

Before proceeding with this report, it is important to clarify the methodology used to calculate the residuals. In the subsequent sections, three different models were employed, and their corresponding equations are presented below for clarity.

Jones model: $\frac{TA_{it}}{A_{it-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{A_{it-1}} \right) + \beta_1 \left(\frac{\Delta R_{it}}{A_{it-1}} \right) + \beta_2 \left(\frac{PPE_{it}}{A_{it-1}} \right) + \epsilon_{it}$

Modified Jones model: $\frac{TA_{it}}{A_{it-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{A_{it-1}} \right) + \beta_1 \left(\frac{\Delta R_{it}}{A_{it-1}} \right) + \beta_2 \left(\frac{PPE_{it}}{A_{it-1}} \right) + \epsilon_{it}$

Here we include DLC change in total accruals (TA) measure.

Teoh model:

Estimated model: $\frac{TCA_{it}}{A_{it-1}} = \alpha_1 \left(\frac{1}{A_{it-1}} \right) + \alpha_2 \left(\frac{\Delta R_{it}}{A_{it-1}} \right) + \epsilon_{it}$

Model to calculate normal current accruals: $NCA_{it} = \hat{\alpha}_1 \left(\frac{1}{A_{it-1}} \right) + \hat{\alpha}_2 \left(\frac{\Delta R_{it} - \Delta AR_{it}}{A_{it-1}} \right)$

Investigate earnings quality (EQ) differences between restating and non-restating firms using three models and two restatement outcomes.

I calculated abnormal accruals using the Jones model, modified Jones model, and Teoh model.

From the perspective of all restatements, by using all the three models. companies with restatements had higher average abnormal accrual compare to companies without restatements. These results indicate that companies with restatements have lower earning quality compared to companies without restatements, suggesting that they may be more likely to engage in earnings manipulation or accounting irregularities that eventually lead to restatements.

Looking at the perspective of only SEC investigated restatements, companies with restatements had a higher average abnormal accrual compare with companies without restatements. This may be due to the fact that SEC investigations are often triggered by suspected accounting irregularities, which are likely to result in lower abnormal accruals. These results suggest that companies with SEC investigated restatements have higher earning quality compared to companies without SEC investigated restatements. When a company engages in accounting irregularities, it is likely to have higher abnormal accruals as a result of manipulating earnings. However, if these irregularities are discovered and investigated by the SEC, the company may be forced to correct its accounting errors and adjust its financial statements, resulting in lower abnormal accruals.

After comparing three logistic regression models that were built to predict whether a firm had restated its financial statements or not, it was found that predictors in all three models were statistically significant. However, when comparing them individually, some slight differences were observed. The models based on residuals obtained from the Jones and modified Jones models were found to be better at minimizing Type I errors, resulting in higher accuracy in predicting true negatives. On the other hand, the model based on residuals from the Teoh model was better at minimizing Type II errors, resulting in higher accuracy in predicting true positives.

Since the dataset consisted mostly of non-stated firms, the model that minimizes Type I errors was deemed more important for achieving better overall accuracy. Thus, the models based on residuals obtained from the Jones and modified Jones models were found to be more effective in this regard, with an overall accuracy of about 65%. In contrast, the model based on residuals from the Teoh model only had an overall accuracy of 50%.

In summary, the models based on residuals obtained from the Jones and modified Jones models were found to be better suited for predicting non-stated firms, while the model based on residuals from the Teoh model may be more appropriate for predicting stated firms.

Examine more additional firm-level factors predicting fraud alongside accruals and assess their impact on restatements.

In addition to abnormal accruals, I included several other firm-level factors CAPS, DN, NI, DUDD, CSTKCV, and DPACT, to predict the likelihood of fraud. I chose these variables as they provide insights into a company's financial health, profitability, and risk of financial distress, which can be indicators of fraudulent behavior. CAPS and CSTKCV may suggest inflated stock prices, NI may indicate attempts to inflate earnings, DUDD and high debt levels may indicate financial distress, and high DPACT may suggest accounting manipulation. These variables can help in detecting fraudulent behavior through statistical modeling and analysis.

And then three logistic regression models were built to predict whether a firm had restated its financial statements or not. Similar to the previous models, all variables were found to be statistically significant when using residuals computed from these models together with the firm-level factors.

However, there were differences in accuracy between the three models. The model using residuals from the Jones model had the lowest Type II error among all the models, while the models using residuals from the modified Jones and Teoh models had a lower Type I error. The model with residuals from the Jones model was found to be better at predicting true positives, while the other two models were better at predicting true negatives. The overall accuracy of the model using residuals from the Jones model was about 33%, while the accuracy of the other two models was about 45%. However, it was still concluded that the model using residuals from the Jones model outperformed the others. This is because the task was to detect firms that may have committed fraud, making it more important to correctly identify true positives than to achieve high overall accuracy.

Apply coefficients from 2) to predict 100 firms likely to restate earnings in 2019-2021 and verify predictions using actual restatement data.

I conducted separate predictions for each probit model across three years (2019, 2020, 2021). The model with residuals from Jones model correctly identified 8 out of the top 100 most likely to restate firms. The model with residuals from modified Jones model identified 7 firms, while the model with residuals from Teoh model identified 7 as well. These findings support our earlier conclusion that the model with residuals from Jones model is better at detecting true positives than the other models.

Furthermore, our analysis indicates that regardless of which model we use, the number of predicted restated firms in 2021 is consistently lower than in previous years. This suggests that there were indeed fewer firms that made restatements in 2021.

However, our prediction accuracy was somewhat hindered by the imbalanced dataset, where the majority of firms were not restated. To address this issue, we could consider using oversampling or undersampling techniques to balance the dataset and then re-run the probit regression to obtain a better classification model. This could potentially improve the accuracy of our predictions and help us identify more firms that are likely to make restatements in the future.

Create an annual EM index, re-estimate 2) using EM index and other variables, identify 10 likely restating firms, and qualitatively narrow down to 5 with the highest restatement potential.

Using a new model, I have identified the top 10 firms that are most likely to be restated. These firms include BRISTOL-MYERS SQUIBB CO, AMC ENTERTAINMENT HOLDINGS, BIRD GLOBAL INC, NATURALSHRIMP INC, CONCRETE PUMPING HOLDINGS, LEGALZOOM.COM INC, AMERICAN REBEL HOLDINGS INC, HEMPACCO CO INC, MGO GLOBAL INC, and VANJIA CORP.

After conducting qualitative assessments, I have narrowed down the top 10 firms to the top 5 firms that are most likely to make a restatement in 2021. Among these firms, BIRD GLOBAL INC had overstated its revenue in 2021 by recognizing unpaid customer rides, which increases the likelihood of a restatement. NATURALSHRIMP INC is also more likely to make a restatement in 2021 due to errors in the accounting treatment of certain transactions, specifically related to debt and equity transactions that occurred during fiscal years 2018-2020. CONCRETE PUMPING HOLDINGS INC. (CPH) is also likely to make a restatement in 2021 due to an accounting error related to its recognition of revenue. HEMPACCO CO INC announced its intent to acquire Wildhorse Worldwide LLC in 2021, which increases the likelihood of restating its financials. AMERICAN REBEL HOLDINGS INC completed a reverse merger with a publicly traded company in 2021, making it more likely to restate its financials as well.