The Relationship between Earnings Management and Credit Ratings and their impact on Firm Performance: Evidence from Egypt

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Abstract:

The objective of this research is to examine the relationship between earnings management (EM) and credit rating (CR) and their impact on a firm's performance (FP). In this research, a sample of 136 Egyptian firms for a period of one year (2021) will be tested. Ordinary Least square (OLS) regression analysis and Structural Equation Modeling (SEM) are employed to test the research hypotheses. Real earnings management (REM) is used to measure EM. Profitability and leverage are used to measure FP. To measure a CR, the rating score are obtained from the Eikon database on Thomson Reuters. The results revealed that there is a significant negative impact of REM on CR. Also, it is found that REM has a significant positive impact on FP measured by profitability and leverage. Furthermore, the results

indicated that CR has a significant positive impact on FP when measured by ROA and a negative impact when measured by leverage. Finally, it is indicated that the involvement of CR as a mediator in the relationship between EM and FP motivates the relationship between them when FP is measured by ROA. At the same time, there is an indirect negative significant effect of REM on leverage, which means CR fully mediated the association between REM and leverage in a sample of Egyptian firms.

Key words: Earnings Management, Credit Ratings, Profitability, Leverage.

1. Introduction

Earnings management (EM) has received great attention from previous researchers, especially because users of financial statements (either internal or external) need relevant, reliable, and comparable data to aid them in analyzing the financial situation and performance. As well as, credit rating agencies (CRAs) need information that may be used to help them in setting suitable ratings. Also, CRAs require information that will enable them to gain a better knowledge of the unique peculiarities of firms' operations. Thus, managers play a critical role in keeping up credibility within its financial framework through close interaction with regulatory and public authorities such as CRAs.

On the other hand, managers provide CRAs and other regulatory authorities with such data that is not continuously accessible to the public. Furthermore, Wu et al. (2016) pointed

out that using earnings manipulation by managers, returned to the needs of managers to give subjective judgments about expected reserves for losses and sustain the level of performance. In light of the above discussion, the purpose of this research is to estimate the performance of Egyptian firms, through investigating the relationship between EM practices and CR. Therefore, monitoring by CRAs on the firm's financial statements needs to be sufficient to meet the trust of both internal and external users by setting the accurate rating for each firm separately. As a result, CR issues are one of the most serious issues confronting Egyptian firms.

Over the past times, financial and non-financial institutions that are placed under credit control have a great interest in maintaining and improving their CR and then they become satisfied with their current performance. But, all the time they are suffering from the risk of downgrading their CR which is established by CRAs. On the other hand, under Generally Accepted Accounting Principles (GAAP), managers with access to more extensive and confidential information can choose reporting techniques, estimations, and explanations. Accordingly, managers will have the chance to abuse their managerial discretion. Simultaneously, they exploit the opportunity to manage earnings to keep or improve their current CR.

Therefore, previous studies were interested in investigating the impact of EM on CR. However, the empirical results were

mixed. Some studies have documented that financial reporting misbehaviors may be likely to be detected through the monitoring by CRAs and the reduced information asymmetry, and this is because of the provision of CR. In contrast, other studies provide evidence that CRAs are fooled by manipulations of EM. In addition, there have been no studies were ever conducted on the impact of EM on CR applied to Egyptian firms. Also, there were only limited studies on the relationship between CR on FP. In addition, the indirect impact of EM on FP through CR as a mediating variable has not been tested before. So, a broad sample of Egyptian firms in 2021 will be tested.

In this context, to fill the gap, there are three models to test the relationship between EM and CR and their impact on FP. The first one is to test the direct impact of EM and CR on FP. The second one is to test the direct impact of EM on CR. Furthermore, the third and final one is to test the indirect impact of EM on the FP through CR as a mediator variable. This research focused on applying this to Egyptian firms. Also, the empirical study will be useful for users of CR and CRAs by offering evidence about whether managers tend to manipulate earnings, especially through EM techniques, to achieve or maintain their expected ratings and how it affects the decisions of CRAs.

The structure of this study is as follows; Part 2 includes a theoretical overview of the main variables. Part 3 contains a review of the literature and the formulation of hypotheses. In Part

4, the research design is presented. The study findings and empirical tests are exhibited in Part 5. A discussion of the findings is shown in Part 6. The conclusions of the research are presented in the final section.

2. Theoretical Background

The concept of EM is introduced by (Healy and Whalen, 1999, page 6) as ‘‘It occurs when managers use managerial judgment and decisions in financial reporting that alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers’’.

The accounting literature has documented several motives for EM, for instance, Healy and Wahlen (1999), Cohen, et al. (2008), Ghazali, et al. (2015), and Bouwens (2017). As managers have many reasons to use their judgment in the process of decision-making about the accounting procedures and financial statements practices of the organizations they oversee. Accordingly, prior research confirms the significance of highlighting the incentives and motivations behind EM.

They documented these incentives as: 1) Managers are more likely to participate in EM if their compensation is linked to the company’s financial results, so, they are in their best interests to appear to do well by EM to obtain higher compensation. 2) EM may also be utilized to benefit the company’s owners, as; it is used as a method to increase the value relevance of earnings to

lead to a more accurate picture of a company's success and performance. 3) Managers also use EM in an endeavor to impact stock market participants, especially before seasoned equity offerings. 4) Stock returns are higher for companies that reach or surpass forecasts than for companies that fall short of expectations. 5) The intent of CEOs is to inflate their earnings to deceive investors about the firm's future performance and to reinforce their own reputations. 6) Managers typically want to reach or exceed earnings targets to gain capital market legitimacy, retain or raise stock prices, boost the firm's external image, and signal potential growth prospects. 7) Some executives also conceded that in order to meet earnings targets, they would take cost-cutting measures such as deferring maintenance or advertising expenses. 8) The managers' willingness to report positive earnings and maintain recent performance. 9) Meeting or exceeding the expectations of analysts. 10) Finally, avoiding reporting losses and achieving predictions of shareholders.

As a result, researchers of accounting have traditionally concentrated on two types of EM techniques: Real earnings management (REM) and accrual-based earnings management (AEM) (Gounopoulos and Pham, 2017). On one hand, some of these strategies are focused on changing the timing or structuring of real economic operations and interventions in business operations, investment, and financing. Some, on the other hand, depend on accounting discretion through accrual consideration

and interventions in the process of financial reporting as well as in accounting rules and regulations.

Roychowdhury (2006) found evidence that managers seek to attain short-term improvements in reported results through operational activities management (REM). Thus, REM is defined as management decisions made with the primary goal of deviating from standard business procedures to manipulate cash flow from operations, production costs, and discretionary expenses in order to satisfy particular earnings benchmarks (Roychowdhury, 2006). This happens when managers intentionally make operational decisions that have both direct and actual cash flow implications with the purpose of altering recorded earnings by changing the timing or structuring of transactions, investing, and financing transactions.

On the other hand, previous studies found that managers manipulate earnings not only through real activities earnings management, but also through accrual manipulation with no direct cash flow consequences (Cheng et al., 2011). Because management has the authority and power to exercise their own judgment and discretion in accounting, they can control and manage their true economic performance by manipulating earnings through accrual (Dechow and skinner, 2000). Also, because of the inherent flexibility in accounting principles, managers adopt accrual-based EM, as accounting discretions allow managers to modify income numbers (either upward or

downward) by selecting any authorized accounting technique or estimate (Dechow and skinner, 2000; Kim, 2013). So, AEM occurs when managers control their reported earnings by utilization of the accounting discretion associated with GAAP (Joosten, 2012).

Demirtas (2013); Ghazali et al. (2015); and Bouwens (2017) stated that the usage of accruals is one of the strategies used by managers to exercise their discretion because total accruals are divided into two categories: non-discretionary accrual (normal accrual) depended on management estimates of economic performance and discretionary accrual which is usually manipulated by management through the constraints of accounting principles. Consequently, Managers may manipulate the discretionary accruals to achieve the targeted earnings number (Kim, 2013).

In addition, previous research emphasizes on the significance of CR by showing that firms, banks and investors take a large amount of concern in their CR. At the beginning of 1930s, controllers of financial institutions, like banks, insurance agencies, and pension funds, started consolidating the utilization of CRs in their particular guidelines (Sethuraman, 2019). CR can be defined as ‘‘a quality assessment of the creditworthiness of a debt issuer or a specific debt obligation’’ (U.S. Securities and Exchange Commission, 2013). Also, CR is the assessment of firm’s overall credit risk and the ability of debt-paying (Lin, 2015).

Jung (2013), Bouwens (2017) and Sethuraman (2019) reported that the CR is controlled and dominated by three biggest agencies: Moody's, Standard & Poor's (S&P), and Fitch. In addition, the estimation of credit risk and determining the CR to issues, issuers, or both is the responsibility of these three leading rating agencies (Jung, 2013). CRAs are responsible for 98% of all outstanding ratings and gain 90% of the total revenue (Bouwens, 2017).

Furthermore, independent assessment of firm's creditworthiness is provided based on disclosed gathered information because they conduct in-depth interviews and discussions with firms' managers to gather additional information about management policies, future plans, and current positions that may have an effect on ratings (Gounopoulos and Pham, 2017). Various studies documented that credit analysts rely on both sources of information: public and non-public provided by managers to evaluate the firm (Demirtas, 2013; Gounopoulos and pham, 2017).

Firm supervisors have superior data around the long run rating changes of their firms than exterior financial specialists as rating offices tend to gather data from management (kim, 2013). Frost (2007) mentioned that CR organizations act as guardians by giving an independent evaluation of creditworthiness through the analysis of financial and non-financial sources of information and looking into due diligence.

Finally, these evaluations of ratings are appraisals of firms' creditworthiness that is released as a rating to categorize businesses into various classes (Bouwens, 2017). Then, ratings agencies address a sign of in general quality, and firms in a similar rating class are pooled together as being of a similar quality (Kisgen, 2006; Alissa et al., 2013).

3. Literature Review and Hypotheses Development

In accounting literature, EM has been cited as one of the most critical ethical issues. Because managers have great motives to manipulate earnings to affect short-term stock prices and achieve higher firm performance, as investors usually depend on earnings in estimating the value of stocks and in evaluating the FP (Gounopoulos and Pham, 2017). Also, it was found that credit analysts revise both sources of information (public and private) which is provided by managers to evaluate the creditworthiness to provide ratings based on their opinion at a specified date. At the same time, managers have the ability to utilize their authority in manipulating earnings to attain many incentives such as enhancing the CRs.

Accordingly, this part of the literature exhibits the previous studies that investigated the relationship between three main variables (EM, CR, and FP). Thus, the literature review is divided into three main groups. The first group indicates the relationship between EM and CR. The second group indicates the

relationship between EM and FP. The third and final group indicates the relationship between CR and FP.

3.1. The relationship between EM and CR:

Regarding the first group of studies which explained the relationship between EM and CR, there was a debate between researchers about the impact of each component of EM whether AEM or REM and their proxies on CR. Prior literature depends more on using both REM and AEM as main proxies for EM. But the used measures of EM were different. Some studies focused on measuring EM by focusing on AEM technique using abnormal accruals as a proxy and estimated by modified 1991 jones model (Jung, 2013; Demirtas, 2013; Liu, 2018 and Huang et al., 2020). On the other hand, another large stream of the prior literature measured EM using both techniques (AEM and REM) by using abnormal accruals as a proxy of AEM and using abnormal cash flow from operations, abnormal production costs and abnormal discretionary expenses as a proxies of REM (Alissa et al., 2013; Kim, 2013; Lin, 2015; John, 2016; Gounopoulos and pham, 2017; Zhao, 2017 and Hill, 2019). Finally, Bouwens, (2017) measured EM by discretionary accruals and conservatism. So, using both AEM and REM were considered the most widely used measures in previous literature. Regarding CR, most of studies obtained the ratings from Compustat database which has been issued by one of three major rating agencies (Moody's, S&P, and Fitch).

In addition, empirical studies which conducted on such a relationship have been revealed different point of views. As, Alissa et al., 2013; Kim, 2013; Lin, 2015; john, 2016; Gounopoulos and pham, 2017; Bouwens, 2017; Liu, 2018) found that EM when measured by AEM was associated significantly and negatively with CR. When businesses successfully oversee their earnings and effectively get a higher CR, the perceived quality of these CR will be harmed over a long run.

Additionally, Alissa et al. (2013) and Gounopoulos and pham (2017) found that EM when measured by REM had a negative relationship with CR. On the other hand, there were other studies which indicated that there was a positive relationship between EM measured by AEM and CR (Demirtas, 2013; Jung, 2013; Zhao, 2017; Hill, 2019 and and Huang et al., 2020). Also, Kim, (2013); Lin, (2015); John, (2016); Zhao, (2017) and Hill, (2019) revealed that there was a positive association between EM when measured by REM and CR.

Finally, the findings were mixed because according to previous mentioned studies, it was found that managers try to avoid CR downgrades by using both techniques of EM (accruals-based and real EM). Some studies documented that financial reporting misbehaviors may be likely to be detected through the monitoring by CRAs and the reduced information asymmetry and this because of the provision of CR. In contrast, other studies provide evidence that CRAs are fooled by manipulations of EM.

Additionally, REM is an opportunistic practice that raises a firm's default risk as well as its information risk as it conceals a firm's true performance and increments the data asymmetry between lenders and managers (Pappas, 2019). Real management activities are harder than accrual-based EM to be detected by outsiders, because REM may be unclear from optimal business activities (Zhao, 2017) and (Pappas, 2019). Furthermore, it sacrifices a company's future cash flows in return for current recorded earnings (Pappas, 2019).

kim, (2013) and Zhao (2017) stated that the survey which has been provided by Graham et al. (2005) clarified the mangers' inclinations and incentives behind preferring REM rather than AEM. One of the conceivable reasons for using such preference is that those techniques are likely to be harder to be detected, despite their high cost (Cohen et al., 2008) as cited in (Zhao, 2017). Also, the survey of Graham et al. (2005) stated that managers have the intent to apply REM rather than AEM, since accrual-based manipulation is more likely to attract audit or regulatory attention than real manipulation activities (kim, 2013). Accordingly, this may influence future firm performance negatively (Gunny, 2010).

Following Roychowdhury (2006), as a result, companies manage earnings by deviating from the normal business activities to achieve the desired level of earnings by ‘‘three types of REM: abnormal cash flow from operations, abnormal production costs,

and abnormal discretionary expenses'' (Pappas, 2019). Therefore, the results of various studies are not consistent with each other. Hence, based on the majority of the prior literature, the first hypothesis and its sub-hypotheses are developed as follows by focusing on REM as a proxy of EM:

H1: REM's index has a significant direct impact on CR.

H1a: There is a significant direct impact of abnormal cash flow from operations on CR.

3.2. The Relationship between EM and FP:

The second group of research is the relationship between EM and FP. It explores whether EM impacts the current and future performance of firms. Especially by focusing on analyzing the association between measures of both EM and FP. As, several previous studies have illustrated the relationship between EM and FP. But it was found that the empirical evidence results were mixed.

According to previous studies, there was a negative and significant relationship between EM and FP (e.g. Beatty et al., 2002; Gill et al., 2013; Jamkarani & Hozi, 2016; Wu et al., 2016; Alhadab, 2017; Chakroun & Amar, 2019; Khuong, 2019 and Dakhlallh et al., 2020). These studies concluded that EM contributes to a firm with a way to enhance performance in the short term, as firms use both AEM and REM to improve reported financials in the short run. Therefore, those prior studies expected that EM would have a negative impact on the performance of firms in the future. As, managers would rather have an

accounting strategy to manage earnings so that they fulfill the financial analysts' or investors' predictions during the current situation of their firms.

Also, other studies tested a positive relationship between EM and FP (e.g. Bazrafshan et al., 2016; Ngunjiri, 2017; Ding et al., 2018). The findings of these studies were based on the view that it can resolve agency problems between firm managers and its shareholders which results in reducing the agency costs and capital costs. In support of this, Jensen and Meckling (1976) clarified that based on agency theory the conflicts in the purposes and interests between managers and shareholders have an important role in using strategies of EM by managers as a tool to enhance the future performance of firms. Because managers may exaggerate or lower reported income in order to highlight the firm's performance and receive higher compensation tied to the firm's future sock performance.

According to (Beatty et al., 2002; Gill et al., 2013; Jamkarani & Hozi, 2016; Wu et al., 2016; Ngunjiri, 2017) FP was measured by return on assets (ROA). On the other hand, (Bazrafshan et al., 2016; Alhadab, 2017; Ding et al., 2018; Chakroun & Amar, 2019; Khuong, 2019) measured the FP by ROA and return on equity (ROE). More recently, (Dakhlallh et al., 2020) measured FP by Tobin's Q.

The majority of earlier studies also focused on publicly traded companies in various nations. Additionally, however, the

relationship between EM and FP in the banking industry was covered in earlier studies (Beatty et al., 2002; Wu et al., 2016; and Alhadab, 2017). In the accounting literature, banks' EM attracted the attention of academics and professionals. Banks and other financial institutions are usually excluded from EM studies and sampling because their financial reporting practices differ from those of other businesses.

Therefore, the results of the prior studies were not consistent with each other. These disagreements may be because of using different samples related to different countries and different industries. In addition to using different measures and different statistical techniques for both EM and FP. Hence, it was also noted that the majority of the previous studies measured the FP by ROA. Therefore, based on the prior literature regarding the direct relationship between EM and FP, the following hypotheses are developed as follows:

H2: There is a significant direct impact of REM as an index on ROA.

H2a: There is a significant direct impact of abnormal cash flow from operations on ROA.

H3: There is a significant direct impact of REM as an index on leverage.

H3a: There is a significant direct impact of abnormal cash flow from operations on leverage.

3.3. The Mediating Impact of CR on the Relationship between EM and FP:

Finally, the last group presents a few previous studies that examined the relationship between CR and FP. It addresses whether CR has an effect on FP indicators. The results of the previous few studies indicated that there is a positive relationship between CR and FP (Shaheen & Javid, 2014; and Rafay et al., 2018). The findings of these studies were based on the view that the drop in CR might result in a large economic loss because the ratings affect the firms' borrowing costs. So that, managers of firms try to avoid CR downgrades to enhance their performance. This implies that the higher the CR, the higher FP.

Because of few studies of the relationship between CR on FP, the third set of hypotheses are developed to be tested as follows:

H4: There is a significant direct impact of CR on FP as measured by ROA.

H5: There is a significant direct impact of CR on FP as measured by leverage.

Moreover, from reviewing the prior literature, it is indicated that there is a lack of preceding studies which examined the relationship between EM and CR and their impact on FP. Accordingly, the current research aims to test the indirect impact of EM on FP through the existence of CR as a mediating variable on firms in Egypt in order to determine whether the findings will

be in the same line with the majority of previous studies results or not. Thus, structural equation modeling (SEM) analysis is used to test this combined relation. In this context, the following hypotheses are developed:

H6: There is a significant indirect impact of REM as an index on ROA through CR as a mediating variable.

H6a: There is a significant indirect impact of abnormal cash flow from operations on ROA through CR as a mediating variable.

H7: There is a significant indirect impact of REM as an index on leverage through CR as a mediating variable.

H7a: There is a significant indirect impact of abnormal cash flow from operations on leverage through CR as a mediating variable.

3. The Research Design

This part illustrates the sample selection process and the sources of data that were gathered, the variables used in the study, how they were measured, and the empirical models employed.

3.1. Sample Selection and Data Collection

The final sample is selected based on the following criteria. The sample includes all sectors except for all financial institutions such as banks, insurance firms, and brokerage firms as these firms have different capital structures and investment decisions. The final sample consists of 136 Egyptian firms in

2021 and this is because the data of CR on Thomson Reuters was available for one year.

The researcher depends on secondary data to conduct statistical analysis. Data are collected from the annual financial statements of the firms including balance sheets, income statements, and statements of cash flows which are available on the Thomson Reuters Database. Also, the CR data were collected from Thomson Reuters Eikon, DataStream Professional database. The letter ratings assigned by Thomson Reuters are transformed into numerical equivalents using an ordinal scale according to Fitch and S&P ranking scores, ranging from 1 for the lowest-rated firms (D) to 22 for the highest-rated firms (AAA).

3.2. Statistical Techniques

To analyze the research data, a cross-sectional analysis of year 2021 was applied. As the data obtained from Thomson Reuters was available for only one year. Ordinary least square (OLS) is used to test hypotheses concerning the direct association of the research models and structural equation modeling (SEM) to test the hypotheses of indirect association of the research models. In order to test the validity of the research hypotheses, the regression analysis is applied using STATA 17.

Before accepting the results of OLS, some goodness of fit tests should be conducted to confirm that the statistical techniques applied in the current study best-fit sample data: Homoscedasticity test, Multilinearity via variance inflation factor

and Model specification through the Ramsey test. In addition, before accepting the results of SEM, some goodness of fit tests should be conducted to confirm that the statistical techniques applied in the current study best-fit sample data: Chi2 probability, RMSEA, CFI, and SRMR.

3.3. Measurement of the Research Variables

FP is the dependent variable in all empirical models used in this research. There are different measures for FP. In this research, FP is measured by ROA and leveraged to reflect it from different perspectives. As, ROA is used to reflect how well a company or management utilizes its assets to generate profits. It is computed as the net income after tax divided by the total assets of firm i at year t (Gill et al., 2013; Bazrafshan et al., 2016; Alhadab, 2017; and Ding et al., 2018). Leverage is used to assess the ability of a company to meet its financial obligations in the long run. So, it is measured by the debt-to-equity ratio to show the degree to which shareholder's equity can settle a firm's obligations to its creditors in case a business decline. It is also used to show the extent to which a firm's assets are financed by debts and shareholder's equity. The company is considered highly leveraged when the debt-to-equity ratio tends to be higher as it is the primary source to finance its assets. It is computed by the ratio of total debt to total shareholders' equity (Jung, 2013; Demirtas, 2013; and Khuong, 2019).

EM is the main independent variable used in this research. There are two main different measures of EM were used in this research. The first one is REM as an index to test to what extent REM has an impact on both CR and FP, the second one is one of the proxies of REM which is abnormal cash flow from operations in order to test the effect of it separately on CR and FP.

CR is considered a dependent variable with EM to test the direct impact of EM on CR. Also, CR is considered an independent variable with FP to test the direct impact of CR on FP. At the same time CR used as mediator variable to test the indirect impact of EM on the FP through CR. In this research, this research relied on extracting the CR data from Thomson Reuters Eikon, DataStream Professional. As, it provides its daily scores, and daily data feed. In addition, obtaining the data of CR from S&P, Moody's, and fitch are unavailable for Egyptian firms. Thus, this research relied on Thomson Reuters data as an alternative. As, Thomson Reuters created its own way to measure and reveal the firms' CR and explained how it has been calculated.

StarMine provides daily scores for more than 40,000 global securities and is available as a referential tool via Thomson Reuters Eikon, DataStream Professional. CRs are ranked from D to AAA (1 to 22) according to Fitch and S&P ranking scores, scores from 1 to 12 are considered junk grades, and scores from 13 to 22 are considered investment grades. Table 1 presents the variables and their measures.

Table 1: Variables Measurements

Variable	Type	Measurement
Earnings Management (EM)	Independent	- Real earnings management (REM) as an index. - Abnormal cash flow from operations (Abn-CFO).
Firm Performance (FP)	Dependent	- Return on assets (ROA). - Leverage.
Credit Rating (CR)	Mediator variable	- CR score was obtained from Thomson Reuters Eikon, DataStream Professional. CRs are ranked from D to AAA (1 to 22) according to Fitch and S&P ranking scores.
Firm Value (TQ)	Control variables	- Tobin's Q: The market value of a company divided by its assets' replacement cost.
Asset's Structure (TANG)		- Tangibility (TANG): Ratio of property, plant, and equipment divided by total assets.
Operation Cash Flow (OCF)		-Ratio of cash flow from operations to total assets.
Firm Age (AGE)		-Age of the firm in years. Firm age is the difference between the firm's offering year and its founding year.
Cash Holding (CH)		-Liquidity measure that shows a company's ability to cover its short-term obligations using only cash and cash equivalents.
Non-Debt Tax Shield (NDTS)		-The ratio of depreciation to total assets.
Earnings Per Share (EPS)		- A company's profit divided by the outstanding shares of its common stock.
Capital Expenditure (CPX)		-Addition of net change in Property Plant and Equipment (PP&E) value over a given period to the depreciation expense for the same year.
Inflation (INF)		- For 2021, an inflation rate of 5.2% was calculated.
Gross Domestic Product Growth (GDP)		-The sum of all consumption, investment, and government spending in an economy, plus the net exports.

4. The Research Models

In order to test the validity of the research hypotheses, multiple regression analysis is applied using STATA 17. Ordinary least square (OLS) is used to test hypotheses concerning the direct association of the research models, and structural equation modeling (SEM) to test hypotheses

concerning the indirect association of the research models. Ordinary least square Empirical models (1 and 2) are used to examine the first research hypothesis and its sub-hypothesis concerning the relationship between EM and CR. Empirical models (3, 4, 5, and 6) are used to examine the second set of hypotheses concerning the relationship between EM and FP. Empirical models (7 and 8) are used to examine the third set of hypotheses concerning the relationship between CR and FP. Finally, SEM empirical models (9, 10, 11, and 12) are used to test the fourth set of hypotheses regarding the relationship between EM on FP through CR as a mediating variable. These empirical models are constructed as follows:

Model (1): $CRi\ , = \alpha i + \beta 1\ REMi + \beta 2\ TQi + \beta 3\ AGEi + \beta 4\ OCFi + \beta 5\ CHi + \beta 6\ NDTSi + \beta 7\ EPSi + \beta 8\ CPXi + \beta 9\ INFi + \beta 10\ GDPi + \varepsilon i$

Model (2): $CRi\ , = \alpha i + \beta 1$ Abn CFO $+ \beta 2\ TQi + \beta 3\ AGEi + \beta 4\ OCFi + \beta 5\ CHi + \beta 6\ NDTSi + \beta 7\ EPSi + \beta 8\ CPXi + \beta 9\ INFi + \beta 10\ GDPi + \varepsilon i$

Model (3): $ROAi = \alpha i + \beta 1\ REMi + \beta 2\ TQi + \beta 3\ AGEi + \beta 4\ OCFi + \beta 5\ CHi + \beta 6\ NDTSi + \beta 7\ EPSi + \beta 8\ CPXi + \beta 9\ INFi + \beta 10\ GDPi + \varepsilon i$

Model (4): $ROAi = \alpha i + \beta 1$ Abn CFO$i + \beta 2\ TQi + \beta 3\ AGEi + \beta 4\ OCFi + \beta 5\ CHi + \beta 6\ NDTSi + \beta 7\ EPSi + \beta 8\ CPXi + \beta 9\ INFi + \beta 10\ GDPi + \varepsilon i$

Model (5): $\mathrm{LEV}i = \alpha i + \beta 1\ \mathrm{REM}i + \beta 2\ TQi + \beta 3\ AGEi + \beta 4\ OCFi + \beta 5\ CHi + \beta 6\ NDTSi + \beta 7\ EPSi + \beta 8\ CPXi + \beta 9\ INFi + \beta 10\ GDPi + \varepsilon i$

Model (6): $\mathrm{LEV}i = \alpha i + \beta 1\ \mathrm{Abn\ CFO}i + \beta 2\ TQi + \beta 3\ AGEi + \beta 4\ OCFi + \beta 5\ CHi + \beta 6\ NDTSi + \beta 7\ EPSi + \beta 8\ CPXi + \beta 9\ INFi + \beta 10\ GDPi + \varepsilon i$

Model (7): $ROAi = \alpha i + \beta 1\ CRi + \beta 2\ TQi + \beta 3\ AGEi + \beta 4\ OCFi + \beta 5\ CHi + \beta 6\ NDTSi + \beta 7\ EPSi + \beta 8\ CPXi + \beta 9\ INFi + \beta 10\ GDPi + \varepsilon i$

Model (8): $LEVi = \alpha i + \beta 1\ CRi + \beta 2\ TQi + \beta 3\ AGEi + \beta 4\ OCFi + \beta 5\ CHi + \beta 6\ NDTSi + \beta 7\ EPSi + \beta 8\ CPXi + \beta 9\ INFi + \beta 10\ GDPi + \varepsilon i$

Model (9): $\mathrm{ROA}i = \alpha i + \beta 1\ REMi + \beta 2\ CRi + \beta 3\ TQi + \beta 4\ AGEi + \beta 5\ OCFi + \beta 6\ CHi + \beta 7\ NDTSi + \beta 8\ EPSi + \beta 9\ CPXi + \beta 10\ INFi + \beta 11\ GDPi + \varepsilon i$

Model (10): $\mathrm{ROA}i = \alpha i + \beta 1\ \mathrm{Abn\ CFO}i + \beta 2\ CRi + \beta 3\ TQi + \beta 4\ AGEi + \beta 5\ OCFi + \beta 6\ CHi + \beta 7\ NDTSi + \beta 8\ EPSi + \beta 9\ CPXi + \beta 10\ INFi + \beta 11\ GDPi + \varepsilon i$

Model (11): $\mathrm{LEV}i = \alpha i + \beta 1\ REMi + \beta 2\ CRi + \beta 3\ TQi + \beta 4\ AGEi + \beta 5\ OCFi + \beta 6\ CHi + \beta 7\ NDTSi + \beta 8\ EPSi + \beta 9\ CPXi + \beta 10\ INFi + \beta 11\ GDPi + \varepsilon i$

Model (12): $\mathrm{LEV}i = \alpha i + \beta 1\ \mathrm{Abn\ CFO}i + \beta 2\ CRi + \beta 3\ TQi + \beta 4\ AGEi + \beta 5\ OCFi + \beta 6\ CHi + \beta 7\ NDTSi + \beta 8\ EPSi + \beta 9\ CPXi + \beta 10\ INFi + \beta 11\ GDPi + \varepsilon i$

5. Data Analysis and Discussion of Results

This section examines the validity of the developed hypotheses concerning the relationship between EM and CR and their impact on FP in Egyptian firms. Thus, this section presents data preprocessing, descriptive statistics, diagnostic statistics, and hypotheses testing. Moreover, STATA 17 is used to conduct all the required statistical analyses.

5.1. Data Preprocessing

This section shows the statistical treatment of the missing values. Moreover, it represents how extreme values are determined and treated without affecting the basic statistical properties of the data. Furthermore, the reasons why some variables are transformed from their original levels are also presented along with the applied transformation methods. Finally, determining and treating highly correlated independent variables, if any.

5.1.1. Missing Value

The final data used in the analysis is obtained by using the following two criteria: - Excluding any firm with missing values represents more than 10% of the total observations for any variable. - The average of non-missing observations for any single variable can replace the missing values for each firm only if a specific firm has missing values representing less than 10% of the total observations for any variable.

6.1.2. Transformation Methods

- All the variables employed to examine the relationship between EM and CR and their impact on firm performance are used at their original levels, except:

• The firm size is transformed using the logarithm. The logarithm transformation is used because it retains the relative differences among the values of the transformed variables.

• CRs are ranked from D to AAA (1 to 22) according to Fitch and S&P ranking scores, scores from 1 to 12 are considered junk grades, and scores from 13 to 22 are considered investment grades.

6.1.3. Outliers

Aggarwal (2015) defined outliers as the values of observations that extend further than 1.5*IQR from the third quartile or are 1.5*IQR below the first quartile. Before conducting the descriptive analysis of the study variables.

The winsorization method is applied to limit the effect of outliers on the study variables. Therefore, any extreme value that exceeds the upper limit is replaced by the upper limit value. Similarly, any extreme value less than the lower limit is replaced by the lower limit value. Hence, the extreme value retains its main characteristic: the largest or the smallest value within the sampled data.

6.1.4. Highly correlated independent variables

The correlation coefficients in the Pearson correlation matrix are used to detect the multicollinearity between any two independent variables employed in the same regression model. Gujarati (2003) states that multicollinearity exists if the Pearson correlation coefficient is greater than 80% between any two independent variables. Hence, no multicollinearity was detected between regressors used to test the relationship between EM and CR and their impact on FP in Egyptian firms.

6.2. Descriptive Statistics

The importance of descriptive statistics stems from the simplicity of presenting the basic properties of a large set of observations. Also, the appropriate statistical techniques used to analyze the data are chosen based on the underlying characteristics of the data included in the study sample.

The primary statistical features of the 136 Egyptian firms are presented in Table (2).

Table (2): Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	136	.056	0.094	-.126	.22
LEV	136	.184	0.211	0	.806
CR	136	15.088	3.314	9	22
REMs	136	-.429	1.123	-2.127	1.186
Abn CFOs	136	-.411	1.072	-1.854	1.937
TQ	136	1.509	0.720	.64	3.102
AGE	136	40.824	19.553	-8	76

TANG	136	.308	0.243	.001	.926
OCF	136	.045	0.099	-.126	.217
CH	136	.126	0.114	0	.357
NDTS	136	.02	0.018	0	.076
EPS	136	.093	0.220	-.413	.743
CPX	136	.025	0.028	0	.08
INF	136	5.045	0.000	5.045	5.045
GDP	136	3.57	0.000	3.57	3.57

- Firm performance is measured by profitability (ROA) and leverage (LEV); profitability, as measured by return on assets (ROA), shows an overall mean of 0.056 for the full sample, indicating low profitability. In addition, it had 0.094 standard deviation, which is a large standard deviation relative to the mean, reflecting high heterogeneity in profitability for the sample and high homogeneity regarding the behavior of profitability.
- Leverage (LEV) shows an overall mean of 0.184 for the full sample. In addition, it had 0.211 standard deviation, which is a large standard deviation relative to the mean, reflecting high heterogeneity in financing policy for the sample.
- Credit rating (CR) shows an overall mean of 15.088 for the full sample, it had 3.314 standard deviation, a low standard deviation relative to the mean, reflecting high homogeneity in CR for the sample.
- The real earning management index (REM) shows an overall mean of -0.429 for the full sample. In addition, it had 1.123 standard deviation, a high standard deviation relative to the

mean, and high heterogeneity in real earning management through abnormal cash flow, abnormal discretionary, and abnormal production for the sample.

- Abnormal operating cash flow (Abn_CFO) shows an overall mean of -0.411 for the full sample. Furthermore, it had 1.072 standard deviation, a high standard deviation relative to the mean, reflecting high heterogeneity in real earning management through abnormal operating cash flow for the sample.
- Tobin's Q as a measure of firm value shows an overall mean of 1.509 for the full, indicating that it had a similar relative firm value greater than 1, which means there is unrecorded goodwill. In addition, it had 0.720 standard deviation, a large standard deviation relative to the mean, reflecting high heterogeneity in firm value for the sample.
- Firm age (Age) shows an overall mean of 41 years for the full sample. In addition, it had 20 years as standard deviation, a large standard deviation relative to the mean, reflecting high heterogeneity in firm age for the sample.
- Asset's structure, as measured by tangibility (TANG), shows an overall mean 0.308 for the full sample. In addition, it had 0.243 standard deviation, a large standard deviation relative to the mean, reflecting high heterogeneity in assets structure for the sample.
- Operation cash flow (OCF) shows an overall mean of 0.045 for the full sample. In addition, it had 0.099 standard

deviation, a large standard deviation relative to the mean, reflecting high heterogeneity in operating cash flow for the sample.

- Cash holding (CH) shows an overall mean of 0.126 for the full sample. In addition, it had 0.114 standard deviation, a large standard deviation relative to the mean, reflecting high heterogeneity in cash holding for the sample.
- Non-debt tax shield (NDTS) shows an overall mean of 0.02 for the full sample. In addition, it had 0.018 standard deviation, a large standard deviation relative to the mean, reflecting high heterogeneity in the non-debt tax shield for the sample.
- Earnings per share (EPS) shows an overall mean of 0.093 for the full sample. In addition, it had 0.22 standard deviation, a large standard deviation relative to the mean, reflecting high heterogeneity in the earnings per share for the sample.
- Capital expenditure (CPX) shows an overall mean of 0.025 for the full sample. In addition, it had 0.028 standard deviation, a large standard deviation relative to the mean, reflecting high heterogeneity in the new investment for the sample.
- Inflation (INF), as measured by the consumer price index, shows an overall mean of 5.045% for the full sample.
- Gross domestic product growth (GDP) shows an overall mean of 3.57 % for the full sample.

6.3. Hypotheses Testing

6.3.1. The Impact of EM and CR on FP

There are two direct relationships in this research, the first one is the impact of EM on FP and the second one is the impact of CR on FP. ROA and leverage are used as proxies of FP. Thus, the direct impact of EM and CR on FP are tested as follows:

6.3.1.1. The Direct Impact of EM and CR on FP as measured by ROA.

Some goodness of fit tests should be conducted to confirm that the Statistical techniques applied in the current study best fit the sample data. These tests are multicollinearity, heteroskedasticity, and omitted variables. If problems (multicollinearity, heteroskedasticity, and omitted variables) are evidenced, they should be considered while estimating the final model of the impact of EM and CR on ROA.

Table (3): OLS Goodness of ROA direct model

Variables	Model A	Model B
	VIF	VIF
REMs	1.456	--
Abn_CFOs	--	1.935
AGE	1.067	1.087
CH	1.285	1.306
CPX	1.395	1.407
CR	1.404	1.432
EPS	1.373	1.392
GDP	1.905	1.924

INF	**1.704**	**1.814**
NDTS	**1.64**	**1.897**
OCF	**1.426**	**1.443**
TANG	**1.522**	**1.563**
TQ	**1.224**	**1.241**
Mean VIF	**1.45**	**1.556**
Heteroskedasticity	**0.0067**	**0.0207**
Omitted variables	**0.0503**	**0.1176**

Table (3) shows the goodness of fit tests to assess the validity of the pooled OLS regression results. Reveals that there is no multicollinearity among the regressors. As Landau and Everitt (2004) and Field (2005) state, multicollinearity exists when the variance inflation factor (VIF) of any independent variable exceeds ten and when the tolerance factor (1/VIF) is less than 0.10. Therefore, there is no multicollinearity among the explanatory variables included in models because all explanatory variables show a VIF coefficient less than 10 and a tolerance coefficient greater than 0.10.

Moreover, Table (3) reveals a heteroskedasticity problem, which means that the error variances are not constant for research models. Therefore, the null hypothesis is rejected because the p-value is less than 5%. Accepting the alternative hypothesis states that the variances of errors are non-constant across observations.

Concerning the specifications, Gujarati (2015) stated that model specification errors may arise from the omission of essential explanatory variables from the model, the inclusion of

irrelevant explanatory variables, or the incorrect functional form of independent and dependent variables. As shown in Table (3), the p-value of the omitted variables test is greater than 5%. Therefore, the null hypothesis is accepted, which states that the functional form is correct and has no omitted variables in the models of the impact of CR and EM on ROA. Hence, it can be concluded that the model is specified-well.

Table (4) the impact of EM and CR on firm performance as measured by ROA

Variables	Egypt	
	Model A	Model B
CR	.00488777**	.00386428**
REMs	.01705603***	--
Abn_CFOs	--	0.000
TQ	0.010	.01455769*
AGE	-0.000	-0.000
TANG	-.07109624***	-.05668364**
OCF	.38308941***	.38061556***
CH	-.09346501*	-0.063
NDTS	0.423	0.319
EPS	.13871047***	.14065896***
CPX	.43561982*	0.334
INF	--	--
GDP	--	--
_cons	-0.035	-0.034
Obs	136	136
f-test	0.000	0.000
R-Square	0.627	0.675

- Table (4) shows that. Generalized Least Square (GLS) is used to treat the violation of OLS assumptions. According to table (4), Model-A expresses the direct impact of REMs and CR individually on ROA, and Model-B expresses the direct impact of abnormal CFO only and CR individually on ROA.
- The overall model can be accepted as a reliable model of the impact of CR and EM on ROA because the Prob > F is less than 5%.
- In addition, this model can explain, on average, 56% and 63% of the impact of CR and EM on ROA for the full sample and imply that these characteristics drive ROA.
- There is a positive significant direct impact of CR on profitability for all models.
- The real earning management index for Egyptian firms impacts ROA.
- Abnormal operating cash flow has no effect on ROA for the sample.

6.3.1.2. The impact of EM and CR on FP as measured by leverage.

Some goodness of fit tests should be conducted to confirm that the Statistical techniques applied in the current study best fit the sample data. These tests are multicollinearity, heteroskedasticity, and omitted variables. If problems (multicollinearity, heteroskedasticity, and omitted variables) are

evidenced, they should be considered while estimating the final model of the impact of EM and CR on leverage.

Table (5): OLS Goodness of a direct model of leverage		
Variables	**Model A**	**Model B**
	VIF	**VIF**
REMs	**1.456**	**--**
Abn_CFOs	**--**	**1.935**
AGE	**1.067**	**1.087**
CH	**1.285**	**1.306**
CPX	**1.395**	**1.407**
CR	**1.404**	**1.432**
EPS	**1.373**	**1.392**
GDP	**1.905**	**1.924**
INF	**1.704**	**1.814**
NDTS	**1.64**	**1.897**
OCF	**1.426**	**1.443**
TANG	**1.522**	**1.563**
TQ	**1.224**	**1.241**
Mean VIF	**1.45**	**1.556**
Heteroskedasticity	**0.000**	**0.000**
Omitted variables	**0.000**	**0.000**

Table (5) shows the goodness of fit tests to assess the validity of the pooled OLS regression results. Reveals that there is no multicollinearity among the regressors. As Landau and Everitt (2004) and Field (2005) state, multicollinearity exists when the variance inflation factor (VIF) of any independent variable exceeds ten and when the tolerance factor (1/VIF) is less than 0.10. Therefore, there is no multicollinearity among the explanatory variables included research models because all

explanatory variables show a VIF coefficient less than 10 and a tolerance coefficient greater than 0.10.

Moreover, Table (5) reveals a heteroskedasticity problem, which means that the error variances are not constant for research models. Therefore, the null hypothesis is rejected because the p-value is less than 5%. Accepting the alternative hypothesis states that the variances of errors are non-constant across observations.

Concerning the specifications, Gujarati (2015) stated that model specification errors may arise from the omission of essential explanatory variables from the model, the inclusion of irrelevant explanatory variables, or the incorrect functional form of independent and dependent variables. As shown in Table (5), the p-value of the omitted variables test is less than 5%. Therefore, the null hypothesis is accepted, which states that the functional form is incorrect and has omitted variables in the models of the impact of CR and EM on leverage. Hence, it can be concluded that the model is needed to enhance.

Table (6) the impact of EM and CR on firm performance as measured by Leverage (LEV)

Variables	Egypt	
	Model A	Model B
CR	-.02760355***	-.0275516***
REMs	.06143599***	--
Abn_CFOs	--	0.014
TQ	.05388196*	.05721545*
AGE	0.000	0.000
TANG	0.065	0.075
OCF	-.53806909**	-.53582424**

CH	**0.025**	**0.027**
NDTS	**3.5522654*** **	**3.3804989** **
EPS	**0.095**	**0.095**
CPX	**1.022**	**1.034**
INF	**--**	**--**
GDP	**--**	**--**
_cons	**.43776068*** **	**.43527453*** **
Obs	**136**	**136**
f-test	**0.000**	**0.000**
R-Square	**0.41**	**0.41**

- Table (6) shows that. Generalized Least Square (GLS) is used to treat the violation of OLS assumptions. According to table (6), Model-A expresses the direct impact of REMs and CR individually on LEV, and Model-B expresses the direct impact of abnormal CFO only and CR individually on LEV.
- The overall model can be accepted as a reliable model of the impact of CR and EM on leverage because the Prob > F is less than 5%.
- In addition, this model can explain, on average, 43% and 38% of the impact of CR and EM on leverage and imply that these characteristics drive leverage.
- There is a negative significant direct impact of CR on leverage for all models.
- The real earning management index positively impacts leverage.
- Abnormal operating cash flow has no significant impact on leverage for all models.

6.3.2. The impact of EM on CR

If problems (multicollinearity, heteroskedasticity, and omitted variables) are evidenced, they should be considered while estimating the final model of the impact of EM on CR.

Table (7): OLS Goodness of credit rating model		
Variables	**Model A**	**Model B**
	VIF	**VIF**
REMs	**1.397**	**--**
Abn_CFOs	**--**	**1.924**
AGE	**1.066**	**1.086**
CH	**1.203**	**1.217**
CPX	**1.391**	**1.403**
EPS	**1.268**	**1.292**
GDP	**1.852**	**1.863**
INF	**1.698**	**1.808**
NDTS	**1.589**	**1.869**
OCF	**1.34**	**1.369**
TANG	**1.519**	**1.561**
TQ	**1.223**	**1.241**
Mean VIF	**1.413**	**1.533**
Heteroskedasticity	**0.2387**	**0.454**
Omitted variables	**0.002**	**0.0000**

Table (7) shows the goodness of fit tests to assess the validity of the pooled OLS regression results. Reveals that there is no multicollinearity among the regressors.

Moreover, Table (7) reveals no heteroskedasticity problem, which means that the error variances are constant for research models. Therefore, the null hypothesis is accepted because the p-value is greater than 5%. Accepting the alternative hypothesis

states that the variances of errors are constant across observations.

Concerning the specifications, Gujarati (2015) stated that model specification errors may arise from the omission of essential explanatory variables from the model, the inclusion of irrelevant explanatory variables, or the incorrect functional form of independent and dependent variables. As shown in Table (7), the p-value of the omitted variables test is less than 5%. Therefore, the null hypothesis is accepted, which states that the functional form is incorrect and has omitted variables in the models of the impact of EM on CR. Hence, it can be concluded that the model is needed to enhance.

Table (8): The impact of EM on CR

Variables	Egypt	
	Model A	Model B
REMs	-.7713732***	
Abn_CFOs		-0.119
TQ	-0.535	-0.491
AGE	0.012	0.013
TANG	0.525	0.625
OCF	14.468533***	14.188776***
CH	9.5901911***	9.8364917***
NDTS	0.478	0.521
EPS	3.6707782***	3.6476007***
CPX	-11.711	-13.028
_cons	12.978445***	12.819269***
Obs	136	136
f-test	0.000	0.000
R-Square	0.53	.53

- Table (8) shows that. Generalized Least Square (GLS) is used to treat the violation of OLS assumptions. According to table (8), Model-A expresses the impact of REMs on CR, Model-B expresses the impact of abnormal CFO only on CR.
- The overall model can be accepted as a reliable model of the impact of EM on CR because the Prob > F is less than 5%.
- In addition, this model can explain, on average, 28% and 52% of the impact of EM on CR.
- The real earning management index has a negative significant impact on CR for all models.
- Abnormal operating cash flow has no significant impact on CR.

6.3.3. The Mediating Effect of CR on the association between EM and FP

- Performing SEM requires a significant direct effect of EM on CR and a significant direct effect on firm performance.
- Earning management is measured by real earning management (REM). REM has three dimensions: abnormal operating cash flow, abnormal production cost, and abnormal discretionary accruals, only abnormal operating cash flow is taken into consideration.
- Firm performance is measured by profitability and leverage. Accordingly, the fitted models are as follows:

6.3.3.1 The mediating effect of CR on the association between EM and firm performance as measured by ROA

Table (9) shows that the overall structural model does not meet the cut-off value for accepting the likelihood ratio of the Chi-square statistic. Therefore, four more fit statistics should be tested; these are root means squared error of approximation (RMSEA), comparative fit index (CFI), Normed Fit Index (NFI), and standardized root mean squared residual (SRMR). Fortunately, the Cut-off values for these models are fitted and acceptable. Therefore, the structured model presented can be accepted as a reliable model.

Table (9): Chi-square statistic

	Egyptian firms	
Fit index	**Model fit**	**Benchmark**
Prob > chi2	**0.000**	**> 0.05**
RMSEA	**0.000**	**< 0.08**
CFI	**1**	**> 0.90**
SRMR	**0.000**	**< 0.08**

- The role of credit rating (CR) in mediating the impact of EM on firm performance as measured by ROA is as follows:

Table (10): The mediating effect of CR on the association between EM and firm performance as measured by profitability

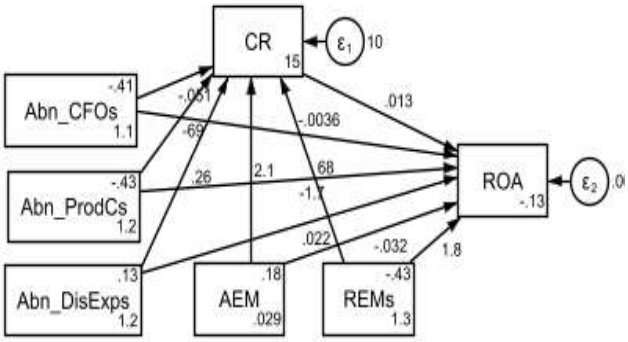
Path	Egyptian firms		
			
	Direct	**Indirect**	**Total**
REM → CR → ROA	**1.76****	**0.91***	**2.667*****
Abn_CFO → CR → ROA	**-0.003**	**-0.00006**	**-0.004**
****** p<0.01, ** p<0.05, * p<0.1***			

Table (10) shows:

- There is a positive, significant direct, indirect, and total effect of real earning management (REM) on ROA for Egyptian firms; this means CR partially motives the effect of real earning management on ROA.
- There is no significant direct, indirect, and total effect of abnormal operating cash flow as a dimension of real earning management (Abn_CFO) on profitability for Egyptian firms, while there is an indirect negative significant impact of Abn_CFO on profitability, which means CR partially

mitigates the positive impact of abnormal operating cash flow on ROA.

6.3.3.2 The mediating effect of CR on the association between EM and firm performance as measured by leverage

Table (11) shows that the overall structural model does not meet the cut-off value for accepting the likelihood ratio of the Chi-square statistic. Therefore, four more fit statistics should be tested; these are root means squared error of approximation (RMSEA), comparative fit index (CFI), Normed Fit Index (NFI), and standardized root mean squared residual (SRMR). Fortunately, the Cut-off values for these models are fitted and acceptable. Therefore, the structured model presented can be accepted as a reliable model.

Table (11): Chi-square statistic

	Egyptian firms	
Fit index	**Model fit**	**Benchmark**
Prob > chi2	**0.000**	**> 0.05**
RMSEA	**0.000**	**< 0.08**
CFI	**1**	**> 0.90**
SRMR	**0.000**	**< 0.08**

- The role of credit rating (CR) in mediating the impact of earning management on firm performance as measured by leverage is as follows:

Table (12): The mediating effect of CR on the association between EM and firm performance as measured by leverage

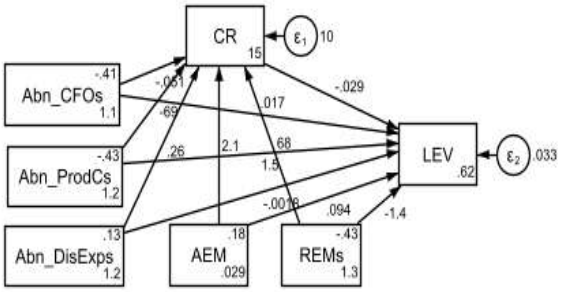
Path	Egyptian firms		
			
	Direct	**Indirect**	**Total**
REM → CR → LEV	**-1.44**	**-1.97***	**-3.41**
Abn_CFO → CR → LEV	**0.017**	**0.0014**	**0.018**
****** p<0.01, ** p<0.05, * p<0.1***			

Table (12) shows:

- There is no direct and total effect of real earning management on leverage for Egyptian firms. At the same time, there is an indirect negative significant effect of real earning management on leverage, which means CR fully mediated the association between real earning management and leverage in Egyptian firms.
- There is no significant direct, indirect, and total effect of abnormal operating cash flow as a dimension of real earning management (Abn_CFO) on leverage for Egyptian firms,

which means CR partially motives the positive impact of abnormal operating cash flow on leverage.

7. Conclusion

The current research examined the relationship between EM and CR, the relationship between EM and FP, the relationship between CR and FP, in addition to examining the indirect impact of EM on FP through CR as a mediating variable. EM is measured by two main indicators which are REM and one of its main proxies which is abnormal cash flow from operations. CR data is obtained from Thomson Reuters Eikon, DataStream Professional database, as it provides its daily scores, and daily data feed. Thus, CCIR will be CR indicator. In addition, CR are ranked from D to AAA (1 to 22) according to Fitch and S&P ranking scores, scores from 1 to 12 are considered junk grades, and scores from 13 to 22 are considered investment grades. FP is measured by ROA and leverage to reflect it from different perspectives.

In the current research, all relationships are tested in a sample of Egyptian firms to examine the different effects of EM practices and its impact on both CR and FP in Egypt. Regarding the first relation between EM and CR, the findings revealed that the REM index has a negative significant impact on CR. While, there is no significant impact of abnormal operating cash flow on CR.

Further analysis is applied to examine the direct impact of EM and CR on FP. As mentioned before that FP has two indicators. Thus, the direct impact of both EM and CR on each

indicator of FP was tested. First, the impact of EM on FP implies that REM index positively impacts profitability. While, abnormal operating cash flow has no effect on ROA. On the other hand, REM index positively impacts leverage. But, abnormal operating cash flow has no significant impact on leverage for all models.

Moreover, the results of the relationship between CR and ROA imply that there is a significant positive impact of CR on ROA. In contrast, there is a negative significant direct impact of CR on leverage.

Finally, the last result regarding the involvement of CR as a mediator in the relationship between EM practices and FP indicated that the indirect involvement of CR in this relationship motivates the relationship between EM and FP when measured by ROA. Thus, managers care to improve their CR to enhance FP by using EM practices. At the same time, there is an indirect negative significant effect of REM on leverage, which means CR fully mediated the association between REM and leverage in a sample of Egyptian firms.

The current research contributes to the previous literature in different ways; first, this research employed two main indicators of EM (REM as an index and abnormal cash flow from operations as a separate measure). Also, FP is measured by ROA and leverage. Moreover, CCIR is extracted from Thomson Reuters to measure CR.

Second, the present research examines the impact of EM and its separate components on CR and FP to help managers determine an effective and efficient way to provide better insights on how to create efficient strategies for EM which achieve higher FP for Egyptian firms. Furthermore, only limited studies explained the relationship between CR and FP. Thus, the current research will be helpful and valuable for users of CR and CRAs.

Finally, the main contribution of the current research is that it is considered the first to examine the relationship among EM, CR, and FP in the Egyptian context by investigating whether the involvement of CR is a mediating variable by using SEM to explain this indirect relationship.

8. The Research Limitations

The current research doesn't consider the other proxies of the main variables used in this research (EM and FP). Furthermore, the declared CR scores which had been issued by the most popular three rating agencies weren't available for the sample. Accordingly, this research relied on implied combined CR that was revealed by Thomson Reuters Eikon, DataStream Professional database.

Also, the data was available for only one year. Thus, cross-sectional analysis was used instead of time series or panel data analysis. Moreover, the sample used in this research is limited to non-financial firms only and excludes all financial firms such as banks and financial services firms as their capital structure is

different in nature from non-financial firms. Also, the sample is limited only to large firms and excludes small and medium enterprises. Thus, the findings of the research cannot be applied to financial institutions and small and medium enterprises. In addition, the number of Egyptian firms is limited to only 136 firms.

9. The Recommendation for Future Research

Based on the outcomes of the research, there are some ideas for forthcoming research: employing other proxies of EM such as AEM and the other two proxies of REM separately, examining the impact of EM and CR on firm value proxied by Tobin's Q and market to book ratio, studying the effect of EM and CR, while taking into account the role of corporate governance, studying the impact of EM and CR for more than one year as time series analysis, applying the research on each sector separately in order to take into account the different nature of each industry to get more accurate results, extending the sample of the research to include financial institutions such as banks and financial firms, extending the sample of the research to include small and medium enterprises which can allow the researcher to make a comparison between the results of large companies and the results of small and medium enterprises.

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