issuance (noncash transaction). In a similar spirit, Hribar and Collins (2002) find that estimated accruals using changes in comparative balance sheet accounts, instead of directly from the IM statement of cash flows, contain systematic errors due to non-articulation between comparative balance sheets and the IM statement of cash flows. They investigate three primary non-articulation events, mergers and acquisitions, divestitures, and foreign currency translations, and find that these non-articulation events induce significant errors in accruals estimates using the balance sheet approach. Moreover, even in a subsample where none of these three primary non-articulation events exists, accruals estimation errors (i.e., articulation errors) still widely exist.

Krishnan and Largay (2000) find that there are articulation errors between disclosed cash received from (paid to) customers (suppliers and employees) and estimated cash received from (paid to) customers (suppliers and employees) using comparative balance sheets. Orpurt and Zang (2009) further show that such articulation errors still exist even when estimating cash

received from (paid to) customers (suppliers and employees) using the IM statement of cash flows. This finding is important because it provides evidence inconsistent with a belief alluded to in SFAS 95 that CFO components might be estimated using the IM statement of cash flows perhaps with trivial articulation errors.

Usefulness of Direct Cash Flow Disclosures for Forecasting Future CFO and Earnings

After documenting the existence of articulation errors for cash received from (paid to) customers (suppliers and employees), Orpurt and Zang (2009) investigate whether articulation errors are incrementally useful beyond estimated CFO components for forecasting future CFO and earnings. They show that the articulation errors for the two largest CFO components, cash received from customers and cash paid to suppliers and employees, are useful for predicting future CFO and earnings incremental to estimated CFO components. In effect, Orpurt and Zang (2009) find that the combined information from IM and DM statements of cash flows is superior to the information from IM statements of cash flows alone, i.e., the DM information is useful incrementally to the IM information. However, they do not investigate whether the DM information is relatively superior to the IM information, given the choice of one, for predicting future CFO and earnings.

Krishnan and Largay (2000) conduct a one-on-one horse race between DM disclosures and IM disclosures. Specifically, they use DM disclosures and IM disclosures, respectively, to predict one-year-ahead CFO and then compare the predictive accuracy between the two models. They find that the prediction errors of the model using DM disclosures are smaller than those of the model using IM disclosures. They thus find that DM disclosures are relatively superior to IM disclosure for predicting one-year-ahead CFO.

We investigate whether findings in Orpurt and Zang (2009) and Krishnan and Largay (2000) based on small samples of US firms that voluntarily disclose DM statements of cash flows are generalizable to a regime of mandatory disclosure of DM statements of cash flows. Based on Orpurt and Zang (2009), Krishnan and Largay (2000), and a belief in SFAS 95 and IAS 7 that DM disclosures provide more information than IM disclosures, we formalize our first and second hypotheses (in alternative form) below.

H1: Articulation errors are useful incremental to estimated CFO components for predicting future CFO and earnings.

H2: Disclosed CFO components are relatively superior to estimated CFO components for predicting future CFO and earnings.

Absolute Articulation Errors and Cash Flow Persistence

As discussed earlier, Krishnan and Largay (2000) and Orpurt and Zang (2009) document articulation errors for cash received from customers and cash paid to suppliers and employees. However, they do not investigate underlying causes for articulation errors. We argue that articulation errors arise from a firm's non-recurring and unusual transactions that are not or incompletely disclosed in financial statements. With *complete* information, one can perfectly articulate disclosed cash received from customers and disclosed cash paid to suppliers and employees with information from the IM statement of cash flows or comparative balance sheets as follows as follows.

Disclosed cash received from customers = sales revenue – change in accounts receivables + change in unearned revenue – *accounts receivable written-off + cash collection*

from previously written-off accounts + change in accounts receivable due to noncash or non-operating transactions.[6]

Disclosed cash paid to suppliers and employees = cost of goods sold – change in accounts payable + change in inventory + change in prepaid purchase + selling, general and administrative expense – depreciation and amortization – change in wages payable + *change in accounts payable due to noncash or non-operating transactions – change in inventory due to noncash or non-operating transactions + inventory spoilage*.[7]

The italicized items are non-recurring or unusual transactions. With complete information, one can determine these irregular items and individually assess their low persistence levels for future CFO and earnings. However, these italicized items are not reported in general purpose financial statements and are not or incompletely disclosed in footnotes. Consequently, cash received from customers and cash paid to suppliers and employees are *estimated* without the italicized items, causing the estimated amount to differ from the disclosed amount. Articulation errors, thus, precisely capture the aggregate of these non-recurring and unusual transactions.

To obtain a first-hand understanding of the underlying causes for articulation errors in our sample, we randomly choose 100 observations from our sample with medium to large absolute articulation errors (i.e., in the middle and upper terciles). We then hand collect annual reports and read footnotes for accounts receivable, trade notes receivable, inventory, accounts payable, and trade notes payable. We also read audit reports. For most cases, we are able to find some disclosures about articulation errors although such disclosures are far from complete. We

[6] *Change in accounts receivable due to noncash or non-operating transactions* includes transactions such as (1) the acquisition of other firms' accounts receivable by giving other parties long-term assets or incurring long-term liabilities and (2) swapping accounts receivable with other firms' long-term assets.

[7] *Change in accounts payable due to noncash or non-operating transactions* includes, for example, (1) paying off accounts payable by long-term assets or issuance of long-term debt or equity and (2) assuming other firms' accounts payable and acquiring their noncash assets.

summarize five cases in the Appendix. These cases confirm our conjecture that articulation errors arise from non-recurring and unusual transactions.

Since articulation errors are caused by non-recurring and unusual transactions, we argue that disclosed cash received from customers or disclosed cash paid to suppliers and employees are *temporarily* high or low due to these non-recurring transactions. For example, if a firm receives cash payment from a previously written-off account, disclosed cash received from customers will be greater than the estimated amount, resulting in a positive articulation error. However, disclosed cash received from customers is only temporarily high or contains a positive transient component. As another example, if a firm swaps its accounts receivable for long-term assets with another firm, disclosed cash received from customers is less than the estimated amount, resulting in a negative articulation error for cash received from customers. However, disclosed cash received from customers is only temporarily low or contains a negative transient component. The larger the *absolute* articulation errors, the larger the transient components in disclosed cash received from customers, and the less persistent is disclosed cash received from customers. We formalize our third hypothesis (in alternative form) below.

H3: The persistence of disclosed cash received from customers and disclosed cash paid to suppliers and employees with respect to future CFO and earnings is negatively associated with absolute articulation errors.

Absolute Articulation Errors and Uncertainty of Future CFO and Earnings

H3 suggests that larger absolute articulation errors imply lower persistence for disclosed cash received from (paid to) customers (suppliers and employees). We hypothesize that larger absolute articulation errors also imply higher volatility for future CFO and earnings. This hypothesis can be motivated intuitively by an analogy between discretionary accruals and

articulation errors. One line of research in the discretionary accrual literature shows that discretionary accruals (analogous to articulation errors) are useful for predicting future earnings although discretionary accruals are less persistent than nondiscretionary accruals and CFO (Subramanyam 1996a; Xie 2001). Another line of research finds that *absolute* discretionary accruals (analogous to absolute articulation errors) are positively associated with the cost of equity capital (Francis et al. (2005, p. 325)), implying that absolute discretionary accruals, and absolute articulation errors by analogy, are positively associated with the risk and uncertainty of future cash flows.

Our hypothesis can also be motivated by Subramanyam (1996b). Subramanyam (1996b) models the effect of information on security prices when there is uncertainty regarding the precision of the information. He shows that the conditional expectation of the signal precision is strictly decreasing in the absolute magnitude of the information surprise, which is the difference between the realized value of the information and its mean. That is, the conditional expectation of the signal *variance* is strictly increasing in the absolute magnitude of the information surprise. Recast the Subramanyam (1996b) model in our setting, disclosed cash received from (paid to) customers (suppliers and employees) can be interpreted as signal with uncertain variance. Without losing generality, we assume the signal variance is either high or low following a binary distribution. Our articulation errors are analogous to the signal surprise in Subramanyam (1996b). Thus, according to Subramanyam (1996b), the conditional expectation of the signal variance is increasing in the absolute information surprise. That is, the larger the absolute articulation errors, the more likely the disclosed cash from (paid to) customers (suppliers and employees) comes from the distribution with a high variance.

Based on the above discussion, we formalize our fourth hypothesis (in alternative form) below.

H4: Firms with larger absolute articulation errors have more volatile future CFO and earnings.

Absolute Articulation Errors and Audit Opinions

Auditors are the first outside users of firms' financial statements and are also the examiners of these financial statements. We can learn about the nature of absolute articulation errors by examining auditors' reactions to them. We thus examine how audit opinions vary with absolute articulation errors. Since articulation errors are caused by non-recurring and unusual transactions that have higher inherent risk and that sometimes involve noncash and related party transactions, auditors face a higher audit risk when auditing firms with larger absolute articulation errors because of the following reasons. First, larger absolute articulation errors mean lower persistence in disclosed cash received from customers and disclosed cash paid to suppliers and employees and higher volatility in future CFO and earnings. Second, larger absolute articulation errors mean more non-recurring or unusual transactions underlying the articulation errors and more non-recurring or unusual transactions mean higher inherent risk. As we show in the Appendix, some non-recurring transactions are noncash transactions, which increase the risk of misstatement, especially when the market value of the noncash consideration is not readily available. Furthermore, some non-recurring transactions are arranged with related parties. This further increases the risk of misstatement or even fraud. To summarize, auditors face a higher audit risk when auditing firms with larger absolute articulation errors. To compensate for the increased audit risk, auditors are likely to lower the threshold to issue modified audit opinions (Francis and Krishnan 1999).

Based on the above discussion, we state our fifth hypothesis (in alternative form) below.

H5: Auditors are more likely to issue modified audit opinions to firms with larger absolute articulation errors.

III. RESEARCH DESIGN

Usefulness of Direct Cash Flow Disclosures for Predicting Future CFO and Earnings

Orpurt and Zang (2009) show that the two largest CFO components, *disclosed* cash received from customers (*Dis_Sales*) and *disclosed* cash paid to suppliers and employees (*Dis_Supem*) in the DM statement of cash flows, are incrementally useful for predicting future CFO and earnings in the presence of *estimated* cash received from customers (*Est_Sales*) and *estimated* cash paid to suppliers and employees (*Est_Supem*). We first investigate whether this finding can be generalized to a regime of mandatory reporting of DM statements of cash flows. Following Orpurt and Zang (2009), we use the following equations to demonstrate the incremental forecasting power of *Dis_Sales* and *Dis_Supem*.

Our baseline forecasting model for future CFO is as follows,

$$FCFO = a_0 + a_1 CFO + \varepsilon, \quad (1)$$

where *FCFO* and *CFO* are CFO in the subsequent year and current year, respectively.

Following Orpurt and Zang (2009), we decompose *CFO* into its components and examine the forecasting ability of *Est_Sales* and *Est_Supem* for future CFO (*FCFO*) using the following equation.

$$FCFO = a_0 + a_1 Est\_Sales + a_2 Est\_Supem + a_3 Dis\_Tax + a_4 Est\_Other + \varepsilon, \quad (2a)$$

where *Est_Sales* is estimated cash received from customers and *Est_Supem* is estimated cash paid to suppliers and employees. Prior studies (e.g., Livnat and Zarowin 1990; Krishnan and

Largay 2000) use the balance sheet approach to estimate these two variables. *Est_Sales* is typically estimated as sales revenue minus the change in accounts receivable from the comparative balance sheets (the BS approach). The change in accounts receivable, however, can also be obtained from the IM statement of cash flows. Thus, *Est_Sales* and *Est_Supem* can also be estimated using the IM statement of cash flows (the IM approach). Following Orpurt and Zang (2009), we estimate *Est_Sales* and *Est_Supem* using both the BS and IM approaches. See Table 1 for detailed definitions of these two and all other variables.

Dis_Tax is net taxes paid and *Est_Other* is estimated cash flows from other operating activities, which is a plug figure. That is, *Est_Other* = *CFO* – (*Est_Sales* + *Est_Supem* + *Dis_Tax*). Note that firms are required to disclose *Dis_Tax* in the IM statement of cash flows in the U.S. Since firms in China are required to report both IM and DM statement of cash flows, *Dis_Tax* is disclosed in the DM statement of cash flows. Moreover, disclosed interests received or paid are treated as financing cash flows according to Chinese accounting standards and thus are not part of operating cash flows (*CFO*).

To summarize, we decompose operating cash flows into four estimated components (*CFO = Est_Sales + Est_Supem + Dis_Tax + Est_Other*) and assess the forecasting ability of *Est_Sales* and *Est_Supem* for future CFO using Equation (2a).

The DM statement of cash flows discloses cash received from customers (*Dis_Sales*) and cash paid to suppliers and employees (*Dis_Supem*) directly. Prior studies show that *Dis_Sales* and *Dis_Supem* cannot be accurately estimated using either the BS approach (Krishnan and Largay 2000) or the IM approach (Orpurt and Zang 2009). The difference between the disclosed and estimated amounts is termed estimation errors or articulation errors. Orpurt and Zang (2009)

examine whether articulation errors are incrementally useful for forecasting future CFO using the following equation.

$$FCFO = a_0 + a_1 Est\_Sales + a_2 Est\_Supem + a_3 Dis\_Tax + a_4 Dis\_Other + a_5 Sales\_Err + a_6 Supem\_Err + \varepsilon, \quad (3)$$

where *Dis_Other* is disclosed cash flows from other operating activities, which is again a plug figure. That is, *Dis_Other* = *CFO* – (*Est_Sales* + *Est_Supem* + *Dis_Tax* + *Sales_Err* + *Supem_Err*) = *CFO* – (*Dis_Sales* + *Dis_Supem* + *Dis_Tax*). *Sales_Err* is the articulation error in estimated cash received from customers (= *Dis_Sales* – *Est_Sales*), and *Supem_Err* is the articulation errors in estimated cash paid to suppliers and employees (= *Dis_Supem* – *Est_Supem*).

Significantly positive coefficients on *Sales_Err* and on *Supem_Err* ($a_5 > 0$ and $a_6 > 0$) and a significant increase in explanatory power in Equation (3) over Equation (2a) support H1 that articulation errors (*Sales_Err* and *Supem_Err*), and thus *Dis_Sales* and *Dis_Supem*, are useful for forecasting future CFO *incremental* to *Est_Sales* and *Est_Supem*.[8]

Comparing Equation (3) with Equation (2a), we can see that *Est_Other* = *Dis_Other* + *Sales_Err* + *Supem_Err*.[9] That is, with the DM statement of cash flows, we can further disaggregate *Est_Other* into *Dis_Other*, *Sales_Err*, and *Supem_Err*. To the extent that the coefficients on *Dis_Other*, *Sales_Err*, and *Supem_Err* are different from each other in Equation

[8] That Equation (3) tests whether *Dis_Sales* and *Dis_Supem* are useful for forecasting future CFO incremental to *Est_Sales* and *Est_Supem* can be more readily seen if we re-write Equation (3) as follows.

$$\begin{aligned} FCFO &= \alpha_0 + \beta_1 Est\_Sales + \beta_2 Est\_Supem + \beta_3 Dis\_Tax + \beta_4 Dis\_Other + \beta_5 Sales\_Err + \beta_6 Supem\_Err + \varepsilon \\ &= \alpha_0 + \beta_1 Est\_Sales + \beta_2 Est\_Supem + \beta_3 Dis\_Tax + \beta_4 Dis\_Other + \beta_5 (Dis\_Sales - Est\_Sales) \\ &\quad + \beta_6 (Dis\_Supem - Est\_Supem) + \varepsilon \\ &= \alpha_0 + (\beta_1 - \beta_5) Est\_Sales + (\beta_2 - \beta_6) Est\_Supem + \beta_3 Dis\_Tax + \beta_4 Dis\_Other + \beta_5 Dis\_Sales \\ &\quad + \beta_6 Dis\_Supem + \varepsilon, \end{aligned} \quad (3FN)$$

It is clear that Equation (3FN), and thus Equation (3), examines whether *Dis_Sales* and *Dis_Supem* are useful for forecasting CFO incremental to *Est_Sales* and *Est_Supem*.

[9] This is because *CFO* = *Est_Sales* + *Est_Supem* + *Dis_Tax* + *Est_Other* = *Est_Sales* + *Est_Supem* + *Dis_Tax* + *Dis_Other* + *Sales_Err* + *Supem_Err*. Thus, *Est_Other* = *Dis_Other* + *Sales_Err* + *Supem_Err*.

(3), such a decomposition of *Est_Other* provides *additional* explanatory power in Equation (3) relative to Equation (2a).

Similar to Orpurt and Zang (2009), we also examine the usefulness of *Sales_Err* and *Supem_Err* (and thus *Dis_Sales* and *Dis_Supem*) for forecasting future earnings incremental to *Est_Sales* and *Est_Supem* using the following equations.

$$FEARN = b_0 + b_1 ACCR + b_2 CFO + \varepsilon, \quad (4)$$

$$FEARN = b_0 + b_1 ACCR + b_2 Est\_Sales + b_3 Est\_Supem + b_4 Dis\_Tax + b_5 Est\_Other + \varepsilon, \quad (5a)$$

$$FEARN = b_0 + b_1 ACCR + b_2 Est\_Sales + b_3 Est\_Supem + b_4 Dis\_Tax + b_5 Dis\_Other + b_6 Sales\_Err + b_7 Supem\_Err + \varepsilon, \quad (6)$$

where *FEARN* is earnings in the next period and *ACCR* is total accruals calculated as the difference between earnings and cash from operations (*CFO*). See Table 1 for definitions of all variables.

Significantly positive coefficients on *Sales_Err* and on *Supem_Err* ($b_6 > 0$ and $b_7 > 0$) and a significant increase in explanatory power in Equation (6) over Equation (5a) support H1.

We examine whether disclosed CFO components (*Dis_Sales*, *Dis_Supem*, *Dis_Tax*, and *Dis_Other*) are relatively superior to estimated CFO components (*Est_Sales*, *Est_Supem*, *Dis_Tax*, and *Est_Other*) for forecasting future CFO and earnings using the following equations in conjunction with Equations (2a) and (5a), respectively.

$$FCFO = a_0 + a_1 Dis\_Sales + a_2 Dis\_Supem + a_3 Dis\_Tax + a_4 Dis\_Other + \varepsilon, \quad (2b)$$

$$FEARN = b_0 + b_1 ACCR + b_2 Dis\_Sales + b_3 Dit\_Supem + b_4 Dis\_Tax + b_5 Dis\_Other + \varepsilon. \quad (5b)$$

Following Dechow (1994), we use the Vuong (1989) test to examine whether the explanatory power (as measured by R^2) of Equations (2b) and (5b) is significantly larger than the explanatory power (as measured by R^2) of Equations (2a) and (5a), respectively. A significantly positive Vuong (1989) test score for comparison between Equation (2b) and Equation (2a) or comparison between Equation (5b) and Equation (5a) supports our H2.

Absolute Articulation Errors and Cash Flow Persistence

As we explained earlier, articulation errors (*Sales_Err* and *Supem_Err*) arise from non-recurring and irregular operating activities. Our H3 predicts that the larger the absolute articulation errors, the less persistent are *Dis_Sales* and *Dis_Supem*. We measure absolute articulation errors (|*Tot_Err*|) as the sum of absolute articulation errors in cash received from customers and absolute articulation errors in cash paid to suppliers and employees, i.e., |*Tot_Err*| = |*Sales_Err*| + |*Supem_Err*|. We use the following equations to test H3.

$$\begin{aligned} FCFO = {} & a_0 + a_1 Dis\_Sales + a_2 Dis\_Supem + a_3 Dis\_Tax + a_4 Dis\_Other \\ & + a_5 |Tot\_Err| + a_6 Dis\_Sales \times |Tot\_Err| + a_7 Dis\_Supem \times |Tot\_Err| \\ & + a_8 Dis\_Tax \times |Tot\_Err| + a_9 Dis\_Other \times |Tot\_Err| + \varepsilon, \end{aligned} \tag{7}$$

$$\begin{aligned} FEARN = {} & b_0 + b_1 ACCR + b_2 Dis\_Sales + b_3 Dis\_Supem + b_4 Dis\_Tax + b_5 Dis\_Other \\ & + b_6 |Tot\_Err| + b_7 ACCR \times |Tot\_Err| + b_8 Dis\_Sales \times |Tot\_Err| \\ & + b_9 Dis\_Supem \times |Tot\_Err| + b_{10} Dis\_Tax \times |Tot\_Err| \\ & + b_{10} Dis\_Other \times |Tot\_Err| + \varepsilon. \end{aligned} \tag{8}$$

Significantly negative coefficients on the interaction terms (i.e., $a_6 < 0$, $a_7 < 0$, $b_8 < 0$, and $b_9 < 0$) are consistent with H3.

Absolute Articulation Errors and Uncertainty of Future CFO and Earnings

We use the following equations to test H4 that firms with larger absolute articulation errors have more volatile future CFO and earnings.

$$FCFO\_VOL = c_0 + c_1|Tot\_Err| + c_2 STDRET + c_3 BTM + c_4 LOGMV + c_5 CAP\_INTEN + c_6 LEV + c_7 ROA + \varepsilon, \quad (9)$$

$$FEARN\_VOL = d_0 + d_1|Tot\_Err| + d_2 STDRET + d_3 BTM + d_4 LOGMV + d_5 CAP\_INTEN + d_6 LEV + d_7 ROA + d_8 FCFO\_VOL + \varepsilon, \quad (10)$$

where *FCFO_VOL (FEARN_VOL)* is the volatility of future CFO (earnings), measured as the standard deviation of eight quarterly CFOs (earnings), scaled by quarter-end total assets, during the two years from the current year to the next year. See Table 1 for definitions of other variables. Significantly positive coefficients on |*Tot_Err*| in Equations (9) and (10), i.e., $c_1 > 0$ and $d_1 > 0$, are consistent with H4.

We include several control variables in Equations (9) and (10) following Zhang (2009). Zhang (2009) includes the median cash flows volatility and median earnings volatility in each industry as a control variable in Equation (9) and Equation (10), respectively. Since we estimate Equations (9) and (10) with industry dummies, which is equivalent to controlling for the mean cash flows volatility and mean earnings volatility in each industry, we do not include the industry median volatility in these two equations. *STDRET*, *BTM*, and *LOGMV* are included to control for risk factors at the firm level. Following Zhang (2009), we expect a positive (negative) coefficient on *STDRET* (*LOGMV*) and make no prediction for *BTM*. Firms with higher capital intensity (*CAP_INTEN*) or higher financial leverage (*LEV*) tend to be in the mature stage of life cycle and have lower cash flow and earnings volatility. We thus expect a negative coefficient on *CAP_INTEN* and *LEV*. We include *ROA* to control for the potential effect of profitability on future cash flow and earnings volatility with no prediction for the sign of the coefficient. Finally,

we control for *FCFO_VOL* in equation (10) because operating cash flow is part of earnings and expect a positive coefficient on *FCFO_VOL*.

Absolute Articulation Errors and Audit Opinions

We use the following logistic regression to test H5 that auditors are more likely to issue a modified audit opinion to firms with larger absolute articulation errors.

$$MAO = e_0 + e_1|Tot\_Err| + e_2ROA + e_3EXTRAGAIN + e_4LOSS + e_5LEV + e_6Quick + e_7SIZE + e_8EM + e_9AR + e_{10}INV + e_{11}BIG4 + e_{12}RET + e_{13}STDRET + \varepsilon, \quad (11)$$

where *MAO* is a dummy variable for modified audit opinions and all other variables are defined in Table 1. A significantly positive coefficient on $|Tot\_Err|$ in Equations (11), i.e., $e_1 > 0$, is consistent with H5.

We include several control variables in Equation (11) following prior literature. Following Dopuch, Holthausen, and Leftwich (1987) and Wang, Wong, and Xia (2008), we control for *ROA* (return on assets), *LOSS* (a dummy variable for losses in a given year), *LEV* (financial leverage), *Quick* (quick ratio), *SIZE* (natural logarithm of total assets), *AR* (accounts receivable), *INV* (inventory), *RET* (market-adjusted stock returns), and *STDRET* (and standard deviation of the residuals from the market model). We add *EXTRAGAIN* (extraordinary items in net profit) as a separate control variable because extraordinary gains are susceptible to managerial manipulation. Following Chen, Chen, and Su (2001) and Chen, Sun, and Wu (2010), we also include *EM* (a dummy variable for a firm's incentives to manage earnings). Finally, we include *BIG4* (a dummy variable for Big 4 audit firms) to control for the possibility that Big 4 auditors may differ systematically from non-Big 4 auditors in issuing audit opinions.

Following prior literature, we expect the coefficients on *ROA*, *Quick*, *SIZE*, and *RET* to be negative and those on *LOSS*, *LEV*, *EM*, *AR*, *INV*, and *STDRET* to be positive. We also expect a positive coefficient on *EXTRAGAIN* because, as we explained earlier, large extraordinary gains are likely associated with earnings management. Finally, we do not make prediction for the coefficient on *BIG4*.

IV. DATA AND DESCRIPTIVE STATISTICS

Sample Selection

We obtain all necessary data from the CSMAR (China Stock Market Financial Statements Database). Our sample period spans eight years from 2002 to 2009. Table 2, Panel A, summarizes our sample selection process. We identify 11,269 firm-year observations in nonfinancial industries with A-shares on CSMAR in our sample period.[10] We then delete observations where (1) financial data in the previous year is missing (total = 662), (2) stocks are traded less than six months in a year (total = 61), (3) number of quarterly CFOs or earnings is less than eight during the current and subsequent years (total = 468), (4) financial data in the next year are missing (total = 10), (5) the number of observations in an industry-year is less than 20 (total = 237), (6) market value at year end is missing (total = 338), and (7) a firm has only one observation during our sample period (total = 61).[11] This selection process yields a sample of 9,432 observations.

[10] Firms incorporated in the mainland China can issue A-shares, B-shares, or both. Since firms with B-shares are required to follow International Accounting Standards in addition to Chinese accounting standards, we exclude them.

[11] We use two-way clustered standard errors (Petersen 2009) for our statistical inferences and thus require at least two observations for a firm.

Panel B of Table 2 presents the percentage of firms in each year that receive a modified audit opinion (MAO). Before 2006, about 10.00% of firms receive MAOs except for the year of 2003 when the percentage is only 6.25%. This percentage declines after 2006 to below or around 6.00%. Over the sample period, the average percentage of firm-years receiving MAOs is 7.70%.

Descriptive Statistics and Correlations

Table 3, Panel A, presents the descriptive statistics of the main variables. The mean and median of *FCFO* (CFO in the next year) are 0.059 and 0.055, respectively, whereas those of *FEARN* (earnings in the next year) are 0.087 and 0.076, respectively. The mean *CFO* is 0.053, and mean *ACCR* (total accruals) is 0.009. Cash received from customers and cash paid to suppliers and employees are two largest components of *CFO*. The mean (median) of *estimated* cash received from customers (*Est_SalesIM*) is 0.672 (0.550) whereas the mean (median) of *disclosed* cash received from customers (*Dis_Sales*) is 0.704 (0.572).[12] The articulation error between *Dis_Sales* and *Est_Sales* (*Sales_ErrIM*) has a mean of 0.032 and a median of 0.039. Similarly, the mean (median) *estimated* cash paid to supplies and employees (*Est_SupemIM*) is -0.619 (-0.493) and the mean (median) *disclosed* cash paid to suppliers and employees (*Dis_Supem*) is -0.586 (-0.451). The articulation error between these two variables (*Supem_ErrIM*) has a mean of 0.033 and a median of 0.011. The mean and median of our articulation errors (*Sales_ErrIM* and *Supem_ErrIM*) are considerably larger than their counterparts in Orpurt and Zang (2009).[13] Besides the differences between US firms and Chinese firms and their respective accounting standards, a potential explanation is that Orpurt and Zang

[12] Since descriptive statistics for variables estimated using the BS approach (e.g., *Est_SalesBS*) are similar to those estimated using the IM approach (e.g., *Est_SalesIM*), we report descriptive statistics for the IM variables only.
[13] The means of *Sales_Err* and *Supem_Err* in Orpurt and Zang (2009, Table 3, Panel A) are -0.0065 and -0.0082.

(2009) examine a small sample of US firms that voluntarily disclose DM statement of cash flows and these firms have relatively small articulation errors.

The means of taxes paid (*Dis_Tax*), estimated other operating cash flows (*Est_OtherIM*), disclosed other operating cash flows (*Dis_Other*), and absolute articulation errors (|*Tot_ErrIM*|) are -0.034, 0.033, -0.032, and 0.225, respectively. Our mean |*Tot_ErrIM*| is about three times as large as that reported in Orpurt and Zang (2009).

Table 3, Panel A, also shows that the mean (median) *FCFO_VOL* is 0.041 (0.033). The mean (median) *FEARN_VOL* is smaller than the mean (median) *FCFO_VOL*, consistent with prior findings that earnings are less volatile than CFO. The mean *LEV* (leverage) is 0.304 and the Chinese listed firms, on average, are profitable with mean *ROA* equal to 0.022. The mean *MAO* is 0.077 and mean *EXTRAGAIN* 0.006. 13.10% of our sample observations report losses (*LOSS*). The mean *Quick* (quick ratio) is 1.009. The mean (median) *SIZE* is 7.574 (7.474). Our dummy variable for earnings management (*EM*) suggests that, on average, 26.20% of our sample chooses various ways including "Big Bath" to boost earning to meet or beat the various requirements set by Chinese regulators (Chen et al. 2010). The mean and median *AR* (accounts receivable) are comparable to the mean and median *INV* (inventory). Interestingly, the mean *BIG4* is only 0.072.[14]

Table 3, Panel B, presents the correlation matrix for key variables in our future CFO (*FOCF*) and future earnings (*FEARN*) forecasting models. First of all, the correlation between *Est_SalesIM* (*Est_SupemIM*) and *Dis_Sales* (*Dis_Supem*) is very high at 0.931 (0.923), which seems to suggest that *Est_SalesIM* (*Est_SupemIM*) is a good approximation for *Dis_Sales* (*Dis_Supem*). Second, the correlation between *FOCF* and *Dis_Sales* (0.117) is slightly higher

[14] The clients of Big 4 auditors, however, are relatively large. Untabulated results show that 44.62% of total assets in our sample are audited by Big 4 audit firms.

than that between *FOCF* and *Est_Sales* (0.102). A similar pattern of correlations exists for the pair of *FEARN* and *Dis_Sales* and the pair of *FEARN* and *Est_Sales*. These correlations seem to suggest that *Dis_Sales* predict future CFO and earnings better than *Est_Sales*. Finally, our two articulation errors (*Sales_ErrIM* and *Supem_ErrIM*) are positively correlated with *FCFO* and *FEARN* (except for the correlation between *FCFO* and *Supem_ErrIM*), consistent with Orpurt and Zang (2009) that these articulation errors are useful for predicting future CFO and earnings.

Table 3, Panel C, reports the correlations among key variables in our future CFO and earnings volatility models and audit opinions model. First, absolute articulation errors (|*Tot_ErrIM*|) are positively correlated with future CFO volatility (*FCFO_VOL*) and modified audit opinions (*MAO*), consistent with our H4 and H5. Second, *FCFO_VOL* is negatively correlated with *LEV* (-0.127, *p*-value = 0.000), consistent with our expectation. Finally, we find that *SIZE* is negatively correlated with *MAO* as expected.

Usefulness of Direct Cash Flow Disclosures for Forecasting Future CFO and Earnings

We estimate Equations (1), (2a), (3), and (2b) and report our findings in Table 4, Panel A. Since we use panel data and observations are likely correlated both in the time series and in the cross section, we use two-way clustered standard errors (Petersen 2009) for making statistical inferences in this paper unless stated otherwise. Each column in Panel A reports the regression results for one equation and columns are named after their corresponding equations. Since we estimated operating cash receipts and payments using both the IM approach and BS approach, we add "IM" or "BS" after equation number to indicate which approach is used. Since all variables in Equation (2b) are taken from the DM statement of cash flows, we name the column "Model (2bDM)."

Our benchmark model is Model (1), which predicts CFO in the next year using current CFO. We find a significantly positive coefficient on *CFO* (0.283, *t* = 14.598), which is consistent with prior studies. Our coefficient (0.283), however, is considerably smaller than that reported in Orpurt and Zang (2009), 0.7805, and that reported in Cheng and Hollie (2008), 0.616. Moreover, our adjusted R^2 (0.117) is also considerably smaller than those (0.4375 and 31.70%) reported in Orpurt and Zang (2009) and Cheng and Hollie (2008).

Model (2aIM) assesses the predictive ability of estimated CFO components (*Est_Sales*, *Est_Supem*, *Dis_Tax*, and *Est_Other*) using the IM statement of cash flows. The coefficients on *Est_Sales* (0.234), *Est_Supem* (0.228), and *Est_Other* (0.214) are all significantly positive, consistent with Orpurt and Zang (2009). However, the coefficient on *Dis_Tax* is significantly negative (-0.251), which suggests that the more taxes a firm pays in the current year, the larger the operating cash flows in the subsequent year. This seemingly counterintuitive result may be due to the fact that a significant component of taxes that Chinese firms pay is value-added tax, which is an indirect tax, just like sales tax in US, and is more closely related to sales than to net income (value-added tax does not affect net income). The more value-added taxes that a firm pays in the current year, the larger is its sales revenue, which indicates a larger sales revenue and thus higher CFO in the next year. Consistent with Orpurt and Zang (2009), our F-test of coefficient equality strongly rejects the null that the coefficients on *Est_Sales*, *Est_Supem*, *Dis_Tax*, and *Est_Other* are equal (F-statistic = 37.41). This implies that decomposing *CFO* in Model (1) into its estimated components in Model (2aIM) improves the explanatory power of Model (2aIM) relative to Model (1). Indeed, adjusted R^2 for Model (2aIM), 0.141, is larger than that for Model (1), 0.117.

With information from the DM statement of cash flows, Orpurt and Zang (2009) further decompose *Est_Other* in Model (2aIM) into *Dis_Other*, *Sales_Err*, and *Supem_Err* and examine whether articulation errors (*Sales_Err* and *Supem_Err*) are incrementally useful for predicting future CFO using Model (3IM). Consistent with Orpurt and Zang (2009), we find that the coefficients on *Sales_Err* and *Supem_Err* are both significantly positive (0.246 and 0.242). The F-test of coefficient equality strongly rejects the null that the coefficients on *Dis_Other*, *Sales_Err*, and *Supem_Err* are equal (F-statistic = 21.70). This implies that decomposing *Est_Other* in Model (2aIM) into three components in Model (3IM) can enhance the explanatory power of Model (3IM) relative to Model (2aIM). We find that adjusted R^2 for Model (3IM) is 0.146, larger than adjusted R^2 for Model (2aIM), 0.141. Our increase in adjusted R^2 from 0.141 to 0.146, however, is much smaller than the increase in adjusted R^2 from 0.4579 to 0.4966 reported in Orpurt and Zang (2009). Following Orpurt and Zang (2009), we conduct the Vuong (1989) test to formally test whether our increase in adjusted R^2 is significant. The Vuong test result (z-statistic = 3.070) confirms that the explanatory power of Model (3IM) is significantly larger than the explanatory power of Model (2aIM). To summarize, the results so far suggest that articulation errors (*Sales_Err* and *Supem_Err*) in Model (3IM) are incrementally useful for predicting future CFO, consistent with H1.

We estimate Equations (4), (5a), (6), and (5b) and report our findings in Table 4, Panel B. Model (4) is our benchmark model, showing the predictive ability of total accruals (*ACCR*) and *CFO* for future earnings. We find that the coefficients on *ACCR* and *CFO* are both significantly positive. In addition, the coefficient on *CFO* is larger than that on *ACCR*, suggesting that the cash component of earnings persists more into future earnings than the accrual component of earnings. These findings are consistent with a large body of prior studies (e.g., Sloan 1996).

Again, our coefficients on *ACCR* and *CFO* are considerably smaller than their counterparts in Orpurt and Zang (2009).

As in Table 4, Panel A, we decompose *CFO* in Model (4) into estimated CFO components in Model (5aIM). This decomposition improves adjusted R^2 from 0.254 in Model (4) to 0.274 in Model (5aIM). An F-test strongly rejects the null that coefficients on *Est_Sales*, *Est_Supem*, *Dis_Tax*, and *Est_Other* are equal (F-statistic = 29.73). Further decomposing *Est_Other* in Model (5aIM) into *Dis_Other*, *Sales_Err*, and *Supem_Err* in Model (6IM) further improves adjusted R^2 from 0.274 in Model (5aIM) to 0.278 in Model (6IM). Similar to the CFO prediction results in Panel A, we find that an F-test rejects the null that coefficients on *Dis_Other*, *Sales_Err*, and *Supem_Err* are equal (F-statistic = 9.019). In addition, the Vuong (1989) test (z-statistic = 3.017) suggests that the explanatory power of Model (6IM) is significantly larger than the explanatory power of Model (5aIM). That is, articulation errors (*Sales_Err* and *Supem_Err*) in Model (6IM) are incrementally useful for predicting future earnings, consistent with Orpurt and Zang (2009), consistent with H1.

We conduct a one-on-one horse race between DM and IM disclosures by comparing Equation (2b) with Equation (2a) and by comparing Equation (5b) with Equation (5a). Our findings are also reported in Table 4. Panel A shows that adjusted R^2 of Model (2bDM) is 0.146 and that of Model (2aIM) is 0.141. The Vuong (1989) test of the difference in explanatory power between Model (2bDM) and Model (2aIM) is significantly positive at the 0.01 level (z-statistic = 2.887). The test between Model (2bDM) and Model (2aBS) is also significantly positive at the 0.01 level (z-statistic = 2.864). Thus, DM disclosures are relatively superior to IM disclosures for predicting future CFO, consistent with H2.

Turning to predicting future earnings, Panel B of Table 4 shows that the explanatory power of Model (5bDM) is only marginally significantly larger than that of Model (5aIM) at the 0.10 level (z-statistic = 1.818). However, the explanatory power of Model (5bDM) ties with that of Model (5aBS) (z-statistic = 0.442). Thus, DM disclosures marginally dominate or tie with IM disclosures for predicting future earnings. Our results are only weakly consistent with H2 when the prediction of future earnings is concerned.

In summary, our results in Table 4 extend the Orpurt and Zang (2009) finding that articulation errors are incrementally useful for predicting future CFO and future earnings to a regime where disclosure of DM statements of cash flow is mandatory, consistent with H1. However, the incremental explanatory power from incorporating the DM information in Model (3IM) (Model (6IM)) relative to Model (2aIM) (Model (5aIM)) is much smaller than what is reported in Orpurt and Zang (2009). In addition, in a one-on-one horserace between disclosed CFO components and estimated CFO components, disclosed CFO components dominate their estimated counterparts for forecasting future CFO but only marginally so for forecasting future earnings. Our findings, thus, are only weakly consistent with H2.

Absolute Articulation Errors and Cash Flow Persistence

We test H3 that disclosed cash received from customers and disclosed cash paid to suppliers and employees persist less into future CFO and earnings when absolute articulation errors are larger. We estimate Equations (7) and report findings in Table 5. In the Model (7IM) column, the coefficients on *Dis_Sales* (0.295), *Dis_Supem* (0.283), and *Dis_Other* (0.188) are all significantly positive. The coefficient on *Dis_Tax* (-0.193) is negative but insignificant. More importantly, the coefficients on *Dis_Sales*×|*Tot_Err*| (-0.153) and on *Dis_Supem*×|*Tot_Err*| (-

0.137) are both significantly negative, consistent with H3. Findings using the BS approach (Model (7BS)) are similar.

We estimate Equation (8) and report findings also in Table 5. In Model (8IM), the coefficients on *ACCR* (0.536), *Dis_Sales* (0.774), *Dis_Supem* (0.762), *Dis_Tax* (0.251), and *Dis_Other* (0.702) are all significantly positive. Importantly, the coefficients on *Dis_Sales*×|*Tot_Err*| (-0.426) and on *Dis_Supems*×|*Tot_Err*| (-0.418) are both significantly negative, consistent with H3.

In summary, results in Table 5 support our hypothesis that disclosed cash received from customers and disclosed cash paid to suppliers and employees persist less into future CFO and earnings for firms with larger absolute articulation errors.

Absolute Articulation Errors and Uncertainty of Future CFO and Earnings

We test H4 that firms with larger absolute articulation errors have more volatile future CFO and earnings using Equations (9) and (10). Our findings are reported in Table 6. As shown in Model (9IM), the coefficient on |*Tot_Err*| (0.014) is highly significantly positive. The coefficient on |*Tot_Err*| (0.016) is also highly significantly positive in Model (9BS). The positive coefficients on |*Tot_Err*| support our H4.

We only discuss Model (9IM) in detail for control variables because results for Model (9BS) are similar. Our coefficients are generally consistent with Zhang (2009). For example, the coefficients on *LOGMV* (-0.003), *CAP_INTEN* (-0.028), and *LEV* (-0.010) are all significantly negative, consistent with Zhang (2009). Zhang (2009) predicts a positive coefficient on *STDRET* but finds an insignificant coefficient on *STDRET*. Our coefficient on *STDRET* is also insignificant. Zhang (2009) does not predict signs for *BTM* and *ROA*.

Absolute Articulation Errors and Audit Opinions

We test H5 that auditors are more likely to issue modified audit opinions to firms with larger absolute articulation errors using Equations (11). Our findings are reported in Table 7. As shown in Model (11IM), the coefficient on |*Tot_Err*| is significantly positive (0.945). The coefficient on |*Tot_Err*| is also significantly positive (0.996) in Model (11BS). The significantly positive coefficients on |*Tot_Err*| support our H5.

We only discuss the coefficients on control variable for Model (11IM). The coefficient on *ROA* (-6.023) is significantly negative, which suggests that firms with higher profitability have a lower probability to receive MAOs and is consistent with prior literature (e.g., Chen et al. 2010). The coefficient on *EXTRAGAIN* (5.998) is significantly positive, suggesting that higher extraordinary items in net income will increase the likelihood of receiving MAOs. This is consistent with the notion that auditors view extraordinary items as vehicle for earnings management (e.g., Chen and Yuan 2004). Our significantly positive coefficients on *LOSS* (1.279) and *LEV* (1.041) are consistent with Chen et al. (2010). Chen et al. (2010) find an insignificant coefficient on *QUICK*. Our coefficient, however, is significantly negative (-0.384).

The coefficient on *SIZE* (-0.511) is significantly negative, consistent with the expectation that larger firms are less likely to receive MAOs. Our coefficient on *EM* (0.336) is significantly positive, consistent with Chen et al. (2010). We find a significantly positive coefficient on *AR* (2.527), consistent with Wang et al. (2008). Our coefficient on *INV* (-3.329), however, is significantly negative, contrary to Wang et al. (2008) but consistent with Chen et al. (2007). A high level of inventory does not necessarily signal poor performance in China because firms need to stock inventory to meet volatile product demand due to undeveloped logistical support and transportation system. Finally, our coefficient on *BIG4* (0.391) is insignificantly positive,

suggesting that Big 4 and non-Big 4 auditors do not differ significantly in their propensity to issue MAOs. Our coefficients on *RET* (-0.119) and *STDRET* (-1.210) are both insignificant.

We argue that |*Tot_Err*| contains information for the persistence of disclosed CFO components. As such, |*Tot_Err*| can be thought of as an inverse proxy for cash flow quality. Accounting literature often uses absolute discretionary accruals as an inverse proxy for accruals quality or earnings quality. To test if our |*Tot_Err*| is |*DACCR*| in disguise, we expand Model (11IM) and Model (11BS) to include |*DACCR*|. If the significantly positive coefficient on |*Tot_Err*| in Model (11IM) is due to |*Tot_Err*| being a proxy for |*DACCR*|, including |*DACCR*| in Model (11IM') would reduce the significant coefficient on |*Tot_Err*|. As shown in Model (11IM') and Model (11BS'), the coefficients on |*Tot_Err*| remain significantly positive while those on |*DACCR*| are insignificant. We thus rule out |*Tot_Err*| as a proxy for |*DACCR*|.

V. CONCLUSION

China is one of the few countries that require listed firms to report the statement of cash flows using both the direct method (DM) and indirect method (IM). Using a large sample of Chinese listed firms, we investigate (1) whether disclosed CFO components from the DM statement of cash flows are useful, both incrementally and relatively to estimated CFO components from the IM statement of cash flows, for predicting future CFO and earnings and (2) the information in and usefulness of the articulation errors between DM and IM statements of cash flows. We address several research questions. First, we investigate whether the Orpurt and Zang (2009) finding that the DM disclosures are useful incremental to the IM disclosures for predicting future CFO and earnings is generalizable to China where the disclosure of DM statements of cash flows is mandatory. While we can qualitatively replicate the Orpurt and Zang

(2009) finding using the Chinese data, we find the incremental explanatory power of the DM disclosures over the IM disclosure is quite small.

Second, we investigate whether the Krishnan and Largay (2000) finding that DM disclosures are relatively superior to the IM disclosure for predicting future CFO and earnings can be generalized to a regime of mandatory reporting of DM statements of cash flows. We find that the DM disclosures dominate (marginally dominate) the IM disclosures for predicting future CFO (future earnings) but the margin of dominance is much smaller than what is reported in Krishnan and Largay (2000).

Third, we argue that articulation errors arise from non-recurring and unusual transactions. As such, positive (negative) articulation errors indicate that disclosed cash received from (paid to) customers (suppliers and employees) contain positive (negative) transient components. We thus hypothesize and find that disclosed cash from customers and disclosed cash paid to suppliers and employees persist less into future CFO and earnings when absolute articulation errors are larger.

Fourth, we hypothesize that firms with larger absolute articulation errors have more volatile future CFO and earnings. We find that the volatility of future CFO and future earnings, respectively, increases with absolute articulation errors.

Finally, we hypothesize that firms with larger absolute articulation errors pose a higher audit risk and find that auditors are more likely to issue modified audit opinions to firms with larger absolute articulation errors.

In summary, we find that DM disclosures are useful both incrementally and relatively to IM disclosures for predicting future CFO and earnings. However, the superiority of DM disclosures over IM disclosures for predicting future CFO and earnings is small. Our tests based

on cash flow persistence, future CFO and earnings volatility, and audit opinions are consistent with the notion that absolute articulation errors contain information about cash flow persistence and about the risk and uncertainty of future CFO and earnings. We conclude that DM disclosures are useful because (1) DM disclosures are modestly superior to IM disclosures for assessing the *amount* of future cash flows and earnings and, more importantly, (2) absolute articulation errors derived from DM disclosures help financial statement users in assessing the risk and *uncertainty* of future cash flows and earnings.

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APPENDIX
UNDERLYING CAUSES FOR ARTICULATION ERRORS

Case 1: North China Pharmaceutical Co., Ltd. (Stock Code: 600812). The firm disclosed in its annual reports that 753,426,740.09 (644,929,342.67) RMB of its trade notes receivable in 2007 (2008) were endorsed to pay various operating expenses including purchases of inventory. If a firm uses trade notes receivable to pay for inventory, its estimated cash received from customers and estimated cash paid to suppliers and employees will be both overstated. If the firm uses trade notes receivable to pay for other operating expenses, its estimated cash received from customers will be overstated. In any event, endorsed transfer of notes receivable lead to a negative articulation error for cash received from customers.

Case 2: Tonghua Golden-Horse Pharmaceutical Industry Co., Ltd. (Stock Code: 000766). The firm announced that it recovered 19,361,794.93 RMB on December 31, 2009 from an account that was previously written off. The account was related to the firm's former Chairman of the Board, who embezzled the money and fled overseas. Because the probability of recovering the loan was deemed slim, the company wrote the account off in 2004. However, at the request of the Chinese government, an Australian court confiscated the fugitive's embezzled asset and remitted it back to China. When a firm receives a payment from a previously written-off account, estimated cash received from customers is understated, resulting in a positive articulation error for cash received from customers.

Case 3: Shanghai Dingli Technology Development Co., Ltd. (Stock Code: 600614). The firm disclosed that it reached an agreement with its largest controlling shareholder, Dingli Construction Co., Ltd. (not a listed company), on June 8, 2007, to exchange its accounts receivables, other receivables, and long-term equity investment for a hotel that has an appraised value of 53,620,000 RMB and is 100% owned by Dingli Construction. Thus, a certain amount of

reduction in Shanghai Dingli's accounts receivable in 2007 did not result in cash, leading to a negative articulation error for cash received from customers.

Case 4: Chang Ling (Group) Co., Ltd. (Stock Code: 000561). The 2003 audit report for the firm stated that Chang Ling netted its own accounts payable with accounts receivable of its subsidiary sales company in Chang Ling's 2003 consolidated financial statements. Chang Ling, however, did not provide sufficient evidence to establish a corresponding relation between its accounts payable and the subsidiary's accounts receivable. The auditor, thus, cannot assess whether the netting is appropriate and consequently issued a modified audit opinion. In this case, estimated cash paid to suppliers and employees is overstated because a certain reduction in Chang Ling's accounts payable is not due to cash payment.

Case 5: Shanghai Hong Sheng Technology Co., Ltd. (Stock Code: 600817). The firm was engaged in re-export trade with a US company via a Hong Kong company. In its 2008 annual report, Shanghai Hong Sheng netted 519,428,000,000 RMB of its accounts receivable from the US company with an equal amount of accounts payable to the HK company, based on a tripartite (Shanghai Hong Sheng, HK company, and US company) agreement that the HK company would collect the said amount from the US company, in lieu of collecting from Shanghai Hong Sheng. The auditor issued a modified audit opinion (disclaimer) because it was unable to conduct necessary auditing procedures and obtain sufficient evidence to express an opinion on whether the netting of accounts receivable with accounts payable is appropriate. In this case, both estimated cash received from customers and estimated cash paid to suppliers and employees are overstated although net cash flow from operating activities (CFO) is not affected.[15]

[15] It was discovered in 2009 that Shanghai Hong Sheng was involved in a large scale fraud. The netting of accounts payable with accounts receivable and the resulting articulation errors are partly a result of the company's fictitious transactions.

TABLE 1
Variable Definition

Variable		Definition
CFO	=	cash from operations = Net Cash Flow from Operating Activities;[a]
FCFO	=	*CFO* in the next year;
EARN	=	net operating income = Net Profit[b] + Unrealized Investment Loss + Provision for Impairment of Assets + Losses on Disposal of Fixed Assets, Intangible Assets, and Other Long-term Assets + Losses on Scrapping of Fixed Assets + Gains/Losses from Changes in Fair Values + Finance Expenses + Losses of Investment (Less: Gains) + Decrease of Deferred Income Tax Assets + Increase of Deferred Income Tax Liabilities. Gains are valued as negative. Note that we back out accrued income tax expense because income tax expense is equal to income tax paid before 2006. Starting 2006, firms are required to report accrued income tax expense. Net operating income so calculated is analogous to income before extraordinary items in Compustat;
FEARN	=	*EARN* in the next year;
ACCR	=	total accruals = *EARN* – *CFO*;
Est_SalesBS	=	estimated cash received from customers based on comparative balance sheets (BS) = Operating Revenue[c] – change in (*gross* accounts receivables + Net Notes Receivable) + change in Advance Receipts, where a *gross* account is the sum of its net account and the provision for impairment, e.g., *gross* accounts receivables = Net Accounts Receivable + provision for bad debts (which is from the footnotes in annual reports). There is no provision for bad debts for notes receivable and so *gross* notes receivable is equal to Net Notes Receivable;
Est_SalesIM	=	estimated cash received from customers based on the indirect method statement of cash flows (IM) = Operating Revenue + [Decrease of Operating Receivables (Less: Increase) + change in (*gross* other receivables + Net Prepayment)][d] + change in Advance Receipts. Note that Decrease of Operating Receivables (Less: Increase) contains the decrease in (*gross* other receivables + Net Prepayment). Adding change in (*gross* other receivables + Net Prepayment) to Decrease of Operating Receivables (Less: Increase) thus backs out the former from the latter;
DEP&AMT	=	depreciation and amortization = Depreciation of Fixed Assets, Oil and Gas Assets, and Bearer Biological Assets + Amortization of Intangibles Assets + Amortization of Long-term Prepaid Expenses;
Est_SupemBS	=	estimated cash paid to suppliers and employees based on comparative balance sheets (BS) = Operating Expenses[e] – change in (Accounts Payable + Notes Payable) + change in *gross* inventory from the balance sheet + change in Net Prepayment + Selling Expenses + General and Administrative Expenses – *DEP&AMT* – change in Employee Benefits Payable. This estimation formula is based on Hankel and Livnat (1995). Cash outflows are valued as a negative number;
Est_SupemIM	=	estimated cash paid to suppliers and employees based on the indirect method statement of cash flows (IM) = Operating Expenses – [Increase of Operating Payables (Less: Decrease) – change in (Other Payables + Advance Receipts + Taxes Payable)] – Decrease of Inventories (Less: Increase) + change in Net Prepayment + Selling Expenses + General and Administrative Expenses – *DEP&AMT*. Note: [Increase of Operating Payables (Less: Decrease) – change in (Other Payables + Advance Receipts + Taxes Payable)] = change in (Accounts Payable + Notes Payable + Employee Benefits Payable);
Dis_Sales	=	disclosed cash received from customers from the direct method (DM) statement of cash flows = Cash Received from Sales of Goods or Rendering of Services;
Dis_Supem	=	dsisclosed cash paid to suppliers and employees from the direct method (DM) statement of cash flows = Cash Paid for Goods and Services + Cash Paid to and on Behalf of Employees;
Sales_ErrBS (*Sales_ErrIM*)	=	articulation errors in estimated cash received from customers based on comparative balance sheets (BS) (on the indirect method statement of cash flows (IM)) = *Dis_Sales* – *Est_SalesBS* (*Dis_Sales* – *Est_SalesIM*);
Supem_ErrBS (Supem_ErrIM)	=	articulation errors in estimated cash paid to suppliers and employees based on comparative balance sheets (BS) (on the indirect method statement of cash flows (IM)) = Dis_Supem – Est_SupemBS (Dis_Supem – Est_SupemIM);

(*continued on next page*)

TABLE 1 (continued)

Variable		Definition
Dis_Tax	=	disclosed net taxes paid = Tax Refund – Various Taxes Paid;
Est_OtherBS	=	estimated other operating cash flows based on comparative balance sheets (BS) = CFO – (*Est_SalesBS* + *Est_SupemBS* + *Dis_Tax*);
Est_OtherIM	=	estimated other operating cash flows based on the indirect method statement of cash flows (IM) = CFO – (*Est_SalesIM* + *Est_SupemIM* + *Dis_Tax*);
Dis_Other	=	disclosed other operating cash flows = CFO – (*Dis_Sales* + *Dis_Supem* + *Dis_Tax*);
|*Tot_ErrBS*| (|*Tot_ErrIM*|)	=	absolute total articulation errors based on comparative balance sheets (BS) (on the indirect method statement of cash flows (IM)) = |*Sales_ErrBS*| + |*Supem_ErrBS*| (|*Sales_ErrIM*| + |*Supem_ErrIM*|); All variables above are scaled by Total Assets;
FCFO_VOL (FEARN_VOL)	=	volatility of future CFO (earnings) = standard deviation of eight quarterly CFOs (earnings), scaled by quarter-end total assets, during the two years from the current year to the next year.
STDRET	=	standard deviation of the residuals from the market model estimated using daily returns over the year;
BTM	=	book-to-market ratio = book value of equity ÷ (stock price × number of shares outstanding);
LOGMV	=	market capitalization = Ln(stock price × number of shares outstanding);
CAP_INTEN	=	capital intensity = Net Fixed Assets ÷ Total Assets;
LEV	=	leverage = (Short-term Borrowings + Non-current Liabilities Due within One year + Total Long-term Liabilities) ÷ Total Assets;
ROA	=	return on assets = Net Profit ÷ Total Assets;
MAO	=	dummy variable for modified audit opinions = one if a firm receives a modified audit opinion (including unqualified with explanatory notes, qualified, and disclaimer/adverse opinions) and zero otherwise;
EXTRAGAIN	=	extraordinary items in Net Profit = –[Unrealized Investment Loss + Losses on Disposal of Fixed Assets, Intangible Assets, and Other Long-term Assets + Losses on Scrapping of Fixed Assets + Losses of Investment (Less: Gains)] ÷ Total Assets;
LOSS	=	dummy variable for losses = one if a firm's Net Profit is negative and zero otherwise;
QUICK	=	quick ratio = (Cash and Cash Equivalents + Net Short-term Investment + Net Notes Receivable + Net Accounts Receivable) ÷ Total Current Liabilities;
AR	=	total receivable as a percent of total assets = (Net Accounts Receivable + Net Notes Receivable + Net Prepayment + Net other Receivables) ÷ Total Assets;
INV	=	inventory as a percentage of total assets = Net Inventory ÷ Total Assets;
SIZE	=	firm size = natural logarithm of Total Assets where Total Assets are in million Chinese Yuan;
EM	=	dummy variable for earnings management = one if any of the following conditions is met and zero otherwise: (1) a firm has slightly positive earnings (*ROA* is between 0 and 0.01), (2) a firm reports losses with a reported *ROA* being lower than the median value of the non-positive *ROA*s of all of the listed firms, and (3) a firm reports *ROE* (Net Profit ÷ Total Shareholders' Equity) that is marginally above the CSRC's rights offering requirement, which is 0.06–0.07 for a lower bottom-line *ROE* or recurring *ROE* after 2000. This definition follows Chen et al. (2010);
BIG4	=	dummy variable for Big 4 audit firms = one if a firm's audit firm is a Big 4 auditor and zero otherwise;
RET	=	a firm's market-adjusted stock return during the year; and
|*DACCR*|	=	absolute discretionary accruals, where discretionary accruals are the residuals of the Jones (1991) model estimated in each year-industry combination.

[a] For each data item from CSMAR database, we use the exact variable name (as in Field Content) in the CSMAR China Stock Market Financial Statements Database – User Guide (2010).
[b] Net Profit is the bottom line net income.
[c] Operating Revenue corresponds to sales revenue.
[d] Decrease in an account is the difference between the beginning balance and ending balance of that account whereas change or increase in an account is the difference between the ending balance and beginning balance of that account.
[e] Operating Expenses correspond to cost of goods sold.

TABLE 2
Sample Selection and Distribution

Panel A: Sample Selection	**Observation**
Number of A-share observations in nonfinancial industries during 2002–2009 on CSMAR	11,269
Less: Financial data in the previous year missing	(662)
Stock traded less than six months in a year	(61)
Quarterly CFOs and earnings less than eight in the current and subsequent years	(468)
Financial data in the next year missing	(10)
Observations in an industry-year less than 20	(237)
Market value at the end of year missing	(338)
Only one observation for a firm during sample period	(61)
Final sample	9,432

Panel B: Sample Distribution and Modified Audit Opinion by Year

Year	**Observation**	**Clean Audit Opinion**	**Modified Audit Opinion**	**Modified Audit Opinion Percent**
2002	983	873	110	11.19%
2003	992	930	62	6.25%
2004	1,062	961	101	9.51%
2005	1,163	1,039	124	10.66%
2006	1,171	1,073	98	8.37%
2007	1,251	1,183	68	5.44%
2008	1,383	1,308	75	5.42%
2009	1,427	1,339	88	6.17%
Total	9,432	8,706	726	7.70%

TABLE 3
Descriptive Statistics and Correlations

Panel A: Descriptive Statistics[a]

Variable	N	Mean	Std. Dev.	5%	Q1	Median	Q3	95%
FCFO	9,432	0.059	0.100	-0.092	0.009	0.055	0.109	0.224
FEARN	9,432	0.087	0.139	-0.136	0.031	0.076	0.142	0.313
CFO	9,432	0.053	0.087	-0.081	0.010	0.051	0.099	0.186
ACCR	9,432	0.009	0.124	-0.200	-0.034	0.018	0.068	0.178
Est_SalesIM	9,432	0.672	0.505	0.126	0.341	0.550	0.846	1.729
Est_SupemIM	9,432	-0.619	0.492	-1.652	-0.778	-0.493	-0.302	-0.090
Dis_Sales	9,432	0.704	0.522	0.134	0.350	0.572	0.891	1.785
Dis_Supem	9,432	-0.586	0.492	-1.624	-0.744	-0.451	-0.260	-0.079
Sales_ErrIM	9,432	0.032	0.191	-0.210	-0.013	0.039	0.108	0.263
Supem_ErrIM	9,432	0.033	0.192	-0.180	-0.046	0.011	0.074	0.299
Dis_Tax	9,432	-0.034	0.035	-0.097	-0.047	-0.028	-0.015	0.004
Est_OtherIM	9,432	0.033	0.121	-0.079	0.003	0.029	0.060	0.150
Dis_Other	9,432	-0.032	0.061	-0.129	-0.052	-0.024	-0.006	0.038
|Tot_ErrIM|	9,432	0.225	0.266	0.026	0.073	0.141	0.266	0.700
FCFO_VOL	9,432	0.041	0.028	0.010	0.021	0.033	0.052	0.097
FEARN_VOL	9,432	0.018	0.034	0.002	0.005	0.008	0.016	0.062
STDRET	9,432	0.023	0.007	0.012	0.017	0.023	0.028	0.035
BTM	9,432	0.439	0.289	0.086	0.232	0.390	0.601	0.997
LOGMV	9,432	7.785	1.061	6.341	7.045	7.632	8.373	9.762
CAP_INTEN	9,432	0.305	0.186	0.031	0.164	0.279	0.432	0.646
LEV	9,432	0.304	0.224	0.001	0.134	0.277	0.428	0.727
ROA	9,432	0.022	0.079	-0.115	0.009	0.029	0.055	0.117
MAO	9,432	0.077	0.267	0.000	0.000	0.000	0.000	1.000
EXTRAGAIN	9,432	0.006	0.022	-0.011	-0.001	0.000	0.007	0.043
LOSS	9,432	0.131	0.337	0.000	0.000	0.000	0.000	1.000
QUICK	9,432	1.009	0.988	0.206	0.481	0.743	1.140	2.756
SIZE	9,432	7.574	1.129	5.991	6.845	7.474	8.191	9.543
EM	9,432	0.262	0.440	0.000	0.000	0.000	1.000	1.000
AR	9,432	0.170	0.115	0.020	0.080	0.151	0.237	0.396
INV	9,432	0.164	0.145	0.006	0.065	0.130	0.217	0.476
BIG4	9,432	0.072	0.258	0.000	0.000	0.000	0.000	1.000
RET	9,432	0.050	0.611	-0.806	-0.218	-0.035	0.192	1.226

(*continued on next page*)

TABLE 3 (continued)

Panel B: Pearson Correlations between Future Cash from Operations (Future Earnings) and Articulation Errors[b]

Variable	*FCFO*	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*
(1) FEARN	0.420									
	[0.000]									
(2) CFO	0.291	0.309								
	[0.000]	[0.000]								
(3) ACCR	0.037	0.261	-0.339							
	[0.000]	[0.000]	[0.000]							
(4) Est_SalesIM	0.102	0.144	0.167	0.022						
	[0.000]	[0.000]	[0.000]	[0.033]						
(5) Est_SupemIM	-0.043	-0.085	-0.002	-0.060	-0.957					
	[0.000]	[0.000]	[0.829]	[0.000]	[0.000]					
(6) Dis_Sales	0.117	0.153	0.192	0.044	0.931	-0.909				
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]				
(7) Dis_Supem	-0.044	-0.070	-0.022	-0.076	-0.912	0.923	-0.974			
	[0.000]	[0.000]	[0.032]	[0.000]	[0.000]	[0.000]	[0.000]			
(8) Sales_ErrIM	0.051	0.038	0.084	0.063	-0.094	0.044	0.275	-0.256		
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]		
(9) Supem_ErrIM	-0.002	0.036	-0.051	-0.042	0.112	-0.191	-0.172	0.200	-0.765	
	[0.838]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	
(10) |Tot_ErrIM|	-0.007	0.022	-0.013	-0.083	0.486	-0.522	0.359	-0.356	-0.302	0.420
	[0.489]	[0.031]	[0.197]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]

(*continued on next page*)

TABLE 3 (continued)

Panel C: Pearson Correlations between Audit Fees (Modified Audit Opinion) and Articulation Errors

Variable	*CFO_VOL*	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*
(1) MAO	0.061									
	[0.000]									
(2) |Tot_ErrIM|	0.166	0.152								
	[0.000]	[0.000]								
(3) ROA	-0.022	-0.471	-0.120							
	[0.031]	[0.000]	[0.000]							
(4) EXTRAGAIN	-0.028	-0.067	-0.013	0.243						
	[0.007]	[0.000]	[0.208]	[0.000]						
(5) LEV	-0.127	0.150	-0.040	-0.282	-0.090					
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]					
(6) SIZE	-0.188	-0.216	-0.076	0.236	0.014	0.185				
	[0.000]	[0.000]	[0.000]	[0.000]	[0.180]	[0.000]				
(7) INV	0.184	-0.077	0.043	0.015	-0.049	-0.067	0.061			
	[0.000]	[0.000]	[0.000]	[0.134]	[0.000]	[0.000]	[0.000]			
(8) BIG4	-0.074	-0.042	-0.020	0.091	0.024	-0.012	0.341	-0.036		
	[0.000]	[0.000]	[0.048]	[0.000]	[0.022]	[0.234]	[0.000]	[0.001]		
(9) RET	0.053	-0.055	0.049	0.156	0.099	-0.021	0.079	0.064	-0.022	
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.039]	[0.000]	[0.000]	[0.032]	
(10) STDRET	0.061	0.070	0.096	-0.086	0.108	0.010	-0.067	0.122	-0.090	0.287
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.338]	[0.000]	[0.000]	[0.000]	[0.000]

[a] All continuous variables are winsorized at the top and bottom 1%.
[b] Numbers in brackets are two-tailed *p*-values.

TABLE 4
Forecasting Future Cash Flows and Earnings

Panel A: Forecasting Future Cash from Operations (*FCFO*)

Variable	Model (1)	Model (2aIM)	Model (3IM)	Model (2aBS)	Model (3BS)	Model (2bDM)
Intercept	0.027***	0.022***	0.021***	0.022***	0.021***	0.021***
	(4.407)	(3.078)	(2.856)	(3.029)	(2.835)	(2.871)
CFO	0.283***					
	(14.598)					
Est_Sales		0.234***	0.254***	0.234***	0.255***	
		(13.461)	(14.589)	(12.535)	(14.014)	
Est_Supem		0.228***	0.252***	0.228***	0.253***	
		(12.145)	(13.881)	(11.029)	(13.088)	
Dis_Sales						0.254***
						(14.228)
Dis_Supem						0.252***
						(13.489)
Dis_Tax		-0.251***	-0.162**	-0.249***	-0.161**	-0.156**
		(-3.957)	(-2.289)	(-4.162)	(-2.472)	(-2.259)
Est_Other		0.214***		0.218***		
		(9.053)		(11.603)		
Dis_Other			0.112***		0.113***	0.119***
			(3.674)		(4.007)	(4.179)
Sales_Err			0.246***		0.247***	
			(10.441)		(14.421)	
Supem_Err			0.242***		0.243***	
			(9.546)		(15.824)	
IndustryDummy	included	included	included	included	included	included
n	9,432	9,432	9,432	9,432	9,432	9,432
Adj. R^2	0.117	0.141	0.146	0.141	0.146	0.146

F-tests of coefficient equality: Coefficients on *Est_Sales*, *Est_Supem*, *Dis_Tax*, and *Est_Other* are equal
F-statistic = 37.41*** in Model (2aIM); F-statistic = 47.41*** in Model (2aBS).

F-tests of coefficient equality: Coefficients on *Dis_Other*, *Sales_Err*, and *Supem_Err* are equal
F-statistic = 21.70*** in Model (3IM); F-statistic = 21.09*** in Model (3BS).

Vuong tests of the difference in explanatory power:
Model (3IM) vs. Model (2aIM): z-statistic = 3.070***; Model (3BS) vs. Model (2aBS): z-statistic = 3.055***;

Vuong tests of the difference in explanatory power:
Model (2bDM) vs. Model (2aIM): z-statistic = 2.887***; Model (2bDM) vs. Model (2aBS): z-statistic = 2.864***.

(*continued on next page*)

TABLE 4 (continued)

Panel B: Forecasting Future Earnings (*FEARN*)

Variable	Model (4)	Model (5aIM)	Model (6IM)	Model (5aBS)	Model (6BS)	Model (5bDM)
Intercept	0.031**	0.020	0.020	0.020	0.019	0.022
	(2.219)	(1.346)	(1.353)	(1.311)	(1.331)	(1.463)
ACCR	0.449***	0.402***	0.404***	0.402***	0.407***	0.398***
	(20.333)	(16.449)	(16.752)	(16.419)	(16.758)	(16.234)
CFO	0.690***					
	(28.998)					
Est_Sales		0.606***	0.637***	0.615***	0.646***	
		(22.757)	(27.614)	(22.331)	(27.274)	
Est_Supem		0.588***	0.626***	0.597***	0.634***	
		(20.791)	(26.427)	(20.188)	(25.763)	
Dis_Sales						0.630***
						(24.562)
Dis_Supem						0.623***
						(24.232)
Dis_Tax		0.041	0.158**	0.020	0.137*	0.127
		(0.467)	(2.125)	(0.222)	(1.734)	(1.593)
Est_Other		0.604***		0.555***		
		(16.806)		(12.120)		
Dis_Other			0.483***		0.446***	0.459***
			(7.356)		(6.879)	(7.682)
Sales_Err			0.635***		0.583***	
			(17.542)		(12.722)	
Supem_Err			0.662***		0.619***	
			(20.867)		(13.348)	
IndustryDummy	included	included	included	included	included	included
n	9,432	9,432	9,432	9,432	9,432	9,432
Adj. R^2	0.254	0.274	0.278	0.276	0.280	0.276

F-tests of coefficient equality: Coefficients on *Est_Sales*, *Est_Supem*, *Dis_Tax*, and *Est_Other* are equal
F-statistic = 29.73*** in Model (5aIM); F-statistic = 25.58*** in Model (5aBS).

F-tests of coefficient equality: Coefficients on *Dis_Other*, *Sales_Err*, and *Supem_Err* are equal
F-statistic = 9.019*** in Model (6IM); F-statistic = 9.377*** in Model (6BS).

Vuong tests of the difference in explanatory power:
Model (6IM) vs. Model (5aIM): z-statistic = 3.017***; Model (6BS) vs. Model (5aBS): z-statistic = 3.047***.

Vuong tests of the difference in explanatory power:
Model (5bDM) vs. Model (5aIM): z-statistic = 1.818*; Model (5bDM) vs. Model (5aBS): z-statistic = 0.442.

See Table 1 for variable definition.
Est_Sales = Est_SalesIM and Est_SalesBS, respectively, in Model (IM) and Model (BS). *Est_Supem*, *Sales_Err*, and *Supem_Err* are defined similarly.
*, **, and *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed) for regression coefficients (*t*-statistics) or for equality in coefficients (F-statistics) using the two-way clustered standard errors (Petersen 2009) or for the Vuong (1989) test of the difference in explanatory powers between two regressions based on the OLS estimation.

TABLE 5
Absolute Articulation Errors and Cash Flow Persistence

	Dependent Variable = *FCFO*		Dependent Variable = *FEARN*	
Variable	**Model (7IM)**	**Model (7BS)**	**Model (8IM)**	**Model (8BS)**
Intercept	0.018**	0.018*	0.012	0.012
	(2.095)	(1.954)	(0.768)	(0.721)
ACCR			0.536***	0.515***
			(19.121)	(12.252)
Dis_Sales	0.295***	0.301***	0.774***	0.754***
	(11.676)	(10.724)	(16.453)	(15.361)
Dis_Supem	0.283***	0.288***	0.762***	0.740***
	(11.236)	(10.455)	(16.017)	(15.330)
Dis_Tax	-0.113	-0.113	0.251**	0.242***
	(-1.625)	(-1.518)	(2.277)	(3.200)
Dis_Other	0.188***	0.209***	0.702***	0.658***
	(6.313)	(8.580)	(8.796)	(7.349)
|*Tot_Err*|	0.000	-0.003	0.027***	0.019**
	(0.013)	(-0.219)	(5.766)	(1.971)
ACCR×|*Tot_Err*|			-0.320***	-0.335***
			(-4.189)	(-3.016)
Dis_Sales×|*Tot_Err*|	-0.153***	-0.198***	-0.426***	-0.429***
	(-3.691)	(-3.186)	(-8.726)	(-5.384)
Dis_Supem×|*Tot_Err*|	-0.137***	-0.180***	-0.418***	-0.419***
	(-3.361)	(-2.923)	(-9.006)	(-5.458)
Dis_Tax×|*Tot_Err*|	-0.203*	-0.252*	-0.264	-0.375*
	(-1.751)	(-1.849)	(-1.583)	(-1.812)
Dis_Other×|*Tot_Err*|	-0.222***	-0.313***	-0.676***	-0.622***
	(-2.591)	(-3.049)	(-4.890)	(-3.506)
IndustryDummy	included	included	included	included
n	9,432	9,432	9,432	9,432
Adj. R^2	0.149	0.150	0.296	0.290

See Table 1 for variable definition.
|*Tot_Err*| = |*Tot_ErrIM*| and |*Tot_ErrBS*| in Model (IM) and Model (BS), respectively.
*, **, and *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed) using the two-way clustered standard errors (Petersen 2009).

TABLE 6
Absolute Articulation Errors and Uncertainty of Future CFO and Earnings

Variable	Model (9IM)	Model (9BS)	Model (10IM)	Model (10BS)
Intercept	0.090***	0.091***	0.035***	0.035***
	(12.749)	(12.597)	(3.771)	(3.712)
|*Tot_Err*|	0.014***	0.016***	0.018***	0.016***
	(8.545)	(9.386)	(6.429)	(5.756)
STDRET	-0.064	-0.049	0.096	0.118
	(-0.390)	(-0.297)	(0.830)	(0.996)
BTM	-0.016***	-0.017***	-0.025***	-0.026***
	(-4.964)	(-5.002)	(-6.570)	(-6.428)
LOGMV	-0.003***	-0.003***	-0.001	-0.001
	(-6.917)	(-7.050)	(-1.351)	(-1.417)
CAP_INTEN	-0.028***	-0.028***	0.001	0.001
	(-9.211)	(-9.190)	(0.177)	(0.401)
LEV	-0.010***	-0.010***	0.004	0.004
	(-5.580)	(-5.406)	(1.538)	(1.491)
ROA	0.010	0.009	-0.211***	-0.213***
	(1.118)	(1.053)	(-9.657)	(-9.868)
CFO_VOL			0.144***	0.150***
			(6.438)	(6.235)
Industry dummy	included	included	included	included
n	9,432	9,432	9,432	9,432
Adj R^2	0.149	0.148	0.407	0.399

See Table 1 for variable definition.
|*Tot_Err*| = |*Tot_ErrIM*| and |*Tot_ErrBS*| in Model (IM) and Model (BS), respectively.
*, **, and *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed) using the two-way clustered standard errors (Petersen 2009).

TABLE 7
Logistic Regression of Modified Audit Opinions ((*MAO*) on Absolute Articulation Errors

Variable	Model (11IM)	Model (11BS)	Model (11IM')	Model (11BS')
Intercept	0.677	0.860	0.405	0.546
	(0.478)	(0.591)	(0.288)	(0.383)
|*Tot_Err*|	0.945***	0.996***	0.833***	0.874***
	(4.889)	(3.665)	(4.449)	(3.220)
|*DACCR*|			1.333***	1.444***
			(3.770)	(3.831)
ROA	-6.023***	-5.919***	-5.656***	-5.562***
	(-8.512)	(-7.679)	(-7.711)	(-7.044)
EXTRAGAIN	5.998***	5.883***	5.736***	5.646***
	(2.973)	(2.987)	(2.829)	(2.859)
LOSS	1.279***	1.276***	1.306***	1.304***
	(8.773)	(8.663)	(8.867)	(8.693)
LEV	1.041***	1.096***	1.035***	1.082***
	(2.631)	(2.744)	(2.623)	(2.717)
QUICK	-0.384*	-0.397*	-0.404*	-0.418*
	(-1.898)	(-1.847)	(-1.949)	(-1.896)
SIZE	-0.511***	-0.541***	-0.492***	-0.516***
	(-4.635)	(-4.671)	(-4.546)	(-4.634)
EM	0.336***	0.344***	0.349***	0.355***
	(3.251)	(3.243)	(3.298)	(3.303)
AR	2.527***	2.484***	2.545***	2.506***
	(3.049)	(2.988)	(3.119)	(3.047)
INV	-3.329***	-3.430***	-3.281***	-3.373***
	(-5.001)	(-5.119)	(-5.038)	(-5.176)
BIG4	0.391	0.406	0.404	0.417
	(1.444)	(1.485)	(1.493)	(1.521)
RET	-0.044	-0.043	-0.061	-0.061
	(-0.258)	(-0.247)	(-0.359)	(-0.354)
STDRET	1.633	3.788	1.154	2.886
	(0.086)	(0.199)	(0.061)	(0.153)
IndustryDummy	included	included	included	included
n	9,432	9,432	9,432	9,432
Adj. R^2	0.343	0.341	0.345	0.344

See Table 1 for variable definition.
|*Tot_Err*| = |*Tot_ErrIM*| and |*Tot_ErrBS*| in Model (IM) and Model (BS), respectively.
*, **, and *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed) using the two-way clustered standard errors (Petersen 2009).