The Tradeoff between Accruals and Real Activities Earnings Management by More Capable Managers: Evidence from Egypt

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Abstract

The purpose of this study is to investigate the impact of managerial ability on the choice between accruals and real earnings management in the Egyptian setting. To achieve this purpose, data was collected from the annual financial statements of the companies included in the sample composed of 83 companies that belong to 7 main sectors: real Estate, basic Resources, building Materials, contracting and Construction Engineering, Food, Beverages, & Tobacco, travel & Leisure, and health Care & Pharmaceuticals. These companies are listed and traded in the Egyptian Stock Exchange EGX during the period 2018-2020. Two regression models were developed to test the research hypotheses, the first was about the impact of managerial ability on accruals earnings management, and second was about the impact of managerial ability on real earnings management. Feasible Generalized Least squares FGLS test was used to test the research hypotheses because the problems of heteroskedasticity and autocorrelation existed in the study data. Results showed that managerial ability has a significant positive impact on both accruals earnings management and real earnings management. The study findings have implications for standards setters, investors, analysts, auditors, and tax authorities in Egypt and other emerging economies.

Key words

Managerial ability;accruals earnings management;real earnings management

ملخص الدراسة

استهدفت هذه الدراسة اختبار تأثير القدرة الإدارية على الاختيار بين إدارة الأرباح بالاستحقاقات وبالأرباح الحقيقية في البيئة المصرية. ولتحقيق هذا الهدف ، تم جمع البيانات من القوائم المالية السنوية للشركات المدرجة في العينة المكونة من ٨٣ شركة مدرجة ومتداولة بالبورصة المصرية خلال الفترة ٢٠١٨-٢٠٢٠ والتي تنتمي إلى ٧ قطاعات رئيسية: العقارات ، الموارد الأساسية ، مواد البناء ، المقاولات الانشاءات الهندسية ، الأغذية والمشروبات والتبغ ، السياحة والترفيه ، والرعاية الصحية والأدوية. تم تطوير نموذجين انحدار لاختبار فروض البحث ، الأول حول تأثير القدرة الإدارية على إدارة أرباح بالاستحقاقات، والثاني حول تأثير القدرة الإدارية على إدارة الأرباح بالأنشطة الحقيقية. وقد تم استخدام اختبار المربعات الصغرى المعمم FGLS لاختبار فرضيات البحث نظرًا لوجود مشاكل التغاير والترابط الذاتي في بيانات الدراسة. أظهرت النتائج أن القدرة الإدارية لها تأثير إيجابي جوهري على كل من إدارة أرباح بالاستحقاقات وإدارة الأرباح بالأنشطة الحقيقية. وتؤثر نتائج هذه الدراسة على واضعي المعايير والمستثمرين والمحللين والمراجعين وسلطات الضرائب في مصر والاقتصادات الناشئة الأخرى.

الكلمات المفتاحية

القدرة الإدارية – إدارة أرباح بالاستحقاقات – إدارة الأرباح بالأنشطة الحقيقية

1. **Introduction**

Managerial ability is increasingly recognized as an important worldwide determinant of several accounting practices. Recently, a considerable amount of literature tried to link managerial ability and earnings quality, earnings persistence, income smoothing, accounting conservatism, or tax avoidance (e.g., Demerjian et. al.,2013; Koester et. al., 2017; García-Meca & García-Sánchez,2018; Demerjian et. al., 2020; Haider et al.,2021). Earnings management is also recognized as one of the most important topics in accounting research. A considerable amount of literature has been published on earnings management; these studies did not settle the existing debate about the determinants of earnings management, its various consequences, and the tradeoff between its methods.

Accordingly, the major objective of this study is to investigate the impact of managerial ability on the choice between accruals and real earnings management by answering two major questions; to what extent does managerial ability encourage managers to borrow earnings from future periods by accelerating revenues and/or slowing expenses to improve current earnings intentionally? and to what extent does it encourage them to alter earnings in a specified direction by performing actions such as overproducing inventory to lower the cost of goods sold or lowering discretionary expenses such as advertising, research and development, selling, general and administrative expenses? This topic is considered important to be investigated especially in an emerging economy like Egypt which have gone through a series of economic, structural, and legal reforms aiming to encourage the private sector and to make it a more attractive destination for foreign investment by improving the business environment and increasing Egypt's integration into global trade.

The study has been organized in the following manner: section 2 first gives an overview of the concept and measures of managerial ability, then it discuses the two major types of earnings management, accruals and real earnings management leading to the development of the two study hypotheses. Section 3 begins with defining the study sample and then it explains how variables were measured. Section 4 presents the findings of the study, focusing on testing the study hypotheses. And section 5 includes a brief

summary, critique of the findings, and a discussion of the implications of the findings for future research.

2. Literature Review and Hypotheses Development

2.1 Managerial Ability

Managerial ability was defined as the ability to convert firm resources into revenues (Demerjian et. al., 2012). It is an important managerial characteristic which has received much attention recently, a considerable stream of research investigates the influence of individual managers on corporate decisions. Managerial ability stems mainly from domain experience, as more capable managers possess more valuable knowledge about their companies, competitors, markets, and the industry trends which leads to more positive outcomes and benefits (Kor, 2003; Demerjian et. al. ,2012). These positive outcomes were investigated in a large set of prior accounting and finance literature. For example, high-ability managers were found to deliver superior firm performance (Bamber et al., 2010; Cheung et al., 2017; Demerjian et. al., 2013), they can predict the expected changes in firm performance efficiently and provide more accurate management earnings forecasts (Baik et. al.,2018), they focus on not only financial performance but also on nonfinancial performance elevating corporate social responsibility performance (Gong et, al., 2021), they demonstrate lower levels of opportunistic behavior as they are less likely to engage in tax avoidance activities (Koester et. al., 2017). Additionally, firms with less-able managers experience significant negative stock returns (Hayes & Schaefer, 1999), while firms with more-able mangers receive higher credit ratings (Bonsall et. al., 2017). From auditing point of view, a negative association was found between managerial ability and both audit fees and going-concern opinions (Krishnan & Wang , 2015). To sum up, previous studies demonstrate that managerial ability has an influence on the decisions and performance of businesses.

The growing interest concerning managerial ability followed the presentation of the comprehensive and objective measure of managerial ability developed by Demerjian et. al. (2012), prior to the presentation of this measure, it was difficult to measure managerial ability because the ability to manage firm resources efficiently cannot be observed directly and should be inferred from

some observable outcomes, such as the decisions of managers about resource allocation (Huang & Sun, 2017). Accordingly, before the presentation of the above-mentioned measure, managerial ability used to be proxied by CEO press visibility, CEO turnover, or by firm performance (García-Meca & García-Sánchez, 2018). These measures were criticized because focusing on the ability of the CEO overlooks that top management that drives firm outcomes is a team not only the CEO, and that firm performance should be considered including influences due to both management and the firm itself, such as economies of scale and organizational structures, etc. (Andreou et. al., 2015).

The quantitative measure of managerial ability developed by Demerjian et al. (2012) captures how efficiently managers can convert firm resources into sales compared to their peers in the same industry. This measure is built with the notion that managers with more ability can make more sales revenue out of the same set of inputs (e.g., labor, assets, and capital). It depends on calculating a Data Envelopment Analysis (DEA) score which produces an estimate of how efficiently managers use the resources of their firms, it unveils that higher-quality managers will produce a higher rate of output from the same given inputs compared to lower-quality managers. More precisely, the measure estimates the efficiency of the firm (DEA score) within industries by comparing the amount of sales made by each firm i.e., the output, conditional on the inputs used by the firm which include cost of goods sold, selling and administrative expenses, net property, plant, & equipment, net operating leases, net research and development, purchased goodwill, and other intangible assets. then the DEA score is regressed to find the residuals which identifies the efficiency that can be attributed to the manager. certain firm-specific characteristics which are expected to help management's efforts, such as firm size, market share, positive-free cash flow, and firm age, or those characteristics that tend to hamper management's efforts such as complex operations, multi-segment, and international operations are then removed from the DEA score. (García-Meca & García-Sánchez,2018)

2.2 Earnings Management

Earnings management is increasingly recognized as a leading subject in accounting research that must be explored. Recently, a significant amount of accounting literature that has been carried out dealt with earnings management. Earnings management occurs when managers use their judgment in financial reporting and/or structuring transactions with the intent to alter financial reporting to mislead stakeholders about the underlying performance of the company or to affect contractual outcomes that depend on reported accounting results (Healy& Wahlen,1998). In this regard, two methods of earnings management were mostly studied; accruals and real activities manipulation (McVay, 2006; Abernathy et. al., 2014; Boahen & Mamatzakis, 2020). Accruals-based earnings management is accomplished by borrowing earnings from future periods by accelerating revenues and/or slowing expenses to improve current earnings intentionally (Dechow et.al. 2010), while real activities manipulation alters earnings in a specified direction by performing actions such as overproducing inventory to lower the cost of goods sold or lowering discretionary expenses such as advertising, research and development, selling, general and administrative expenses, it can also be done by giving price discounts to increase sales to improve reported revenues or net income. (Zang, 2012; Huang & Sun, 2017). The usage of these methods has time and cost limitations (Zang,2012). A third tool to manage earnings is classification shifting which was introduced by McVay (2006), it occurs within the income statement by deliberately misclassifying operating expenses to special items to increase operating earnings without affecting the bottom-line net income. Thus, it is often disguised as a standard accounting practice in financial statements, and it is difficult to be detected in practice (Boahen & Mamatzakis, 2020).

Incentives for earnings management were investigated by previous research, numerous writers defined a considerable set of motives for earnings management. One of the most influential factors that motivates managers to modify upwards the reported earnings of the firm is to meet the expectations and requirements of providers of finance whether investors or creditors (Daniel et. al., 2008; Makhaiel & Sherer, 2017). Concerns about current and future employees were also found to be a factor that encourage managers to

produce positive financial results to Keep current skilled and valued employees and to attract potential ones because managers believe that high profits is one of the important elements that makes firms more attractive for employees, especially when they are given the legal right to share the firm's profits (Makhaiel & Sherer, 2017). Another influential factor for managers to modify upwards their financial results is the effect of strict adoption of stock market rules for listing and delisting of the firms' securities. the need for sustaining reporting profits to gain a listing, or retain a listing exerts pressure on managers to manage earnings (Othman & Zeghal, 2006). Additionally, Copying the same level of profits of other firms in the same industry can be considered another important motivational factor for managers to manage earnings. Achieving prevalent levels of profit motivates managers to positively modify their financial results to be able to compete and to seem as successful as other firms in the same industry (Ambrose & Bian, 2010). Moreover, Managers may also manage earnings with the intent to show their companies as less profitable to reduce political risk. Incentives for firms to manage earnings may result from political pressures to reduce prices or avoid the penalties that may arise from the investigation of firms which are suspected of breaking rules or of taking advantage of the public (Coppens & Peek, 2005; Goncharov & Zimmermann, 2006).

2.3 Managerial Ability and Accruals Earnings Management

Managers may manage their companies' earnings to mislead the shareholders about the real economic performance of the company. This type of earnings management which is performed by manipulation of accounting digits would affect the accuracy and the reliability of earnings negatively, increase the risk and the suspicion of users outside the organization, lead to information asymmetry, and ultimately lead to investment inefficiency (Salehi et. al., 2019). Earnings management does not only conceal the real economic performance of the firm, but it also hides the actual tendency of profit growth and firm income, which is helpful for predicting the firm's future growth (McNichols & Stubben, 2008). Usually, accruals earnings management occurs during the present period and produces loss at the end of the period, managers manage the earnings through accrual-based earnings management to avoid that loss (Sanjaya & Saragih, 2012)

More information is usually presented to users by high-able managers compared to low-ability ones (Baik et. al.,2011; Baik et. al.,2020). because accruals earnings management is multifaceted, it requires managers with significant vision. To engage in accruals earnings management, managers must possess the ability to evaluate current performance, predict future performance accurately, and adjust firm's financial reports (DeFond & Park, 1997). In the same vein, Demerjian et al. (2013) argued that higher-ability managers have more knowledge about the future operations of the company which results in more accurate judgment and are reflected in higher-quality earnings estimates. On the other hand, the superior reputation of higher-ability managers guarantees them lifetime rewards, so they attempt to keep that reputation by avoiding reputationally harmful practices (Demerjian et al., 2020). Doukas & Zhang (2020) argued that earnings manipulation may damage the reputation of managers because of subsequent lawsuits or restatements. Based on this discussion, the study will test the following hypothesis:

H1: Managerial ability has an impact on accruals earnings management in Egyptian companies.

2.4 Managerial Ability and Real Earnings Management

There is a large volume of published studies that examined the different determinants of earnings management, a considerable amount of these studies focused on firm-level characteristics and ignored the impact of individual managers (Huang & Sun, 2017). However, it was argued that the decisions of the company are the reflection of the different styles of managers. Accordingly, we argue that managerial ability may have an impact on practicing earnings management.

Managerial ability is considered a critical determinant factor that explains the strategy and policy of business performance, achievement, and financial reporting (Demerjian et. al., 2020). Real earnings management can be employed as a strategy to improve performance. Higher-ability managers who face pressures to beat earnings targets are more likely to engage in real earnings management because earnings are fundamental information to evaluate managers' performance (Huang & Sun, 2017). In addition to that,

higher-ability managers relatively possess a greater amount of knowledge about the firms' business environment which gives them greater opportunities to engage in real earnings management (Demerjian et. al., 2012).

In contrast, and because managers with higher ability usually maintains higher earnings quality, they are less likely to engage in real earnings management because earnings management is mostly associated with lower earnings quality (Purwaningsih & Kusuma, 2020). Huang and Sun (2017) found that managerial ability was negatively associated with real earnings management because of three reasons, to begin with, higher ability managers can achieve optimum revenues with the same given firms' resources, so they can achieve earnings targets with no need to engage in real earnings management (Demerjian et. al., 2012). In addition, higher ability managers are aware that earnings management threatens the future performance of the organization (Tabassum et. al., 2015; Vorst, 2016). Furthermore, high ability managers with limited time and effort prefer to use their limited resources to boost normal business activities rather than spending more time and effort to engage in real earnings management (Filip et. al., 2015). This conflicting argument of the association between managerial ability and real earnings management can be viewed in the light of the agency theory, the agency conflict between managers and shareholders brings higher information asymmetry which can be misused by managers when they are put under the pressure of beating earnings targets (Abad et. al., 2018). Because managers are the main driver for earnings management, the association between managerial characteristics, including managerial ability and real earnings management is essential to be explored. Based on the above discussion, the study will test the following hypothesis:

H2: Managerial ability has an impact on real earnings management in Egyptian companies.

3 Research Methodology

3.1 Sample Selection

The study population consists of companies listed and traded in the Egyptian Stock Exchange EGX during the period 2018-2020, which totaled 194 companies distributed in 18 sectors, according to the data announced by the Egyptian Stock Exchange in March 2021. Criteria for selecting the study sample were as follows:

1. The company must be registered and traded in the Egyptian stock market during the period 2018- 2020.

2. Availability of financial reports for companies during the period 2018-2020.

3. Financial reports of companies must be prepared on December 31st.

4. Financial reports of companies must be prepared with Egyptian pounds.

5. Only sectors whose number of companies are greater than or equal to 6 were included in the sample, because calculating some study variables requires that the number of companies within each sector is not less than 6 companies.

6. Banks and insurance companies are excluded from the sample due to the special nature of their activities and their subjection to the supervision and control of the Central Bank.

By applying the previous conditions, the number of companies in the sample reached 83 companies, with a rate of 42.78% of the total number of companies in the study population, the total number of observations is 249 distributed over 7 sectors. The number of sample companies within each sector and the percentage of their contribution to the sample is presented in the following table:

Table 1
Sample distribution by sector

Sector	Number of listed companies	Number of excluded companies	Number of included companies	Percentage to total companies in the sample
Banks	12	12	-	-
Real Estate	35	8	27	32.53%
Basic Resources	16	6	10	12.05%
Building Materials	11	1	10	12.05%
Non-Bank Financial Services	26	26	-	-
Contracting and Construction Engineering	9	3	6	7.23%
Food, Beverages, & Tobacco	24	9	15	18.07%
Utilities	1	1	-	-
IT, Media &Communication Services	6	6	-	-
Energy & Support Services	3	3	-	-
Industrial Goods, Services & Automobiles	7	7	-	-
Travel & Leisure	8	2	6	7.23%
Trade & Distributors	4	4	-	-
Shipping & Transportation Services	4	4	-	-
Education Services	2	2	-	-
Textiles & Durables	7	7	-	-
Paper & Packaging	2	2	-	-
Health Care & Pharmaceuticals	17	8	9	10.84%
Total	**194**	**111**	**83**	**100%**

3.2 Measurement of Variables

3.2.1 Managerial Ability

Several measures have been used for managerial ability, for instance, back in 1982 firm size was used as a proxy for managerial ability (Rosen, 1982), (Fee & Hadlock, 2003) used the historical stock returns to measure managerial ability, (Rajgopal et. al., 2006) used the media evaluation to measure managerial ability. These measures are not reliable because they are more indicative of both managerial ability and some other firm characteristics, and they lack the testing power (Demerjian et. al., 2012). In 2012, Demerjian et. al. developed a new measure of managerial ability based on the efficiency of the manager to generate revenues; they adopted a two-steps approach to apply their measure. Firstly, they relied on data envelopment analysis (DEA) to estimate total firm efficiency by industry and by year. DEA fits a linear envelope of frontier to data in a multidimensional space.it indicates a normative ideal depending on all available data. Points located on the envelope are efficient with a 1 value, points below the envelope are inefficient with a less than 1 value. DEA evaluates the points according to their deviation from the envelope, it requires the identification of input and output variables. Demerjian et. al. (2012) used seven input variables: cost of goods sold, selling, general, and administrative expenses, property, plant, and equipment, research and development cost, goodwill, and other intangibles. While the output variable is net sales. Specifically, firstly, they solve the following optimization problem in DEA:

$$Max\theta = Sales / (v_1COGS+v_2SG\&A+v_3R\&D+v_4PPE+v_5GW+v_6Intan) \quad (1)$$

The efficiency measure calculated in optimization Model can take the value between zero and one. That is because the total firm efficiency scores can be attributed to the manager or the firm, Demerjian et. al. (2012) then divides total firm efficiency between the firm and the management by regressing total firm efficiency on six firm characteristics which either aid or hinder management's efforts: firm size, market share, positive cash flow, and firm age (factors that are expected to aid management), and complex multi-segment and international operations (factors that are expected to hinder management). They estimate the following regression:

$$Firm\ efficiency_i = α + β_1\ Ln(Total\ Assets)_i + β_2\ Market\ Share_i + β_3\ Free$$
$$Cash\ Flow\ Indicator_i + β_4\ Ln(Age)_i + β_5\ Business\ Segment$$
$$Concentration_i + β_6\ Foreign\ Currency\ Indicator_i + Year_i + ε_i \qquad (2)$$

The residual from the above model captures managerial ability. Based on this measure, Demerjian et al. (2012) creates sign ranks of managerial ability by year and industry to make the score more comparable among time and industries and to lessen the influence of outliers. This measure is employed in this study to measure managerial ability according to several reasons; firstly, it is more objective and accurate than other measures employed in previous studies as it is a direct assessment of managerial ability score so, it contains fewer errors. Secondly, it depends on secondary data available from published financial statements. Thirdly, it evaluates the managerial ability of the management team, not only the managerial ability of the CEO. Finally, this measure was tested for validity in multiple previous studies and was proved to be a reliable measure of management ability (Abernathy et al., 2018).

3.2.2 Accruals Earnings Management

Following prior literature, accruals earnings management was measured according to the modified version of the Jones model, this modification was designed by Dechow et. al., (1995) to eliminate the conjectured propensity of the Jones model to measure discretionary accruals falsely when discretion is exercised over revenues. In this modified model, nondiscretionary accruals are estimated for a given period by the difference between net profit and cash flows from operating operations as follows:

$$TACC_{it} = NIBE_{it} - OCF_{it} \qquad (1)$$

Then the absolute value of optional benefits is calculated as a percentage of the total assets at the beginning of the period (benefits that are subject to the management's choice) in three steps as follows:

Step 1: Building a regression model at the level of each sector, in which the dependent variable is the TACCit in (1), and the explanatory variables are; (change in revenue $ΔREV_{it}$ - change in receivables $ΔREC_{it}$), and depreciable fixed assets PPE_{it}, and both sides of the equation are divided by the total assets at the beginning of the period $Ai_{t-1,}$ then estimating the parameters of the model at a sectoral level (regression coefficients α2 & α3, and the constant α1).

$$TACC_{it}/A_{it-1} = α_1\ (1/A_{it-1}) + α_2\ [(Δ\ REV_{it} - Δ\ REC_{it})\ /A_{it-1}] + α_3\ (PPE_{it}/A_{it-1})$$

Step 2: Using the parameters of the model at the sectoral level to estimate the value of non-discretionary benefits as a percentage of total assets at the beginning of the $NDACC_{it}$ period at the level of each company.

$$NDACC_{it} = \alpha_1 (1/A_{it-1}) + \alpha_2 [(\Delta REV_{it} - \Delta REC_{it})/A_{it-1}] + \alpha_3 (PPE_{it}/A_{it-1})$$

Step 3: The percentage of voluntary benefits for each company on the total assets at the beginning of the period $DACC_{it}$ is calculated by the difference between the total accruals and the non-discretionary accruals.

$$DACC_{it} = (TACC_{it}/A_{it-1}) - NDACC_{it}$$

The absolute values of the ratio of discretionary accruals to total assets at the beginning of the period express the earnings management, so that the higher this value is, this indicates the company's greater involvement in earnings management practices, and vice versa.

3.2.3 Real Earnings Management

Prior studies have determined two manipulations of real activities: reducing production costs (cost of goods sold) by overproducing inventory, and cutting discretionary expenditures such as research and development, advertising, and selling, general, and administrative expenses (Roychowdhury, 2006; Kim et. al., 2012; Brown et. al., 2015; Huang & Sun, 2017). To capture those two real activities manipulations, reducing production costs is measured using the abnormal level of production costs, and cutting discretionary expenditures is measured using the abnormal level of discretionary expenditures. Subsequent studies have provided further evidence that these measures capture real activities manipulation (eg., Cohen & Zarowin, 2010).

The normal level of production costs is measured following Roychowdhury (2006) as follows:

$$PROD_{it}/A_{t-1} = a + \beta_1(1/A_{it-1}) + \beta_2(S_{it}/A_{it-1}) + \beta_3(\Delta S_{it}/A_{it-1}) + \beta_4(\Delta S_{it-1}/A_{it-1}) + \varepsilon_{it} \quad (1)$$

Where $PROD_t$ is the sum of the cost of goods sold in year t and the change in inventory from t-1 to t, A_{t-1} represents the total assets in year t-1, St is the net sales in year t, and ΔS_t is the change in the net sales from year t-1 to t. The abnormal level of production costs is measured as the estimated residual from this equation, The higher the residual, the larger is the amount of inventory

overproduction, and accordingly the greater is the increase in reported earnings through reducing the cost of goods sold.

The normal level of discretionary expenditures is also measured following Roychowdhury (2006) as follows:

$$DISEXP_{it} /A_{it-1} = a + \beta_1(1 /A_{it-1}) + \beta_2(S_{it-1} /A_{it-1}) = \varepsilon_{it} \quad (2)$$

where $DISX_t$ is the discretionary expenditures (the sum of R&D, advertising, and SG&A expenditures) in year t. After estimating the above regression cross-sectionally for industry-years, the abnormal level of discretionary expenditures is measured as the estimated residual from the regression. residuals are multiplied by negative one such that higher values signal greater amounts of discretionary expenditures cut by companies to increase reported earnings.

Modified real earnings management measures are based on the modifications presented by Gunny (2010) and Vorst (2016), the model is modified to include a separate explanatory variable to capture the effect of a decline in sales, estimated by the following model:

$$CFO_{i,t}/A_{i,t-1} = a0 + a1 (1/A_{i,t-1}) + a2 (S_{i,t}/A_{i,t-1}) + a3 (\Delta S_{i,t}/ A_{i,t-1})*DD + e_{i,t} \quad (3)$$

Where CFO is cashflow from operations, S is the annual sales, ΔS is the change in annual sales, A is total assets, and DD is an indicator variable which is set to 1 when sales have declined and to 0 otherwise.

The three real activities manipulation measures are then aggregated into one proxy by taking their sum, a high the value of this measure indicates that the firm performs more real earnings management practices. This aggregate measure of real earnings management is expected to capture real earnings management more accurately than employing one or two of the three above measures (Cohen et. al.,2020)

3.2.4 Control Variables

Control variables include four categories of variables; performance uncertainty factors that affect earnings management behavior, firm growth that indicates managerial performance, firm characteristics, and motivation of real earnings management to avoid loss and beat earnings target. The first

group (performance uncertainty factors) includes sales volatility S_VOL which is measured by the standard deviation of five years sales to total assets, earnings volatility EA_VOL which is measured by the standard deviation of five years earnings after tax to total assets, and operational cash flow volatility OCF_VOL which is measured by the standard deviation of five years operational cash flow to total assets (Demerjian et al., 2013). sales volatility, earnings volatility and operational cash flow volatility are used to control the motivation of earnings management because when sales volatility, earnings volatility and operational cash flow volatility are higher, they are expected to positively motivate managers to engage in earnings management (Demerjian et al., 2020).

The second group of control variables is firm growth F_GRW which is measured by the change of sales divided by total assets (Demerjian et al., 2013). Sales growth is used to control managerial performance because higher sales growth indicates higher managerial performance that negatively affects earnings management (Demerjian et al., 2020). The third group of control variables (firm characteristics) includes firm size F_SZ, market value to assets ratio $MV{:}AS$ and return on assets ROA (Roychowdhury, 2006), these variables are used to capture business conditions that may lead to abnormal activities. As profitable and bigger firms have higher exposure to the public, they will reduce earnings management activities (Roychowdhury, 2006). The last group of control variables includes a proxy of the motivation of earnings management which is losses performance $LOSS$ that is measured by score one if earnings are negative and 0 otherwise (Demerjian et al., 2020) and earnings target beating EA_TRG which is measured by score one if firms achieve earnings change between 0 to 5% relative to total assets and 0 if otherwise (Gunny, 2010). Loss and earnings target indicators are used to control earnings management motivation and future performance signals as they are expected to affect earnings management (Roychowdhury, 2006).

4. Empirical Results

4.1 Descriptive Statistics

The results obtained from the preliminary analysis of data are presented in Table 2. The table shows the means, maximum values, minimum values, and standard deviation of the study's 249 observations.

Table 2
Descriptive Statistics for the study variables

Variable	Obs	Mean	Std. Dev.	Min	Max
AAC_EAR	249	.127	.556	0	7.744
RL_EAR	249	-.000012	.424	-1.037	5.613
MNG_AB	249	.732	.1	.393	.965
S_VOL	249	.161	.198	0	1.428
EA_VOL	249	.045	.045	0	.292
OCF_VOL	249	.104	.184	.001	1.691
F_GRW	249	.341	17.017	-96.904	70.059
F_SZ	249	20.711	1.798	17.473	25.493
MV:AS	249	75.875	94.004	.553	924.913
ROA	249	3.347	9.203	-49.211	65.73

Table 2 presents the descriptive statistics for 249 firm-year observations during the period from 2018–2020. *ACC_EAR* is earnings management by accruals manipulation, *RL_EAR* is earnings management by real activities manipulation, *MNG_AB* represents managerial ability, *S_VOL* is the sales volatility measured by the standard deviation of five years sales to total assets, *EA_VOL* is the earnings volatility measured by the standard deviation of five years earnings after tax to total assets, *OCF_VOL* is the operational cash flow volatility measured by the standard deviation of five years operational cash flow to total assets, *F_GRW* is the firm growth measured by the change of sales divided by total assets, *F_SZ* is the firm size measured by the logarithm of total assets, *MV:AS* is the market value to assets ratio, *ROA* is return on assets, *LOSS* is a dummy variable that scores one if earnings are negative and is considered a proxy of the motivation of earnings management, and *EA_TRG* is earnings target beating which is a dummy variable that scores one if firms achieve earnings change between 0 to 5% relative to total assets and 0 if otherwise.

The table shows that the mean value of ACC_EAR is .127 with minimum and maximum values of 0 and 7.744 respectively, this result is consistent with previous studies that tested accruals earnings management in Egyptian firms (for example, Kamel & Elbanna,2012; Mostafa, 2018; Boghdady, 2019) these studies have found a high degree of variation in the practices of accruals earnings management among the Egyptian companies. The results about *RL_EAR* show that the average is within a range between -1.037 and 5.613 and are also in the same vein as other previous studies held in Egypt (for example, Boghdady, 2019; Attia et. al.,2022). As for *MNG_AB* it has an average of .732 with a minimum and maximum values of .393 and .965 respectively, this result indicates that Egyptian companies are managed by mangers with average managerial skills, this result supports the results of previous studies held in Egypt (for example, Abd Elaal,2021; ElRamlly,2022).

Turning to control variables, *S_VOL, EA_VOL*, and *OCF_VOL* have average values of .161, .045, and .104 respectively which indicates a degree of stability in the three variables over the study period. The results of *F_GRW* indicates that some of the companies in the study sample suffers from retraction as this variable range between -96.904 and 70.059, the average *F_SZ* is 20.711 which goes in vein with most of the previous studies, A surprisingly high degree of variation in *MV:AS* was found as this variable ranges from .553 and 924.913 with standard deviation of 94.004 which indicates that various factors contribute to the valuation of Egyptian companies, and these factors should be investigated. *ROA* ranges from -49.211 and 65.73 with a mean value of 3.347, the negative value of *ROA* indicates a quite poor financial performance in some of the Egyptian companies in the study period.

Table 3
Frequency distribution for variable LOSS & EA_TRG

		Freq.	Percent	Cum.
LOSS	0	192	77.11	77.11
	1	57	22.89	100.00
	Total	249	100.00	
EA_TRG	0	159	63.86	63.86
	1	90	36.14	100.00
	Total	249	100.00	

The results in table 3 show that:

- 57 of the companies in the study sample had negative earnings in the study period with a percentage of 22.89% of the total sample. This result further emphasizes that some of the Egyptian companies suffered from poor financial performance in the study period.

- only 90 companies with a percentage of 36.14% of the Egyptian companies included in the study sample beat the earnings target and achieved earnings change between 0 to 5% relative to total assets. This result comes in the same vein with the above results which indicated poor performance of Egyptian companies in the study period.

4.2 Testing the First Study Hypothesis

The first study hypothesis states that managerial ability has an impact on accruals earnings management in Egyptian companies. The following table shows the results of linear regression for the accruals earnings management, managerial ability, and the control variables.

Table 4
Results of linear regression for the first model

ACC_EAR	Coef.	St.Err.	t-value	p-value	[95% Conf	Sig
MNG_AB	.121	.384	0.31	.753	-.636	
S_VOL	-.112	.234	-0.48	.632	-.574	
EA_VOL	.019	.905	0.02	.983	-1.765	
OCF_VOL	.895	.216	4.15	0.000	.47	***
F_GRW	.004	.002	2.04	.043	0	**
F_SZ	-.014	.021	-0.68	.498	-.055	
MV:AS	-.0000829	.000386	-0.21	.83	-.001	
ROA	-.004	.005	-0.76	.446	-.014	
LOSS	.101	.109	0.93	.354	-.113	
EA_TRG	-.032	.074	-0.43	.667	-.178	
Constant	.261	.462	0.56	.573	-.649	

Mean dependent var	0.127	SD dependent var		0.556
R-squared	0.093	Number of obs		249
F-test	2.426	Prob > F		0.009
Akaike crit. (AIC)	411.257	Bayesian crit. (BIC)		449.949

*** p<.01, ** p<.05, * p<.1

Linear regression is based on certain statistical assumptions. It is crucial to test these assumptions before modeling the data using linear regression. Accordingly, the assumptions underlying linear regression should be tested before interpreting the above results. The Variance Inflation Factor (VIF) test was conducted to make sure that the independent variables of the study do not suffer from multicollinearity as this problem may cause imprecise regression coefficients, failure to attain statistical significance, change in the estimated signs of coefficients, or considerable changes in the estimated coefficients when adding or deleting a few observations (Asteriou & Hall ,2015).The results in table 5 reveals that VIF values for all study variables are less than 10 which highlights that there is not multicollinearity problem, and that the study model is able to explain the effect of managerial ability on accruals earnings management.

Table 5
Results of variance inflation factor

VIF test		
	VIF	1/VIF
MNG_AB	1.245	.803
S_VOL	1.823	.549
EA_VOL	1.424	.702
OCF_VOL	1.332	.751
F_GRW	1.18	.847
F_SZ	1.184	.845
MV:AS	1.116	.896
ROA	1.789	.559
LOSS	1.782	.561
EA_TRG	1.079	.926
Mean VIF	1.395	.

Then, and to test the assumptions underlying the above linear regression model, the model errors were tested for heteroskedasticity using the Breusch-Pagan test, heteroskedasticity does not cause bias or inconsistency in the linear regression results, but the standard errors and the test statistics may be no longer valid (Wooldridge, 2015). As table 6 shows, the P-value of the Breusch-Pagan test is less than 0.05 which indicates the existence of heteroskedasticity problem and cause the model to be unsatisfactory. After that, Wooldridge test for autocorrelation was conducted. This test is carried

on to ensure that the residuals are not serially correlated because this problem may result in estimated variances of the regression coefficients to be biased or inconsistent, causing the hypotheses testing to be invalid, and R^2 to be overestimated (Asteriou & Hall , 2015). Table 6 shows that the P-value of the Wooldridge test is less than 0.05 which indicates the existence of autocorrelation in residuals that cause the results of the linear regression model to be invalid. Finally, Jarque-Bera test was conducted for testing the normality of errors, this test examines whether sample data have skewness and kurtosis that follow normal distribution. The absence of this assumption makes the results of the linear regression model to be unacceptable. As table 6 shows, the P-value of the Jarque-Bera test is less than 0.05 which indicates that the errors are not normally distributed, and that the linear regression model is invalid.

Table 6
Results of Breusch-Pagan, Wooldridge, and Jarque-Bera tests for the first model

		Breusch-Pagan	Wooldridge	Jarque-Bera
H0		Constant variance	no first-order autocorrelation	Normality of errors
Test statistic	Chi^2 tabulated	199.12		280000
	F tabulated		10.758	
P-value		0.000	0.002	0.000

In the light of the presence of the above problems, linear regression is no longer the best linear unbiased estimator, and a feasible generalized least squares FGLS model becomes a more suitable alternative (Wooldridge, 2015). FGLS is a method to estimate the parameters in a linear regression model when there is correlation between the residuals in the regression model and in the case of heteroskedasticity. In these cases, ordinary least squares and weighted least squares may lead to misleading inferences. Table 7 shows the results of the feasible generalized least squares FGLS for testing the first hypothesis.

Table 7
Results of FGLS regression for the first model

ACC_EAR	Coef.	St.Err.	t-value	p-value	[95% Conf	Sig
MNG_AB	.266	.079	3.368	.001	.111	***
S_VOL	-.082	.049	-1.696	.09	-.178	*
EA_VOL	.101	.179	.564	.573	-.25	
OCF_VOL	.533	.154	3.469	.001	.232	***
F_GRW	.005	.0004515	10.368	0.000	.004	***
F_SZ	-.011	.005	-2.248	.025	-.02	**
MV:AS	.001	.0000805	8.767	0.000	.001	***
ROA	-.006	.001	-5.649	0.000	-.008	***
LOSS	.022	.02	1.095	.274	-.018	
EA_TRG	-.057	.008	-7.156	0.000	-.073	***
Constant	.087	.09	.96	.337	-.09	
Mean dependent var		0.127	SD dependent var			0.556
Number of obs		249	Chi-square			254.201

*** p<.01, ** p<.05, * p<.1

Table 7 shows that managerial ability MNG_AB has a significant impact on accruals earnings management ACC_EAR, this result goes in line with a great deal of previous studies (for example, DeFond & Park, 1997; Demerjian et al.,2013) which argued that engaging in accruals earnings management requires managers with significant ability to evaluate current performance, predict future performance accurately, and adjust firm's financial reports which is not possible unless these managers have more knowledge about the future operations of the company which results in more accurate judgment and are reflected in higher-quality earnings estimates. As for the control variables, sales volatility S_VOL has a negative impact on accruals earnings management ACC_EAR, this result is logical in the light of the fact that accruals earnings management occurs during the present period and produces loss at the end of the period and that managers manage the earnings through accrual-based earnings management to avoid that loss (Sanjaya & Saragih, 2012).Other control variables have significant impact on accruals earnings management except earnings volatility EA_VOL and LOSS. A result which deserves consideration is that firm size F_SZ has a negative impact on accruals earnings management ACC_EAR which supports the notion that the bigger the firm, the more effective governance policies it adopts, the harder

for its management to engage in accruals earnings management (Roychowdhury, 2006). Additionally, ROA and earnings target beating EA_TRG have negative impact on accruals earnings management ACC_EAR, this result comes in the same vein with (Roychowdhury, 2006; Demerjian et al., 2013) that the profitability of the firm is a major determinant of its practicing accruals earnings management. The FGLS model for this hypothesis has a high fit because the overall significance has p-value of.000, and the calculated Chi-square is higher than the tabulated value of Chi-square.

Accordingly, the regression equation for estimating accruals earnings management by managerial ability and the control variables can be presented as follows:

$$ACC\_EAR = .087 + .266\ (MNG\_AB) + .533\ (OCF\_VOL) + .005\ (F\_GRW) + .001\ (MV: AS) - .006\ (ROA) - .057\ (EA\_TRG)$$

4.3 Testing the Second Study Hypothesis

The second study hypothesis states that managerial ability has an impact on real earnings management in Egyptian companies, the following table shows the results of linear regression for the real earnings management, managerial ability, and the control variables.

As was done with the first hypothesis, the statistical assumptions on which linear regression is based were tested before interpreting its results and modeling the data using linear regression. The Variance Inflation Factor (VIF) test was firstly conducted to make sure that the independent variables do not suffer from multicollinearity problem which may result in multiple other problems such as imprecise regression coefficients, failure to attain statistical significance, change in the estimated signs of coefficients, and considerable changes in the estimated coefficients when adding or deleting a few observations (Asteriou & Hall ,2015). Table 9 shows that VIF values for all variables are less than 10 which indicates that there is not multicollinearity problem, and that the study model can be used to explain the effect of managerial ability on real earnings management

Table 8
Results of linear regression for the second model

RL_EAR	Coef.	St.Err.	t-value	p-value	[95% Conf	Sig
MNG_AB	.262	.305	0.86	.391	-.339	
S_VOL	-.074	.186	-0.40	.692	-.44	
EA_VOL	.027	.719	0.04	.97	-1.389	
OCF_VOL	.03	.171	0.17	.862	-.308	
F_GRW	-.001	.002	-0.45	.656	-.004	
F_SZ	.017	.016	1.03	.305	-.016	
MV:AS	.0001966	.0003065	0.64	.522	0	
ROA	-.002	.004	-0.45	.654	-.01	
LOSS	-.081	.086	-0.94	.351	-.251	
EA_TRG	-.01	.059	-0.17	.864	-.126	
Constant	-.522	.367	-1.42	.156	-1.245	
Mean dependent var		-0.000	SD dependent var			0.424
R-squared		0.018	Number of obs			249
F-test		0.425	Prob > F			0.934
Akaike crit. (AIC)		296.440	Bayesian crit. (BIC)			335.132

*** p<.01, ** p<.05, * p<.1

Table 9
Results of variance inflation factor VIF test

	VIF	1/VIF
MNG_AB	1.245	.803
S_VOL	1.823	.549
EA_VOL	1.424	.702
OCF_VOL	1.332	.751
F_GRW	1.18	.847
F_SZ	1.184	.845
MV:AS	1.116	.896
ROA	1.789	.559
LOSS	1.782	.561
EA_TRG	1.079	.926
Mean VIF	1.395	.

As was done with the first model, other statistical tests were conducted to test the assumptions underlying the linear regression model, Breusch-Pagan test for heteroskedasticity was performed to the model errors because heteroskedasticity may cause the test statistics to be no longer valid (Wooldridge, 2015). Table 10 shows that the P-value of the Breusch-Pagan

test is less than 0.05 which indicates the existence of heteroskedasticity problem, and this may result in imprecise linear model results. Then autocorrelation was tested using Wooldridge test which is conducted to verify that the residuals are not serially correlated as this problem may result in biased or inconsistent estimated variances of the regression coefficients making the hypotheses testing to be invalid, and R^2 to be overestimated (Asteriou & Hall ,2015). As table 11 shows, the P-value of the Wooldridge test is less than 0.05 which indicates that there is autocorrelation in residuals causing the results of the linear regression model to be invalid. The normality of errors was tested by Jarque-Bera test which examines whether data have skewness and kurtosis that follow normal distribution. The absence of this assumption makes the results of the linear regression model to be unacceptable. Table 10 shows that the P-value of the Jarque-Bera test is less than 0.05 which indicates that the errors are not normally distributed, and that the linear regression model is invalid.

Table 10

Results of Breusch-Pagan, Wooldridge, and Jarque-Bera tests for the second model

		Breusch-Pagan	Wooldridge	Jarque-Bera
H0		Constant variance	no first-order autocorrelation	Normality of errors
Test statistic	Chi^2 tabulated	22.09		160000
	F tabulated		111.062	
P-value		0.000	0.000	0.000

The presence of the above problems makes linear regression not to be the best linear unbiased estimator, Accordingly, a feasible generalized least squares FGLS model was used instead of linear regression as Wooldridge (2015) argues that it is a better method to estimate the parameters in a linear regression model when there is correlation between the residuals in the regression model and in the case of heteroskedasticity which may lead to misleading inferences. Table 11 shows the results of the feasible generalized least squares FGLS for testing the second hypothesis.

Table 11
Results of FGLS regression for the second model

RL_EAR	Coef.	St.Err.	t-value	p-value	[95% Conf	Sig
MNG_AB	.268	.045	5.903	0.000	.179	***
S_VOL	-.129	.029	-4.464	0.000	-.186	***
EA_VOL	.401	.172	2.332	.02	.064	**
OCF_VOL	-.032	.058	-.555	.579	-.147	
F_GRW	-.001	.0002158	-4.602	0.000	-.001	***
F_SZ	.024	.003	8.647	0.000	.019	***
MV:AS	.0002222	. .000042	5.284	0.000	0	***
ROA	-.002	.001	-2.78	.005	-.003	***
LOSS	-.08	.009	-9.206	0.000	-.097	***
EA_TRG	-.017	.005	-3.232	.001	-.027	***
Constant	-.685	.069	-10	0.000	-.82	***

Mean dependent var	-0.000	SD dependent var	0.424
Number of obs	249	Chi-square	486.120

*** p<.01, ** p<.05, * p<.1

As table 11 shows, managerial ability MNG_AB has a significant impact on real earnings management RL_EAR, Although this result contradicts with the results of some of the previous studies which found that higher-ability managers engage in less real earnings management because higher-ability managers tend to exercise better management of firm resources and achieve more positive outcomes (for example, Huang & Sun, 2017; Oskouei& Sureshjani,2021), it is consistent with the results of other studies which have found a positive significant relationship between managerial ability and real earnings management (for example, Hessian, 2019; Simamora, 2022).As for the control variables, all of them have a significant impact on real earnings management except operating cash flow volatility OCF_VOL. the values of coefficients is interesting as they indicate that companies which achieve high performance levels tend to less exercise real earnings management as these control variables have negative coefficients (firm growth F_GRW, return on assets ROA, LOSS, and earnings target beating EA_TRG). sales volatility S_VOL also has a negative impact on real earnings management RL_EAR, a result that is consistent with (Habib et. al.,2022) which has found that capital market pressures may encourage managers to engage in real activity manipulation to meet or beat earnings targets. The FGLS model for this

hypothesis has a high fit because the overall significance has p-value of.000, and the calculated Chi-square is higher than the tabulated value of Chi-square.

Accordingly, the regression equation for estimating real earnings management by managerial ability and the control variables can be presented as follows:

$$RL\_EAR = -.685 + .268\ (MNG\_AB) + .129\ (S\_VOL) - .001\ (F\_GRW) + .024\ (F\_SZ) + .000222\ (MV{:}AS) - .002\ (ROA) - .08\ (LOSS) - .017\ (EA\_TRG)$$

5. Discussion and Conclusion

The present study was designed to achieve a main objective, to investigate the impact that managerial ability has on earnings management both by borrowing earnings from future periods by accelerating revenues and/or slowing expenses to improve current earnings intentionally and by altering earnings in a specified direction by performing actions such as overproducing inventory to lower the cost of goods sold or lowering discretionary expenses such as advertising, research and development, selling, general and administrative expenses. This was performed by testing two hypotheses; that managerial ability has an impact of accruals earnings management, and that managerial ability has an impact on real earnings management.

The results of this study indicate that managerial ability has a significant positive impact on accruals earnings management in Egyptian companies i.e., that more capable managers tend to intentionally take actions to reach desirable objectives by manipulating accruals through accelerating revenue recognition and delaying the expenses detection. This result comes in line with other previous work such as Huang and Sun (2017) which concluded that managers with high abilities prefer to use accrual earnings management instead of real earnings management as they have a better understanding about the negative effect on the future performance of the firm. Similarly, Hasan et. al. (2022) which found that firms with high-ability managers are more likely to engage in accruals earnings management because managers are likely to consider the relative cost of different options of earnings management and choose the less costly one. In addition, some previous studies argue that practicing accruals earnings management requires managers with high ability to evaluate current performance, predict future performance accurately, and adjust firm's financial reports. This cannot be done unless these managers have more knowledge about the future operations of the company (DeFond & Park, 1997; Demerjian et al.,2013). On the other

hand, this result contradicts with those of (Demerjian et al., 2020; Doukas & Zhang ,2020) which argued that the superior reputation of higher-ability managers guarantees them lifetime rewards, so they attempt to keep that reputation by avoiding reputationally harmful practices and that earnings manipulation may damage the reputation of managers because of subsequent lawsuits or restatements.

The second result of this study is that managerial ability has a significant positive impact on real earnings management in Egyptian companies i.e., more capable managers push earnings in a specified direction by overproducing inventory to lower the cost of goods sold, lowering discretionary expenses, or giving sales discounts to increase sales revenues. In contrast to earlier findings, this result differs from most of the previous studies, (Huang & Sun,2017) found that managers' ability to efficiently convert firm resources into sales is negatively related to real earnings management, they justified that result by some reasons, to begin with, higher-ability managers are more capable of generating higher sales revenue and thus are less likely to practice real earnings management. In addition to that, high-ability managers understand the negative impact of real earnings management on future firm performance and therefore they are more reluctant to engage in real earnings management. Finally, and considering the opportunity cost, more-talented managers would rather devote greater effort to the normal operations than to real earnings management Because they have limited time and effort (Roychowdhury, 2006; Cohen and Zarowin, 2010). Additionally, (Purwaningsih & Kusuma, 2020) argues that managers with higher ability usually maintain higher earnings quality and they are less likely to engage in real earnings management because earnings management is mostly associated with lower earnings quality. This contradicting result with previous studies may be because all managers face the pressures of meeting or beating the earnings benchmarks. Given that high-ability managers have higher reputation costs, they might face more pressure if they miss the earnings benchmarks. Accordingly, when they face the earnings benchmarks, more-talented ones might engage in real earnings management (Huang & Sun, 2017). Another reason for this contradiction is that higher-ability managers have a superior knowledge of their firms' operating environment (Demerjian et. al., 2013), this knowledge enables them to align real earnings management with their reporting strategies.

The findings of this study indicate that capable managers in Egyptian firms perform both accruals and real activities earnings management evenly, they do not prefer a method of earnings management upon the other. This may be

because they possess sufficient knowledge and experience about their companies, competitors, and industries that enable them to practice accruals earnings management and real activities earnings management without considerable effort. Another explanation of this finding may be because of the weak regulatory environment which gives managers the required chances to practice earnings management whether accruals-based or real earnings-based, especially in the presence of the management opportunistic behavior. Moreover, the unsatisfactory level of performance of Egyptian companies especially in light of recent international economic conditions, may encourage more capable Egyptian managers to manipulate earnings whether to achieve personal benefits or to maintain their companies' image.

Considering these findings, the results have considerable implications for standards setters, investors, analysts, auditors, and tax authorities. For standard setters, it is vital to set enough standards and regulations which mitigate the opportunistic behavior of managers and limit their opportunities to practice earnings management. Furthermore, the reputation of high-ability managers may provide signals for investors and analysts that these firms are more likely to practice earning management activities, and therefore, it requires to check the accuracy and reliability of financial reports by auditors and tax authorities. In other words, the presence of ability in managers leads auditors to suspect the existence of fraudulent financial reporting.

However, with a relatively small sample size due to the established criteria for choosing the study sample, caution must be applied as the findings would have been different if tests were performed on larger sample size. The measures employed for managerial ability, accruals earnings management, and real earnings management are not the only measures for these variables, caution also must be applied as employing other measures would cause a difference in results. It is important to bear in mind that the results of this study may have differ if applied on banks and other financial institutions as they are governed by special regulations. Finally, and most importantly, conducting this study in countries other than Egypt may lead to different results as Egypt is characterized by a relatively weak corporate governance which gives managers especially higher-ability ones significant opportunities to manage their firms' earnings whether by accruals management or by real activities management. In future investigations, it might be possible to use a larger sample size, employ other measures of managerial ability, accruals earnings management, or real earnings management, and retesting the study models in banks and financial institutions.

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