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Investigating the Effect of Capital Expenditure and Age on Profitability: A Study of Listed Manufacturing Firms in Bangladesh

Abstract

The study has been conducted to investigate whether firms' capital expenditure and age have any impact on profitability. To serve this purpose, around 38 listed manufacturing companies of Dhaka Stock Exchange have been considered. Capital expenditure and age of the business since its commencement have been considered as independent variables where return of assets (ROA) as a proxy for profitability has been considered as dependent variable. To normalize the variability, the study used the natural logarithm of the said variables. To consider the confounding effect, the study also considered five control variables: total assets as proxy for firm size, debt to total assets as proxy for financial leverage, GDP growth as proxy for economic growth, the presence of COVID and one period lag on dependent variable. Based on the results of Hausman test, the study used Random Effect Model. In addition, owing to presence of heteroskedasticity and serial correlation, the study further accommodated Panel Corrected Standard Errors (PCSE) to interpret its findings. The findings of the study suggest that both capital expenditure and age of the firm have positive and significant effect on the profitability of the firms.

1.0 Background of the Study

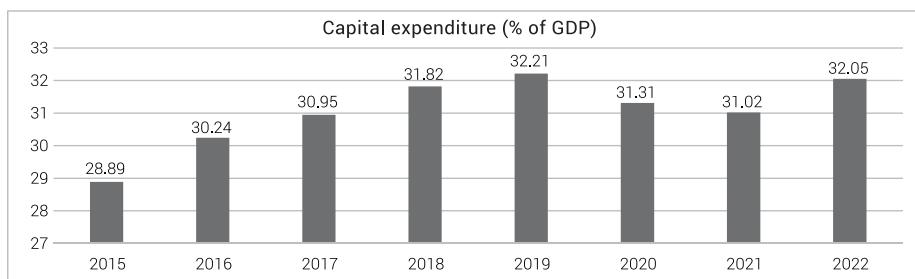
As the lifeblood that maintains operational vitality and promotes long-term success, profitability is of utmost importance in manufacturing companies. Fundamentally, profitability affects financial stability by allowing businesses to invest in cutting-edge technologies, pay for production, and maintain a strong position in ever-changing markets. Thus, businesses are able to grow their production capacity, launch new product lines, and investigate undiscovered markets since they are able to produce steady earnings. This growth helps the company's overall economic development in addition to securing market share. Furthermore, the well-being of employees is closely linked to profitability. A financially stable manufacturing company can provide a qualified and motivated workforce by investing in employee

training, paying competitive wages, and providing full benefits. Consequently, this raises productivity and adds to the manufacturing processes' overall efficiency. Manufacturing businesses frequently need to make large capital investments, and a successful business is better able to pay off debt, secure favorable credit conditions, and draw in outside money. Similar to a number of factors, Capital expenditure (Capex) is a critical component that enhances a business's long-term growth, efficiency, and competitiveness, all of which contribute to its profitability. In order to satisfy rising demand, businesses frequently need to increase their production or service capacities. Capex gives businesses the ability to invest in new equipment, buildings, or other resources, which enables them to take advantage of market opportunities and boost sales.

Besides capital expenditure, the age of the firm can have a mixed impact on profitability of the business. A company's age can have a big impact on its profitability since different phases of the business lifecycle offer different possibilities and obstacles. Age and profitability of a company have a dynamic relationship that is impacted by experience, flexibility, and market placement. Businesses of all ages can successfully navigate the web of time and continue to be profitable by being aware of the unique benefits and obstacles that come with becoming older and making proactive strategic decisions. Investment in capital expenditure brings positive and significant effect on output as defined by return on investment (Firli, Primiana and Kaltum, 2015). Empirical evidence has been preva-

lent that when firms invest in capital expenditure, they subsequently enjoy higher financial performance (Pandya, 2017). Therefore, this study intends to provide light on how well these investment choices generate returns for Bangladeshi manufacturing companies by examining the link between- capital expenditure and profitability. The manufacturing sector in Bangladesh is essential to the nation's economic growth, job creation, and export revenue. According to World Bank data, average capital expenditure by Bangladeshi manufacturing firms is around \$147.48 billion dollars as of 2022. The following graph highlights the capital expenditure of manufacturing companies of Bangladesh as a percentage of GDP.

Figure 1: Capital expenditure as a percentage of Gross Domestic Product



Source: The World Bank

Besides, a company's age is a good indicator of its organizational maturity, expertise, and ability to overcome obstacles in the market over time. Among a number of determinants of profitability, firms' age is a vital element (Maryana and Carolina, 2021). Why do certain businesses last longer than others? Academics studying business history, management, and economics are quite interested in this topic. While finding out the answer of the question, Panza, Vile and Merrett (2017) found that firms' age and profitability are significant predictor of firms' longevity. Older businesses might be more profitable because they have a more established market presence, a stronger brand

reputation, and more industry-specific knowledge. On the other hand, younger businesses might be more inventive, flexible, and sensitive to shifting market conditions. Enhancing knowledge of strategic resource allocation, competitive dynamics, lifecycle effects, economic development, and empirical evidence within the context of Bangladesh's manufacturing sector is the driving force behind research into the impact of capital expenditure and firm age on profitability. This research intends to address the unique possibilities experienced by listed manufacturing firms in Bangladesh within the context of the nation's economy by concentrating on these firms.

This study aims to add fresh perspectives and factual data to improve our knowledge of the variables (capital expenditure and age) affecting the dynamics of profitability in Bangladesh's manufacturing industry. The study aims to identify the distinct factors and drivers influencing the link between capital expenditure, business age, and profitability through in-depth analysis and statistical modeling.

Therefore, this study investigates whether investment in capital expenditure and age of the manufacturing companies have any impact on the profitability of the firms. This has also acknowledged that the determinants of profitability are not limited to capital expenditure and age rather a number of other factors as well. The study has considered selected listed manufacturing companies of Bangladesh as observation.

2.0 Literature review and hypothesis development

Profitability being a prime metrics of business depends on number of factors. Alarussi and Gao (2023) have conducted a study on Chinese listed companies regarding the determinants of profitability. The study came to the conclusion that there are positive and significant correlations between profitability and firm size, working capital, and intangible assets. Tahir, Hussain, Iqbal, Aslam and Masri (2020) conducted a study on non-financial firms to visualize how return on assets is affected. The findings indicate that, in the Malaysian context, board diversity and size have negligibly negative correlations with ROA. The Malaysian non-financial enterprises are significantly impacted negatively by financial leverage. In Malaysian non-financial enterprises, the dividend payout and ROA show a statistically significant and positive association, respectively. Hsaan, Anam and Didar (2019) conducted a study on financial determinants of return on assets in manufacturing companies in Bangladesh. They have considered

liquidity ratios, financial leverage ratios, efficiency ratios to identify their impact on profitability. The study showed confounding relationship of those variables with return on assets. While there are a number of factors affect the profitability of the firm, this study considers capital expenditure and age of the firm as factors that may have any effect on the firms' profitability.

2.1 Capital expenditure and profitability

Financial theory states that decisions on capital expenditures are crucial because they affect a company's capacity for future profits, level of productivity, and ability to compete. There are many facets and a complex relationship between capital expenditure and profitability. Pandya (2017) conducted a study regarding the impact of capital expenditure on firm's financial performance of infrastructure companies in India. The study suggests that the capital investment improves the company's financial performance. While identifying the effect of capital expenditure on the long-term performance of Indonesian listed companies, Kwistianus and Juniarti (2022) found that capital expenditure impacts the performance of companies positively in long-term. Amir, Guan and Livne (2006) estimated the impact of R&D and capital expenditures on physical assets (CAPEX) and the subsequent variability of profitability. They concluded that R&D contributes to subsequent earnings variability more than capital expenditure. Increasing CAPEX significantly improves ROI, profit, and the number of customers in Indonesia's Telecommunication Sector (Firli, Primiana, Kaltum, Oesman, Herwany, Azis and Yunani, 2017). Haryanto and Retnaningrum (2020) studied regarding the impact of capital expenditure on profitability. The study found that capital expenditure has significant positive impact on the firms' profitability. The impact of capital expenditure can be gone beyond profitabil-

ity In an effort to find whether capital expenditure, profitability and business risk have any impact on the capital structure of the firm.

Sihombing and Susanto (2021) found that in the real estate and property sector, capital expenditures and business risks have no bearing on the capital structure of the organization. Rosandy and Mita (2017) examined the impact of capital expenditure and market share on profits in Indonesian mobile telecommunications. Using the panel data regression, the study found that market share and CAPEX have a favorable impact on earnings. Zefriyenni, Pratiwi and Sari (2022) conducted a study to ascertain the principal effects of firm size, capital structure, and capital expenditure on company value in manufacturing companies listed on the IDX for the Years 2016-2020. Among a number of findings, the study found that the impact of capital expenditure on profitability is unrelated. Drawing on Keynes income multiplier theory and accelerator theory of investment, Onuoha and Okoye (2021) conducted a study to investigate the effect of capital expenditure on profitability. Utilizing a panel corrected standard error (PCSE) model to analyze data from the annual reports of eleven manufacturing companies listed on the Nigerian Stock Exchange over a five-year period (from 2013 to 2017), the study discovered that capital expenditure—that is, the expenditure on property, plant, and equipment—has a significant positive impact on corporate profitability, as measured by return on asset, net profit ratio, and sales revenue. Therefore, capital expenditure has significant impact on the profitability of manufacturing companies both globally and locally. To address these literatures, this study investigates whether capital expenditure has any impact on profitability of the business.

2.2 Firms' age and profitability

According to the Life Cycle Theory of the Firm, a company goes through several developmental stages, including introduction, growth, maturity, and decline. Every level has its own set of chances, tactics, and obstacles. According to this theory, a firm's age has an impact on its financial performance as it moves through different stages in terms of profitability. Younger businesses may place a higher priority on expansion and gaining market share than on immediate financial gain, making significant investments in marketing, innovation, and growth initiatives. As businesses get older, they could concentrate on increasing productivity, controlling expenses, and adding value in order to maintain profitability in a cutthroat market. To comprehend the impact of a firm's age on its profitability, it is necessary to analyze the unique obstacles and tactics linked to every stage of the company's existence. According to organizational learning theory, businesses can enhance their performance over time by gaining, assimilating, and using new information and abilities. Businesses can improve operational effectiveness, innovate products and processes, and adjust to shifting market conditions thanks to this learning process, all of which have an effect on profitability. According to Institutional theory, as businesses get older, they are assimilated into institutional contexts that are defined by stakeholder expectations, industry conventions, legal frameworks, and cultural values.

The effect of age on profitability demonstrates mixed dimensions. To find out whether firms' age has any effect on profitability, Selchuk (2006) conducted a study in Turkey. The study revealed that the age of the company has a negative and convex association with profitability as determined by return on equity, return on assets, or gross profit margin. Jahidur and Yilun (2021)

conducted a study on all the public firms in China stock market from 2008 to 2018. The study revealed positive impact between size and profitability but negative relationship between age and firms' profitability. Margaretha and Supartika (2016) studied regarding whether SMEs firms listed on the Indonesia Stock Exchange have an impact on profitability considering business size, age, growth, lagging profitability, productivity, and industry affiliation. The study discovered that while variable productivity and industry affiliation have a favorable impact on profitability, variable firm size, growth, and lagged profitability had a negative impact on profitability. On the contrary, Ilaboya and Ohiokha (2016) analyzed firm's age, size and profitability on listed companies of Nigerian Stock Exchange. The study discovered a positive association of firm's age and size on profitability. Samosir (2018) studied the impact of cash conversion cycle, firm size and age on profitability of manufacturing companies in Indonesia. It revealed that the factors that positively impact the variable return on assets are the firm's age, size, and cash conversion cycle. While finding the impact of firms' age, size and growth on its profitability of insurance companies of Jordan, Nawaiseh (2020) concluded that the age, size, and expansion of the insurance company have little bearing on its profitability. Haryati, Burhany, and Suantanto (2019) studied the role of age and bank performance on profitability. The study found that banks' age does not have significant relationship with profitability. Therefore, this study will investigate whether the age of the firm has any effect on.

2.3 Firm size and profitability

Besides capital expenditure and age, the study acknowledges the impact of size, leverage, economic growth and covid on profitability as control variables. Abeyrathna and Priyadarshana (2019)

conducted a study regarding the impact of firm size on profitability of manufacturing companies of Sri Lanka. The findings demonstrated that the profitability of Sri Lanka's listed manufacturing companies is not significantly impacted by firm size. Isik, Unal and Unal (2017) examined the effect of firm size on profitability for Turkish manufacturing sector. The study found firm size as measured by firms' assets, sales and number of employees have positive impact on the profitability as measured by return on assets. Islam, Rahman, Tanchangya, and Islam (2023) conducted a study on manufacturing sector of Bangladesh. The study found that while the natural logarithm of total assets (TA) has a substantial negative relationship with ROA, the natural logarithms of net profit margin (NPM) and total sales (TS) have a strong positive relationship with ROA. While finding out the profitability of commercial banks in Bangladesh, Dey (2014) found that the overall profitability of commercial banks is mostly determined by three factors: asset quality, earnings, and bank size. On the contrary, Sufian and Habibullah (2008) studied the profitability of 37 commercial banks of Bangladesh where they found that return on average equity is negatively impacted by size, although net interest margins and return on average assets are positively impacted. Therefore, the impact of size on profitability has three dimensions: positive, negative and neutral. Thus, firm size may have significant impact on profitability.

2.4 Financial leverage and profitability

Rezina, Ashraf and Khan (2020) analyzed the determinants of profitability in the cement industry in Bangladesh. The study discovered that the real interest rate, GDP growth rate, and leverage all significantly affect profitability. The profitability of the businesses in the cement sector is negatively impacted by inflation, leverage, the expenses to revenue ratio, and firm size,

age, GDP growth rate, and real interest rate. Alam (2017) examined on the analysis on the manufacturing firm of Bangladesh. The study found that profitability of firms is significantly influenced by debt ratio, liquidity, size, total asset turnover and financial leverage. To observe the impact of financial leverage on the profitability of 60 Fast Moving Consumer Goods (FMCG) companies listed on National Stock Exchange (NSE) and Bombay Stock Exchange (BSE), Sing and Bansal (2016), found that demonstrated that the firm's performance indicator is significantly impacted negatively by leverage. On the other hand, ROA is positively and significantly impacted by financial leverage. The research shows that a high interest rate and a large debt load reduce equity value and negatively affect business performance. According to the findings, financial leverage improves a company's profitability as long as its debt load is kept under control (Iqbal and Usman, 2018).

2.5 Economic growth and profitability

Gazi et al., (2021) conducted a study regarding the profitability in banking sector. The study's findings indicate that the macroeconomic variable, GDP growth rate, as well as the firm-specific variables, equity to asset ratio, deposit to asset ratio, debt to equity ratio, and loan to deposit ratio, all statistically significantly affect the profitability, as measured by return on equity (ROE) and return on asset (ROA). The government, bank authorities, investors, shareholders, and policy makers can all benefit greatly from the research findings in order to improve the performance of Bangladesh's banking industry. Hossain and Ahamed (2021) conducted a study on the determinants of bank profitability in Bangladesh. It has been discovered that there is a substantial correlation between GDP growth, capital ratio, and non-interest income and ROA. A study conducted by

Sharma (2022) found that GDP growth has no significant effect on the ceramic industry of Bangladesh. While finding the determinants of profitability of listed manufacturing companies of Bangladesh, Hossain (2020) discovered that GDP growth, working capital, yearly inflation, and business size had no discernible effects on profitability.

2.6 COVID and profitability

Firm performance has been significantly impacted by the COVID-19 epidemic, as evidenced by Return on Assets (ROA). Numerous companies saw a reduction in sales and profitability, which in turn caused a decline in ROA across a range of industries. These factors included widespread disruptions to supply chains, a decline in customer demand, and changes in consumer behavior. The rapid adoption of digital services resulted in notable decreases in certain industries, such as hospitality and entertainment, but boosted demand and enhanced ROA in others, like technology and online retail. Enterprises in difficulty were helped by government assistance and regulatory changes, but the pandemic's long-term effects—such as alterations in customer behavior and business practices—are still influencing how well enterprises succeed. Cho and Sake (2021) investigated the impact of COVID-19 on business performance was demonstrated using the example of the US textile and clothing sector, which saw a precipitous drop in business performance after the epidemic. Moreover, the detrimental impact of COVID-19 on the performance of textile and apparel companies outweighs that of the 2008 recession and the 9/11 terrorist attacks. Devi, Warasniasih, Masdi-antini, and Musmini (2020) analyzed the impact of Covid-19 on the financial performance of Indonesian companies. They found that between before and during the COVID-19 pandemic, there were notable

differences in the profitability ratio and short-term activity ratio of the companies. While consumer goods sector experienced positive impact after covid, property, real estate, finance, trade, services and investment sector experienced negative impact in covid. Therefore, the presence of covid may have effect on the profitability of the company.

Based on the existing literatures, it can be inferred that there is no study conducted that demonstrates the effect of capital expenditure and age of the firm on the profitability of manufacturing companies in Bangladesh. Previously, effect of capital expenditure on profitability has been conducted based on a particular sector. But this study encompasses the diverse manufacturing companies of Bangladesh. Moreover, the time period of this study is from 2010 to 2022 which is another unique to the literatures.

In order to explore the connections between capital expenditure (CapEx), business age, and profitability, this study puts up a number of literatures. The hypothesis is that an increase in CapEx will impact profitability since investments in capacity, efficiency, and innovation result in lower costs and higher revenue. Based on existing literatures, there are mix relationship between firms' age and profitability. Due to growth investments, younger companies may be less profitable, but older companies may gain from economies of scale and improved operational efficiency. In order to comprehend how moderating factors affect the correlations between these variables and profitability, the study also examined them, including business size, financing method, economic growth and the presence of COVID. Therefore, based on the objective of the research, the null and alternate hypothesis for this study is as follows:

H1: There is significant effect of capital expenditure and age on profitability of the manufacturing companies of Bangladesh.

3.0 Methodology

Methodology of this paper has been designed in such a way that meets the answer of the research question. Based on the availability of data of same time span, finally 38 (thirty-eight) DSE-listed manufacturing companies have been taken into consideration. Altogether, there are 494 observations for this study. The companies' name of this study has been shown in appendices section of this study. However, the sector-wise number of company's list has been depicted below:

3.1 Dataset

The dataset used in this study encompasses the following characteristics:

Table 1: Sector-Wise Number of Companies

Sector Name	Number of Companies	% of Total Sample
Cement	05	13.15%
Ceramic	05	13.15%
Food	06	15.79%
Jute	01	2.63%
Paper and Printing	02	5.26%
Pharmacy and Chemical	08	21.05%
Tannery	03	7.89%
Textile	08	21.05%
Total	38	100%

3.1.a Time frame: As the study has been conducted in 2023, the last year considered for the study was 2022. In total, the study considers 13 (thirteen) years of data from 2010 to 2022 of 38 manufacturing companies.

3.1.b Sources of data: Secondary sources have been used for this study. The variables chosen both dependent and independent have been sourced from annual reports of the respective company. In addition, World Bank Indicator's data has been used as another source for macroeconomic data of this study. The detailed variables' names

and source are to be portrayed in the following section. To enrich the study and to increase the depth, contemporary newspapers, articles and literatures have been aligned, pertinent to this study.

3.1.c Data processing and presentation:

The secondary data has been collected and arranged in Microsoft Excel and processed in statistical software STATA. After processing in STATA, results have been depicted in tables and charts of Microsoft Word, convenient to understand from reader's perspective.

3.2 Research Type

The research is quantitative in nature. Panel data has been used in this study which is a type of dataset that combines characteristics of both cross-sectional data and time-series data. Each entity, company in our case, is observed at multiple points in time, creating a panel or matrix structure. For empirical analysis, the study used Random Effect Model based on the results of Hausman test. However, the study also adds Panel-Corrected Standard Errors (PCSE). The presence of heteroskedasticity, autocorrelation and cross-sectional dependence has called for adopting PCSE for this study. It is customary when working with panel data to take into consideration the possibility of correlation between observations made over time within the same entity. The standard errors of regression coefficients are adjusted for probable heteroscedasticity and serial correlation within panels using the Panel-Corrected Standard Errors (PCSE) function. Stated differently, PCSE is a technique that modifies standard errors to take into consideration potential correlation and heteroscedasticity among individual entities when estimating regression models using panel data.

3.3 Variables

There are one dependent variable and

seven independent variables. The independent variables have been considered based on existing literatures and theories.

3.3.a Dependent variable: The dependent variable of the study is profitability. The study has considered Return on Assets (ROA) as profitability as per most of the literatures. To normalize the data, the research used logarithm of ROA (Rostami et al., 2016).

3.3.b Independent variables: While choosing independent variable whether the firms' capital expenditure and age have any effect on profitability, the study has sought investment in capital expenditure and age of the firm respectively. In case of capital expenditure, the study used investment into property, plant and equipment as the most justified proxy as per literature. Theoretically, the effect of capital expenditure does not immediately effect on the profitability of the firm. That is why one period lag of capital expenditure has been considered. To standardize the data, the study used logarithm form of one period lag of capital expenditure. Another variable is age. The age has been considered since the inception of the business operation of individual operation. Again, to standardize data, the study used logarithm of age for respective observation. To account for potential confounding factors or sources of variation, size of the firm, financial leverage, economic growth has been considered as control variables for the study. For size of the firm, logarithm of total assets has been used. For financial leverage, debt to total assets have been used. For economic growth, GDP growth rate has been considered. As the data period includes COVID, the study considers covid as dummy variable. To address endogeneity issue, one period lag of logarithm ROA has been considered. The description of the variables is as follows:

Table 2: Description of each variable

Types of variables	Variable	Acronym	Measurement	Expected sign	Data source	Source
Dependent	Profitability	Inroa	Logarithm of Return on Assets i.e. (Net income/Total Assets)		Annual Reports	Rostami et al., (2016)
Independent Variables	Capital Expenditure	Incapexlag	One period lag of logarithm of investment into Property, Plant & Equipment	(+)	Annual Reports	Nguyen-Hoang and Yeung (2014)
	Age	Inage	Logarithm of number of years since company's establishment till the observation date (2022)	(+/-)	Annual Reports	Kim et al., (2020)
Control Variables	Size of the company	Ina	Logarithm of total assets	(+/-)	Annual Reports	Islam et al., (2023)
	Leverage	dta	Debt to total assets	(+/-)	Annual Reports	Bei and Wijewardana, (2012)
	Lag Profitability	Inroalag	One period lag of Return on Asset	(+)	Annual Reports	
	Economic Growth	gdpgr	GDP growth rate of the respective year	(+/-)	WDI, World Bank	Gazi et al., (2021)
	Covid	Cov	Presence of covid as denotes 1 and absence 0	(+/-)	-	Devi et al., (2020)

3.4 Model of the study

The model of the study is as follows as per literatures:

$$\logroai_t = \beta_0 + \beta_1 \times \logcapexi_{t-1} + \beta_2 \times \logagei_{t+} + \beta_3 \times \logtotalai_t + \beta_4 \times dtai_t + \beta_45 \times gdpgr_i_t + \beta_6 \times \logroai_{t-1} + \text{covi}_t + \epsilon_i_t$$

3.5 Model diagnostic tests

To meet the assumptions of underlying Panel Data Analysis, the study performed a number of tests and then finally arrived at using the most suitable model. The following section describes the tests performed and the results. Moreover, the appendices section contains all the detailed results of the following tests.

3.5.a Normality test: To check whether the variables chosen follow a normal distribution, the study incorporated Shapiro-Wilk Test for normality. Based on P-value which

is less than 5%, the test indicates that all variables in the study does not follow normal distribution.

3.5.b Multicollinearity test: According to Pearson Correlation Coefficient result, this is evident that no explanatory variables demonstrate multicollinearity issues because none of them has a correlation coefficient greater than 0.80. To check the multicollinearity, the study further used Variance Inflation Factor (VIF). Based on the test, the mean VIF is 1.44. As it is less than 10, it indicates that the model does not have multicollinearity.

3.5.c Heteroskedasticity test: To check the heteroskedasticity, the research adopted Breusch-Pagan / Cook-Weisberg test. Based on the P value which is close to 0.00, the model shows that there is presence of heteroscedasticity.

3.5.d Autocorrelation test: To check the autocorrelation, Wooldridge test has been run for this model. Considering 5% significance level, the test suggests that there is presence of autocorrelation in dataset.

3.5.e Cross-sectional dependency: The model used Pesaran's methods to check the cross-sectional dependence among the panel data set. Since the p-value is high (0.91), there is not enough evidence to reject the null hypothesis. Therefore, based on these results, there is no significant cross-sectional dependence in data.

3.5.f Hausman test: Whether to use Fixed Effects Model or Random Effect Model, the study has considered Hausman test. Based on above table, the null hypothesis—that is, the idea that the coefficients from the random effects model are efficient and consistent—cannot be rejected since the chi-square value is nearly zero. This implies

that both the fixed effects and random effects estimators may be consistent and effective but the random effects model may be marginally more efficient. Based on Hausman test, the null hypothesis—that is, the idea that the coefficients from the random effects model are efficient and consistent—cannot be rejected since the chi-square value is nearly zero. This implies that both the fixed effects and random effects estimators may be consistent and effective but the random effects model may be marginally more efficient.

4.0 Findings and discussion

4.1 Descriptive statistics

The study shows 494 observations of 38 manufacturing companies. The following table shows the mean, standard deviation, minimum and maximum values of those observations.

Table 3: Descriptive statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
roa	494	0.046	0.206	-4.052	0.537
capexlag (million)	494	3,730	5,930	1.000	41,800
dta	494	0.420	0.349	-4.655	1.106
age	494	30.16	18.335	4.000	112.00
ta (million)	494	8,350	11,500	1.000	83,400
roalag	494	0.046	0.206	-4.052	0.537
gdpgr	494	6.429	1.041	3.448	7.882
cov	494	0.230	0.421	0.000	1.00

Source: Author's analysis using STATA (Version 14.2)

As per above table, the mean value of Return on Assets (ROA) is 0.046 or 4.6% whereas the mean capital expenditure by the firms is around Tk. 3,730 million. The mean financial leverage level (debt to total asset) is nearly half of the capital structure

i.e. 0.42:1. The average age of the firms in this study is around 30 years. The mean value of total assets is around Tk. 8,350 million. The average economic growth in this time span was 6.429%.

Table 4: Result of Random Effect Model

Variables	Coef.	Std. Err.	z	P > z
Inroalag	0.530	0.038	13.810	0.000***
Incapexlag	0.091	0.012	7.760	0.000***
dta	-0.387	0.182	-2.120	0.034**
Inage	0.188	0.106	1.770	0.077*
Inta	-0.132	0.011	-11.960	0.000***
gdpgr	-0.031	0.060	-0.520	0.605
cov	-0.134	0.154	-0.870	0.385
constant	-0.597	0.503	-1.190	0.236
R-Sq	50.24%			
Prob > chi2	0.0000			
<i>Note: 1) Here *** means significant at 1%, ** means significant at 5%, * means significant at 10%.</i>				

Source: Author's analysis using STATA (Version 14.2)

Based on the results of Random Effect Model, the two independent variables of our study (Incapexlag and Inage) are significant. However, the Inage variable is significant at 10% and Incapexlag is significant at 1% level. The overall model is significant since the P-Value is close to 0.000. The R-square of the model is 50.24% which means approximately 50.24% of the variability in the dependent variable is explained by the independent variables.

However, Random Effects Model assumes constant variance of the error term across groups (individuals in panel data). This assumption is broken by heteroskedastic-

ity, which could result in estimates that are biased and ineffective. It also assumes no serial correlation within groups (observations for the same individual over time). This assumption is incorrect due to autocorrelation, which can also provide deceptive standard errors.

To address heteroskedasticity and autocorrelation, the study further used PCSE (Panel-Corrected Standard Errors). In panel data models, the PCSE method is used to modify the standard errors to take into consideration probable heteroscedasticity and serial correlation which are present in this study. The result of PCSE is as follows:

Table 5: Result of PCSE Model

Variables	Coef.	Std. Err.	z	P > z
Inroalag	0.408	0.092	4.400	0.000***
Incapexlag	0.073	0.019	3.750	0.000***
dta	-0.384	0.246	-1.560	0.120
Inage	0.245	0.069	3.520	0.000***
Inta	-0.131	0.015	-8.580	0.000***
gdpgr	-0.045	0.062	-0.730	0.467
cov	-0.173	0.188	-0.920	0.357
constant	-0.678	0.509	-1.330	0.183

Variables	Coef.	Std. Err.	z	P > z
R-Sq	40.93%			
Prob > chi2	0.0000			
<i>Note: 1) Here *** means significant at 1%, ** means significant at 5%, * means significant at 10%.</i>				

Source: Author's analysis using STATA (Version 14.2)

Based on the result of above table, the two main variables in the study are significant at 1% level. The Incapexlag which is logarithm of one period lag of capital expenditure is significant. The coefficient of 0.073 implies that if the capital expenditure is increased by 1%, then the return on assets on the next year will be increased by 7.3% and vice-versa, other things remaining constant. Another independent variable is Inage which is logarithm of age of the firms. The coefficient of 0.213 suggests that when the age of the firm increased by 1 year then the return on the assets of the firm increases by 21.3 percentage and vice-versa, other things remaining same. Both explanatory variables are significant at 1% level. The size of the firm (Inta), one of the control variables of the model, has been also significant but other three control

variables (dta, gdpgr, and cov) are not significant at 10% level. To address the endogeneity, the model used one period lag of dependent variable (Inroalag) which has been also significant 1%.

The overall model is significant since the P-value is close to 0.000. In addition, the R-sq is 40.93% which means the explanatory variables can explain around 40.93% of variability of dependent variable.

Therefore, based on the P-value, we can reject null hypothesis and state that there is significant effect of capital expenditure and age on profitability of the manufacturing companies of Bangladesh.

The expected relationship versus the actual relationship based on PCSE have been depicted below:

Table 6: Expected and actual relationship

	Lag of Log Capital Expenditure	Log of Age	Debt to Asset	Log of Total Assets	Lag of Log Return on Assets	GDP Growth Rate	Covid
Expected Sign	(+)	(+/-)	(+/-)	(+/-)	(+)	(+/-)	(+/-)
Random Effect	(+) ^{***}	(+) [*]	(-) ^{**}	(-) ^{***}	(+) ^{***}	(-)	(-)
PCSE	(+) ^{***}	(+) ^{***}	(-)	(-) ^{***}	(+) ^{***}	(-)	(-)
<i>Note:</i> 1) Here *** means significant at 1%, ** means significant at 5%, * means significant at 1%. 2) () comprises the sign of the variables							

Despite higher R-square in Random Effect Model, the study uses PCSE model to interpret the findings as this model is more robust given the characteristics of data.

Hence, the discussion of this study has been described in this section using PCSE model.

4.2 Capital expenditure

Firms invest in capital expenditure to enhance productivity, efficiency and overall competitiveness. Even while capex has high upfront expenses, if the investments are well-planned and lead to better operations, they can eventually enhance revenue and profitability. Capital investments boost the business's profitability by improving its financial performance (Pandya, 2017). A number of studies found positive impact of capital expenditure on profitability (Kwistianus and Juniarti, 2022; Firlil et al., 2015; Haryanto and Retnaningrum, 2020; Rosandy and Mita, 2017; Onuoha and Okoye, 2021). On the other hand, there is evidence that investment in capital expenditure is unrelated to profitability of the firm (Zefriyenni et al., 2022).

As per the results of PCSE in this study, investment in capital expenditure has positive impact on following year's profitability. Given the both ways of impact in literature (positive and negative), the result of this study supports that investment in capital expenditure has positive impact of the profitability of the firms. The co-efficient of the variable is also 0.07 which means for each unit of capital expenditure produces 0.07 return on assets, other things remaining constant. The co-efficient found is also statistically significant at 1% significance level. Therefore, we can state that investment in capital expenditure has positive impact on profitability. However, when a company invests in capital expenditure in a particular year, it may not experience impact on profitability on that year. It has impact on profitability in the following years. This research has incorporated this lag behavior thus considered one period lag of capital expenditure.

4.3 Age of the firm

The age of the firm is simply the cumulative years that business has been in operation

till the date. A company's age can have a number of effects on its profitability. There is complicated correlation between a company's age and profitability. It might be difficult for younger businesses to get recognition in the industry and turn a profit at first. The early profitability can be affected by start-up costs, initial investments, and marketing expenses. Likewise, older businesses frequently have a well-established reputation and brand in the industry. Profitability may benefit from increased client loyalty and trust as a result of this. Alternatively, older firms may face the threat of extinction if they do not update themselves. In essence, the relationship between firm age and profitability is not static. Literatures support both positive and negative relationship of age with profitability. The impact of age has negative and convex association with the profitability (Jahidur and Yolun, 2021; Selchuk, 2006).

Whereas several studies found positive impact of age on profitability (Samosir, 2018; Ilaboya et al., 2016). Moreover, there are further studies that showed age has no impact on profitability (Nawaiseh, 2020; Haryati et al., 2019). This study found that older firms prove to be more profitable. In other words, as the firm grows, their ability to generate profits increases. Furthermore, the co-efficient of the age in this study is statistically significant.

4.4 Financial leverage

According to the trade-off theory, there is an ideal debt level for a business that strikes a balance between the benefits of debt (interest tax protection) and the expenses associated with financial difficulty. This idea suggests that a company's profitability can be increased by a reasonable amount of debt because it can take advantage of tax benefits without incurring significant expenditures associated with financial distress. On the contrary, it is imperative for

companies to uphold a certain degree of financial adaptability in order to accommodate evolving market dynamics and investment prospects. While too little debt may lead to missed opportunities, excessive debt might restrict one's ability to make financial decisions. Higher leverage can affect negatively to the profitability of the company (Rezina et al., 2020; Alam, 2017). However, ROA can be positively affected by financial leverage if it is taken under control (Iqbal and Usman, 2018). As per the result of the study, financial leverage has negative impact on the profitability of the companies. However, the relationship is not significant as per PCSE model.

Size of the Firm

There is no clear consensus on whether firm size and profitability are uniformly correlated positively or negatively, despite a large number of studies. It appears that the link is intricate and subtle. According to certain research, firm size has a positive impact on profitability thus bigger firms enjoy comparatively more profits (Isik et al., 2017). On the other hand, a number of research found that firm's size has negative impact on profitability (Islam et al., 2023). Interestingly, there is evidence that firms' size has no impact on the profitability (Abeyrathna and Priyadarshana, 2019). As per this study, size of the firm has negative impact on the profitability. There might be a number of reasons. For instance, a large business can have a higher number of management tiers, which could impede communication and decision-making. Furthermore, large organizations could find it more difficult to coordinate efforts amongst several divisions, which could result in resource waste and duplication of effort. In addition, smaller businesses can react to market developments faster and are frequently more innovative. Furthermore, smaller businesses might be able to undercut larger businesses' prices due to

their reduced costs.

4.5 Economic growth

Whether economic growth and ROA are positively or negatively correlated is a matter of debate. The link seems complex and context-specific, impacted by a range of variables such as economic cycles, business characteristics, and industry. Positive impact has been shown in several research, suggesting that times of rapid economic expansion boost business profitability through higher investment spending, enhanced customer confidence, and increased demand (Gazi et al., 2021; Hossain and Ahamed, 2021). On the other hand, a number of research suggested a contrary notion, contending that swift expansion may exacerbate rivalry, price increases, and labor demands, ultimately weakening profit margins. Moreover, GDP as an indicator of economic growth has no effect on the firm profitability (Hossain, 2020) as per this study, GDP has negative impact on the firms' profitability. However, according to P-value, such relationship is not statistically significant.

4.6 COVID

The COVID-19 epidemic has significantly affected the performance of businesses. Some industries profited from the crisis, but others saw serious difficulties. In the face of the pandemic's obstacles, companies who could quickly adjust, use technology, and respond to shifting market conditions were better positioned to preserve or even increase their return on assets (ROA). The impact of COVID has both dimensions. It impacted positively to a number of industries as well as negatively (Devi et al., 2020). However, this study has found that the presence of COVID has negatively impacted the firms' performance, as measured by ROA. Yet, the coefficient is not statistically significant.

5.0 Conclusion

In the context of listed manufacturing companies in Bangladesh, the study has clarified the complex relationship between capital expenditure, the age of businesses, and their profitability. Numerous significant conclusions have been drawn from the thorough examination of financial data using reliable statistical techniques. Firstly, among the manufacturing companies in our sample, there is a strong positive association between capital expenditure and profitability, according to research. This shows that investing in capital assets—like infrastructure, technology, and machinery—is essential to improving these businesses' financial performance. These results highlight how crucial it is to strategically allocate financial resources toward capital investments in order to promote long-term profitability and steady growth. Second, we have some fascinating new information about the effect of business age on profitability. We discover that older enterprises are more profitable than their younger counterparts, defying the mixed link between age and profitability. This emphasizes how established businesses constantly innovate and adapt their business plans in order to preserve their competitive edge and guarantee long-term prosperity. Research further emphasizes how important it is for management teams, industry stakeholders, and policymakers to understand the dynamic interactions among capital expenditure, business age, and profitability. To boost economic growth and improve the manufacturing sector's competitiveness in Bangladesh, policymakers should cultivate an atmosphere that is favorable to investment, innovation, and entrepreneurship.

To sum up, the results of this research add significant understanding to the corpus of information already available on corporate finance and strategic management. Examining the effects of capital expenditure and age on profitability helps further the development

of organizational theory by elucidating the various elements that determine business performance. Stakeholders can improve theoretical frameworks pertaining to resource-based theory, dynamic capacities, and organizational learning by investigating these aspects. Analyzing the impact of capital expenditure and age on profitability has beneficial implications for strategic management. These results can help managers decide on long-term planning, resource allocation, and investment plans. To maximize profitability, for example, specific strategies for both young and senior enterprises can be designed with an understanding of how different age cohorts of firms respond to capital investment. It is imperative to recognize the constraints of our study, such as the extent of data accessibility and the possibility of unidentified variables impacting profitability dynamics. In order to give a more thorough grasp of the intricate elements influencing business success in Bangladesh's manufacturing sector, future research projects may go further into these areas. In the end, companies may use these insights to guide well-informed decisions that optimize their capital spending strategies and promote long-term profitability in a constantly changing economic environment.

Further research could explore the impact of other financial metrics, such as debt levels and operational efficiency, on profitability. Additionally, investigating the role of external factors like economic conditions, market competition, and regulatory changes on manufacturing firms' profitability in Bangladesh would provide a more comprehensive understanding. Comparative studies with firms in other developing countries could also offer valuable insights into the unique challenges and opportunities in Bangladesh. Finally, incorporating qualitative data through interviews with industry experts could enrich the analysis by providing context to the quantitative findings.

6.0 References

- Abeyrathna, S. P. G. M., & Priyadarshana, A. J. M. (2019). Impact of firm size on profitability. *International Journal of Scientific and Research Publications (IJSRP)*, 9(6). doi: 10.29322/ijsrp.9.06.2019.p9081
- Akben-Selcuk, E. (2016). Does firm age affect profitability? evidence from Turkey. *International Journal of Economic Sciences*, V(3). doi:10.20472/es.2016.5.3.001
- Alarussi, A. S., & Gao, X. (2021). Determinants of profitability in Chinese companies. *International Journal of Emerging Markets*, 18(10), 4232-4251. doi:10.1108/ijoem-04-2021-0539
- Amir, E., Guan, Y., & Livne, G. (2006). The association of R&D and capital expenditures with subsequent earnings variability. *Journal of Business Finance & Accounting*, 34(1-2), 222-246. doi:10.1111/j.1468-5957.2006.00651.x
- Bangladesh capital investment, percent of GDP - data, Chart. *TheGlobalEconomy.com*. (n.d.). https://www.theglobeconomy.com/Bangladesh/capital_investment/
- Bei, Z., & Wijewardana, W. P. (2012). Financial leverage, firm growth and financial strength in the listed companies in Sri Lanka. *Procedia - Social and Behavioral Sciences*, 40, 709-715. <https://doi.org/10.1016/j.sbspro.2012.03.253>
- Cho, B., & Saki, Z. (2021). Firm performance under the COVID-19 pandemic: The case of the U.S. textile and apparel industry. *The Journal of The Textile Institute*, 113(8), 1637-1647. <https://doi.org/10.1080/00405000.2021.1943258>
- Maryana, M., & Carolina, Y. (2021). The impact of firm size, leverage, firm age, media visibility and profitability on Sustainability Report disclosure. *Jurnal Keuangan Dan Perbankan*, 25(1). <https://doi.org/10.26905/jkdp.v25i1.4941>
- Devi, S., Warasnasih, N. M., Masdiantini, P. R., & Musmini, L. S. (2020). The impact of covid-19 pandemic on the financial performance of firms on the Indonesia Stock Exchange. *Journal of Economics, Business, & Accountancy Ventura*, 23(2), 226-242. <https://doi.org/10.14414/jebav.v23i2.2313>
- Dey, M. (2014). Profitability of commercial banks in Bangladesh: A multivariate analysis. *IOSR Journal of Business and Management*, 16(4), 92-95. <https://doi.org/10.9790/487x-16439295>
- Firli, A., Primiana, I., & Kaltum, U. (2015). The impact of increasing capex on customer number, profit, and ROI in Indonesia Telecommunication Industry. *American Journal of Economics*. <http://article.sapub.org/10.5923.c.economics.201501.14.html>
- Gazi, Md. A., Alam, Md. S., Hossain, G. M., Islam, S. N., Rahman, M. K., Nahiduzzaman, Md., & Hossain, A. I. (2021). Determinants of profitability in banking sector: Empirical evidence from Bangladesh. *Universal Journal of Accounting and Finance*, 9(6), 1377-1386. <https://doi.org/10.13189/ujaf.2021.090616>
- Haryanto, T., & Retnaningrum, M. (2020). The effect of capital expenditure on profitability with the size of company as the moderating variables. *Proceedings of the 2nd International Conference of Business, Accounting and Economics, ICBAE 2020*, 5 - 6 August 2020, Purwokerto, Indonesia. <https://doi.org/10.4108/eai.5-8-2020.2301085>
- Haryati, N., Burhany, D. I., & Suhartanto, D. (2019). Assessing the profitability of Islamic banks: The role of Bank Age and Bank Performance. *IOP Conference Series: Materials Science and Engineering*, 662(6), 062014. <https://doi.org/10.1088/1757-899x/662/6/062014>
- Hassan, Md Arif & Anam, Sayedul, & Kamruzzaman Didar, Md. (2019). Effect of financial determinants on return of assets (ROA) in manufacturing companies of Bangladesh.
- Hossain, T. (2020). Determinants of profitability: A study on manufacturing companies listed on the Dhaka Stock Exchange. *Asian Economic and Financial Review*, 10(12), 1496-1508. <https://doi.org/10.18488/journal.aefr.2020.1012.1496.1508>
- Iqbal, U., & Usman, M. (2018). Impact of financial leverage on firm performance. *SEISENSE Journal of Management*, 1(2), 70-78. <https://doi.org/10.33215/sjom.v1i2.13>
- Isik, O., Aydın Unal, E., & Unal, Y. (2017). The effect of firm size on profitability: Evidence from Turkish Manufacturing Sector. *Pressacademia*, 6(4), 301-308. <https://doi.org/10.17261/pressacademia.2017.762>
- Kim, S., Saha, A., & Bose, S. (2020). Do capital expenditures influence earnings performance: Evidence from loss-making firms. *Accounting & Finance*, 61(S1), 2539-2575. <https://doi.org/10.1111/acfi.12675>
- Kwistianus, H., & Juniarti. (2022). The long-term performance of capital expenditure from a fundamental perspective: Evidence from Indonesia. *Asian Economic and Financial Review*, 12(12), 1027-1040. <https://doi.org/10.55493/5002.v12i12.4667>
- Margaretha, F., & Supartika, N. (2016). Factors affecting profitability of small medium enterprises (smes) firm listed in Indonesia Stock Exchange. *Journal of Economics, Business and Management*, 4(2), 132-137. <https://doi.org/10.7763/joebm.2016.v4.379>

- Mwangi, R. W. (2014, October 1). The effect of capital expenditure on financial performance of firms listed at the Nairobi Securities Exchange. UoN Digital Repository Home. <http://erepository.uonbi.ac.ke/handle/11295/75458>
- Nguyen-Hoang, P., & Yeung, R. (2014). Dollars for lives: The effect of highway capital investments on traffic fatalities. *Journal of Safety Research*, 51, 109–115. <https://doi.org/10.1016/j.jsr.2014.09.008>
- Ilaboya, Ofuan. J., & Ohiokha, Izien. F. (2016). Firm age, size and profitability dynamics: A test of learning by doing and structural inertia hypotheses. *Business and Management Research*, 5(1). <https://doi.org/10.5430/bmr.v5n1p29>
- Onuoha, N. E. ., & Okoye, G. O. (2021). CAPITAL EXPENDITURE AND CORPORATE PROFITABILITY NEXUS: EVIDENCE FROM MANUFACTURING FIRMS IN NIGERIA. *Advance Journal of Management, Accounting and Finance*, 6(07), 87–98. Retrieved from <https://aspjournals.org/majmaf/index.php/ajmaf/article/view/5>
- Pandya, B. (2017, January 1). Impact of capital expenditure on firm's financial performance: A study of select infrastructure companies in India. *NICE Journal of Business | EBSCOhost*. <https://openurl.ebsco.com/EPDB%3Agcd%3A14%3A19092670/detailv2?sid=ebsco%3Aplink%3Ascholar&id=ebsco%3Agcd%3A132823377&crl=c>
- Panza, L., Ville, S., & Merrett, D. (2017). The drivers of firm longevity: Age, size, profitability and survivorship of Australian corporations, 1901–1930. *Business History*, 60(2), 157–177. <https://doi.org/10.1080/00076791.2017.1293041>
- Parvez Alam, Md. (2017, October 28). Profitability and its determinants - an empirical analysis on manufacturing firm of Bangladesh. UIU DSpace Home. <http://dspace.uiu.ac.bd/handle/52243/820>
- Rezina, S., Ashraf, A., & Khan, Md. A. (2020). An inferential study on the profitability determinants of the cement industry in Bangladesh. *Asian Finance & Banking Review*, 4(2), 8–21. <https://doi.org/10.46281/asfbr.v4i2.684>
- Hassan, Rifat. (2019). Factors Influencing the Profitability of Pharmaceutical Companies in Bangladesh.
- Rosandy, N. N., & Mita, A. F. (2018). The effect of capital expenditure and market share on profits per region in an Indonesian mobile telecommunications company. *Proceedings of the 6th International Accounting Conference (IAC 2017)*. <https://doi.org/10.2991/iac-17.2018.26>
- Rostami, S., Rostami, Z., & Kohansal, S. (2016). The effect of corporate governance components on return on assets and stock return of companies listed in Tehran Stock Exchange. *Procedia Economics and Finance*, 36, 137–146. [https://doi.org/10.1016/s2212-5671\(16\)30025-9](https://doi.org/10.1016/s2212-5671(16)30025-9)
- Samosir, F.C. (no date) Effect of cash conversion cycle, firm size, and firm age to profitability. Available at: <https://core.ac.uk/download/pdf/229850339.pdf> (Accessed: 10 September 2023).
- Sharma, I. (2022). Determinants of profitability: a study on ceramic industry in Bangladesh. *Journal of Business And Entrepreneurship*, 10(2), 161. <https://doi.org/10.46273/job.e.v10i2.319>
- Sihombing, T., & Susanto, S. A. (2021). Analysis of the effect of capital expenditure, business risk, and profitability on the capital structure of companies on property industry. *Ultimacounting Jurnal Ilmu Akuntansi*, 257–270. <https://doi.org/10.31937/akuntansi.v13i2.2251>
- Singh, A. K., & Bansal, P. (2016). Impact of financial leverage on firm's performance and valuation: A panel data analysis. *Indian Journal of Accounting*, 48(2), 73-80
- Sufian, F., & Habibullah, M. S. (2009). Determinants of bank profitability in a developing economy: Empirical evidence from Bangladesh. *Journal of Business Economics and Management*, 10(3), 207–217. <https://doi.org/10.3846/1611-1699.2009.10.207-217>
- Zefriyenni, Pratiwi, N. and Sari, R.F. (2022) Influence of capital structure, capital expenditure, and firm size on firm value with profitability as intervening variable, *Jurnal Ipteks Terapan*. Available at: <https://publikasi.lldikti10.id/index.php/jit/article/view/2029> (Accessed: 21 October 2023).

7.0 Appendices

Table A1: List of companies

No.	Name	No.	Name
01	Crown Cement PLC.	20	ACI Limited
02	Heidelberg Cement Bangladesh Ltd.	21	Beacon Pharmaceuticals Limited
03	LafargeHolcim Bangladesh Limited	22	Beximco Pharmaceuticals Ltd.
04	Meghna Cement Mills Ltd.	23	The IBN SINA Pharmaceuticals Industry PLC
05	Premier Cement Mills PLC	24	Renata Ltd.
06	Fu-Wang Ceramic Industries Ltd.	25	Square Pharmaceuticals PLC
07	Monno Ceramic Industries Ltd.	26	JMI Syringes & Medical Devices Ltd.
08	RAK Ceramics (Bangladesh) Limited	27	Marico Bangladesh Limited
09	Shinepukur Ceramics Limited	28	Apex Footwear Limited
10	Standard Ceramic Industries Ltd.	29	Apex Tannery Limited
11	Agricultural Marketing Company Ltd.	30	Bata Shoe Company (Bangladesh) Limited
12	Apex Foods Limited	31	Al-Haj Textile Mills Limited
13	Fu Wang Food Ltd.	32	Apex Spinning & Knitting Mills Limited
14	Golden Harvest Agro Industries Ltd.	33	Malek Spinning Mills Ltd.
15	Olympic Industries Ltd.	34	Rahim Textile Mills Ltd.
16	British American Tobacco Bangladesh Company Limited	35	R.N. Spinning Mills Limited
17	Sonali Aansh Industries Limited	36	Saiham Textile Mills Ltd.
18	Hakkani Pulp & Paper Mills Ltd.	37	Square Textiles Ltd.
19	Sonali Paper & Board Mills Ltd.	38	Zahintex Industries Limited

Table A2: Normality test using Shapiro-Wilk test

Variable	Acronym	Prob > z	Decision
Return on Assets (Log of ROA)	Inroa	0.000110	Does not follow normal distribution
Lag of ROA	Inroalag	0.000100	Does not follow normal distribution
Lag of Investment into Capital Expenditure	Incapexlag	0.000000	Does not follow normal distribution
Financial Structure (Debt to Total Assets)	dta	0.000000	Does not follow normal distribution
Age of the Firm (Log of Age)	Inage	0.003710	Does not follow normal distribution
Size of the Firm (Log of Total Assets)	Inta	0.000000	Does not follow normal distribution
Economic Growth (GDP Growth)	gdpgr	0.000000	Does not follow normal distribution
Covid	cov	0.002300	Does not follow normal distribution

Source: Author's analysis using STATA (Version 14.2)

Table A3: Pearson correlation coefficient result

Variables	roa	age	capexlag	dta	ta	roalag	gdpgr	cov
roa	1.00							
age	0.06	1.00						
capexlag	0.04	0.28	1.00					
dta	0.00	0.05	-0.01	1.00				
ta	0.11	0.44	0.73	0.13	1.00			
roalag	0.28	0.07	0.09	-0.03	0.12	1.00		
gdpgr	-0.04	0.03	-0.03	0.01	0.05	0.12	1.00	
cov	-0.01	0.14	0.13	0.07	0.22	-0.09	-0.31	1.00

Source: Author's analysis using STATA (Version 14.2)

Table A4: Result of VIF test

Variable	VIF	1/VIF
lnroalag	1.45	0.69138
lnacapexlag	1.99	0.50349
lndta	1.23	0.81025
lnage	1.10	0.91269
lnta	1.87	0.53573
gdpgr	1.18	0.84744
cov	1.29	0.77631
Mean	1.44	

Source: Author's analysis using STATA (Version 14.2)

Table A5: Result of Heteroskedasticity test

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity			
Model	chi2	Prob>chi2	Presence of Heteroscedasticity
1	29.71	0.0000	Yes

Source: Author's analysis using STATA (Version 14.2)

Table A6: Result of autocorrelation test

Wooldridge test for autocorrelation in panel data			
Model	F value	Prob>F	Presence of Autocorrelation
1	43.207	0.0000	Yes

Source: Author's analysis using STATA (Version 14.2)

Table A7: Result of Pesaran's test of cross-sectional independence

Pesaran's test of Cross-sectional Independence			
Model	Pesaran's Value	Prob. Value	Presence of Cross-Sectional Dependence
1	0.113	0.91	No

Source: Author's analysis using STATA (Version 14.2)

Table A8: Result of hausman test

Model	Chi2	Prob > Chi2	Decision
1	0.000	Not positive definite	Random Effect Model

Source: Author's analysis using STATA (Version 14.2)