The Development Of The Miller Ratio (MR): A Tool To Detect For The Possibility Of Earnings Management (EM)

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ABSTRACT

This study focuses on the study of tool practitioners and regulators may find useful. The large body of literature on the topic of earnings management provides discussions of total accruals, discretionary total accruals, and current accruals. The literature also offers discussions of the development and study of models to determine the level of earnings management given that cash flow from operations (CFO) and net income differ.

BACKGROUND OF EARNINGS MANAGEMENT

Corporate managers, in their fiduciary role as the stewards of stockholders' assets, are expected to run the company in the best interests of the stockholders. Presumably, the firm should maximize long-term earnings. However, short-term goals are also necessary to enhance the productivity and image of the company (Giroux, 2004). One of the potential problems inherent in the corporate form is managers may focus on short-term personal incentives such as maximizing salaries, bonuses, and other short-term compensations, rather than focus on the long-term economic success of the firm. While this can be accomplished through improved business strategies and successful operations; it can also be accomplished, at least in the short-term, through aggressive earnings management. It is this aggressive use of earnings management to accomplish managers' short-term goals which causes the topic of earnings management to rise to a level of importance for study. Accrual accounting manages earnings within the guidelines and flexibility of Generally Accepted Accounting Principles (GAAP). To the extent that this earnings management becomes aggressive, it changes the reader's perception of the story being told. When aggressive earnings management crosses the boundaries of the flexibility of GAAP it becomes fraud (Mulford & Comiskey, 2002). Consequently, the study of earnings management, and methodologies to detect such, assist stakeholders of corporations in analyzing risk.

A fundamental gap exists between the interests of academic research and the needs of the practitioner and regulator for a useful, practical, and simplified tool in detecting earnings management. This study provides the practitioner and regulator with a new tool to test for the possibility of corporate management engaging in aggressive earnings management. Earnings management has been an important topic for academic researchers in accounting and finance (Giroux, 2004). The perspective of academics has differed from that of non-academic professionals (practitioners and regulators). As stated by Dechow and Skinner (2000, p. 236):

First, because academics usually wish to make general statements about earnings management, they often choose to examine large samples of firms, and so tend to use statistical definitions of earnings management that may not be very powerful in identifying earnings management. Second, academics have focused on particular samples and management incentives that (1) are not of a great deal of interest to practitioners, and (2) ex post, have not been very fruitful in terms of identifying earnings management behavior.

In response to extreme pressure faced by many corporate executives during the 1990s to achieve targeted earnings and financial analysts' projections, some managers turned to the use of aggressive and fraudulent financial reporting practices (Schroeder, Clark & Cathey, 2005). One study (Healy & Wahlen, 1999) found that earnings

management occurs for a variety of reasons including, but not limited to influencing the stock market, increasing management compensation, reducing the likelihood of violating lending covenants, and avoiding intervention by government regulators.

Earnings management manipulations can be either of an accounting-based or an operations-based nature (Crumbley, Heitger, Smith, & Stevenson, 2003). Accounting-based earnings management manipulations include for example, changing accounting methods, increasing earnings to meet a budget target, or changes in accounting estimates, e.g. bad debt reserves, life of depreciable assets, and inventory obsolescence. Operations-based earnings management manipulations include for example, accelerating production, accelerating sales, or stockpiling excessive inventory not needed until well into the following year. When these various activities are of a significant nature, the auditors are expected to ascertain this activity with the proper adherence to Generally Accepted Auditing Standards (GAAS) (Konrath, 1999).

This study focuses on the study of tool practitioners and regulators may find useful. The large body of literature on the topic of earnings management provides discussions of total accruals, discretionary total accruals, and current accruals. The literature also offers discussions of the development and study of models to determine the level of earnings management given that cash flow from operations (CFO) and net income differ.

Management utilizes short-term earnings management for reasons previously stated. Examples are: to enhance market value of the stock for stockholders, or to increase income-based compensation for management. The flexibility of GAAP allows management to exploit accounting principles to produce the appearance of increased earnings (Crumbley, et al, 2003). The intent of GAAP fails, according to Rosenfeld (2000), due to a lack of transparent financial information and the flexibility for earnings management have been made part of GAAP. When aggressive earnings management is utilized it camouflages the valid story being described by the financial statements of a company.

Corporations have stakeholders who rely on the validity of the financial information provided to them. They are composed of various groups and individuals who benefit from, or are harmed by, and whose rights are violated or respected by, corporate actions (Donaldson & Werhane, 1999). Stakeholders of the corporation include, but are not limited to: management, owners, suppliers, employees, customers, and the local community (Donaldson, & Werhane, 1999, p. 251). The concept of stakeholders is a generalization of the notion of stockholders, the owners of the corporation, who themselves have some special claim on the corporation. Just as stockholders have a right to demand certain actions by management, so do stakeholders have a right to make claims. Stakes require action of a certain sort, and conflicting stakes require methods of resolution. Financial information must be of such a fair nature that it does not violate the lawfully established economic rights and interests of all stakeholders (Monti-Belkaoui & Riahi-Belhaoui, 1996).

Accounting-based earnings management may also be accomplished through the use of discretionary accruals. Accruals are less observable than changes in accounting principles and accounting estimates since they are not disclosed in the notes to financial statements. Therefore, as pointed out by Healy and Palepu (1990), earnings management through accrual manipulations is less costly to the firm. The result is that a manager's accrual decision is less detectible relative to changes in accounting principles and accounting estimates as well as early adopted mandated accounting standards.

Accruals affect the balance in certain balance sheet accounts such as accounts receivable, inventory, and accounts payable, along with other possible accrued asset and liability accounts. The offset to affecting the balances in the balance sheet accounts is reflected in an income or expense account (Horngren, et al, 2002). The basic simplicity of double entry accounting is it permits earnings management activities, but is also that simplicity that exposes the problem when the activity must be perpetuated.

One study (Healy & Wahlen, 1999) found that earnings management occurs for a variety of reasons including, but not limited to influencing the stock market, increasing management compensation, reducing the likelihood of violating lending covenants, avoiding intervention by government regulators. Healy (1985) tested for

earnings management by comparing average total accruals (scaled by lagged total assets) across a stated time frame. Healy's model defined estimated discretionary accruals in a period as total accruals scaled by lagged total assets. This implies that non-discretionary accruals are expected to be zero. The formula for the Healy model is:

$EDAC_{it}=TAC/A_{it-1}$

Where

$EDAC_{it}$ = Estimated discretionary accruals for firm i in year t,
TAC_{it} = Total accruals for firm i in year t,
A_{it-1} = Total assets for firm i at the beginning of year t.

I refers to the firm or the industry depending on whether the analysis is time series or cross-sectional. This is the simplest of all the models and is expected to contain the highest measurement error since it does not take into account the normal operations that would require some level of accruals. Healy's study attempted to segregate accruals between discretionary and non-discretionary accruals, with discretionary accruals being the focus of earnings management. Therefore, the degree of discretionary accruals determined the degree of earnings management.

DeAngelo (1986) tested for earnings management by computing first differences in total accruals, and by assuming that the first differences have an expected value of zero under a null hypothesis of no earnings management. DeAngelo used the last period's total accruals (scaled by lagged total assets) as the measure of nondiscretionary accruals. The DeAngelo model is similar to the Healy model in that the estimated period for nondiscretionary accruals was restricted to the prior year's observation. The DeAngelo model assumes that non-discretionary accruals follow a random walk and uses the change in the aggregate accruals from year t-1 to year t to represent the discretionary component. The formula for the DeAngelo model is:

$EDAC_{it}= (TAC_{it}-TAC_{it-1})/A_{it-1}$

where

$EDAC_{it}$ = Estimated discretionary accruals for firm i in year t,
TAC_{it} = Total accruals for firm i in year t,
A_{it-1} = Total assets for firm i at the beginning of year t.

Similar to the Healy model, the source of measurement error in this model comes form omitted variables affecting accruals in the current year. The nature of the accrual accounting process dictates that the level of nondiscretionary accruals should change in response to changes in economic circumstances. The DeAngelo model does not account for the impact in economic circumstances.

A common feature offered in the Healy and DeAngelo models was that if nondiscretionary accruals (necessary accruals for strict GAAP compliance were constant over time and discretionary accruals have an average of zero in the in the estimation period, then both models would measure nondiscretionary accruals without error (Dechow, et al, 1995).

Jones (1991) had proposed a model that had relaxed the Healy and DeAngelo assumptions that nondiscretionary accruals were constant. Her model had attempted to control for the effect of changes in a firm's economic circumstances on nondiscretionary accruals. Jones had made an implicit assumption that revenues are nondiscretionary. The formula for the Jones model is:

$TAC_{it}/A_{it-1}=\alpha_{i1}(1/A_{it-1})+\beta_{i1}(\Delta REV_{it}/A_{it-1})+\beta_{i2}(PPE_{it}/A_{it-1})+\varepsilon_{it}$

where

TAC_{it} = total accruals for firm i in year t,
A_{it-1} = Total assets for firm i at the beginning of year t,
ΔREV_{it} = Change in revenue for firm i from year t-1 to year t, and
PPE_{it} = Gross property, plant, and equipment for firm i in year t.

All variables are deflated by beginning total assets to adjust for heteroscedasticity.

This assumption that revenues are nondiscretionary orthogonalizes (Dechow, et al, 1995) total accruals with respect to revenues and would therefore extract this discretionary component of accruals, causing the estimate of earnings management to be biased toward zero.

A modified version of the Jones Model (Dechow, et al, 1995) addressed the issue of discretion over revenues and its relationship with earnings management. The formula for the modified Jones model is:

$$EDAC_{it}= TAC_{it}/A_{it-1}-[a_{i1}(1/ A_{it-1})+b_{i1}((\Delta REV_{it}-\Delta AR_{it})/ A_{it-1})+ b_{i2}(PPE_{it}/ A_{it-1})]$$

where

$EDAC_{it}$ = Estimated discretionary accruals for firm i in year t,
TAC_{it} = Total accruals for firm i in year t,
A_{it-1} = Total assets for firm i at beginning of year t,
ΔREV_{it} = Change in revenue for firm i from year t-1 to year t,
ΔAR_{it} = Change in accounts receivable for firm i from year t-1 to year t, and
PPE_{it} = gross property, plant and equipment for firm i in year t.

This version of the Jones Model implicitly assumed that all changes in credit sales in the study period result from earnings management. This was based on the reasoning that it is easier to manage earnings by exercising discretion over the recognition of revenue on credit sales than it is to manage earnings by exercising discretion over the recognition of revenue over cash sales.

The Healy, DeAngelo, and Jones models of earnings management focused on discretionary accruals and non-discretionary accruals. The difficulty is within the definitions of their determination of what constitutes discretionary and non-discretionary accruals. Consequently, assumptions must be made causing measurement error that may affect the results (Ibrahim, 2005).

The detection of earnings management thru the use of discretionary accruals has been the study of many researchers. Accruals, whether discretionary or non-discretionary, is the most useful tool to utilize in effecting earnings management since they are less observable. Many researchers have studied the determination of accruals to estimate earnings management predictions. The researchers were consistent in their studies of earnings management by using the following computation for totals accruals (TA) (Healy, 1985; Jones, 1991; Dechow, et al, 1995):

$$TA_t=(\Delta CA_t-\Delta CL_t-\Delta Cash_t+\Delta STD_t-Dep_t)/(A_{t-1}),$$

where

ΔCA = change in current assets,
ΔCL = change in current liabilities,
$\Delta Cash$ = change in cash and cash equivalents,
ΔSTD = change in debt included in current liabilities,
Dep = depreciation and amortization expense, and
A = Total assets.

DEVELOPMENT OF THE MILLER RATIO

The Statement of Changes in Financial Position dates back to 1862 in England and 1863 in the United States (Gibson, 1995). The original funds statement accounted for the changes in cash in the bank, cash on hand, and stamps. The original statements emphasized the flow of cash, but they had many different formats. By 1903, there were at least four conceptually different statements. In the period from the 1910s to the late 1920s, an educator named H. A. Finney led a drive to present the statement using a format that showed the cause of a change in working capital (Gibson). Finney was successful, and the working capital approach became the dominant format for presenting the statement. The APB addressed the presentation of the funds statement with the issuance of APB Opinion No. 3 in 1963. In 1971, APB Opinion No. 19 made the funds statement a required statement when a company presents a balance sheet and income statement. At the time of the issuance of APB No. 19, two basic presentation formats existed for the statement: the working capital format and the cash and cash equivalents format. In 1971 the working capital was the dominant format. During the 1980s, the cash and cash equivalents format became the dominant format. Components of the working capital format are subject to manipulation via accruals using current assets and current liabilities. In 1987 the FASB, the successor to the APB, issued Statement No. 95 titled "Statement of Cash Flows" (Spiceland, et al, 2004). Statement No. 95 directs that the statement be prepared on a cash basis, effectively abandoning the Statement of Changes in Working Capital. The major purpose of the statement of cash flows is to provide the user with information as to why the cash position of the company changed during an accounting period. Additionally, the cash flow statement must disclose the effect of all investing and financing transactions of the period as separate items from the cash flows of operations. The cash flows from operating activities are generally the cash effects of transactions and other events that enter into the determination of net income. Thus, the financial information offered by the working capital format was no longer available. CFO is a more pure financial number, less subject to manipulation. Consequently, the relationship between the manipulable (change in working capital) and the pure (cash flow from operations) leads to a need for further study.

Accruals can be manipulated (earnings management) during the short-term, but these amounts will eventually reverse themselves. Accrual accounting provides the ability to manipulate net income by aggressive recording of revenues or postpone recording of expenses with offsetting entries to the various accounts comprising working capital. Therefore, it would appear that a relationship between the change in working capital and cash flow from operations would be an indicator of earnings management. If a firm was not engaging in aggressive earnings management, the relationship would be stable.

The voluminous literature on the topic of earnings management provides discussions of total accruals, discretionary total accruals, and current accruals. The voluminous literature also offers discussions of the development and study of models to determine the level of earnings management given that CFO and net income differ. The statement of changes in working capital has been abandoned as a required financial statement, leading to less transparent financial information leading to an increased opportunity for earnings management through accruals. It appears that academia has not developed a relationship between the abandoned *statement of changes in working capital* and the required *statement of cash flows.* Therefore, since the study of earnings management has evolved around the study of the differences between CFO and net income, the lack of study of *changes in working capital* and its relationship with CFO offers an opportunity for further study of the determination of earnings management. Consequently, this opportunity provides fertile ground for the study of a relationship between changes in working capital and CFO.

CFO is also considered in the accounting concept referred to as *earnings quality*. Spiceland, et al (2004) states that earnings quality is the ability of reported earnings (income) to predict a company's future earnings (p. 20) – predictive value. The relationship of income from operations with CFO is the accepted computation. The presentation of the components of net income and the related supplemental disclosures (note to financial statements) provide clues to the user of the statement in assessing earnings quality. To enhance predictive value, analysts try to separate a company's transitory earnings effects from its permanent earnings. Transitory earnings effects result from transaction or events that are not likely to occur again in the foreseeable future or that are likely to have a different impact on earnings in the future. Thus, analysts begin their assessment of permanent earnings with income

from continuing operations. The elements that comprise transitory earnings are components of income that are required to be disclosed separately.

Financial analysts must be alert to the effect of discretionary accruals on income, which has an impact on earnings quality assessments (Spiceland, et al, 2004). Earnings management is a practice that negatively impacts earnings quality. Since discretionary accruals affect income from operations, thru accruals to working capital accounts, the earnings quality relationship is distorted. A stable relationship is expected, and when it is not stable, the quality of earnings decreases as a predictor of future permanent earnings. Since working capital accruals are reversed in the next accounting period, to the extent that management is aggressive in their discretion of accruals, management can manipulate income between periods, or they must perpetuate the situation if business events that necessitated the discretionary accruals do not change. This consideration provides the connection between changes in working capital and CFO, which leads to the model to be studied.

A practical tool does not appear to have been developed by academic researchers, useful for practitioners and regulators, to test for the possibility of management engaging in earnings management on a case-by case basis. The prior research models are not hereby rejected or refuted. They are simply of no practical, useful benefit to the practitioner and regulator.

A review of the literature leads to the opportunity to study the relationship between CFO and ΔWC (Change in Working Capital) as a tool to detect earnings management. The relationship is to be known as the MR and specified as ΔWC /CFO. The modified Jones model remains the benchmark with which researchers study earnings management. Consequently, the MR will be studied to bridge the previously mentioned gap in knowledge, the relationship of the manipulable with the pure. The intent of the MR is such that practitioners and regulators can prioritize their list of firms to ascertain if, in fact, the firm is engaging in earnings management by inappropriately altering the financial story being told to the public. The hypothesis supporting the MR (Miller Ratio) is formulated as follows:

$\mathbf{H_0}$ = $(\Delta wc/cfo)_t - (\Delta wc/cfo)_{t-1}=0$

$\mathbf{H_1}$: $(\Delta wc/cfo)_t - (\Delta wc/cfo)_{t-1}\neq 0$

Acknowledged within the MR is ΔREV (change in revenue) and ΔREC (change in accounts receivable) by virtue of the definitional components of ΔWC and CFO. Because the MR is designed to study current accruals, and not total accruals, the variable of PPE is not being considered. As recently as October of 2006, Cheng and Thomas (2006) employed the modified Jones Model variables mentioned previously in their study of abnormal accrual anomalies incremental to operating cash flows. The accepted definition of total accruals is that which causes the difference between cash flows from operations and net income. This includes items in addition to that which is studied by the MR with respect to working capital accruals. Consequently, the MR does not imply that any of the previous models are in error, nor are their variables inappropriate. The study of the MR complements the previous studies while providing practitioners and regulators a practical method of detecting earnings management. Specifically, the further from zero the MR, the more probability of earnings management, since it detects discretionary accruals. It is the level of discretionary accruals that suggest earnings management.

Prior research has established methods of measuring accounting manipulation that have credibility in the research community. In order to establish the MR as a dependable indicator of accounting manipulation, it is necessary to calculate the MR for data to which other models of measuring manipulation have been applied and then to compare the behavior of the MR to such. If the MR performs as well as the other models, then it will demonstrate that it is credible, as well as being easy to compute and interpret.

The General Accounting Office (GAO) identified companies which announced restatements to their annual reports between January 1, 1997 and March 26, 2002. There were 919 companies, of which 38%, or 354 companies, which had restatements due to revenue recognition issues. This list offered the ideal situation of acknowledged earnings management upon which to study the MR.

The MJM has consistently been recognized as an indicator of earnings management in the literature (Mitra, 2007; Lobo & Zhou, 2006; Wright, et al, 2006; Xiong, 2006; Kwon & Yin, 2006). Thus, it appears reasonable to compare the behavior of the MR to the modified Jones model using the aforementioned 354 companies from the GAO list of restatement announcements to ascertain if the volatility of the MR is as robust as that of the modified Jones model. The appropriate variables were acquired from COMPUSTAT to compute the MR and modified Jones model. As consistent with Dechow, et al (1995), and as emulated by Mitra (2007), Wright, et al. (2006), Lobo & Zhou (2006), and Kwon & Yin (2006), descriptive statistics were be generated for the MR and the modified Jones model from the same data set. The next statistical tool is the use of binary logistic regression. The MR and MJM were examined to determine if either model indicated the possibility of earnings management (EM).

TEST AND RESULTS

The data was provided by COMPUSTAT to compute the MR, the MJM. Other economic factors were obtained for further study (Miller, 2007). Data covering the years 1992 thru 2001 involving 23 items of information, per company, for each year, was requested. Due to limitations in availability of the requested data, the MR and MJM were able to be computed for 126 companies having restatements and also data to compute the MR and MJM for up to four prior years. Computing the MR and MJM for more than one year prior to the year of restatement was considered necessary as an attempt to minimize the ramifications of the assumption of the restatement year as being for the fiscal year immediately prior to the date of the restatement announcement. It is understood that many companies may have restated more than one year, or a year other then the immediately prior year. Thus, computing the MR and MJM for up to four prior years, given the availability of data, could alleviate the issue created by the aforementioned assumption. Table 1 displays a summary of the number of firms in the sample for each year studied. The computations were performed using a combination of Microsoft Excel 2003 and Small Stata version 8.0.

Table 1
Summary of companies

Year	1996	1997	1998	1999	2000	2001	Total
Number of Firms	97	131	128	128	83	31	598
Percent of Firms	16.2%	21.9%	21.4%	21.4%	13.8%	5.3%	100.0%
Number of Financial Restatements	0	0	0	43	52	31	126

Table 2 provides the descriptive statistics for both the MR and MJM for the prior years combined, and restatement years. Emulating the considerations of prior literature, the informative statistic is the standard deviation (Dechow, et al, 1995; Mitra, 2007; Wright, et al, 2006; Lobo & Zhou, 2006; and Kwon & Yin, 2006). While the values of the mean and standard deviation give some indications of normality, the skewness and kurtosis values are strong evidence as to the conformity of the data to the assumptions of multivariate normality. This is because data that is heavily skewed (either positively or negatively) is not symmetric with respect to its mean. A high kurtosis distribution has a sharper peak and fatter tails, while a low kurtosis distribution has a more rounded peak and wider shoulders. While truly normally distributed data will have both skewness and kurtosis measures equal to a value of zero, data with skewness and kurtosis measures less than three to five times their standard errors in absolute value tend to work adequately with regard to the robust statistical tests commonly used (Hogg & Tanis, 1993).

The expectation is that the standard deviation would increase from the prior years to the restatement year if the MR and MJM were predictors of earnings management. The kurtosis and skewness of the MR and MJM for the prior years and the restatement year is indicative the data is not normally distributed. The failure of the variables to adhere to the assumption of normality means that the results of any parametric tests performed will need to be carefully scrutinized. The lack of normality will cause bias in the parameter estimates reducing confidence in the results.

Table 2
Descriptive Statistics

	Miller Ratio		Modified Jones	
	Prior Years	**Restate Year**	**Prior Years**	**Restate Year**
Mean	-0.298	0.743	-3.385	-23.420
Standard Error	0.899	1.578	12.007	34.145
Median	-0.004	-0.334	2.383	1.408
Std. Deviation	19.524	17.712	260.850	383.271
Sample Var.	381.171	313.721	68042.836	146896.879
Kurtosis	52.346	36.175	65.545	25.091
Skewness	-0.778	4.903	-4.830	-3.352
Range	365.366	192.991	4564.250	4235.092
Minimum	-183.050	-568.173	-3277.249	-2719.059
Maximum	182.317	136.174	1287.001	1516.033
Sum	-140.865	93.654	-1597.943	-2950.901
Count	472	126	472	126
Confidence Level (95%)	1.766	3.123	23.593	67.576

The purpose for using the binary logistic regression test was to determine if the MR was as good at predicting the possibilities of earnings management as is the MJM. Since the prior tests were not clear on the robustness of the volatility of the MR as compared to the MJM, it was decided that testing for predicting earnings management would offer a conclusive determination. Using the binary logistic regression approach there were four possible outcomes: 1) both the MR and MJM are statistically significant predictors of the possibility of earnings management; 2) neither the MR not the MJM are statistically significant predictors; 3) the MJM is a statistically significant predictor and the MR is not; and 4) the MR is a statistically significant predictor and the MJM is not.

Table 3
Binary Logistic Regression

Summary Output – Miller Ratio

Number of observations	598

	Odds Ratio	Std. Err.	Z	P > | z |	[95% conf.	Interval]
MR	1.003	.005	0.54	0.587	.9926086	1.013

Table 4
Binary Logistic Regression

Summary Output – Modified Jones Model

Number of observations	598

	Odds Ratio	Std. Err.	Z	P > | z |	[95% onf.	Interval]
MJM	1.000	.000	-0.68	0.494	.999148	1.000

The binary logistic regression output summaries indicate that the p-statistic for the MR is 0.587 and the MJM is 0.494. With a confidence level of 95%, the null hypothesis fails to be rejected. Additionally, if the MJM had been hypothesized, the null hypothesis for it would fail to be rejected. The literature review had not indicated that the MJM had previously been tested with a set of data, such as utilized in this study, whereby EM has been acknowledged. Given the relative closeness of the p-statistics for the MR and MJM, it is generally stated that neither model reliably predicts the occurrence of EM.

The MJM attempts to segregate the discretionary accruals from total accruals (both short-term and long-term). The MR attempts to segregate the discretionary accruals from short-term accruals only. Consequently, a major difference between the MR and the MJM are long-term accruals, which are not considered in the MR. The purposes of the MR and MJM are to measure EM. Since the MR and MJM have different elements of the data for their respective computations, they do not result in similar computed answers. They attempt to accomplish their objective of measuring EM with different elements of financial data, essentially arriving at their intended objective from different directions. The MR is a relative proportional measure. The MJM had been standardized in an attempt to make it a relative proportional measure. Given the essential difference in the relative proportional measures and the different data elements used in the measurement, the MR and MJM were not expected to, and do not in fact, result in the same computed answer and, therefore, have differing descriptive statistics.

The findings of this study indicate that neither the MR nor the MJM predicted the possibility of EM at a statistically acceptable level of confidence on the body of data with acknowledged EM. The null hypothesis fails to be rejected. However, this does not conclude that the study is of no significance. The purpose of the study was to ascertain if the MR performs similarly to the MJM in determining the possibility of the existence of EM. This has been achieved, giving credibility to the MR, permitting it to be the topic of further research.

Most practitioners and regulators (essentially the SEC) review EM on a case-by-case basis (Giroux, 2004). The models previously discussed, e.g., MJM, were studied using a large sample of firms in the aggregate. The previously studied models were not designed to be utilized on a case-by-case basis. The MR is designed to be utilized on a case-by-case basis, and is easily computed. The result of the binary logistic regression discussed on the previous chapter indicated that the MR identified the possibility of EM with a p-statistic of 0.587, which is stronger than the p-statistic of 0.494 for the MJM. While this was not statistically significant to permit the rejection of the null hypothesis, there is the possibility for usefulness to practitioners and regulators in prioritizing the list of companies requiring further study. Since government regulators are bound by budgetary staff constraints, the benefit of having a useful tool to assist in determining which companies to examine further on a priority basis can be of assistance.

Limitations presented by the data set required two basic assumptions. The first assumption was that the year of restatement was assumed to be the year immediately prior to the date of restatement announcement, as provided by the General Accounting Office (GAO). The second assumption was the GAO report did not offer information as to whether the restatement was for an annual or quarterly report. Therefore, the assumption was made that the restatements were annual reports.

The ramification of the first assumption, or limitation, was the possibility of restatement year hidden in prior year observations if the restatement was not for the year immediately prior to the restatement announcement. This limitation could affect the conclusions, particularly the binary logistic regressions. However, since the MR and MJM were examined using the same companies and the same years, any effect on the results would be the same for each model.

The ramification of the second assumption, or limitation, was the possibility the restatement was for a quarterly report and not annual. If the restatements were quarterly, it was possible the annual information was not affected and the immediately prior year was indicated as a restatement year for purposes of this study, when in fact it may not have been an annual restatement. As was the consideration for the ramifications of the first limitation, the MR and MJM were examined using the same companies and the same years, any effect on the results would be the same for each model.

An interesting extension of this study could be conducting research to determine the specific year(s) of restatement for a particular small group of companies in an attempt to overcome a basic assumption mentioned in this study whereby the year of restatement was assumed to be the year prior to the date of restatement announcement. Another interesting consideration could be performing the study on a quarterly basis to determine if there is volatility between the first three quarters of the fiscal year and the fourth quarter.

The contribution to research made by this study is in offering an easily determinable model to be used on a case-by-case basis to determine the possibility of existence of EM. The possibilities for further study of the MR are extensive. This study opens a new avenue of research with useful implications for practitioners and regulators.

AUTHOR INFORMATION

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