Critical Evaluation of Accrual Models in Earnings Management Studies

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Earnings management is an important part of current accounting studies. Many of those studies concentrate on accruals. This study critically evaluates frequently used accrual models. The Jones model was the first econometric approach to estimating discretionary accruals. Even though it is subject to several limitations, such as model misspecification, omitted-variables, and errors-in-variables problems, no other accrual model consistently outperforms the Jones model. In the absence of an error-free accrual model, studies in earnings management need the trianglization of their findings by using more than one accrual model and other non-econometric approaches, such as an analysis of earnings number distributions.

INTRODUCTION

Earnings management is a mainstream accounting research topic. This research addresses the possibility that business managers might adjust financial statement variables to accomplish undisclosed or personal goals. Arthur Levitt, Jr., Chairman of the Securities and Exchange Commission, 1993 – 2001, addressed five questionable accounting practices used by corporations to manage earnings: (Munter 1999; Arthur Levitt n.d.): (1) "big bath" charges, (2) creative acquisition accounting, (3) "cookie jar reserves" for accruals, (4) misapplications of accounting materiality, and (5) premature recognition of revenues.

Some earnings management studies focus on events that might motivate managers to manage earnings. Healy (1985) reports that managers use accrual policies to maximize the benefits from their earnings-based bonus contracts. DeAngelo (1986) examines the potential for understatement of accruals as a means of reducing management's cost when the buyout price is based on an earnings-based valuation. Jones (1991) examines a decrease in positive accruals during import relief investigations by the United States International Trade Commission (ITC) since reduced earnings increase the likelihood of obtaining import relief.

In general, acceptable accounting principles are not inflexible and choices can be made to accomplish goals other than the highest degree of objective financial accuracy. Thus, managers can take advantage of the flexibility in generally accepted accounting principles (GAAP) to accomplish their own personal agendas. This type of behavior (earnings management) is defined as "a purposeful intervention in the external financial reporting process, with the intent of obtaining some private gain (as opposed to, say, merely facilitating the neutral operation of the process)" (Schipper 1989, p. 92).

Some methods of earnings management, such as big bath charges, are apparent, but others are not. To quantify non-apparent earnings management, accounting researchers have focused on the accrual portion of a firm's net income calculation, particularly on accrual factors that allow discretionary selection or adjustment. Since every firm operates under a unique economic environment, GAAP provide managers with the discretion to choose between alternative ways to record business transactions, e.g., FIFO and LIFO inventory methods. Also, managers can accrue *estimated* potential expenses, such as bad debt expense, warranty expense, and others. Thus, managers have significant latitude in measuring earnings without violating—or seriously bending—GAAP provisions.

Users of financial statements (e.g. investors, brokers, regulators, etc.) can hardly see through published financial statements to undo managers' adjustments and recreate objectively accurate financial data. A principal reason for that is that the boundary between managers' objective professional judgments and their personal manipulation of financial statement variables is not clear. The difficulty is exacerbated by the fact that rational managers would clandestinely engage in earnings management hoping to ensure the maximum effect possible while avoiding the potential penalties and liabilities that would arise if their earnings management activities were revealed. As a result, the study of earnings management is similar to forensic investigations, gathering and evaluating data to produce an accurate reconstruction of past events.

For current purposes, "earnings" are comprised of two components, operating cash flows and accruals. Managers can "manage" accruals by making permitted discretionary judgments in measuring and recording specific accruals. Accounting researchers must, therefore, partition accruals into discretionary and non-discretionary components as a preliminary step in determining the degree of managers' arbitrary influence on the final accruals figures. The distinction between discretionary and non-discretionary accruals is not directly observable. Accordingly, studies in earnings management have employed a variety of methods to accurately make this partition, which is crucial for their empirical analysis. This study critically evaluates how accrual models have evolved over time and recommends practical methods for use in earnings management studies.

This paper is organized as follows: Section II discusses two components of accruals. Section III includes critical evaluations of selected accrual models, and Section IV presents non-econometric approaches in earnings management studies. Section V provides conclusions.

TWO COMPONENTS OF ACCRUALS

Isolating the key accounting component—discretionary accruals—requires a number of steps. Net income (*NI*) can be expressed as a sum of cash flow from operations (*CFO*) and accruals (*ACC*) as follows (ignoring the firm and time subscripts):

$$NI = CFO + ACC \tag{1}$$

ACC is partitioned into discretionary (*DACC*) and non-discretionary accruals (*NDACC*):

$$ACC = DACC + NDACC \tag{2}$$

Following McNichols and Wilson (1988) and Kang and Sivaramakrishnan (1995), unobservable *NDACC* is measured by a proxy, *NDACCP* with error, η:

$$NDACCP = NDACC + \eta \tag{3}$$

where η is assumed to be white noise. *ACC* are observable and thus are regressed on a vector of variables (χ) to estimate *NDACCP* as a proxy for *NDACC*. The residual from a regression should be orthogonal to χ and is used as a proxy for *DACC*. If the estimation model is subject to the misspecification problem, *NDACCP* will not be an unbiased estimate for NDCAA. If *DACCP* is biased, $E(\text{ɥ}|\ \chi) <> 0$. Thus, the residual is correlated to ɥ and a biased proxy for *DACC*.

Obtaining an unbiased *NDACCP* is a challenging task for earnings management studies. Without an unbiased *NDACCP*, an earnings management study will suffer from type I or type II errors, or both. Type I errors arise when a biased *DACC* leads to a false conclusion that earnings management occurs. Type II errors arise when a biased *DACC* leads to a failure of detecting extant earnings management. In particular, type I errors can result in a rejection of the null hypothesis even though the apparent relationship between earnings management and an event under investigation is spurious. In the following section, selected accrual models that have employed in past earnings management studies are reviewed.

ACCRUAL MODELS

Healy (1985) and DeAngelo (1986) are early studies in earnings management that address the measurement of *DACC*. Healy (1985) uses *ACC* as a proxy for *DACC* where *ACC* are deflated by lagged total assets to control firm size effect. For his partitioned samples, earnings—increasing and earnings—decreasing, he computes a mean of *ACC* for each subsample and then compares the two to have statistical inference. Thus, the Healy model assumes that *NDACC* remain constant between the subsamples. On the other hand, DeAngelo (1986) computes a change in *ACC* between two adjacent years deflated by lagged total assets. This assumes that *NDACC* are stable over years, and therefore a change in *ACC* reflects *DACC* being adjusted by managers for non-accounting purposes using accounting procedures. Thus, the DeAngelo model uses the prior year as a basis to estimate *NDACC*, while the Healy model relies on cross-sectional comparison.

The validity of the both models depends upon the nature of *NDACC*. If *NDACC* follow a white noise pattern, the Healy model produces *DACC* without errors. On the other hand, if *NDACC* follow a random walk pattern, the DeAngelo model would produce unbiased *DACC* (Dechow et al. 1995). Nonetheless, both models may produce inaccurate estimates of *DACC* because firms' operations are influenced by their economic environments. In the real world, *NDACC* would vary between firms and over years because of changes in operational outcomes from firms' responses to changes in their economic environment. For example, an increase in revenues will produce an increase in *NDACC* even without manipulation.

Healy's and DeAngelo's methods are both intuitive, but based on an unrealistic assumption that *NDACC* are stable over years and/or across firms. Jones (1991) relaxes this assumption by constructing an econometric model to estimate *DACC*. The Jones model estimates *DACC* as a function of changes in revenues and capital intensity. Under standard accounting rules, many accruals are principally based on objective criteria. A number of accruals are computed based on revenues, e.g., bad debt expense and warranty expense. Similarly, depreciation expense, a major portion of accruals, is principally determined by the historical cost of depreciable tangible assets. The Jones model assumes that NDACC can be determined as follows:

$$NDACC_{i,t} = \hat{a}_1\left(\frac{1}{AT_{i,t-1}}\right) + \hat{a}_2\left(\frac{\Delta REV_{i,t}}{AT_{i,t-1}}\right) + \hat{a}_3\left(\frac{PPE_{i,t}}{AT_{i,t-1}}\right) \tag{4}$$

where

$NDACC_{i,t}$ = nondiscretionary accruals for firm *i* in year *t*,

$AT_{i,t-1}$ = total assets for firm *i* in year *t-1*,

$\Delta REV_{i,t}$ = a change in revenues for firm *i* in year *t*,

$PPE_{i,t}$ = gross plant, property, and equipment for firm *i* in year *t*, and

$\hat{a}_1$, $\hat{a}_2$, $\hat{a}_3$ = estimated parameters for firm *i*.

The parameters (a_1, a_2, and a_3) are estimated from Equation (5):

$$ACC_{i,t} = a_1\left(\frac{1}{AT_{i,t-1}}\right) + a_2\left(\frac{\Delta REV_{i,t}}{AT_{i,t-1}}\right) + \ a_3\left(\frac{PPE_{i,t}}{AT_{i,t-1}}\right) + e_{i,t} \tag{5}$$

where
$ACC_{i,t}$ represents total accruals for firm *i*, in year *t*,
a_1, a_2, and a_3 are estimated and denoted as $\hat{a}_1$, $\hat{a}_2$, and $\hat{a}_3$, respectively, and
$e_{i,t}$ represents *DACC* for firm *i*, in year *t*.

Variables in Equation (5) are deflated by lagged assets to mitigate heteroskedasticity in residuals (White 1980).

The parameters in Equation (5) can be estimated using either time-series data of each firm (Jones 1991; Dechow et al. 1995) or cross-sectional data (Xie 2001; Klein 2002; Zang 2012). In general, researchers prefer the cross-sectional estimation because of the greater number of available observations. For example, using a time-series model, Dechow et al. (1995) requires each firm to have at least 10 observations; their firms have 21.5 observations on average. On the other hand, a cross-section model is formed based on, usually, a two-digit SIC code and year combination. Thus, each model provides many more observations, e.g., 151.6 observations on average (Zang 2012). However, the cross-sectional Jones model effectively assumes that firms in the two-digit SIC industry all maintain a similar functional relationship between NDACC and their determining variables in Equation (4). Thus, where sample firms maintain individualized accruals patterns over time, the time-series Jones model should be preferred (Pae 2005).

The residuals from Equation (5) are used as a proxy for *DACC*. The residuals are assumed to be orthogonal to the regressors in Equation (5). If this is not the case, the residuals are a biased proxy for *DACC*, particularly when it has a correlation with measurement errors in the regressors. Further, any relevant variables that are omitted from a regression model may make parameter estimates be biased, especially if the omitted variables are associated with both a regressand and one or more regressors in the model. Another concern is that the Jones model assumes that accounting for revenues is entirely nondiscretionary; but some revenue items can be managed. For example, managers can effectively borrow future sales through an increase in accounts receivable. Also, the allowance for sales returns is subject to managers' discretion (Kang and Sivaramakrishnan 1995).

To relax the assumption of non-discretionary revenues and enhance the accuracy of *NDACC*, Dechow et al. (1995) computes NDACC using Equation (6):

$$NDACC_{i,t} = \hat{a}_1\left(\frac{1}{AT_{i,t-1}}\right) + \hat{a}_2\left(\frac{\Delta REV_{i,t} - \Delta AR_{i,t}}{AT_{i,t-1}}\right) + \ \hat{a}_3\left(\frac{PPE_{i,t}}{AT_{i,t-1}}\right) \tag{6}$$

where
$\Delta AR_{i,t}$ represents a change in net accounts receivable for firm *i*, in year *t*.

This modified-Jones model (Dechow et al. 1995) estimates the parameters of Equation (5) and then computes *NDACC* using Equation (6). The modified-Jones model assumes no manipulation of credit sales during the estimation period, so a change in accounts receivable, during the event period only, is adjusted to a change in revenues. Therefore, *NDACC* from Equation (6) reflect the discretionary part of credit sales. Dechow et al. (1995) demonstrate that the modified-Jones model provides a more powerful test of earnings management than the Jones model.

Alternatively, as the management of revenues could occur in both estimation and event periods, the modified-Jones model is used to estimate *DACC* during the event period as follows:

$$ACC_{i,t} = a_1\left(\frac{1}{AT_{i,t-1}}\right) + a_2\left(\frac{\Delta REV_{i,t} - \Delta AR_{i,t}}{AT_{i,t-1}}\right) + \ a_3\left(\frac{PPE_{i,t}}{AT_{i,t-1}}\right) + e_{i,t} \tag{7}$$

Like the Jones model in equation (5), the residuals from Equation (7) are taken as *DACC* (Jones et al. 2008; Kothari et al. 2005).

Both the Jones and modified-Jones models are criticized for their misspecifications. Nevertheless, in the absence of better alternatives, they are still favored by many researchers to estimate discretionary accruals (Guay et al. 1996). In addition, a number of studies have attempted to improve the accrual models.

Kang and Sivaramakrishnan (1995) raise several methodological issues about the Jones model as discussed above. First, using accounting variables as independent variables in Equation (5) makes it subject to the errors-in-variables problem because most accounting variables are subject to some degree of managers' discretion. This errors-in-variables problem would produce inconsistent and biased parameter estimates if the variable errors are correlated with the model's residuals. Second, any omitted variables in the Jones model result in biased estimates of *DACC*. For example, exceptionally good economic conditions would lead to *DACC* measuring errors because such economic conditions would affect both regressors and a regressand. Finally, all accounting variables are subject to the constraints in the accounting systems that are prescribed by GAAP and thus interrelated to each other to some degree. Such a simultaneous relationship between a regressand and regressors would introduce inconsistent parameter estimates. To adjust for these issues, Kang and Sivaramakrishnan (1995) propose an accrual model as follows:

$$\begin{aligned} AB_{i,t} = a_1 + a_2\left(\frac{AR_{i,t-1}}{REV_{i,t-1}} * REV_{i,t}\right) + a_3\left(\frac{NV_{i,t-1} + OCA_{i,t-1} - CL_{i,t-1}}{EXP_{i,t-1}} * EXP_{i,t}\right) \\ + \ a_4\left(\frac{DEP_{i,t-1}}{PPE_{i,t-1}} * PPE_{i,t}\right) + e_{i,t} \end{aligned} \tag{8}$$

where

$AB_{i,t}$	= accrual balance for firm *i* in year *t* that is computed as $AR_{i,t} + INV_{i,t} + OCA_{i,t} - CL_{i,t} - DEP_{i,t}$,
$AR_{i,t}$	= accounts receivable for firm *i* in year *t*,
$INV_{i,t}$	= inventory for firm *i* in year *t*,
$OCA_{i,t}$	= other current assets except cash, *AR*, and *INV* for firm *i* in year *t*,
$CL_{i,t}$	= current liabilities minus taxes and a current portion of long-term debt for firm *i*, year *t*,
$DEP_{i,t}$	= depreciation and amortization for firm *i* in year *t*,
$\Delta \mathrm{REV}_{i,t}$	= a change in revenues for firm *i*, in year *t*,
a_1, a_2, a_3, a_4	= parameters for firm *i*, and
$e_{i,t}$	= residuals for firm *i*, in year *t*.

Kang and Sivaramakrishnan (1995) estimate parameters of Equation (8) using the instrumental variable model and the GMM model to address the simultaneity issue. The simulation results prove the enhanced accuracy of predictions by Equation (8) compared to the Jones model. In particular, the Jones model shows increased type I errors for observations that experienced performance increases and decreases (i.e. positive and negative changes in pretax *ROA*, respectively). In other words, the Jones model does not properly reflect the effect of firm performance changes on non-discretionary accruals and thus is subject to the omitted-variable problem, in particular, for firms that experience changes in their performance.

Kang and Sivaramakrishnan (1995) ameliorate some of the Jones model's issues; nevertheless, their method has its own shortcomings. For example, their instrumental variable method cannot guarantee that the instruments employed are always correlated with the regressors only, not with the residual (Pindyck and Rubinfeld 2004). Most earnings management studies attempt to improve the Jones model's predictions. They derive a new accrual model through augmenting the Jones model and thus their results are easily comparable to the Jones model's (Dechow et al. 1995; Kothari et al. 2005; Pae 2005). The

Kang and Sivaramakrishnan (1995) model, however, can be hardly reconciled with the Jones model. In general, the superiority of a new accrual model tends to be firm-specific; for example, Kothari et al. (2005) and Pae (2005) report no substantial difference between the Jones and modified-Jones models in terms of their ability to estimate unbiased DACC. Rather, the modified-Jones model experiences a decrease in the power for observations with low growth in sales (Kothari et al. 2005).

In the absence of a new accrual model that corrects all model misspecification issues, accounting researchers are required to employ multiple models to ensure that their findings are not model-specific. From this perspective, the Kang and Sivaramakrishnan accrual model would impose additional costs on researchers, who need to run more than two incomparable accrual models. In addition, the simultaneous equation model cannot be easily applied to a specific research context and thus the Kang and Sivaramakrishnan accrual model is not widely adopted by other researchers in earnings management (Fields et al. 2001).

Kothari et al. (2005) attempt to improve the accuracy of accrual model predictions in two ways: (1) including an intercept, and (2) controlling for the effect of performance. The Jones and modified-Jones models are estimated without an intercept, which could magnify the misspecification of the accrual model. Kothari et al. (2005) include a constant term to mitigate misspecification problems arising from heteroskedasticity in residuals and omitted variables. Further, Kothari et al. (2005) propose the random walk property of sales changes and thus sales changes in the following year are expected to be zero. As accruals are a function of sales changes, expected accruals are zero as well. When firms, however, depart from the random walk, expected accruals become non-zero and thus a proxy for *DACC* would be biased.

The trend of sales in previous years can be projected into the future. Firms with unusual past performance are likely to mean revert or continuously to move in the same direction. As the accuracy of predicted future performance and accruals could improve with past performance, Kothari et al. (2005) propose two types of a testing model to improve the accuracy of DACC estimates.

$$ACC_{i,t} = a_1 + a_2\left(\frac{1}{AT_{i,t-1}}\right) + a_3\left(\frac{\Delta REV_{i,t}}{AT_{i,t-1}}\right) + a_4\left(\frac{PPE_{i,t}}{AT_{i,t-1}}\right) + a_5 ROA_{i,t(i,t-1)} + e_{i,t} \qquad (9)$$

where

$ROA_{i,t\,(i,t-1)}$ net income over total assets; Equation (9) includes either $ROA_{i,t}$ or $ROA_{i,t-1}$ and

All other variables are defined above.

Equation (9) is the Jones model with *ROA*. The incorporation of ROA in the accrual model is also supported by the simulation results of Kang and Sivaramakrishnan (1995), which report that type I errors are substantially larger for firms with ROA increases or decreases.

Alternatively, Kothari et al. (2005) compute the Jones-model performance-matched discretionary accruals. Each firm-year observation in the sample firm is matched with another firm that is in the same two-digit SIC code and year and reports comparable current- or prior-year *ROA*. Performance-matched discretionary accruals are computed by subtracting the matched firm's discretionary accruals from a sample firm's discretionary accruals for a given year. *NDACC* are computed using either the Jones model or the modified-Jones model.

The performance-matched discretionary accruals outperform other accrual models including Equation (9) in terms of its power. Equation (9) is convenient because a matched firm is not required. However, a potential non-linearity between accruals and ROA would introduce spurious relationships in the Equation (9) model. Thus, Kothari et al. (2005) recommend the performance-matched discretionary accruals using the Jones model even though this technique cannot entirely cure the misspecification problem. The performance-matched method of Kothari et al. (2005) can be easily implemented by researchers because the Jones model is the primary basis for accrual estimates.

Similarly, Pae (2005) attempts to mitigate the Jones model's misspecification problem by adding additional variables. Pae (2005) adds two variables, current cash flow from operations (CFO_t) and lagged cash flow from operations (CFO_{t-1}), based on the fact that accruals are negatively correlated with cash flow from operations, but positively correlated with lagged cash flow from operations (Dechow 1994; Dechow and Dichev 2002). Thus:

$$ACC_{i,t} = a_1\left(\frac{1}{AT_{i,t-1}}\right) + a_2\left(\frac{\Delta REV_{i,t}}{AT_{i,t-1}}\right) + a_3\left(\frac{PPE_{i,t}}{AT_{i,t-1}}\right) + a_4\left(\frac{CFO_{i,t}}{AT_{i,t-1}}\right) + a_5\left(\frac{CFO_{i,t-1}}{AT_{i,t-1}}\right) + e_{i,t} \qquad (10)$$

where
$CFO_{i,t\,(i,t-1)}$ cash flow from operations for firm *i* in year *t* (*t*-1) and
All other variables are defined above.

Alternatively, Pae (2005) extends the Jones model by adding either lagged *ACC* or *CFO*, lagged *CFO* and lagged *ACC*. Further, Pae (2005) makes the same adjustments to the modified-Jones model. His empirical results prove that the inclusion of current and lagged CFOs significantly improves the explanatory power of the Jones model. There is no qualitative difference between the Jones model and the modified-Jones model in the demonstrated explanatory power of the added terms.

NON-ECONOMETRIC APPROACHES IN EARNINGS MANAGEMENT STUDIES

A couple of alternative non-econometric approaches have adopted by studies in earnings management. Accounting researchers could identify observations that are suspected of managing earnings without estimating *DACC*. The first group of accounting studies rely on the distribution of earnings numbers, such as earnings levels and earnings changes. In the absence of intentional intervention, these distributions are expected to produce a bell curve with a single peak. Instead, in the earnings change distribution, Burgstahler and Dichev (1997) report a break in the smooth line in the slightly-less-than–zero range. A similar observation is noted in the distribution of earnings levels. The number of slightly-less-than-zero observations is significantly lower than the number of slightly-more-than-zero observations. This leads to the suspicion that managers have manipulated earnings components in an attempt to avoid either an earnings decrease or a loss. Degeorge et al. (1999) report similar findings that might be associated with managers' efforts to avoid a loss or to exceed prior year earnings or analysts' predictions. A number of studies utilize the earnings distribution method to identify firms engaging in earnings management (e.g., Durtschi and Easton 2009; Gunny 2010).

Another group of studies (e.g., Carslaw 1988; Thomas 1989) examine the distribution of digits in financial statement numbers employing Benford's Law, which predicts the frequencies of digits in collected numerical data (Benford 1938). For example, collected numerical data are expected to have 30.1% of their first digit from the left as 1s, but 4.58% as 9s. But the same data would be expected to have 11.39% of the second digit from the left as 1s, but 8.5% as 9s. Thus, the frequency of particular numbers is not equally distributed. Rather, the higher the number (1, 2, 3, . . .) the less likely it will appear as the first digit from the left in a number. The difference between probabilities decreases as one moves toward the right. Eventually, the frequency of digits is equally distributed in the fifth and greater digits from the left.

Carslaw (1988) was the first empirical study in accounting to adopt this methodology. He studied New Zealand firms and documented their earnings management practice. New Zealand's firms with positive earnings reported a higher frequency of 0s, and a lower frequency of 9s, in the second digits from the left in their earnings than the predicted Benford proportion. The results imply that firms with high second digits likely managed earnings in a manner that increased the first digit and thus leaving a 0 as the second digit. Thomas (1989) extends Carslaw's findings to U.S. firms and reports similar findings. Niskanen and Keloharju (2000), Van Caneghem (2002), and Skousen et al. (2004) report similar results using Finish, British, and Japanese samples, respectively.

These two non-econometric techniques can be used to identify suspected earnings management activities. Thus, researchers may wish to design research methodologies in earnings management that utilize these techniques to avoid a concern to deal with potential errors that might arise from an extant accrual model.

SUMMARY AND RECOMMENDATIONS

One of the important tasks for earnings management research is to separate observable accruals into two unobservable sub-components: non-discretionary and discretionary. Early studies in earnings management adopt all accruals or change in accruals as a proxy for discretionary accruals. If accruals are assumed to have white noise property, undifferentiated accruals could represent discretionary accruals. On the other hand, if accruals are assumed to follow a random walk pattern, the change in accruals could be used to represent discretionary accruals.

In reality, nondiscretionary accruals are not stable over time or across firms but rather depend upon firm specific factors. Thus, the Jones model is designed to estimate discretionary accruals by assuming that non-discretionary accruals are a function of two factors: change in revenues and capital intensity. The Jones model was the first econometric approach to estimate discretionary accruals by regressing accruals against the two determining factors of nondiscretionary accruals to which the residual (discretionary accrual) is orthogonal. Parameters of this regression model can be estimated using either cross-sectional or time-series data. A cross-sectional model is favored because of increased number of available observations. Nonetheless, a time-series model is appropriate for analyzing single firms with their own trend of accruals. The Jones model is subject to the misspecification problem and has been augmented by additional regressors to mitigate that problem in following studies. As demonstrated by Kothari et al. (2005), there is no single accrual model that is free of the model misspecification problem. Under these circumstances, the performance-matched Jones model is recommended as the best choice among extant accrual models to estimate discretionary accruals.

The superiority of one accrual model over another appears to be sample specific. For example, Dechow et al. (1995) demonstrate an increase in accuracy of discretionary accruals estimates by using a modified-Jones model that takes into account the manipulation of credit sales but following studies do not produce similar results (Kothari et al. 2005 and Pae 2005). The Jones model has sustained its resilience against critical scrutiny for over more than 20 years. Accounting researchers are still looking for an improved accrual model. Meanwhile, researchers in earnings management can employ the Jones model in conjunction of other accrual models to ensure that their results are not driven by an accrual model employed.

As all extant accrual models are subject to the model misspecification problem, researchers could consider alternative non-econometric methodologies to identify observations that are suspected of managing earnings. There are two typical groups of studies in earnings management that adopted non-econometric approaches: examination of earnings number distributions and comparison of frequency of each digit in earnings numbers to its corresponding proportion that is prescribed by Benford’s Law. The primary purpose of the two non-econometric approaches is to identify observations with managed earnings numbers. Thus, these approaches could not show how earnings numbers are managed.

Even though a great number of accounting studies have investigated the practice of earnings management over more than two decades, the computation of unbiased discretionary accruals is still a challenging task for accounting researchers. Thus, accounting researchers may consider an option of using both econometric accrual models and non-econometric distribution techniques in the course of examining earnings management issues.

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