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The Operational Risk Disclosure Threshold Effect in the Earnings Management–Sustainability Firm Performance Nexus in Saudi Arabia: A Dynamic Panel Threshold Regression Model

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Abstract: Although the relationship between earnings management and firm performance has been well explored in the literature, sustainable performance has not yet been examined. Furthermore, the literature has not addressed the issue of nonlinearity between earnings management and firm performance. Therefore, this paper aims to examine the potential nonlinear relationship between earnings management and sustainable firm performance in Saudi Arabia using a sample of 70 listed firms over the 2015–2022 period. Specifically, it investigates the operational risk disclosure threshold effect in the earning management–sustainable firm performance nexus. To do so, the dynamic panel threshold regression model (DPTR) is performed. The result proves that there is a threshold effect of operational risk disclosure in the relationship between earning management and sustainable firm performance. Specifically, the threshold values of operational risk disclosure for the three models are estimated at 6 between the low- and the high-operational-risk-disclosure regimes. In the lower regime, firm performance decreases when earning management increases; however, in the higher regime, firm performance increases when earning management increases. These outcomes support the predictions of agency and positive accounting theories.

Keywords: operational risk disclosure; earnings management; sustainable firm performance; Saudi Arabia; DPTR

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1. Introduction

The manipulation of financial results involves the use of accounting methods to present financial statements that do not accurately reflect the true financial health of a firm. This process may involve the enhancement in or smoothing of earnings to create the illusion of consistent profitability to avoid fluctuations that are discouraging to investors and analysts [1]. The influence of earnings manipulation on the firm performance can be significant. It risks undermining the long-term stability and growth prospects of the firm, although it may improve the apparent performance of the firm in the short term [2]. Moreover, as investors' and stakeholders' decisions are based on biased information [3,4], earnings manipulation can undermine investor confidence and lead to the misallocation of resources. Additional risks that are particularly complex and difficult to manage are thus created.

More specifically, there are several risks that can affect both the firm and its stakeholders because of earnings management practices. A key risk is the potential reduction in the informativeness of earnings, which can distort the economic efficiency of the stock market and potentially lead to significantly negative stock market returns and performance deterioration when earnings are identified. In addition, inappropriate use of earnings management strategies and techniques can lead to fraud issues and increase the risk of underperformance and bankruptcy [5,6]. Earnings management can also lead to loss of investor confidence, increased cost of capital, misallocation of capital, and legal and regulatory implications [3]. In addition, the use of earnings management may affect the quality of

financial reporting and the transparency of the true financial condition of the firm, which may affect the long-term stability and growth prospects of the firm due to information asymmetries [7].

To avoid information asymmetry problems, based on the principles of agency and signal theories, it is suggested that operational risk disclosure can have a significant influence on the relationship between earnings management and firm performance. According to signal theory, risk disclosure increases the transparency of corporate information and establishes a relationship of trust with investors. Ultimately, this can improve corporate performance. Higher-quality risk disclosure can weaken the association between firm performance and the cost of equity, while more comprehensive risk disclosure can reduce managers' propensity to distort earnings information by smoothing it [8]. This is in line with agency theory, which highlights conflicts of interest between managers and shareholders and the role of asymmetric information. Firms can reduce this asymmetry and mitigate the agency conflicts that influence earnings management behavior by providing more complete risk disclosure. In addition, the signaling theory suggests that comprehensive risk disclosure can signal a company's commitment to transparency and good risk management practices, thereby increasing the confidence of investors and ultimately improving the performance of the company [8]. Therefore, by influencing the cost of capital, transparency, and the true risk profile of the firm, operational risk disclosure plays a crucial role in the link between earnings management and firm performance [8].

Theoretically, agency theory and positive accounting theory have been used to investigate the impact of earnings management on firm performance. Agency theory argues that earnings management is a result of conflicting interests between management and stockholders arising from a division of ownership and control in public firms [9,10]. This conflict encourages management to conceal the truth in financial reporting because of costly contracts, shareholders' limited ability to understand management's actions, and problems in communicating information to shareholders [5,11]. Conversely, positive accounting theory suggests that managers may manage earnings to align reported earnings with their own interests, for example, by meeting earnings targets to increase compensation [12,13].

In order to avoid problems of information asymmetry, it is assumed that the disclosure of operational risk is identified as a crucial element in the relationship between earnings management and firm performance. High-quality narrative disclosure can mitigate the association between firm performance and the cost of equity, while more comprehensive risk disclosure can reduce managers' propensity to alter earnings information through smoothing [14]. These perspectives are in line with agency theory, which emphasizes conflicts of interest, and signal theory, which suggests that comprehensive risk disclosure can increase investor confidence and improve firm performance [9,15,16]. Therefore, operational risk disclosure plays a crucial role in the link between earnings management and firm performance by influencing the cost of capital, transparency, and the true risk profile of the firm [8].

In practice, a complex and often debated issue is the relationship between earnings management and firm performance. Earnings management practices can have a variety of positive (or negative) effects on firm performance [2,17–20], and the extent of operational risk disclosure is a critical factor in this relationship. Previous studies have shown that higher-quality operational risk disclosure can improve firm performance and reduce the cost of equity [8,21,22], while other studies have found that risk disclosure can reduce the cost of capital and management's tendency to misreport earnings [23,24]. Other recent research has examined the moderator effect of corporate governance (or other factors) on the relationship between earnings management and firm performance [25,26].

However, to the best of my knowledge, the threshold effect of operational risk disclosure on the association between earnings management and sustainable firm performance has not yet been examined. In this case, this study fills this research gap. Motivated by Saudi Arabia's Vision 2030, which aims to build a culture of transparency, accountability, economic diversification, and environmental protection, this study seeks to determine

whether increased transparency in operational risk disclosure can improve earnings management and drive sustainable performance, while respecting local cultural and business norms. In addition, this study aims to identify how Saudi firms can balance the need for risk disclosure while protecting their business strategies and competitiveness.

For this purpose, the main objective of this research is to investigate the operational risk disclosure threshold effect in the earning management–sustainable firm performance nexus. In order to achieve this objective, this study addresses the following research question: how does the level of operational risk disclosure affect the relationship between earnings management and sustainable firm performance?

Building on the previous literature, this study makes several important contributions. Firstly, although there are several studies addressing the relationship between earnings management and firm performance, to the best of my knowledge, this study is the first to examine the earnings management–sustainable firm performance nexus. Second, it broadens the scope of the research by examining the threshold effect of operational risk disclosure on the relationship between earnings management and firm performance, an aspect that has not been fully explored. Thirdly, the choice of the Saudi context is significant, as this country is currently undergoing numerous accounting and financial reforms. This is a unique opportunity to analyze these changes in the context of a changing economy. These contributions aim to provide new and relevant information for practitioners and policymakers, and to enrich the academic debate on operational risk disclosure, earnings management, and sustainable firm performance.

The choice of Saudi Arabia to investigate the operational risk disclosure threshold effect in the earning management–sustainable firm performance nexus is justified by the country's unique economic and regulatory environment. Saudi Arabia is the largest economy in the Middle East and North Africa region, and its stock market is one of the most active in the region. Therefore, studying the relationship between operational risk disclosure, earnings management, and firm performance in Saudi Arabia can provide valuable insights into the effectiveness of risk disclosure regulations and their impact on sustainable firm performance. This justification is supported by the search results, which highlight the importance of risk disclosure and management in Saudi Arabian firms.

This research investigates the nonlinear relationship between earning management and sustainable firm performance in Saudi Arabia using the DPTR model. To this end, this research utilized [27]'s model to measure sustainable firm performance as a dependent variable. In addition, as the main independent variable, accrual earning management and real earning management were used. In addition, this study used a non-financial risk disclosure index as a transition variable. Finally, several control variables were used.

This paper is structured as follows: The literature review and hypothesis development are outlined in Section 3. Section 4 describes the research methodology used and provides a detailed description of the specifications of the empirical model, the data used, and the econometric methods applied in this study. In Section 5, the various findings are discussed. Section 6 outlines the conclusions.

2. Theoretical Background

In the field of accounting, earnings management relates to the conscious and deliberate practice of manipulating a firm's financial earnings to influence the perceptions of stakeholders, particularly shareholders, about the firm's economic performance. This manipulation can take various forms, such as choosing accounting methods, managing provisions, or adjusting income and expenses [28]. The main objective of earnings management is often to respond to specific incentives, internal or external, through the modification of accounting figures to achieve specific objectives [29]. The main objective of earnings management is to respond to specific incentives, internal or external, through the modification of accounting figures to achieve specific objectives [29].

From a theoretical viewpoint, earnings management has aroused considerable interest, particularly in the context of the perspectives offered by agency and positive accounting

theories. From an agency perspective, earnings management as a complex phenomenon highlights the conflicts of interest inherent in manager/shareholder relationships [9]. From this perspective, the severity of asymmetric information problems such as adverse selection and/or moral hazards led managers to engage in fraudulent practices, including earnings manipulation, for personal gain [30,31]. Specifically, managers may have an incentive to manipulate financial earnings to signal more favorable performance to external stakeholders to maximize their own self-interest. This managerial discretion gives managers the freedom to decide how to present financial data, thus introducing a degree of opportunism into the firm's financial communication and increasing agency costs [11,32]. This problem is further exacerbated by the information gap between managers, who know the true financial situation, and investors, who rely on this information to make decisions [30,33]. Therefore, earnings management can be seen as a strategy to reduce information asymmetry. At the same time, however, it creates distortions that affect the quality of decisions made by external stakeholders [10,34].

With a significant impact on firms' cost of capital, earnings management has a negative effect on stakeholder confidence. The backlash from investors against these practices is evidence of an undeniable reality: the deliberate manipulation of financial earnings can lead to a loss of trust and confidence within the investment community. Earnings management goes beyond accounting considerations by highlighting the critical importance of trust in the relationship between firms and investors. It affects the financial market. It can lead to a fall in share value, higher financing costs, and even difficulties in accessing capital. Therefore, the maintenance of transparent and honest financial communication is essential for the preservation of stakeholder confidence and the maintenance of an optimal cost of capital [35].

Moreover, by showing how this practice can also be expressed through its influence on the actual activities of the firm, performance management goes beyond the simple manipulation of figures in financial statements. In other words, earnings management is not limited to clever accounting adjustments, but also involves concrete actions that change how the firm operates, produces, or other tangible aspects of the firm [30,36,37]. In short, according to agency theory, managing for earnings is not limited to manipulating financial numbers. It exposes conflicts of interest, the discretionary power of managers, and asymmetric information. If left unchecked, these aspects risk affecting the overall performance of the firm and its valuation in international financial markets.

This view is echoed in positive accounting theory [12,13], which argues that the flexibility of accounting standards provides managers with incentives and opportunities to engage in earnings management by focusing their attention on specific accounting choices. Accounting choices made by firms can be explained by maximizing managers' individual interests. Within the context of earnings management, managers may be motivated by the desire to adjust financial performance to influence contracts between different stakeholders, such as shareholders and creditors [12]. In addition, the manipulation of earnings can be seen as a strategy for the reduction in agency costs through the reduction in conflicts between stakeholders. However, positive accounting theory points out that these accounting adjustments can also have perverse consequences for the quality of financial reporting, thereby affecting the ability of investors to properly assess the past and future performance of the firm [25,28]. Thus, earnings management raises questions about the transparency and reliability of financial information and may affect the overall performance of the firm, even though it may be a rational economic response within the outline of positive accounting theory.

In addition, operational risk disclosure is seen as a potentially effective means of reducing managerial opportunism, limiting manipulation of accounting earnings, and optimizing the firm performance [38,39]. The increased transparency that results from operational risk disclosure has the power to deter managers from engaging in opportunistic practices by increasing the visibility of potential challenges in the eyes of stakeholders [14,40]. Indeed, weaker risk management systems may signal inadequate control mechanisms, thus limiting

the ability of managers to manipulate outcomes through actual activities to compromise the long-term firm value [41].

Theoretically, the operational risk disclosure emerges as a critical strategy. It has a significant impact on the overall firm performance, while at the same time acting as a mechanism to mitigate earnings management. Operational risk disclosure is seen as a strategic response to the conflicts of interest inherent in the separation of ownership and management from the perspective of agency theory, which examines the dynamics between shareholders and managers [9]. This initiative strengthens the confidence of stakeholders, particularly shareholders, by providing greater visibility of the risks to which the firm is exposed. This increased transparency acts as an essential counterweight, reducing the incentives for managers to manipulate financial earnings to maximize their personal benefits. Operational risk disclosure helps to educate stakeholders about the potential challenges the firm may face by reducing the information asymmetry between management and shareholders. This enhanced visibility reduces the temptation for managers to engage in opportunistic earnings management practices and plays a critical role in maintaining shareholder confidence in management. In short, operational risk disclosure, rooted in agency theory principles, is an essential strategic lever to promote trust, minimize conflicts of interest, and prevent potential earnings management excesses in modern firms.

According to signaling theory, the operational risk disclosure can be interpreted as a strong positive signal from management [15,16]. Management demonstrates its commitment to transparency and effective risk management by providing detailed information on operational risks to investors and analysts. This operational disclosure acts as a credible signal. It indicates the financial health of the firm and its ability to anticipate and manage potential operational challenges. Stakeholder confidence is enhanced by management's willingness to demonstrate honesty and foresight by providing a detailed view of risks [16]. This positive signal helps to build trust between the firm and its investors. It underlines the firm's willingness to deal with uncertainty and to take proactive steps to mitigate potential risks. As a result, operational risk disclosure becomes a strategic way for firms to demonstrate their financial stability, competent risk management, and commitment to transparency, rather than simply being informative in the context of signaling theory. According to this theory, operational risk information is interpreted as a positive managerial signal [15]. Management demonstrates its commitment to transparency and sound risk management by providing detailed information on operational risks to investors and analysts. This disclosure acts as a credible signal of the financial health of the firm and of its ability to anticipate and manage potential operational challenges [42]. In summary, risk disclosure is an important contributor to the improvement in a firm's overall performance. It builds stakeholder trust, reduces conflicts of interest, and limits earnings management practices [24,43]. This highlights the strategic importance of disclosing risk in the financial and managerial context of modern firms [19,44]. Faced with these theories, the theoretical background of this study focuses on agency and positive accounting theories.

3. Empirical Review and Hypotheses' Developments

At the empirical level, there has been little research into the impact of earnings management on firm performance. Empirical studies that seek to establish a positive or negative linear relationship often attempt to demonstrate a direct link between earnings management practices and financial performance [2,17,18,45,46]. These studies suggest that managers' efforts to influence accounting data may be proportional to the improvement (or deterioration) in earnings. For example, according to [18], disclosure of environmental sustainability practices positively affects the firm value, underscoring the importance of increased accountability, improved transparency, and stakeholder trust in enhancing firm value. Furthermore, Ref. [2] showed that earnings management positively and significantly affects Sub-Saharan firm performance. Their findings suggest that unlike other emerging markets, earnings management in Sub-Saharan Africa appears to be driven by efficiency considerations rather than opportunism. This study confirms the predictions of agency

theory. It highlights the effectiveness of internal monitoring in controlling earnings management and improving firm performance. However, Ref. [47], in the case of Vietnamese firms, showed a negative impact on firm performance. In addition, using data from United States listed firms, Ref. [48] showed a negative effect of earnings management on firm value. Furthermore, using Sub-Saharan African firms, Ref. [49] indicated that the performance effect of earnings management is contingent on board diversity.

However, more recent studies have investigated the impact of other factors (corporate social responsibility (CSR), ownership structure, audit, etc.) on earnings management, recognizing that the impact of this practice may vary depending on the amount or intensity of these factors [50–58]. For example, Ref. [50] found a positive association between family ownership and the earnings manipulation of Taiwanese firms. On the other hand, Ref. [41] discovered that in China, firms that focus on CSR and have higher ratings are less likely to manipulate earnings than less CSR-oriented and lower-rated firms. In addition, these firms have more stable earnings, which makes predicting future cash flows from their operations more accurate. Ref. [54] found that the strengthening of the protection of state assets reduced the manipulation of real profits in Chinese state-owned enterprises and at the same time raised the level of corporate governance in these enterprises. In a similar vein, Ref. [59] found that opportunistic earnings management behavior by firms could be significantly reduced by their environmental, social, and governance (ESG) performance. In addition, Ref. [60] argued that firms adjusted their profits in response to economic fluctuations. During the pandemic, firms favored an accrual-based approach. The authors also noted that earnings management and earnings enhancing practices were more prevalent among struggling firms. The study raises concerns about the credibility of financial information during the pandemic, suggesting that public firms were less likely to engage in such practices. Ref. [58] proved that the quality of corporate governance exerts an effective control on earnings manipulation in Vietnamese non-financial firms (as measured by both absolute and signed discretionary accruals as well as actual earnings management).

In addition, other studies have looked at the linear (or nonlinear) impact of other factors on the firm performance (or earnings management) and have shown different results. Specifically, Ref. [61] showed that CSR spending improves the performance of Indian banks. Furthermore, even after controlling for the impact of earnings management, Ref. [62] found a nonlinear relationship (inverted U-shaped curve) between corporate disclosure and performance of listed firms in Hong Kong. The results of the study suggest that corporate disclosure can lead to benefits. However, beyond an optimal level, in-creased disclosure actually reduces firm performance. The nonlinear relationship (or threshold effect) between leverage and firm performance has been examined in other studies. Ref. [63] found that firm size exerts a threshold effect on the relationship between leverage and firm performance in the context of Sub-Saharan Africa. Similarly, Ref. [3] demonstrated that the relationship between debt structure and earnings management in Vietnamese firms is nonlinear. The findings reveal a nonlinear effect of the debt ratio on earnings management, with a positive effect at low debt levels, but a negative effect as debt levels rise. Furthermore, the study suggests that fluctuations in the debt ratio affecting earnings management occur both before and after firms reach their optimal debt threshold. In the context of Iranian firms, Ref. [64] reiterated the issue of nonlinearity between leverage and earnings manipulation. More recently, Ref. [24] concluded that the association between ownership and earnings manipulation is nonlinear. Their outcomes reveal that the ownership structure of Egyptian firms has alignment effects on earnings management. These outcomes provide conclusive support for the theoretical predictions associated with the ownership of managers and the government and earnings management, as prescribed by the agency theory. In addition, using UK firms listed, Ref. [65] showed that corporate governance moderates the earnings management–ESG performance nexus.

In addition, there is currently no study of the threshold effect of operational risk disclosure on the correlation between earnings management and firm performance. Indeed, most prior research has concentrated on the determinants of operational risk disclosure [66–68]

or on the impact of other factors on operational risk disclosure [69–72], with various results. Other recent research has examined whether governance (or others) moderates a relationship between earnings management and firm performance [25,26]. Particularly, Ref. [64] demonstrated that state ownership and the degree of commercialization moderated the relationship between CSR information and performance quality. Ref. [73] mentioned that corporate governance positively and significantly moderates the association between earnings management and firm value. In addition, Ref. [59] showed that superior credit rights and civil law negatively moderated the relationship between ESG performance and opportunistic firms' earnings management.

Recently, Ref. [74] showed that in Singapore and Vietnam, firms that voluntarily adopted governance practices with better educated independent non-executive directors and optimal tenure significantly reduced earnings manipulation compared to firms required to adopt these practices with less educated directors and suboptimal tenure. Using a sample of Sub-Saharan Africa countries, Ref. [2] found that better governance positively moderates the association between earnings management and firm performance. Ref. [55] showed that ownership structure is a negative moderator of the relationship between CSR and earnings management in Indian firms. In addition, Ref. [18] indicated that the relationship between corporate environmental sustainability practices and the performance of Saudi firms is positively moderated by the presence of independent directors on the board. Ref. [22] showed that environmental disclosure has a significant and consistent positive impact on firm financial performance. The authors also found that while the impact of government subsidies was not significant, the ratio of profits to total costs positively moderated this effect. Ref. [21] found that occupational safety disclosure positively impacts the firm performance. Finally, Ref. [75] showed that Chinese firms are more vulnerable to stock price declines if they are required to disclose operational information. As a result, a firm's information environment may deteriorate when it is required to disclose information about its operations, especially in an emerging market with limited investor protection. In the light of this literature, the hypotheses are outlined as

Hypothesis 1. *There is a threshold effect of operational risk disclosure on the earning management–sustainable firm performance nexus.*

Hypothesis 1(a). *Under agency theory, earning management negatively affects the sustainable firm performance.*

Hypothesis 1(b). *Under positive accounting theory, earning management positively affects the sustainable firm performance.*

4. Methodology

4.1. Data

In this research, a sample of 70 listed non-financial firms operating in Saudi Arabia from 2015 to 2022 is used. For dependent, independent, and control variables, the Refinitiv/DataStream database is utilized. For operational risk disclosure, hand-collected data from annual reports published on the websites of several firms are used. In addition, to ensure the reliability of the data and to minimize measurement errors, this study excluded from the sample firms with missing data related to operational risk disclosure. Furthermore, financial institutions (insurance companies, banks, etc.) were excluded. These companies have different accounting, governance, and financial structures compared to non-financial companies. Finally, all companies without at least three years of continuous data were excluded. Hence, the final sample leads to a total of 560 firm–year observations for the regression analysis. To reduce the impact of outliers, all variables were winsorized at the 1st and 99th percentiles.

4.2. Definition of Variables

4.2.1. Dependent Variables

Following Refs. [76,77], I utilized the model from [27] to measure the SFP. The SFP measures long-term firm performance [78]. The SFP is measured as follows:

$$SFP_{it} = \text{Net profit ratio} \times \text{Asset turnover ratio} \times \text{Retention rate} \times \text{Equity multiplier} \quad (1)$$

where the net profit rate is the ratio of the net income divided by the net turnover, the turnover rate is the ratio of the net turnover divided by the balance sheet total, the retention rate is the ratio of the retained earnings divided by the net profit for the year, and the equity multiplier is the ratio of the total assets divided by the total equity.

4.2.2. Main Independent Variables

The previous literature reveals several measurements of EM. These measurements can be subdivided into two types: (i) accrual earning management (AEM) and (ii) real earning management (REM). The first type focused on the discretionary accruals (DAs). The DAs are based on different models such as the modified Jones model [79,80], and the performance-adjusted discretionary accruals [81,82]. The second type can be implemented by manipulating operating cash flow, over-producing inventory to reduce cost of goods sold, reducing discretionary spending such as advertising and research and development, and reducing general selling and administrative expenses [37].

Therefore, this study used these two types of EM measurement. As for AEM, the study applied the modified Jones model. This model gives the DAs, which are the leftover values that measure EM. Then, the equation of this model is written as follows:

$$\frac{TAC_{it}}{TA_{it-1}} = \alpha_1\left(\frac{1}{TA_{it-1}}\right) + \beta_1\left(\Delta REV_{it} - \frac{\Delta REC_{it}}{TA_{it-1}}\right) + \beta_1\left(\Delta REV_{it} - \frac{PPE_{it}}{TA_{it-1}}\right) + \varepsilon_{it} \quad (2)$$

where TAC_{it} is total accruals, which are measured as the difference between net cash flow from operating activities and net profit for firm i at time t; TA_{it-1} is total assets for firm i at year t − 1; ΔREC_{it} is change in account receivables scaled by total assets; PPE_{it} is the gross property plant and equipment for firm i at time t; CFO_{it-1} is cash flow from operating activities for firm i for year t − 1; and ε_{it} is the error term. Note that the predicted value of accrual earning management is named as AEM.

As far as REM is concerned, it can be used by changing the amount of cash flow from operations, making more inventory than necessary to reduce the cost of selling goods, reducing optional expenses such as marketing and research, and spending less on general sales and administration costs. Following [37], the equation of the model is written as follows:

$$\frac{CFO_{it}}{TA_{it-1}} = \beta_1\left(\frac{1}{TA_{it-1}}\right) + \beta_2\left(\frac{Sales_{it}}{TA_{it-1}}\right) + \beta_3\left(\frac{\Delta Sales_{it}}{TA_{it-1}}\right) + \varepsilon_{it} \quad (3)$$

where CFO_{it} is cash flow from the operation for firm i at time t; $PROD_{it}$ is the sum of the cost of goods sold and change in inventory for firm i at time t; $DISEXP_{it}$ is the sum of selling and marketing expenses, general and administrative expenses, advertising expenses, and research and development expenses for firm i at time t; TA_{it-1} is total assets for firm i at time $t-1$; $Sales_{it}$ is sales for firm i at time t; $\Delta Sales_{it}$ is the change in sales for firm i at time t; $\Delta Sales_{it-1}$ is the change in sales for firm i at time $t-1$; and ε_{it} is the error term.

4.2.3. Transition Variable

According to the risk disclosure literature, there are several approaches to quantifying the non-financial risk disclosure (ORD) index [68,69]. Indeed, the measurement approach adopted by previous studies contributes to some extent to the variance identified, particularly about the type and context of information covered and the range of industries or

countries covered. From this perspective, several studies focus on areas of information disclosure (mandatory risk disclosure [83], voluntary disclosure [84].

In this sense, this study uses a self-constructed ORD index to investigate the level of operational risk disclosure provided by non-financial firms. In addition, the ORD index focuses on 22 items, divided into 6 categories, namely People Risk Disclosure, Product Risk Disclosure, Technology Risk Disclosure, Process Risk Disclosure, Health and Safety Risk Disclosure, and Legal Risk Disclosure (see Table A1).

In accounting research, the risk disclosure index is often measured by two approaches, namely weighted and unweighted [85]. Most studies apply a weighted disclosure index [86], while other research utilizes an unweighted disclosure index. However, many studies pointed out that unweighted and weighted scores generally lead to similar results by including many items [87].

For this purpose, this research adopted an unweighted disclosure index by including all items, as this was judged as essential [68,69,88]. There are several reasons for the choice of this index. First, the subjectivity that would be involved in assessing the im-portance of each piece of information when using a weighted publication index would limit the generalization of the results obtained, especially since in this research it is not interested in a particular group of users, but in all users [89]. Then, using both types of indices (weighted and unweighted), several studies have found the same results [87].

Using a disclosure index that does not assign different weights to the items and that scores them as either present or absent may help to reduce the discrimination more than other methods of scoring [90]. This way, the disclosure score may be less affected by the bias. This is important for giving more information about how the disclosure is carried out. Therefore, the ORD index is stated as follows:

$$ORD = \sum_{i=1}^{n} d_i \tag{4}$$

where d = 1 if the item is disclosed; d = 0 if the item is not disclosed; and n is the number of items.

4.2.4. Control Variables

There are many factors that contribute to the firm performance. In this case, this paper uses several control variables that are based on previous research. To monitor the firm's solvency and financial soundness, there is the ratio of long-term debt/total assets (LEV). In addition, it utilizes the dividends per share (DIV) to control the impact of dividend payouts. To control the firm's ability, it employs firm size (SIZE) measured by the natural log of a firm's total assets.

4.3. Econometric Model

As mentioned above, this research aims to investigate the nonlinear relationship between earning management (EM) and sustainable firm performance (SFP). Particularly, this paper explores the threshold effect of operational risk disclosure (ORD) on the EM–SFP nexus. For this purpose, the DPTR model invented by the authors of [91] is applied. The model is performed to estimate the ORD threshold value. Furthermore, the DPTR aims to address potential endogeneity [91]. The practical DPTR model equation is then written as follows:

$$SFP_{it} = \begin{pmatrix} \beta_1 SFP_{t-1} + \beta_2 EM_{it} + \beta_3 LEV_{it} \\ +\beta_4 LIQ_{it} + \beta_5 DIV_{it} + \beta_6 SIZE_{it} \end{pmatrix} 1\{q_{it} \le \gamma\} \\ \begin{pmatrix} \lambda_1 SFP_{t-1} + \lambda_2 EM_{it} + \lambda_3 LEV_{it} \\ +\lambda_4 LIQ_{it} + \lambda_5 DIV + \lambda_6 SIZE_{it} \end{pmatrix} 1\{q_{it} > \gamma\} + \varepsilon_{it} \tag{5}$$

where SFP_{it} is the dependent variable. SFP_{it-1} is the one-year lag of SFP. EM_{it} is the time-varying regressor; LEV_{it}, LIQ_{it}, DIV_{it}, and $SIZE_{it}$ are the control variables; $1\{\cdot\}$ is

an indicator function; and q_{it} is the threshold variable (ORD). γ denotes the threshold parameter. $\varepsilon_{it}(\varepsilon_{it} = \mu_i + \nu_{it})$ reflects the error components, where μ_i is the individual fixed effects and ν_{it} is the idiosyncratic random disturbance. β and λ denote the coefficients of all independent variables for the lower and upper regimes, respectively. To access the specific details of the model, please see [70].

5. Findings and Discussion

5.1. Statistical Analyses

Table 1 presents the descriptive statistics of the variables used in this study. The sample consists of 560 observations from the non-financial firms in Saudi Arabia. The table shows that the mean value of SFP is 0.703. The mean values of AEM and REM are −0.002 and 0.061, respectively, suggesting that the firms use both accruals and real activities to manage their earnings, but the magnitude of the manipulation is relatively small. The mean value of ORD is 7.818, implying that the banks disclose about 41% of the 19 items related to operational risk disclosure. The mean values of LEV, LIQ, and DIV are 0.407, 4.198, and 23.322, respectively, indicating that the firms have low leverage, high liquidity, and moderate dividend policy. The mean value of SIZE is 6.388, reflecting that the firms have large and diverse operations.

Table 1. Descriptive Statistics.

Variable	Obs.	Mean	Std. Dev.	Min	Max
SFP	560	0.613	1.198	−1.24	9.114
AEM	560	−0.002	0.127	−0.286	0.239
REM	560	0.004	0.093	−0.178	0.205
ORD	560	7.818	3.855	2	19
LEV	560	0.282	0.258	0	0.892
LIQ	560	4.021	4.697	1.04	28.9
DIV	560	23.314	32.608	0	97.23
SIZE	560	6.416	0.805	4.924	8.529

Table 2 shows that the empirical models tested do not have a multicollinearity issue. This is because the correlation coefficients among the independent variables are all below 0.80, which means that these variables are not highly related [92]. The result of the variance inflation factor (VIF) is below 10, which means that there is no multicollinearity among the variables (Table 2).

Table 2. Matrix correlation coefficients and VIF results.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	VIF
(1) SFP	1.000								
(2) AEM	−0.077	1.000							1.03
(3) REM	0.028	0.149	1.000						1.02
(4) ORD	0.095	0.066	0.046	1.000					1.14
(5) LEV	0.111	0.026	0.030	0.102	1.000				1.00
(6) LIQ	−0.025	−0.077	−0.064	−0.538	−0.157	1.000			1.13
(7) DIV	−0.084	0.056	−0.006	−0.160	−0.102	0.171	1.000		1.11
(8) SIZE	−0.154	0.074	−0.025	−0.022	0.136	−0.231	0.392	1.000	1.09
Mean VIF									1.07

Note: Table contains Pearson's correlation coefficient.

5.2. Baseline Findings

The present sub-section investigates the threshold impact of ORD on the relationship between EM and SFP. For this purpose, the DPTR model is performed. Table 3 summarizes the different outcomes. The results of the bootstrapped linearity test indicate that the relationship between EM and SFP is nonlinear. Then, the existence of a threshold effect of ORD on this relationship is at the 1% significance level. Then, the results provide empirical

evidence supporting Hypothesis 1. The threshold was estimated at 6 (unweighted) using ORD as a transition variable. In addition, 43% of the observations fall into the lower regime and 57% fall into the higher regime. In addition, the results presented in Table 3 suggest that the coefficients of the lagged SFP variables have a positive effect on the tow regimes (lower and upper) and each measurement of EM.

Table 3. Main results.

	AEM			**REM**		
VARIABLES	**Lower ORD Regime**	**Upper ORD Regime**	**Difference (δ=$\lambda-\beta$)**	**Lower ORD Regime**	**Upper ORD Regime**	**Difference (δ=$\lambda-\beta$)**
SFP_{t-1}	−0.113 ***	0.134 ***	0.247 ***	−0.024	0.046 **	0.070 ***
	(0.043)	(0.039)	(0.004)	(0.019)	(0.022)	(0.003)
EM	−0.079 ***	0.223 ***	0.302 ***	−0.141 ***	0.285 ***	0.426 ***
	(0.025)	(0.028)	(0.003)	(0.031)	(0.050)	(0.019)
LEV	0.134 ***	−0.133 ***	−0.267 ***	0.044 **	−0.042 **	−0.086 ***
	(0.027)	(0.027)	(0.001)	(0.018)	(0.020)	(0.002)
LIQ	−0.001	0.002	0.003 ***	−0.001 *	−0.004 *	−0.003
	(0.001)	(0.002)	(0.001)	(0.000)	(0.002)	(0.002)
DIV	0.001	0.000 ***	−0.001	0.001 ***	−0.001	−0.002 *
	(0.001)	(0.000)	(0.001)	(0.0001)	(0.001)	(0.001)
SIZE	−0.002 ***	−0.013 ***	−0.011 **	−0.002	0.052 ***	0.054 ***
	(0.000)	(0.005)	(0.005)	(0.004)	(0.014)	(0.010)
Constant			−0.006			−0.421 ***
			(0.043)			(0.099)
Threshold value ($\hat{\gamma}$)		6 *** [5.313, 6.689]			6 *** [3.880, 8.120]	
Percentage (%)	43%	57%		43%	57%	
Bootstrap (*p*-value)			0.000			0.000
Observations			560			560
Number of firms			70			70

* indicates $p < 0.1$, ** indicates $p < 0.05$, *** indicates $p < 0.01$.

As for variables of interest, the outcomes indicate that the coefficients of the AEM variable were significant for both regimes (lower and upper). In the lower regime, characterized by a low level of ORD, the AEM has a negative effect on SFP. In the upper regime, where ORD is higher, the AEM has a positive effect on SFP.

Furthermore, it is important to verify the optimal regime. For this reason, it is obvious to compare the coefficients linked to each regime. The upper regime would be the optimal one. Thus, a 10% increase in AEM corresponds to a 2.23% increase in SFP.

In addition, the findings exhibit that the coefficients of the REM variable were significant for both regimes. More specifically, in the lower regime, the estimated coefficients on REM are negative and significant, confirming a negative relationship between REM and SFP. Conversely, in the upper regime, the coefficients are positive and significant, suggesting a positive relationship between REM and SFP. Furthermore, the upper regime would be the optimal one. Thus, a 10% increase in REM corresponds to 2.8% in SFP.

I now turn to a discussion of control variable results. In the lower regime of ORD, it is observed that the effect of LEV on SFP is positive and significant. In other words, firms that disclose less information about their ORD use debt to increase their long-term profitability. This strategy may stem from the fact that in the absence of extensive disclosure, the use of debt can be an effective means of optimizing financial resources and maximizing returns. However, in the upper regime, the leverage has a negative effect on SFP. This observation suggests that once firms reach a satisfactory level of operational risk disclosure (i.e., 6 unweighted), excessive use of debt can have a detrimental effect on long-term profitability. This result contrasts with that found by [63], where the authors concluded that the relationship between leverage and ROA shifts from a negative to a positive one for the context of Sub-Saharan Africa.

Similarly, the results suggest that the coefficients of LIQ are significant, but with opposite signs. Indeed, it appears that liquidity has a positive and significant effect on SFP in the lower regime. Conversely, liquidity has a negative and significant effect on SFP in the upper ORD regime. Economically, this is reflected in the fact that an increase in liquidity is correlated with an improvement in both return on equity and market value in the higher ORD regime. This may be because liquidity is used more strategically in a higher-disclosure environment to take advantage of investment opportunities and strengthen the overall financial health of the firm, and vice versa. Ref. [63] found that liquidity does not have a significant effect on the performance of Sub-Saharan firms.

Similarly, the DIV coefficients are significant. In the lower regime, where disclosure is more extensive, the positive effect of the dividend on total performance suggests that investors respond favorably to a policy of paying out dividends. In the upper regime, however, the dividend has a negative effect on SFP. However, in the upper regime, the dividend has a positive effect on SFP. These results suggest that dividend policy may have different implications depending on the level of ORD. In the lower regime, where disclosure is limited, a negative effect of the dividend on SFP could be interpreted as a strategy of conserving financial resources to deal with operational uncertainties that are not fully disclosed. Firms may thus retain more earnings to strengthen their ability to manage unforeseen risks, to the detriment of immediate shareholder returns.

Finally, the coefficients of size are also significant. They have opposite signs. These signs differ across two regimes. Size appears to have a negative and significant effect on SFP for the least disclosed firms (lower regime), while having a positive effect on SFP for the most disclosed firms (upper regime). However, larger firms can take advantage of operational efficiencies and benefit from greater access to financial markets because of their increased transparency, helping to increase their return on assets. This shows that small firms, often faced with resource constraints and immediate operational priorities, may fail to disclose their operational risk due to reporting constraints and cost concerns. This under-disclosure can have significant economic consequences, leading to a perception of higher risk by investors and lenders, thereby limiting access to finance and hampering growth. Adequate transparency is therefore critical to building trust and ensuring the financial sustainability of small firms.

5.3. Additional Analyses

To ensure the robustness of the empirical findings, several additional tests were carried out. First, we use an alternative measure of SFP. To confirm the reliability of our outcomes, we also follow [76,77] using Van Horne's static SFG model (denoted as ASFP). The ASFP is quantified in the following manner: retained earnings × net profit rate × (1 + debt/equity ratio) × {1/(total assets/total sales) − 1}. The results are reported in Table 4.

In addition, to measure financial firm performance, this study follows several studies using market and accounting measurement [63]. To do so, it employed returns on assets (ROAs), returns on equity (ROEs), and Tobin's Q (Q). The first indicator is measured by the ratio of earnings after interest and tax divided by total assets. The second indicator is measured by the ratio of earnings after interest and tax divided by total equity. The third indicator is used to measure the firm value, measured by the ratio of market capitalization, plus the book value of long-term debt, divided by the book value of a total asset [51].

Second, two alternative measures were used to perform EM. The first is [80]'s model related to AEM (Equation (6)). The second is measured following Equation (7), which relates to REM.

$$\frac{TAC_{it}}{TA_{it-1}} = \alpha_1\left(\frac{1}{TA_{it-1}}\right) + \beta_1\left(\Delta REV_{it} - \frac{\Delta REC_{it}}{TA_{it-1}}\right) + \beta_1\left(\Delta REV_{it} - \frac{PPE_{it}}{TA_{it-1}}\right) + \beta_3 CFO_{it-1} + \varepsilon_{it} \quad (6)$$

$$\frac{PROD_{it}}{TA_{it-1}} = \beta_1\left(\frac{1}{TA_{it-1}}\right) + \beta_2\left(\frac{Sales_{it}}{TA_{it-1}}\right) + \beta_3\left(\frac{\Delta Sales_{it}}{TA_{it-1}}\right) + \beta_4\left(\frac{\Delta Sales_{it-1}}{TA_{it-1}}\right) + \varepsilon_{it} \quad (7)$$

Table 4. Van Horne's static SFG model results.

	AEM			REM		
VARIABLES	**Lower ORD Regime**	**Upper ORD Regime**	**Difference (δ=$\lambda-\beta$)**	**Lower ORD Regime**	**Upper ORD Regime**	**Difference (δ=$\lambda-\beta$)**
$ASFP_{t-1}$	−0.230 ***	0.655 ***	0.885 ***	0.132 **	−0.071	−0.203 ***
	(0.061)	(0.087)	(0.026)	(0.059)	(0.096)	(0.037)
EM	−0.052 ***	0.181 ***	0.233 ***	−0.232 ***	0.466 ***	0.698 ***
	(0.018)	(0.050)	(0.032)	(0.058)	(0.085)	(0.027)
LEV	−0.200 ***	0.202 ***	0.402 ***	−0.239 ***	0.240 ***	0.479 ***
	(0.044)	(0.046)	(0.002)	(0.054)	(0.053)	(0.001)
LIQ	0.001 **	0.051 ***	0.050 ***	0.001	0.032 ***	0.031 ***
	(0.001)	(0.005)	(0.004)	(0.001)	(0.004)	(0.003)
DIV	−0.002 ***	0.003 ***	0.005 ***	−0.001	0.001	0.002 **
	(0.0001)	(0.001)	(0.001)	(0.001)	(0.0001)	(0.001
SIZE	0.003 ***	0.093 ***	0.090 ***	0.012 *	0.072 ***	0.060 ***
	(0.001)	(0.018)	(0.017)	(0.007)	(0.016)	(0.009)
Constant			−0.966 ***			−0.552 ***
			(0.110)			(0.119)
Threshold value ($\hat{\gamma}$)		6 *** [5.745, 6.255]			6 *** [5.453, 6.547]	
Percentage (%)	43%	57%		43%	57%	
Bootstrap (*p*-value)			0.000			0.000
Observations			560			560
Number of firms			70			70

* indicates $p < 0.1$, ** indicates $p < 0.05$, *** indicates $p < 0.01$.

The outcomes (Table 5) are like those obtained from the main results (Table 6), supporting Hypothesis 1.

Table 5. Alternative independent variable results.

	AEM			REM		
VARIABLES	**Lower ORD Regime**	**Upper ORD Regime**	**Difference (δ=$\lambda-\beta$)**	**Lower ORD Regime**	**Upper ORD Regime**	**Difference (δ=$\lambda-\beta$)**
SFP_{t-1}	−0.057 ***	0.063 ***	0.120 ***	−0.009	0.027	0.036 ***
	(0.022)	(0.021)	(0.001)	(0.032)	(0.033)	(0.001)
EM	−0.046 ***	0.213 ***	0.259 ***	−0.072 ***	0.139 ***	0.211 ***
	(0.013)	(0.039)	(0.026)	(0.018)	(0.032)	(0.014)
LEV	0.070 ***	−0.070 ***	−0.140 ***	0.304 ***	−0.302 ***	−0.606 ***
	(0.022)	(0.022)	(0.001)	(0.042)	(0.043)	(0.001)
LIQ	0.001	−0.008 ***	0.009 ***	−0.000	−0.011 **	−0.011 ***
	(0.001)	(0.003)	(0.002)	(0.000)	(0.004)	(0.004)
DIV	0.001 ***	−0.001 ***	0.002 **	0.000 **	0.001	0.001
	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)
SIZE	−0.006 ***	0.010 *	0.016 ***	0.002 ***	0.011 *	0.009
	(0.001)	(0.006)	(0.005)	(0.000)	(0.006)	(0.006)
Constant			−0.060			0.111 *
			(0.045)			(0.061)
Threshold value ($\hat{\gamma}$)		6 *** [5.310, 6.689]			6 *** [5.776, 6.224]	
Percentage (%)	43%	57%		43%	57%	
Bootstrap (*p*-value)			0.000			0.000
Observations			560			560
Number of firms			70			70

* indicates $p < 0.1$, ** indicates $p < 0.05$, *** indicates $p < 0.01$.

Table 6. Financial firm performance results.

Panel A: AEM									
	ROA			**ROE**			**Q**		
VARIABLES	**Lower ORD Regime**	**Upper ORD Regime**	**Difference ($\delta = \lambda - \beta$)**	**Lower ORD Regime**	**Upper ORD Regime**	**Difference ($\delta = \lambda - \beta$)**	**Lower ORD Regime**	**Upper ORD Regime**	**Difference ($\delta = \lambda - \beta$)**
FP_{t-1}	0.234 ***	−0.239 ***	−0.473 ***	0.210 ***	−0.035	−0.245 ***	0.409 ***	−0.902 ***	−1.311 ***
	(0.029)	(0.028)	(0.001)	(0.068)	(0.084)	(0.016)	(0.147)	(0.161)	(0.014)
EM	−0.062 ***	0.083 ***	0.145 ***	−0.379 ***	0.281 ***	0.660 ***	−0.639 **	1.762 ***	2.401 ***
	(0.012)	(0.021)	(0.009)	(0.058)	(0.064)	(0.006)	(0.248)	(0.429)	(0.181)
LEV	0.187 ***	−0.186 ***	−0.373 ***	−0.052	0.055	0.107 ***	−2.642 ***	2.657 ***	5.299 ***
	(0.018)	(0.018)	(0.001)	(0.040)	(0.040)	(0.001)	(0.306)	(0.336)	(0.030)
LIQ	0.001 **	−0.009 ***	−0.010 ***	0.001	0.019 ***	0.018 ***	0.032 ***	−0.078 *	−0.110 ***
	(0.001)	(0.003)	(0.002)	(0.002)	(0.005)	(0.003)	(0.008)	(0.040)	(0.032)
DIV	0.001 ***	−0.000	−0.001 ***	−0.001 ***	0.002 ***	0.003 ***	−0.005 ***	0.006 **	0.011 ***
	(0.0001)	(0.000)	(0.0001)	(0.000)	(0.000)	(0.001)	(0.002)	(0.003)	(0.001)
SIZE	−0.003 ***	0.055 ***	0.058 ***	0.004	0.161 ***	0.157 ***	0.223	−1.711 ***	−1.934 ***
	(0.001)	(0.010)	(0.009)	(0.017)	(0.029)	(0.012)	(0.211)	(0.253)	(0.042)
Constant			−0.398 ***			−1.372 ***			9.596 ***
			(0.089)			(0.202)			(1.832)
Threshold value ($\hat{\gamma}$)		6 *** [5.594, 6.406]			6 *** [2.983, 9.016]			6 *** [3.060, 8.939]	
Percentage (%)	43%	57%		43%	57%		43%	57%	
Bootstrap (*p*-value)			0.000			0.000			0.000
Observations			560			560			560
Number of firms			70			70			70
Panel B: REM									
	ROA			**ROE**			**Q**		
VARIABLES	**Lower ORD Regime**	**Upper ORD Regime**	**Difference ($\delta = \lambda - \beta$)**	**Lower ORD Regime**	**Upper ORD Regime**	**Difference ($\delta = \lambda - \beta$)**	**Lower ORD Regime**	**Upper ORD Regime**	**Difference ($\delta = \lambda - \beta$)**
FP_{t-1}	0.180 ***	−0.191 ***	−0.371 ***	−0.027	0.492 ***	0.519 ***	0.169 ***	−0.282 ***	−0.451 ***
	(0.040)	(0.041)	(0.001)	(0.074)	(0.127)	(0.053)	(0.053)	(0.089)	(0.036)
EM	−0.085 ***	0.075 ***	0.160 ***	−0.063	0.328 ***	0.391 ***	−0.139	4.851 ***	4.990 ***
	(0.016)	(0.025)	(0.009)	(0.061)	(0.080)	(0.019)	(0.258)	(0.442)	(0.184)
LEV	0.146 ***	−0.146 ***	−0.292 ***	−0.173 ***	0.176 ***	0.349 ***	−0.957 ***	0.940 ***	1.897 ***
	(0.019)	(0.019)	(0.001)	(0.049)	(0.048)	(0.001)	(0.283)	(0.291)	(0.008)

Table 6. *Cont.*

Panel B: REM									
	ROA			**ROE**			**Q**		
VARIABLES	**Lower ORD Regime**	**Upper ORD Regime**	**Difference (δ=λ−β)**	**Lower ORD Regime**	**Upper ORD Regime**	**Difference (δ=λ−β)**	**Lower ORD Regime**	**Upper ORD Regime**	**Difference (δ=λ−β)**
LIQ	−0.001 ***	0.002	0.003 ***	0.001	0.039 ***	0.038 ***	0.005 **	0.031	0.026 ***
	(0.000)	(0.002)	(0.002)	(0.001)	(0.004)	(0.003)	(0.002)	(0.031)	(0.029)
DIV	−0.001	0.001 ***	0.002 **	−0.001 **	0.001 **	0.002 ***	−0.005 ***	0.004	0.009 ***
	(0.001)	(0.0001)	(0.001)	(0.0001)	(0.000)	(0.0001)	(0.002)	(0.003)	(0.001)
SIZE	−0.001	0.013 *	0.014 ***	0.061 *	0.079	0.018	−0.172 ***	−0.547 ***	−0.375 **
	(0.001)	(0.007)	(0.006)	(0.037)	(0.055)	(0.018)	(0.026)	(0.188)	(0.162)
Constant			−0.118 **			−0.671 *			3.432 ***
			(0.052)			(0.399)			(1.275)
Threshold value ($\hat{\gamma}$)		6 *** [5.333, 6.667]			6 *** [5.172, 8.828]			6 *** [4.973, 7.027]	
Percentage (%)	43%	57%		43%	57%		43%	57%	
Bootstrap (*p*-value)			0.000			0.000			0.000
Observations			560			560			560
Number of firms			70			70			70

Standard errors are displayed in brackets. ***, **, and * designate statistical significance at the 1%, 5%, and 10% levels, respectively.

Third, this paper employs an alternative econometric approach: Ref. [91]'s Static PTR. The outcomes indicate that the estimated threshold values ($\hat{\gamma} = 6$) are close to the threshold values estimated by the principal outcomes (Table 7). This indicates that the regression findings still support the previous findings.

Table 7. Ref. [91]'s Static PTR model results.

VARIABLES	Lower FII Regime	Upper FII Regime	Difference (δ=$\lambda-\beta$)	Lower FII Regime	Upper FII Regime	Difference (δ=$\lambda-\beta$)
EM	−0.033 *	0.260 ***	0.293 ***	−0.227 ***	0.509 ***	0.736 ***
	(0.018)	(0.033)	(0.015)	(0.022)	(0.040)	(0.018)
LEV	0.371 ***	−0.372 ***	−0.743 ***	0.216 ***	−0.218 ***	−0.434 ***
	(0.035)	(0.035)	(0.035)	(0.034)	(0.036)	(0.002)
LIQ	−0.001 *	0.018 ***	−0.034 ***	−0.001	−0.015 ***	−0.014 ***
	(0.001)	(0.003)	(0.002)	(0.001)	(0.003)	(0.002)
DIV	0.001 ***	−0.001 ***	−0.002 **	0.001 ***	−0.001 **	−0.001 ***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.0001)
SIZE	−0.001	−0.040 ***	−0.039 ***	−0.007 *	0.088 ***	0.095 ***
	(0.001)	(0.009)	(0.008)	(0.004)	(0.013)	(0.009)
Constant			0.283 ***			−0.486 ***
			(0.062)			(0.095)
Threshold value ($\hat{\gamma}$)		6 *** [5.645, 6.355]			6 *** [4.857, 7.143]	
Percentage (%)	43%	57%		43%	57%	
Bootstrap (*p*-value)			0.000			0.000
Observations			560			560
Number of firms			70			70

* indicates $p < 0.1$, ** indicates $p < 0.05$, *** indicates $p < 0.01$.

5.4. Discussion

This is a discussion of the main results of this study. The results show that there is a threshold effect of ORD on the EM-SFP nexus. Hence, Hypothesis 1 is accepted. Indeed, the threshold estimate suggests that there is an optimal level of ORD below which the EM leads to a deterioration of Saudi SFP. However, above this optimal threshold, EM contributes to an improvement in SFP. This finding gives rise to distinct lower and upper regimes.

In the lower regime with limited ORD, the negative impact of EM on Saudi SFP highlights significant concerns about managerial opportunism, supporting Hypothesis 1(a). This finding is consistent with several studies, such as [48,49]. Managers may be tempted to manipulate accounting results to conceal the real challenges and risks faced by firms in an environment where ORD is poorly disclosed. This manipulation of results, often motivated by short-term incentives, can reduce SFP. In addition, there is asymmetric information between managers and external stakeholders, such as investors, due to the low level of ORD. This asymmetry can lead to inefficiencies in the market. Investors do not have a complete and accurate picture of the operational risks incurred by Saudi firms. This opacity can lead to an inaccurate assessment of a firm's prospects, adversely affecting its valuation in the market. In addition, managers who benefit from a lack of oversight and control may be tempted to take unethical measures to artificially improve the firm's financial results, thereby undermining stakeholder confidence. This result is in line with the findings of [47]. However, in the upper regime, characterized by high levels of ORD, EM has a positive impact on SFP. Therefore, Hypothesis 1(b) is accepted. This result is in line with [45,46]. This finding suggests that high levels of ORD can help reduce managers' propensity to manipulate firms' reported earnings. As a result, increased transparency helps to minimize the information asymmetry between managers and external stakeholders, such as investors. This reduction in information asymmetry promotes a more accurate and balanced assessment of an SFP, thereby increasing investor confidence. Firms benefit from a better understanding of their operational risks, which in turn seems to reduce AEM,

thereby promoting a fairer assessment of FP and a positive market valuation. Therefore, this finding is consistent with [2].

6. Conclusion and Implications

This study was designed to examine the threshold effect of ORD on the relationship between EM and SFP in Saudi Arabia. The results obtained using the DPTR method significantly reveal the existence of a threshold effect of ORD in the relationship between EM and SFP. The results indicate that EM reduces the Saudi SFP with a lower level of ORD. This reduction is attributed to the absence of managerial control, which favors AEM practices and creates information asymmetry between different stakeholders. However, with an optimal level of ORD, an increase in EM does not hamper the Saudi SFP. In fact, it may even improve it. In this configuration, agency and signaling theories are relevant. Agency theory highlights the importance of disclosure in mitigating agency conflicts and enhancing managerial control, while signal theory emphasizes the ability of disclosure to send positive signals to investors and other stakeholders.

6.1. Implications

There are significant managerial and policy implications of the findings, which highlight the threshold effect of ORD on EM and Saudi SFP. From a managerial point of view, it is imperative for managers to recognize the critical importance of transparent ORD. They need to promote a fair presentation of SFP by implementing rigorous internal mechanisms to minimize discretionary EM in a context of limited disclosure. The optimization of ORD levels and long-term management incentives may also be considered. At a policy level, regulators can introduce more rigorous and specific disclosure standards to promote transparency. Compliance can be strengthened through increased monitoring and the use of dissuasive sanctions. Training and awareness raising initiatives can be used to educate managers on the benefits of proper disclosure. Finally, to enhance market confidence and financial performance, cooperation between firms and regulators is essential.

In addition, there are significant theoretical implications. Agency theory, which focuses on conflicts between shareholders and managers, intersects with ODR, revealing a threshold effect that impacts SFP. Findings suggest that disclosing operational risks can reduce information asymmetry, align interests, and potentially lower monitoring costs for shareholders by providing insights into risk management practices. However, beyond a certain point, the benefits of ORD may diminish, altering managerial incentives regarding ORD practices. Positive accounting theory offers insights into firms' accounting method choices and their contractual implications. In the context of ORD, the presence of a threshold effect suggests that firms may manage earnings to fulfill contractual obligations. Additionally, positive accounting theory suggests that firms consider market reactions when choosing accounting practices, implying that there is an optimal level of ORD positively received by the market, beyond which the benefits diminish. Moreover, the link between earnings management, sustainability, and ORD underscores the trade-off firms face between short-term earnings and long-term sustainability objectives.

Finally, there are important practical implications of the findings for managers and policymakers in Saudi Arabia. First, it is important to strengthen internal controls to discourage earnings manipulation and ensure accurate risk reporting. In addition, it is essential to balance profitability with a risk-aware culture, use decision support tools for risk assessment, and promote a knowledge sharing environment, thereby strengthening innovation and sustainability. Finally, managers should integrate ESG practices into their company reports, and exploit sustainable financing opportunities that also contribute to sustainable firm performance.

6.2. Limitations and Future Research

Although this study makes important contributions, it has certain limitations that open interesting avenues for future research. Firstly, this study focuses solely on operational risk disclosure. As a result, future research could still focus on the disclosure of other types of non-financial risk, namely Conduct Risk and Cyber Risk. Secondly, the current sample is limited to the study of a single country (Saudi Arabia). Therefore, a future orientation is to study this issue in the GCC region since the countries in this region have the same governmental characteristics. This could give a clear vision.

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Appendix A

Table A1. Operational risk disclosure index items' sources.

Categories	Type of Reported Risks
People Risk	1—Lack of experience 2—Skills shortage 3—Leadership shortage
Product Risk	1—Price fluctuations of the factors of production 2—Customer dissatisfaction
Technology Risk	1—Information technology risks 2—Interruptions in the delivery chain 3—Service obsolescence and shrinkage
Process Risk	1—Execution failure 2—Product and service failure
Health and Safety Risk	1—Physical disaster (explosions and fire) 2—Electrical hazards 3—Lawsuit 4—Natural disasters 5—Failure in quality controls 6—Psychosocial risks: effects of work stress, bullying, violence, and work-related fatigue
Legal Risk	1—Change in regulations 2—Incompliance risk 3—Reputational risk/brand name erosion

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