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Detecting Earnings Manipulation Practice by the M-Score Model: Evidence from the Listed Power Companies of Bangladesh

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ABSTRACT

Purpose: The study aims to detect earnings manipulation practices, if any, and to investigate the relationship between company-specific characteristics and earnings management in the power sector of Bangladesh.

Methodology: In this study, a panel dataset comprising data from annual reports of 22 power sector companies listed in the DSE was utilized. The dataset spanned seven consecutive years, from 2014 to 2020. To identify earnings manipulation practices, the researchers employed the Beneish M-Score model.

Findings: The results of this study indicate that approximately 30% of the Fuel & Power sector companies listed in Bangladesh engage in information manipulation. Moreover, it was found that 64% of these manipulators received an unqualified opinion from auditors. Among the 22 selected power companies, 18 exhibited significantly higher M-Scores for at least one year during the period of 2014-202. Regression analysis shows that accrual quality has a significant positive association with earnings management, while the firm size and audit quality are negatively related to earnings manipulation. However, firm age and audit opinion did not demonstrate any significant influence on earnings management.

Originality/Value: This study marks the pioneering use of the Beneish M-Score model in the Fuel & Power sector of Bangladesh to detect earnings management practices. The findings suggest that having more non-cash items in the income statement allows management to manipulate, and large firms with strong corporate governance are less likely to manipulate information. These findings are valuable for decision-makers and stakeholders such as investors, policymakers, and the government.

Limitations: Only one sector has been chosen for investigation in this study. Selecting more samples from each industry could give a broader picture of earnings manipulation practices by the companies in Bangladesh.

1. Introduction

Stakeholders who rely on financial information to make important decisions always seek accurate and unbiased information related to financial statements. When reported information does not align with reality, stakeholders can suffer negative consequences. The International Accounting Standards Board (IASB) has implemented guidelines known as IASs and IFRSs to ensure the availability of accurate and unbiased information to stakeholders. These guidelines assist managers in generating high-quality

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information and enable stakeholders to make well-informed decisions. According to IASB (2008), companies must disclose relevant, reliable, comparable, and understandable financial information. According to Rahman & Hasan (2019), the quality of financial information plays a vital role in influencing the investment and financing decisions of external users. Otherwise, the quality of financial information will be questioned due to the lack of reliability, truthfulness, and fairness of the disclosed information (Masud, 2021).

Several Accounting scandals that the world witnessed at the beginning of the twenty-first century are examples of the severity of manipulation. Those accounting scandals warned the stakeholders to be aware of earnings manipulation and demand quality financial information from the management. Enron (2001), Tyco (2002), WorldCom (2002), Freddie Mac (2003), HealthSouth (2003), and Lehman Brothers (2008) were some of the renowned accounting scandals of this era. These entities have manipulated their financial information and taken advantages of weak corporate governance system. They used the 'earnings management' technique, also known as the 'creative accounting' or 'window dressing' technique, to satiate their frauds.

Different researchers have defined earnings management in different ways. Ahmed & Azim (2015) defined earnings management as an intentional misrepresentation of financial information to satisfy the desired goal. Healy & Wahlen (1999) said that the use of judgment in reporting and structuring transactions causes earnings management to happen. According to Beneish (1999), earnings manipulation can be defined as a situation where a company's managers deviate from the generally accepted accounting principles (GAAP) in order to present the company's financial performance in a more favorable light. Beneish (1999) summarized several presumptions for earnings manipulation. According to him, companies tend to manipulate when the future prospects of companies are poor. Secondly, following the positive accounting theory research of Watts & Zimmerman (1986), Beneish showed contract-based incentives as another motivational factor for managers to manipulate earnings.

To detect the existence of earnings management, several models have been developed such as the modified Jones model, the aggregated Jones model, the earnings distribution model, the M-score model, the F-score model, and so on (Anh & Linh, 2016). Many accounting researchers like to employ measures of ''discretionary accruals'' as their proxy to identify and assess the presence of earnings management (Dechow *et al.*, 2011). Anh & Linh (2016) presented the M-score as one of the most powerful detection tools. Few researchers applied the M-score model in the various sectors of Bangladesh for investigating the earnings management practice. Rahman & Hasan (2019) applied the M-score in the cement sector of Bangladesh, and Khan & Akter (2017) identified a significant number of companies (12 out of 14) in the food and allied sector exhibited significantly higher M-scores for at least one year within the sample periods. Khatun et al. (2022) have applied this model in the banking sector of Bangladesh also and found observed that Bangladeshi banks exhibit an unstable trend in the preparation of manipulated financial reports.

However, very few researches are found regarding earnings manipulation detection in Bangladesh's fuel & power sector. The fuel and power sector in Bangladesh is experiencing significant growth. According to Bangladesh Investment and Development Authority (BIDA), the power sector in Bangladesh received the highest amount of FDI (Foreign Direct Investment), amounting to $1.01 billion in 2018 (Mujeri *et al.*, 2021). Thus, to attract more foreign direct investment, the financial information of the power sector should be transparent, authentic, and free from manipulation. Moreover, Parvin (2020) traced more than 20% of companies in the fuel & power sector as probable manipulators in the year 2017. But she has investigated only 1-year information (2017). As there is a probability of earnings manipulation, the authors attempted to present a chronological scenario of earnings management practices in the power sector of Bangladesh. So, the objectives of this paper have been set to determine, by applying the Beneish M-score model, whether

any listed companies of the power sector manipulate their earnings and to examine the determinants that affect the probability of earnings management.

This paper has been organized into 09 sections where 1st section contains the introduction. Brief overview of the M-score model has been presented in section 02. Section 3 describes Literature Review and Hypothesis Development. Section 4 presents Research Methodology. Basic Discussion is presented in section 5. Detection of Earnings Management, Result of the quantitative analysis, Discussion of Findings, and Conclusion have been summarized in section 6, section 7, section 8 and section 09 respectively.

2. Brief Overview of the M-score Model

In 1999, Messod Daniel Beneish developed a model, called the M-score model, including eight variables to detect earnings manipulation i.e., earnings management. The M-score model employs a range of analytical ratios and variables to assess whether a company has engaged in earnings manipulation and to determine its propensity for such practices (Bhavani & Amponsah, 2017). If an M-score exceeds the cutoff point of -2.22, then the company will be identified as a manipulator (MacCarthy, 2017). Being a probabilistic model, M-score cannot detect the manipulation 100% accurately (MacCarthy, 2017). Beneish (1999) presented that the model can accurately detect 76% as manipulators and inaccurately detect 17.5% as non-manipulator. The eight variables that are used to predict M-score are briefly explained below:

$$M - score = -4.840 + 0.920 * DSRI + 0.528 * GMI + 0.404 * AQI + 0.892 * SGI + 0.115 * DEPI - 0.172 * SGAI + 4.679 * TATA - 0.327 * LVGI \quad [1]$$

2.1 Days' Sales in Receivables Index (DSRI): DSRI focuses on determining whether the receivables and revenues are in balance in two successive years (Aghghaleh *et al.,* 2016). A large increase in DSRI signals that there is a high likelihood that the revenues are overstated (Beneish, 1999).

2.2 Gross Margin Index (GMI): When GMI exceeds 1, it represents that gross margin have deteriorated (Beneish, 1999). This deterioration of gross margin indicates company's performance is poor. Consequently, the poorer performance will influence the management to manipulate earnings.

2.3 Asset Quality Index (AQI): AQI is used to measure the change in asset realization risk. A rise in this index may indicate the inclusion of additional costs as capitalized expenses to maintain profitability (Aghghaleh *et al.,* 2016). An index of more than 1, AQI concludes that cost deferral involvement is increasing in the company (Beneish, 1999).

2.4 Sales Growth Index (SGI): According to the findings of Aghghaleh *et al.* (2016), there is evidence to suggest that companies that place a significant emphasis on achieving sales growth are more prone to engaging in earnings manipulation. Beneish (1999) observed a positive correlation between the likelihood of manipulation and the sales growth index (SGI).

2.5 Depreciation Index (DEPI): The reason for including depreciation in the M-score is based on the understanding that when a company has lower depreciation expenses, it allows for greater discretion and control over its reported income (Aghghaleh *et al.,* 2016). And this discretion over income will motivate to manipulate earnings.

2.6 Sales, General, and Administrative Expenses Index (SGAI): The SGAI focuses on finding the disproportionate increase in sales. This disproportionate increase in sales serves as a negative indication, suggesting potential concerns about the company's future prospects.

2.7 Leverage Index (LVGI): When the LVGI (Leverage Growth Index) exceeds 1, it signifies an escalation in leverage within a company. In the study conducted by Beneish (1999), the inclusion of

LVGI was aimed at identifying the motivations that arise from debt covenants, which may incentivize earnings manipulation.

2.8 Total Accrual to Total Asset (TATA): Kamal *et al.* (2016) suggested that accruals, in this case, represent the portion of operating profit that is not derived from cash profit within the current year. Beneish (1999) included total accruals in the M-score model to assess the extent to which managers exercise discretionary accounting decisions with the intention of manipulating earnings.

2.9 Interpretation: In some cases, a company might not have any assets other than current assets and property, plant, & equipment (PP&E). In such a case, the denominator of the asset quality index (AQI) would be zero. To address the problem of undefined AQI, Beneish (1999) suggests assigning a value of 1 to represent a neutral value instead of treating the observation as missing. According to the findings of Kamal *et al.* (2016), the M-score generated by the model serves as an indicator of the likelihood of earnings manipulation and financial statement fraud. Beneish (1999) proposed that a score exceeding **-1.78** indicates the respective company as a probable manipulator. On the other hand, when the score is less than **-1.78**, Beneish (1999) identifies the company as a non-manipulator. Bhavani & Amponsah (2017) presented a score exceeding **-2.22** as a probable manipulator and an M-score less than **-2.22** as a non-manipulator. Besides, Aghghaleh *et al.* (2016) have used **-2.22 as** the cutoff point score to enable the differentiation between manipulators and non-manipulators. MacCarthy (2017) also took **-2.22** as the cutoff point to identify manipulators.

2.10 Threshold of Variables: Beneish (1999) stated a cutoff point for each of the variables used in the model to help in separating the manipulators from the non-manipulators. Moreover, this threshold of each variable may assist an individual to focus on the areas of investigation to reduce the manipulation.

Table 1

Threshold of M-score Variables

Name of the index	*DSRI*	*GMI*	*AQI*	*SGI*	*DEPI*	*SGAI*	*LEVI*	*TATA*
Manipulators	1.465	1.193	1.254	1.607	1.077	1.041	1.111	0.031
Non-Manipulators	1.031	1.014	1.039	1.134	1.001	1.054	1.037	0.018

Source: Developed by Beneish (1999)

Kamal *et al.,* (2016) suggested on scrutinizing the cutoff point of manipulation of each of the eight variables provided by Beneish in 1999.

3. Literature Review and Hypotheses Development

3.1 Theoretical Framework

The study examines two relevant theories regarding this study: i) Agency Theory and ii) Legitimacy Theory.

The agency theory describes managers' opportunistic reporting of financial data, which ultimately results in low-quality disclosures. This theory focuses on the relationship between principals (owners) and agents (managers) and highlights information asymmetry and conflicts of interest. Leilina (2015) highlights the fact that managers frequently manipulate earnings and assets using the discretion they have over accruals, leading to information asymmetry and lowering the integrity and trustworthiness of reported financial information. By conducting better audits and offering pertinent responses, auditors can significantly reduce earnings manipulation and the information asymmetry gap in such situations.

On the other hand, Legitimacy theory reveals the importance of obtaining public approval and ensures the legitimacy of their operations. According to Lindblom (1993), this can be described as an ongoing inclination of organizations to make sure that they are seen as operating within the constraints and conventions of their particular societies. In other words, within some socially constructed systems of norms and beliefs, an entity's activities should be desirable, proper, or acceptable. Companies' reporting systems are highly interlinked with the concept of legitimacy theory. To uphold the essence of societal values and culture, big and old firms have the responsibility to disclose more reliable information and reduces manipulations in calculating their earnings. Large companies have a robust internal control structure that limits managers' opportunistic behavior in altering earnings and ensures reliability of the disclosed accounting information.

3.2 Literature Review

Investors of the secondary market always remain careful with every single piece of information, provided by the organization, to take their next best decision. Shafakheibari & Oladi (2015) identified that capital market analysts primarily focus on two key aspects: the nature of financial information and the influence of financial information on determining the stock price. To maintain the quality of financial information, International Accounting Standard Board (IASB) provides some guidelines, commonly known as IASs or IFRSs, so those uniform reporting methods can be followed by all member countries. Rahman & Hasan (2019) affirmed that the adoption of International Financial Reporting Standards (IFRS) enhances the quality of financial information. The primary objective of financial reporting, as outlined by the International Accounting Standards Board (IASB, 2008), is to furnish relevant information that facilitates economic decision-making for a broad spectrum of users. The conceptual framework established by the International Public Sector Accounting Standards Board (IPSASB, 2014) indicates that the accrual basis of accounting offers significant discretion to managers in determining the actual earnings that a company can report within a specific period (Xie *et al.,* 2003). This discretion empowers managers to manipulate the timing of revenue and expense recognition, such as accelerating the recognition of sales revenue through credit sales. This process of changing the timings and amounts of transactions enables managers to manipulate information.

According to Razzaque et al. (2006), earnings management can be categorized into two methods: accounting earnings management and economic earnings management. Accounting earnings management is defined as the utilization of judgment permitted within generally accepted accounting principles (GAAP) to manipulate reported earnings. On the other hand, economic earnings management pertains to the inclination of managers to alter operational decisions, such as delivery schedules or maintenance activities, in order to manipulate the underlying cash flows. Hastuti (2015) presented some indicators by which one can easily identify whether earnings management is practiced by the company or not such as management's reluctance to provide information to the external auditors, weak internal control and governance system, frequent change of independent external auditors, missing document, frequent alteration of bank account, selling below the market price, several transactions at the end of the year and huge amount of unusual transaction, etc.

Researchers have been actively engaged in addressing the seriousness of earnings management and have made significant efforts in developing models to detect such practices. Among these models, the M-score model stands out as one of the recent and highly effective approaches, receiving considerable attention. MacCarthy (2017) found ENRON Corporation's failure could have been detected and prevented earlier using the Beneish M-score model. McCarthy (2017) took the sample from Enron Corporation for the year 1996 to 2000 to determine whether M-score can detect earnings manipulation of Enron. Successfully, he found that earnings had been manipulated from 1998 to 2000 to hide the picture that the company was in distress. Omar *et al.* (2014) researched on determining whether the M-score can detect potential fraud of MEGAN MEDIA HOLDINGS BERHAD

(MMHB). Omar *et al.* (2014) identified MMHB as a manipulator with the help of M-score. After analyzing the operating efficiency ratio, they summarized that MMHB recorded fictitious revenue in the financial statements.

Impink (2010) achieved success in detecting the WORLDCOM fraud case by utilizing the Beneish M-score model. In a similar vein, Kamal *et al.* (2016) discovered that the Beneish M-score model identified 82% of publicly listed companies that were later prosecuted by SC Malaysia for engaging in fraudulent financial reporting. These companies were detected for their involvement in earnings manipulation and financial statement fraud during the year of the fraud, even before any public announcement was made. Anh & Linh (2016) concluded that M-score has a strong power in detecting earnings management in Vietnam. In addition, Anh & Linh (2016) reached the conclusion that the M-score model plays a significant role in assisting banks and other financial institutions in safeguarding themselves against frauds and loan default cases. Furthermore, investors can make informed decisions and assess the credibility of financial information presented in financial statements by employing the M-score (Anh & Linh, 2016). Supporting this notion, Herawati (2015) verified the utility of the M-score model in detecting financial fraud.

3.3 Development of Hypothesis

3.3.1. Firm Size

The size of a company is indicative of its resource base and Atu et al. (2016) proposed that larger firms are less likely to engage in earnings management, instead prioritizing the enhancement of financial reporting quality. Similarly, Bassiouny (2016) discovered a negative correlation between earnings management and firm size. One explanation for this negative relationship, as presented by Bassiouny (2016), is that larger firms often possess robust corporate governance and internal control systems, enabling them to provide reliable information to stakeholders. Additionally, as large firms are typically audited by prominent audit firms (such as the Big 4 affiliated audit firm), their ability to manipulate earnings is constrained due to the effective and efficient audit procedures in place. Lemma et al. (2013) also found a significant negative association between firm size and earnings manipulation, further supporting the notion of larger firms being less prone to such practices.

Conversely, large-sized firms may be driven to engage in creative accounting practices due to the significant pressures imposed by analysts to meet or exceed targets (Lemma *et al.*, 2013). Boudiche (2013) identified a positive relationship, indicating that managers resort to earnings manipulation under the influence of financial analysts' pressures. Here, the hypothesis considered in this research is as follows:

H1: There is a relation between firm size and earnings manipulation.

3.3.2. Accrual Quality

A firm can't manipulate its earnings through cash because cash is easily identifiable and traceable. If a company wants to manipulate earnings, it must manipulate the earnings through accrual earnings or accrual revenues. Through accrual quality, it can easily be identified how much net operating income is collected as operating cash flow and how much accruals are reported in the net operating income. A measure of accrual quality indicates the presence of minimal fictitious revenue in the income statement. Conversely, a weak accrual quality suggests the inclusion of more accrual revenue in the income statement. Additionally, when non-cash items such as depreciation, amortization, and allowance for doubtful accounts are incorporated into the calculation of net income, the operating cash flow tends to surpass net operating income. Rahman & Hasan (2019) observed a positive correlation between earnings manipulation and accrual quality. In contrast, Masud (2021) discovered a negative but statistically insignificant relationship between accrual quality and financial reporting quality, as measured by the modified Jones model. Furthermore, Doyle *et al.* (2007) found that weak

accrual quality leads to insufficient disclosure quality, which in turn provides managers with opportunities for manipulation. So, the hypothesis considered in this case is as follows:

H2: Accrual quality is related to earnings management.

3.3.3. Audit Quality

Audit quality refers to the excellence of audit services delivered by an external auditor according to the highest standards (Hastuti, 2015). A superior-quality audit acts as a robust defense against earnings manipulation since it can effectively identify most errors and irregularities (Bassiouny, 2016). Bassiouny (2016) identified several factors explaining why large audit firms, known as the Big 4 affiliated audit firm, consistently uphold high-quality standards. These factors encompass a substantial client base, skilled professionals, utilization of superior resources to enhance service provision, and the preservation of the firm's reputation. Atu *et al.* (2016) proposed that the Big 4 affiliated audit firms play a significant role in determining the disclosure policies of the companies they audit. Similarly, Bassiouny (2016) discovered a negative correlation between audit quality and earnings management. Furthermore, Atu *et al.* (2016) also suggested that there exists a negative association between the quality of the audit and earnings management. Another study conducted by Fathi (2013) revealed that the Big 4 affiliated audit firms contribute to the reduction of earnings management practices. Thus, the hypothesis related to audit quality considered in this research is as follows:

H3: Audit quality reduce the probability of earnings management.

3.3.4. Audit Opinion

The primary role of auditors within an organization is to assess whether the financial statements present a true and fair view of the company's financial position, particularly for stakeholders such as shareholders and investors. When auditors conclude that the financial statements are accurate, they provide an unqualified opinion. However, if they identify material misstatements, auditors issue a qualified opinion, also known as a modified opinion. The issuance of a qualified opinion can impact share prices and the compensation of managers (Hastuti, 2015). Moreover, it can erode the confidence of existing and potential shareholders, investors, and creditors. Consequently, managers strive to obtain an unqualified opinion from external auditors at any cost. Conversely, independent auditors refrain from providing assurance on the true and fair view of financial statements unless they are satisfied that no material misstatements exist.

Tsipouridou & Spathis (2014) discovered that audit opinions do not significantly influence earnings management. However, Gajevszky's study (2014) demonstrated a significant inverse relationship between audit opinion and discretionary accruals, indicating that audit opinions can impact the manipulation of accounting numbers. Similarly, Moazedi (2016) found a significant association between real earnings management and audit opinion. Thus, the hypothesis related to audit opinion considered in this research is as follows:

H4: An unqualified audit opinion restricts managers' ability to manipulate earnings.

3.3.5. Firm Age

The companies which are conducting their business for longer period of time have a tendency to maintain and show their good performance. In order to maintain stakeholders' confidence in the firm's performance, organizations often strive to meet their expectations. However, when the performance of established firms falls short of stakeholders' demands, intentional or unintentional manipulation of company information may occur. Masud's (2021) study revealed a positive correlation between firm age and earnings management, indicating that older firms are more likely to engage in such practices. Similarly, Kibiya *et al.* (2016) found a significant positive relationship between firm age and the

quality of financial reporting, as measured by the McNicholas model. These findings support the notion that firm age plays a role in shaping both earnings management behavior and the quality of financial reporting.

H5: There is relation between firm age and earnings management.

4. Research Methodology

4.1 Data

To identify ongoing earnings manipulation by a company, it is necessary to examine at least five years of information. This extended time frame allows for a thorough investigation of whether firms engage in consistent manipulation practices, as companies that manipulate earnings in one year are likely to continue doing so in subsequent years to conceal their actions. Additionally, a minimum of two years of information is required to calculate the M-score for a specific year. So, this paper is based on the secondary data which has been collected from the annual reports of the twenty-two listed Fuel and Power sector companies in DSE for the seven consecutive years from 2014 to 2020 of each company. However, due to the non-availability of data, total 25 firm-year observations have been excluded from the analysis. Finally, this study has made the analysis based on total 129 firm-year observations.

4.2 Research Model

In this study, the relationship of various variables of a company with earnings management has been examined. The research model can be stated as follows:

$$EAR\_MGT = \beta_0 + \beta_1\ FRM\_SIZE + \beta_2\ ACC\_QUA + \beta_3\ AUD\_QUA + \beta_4\ AUD\_OP + \beta_5\ FRM\_AG + \varepsilon_i \quad [2]$$

4.2.1 Variables of the Model

This study primarily focuses on the detection of earnings manipulation, employing the M-score model for this purpose. Specifically, the study utilizes the eight variables model of M-score calculation, as opposed to the alternative five variables model. By utilizing the eight variables model, the study aims to provide a thorough analysis and evaluation of earnings manipulation within the chosen context. After that, the value of the M-score model is applied as the dependent variable to determine the relationship of big 4 audit firms (audit quality), audit opinion, firm size, firm age, and accrual quality with respect to earnings management.

Table 2

The Variables used in this Study are

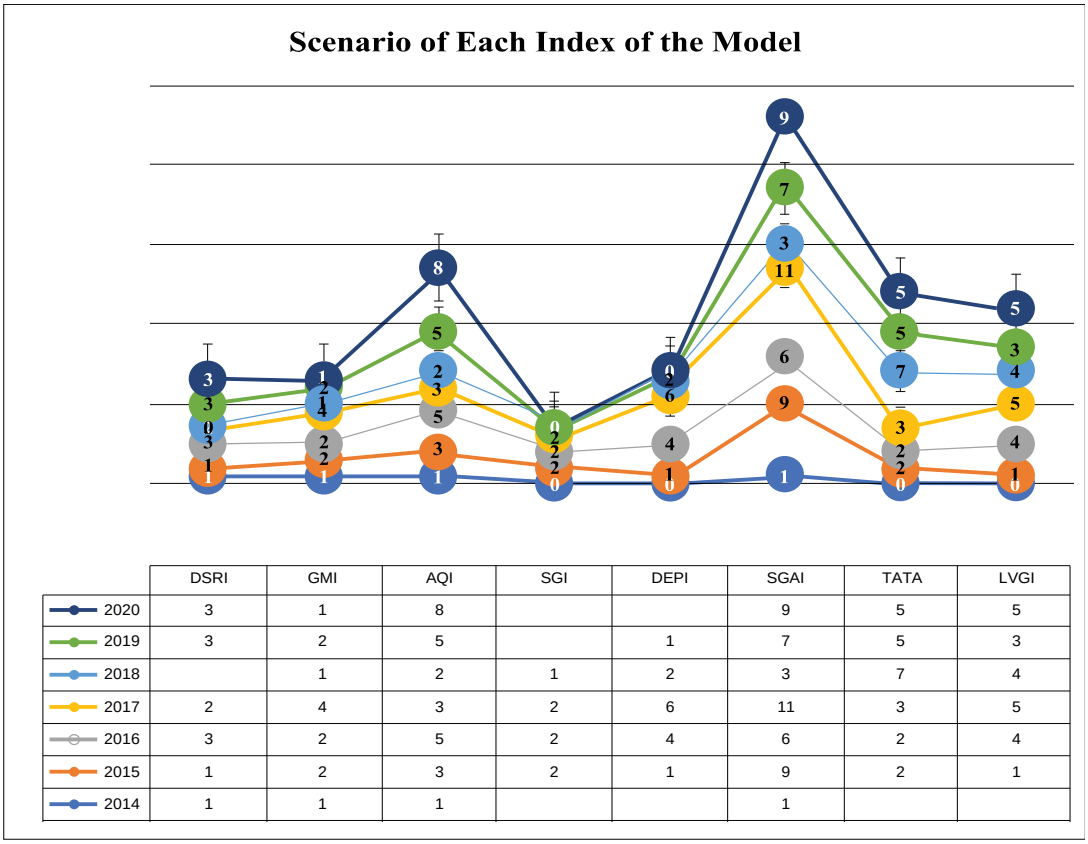
	Independent Variables		
Type of variables	***Name of the variables***	***Formula***	***Reference***
Dependent	EAR_MGT	Value of the M_Score model	
Independent	FRM_SIZE	Natural Logarithm of total assets	Lemma *et al.* (2013); Atu *et al.* (2016)
	ACC_QUA	$\frac{operatingcashflow}{operatingprofit}$	Rahman and Hasan (2019)
	AUD_QUA	A value of 1 is given if audited by four affiliated audit firm otherwise 0.	Atu *et al.* (2016); Fathi (2013)
	AUD_OP	For unqualified opinion, the value is provided as 1 otherwise 0.	Tsipouridou & Spathis (2014)
	FRM_AG	Number of years since company's incorporation	Masud(2021)

Source: Developed by authors

5. Basic Discussion

5.1 Descriptive Summary Statistics of M-score Variables

In Appendix 03, descriptive statistics are presented for eight variables of the M-score model. The results show that 46 firm-years in the power sector have crossed the cutoff point of 1.041 for the SGAI index, indicating that many companies are reporting disproportionate sales revenue to general and administrative expenses. The average SGAI index value (1.315097) is also higher than the threshold limit of 1.041, suggesting that manipulation is predominantly occurring in the operating expense (i.e., Sales, General, and Administrative Expenses) section of the power sector. Additionally, the threshold limit of 1.254 for asset quality index has been violated by 27 firm years. The result indicates that cost capitalization is being practiced by most companies.



	DSRI	GMI	AQI	SGI	DEPI	SGAI	TATA	LVGI
2020	3	1	8			9	5	5
2019	3	2	5		1	7	5	3
2018		1	2	1	2	3	7	4
2017	2	4	3	2	6	11	3	5
2016	3	2	5	2	4	6	2	4
2015	1	2	3	2	1	9	2	1
2014	1	1	1			1		

Figure 1

No. of Company Above each Index's Cutoff point

Source: Developed by authors

The third highest index which is found to have violated the proposed cutoff point is total accruals. About twenty-four selected firm-years are found to have breached the threshold limit of 0.031. The leverage index is found in the fourth place with 22 firm years exceeding the threshold limit of 1.111. On the other hand, the threshold limit of 1.193 for GMI, 1.077 for DEPI, 1.465 for DSRI, and 1.607 for SGI is breached by 13, 14, 13, and 7 firm years respectively. The above information is presented in appendix 03.

5.2 Descriptive Summary Statistics of Independent Variables

Power companies, on average, generate operating cash flow at a rate of 1.41 times their operating profit. This finding suggests that these companies include a significant amount of non-cash items in their net profit calculations. Furthermore, the power sector, on average, has been in operation for approximately 28 years, ranging from a minimum of 5 years to a maximum of 66 years of incorporation. Moreover, the mean total asset value for the Fuel & Power sector is 31,855.83 million, with a standard deviation of 52,335.92 million. The minimum total asset value recorded is 0.264815 million, while the maximum value reaches 292,716.7 million. The descriptive summary statistics of independent variables are presented in Table-03 below:

Table 3

Descriptive Summary Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
EAR_MGT	129	-.051625	21.45734	-10.18366	237.5047
FRM_SIZE (in million)	129	31822.83	52335.92	0.264815	292716.7
ACC_QUA	129	1.41	3.611049	-20.56688	17.05408
FR,_AG	129	27.7907	18.16103	5	66
AUD_OP	129	.6141732	.1887179	0	1
AUD_QUA	129	.234375	.425272	0	1

Source: Developed by authors

Out of the total sample of 129 firm years' financial statements, the Big 4 affiliated audit firm audited the financial statements of 30 firm years, while the remaining 99 firm years' financial statements were audited by non-Big 4 affiliated audit firms. Among these audited financial statements, 81 firm years obtained an unqualified opinion, indicating that approximately two-thirds of the firm years received an unqualified opinion. On the other hand, the remaining one-third, equivalent to 48 firm years, received a qualified opinion.

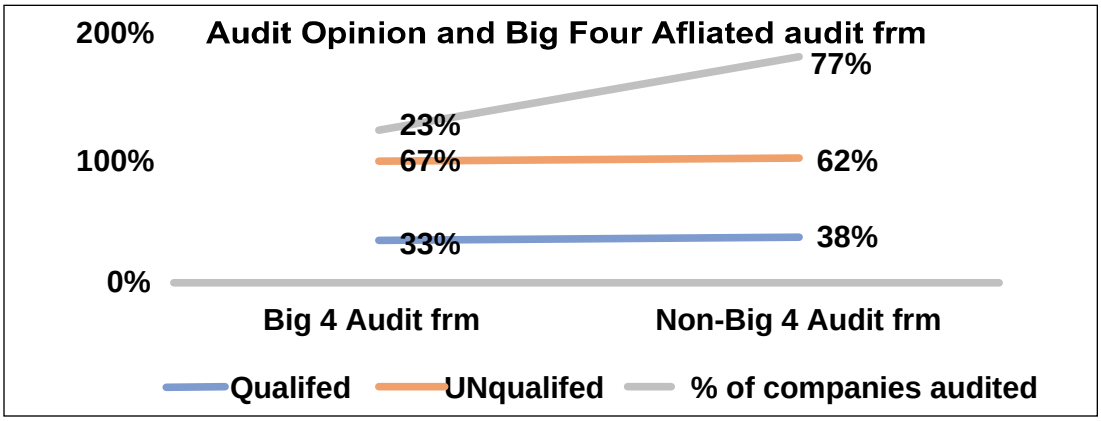


Figure 2

Auditing Scenario of the Power sector

Source: Developed by authors

6. Detection of Earnings Management

The analysis presented in Appendix 04 reveals potential manipulators identified on a yearly basis, using M-score values of -2.22 and -1.78 as benchmarks for identifying manipulation. The results

suggest that 39 firm-years' information may have been manipulated. Notably, the majority of these potential manipulations were associated with 9 companies in the year 2019. Furthermore, the analysis suggests that in 2020, 6 companies were potentially involved in manipulating their information.

The results of the analysis indicate that certain companies in the power sector have engaged in continuous manipulation of their financial information. For instance, KPCL manipulated its information consecutively for four years (2016, 2017, 2018, and 2019), while JAMUNAOIL did so for three consecutive years (2017, 2018, and 2019). Moreover, PADMAOIL, SPCL, SUMMITPOWER, TITASGAS, and UNITEDPOWER were found to have manipulated their information in three different years within the sample period of seven years. In summary, out of the 22 selected power companies, a total of 18 companies exhibited significantly higher M-scores for at least one year between 2014 and 2020. Additionally, KPCL in 2019 and United Power in 2020 have a greater value of M-score (237.549 and 39.958 respectively) because of the higher value of AQI (596.94 and 105.40 respectively). The AQI of both companies has been increased because KPCL has started classifying a huge amount of assets as "Asset held for sale" (about Tk. 2178.11 million) from 2019 and United Power has started presenting a huge amount of leased assets (about 28.044212 million) from 2020. It is important to note that the AQI increases when total assets include any assets other than property, plant, and equipment (PPE) and total current assets.

According to Figure-03, it can be observed that in 2019, approximately 41% of power companies potentially manipulated their financial information. In the years 2016, 2018, and 2020, the percentage of manipulators was 27.30%. Considering the cutoff point for M-score as -2.22, as suggested by Bhavani & Amponsah (2017), Aghghaleh *et al.* (2016), and MacCarthy (2017), the average percentage of manipulators across the studied years is 30%. However, if the cutoff point is considered as -1.78, as proposed by Beneish (1999), the average percentage of manipulators would reduce to 16.30%.

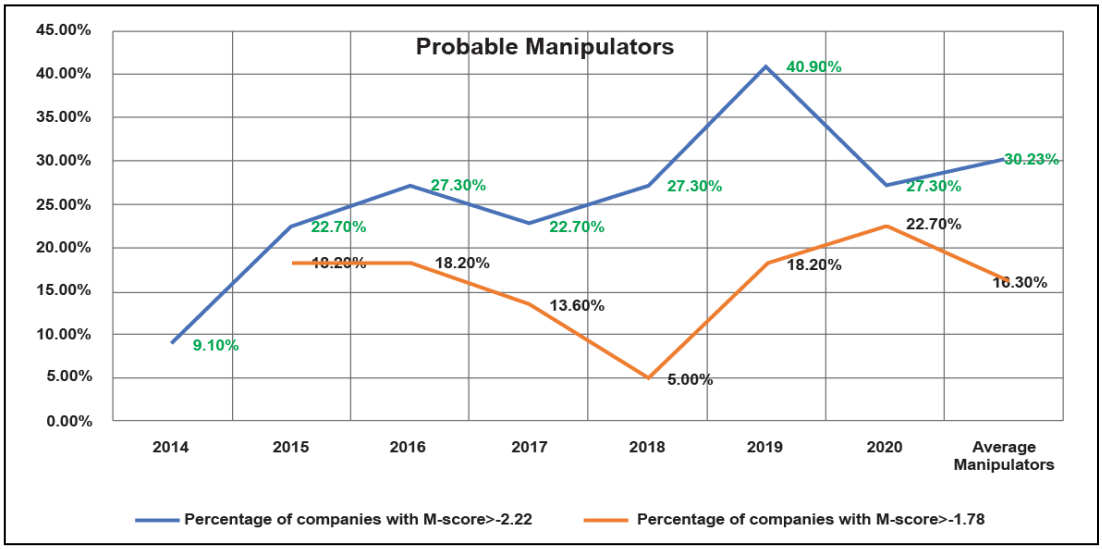


Figure 3

Percentage of Manipulators

Source**:** Developed by Authors

Out of the total 39 probable manipulators identified, 25 of them received an unqualified opinion during the respective years when they were flagged as probable manipulators. Among these, nine companies received an unqualified opinion from the Big 4 affiliated audit firms, which were also

identified as manipulators. On the other hand, the remaining 14 companies received a qualified opinion during the same period.

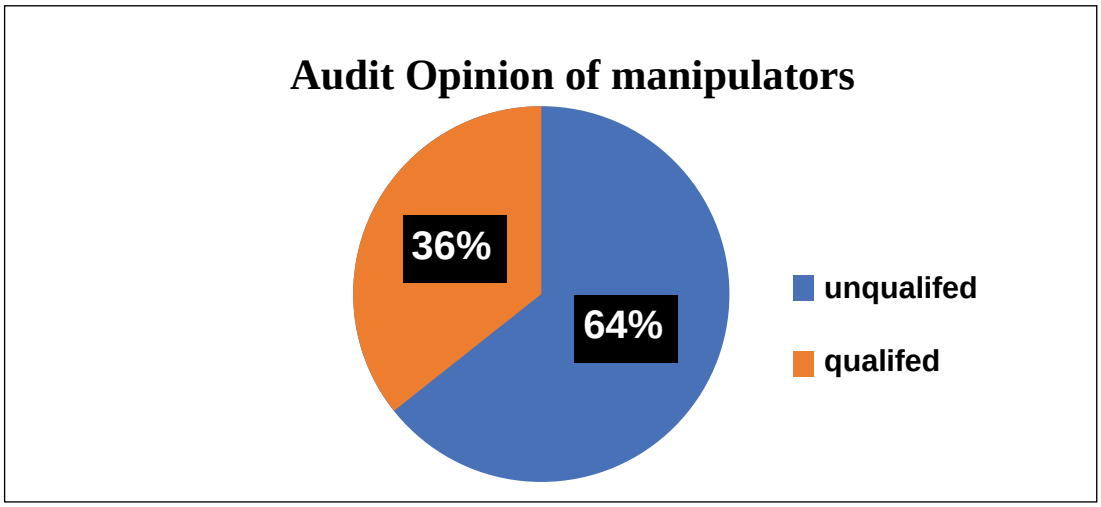


Figure 4

Audit Opinion Obtained by Probable Manipulators

Source: Developed by authors

7. Results of the quantitative analysis

7.1 Correlation Analysis

According to the Pearson correlation matrix presented in Table-04, earnings management is positively correlated with accrual quality (0.037) and negatively correlated with firm size (-0.0721), firm age (-0.086), audit quality (-0.2095), and audit opinion (-0.015). It was evident that when the correlation coefficient of two independent variable exceeds 0.80 then it hinders the researchers to make a precise estimation. In this study, the correlation coefficient of any two independent variables doesn't exceed 0.80. The maximum significant correlation (0.56) is observed between audit opinion and firm size. The Table-04 containing the correlation coefficient is presented below:

Table 4

Pearson Correlation Matrix

Variables	EAR_MGT	FRM_SIZE	ACC_QUA	FRM_AG	AUD_OP	AUD_QUA
EAR_MGT	1.0000					
FRM_SIZE	-0.0721	1.000				
ACC_QUA	0.037	-0.067	1.000			
FRM_AG	-0.086	-0.356*	0.061	1.000		
AUD_OP	-0.015	-0.560*	-0.038	-0.235*	1.000	
AUD_QUA	-0.2095*	-0.011	-0.205*	0.053	0.044	1.000

Source**:** Developed by authors

The issue of multicollinearity is a significant concern when employing multiple regression analysis. However, the analysis conducted using Variance Inflation Factor (VIF) and (1/VIF) in Table -05(B) demonstrates that there is no evidence of multicollinearity among the independent variables. This finding suggests that the independent variables used in the regression analysis are not highly correlated with each other, thereby minimizing the potential impact of multicollinearity on the results.

Table 5

Variance Inflation Factor

Variable	VIF	1/VIF
FRM_SIZE	2.33	0.430107
ACC_QUA	1.06	0.946347
FRM_AG	1.68	0.593528
AUD_OP	2.15	0.464611
AUD_QUA	1.05	0.948043
Mean VIF	1.65	

Source: Developed by authors

7.2 Regression Analysis

This study employs the ordinary least squares (OLS) model to examine the relationship between audit quality, audit opinion, firm size, firm age, accrual quality, and earnings management. The results of the multiple regression analysis reveal that accrual quality is positively associated with earnings management. In contrast, firm size, firm age, audit quality, and audit opinion exert a negative impact on earnings management. These findings indicate that higher levels of accrual quality are linked to increased earnings management, while larger firm size, older firm age, better audit quality, and unqualified audit opinions are associated with reduced levels of earnings management. The regression model is stated below:

Table 6

Coefficient and Significance of Independent Variables in the Regression Equation

EAR_MGT	Coefficient	Standard Error	t	P>t	95% [Confidence Interval]	
FRM_SIZE	-.1685	-0463	-3.64	0.0010	-.2600	-.0768
ACC_QUA	0.0361	0.0051	7.0700	0.0530	0.0260	0.0462
FRM_AG	-0.0143	0.0065	-2.2100	0.5290	-0.0271	-0.0015
AUD_OP	-0.4108	0.2736	-1.5000	01360	-0.9523	0.1308
AUD_QUA	-0.6559	0.2191	-2.9900	0.0030	0.0030	-1.0897
_cons	-1.5050	1.2798	1.1800	0.0420	-1.0283	4.0383

Source: Developed by authors

From the regression model, it can be concluded that there is a negative relationship between earnings management and firm size, firm age, audit quality, and audit opinion. Inversely, accrual quality has a significant positive relationship with earnings management.

Durbin-Watson test concluded that no autocorrelation exists between the error terms because the d value (2.03361) is close to 2. Moreover, to determine whether the variance of the error terms is constant or not, Breusch–Pagan–Godfrey test is also performed. The null hypothesis of this test is that error terms have constant variance. This null hypothesis is tested against the alternative hypothesis that the disturbance terms of the dataset don't have constant variance. The Breusch-Pagan test provides a Chi (2) value of 0.82 and a probability of 0.3651. So, it can be summarized that the residuals have uniform variance i.e., homoscedastic and the estimates are not biased.

8. Discussion of Findings

The significant negative relationship between size and earnings management indicates that large- The observed significant negative relationship between firm size and earnings management suggests that larger-sized firms are less inclined to engage in earnings manipulation. This can be attributed to the presence of robust corporate governance structures and effective internal control systems in larger firms. These findings align with the results reported by Bassiouny (2016), Lemma *et al.* (2013), and Atu *et al*. (2016), indicating a consistency in the literature regarding the negative association between firm size and earnings management.

Furthermore, the regression model reveals a robust and positive relationship between accrual quality and earnings management. This implies that as accrual quality increases, so does the extent of earnings management. This conclusion aligns with the findings of Rahman & Hasan (2019). A rating of accrual quality above 1 signifies the presence of a higher proportion of non-cash items in the income statement. In the power sector, the average accrual quality is measured at 1.41, indicating the utilization of non-cash factors such as depreciation, provisions for doubtful debts, and other similar measures to manipulate profit estimates and engage in earnings management.

An unqualified opinion usually exerts that there is no material misstatement in the financial information. An unqualified opinion is provided when the external auditors are pleased with the true and fairness of the financial information. In the Fuel & Power sector, a negative relationship between audit opinion and earnings management is observed. However, this relationship is found to be statistically insignificant, suggesting that audit opinion does not have a significant impact on earnings management. This finding is consistent with the research conducted by Tsipouridou & Spathis (2014), who also concluded that audit opinion does not have a significant impact on earnings management.

Consistent with prior research conducted by Bassiouny (2016), Atu et al. (2016), and Fathi (2013), the results of this study indicate a significant negative impact of the presence of the big four affiliated audit firms on earnings management. This negative relationship suggests that the big four audit firms have been successful in ensuring high audit quality within the power sector.

Contrary to the findings of Masud (2021) and Kibiya *et al.* (2016), this study observed a negative relationship between firm age and earnings management. However, it is important to note that this relationship is found to be statistically insignificant, suggesting that firm age does not have a significant impact on earnings management.

9. Conclusion

This research aims to investigate the presence of earnings management practices in the power sector and analyze the impact of company-specific characteristics on earnings management. Firstly, the study focuses on detecting instances of earnings management in the power sector. The findings reveal that, on average, 30% of companies in the power sector exhibit higher M-score values during the sample period of 2014-2020. Additionally, in 2015, the M-score value of 41% of power sector companies surpassed the predetermined cutoff point. Among the 22 selected power companies, eighteen of them consistently demonstrated significantly higher M-scores for at least one year between 2014 and 2020. Furthermore, the results indicate that 64% of probable manipulators received an unqualified opinion from external auditors.

In addition, this study examines the impact of five independent variables on earnings management using the M-score as a proxy. The findings reveal several significant relationships. Firstly, accrual quality is found to have a significant positive relationship with earnings management, indicating that higher accrual quality is associated with increased earnings manipulation. Conversely, firm size and audit quality exhibit significant negative impacts on earnings manipulation, suggesting that larger firms with stronger audit quality are less likely to engage in earnings management practices. However, audit opinion and firm age are found to have no significant impact on earnings management. A surprising finding is that out of the 11 probable manipulators identified by the M-score model, all of them received an unqualified opinion from external auditors. This highlights the need for external auditors to exercise caution and thoroughly assess the financial information before providing an unqualified opinion to companies. Furthermore, the study suggests that regulators should mandate companies to report both reported net income and taxable income. This dual reporting system would provide users with a comprehensive understanding of the company's financial performance and reduce the ability of managers to report inconsistent incomes and expenses. Such measures can contribute to improving transparency and reducing the potential for earnings manipulation.

A wide range of stakeholders of the power sector will be the beneficiary of this study. Foreign investors, in particular, will benefit from gaining insights into the current reporting practices of the power sector in Bangladesh. This knowledge can assist investors in making informed decisions regarding their investment levels in the power sector. Similarly, for government-controlled companies, the findings of this study will provide valuable information on whether any manipulation is taking place within the power companies. Furthermore, this study serves as a reminder for managers to exercise caution when reporting extraordinary or unusual information. It emphasizes the importance of providing adequate disclosure for such information. By doing so, managers can enhance transparency and maintain the trust and confidence of stakeholders.

Beneish (1999) identified certain limitations of the M-score model. Firstly, the model's estimation relies on financial information from publicly traded companies, making it less applicable for the analysis of privately held companies. Secondly, the model primarily focuses on detecting earnings overstatements and may not be suitable for examining companies that intentionally decrease their earnings. Moreover, this study doesn't investigate whether the companies are actually manipulating their information. It presents only the probability of manipulation. Moreover, there might some good or bad reasons for manipulation. If the manipulation is done to deceive the shareholders, then it will be treated as unethical and punishing activity. This study focuses solely on financial measures for detecting manipulation and does not include nonfinancial indicators. For instance, unusual reductions of employees can be a good indicator or measure to detect misstatements. This can be calculated by comparing year-over-year percentage changes in employee headcount and total assets, as suggested by Dechow *et al.* (2011). Furthermore, the sample size for this study is limited, and the availability of data for certain selected companies was also a constraint. These limitations should be taken into consideration when interpreting the findings of this study.

This study uses only the M-score model. Further research can be done by using other popular models for detecting earnings management with large scale data set. Moreover, those future research can be conducted in the same sector by another model or other sectors by using the same model.

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Appendix

Appendix:1

Name of the Companies Listed under the Fuel and Power sector

SL. NO	Name of the company	Trading Code	SL. NO	Name of the company	Trading Code
1	Associated Oxygen Limited	AOL	12	Khulna Power Company Limited	KPCL
2	Baraka Power Limited	BARAKAPOWER	13	Linde Bangladesh Limited	LINDEBD
3	Bangladesh Welding Electrodes Ltd.	BDWEILDING	14	Lub-rref (Bangladesh) Limited	LRBDL
4	CVO Petrochemical Refinery Limited	CVOPRL	15	MJL Bangladesh Limited	MJLBD
5	Dhaka Electric Supply Company Ltd.	DESCO	16	Meghna Petroleum Limited	MPETROLEUM
6	Doreen Power Generations and Systems Limited	DORRENPWR	17	Padma Oil Co. Ltd.	PADMAOIL
7	Eastern Lubricants Ltd.	EASTRNLUB	18	Power Grid Company of Bangladesh Ltd.	POWERGRID
8	Energypac Power Generation Limited	EPGL	19	Shahjibazar Power Co. Ltd.	SPCL
9	GBB Power Ltd.	GBBPOWER	20	Summit Power Limited	SUMITPOWER
10	Intraco Refueling Station Limited	INTRACO	21	Titas Gas Transmission & Dist. Co. Ltd.	TITASGAS
11	Jamuna Oil Company Limited	JAMUNAOIL	22	United Power Generation & Distribution Company Ltd.	UPGDCL

Source: Developed by authors

Appendix 02:

Selected Companies' Share Category

A Category		B Category	N Category	Z Category
AOL BARAKAPOWER DESCO DORRENPWR EASTRNLUB GBBPOWER INTRACOs JAMUNAOIL KPCL	LINDEBD MJLBD MPETROLEUM PADMAOIL POWERGRID SPCL SUMMIT TITAS UPGDCL	CVOPRL	EPGL LRBDL	BDWEILDING

Source: Developed by authors

Appendix 03

Descriptive Statistics of M-score Variables

Index	Mean	Cutoff Point of manipulators	No. of firm-years above the cutoff point	Std. Dev.	Min	Max
DSRI	1.19449	1.465	13	.9327325	.0913811	9.060611
GMI	.8831355	1.193	13	1.075005	-9.544227	2.000548
AQI	2.269916	1.254	27	10.20072	.3380207	105.4027
SGI	1.177312	1.607	7	1.167422	.0440609	11.88023
DEPI	.9647652	1.077	14	.1916254	.4749663	1.936883
SGAI	1.315097	1.041	46	2.184463	.0888	21.63333
TATA	-.016387	0.031	24	.0784634	-.3456493	.2700821
LVGI	1.038179	1.111	22	.4185269	.1124047	4.208625

Source: Developed by authors

Appendix 04

The M-score Value of Different Organizations

Year	Company Name	M-score	Total Companies with M-score>-2.22	Percentage of companies	Total Companies with M-score>-1.78	Percentage of companies
2014	BDWEILDING	-2.080	2	**9.1%**	-	
	EPGL	-1.976				
2015	CVOPRL	-0.708	5	**22.7%**	4	**18.2%**
	DESCO	-1.266				
	PADMAOIL	-1.897				
	SPCL	-1.530				
	TITASGAS	-0.975				
2016	BARAKAPOWER	-1.932	6	**27.3%**	4	**18.2%**
	KPCL	-0.601				
	MJLBD	-1.308				
	POWERGRID	-1.726				
	SUMMITPOWER	-1.489				
	UNITEDPOWER	-2.173				
2017	BDWEILDING	-1.630	5	**22.7%**	3	**13.6%**
	JAMUNAOIL	-1.603				
	KPCL	-1.596				
	MJLBD	-2.070				
	UNITEDPOWER	-2.018				
2018	BARAKAPOWER	-2.142	6	**27.3%**	1	**5%**
	JAMUNAOIL	-1.581				
	KPCL	-1.971				
	PADMAOIL	-2.148				
	SPCL	-2.209				
	SUMMITPOWER	-2.138				

2019	CVOPRL	-1.816	9	**40.9%**	4	**18.2%**
	DESCO	7.663				
	INTRACO	-1.886				
	JAMUNAOIL	-1.498				
	KPCL	237.549				
	MPETROLEUM	-1.631				
	POWERGRID	-1.959				
	SUMMITPOWER	-2.159				
	TITASGAS	-2.213				
2020	EASTERNLUB	-0.123	6	**27.3%**	5	**22.7%**
	GBBPOWER	1.121				
	PADMAOIL	-0.919				
	SPCL	-1.597				
	TITASGAS	-2.199				
	UNITEDPOWER	39.958				
Total Probable Manipulators indicated by M-score			39	**30.23%**	21	**16.3%**

Source: Developed by authors