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-RESEARCH ARTICLE-

BEHAVIOUR OF THE DISCRETIONARY ACCRUALS IN TIME: EMPIRICAL STUDY IN THE AMERICAN FIRMS FOOD

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─Abstract─

The main aim of this research study is to point out the vital importance of high-quality exterior audits to limit discretionary accounting, as it could distort a company's commercial results. The research introduces a well-founded hypothesis on the preventive powers of high-quality audits, as it can act as a strong exterior control. The research focuses on testing the complex relationship between earnings management and investors' behavior within the public-listed companies from the food industry. The research gathers credible annual comprehensive data from thirty-five publicly-listed firms from the United States. It encompasses the twenty years prior to 2024, as it includes the twenty years prior to 2024. Additionally, the gathered data has gone through a refined procedure of processing using advanced software from EViews to achieve high accuracy. In the twenty years, the findings indicate huge structural, organizational, and institutional changes within commercial reporting. In opposition, it has stressed a huge impact from exterior international norms related to auditing. The research has also indicated huge advantages from following global norms, including ISAs. In relation to investors' behavior, it indicated huge difficulty in recognizing hidden accounting abuse without powerful regulation, including high-quality exterior audits. By enhancing exterior audit quality, it has a huge impact on making a transparent account credible. In contrast, it has protected investors from huge cognitive, as well as huge behavior, adjustments from distortive commercial info. In a nutshell, it has stressed the huge importance of exterior audits as a regulating factor to avoid negative manipulation from executives, whether it is personal manipulation or presenting commercial info according to a predetermined goal at the expense of accuracy.

Keywords: Earnings Management, Time Series, Discretionary Accruals, Food Industry, ISA.

INTRODUCTION

Earnings management (EM) has become common practice for corporations. The main objective underlying such practice is influencing investors' perceptions, which, on occasion, leads to misleading results, ultimately feeding the interests of executives, as reported in Young (2020). Accruals have been identified as the most effective approach taken by management in making use of flexibility without necessarily creating a transaction, as cited in (Niederkofler et al., 2025). Most importantly, accrual management is usually implemented by a manager, as well as a limited number of decision-makers, being tasked with supervising financial reporting, as cited in (Kimouche & Boussenna, 2024).

Even though account manipulation is a fraud, it does not necessarily indicate poor financial performance emanating from the company's accounts (Ghazalat, 2021).

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Research on EM has concentrated on adjusting the interests of many stakeholders in a corporation to facilitate equal representation of profits within a corporation (Altarawneh et al., 2022). The emphasis on research has, in turn, spurred many scholarly works on management research, whose underlying idea is to decrease account manipulation trends while maintaining some degree of authorised discretion to facilitate smooth operations within organisations (Abweny et al., 2025). Many EM measurement models have emerged, but not one has accurately identified account manipulation within the accounts of a corporation (Salma & Bhuiyan, 2024). The proposed research aims to create another measurement model based on the temporal pattern of discretionary accruals (DAs) to measure account manipulation trends within a corporation. Ramalingegowda et al. (2021) proposed that research on EM as a concept demands more comprehensive measurement. Another research, Jamadar et al. (2022), indicated many EM definitions depend on the interpretation of EM, as indicated within the modelling concept of DA.

Research on the relationship between discretionary accruals (DAs) and non-discretionary accruals indicates a negative correlation between the two (Totowa & Mokoaleli-Mokoteli, 2025; Tran et al., 2023). The randomness in the values, as well as the negative correlation between consecutive values, indicates a lack of quality in earnings. The relationship between discretionary components in DA models can be understood based on the negative correlation between discretionary and non-discretionary components. According to a study conducted by (Dichev & Owens, 2025), adding properties along the time series, along with duration, would be helpful in accounting for the negative correlation. It has been found that discretionary components have a negative relationship with current earnings, while having a positive correlation with future values of DA. Based on the value of current DA, accrual reversals can be used as a predictive tool for accounting manipulation. Multiple periods, in this context, can help in explaining, as well as making predictions, about future earnings management tactics. It has also been identified that past as well as current values of DA are negatively correlated, thereby implying a positive impact on predictive modeling on discretionary behaviour. Since accruals, being mean-reverting, follow a non-persistent path compared to cash flows, a temporal assessment would result in a comprehensive understanding about earnings manipulation.

In addition, analyzing the SAM of past DAs on future DAs allows an assessment on whether accounting manipulation persistence or self-correction features can be realized. It is very essential in ascertaining the quality of reporting on the level of consolidation of accounting policies within a corporation (Aljifri & Elrazaz, 2024). In a similar fashion, it allows for determining whether corporations can envisage a repetition of past manipulation behaviors due to regulatory pressures or market forces (Fernandes et al., 2021). It is a fact that accountants, being human, modify accounting policies according to past experiences as well as prevailing economic trends, implying EM decisions are neither random nor discrete. Rather, the decisions feature flexibility, implying self-

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regression on the part of EM decisions, in which case the current decisions mirror past adjustments. Thus, a hypothesis has been formed to specifically analyze the effect of past accounting manipulation on the current EM.

H1: *The values of the DAs at date t - 1 have a negative impact on those at date t.*

The testing of this hypothesis is very important in comprehending the underlying dynamics of executive managerial practice vis-à-vis EM over a period of time (Bansal, 2024). The hypothesis has been tested mainly on the basis of cross-sectional research, which measures the relationship of DAs on earnings quality based on a period-by-period observation. But Habib et al. (2022) suggested that a model encompassing the time-series dynamics of DA would be much deeper in nature, yielding stronger results in dealing with the underlying instability often prevalent in cross-sectional research. It would be much more apt to use dynamic economic research to comprehend the underlying associations between DA dynamics, whose results would be much more apt in dealing with underlying future instabilities. Research conducted by (Nguyen et al., 2023) has explained how a comprehensive view encompassed from on a time series can be a valuable tool in comprehending underlying strategic opinions of executives.

A static view of EM as a distinct or fixed process could mask the impact of managerial incentives and organizational purposes in manipulating financial results. In order to overcome the limitations, the current research aims to analyze the observed negative correlation in cost estimates, explaining it based on a comprehensive theoretical setting derived from both agency theory and behavioral economics. By adopting this perspective, it is possible to contribute to the improvement of more refined research instruments for the early signaling of earnings manipulation. In this context, it extends the ability of regulators as well as investors to judge the temporal validity of corporate financial announcements.

METHODOLOGY

Estimating the DA values using time series improves the accuracy of EM practice detection, as well as the avoidance of Type-I errors, which are generated because non-stationarity assumptions were considered in the initial model. The proposed improvement increases the power of the statistical model supporting EM practice assessment, thereby ensuring higher accuracy of inferences on managerial activities. To validate the proposed hypothesis, the research approach begins with a description of the research sample, followed by a detailed discussion on model specification, as well as the definition of research variables. Afterward, a discussion on the findings on the temporal properties of accruals is provided. The proposed research focuses on investigating the relationship between EM practice distribution and investors' behavior, based on the assumption that effective external audits have enhanced the moderation of financial statement manipulation.

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a) The data includes thirty-five US food companies studied from 2004 to 2024. The empirical findings confirm the hypothesis that the measurement of EM from a temporal series perspective can overcome the specified non-stationarity in residuals, which usually affects the model's explanatory power. The results imply that managers, while formulating their current earnings management, are informed about the level as well as the trend of past accounting manipulation. Thus, the estimation of DA in a temporal series approach overcomes the associated limitations, strengthening the EM measure model.
b) Sample: The research sample includes thirty-five food enterprises operating in the United States. The choice of this industry has been deliberate, as the kind of activities it conducts requires a special mode of analysis while analyzing EM. The period of observation has been set to cover a period of two decades, spanning the years 2004 to 2024. The accounting information necessary for accrual calculation has been carefully extracted from the annual statements of the companies. For a company to be selected into the research data, it had to have accessible public annual financial statements, which would eliminate the possibility of missing values.
c) Customary Model And Variables

For example,

In order to forecast the values of the DAs, the Modified Jones Model, as proposed in Suk Yoon et al. (2022), has been used. The Modified Jones Model has been recognized as being much more effective than other methodologies, which are essentially modifications of the initial model. The Modified Jones Model has gained recognition as being particularly adept at detecting abnormal accruals, which could be a pointer to suspected manipulation. The model is specified as follows:$NDSt = \alpha_2 \left(\frac{\Delta REV_t - \Delta REC_t}{A_{t-1}}\right) + \alpha_3 \left(\frac{PPE_t}{A_{t-1}}\right)$

The variables used in this study are as follow:
TA: Total accruals
NDS: The non-DAs
DA: The DAs
PPE_t: Immobilizations at the time t
A_{t-1}: Total assets at the time t
ΔREV_t: The difference between the revenues at the date t and those on the date (t-1)
ΔREC_t: The difference between receivables on the date t and those on the date (t-1)

The reason for the superiority of the Modified Jones Model, MJM, over other measures can be attributed to both the simplicity associated with the approach as well as the flexibility of the model in applying to a variety of samples from firms as well as economic scenarios. It has been observed in a comparison of the model that the MJM has a higher accuracy in reducing measurement errors while being consistent in several

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periods/segments rather than other models (Gbadebo et al., 2023). The flexibility of the model makes it suitable for the research being conducted on identifying accounting frauds as well as evaluating the quality of earnings on the basis of connecting relevant measures to economic as well as management-related behavioral factors (Jamadar et al., 2022). The model also helps overcome a primary challenge as identified in the former literature on the subject (Costa & Soares, 2022).

The Modified Jones Model improves forecasting accuracy, as it considers changes in revenue unaffected by operating cash flows, thereby facilitating the correct demarcation between normal accruals, as well as abnormal accruals. The rationale underlying choosing the MJM model specifically to measure discretionary accruals can be considered both logical and scientifically valid, as it has high explanatory power as well as the capability to demarcate discretionary accruals from non-discretionary accruals. The model, initially introduced in a research context by Dechow, Sloan, & Sweeney, has gained prominence within accounting research circles, as it has significantly improved the initial model, namely, the Jones Model, particularly within the context of suppressing the impact of revenue changes not within management's discretion. Inasmuch as the MJM model stipulates, total accruals can be segmented into non-discretionary accruals, primarily driven by normal economic & operational considerations (Indriani & Pujiono, 2021), & discretionary accruals, driven by management decisions, wherein a distinct objective could be managing earnings, the explanatory capability of this model to demarcate abnormal accruals makes it an essential research tool to judge the transparency level & quality of financial disclosures.

In addition, the MJM provides a bottom-up basis for formulating more intricate, time-series-driven models within the current research. The incorporation of temporal elements allows the model to be driven within a temporal context, thereby enabling it to account for the impact of the period length on management's actions. This speaks to the underlying theme of continued research, exploring the continuity of management's estimation as well as future implications of earnings quality. Thus, the use of the MJM within the research provides a vital starting point for enhancing the research's methodologies, as it provides a structured basis for informed estimation of managerial decision-making as well as accounting manipulation.

Study of the Behaviour of the DAs

The underlying research question of this analysis relates to the behavioural pattern observed in a set of DAs within the selected data. The research question focuses on tracing the evolutionary path of these sets in order to evaluate the stationarity properties of these series. The question of whether past EM values impact current values is evaluated, in this research, by looking at the underlying process explaining the residuals extracted from the modified Jones model, along with constraints associated with time.

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The temporal constraint indicates a lack of homoscedasticity on the residuals, which implies the following equation:

$$\mathrm{Cov}(DA_t, DA_{t-1}) \neq 0$$

Cov (DA_t, DA_{t-1}): Being the covariance between the DAs of date t and those of the date (t-1).

Test of Stationarity

In order to check the stationarity of the DAs, two techniques will be used. First, a graphical approach can be used to check the stationarity of the DA. This, as can be noted from Figure 1, involves a graphical representation of a time series of the DA. A priori, stationarity can be presumed based on this graphical representation. It can be noted here that graphical representation is not a conclusive approach while testing a series for stationarity. The correlation coefficients can be a more refined tool than graphical representation for testing stationarity. Nevertheless, this too has limitations. Hence, a further refined approach is mandatory while applying these tests. The unit root test can be used as the next phase.

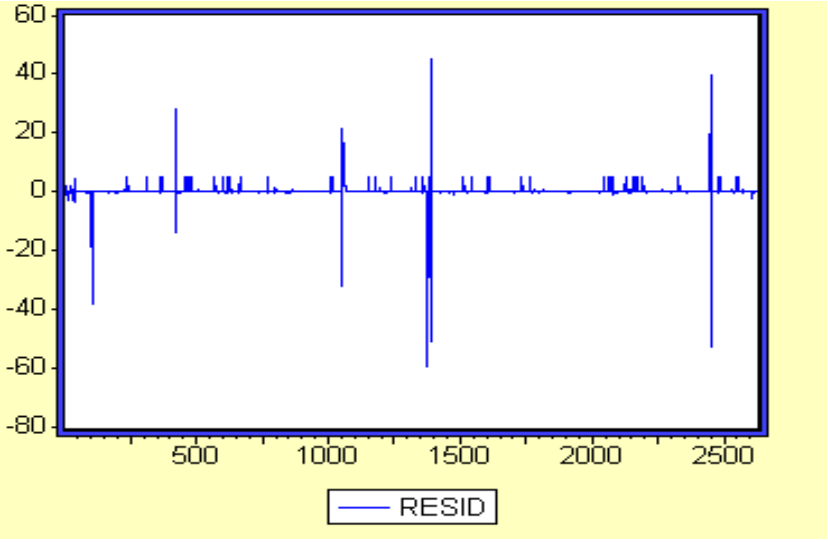

Figure 1: Graphic of the Series of the DAs

The Unit Root Test

The study by Johnson raises the following question:

$$DA_t = \alpha + \beta DA_{t-1} + u_t$$

The series of DAs is considered stationary when |β| < 1, indicating that the accruals

remain constant and are independent of time, thereby confirming stationarity. Conversely, if $|\beta| \geq 1$, the DA series contains a unit root and is therefore non-stationary. Consequently, testing for stationarity is equivalent to testing the unit root hypothesis. In this study, the stationarity of the series is examined using the Augmented Dickey-Fuller (ADF) test.

RESULTS AND DISCUSSION

The Unit Root Test

The result from the unit root test applied to the time series data on the DAs is depicted in Table 1. The positive and significant result indicates the heteroscedasticity of the DAs, suggesting a negative relationship between the current level of EM and the manipulation of accounting data. The result from the unit root test on the DA series showed an observed t-statistic of -1.445061, which is much higher than the critical values of -3.4359, -2.8631, and -2.5676 at the 1%, 5%, and 10% significance levels, respectively. Hence, the null hypothesis of a unit root is not tested at any of these levels, rendering the stationarity assumption invalid. The value of $|\beta|$ is greater than 1, suggesting a non-stationary series, as the result is significantly different from zero. The result supports previous research. For example, it has been demonstrated in a research study conducted by (Hsieh et al., 2021), that a negative correlation value exists between the value of DAs at time t, compared to those in time t-1. Similar results have also been shown in a research study conducted by (Asghar et al., 2020). The researchers identified a negative correlation between DA values, implying a negative correlation, which signifies poor earnings quality. The negative correlation between the current value of the DA, dependent on a past value, indicates that the residuals on the Modified Jones Model follow an autoregressive process, which suggests accounting pressures from past discretionary accounting.

Table 1: Result of the Test of Independence of the DAs

Variable	Coefficient	STD Error	T-Statistic	Prob.
DAs the date t – 1	-.785417	.543515	-1.445069	.0000
+				
(C)	-.000325	.044181	-.007356	.0000
R – Squared	.825003	Mean Dependent Var		.000823
Adjusted R-Squared	.770523	S.D. Dependent Var		6.952123
H.e. of Regression	3.42358	Akaike Information Criterion		5.425987
Sum-Squared Resid	21563.54	Schwarz Criterion		5.354586
Log Likelihood	-7568.056	F Statistic		31.351
Durbin-Watson Stat	1.9281	Prob (F-Statistic)		.000000

Linear Representation of the Model

The first step in the analysis involves the identification step, followed by result

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interpretation. The main task of the identification step is to identify the value of the autoregressive lag order, commonly referred to as (p). The usual approach in determining the value of (p) includes analysing both the autocorrelation function ACF values and partial autocorrelation function PACF values. Once the value of the autoregressive order has been identified as (p), the partial autocorrelations for a higher order will be approximately normally distributed with a value close to zero. The main objective of this step is to avoid underfitting and overfitting. Underfitting involves building a model unable to identify the actual patterns within a time series. On the other hand, overfitting involves building a model that has too many values, thereby reducing the model's predictability. The choice of the correct value for the order of the lag plays a vital role in model building as it helps achieve a balance between accuracy as well as predictability. The process of selecting plays a vital role in time series model building, as it seeks to:

Identify the model's best form based on the delay order (p), which indicates the number of past values that affect the current value of the variable being studied. The choice of the model form depends on the nature of the time series. The model should be able to accurately fit the time series without any complexity. The main statistical techniques used in this step involve ACF and PACF, which have several significances, some of which include:

1. They convey a comprehensive insight into the relationship between consecutive values of time.
2. The autocorrelation function shows the continuity of the relationship from past observations to the current observation.
3. The partial autocorrelation graph indicates the strength of the direct impact of the past values.
4. The impact of the intervening periods is removed. The direct temporal impact is isolated.

Accruals in the past are essentially the net result of decisions taken by management, which can have a bearing on future decisions, as per the usual organizational dynamics and accounting tenets. It is absolutely essential to accurately ascertain the value of the lag order, referred to as 'p,' to be able to form a correct model to analyze the relationship between the current state of accruals and those in the past. The objective of this research is to validate the hypothesis that past manipulation has a bearing on current calculations. In this regard, it becomes much more than a mathematical procedure to accurately ascertain the correct order of lag. For example, the partial autocorrelation coefficients become close to zero within a certain lag, thereby implying that the values prior to the said lag do not have a significant mathematical impact on the current trends and dynamics of the phenomenon. This lag order, in a way, becomes a guide on how many lags are to be incorporated into the model.

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ANALYSIS OF RESULTS

The software creates both the total autocorrelations, as well as partial autocorrelations, for the series under consideration, along with their respective levels of significance. This set of results is called a correlogram, which is a graphical display of correlation coefficients as presented in Table 2. In a stationary series, the graphical representation of the autocorrelations should be decaying exponentially. The result of the EViews test for the current study is as presented in Table 2. Observing the partial autocorrelations from Table 2, it appears as though they become statistically insignificant from the second order onwards, thereby indicating the use of an autoregressive model of order 2, AR(2), to model the given series. The AR(2) model can be linearly estimated without much complexity, as it is linear in parameters, facilitating the direct use of ordinary least square procedures.

By use of correlation charts, a special feature of the EViews software, both the stationarity of the accrual series as well as the reversibility of their temporal trend were confirmed. By use of acombination of systematic testing as well as some statistics, it has been easy to test the negative relationship between current as well as past accruals' hypothesis. It has been observed that the series has a number of features as are common in a stationary time series. It varies over a period of time, has a fixed mean, a steady decrease in autocorrelations, as well as an exponential decrease in autocorrelations as the values of time lags increase. The exponential decrease in autocorrelations, specifically the values of autocorrelations, is a main statistical feature to check a series' stationarity as proposed by (Boutahar & Royer-Carenzi, 2024).

The application of this approach enabled the scrutiny of the temporal measures of accruals estimates, while accounting for irregularities generated by some accounting changes at a certain point in time on a yearly basis. The EViews program, a well-known software package for analyzing time series, worked well because of its user-friendliness, combined quantitative and behavioral elements of finance, thereby making it simple to utilize it as it would greatly enhance the results' validity. By contrast, non-stationary time series have consistently high values of autocorrelations over a long period, suggesting the values continue to affect current results. In many cases, differentiation would be necessary for stationarity, making it possible to use it in various time-series model-data combinations, such as AR(p), ARMA, ARIMA, as held in a study conducted by Kaur et al. (2023). The correlation charts in the EViews software also include confidence limits for the calculated value, usually $\pm 1.96/\sqrt{n}$ at 5% significance level. In those charts, values within the limits indicate a lack of significance in the results, while values outside the margins imply a significance in temporal relations among the results.

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Table 2: Correlogram of the DAs

Autocorrelation	Partial Correlation	AC	CAP	Q Stat	Prob
* | |	* | |	.933	.931	6.8874	.000
* | |	* | |	.819	.817	8.1236	.000
| |	| |	-.028	-.020	29.541	.210
| |	| |	-.027	-.020	3.124	.230
| |	| |	-.020	-.019	31.103	.142
| |	| |	-.028	-.035	32.120	.165
| |	| |	-.006	-.009	32.001	.176
| |	| |	-.016	-.018	32.130	.126
| |	| |	-.010	-.018	32.297	.178
| |	| |	.002	.003	32.298	.164
| |	| |	-.006	-.011	32.521	.132
| |	| |	-.009	-.013	32.453	.154
| |	| |	-.009	-.009	32.256	.143

Extension of the Modified Model of Jones

Given the observed correlation between DAs, as supported by the literature and confirmed for our sample, and following the a priori rejection of the null hypothesis (H0), EM will be estimated using a time-series approach. This involves a dynamic estimation, recognising that the DAs follow an autoregressive process of order 2 (AR (2)). Accordingly, the estimation model for the DAs is specified as follows:

$$TAt = \alpha_1\left(\frac{1}{A_{t-1}}\right) + \alpha_2\left(\frac{\Delta REV_t - \Delta REC_t}{A_{t-1}}\right) + \alpha_3\left(\frac{EPP_t}{A_{t-1}}\right) + \theta_1 DA_{t-1} + \theta_2 DA_{t-2} + DA_t$$

This model can be expressed as follows:

$$\frac{TA_1}{A_{t-1}} = \beta_1\left(\frac{1}{A_{t-1}}\right) + \beta_2\left(\frac{\Delta REV_t}{A_{t-1}}\right) + \beta_3\left(\frac{PPE_t}{A_{t-1}}\right) + \varepsilon_t$$

Where L denotes the lag operator, and i takes values 0, 1, & 2. For testing the validity of this variable, the equation is estimated using ordinary least squares. The correlation function of the derived DA variable is shown in Table 3, where it is observed that all the associated probabilities are well above 0.10. This implies acceptance of the null hypothesis of no autocorrelation, thereby indicating the lack of a continuous pattern associated with earnings estimation. This result has immense significance in the context of the current study, thereby implying that the estimation of earnings in any period is not systematically dependent on the values of the past periods.

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Table 3: Correlogram of the New Series of DAs

Autocorrelation	Partial Correlation	AC	CAP	Q Stat	Prob
| * |	| * |	.020	.030	4.3157	.131
| * |	| * |	.015	.025	4.3542	.178
| |	| |	-.018	-.057	12.235	.142
| |	| |	-.031	-.060	16.780	.176
| |	| |	-.035	-.020	23.223	.150
| |	| |	-.034	-.024	22.560	.130
| |	| |	-.005	-.003	33.600	.164
| |	| |	-.045	-.034	25.456	.135
| |	| |	-.010	-.013	24.354	.148
| |	| |	.005	.002	26.326	.152
| |	| |	-.007	-.005	15.351	.136
| |	| |	-.010	-.003	22.325	.171
| |	| |	-.006	-.001	32.115	.168

Autocorrelations (AC): Autocorrelations are a key tool for analysing managerial behaviour and understanding how earnings reports (ER) are prepared and managed (Arfan, 2024).

Theoretically, this result provides support to the hypothesis that accounting manipulation does not follow a continuous, cumulative fashion but rather a "mean reversion" scheme, where the estimated accruals would go back to their normal value following a period of manipulation. The result implies that earnings management actions taken by the management team are neither continuous nor cumulative in nature; instead, it becomes intermittent, as a result of reaction to pressures from within or without the organization, such as reaching a certain level of profitability to meet market expectations. In a broader perspective, the findings from the results indicate a stable time series, devoid of recurrence, associated with accounting manipulation. The result enables the building of a model on the time series, particularly where low-order lags are set, without necessarily incorporating high-order autoregressive elements. In addition, the result increases the validity of the next sequence of tests on the hypothesis about the negative impacts associated with accruals from period (t-1), as estimated in period (t), as proposed in (Lu & Xu, 2024). This impact is expected to be limited within a certain period, consistent with the properties of a stable time series, as suggested by the results for the autoregression tests.

CONCLUSION

In this paper, we have explored the connection between the past and present accounting manipulation using DAs calculated for the set of firms, thus verifying EM pervasiveness. The use of graphical, as well as unit root tests, such as ADF tests, indicated the non-stationarity of residuals within the Modified Jones Model, thereby proving the AR pattern. The results from the correlogram showed the insignificance of

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autocorrelations from the third order onward, thereby supporting the AR (2) model. Based on the results, we have developed a modification of the Jones Model, accounting for the dynamic nature of the accounting manipulation. The results have indicated stationarity in the adjusted residuals' correlogram, thereby implying that the management takes into account the past manipulation in making adjustments to the estimation of earnings. The use of time-series estimation for accounting manipulation, thereby resolving the non-stationarity, increases accuracy levels in EM. In fact, it has been depicted in the results, the statistical properties include mean reversion, wherein EM has a tendency to revert to a normal state. In fact, it has been observed that the management has a tendency to make adjustments within discretionary activities based on market as well as governance forces, thereby rejects the manipulation. The high levels of probability, along with low autocorrelations, have indicated that the manipulation has a non-cumulative impact on past estimation, thereby suggesting management's short-term behaviour. It can be noted, based on the results, combining ADF test results, wherein the proposed model has achieved a true measure of accounting manipulation. Detailed incorporation within EM would clearly indicate the significance of accounting for time structure, thereby suggesting higher levels of reliability on the assessment of quality along with accuracy on accounting irregularities.

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