

Impact of Fundamental and Macroeconomic Factors on Stock Returns: A Study on Cement Industry in Bangladesh

Md. Habibur Rahman & Krishna Shaha

Abstract

The main aim of this research is to figure out how fundamental and macroeconomic factors affect stock returns in Bangladesh. Five companies out of seven that are listed on the DSE and are part of the cement industry were randomly selected for this purpose. The companies involved are Heidelberg Cement Bangladesh Limited, Lafarge Holcim Bangladesh Limited, Premier Cement Mills Limited, Crown Cement PLC, and Meghna Cement Mills Limited. All the data were gathered as time series on a monthly basis, spanning the years 2012 through 2021. For the sake of the study's objective, some fundamental and macroeconomic factors are identified and incorporated into the framework of multiple regressions. In addition to these fundamental factors, which include debt to equity, return on asset (ROA), return on equity (ROE), price earnings (P/E) ratio, and earnings per share (EPS), macroeconomic factors, e.g., inflation (INF), gross domestic product (GDP), interest rate (INT), money supply (M2), foreign direct investment (FDI), and exchange rate (EX), are also considered. According to the study's overall findings, among key variables, Lafarge Holcim Bangladesh Ltd. and Heidelberg Cement Bangladesh Limited both had positive and statistically significant EPS and PE ratios, whereas Crown Cement PLC only had a positive and statistically significant PE ratio. However, only inflation was determined to have a negative and statistically significant effect on Meghna Cement Mills Ltd. among all sample companies. None of the fundamental or macroeconomic factors was found to be statistically significant in the case of Premier Cement Mills Limited. Since it includes a wide range of macroeconomic variables in addition to the selected fundamental variables, this study stands out from others for listed firms within the cement industry of DSE, Bangladesh. Such a study would be more beneficial if it took into account more exogenous variables and stocks that are listed in or outside of this sector. This study's entire data analysis was carried out with the use of the statistical software Eviews version 10.



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Keywords: *Stock return, Debt to equity, Return on asset, Return on equity, Price earnings ratio, Earnings per share, Inflation, Gross domestic product, Interest rate, Money supply, Foreign direct investment, Exchange rate.*

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1.0 Introduction

Nearly every modern structure needs cement, which is a fundamental construction ingredient utilized worldwide. Cement industry is said to have a fundamental contribution to the infrastructural development of any country. This industry of Bangladesh has become one of the fastest growing sectors in recent years (Rezina et al., 2020). According to (EBL Securities Ltd., 2023) Bangladesh currently ranks as the 20th largest cement market in the world. With per capita cement consumption of 230 kg. The government of Bangladesh has started a number of large-scale construction projects that use a lot of cement. As Bangladesh's economy has expanded over the years, the cement sector has been vital to the development of the country's infrastructure. According to the Bangladesh Cement Manufacturers Association (BCMA), among the 76 registered cement manufacturing companies in the country, 42 plants are in operation of 35 active companies, out of which 7 are currently enlisted in the stock market in Bangladesh. As per a report by (Faruquee, 2021) the cement industry employs 60,000 people directly and employs about one million people indirectly.

The global cement market is projected to grow from USD 340.61 billion in 2022 to USD 481.73 billion by 2029, at a CAGR of 5.1% in the forecast period of 2022–2029 (EBL Securities Ltd., 2023). During the first nine months of the 2023 fiscal year, cement producers and merchants exported cement valued at US\$9.68 million and this is a 49% increase year over year from the US\$6.51 million earned during the first nine months of the 2022 fiscal year as mentioned in report by (Global Cement, 2023). According to the (ASD Report, 2023), despite some current challenges, including Bangladesh's cement industry's reliance on imports, rising raw material import costs, the dollar crisis, challenges in opening letters of credit, and increases in the price of diesel, gas, and electricity, growth momentum is predicted to continue over the forecast period with a CAGR of 3.6% between 2023 and 2027. Though Bangladesh used to import cement from other countries in the 1990s, this country is now an exporter. The majority of the cement exported from Bangladesh, notably its northeastern states, flows to India, as detailed in (CN Cement, 2023). Additionally, Nepal, Sri Lanka, and the Maldives are major purchasers of Bangladeshi cement. The combined annual production capacity of cement manufacturers is 58 million tons, while the local demand is only 33 million tons, indicating an excess production capacity of 43% in the cement industry (EBL Securities Ltd., 2023).

According to 'Making Vision 2041 a Reality Perspective Plan of Bangladesh 2021-2041', published by Bangladesh Planning Commission, Ministry of Planning (2020), the targets of real GDP growth rate of Bangladesh is 9.0%, and 9.9% in FY 31, and FY 41 respectively. To support its incremental economic growth, the government needs continuation of heavily investments in infrastructure development projects, notably in power generation, highways, bridges, seaports, rail networks, and others. Hence, the cement industry is one of the industries that have the potential to attract significant domestic and international investment in the years to come. According to the researcher's knowledge, there is no study that incorporates such a wide range of fundamental as well as macroeconomic variables in such a single study in the context of the listed cement companies in the DSE, Bangladesh. Hence, the researcher was inspired to conduct this study to indirectly assist typical investors and other stakeholders in making their decisions more accurately. Actually, this research aids in identifying the variables that could affect the performance of the stocks listed under the cement sector on DSE, which could help the investigators predict the returns of such stocks. On the other hand, investors who view the cement sector as an essential part of their portfolio may find such research to be of enormous value. In line with this motivation, the researchers want to identify the fundamental and macroeconomic factors that may have impact on the returns of selected companies. The

researchers also want to determine to what extent these factors together can explain the return variations of the selected stocks.

1.1 Literature Review

As per the knowledge of the researcher, not so many research works have been made in the context of the listed companies in the DSE by incorporating such a wide variety of fundamental as well as macroeconomic variables. Consequently, in the case of the listed company under the cement industry in the DSE, the researcher has found a research gap. However, this study has been further enriched by the following studies. Noviyanti & Tullah (2022) wanted to determine the effect of Beta, ROA, CR, PBV, and MVA on the selected LQ-45 Index company returns of the Indonesia Stock Exchange. They found that ROA, PBV, and MVA variables can affect stock returns, while beta and CR variables were proven not to affect stock returns. Nguyen & Pham (2022) used monthly data from the years 2017 to 2021 to empirically test the effects of six variables, including earnings per share, liquidity, firm size, net asset value per share, gross domestic product, and returns on assets, on the stock market returns of 359 companies listed on the Hanoi Stock Exchange. The empirical findings of their study revealed that some characteristics, such as earnings per share (EPS), net asset value per share (NAVPS), and return on assets (ROA), have a direct impact on the market returns of listed equities. Al-Dwiry, Al-Eitan, & Amira (2022) wanted to investigate the impact of microeconomic and macroeconomic factors on the market price per share using panel data from 13 listed Jordanian commercial banks during the period 2010–2021. Based on a microeconomic level, the firm-specific variables were earnings per share (EPS), dividend per share (DPS), price-earnings ratio (PE), book value per share (BV), return on assets (ROA), and size (S). Similarly, gross domestic product (GDP), inflation (INF), and money supply (MS) were chosen as independent variables for macroeconomics, whereas the company's dependent variable was market price per share (MPS). Based on the OLS regression results, the coefficient of EPS was found to be positive at the 1% level of significance. The same positive impacts for DPS, ROA, and S were considered major predictors of stock prices in Jordan. Volume was discovered to be the most important determining variable impacting stock price among the factors. Tabash, Al-Homaidi, Ahmad, and Farhan (2020) attempted to investigate the elements affecting the financial performance of listed Indian firms from 2010 to 2016. 1598 Indian companies listed on the Mumbai Stock Exchange (MSE) make up the sample size. As proxies for the financial performance of Indian enterprises, return on assets (ROA), return on equity (ROE), profit after tax (PAT), and earning per share (EPS) were utilized. The leverage ratio, liquidity ratio, business size, and company age all had a significant and favorable impact on the financial performance of Indian listed companies, according to the results of the fixed effects regression model. The leverage ratio had a positive impact on return on equity (ROE) and negative effect on return on assets (ROA), profit after tax (PAT), and earning per share (EPS). Nugroho, Kesdu A.C., Fatonah, & Susant (2022) determined empirically the effect of Price Earning Ratio (PER), Price to Book Value (PBV), Dividend per Share (DPS), Earning Per Share (EPS), Debt to Equity Ratio (DER), Return on Equity (ROE), Return On Assets (ROA), and Net Profit Margin (NPM) on LQ45 company stock prices for the period 2010–2019 of The Indonesia Stock Exchange (IDX). The PER, PBV, and EPS were discovered to have a positive and significant influence on stock prices. Stock prices were significantly and negatively impacted by ROE. DPS, ROA, and NPM, however, showed positive but insignificant influences on stock prices. Stock prices were negatively and minimally impacted by DER. Additionally, they discovered that EPS had the greatest impact on stock prices. Chitri (2023) tried to investigate the variables influencing the share price of Nepalese joint venture commercial banks. Based on panel data collected over an 11-year period between 2012 and 2022, multiple regression models were used to examine the effects of firm-specific factors on the share price of the Nepalese joint venture of five commercial banks. The

findings demonstrated that factors including earnings per share, price earnings ratio, book value per share, and return on assets were the main determinants of stock price having a substantial impact, whereas firm size had little impact on stock price.

Fadhila & Desmiza (2021) wanted to learn the effect of debt-to-asset ratio, total asset turnover, return on asset, and earnings per share variables on stock returns for the selected 17 sub-sector companies of food and beverages listed on the Indonesia Stock Exchange. They used a multiple regression model and showed that total asset turnover had a positive impact on stock returns, while the debt asset ratio, return on asset, and earnings per share did not have an impact on stock returns. In order to determine the key variables influencing share prices in the Bahrain financial market, (Sharif, Purohit, & Pillai, 2015) conducted their research. For the years 2006–2010, they examined a panel data set of 41 companies listed on the Bahrain Stock Exchange. The estimation technique was based on models for fixed effects, random effects, and pooled OLS regression with robust standard errors. In order to determine their influence on the market price of shares in the relevant market, eight firm-specific factors, including return on equity, book value per share, earnings per share, dividend yield, price-earnings ratio, debt-to-assets ratio, and factors controlled by firm size, were examined. The factors return on equity, book value per share, dividend per share, dividend yield, price-earnings ratio, and business size were all shown to be significant. Pandey & Diaz (2019) examined the effect of eight firm-specific factors on profitability using the return on assets (ROA) of US technology and financial firms. They used multiple linear panel regression models, namely, ordinary least squares (OLS), fixed effects (FE), and random effects (RE) models. Empirical findings showed that the return on equity ratio had a negative effect on ROA, while the return on sales ratio had a positive effect on profitability for both technology and financial firms. On the other hand, the current ratio had a positive effect on the ROA of financial firms, while there was a negative effect for technology firms. Lastly, size had a positive effect on the profitability of technology firms. Islam & Khan (2019) tried to identify the variables that affect Bangladesh's pharmaceutical industry's profitability. A panel dataset of 10 years starting from 2007 to 2016, were run the random effect regression. They discovered that among the macroeconomic variables, the GDP growth rate and the rate of inflation had a significant effect on profitability. Alam et al. (2016) made an effort to pinpoint the main factors influencing share prices in Bangladesh's capital market. Their analysis took into account a panel data set of seven cement companies listed on the Dhaka Stock Exchange (DSE) covering the period from 2006 to 2015. They investigated using Ordinary Least Squares (OLS) regression with fixed effects and random effects models and discovered that EPS, NAVPS, P/E, and CPI had a substantial impact on Bangladesh's cement sector. Rezina et al. (2020) evaluated the impact of firm-specific and macroeconomic factors on the profitability of the cement industry in Bangladesh. They chose all cement companies in Bangladesh and collected data from 2000 to 2018. They found that leverage, GDP growth rate, and real interest rate had significant influences on profitability. Jamil & Naima (2019) attempted to identify the impact of selected company-specific and macroeconomic variables on the stock returns of the banking industry in Bangladesh. They considered money supply, exchange rate, inflation, interest rate, and industrial production as macroeconomic variables. The study resulted in the conclusion that inflation and interest rates had a significant influence on stock returns, while banks total assets had no significant influence on stock returns. Yandra & Alfarisi (2019) focused on identifying the factors influencing stock returns in the Jakarta Islamic Index. They chose the fundamental factors, such as current ratio, debt to equity ratio, return on asset, price-earnings ratio, and price-to-book value, in the sample period of 2014 to 2017, with 17 companies. They used OLS regression and found that CR, DER, ROA, and PBV had a significant impact on stock return, while PER proved to be non-significant for stock return. Santoso et al. (2020) tried to find out the impact of fundamental factors on the stock returns of

engineering and construction companies that are listed on the Indonesia Stock Exchange. They chose 10 companies on the basis of the cross-section technique and the sample period of 2015 to 2019. They concluded that CR, NPM, PBV, EPS, and ROE had a significant positive impact on stock returns, while DER had a significant negative impact on stock returns. Yoewono & Tasrih (2022) tried to analyze the influence of fundamental factors on stock return on the basis of audit quality as a moderator. They selected 19 companies in the period of 2013 to 2020 as a sample on the Indonesia Stock Exchange and used multiple linear regression to analyze the data. Their study revealed that ROA, PER, and audit quality had a significant impact on stock return, while ROE, EPS, DER, and systematic risk had no significant impact on stock return.

1.2 Methodology of the Study

This report is broadly prepared to identify the factors, such as macroeconomic and fundamental factors, that may influence stock returns.

1.2.1 Sources of the Data

This study is based on one source of data. This is secondary data. Here, the monthly stock returns are considered. This study covers monthly data on different fundamental and macroeconomic factors from 2012 to 2021, and it has transformed monthly data into logarithmic monthly returns along with stock returns for calculating purposes by using the following formula:

$$R_t = \log (p_t / p_{t-1})$$

1.2.2 Sample

The cement industry in Bangladesh is one of the rapidly expanding industries with alluring investment potential, and this sector has already drawn investors from within and outside the nation. For that reason, the researchers purposefully picked this industry for their research. To ascertain the effect of fundamental and macroeconomic factors on stock returns, this study has taken into account five cement companies that are listed on the DSE. These are Crown Cement PLC, Lafarge Holcim Bangladesh Limited, Premier Cement Mills Limited, Meghna Cement Mills Limited, and Heidelberg Cement Bangladesh Limited. This study also considers 10-year data from 2012 to 2021 on a monthly basis. It is assumed that these five companies may reflect the overall scenario of the capital market in Bangladesh. Five companies are selected randomly from the list of listed cement companies in DSE, and time-series data from these companies is collected for this study's purposes.

1.2.3 Measurement Techniques

In this study, a statistical method of different regression analysis was used. Time-series data are used for regression analysis, and the same parameters are used for five companies to analyze the result. This report has considered some fundamental factors, which are:

Debt to Equity Ratio: Total Debt / Total Shareholders' Equity

Return on Asset Ratio (ROA): Net Income / Total Assets

Return on Equity (ROE): Net Income / Total Shareholders' Equity

Earnings per Share (EPS): Profit after Tax / Total Number of Shares Outstanding

Price –Earnings Ratio (PE): Price per Share / Earning Per Share

This report also considers some macroeconomic factors that have been assumed to have a relationship with the stock return of a company. Some macroeconomic factors are the exchange rate, Inflation, GDP, Interest Rate, Money Supply, and FDI. Here, m2 is used as a money supply.

1.2.4 Model Specification

The regression model that is used in this study is:

$$Y (SR) = \beta_1 + \beta_2 * DTE + \beta_3 * ROA + \beta_4 * ROE + \beta_5 * EPS + \beta_6 * INF + \beta_7 * GDP + \beta_8 * INT + \beta_9 * M2 + \beta_{10} * FDI + \beta_{11} * EX + \beta_{12} * PE$$

Variables: The conceptual framework of dependent and independent variables is given below.

Independent Variables	Dependent Variable
Debt to equity ratio(DTE)	Stock Return(SR)
Return on Asset(ROA)	
Return on Equity(ROE)	
Earnings Per Share(EPS)	
Exchange Rate(EX)	
GDP Growth rate(GDP)	
Inflation rate(INF)	
Interest rate(INT)	
Money supply(M2)	
Foreign Direct Investment(FDI)	
Price-earnings ratio(P/E)	

1.2.5 Statistical Methods

Unit Root Test: A unit root test is a statistical test used to determine whether a time series variable is non-stationary and possesses a unit root. The null hypothesis in most unit root tests is that the time series has a unit root, while the alternative hypothesis can be either a stationary, trend-stationary, or explosive root, depending on the specific test being used. This study will define stationary at the 1st and 2nd difference by 1 and 2 with respective variables.

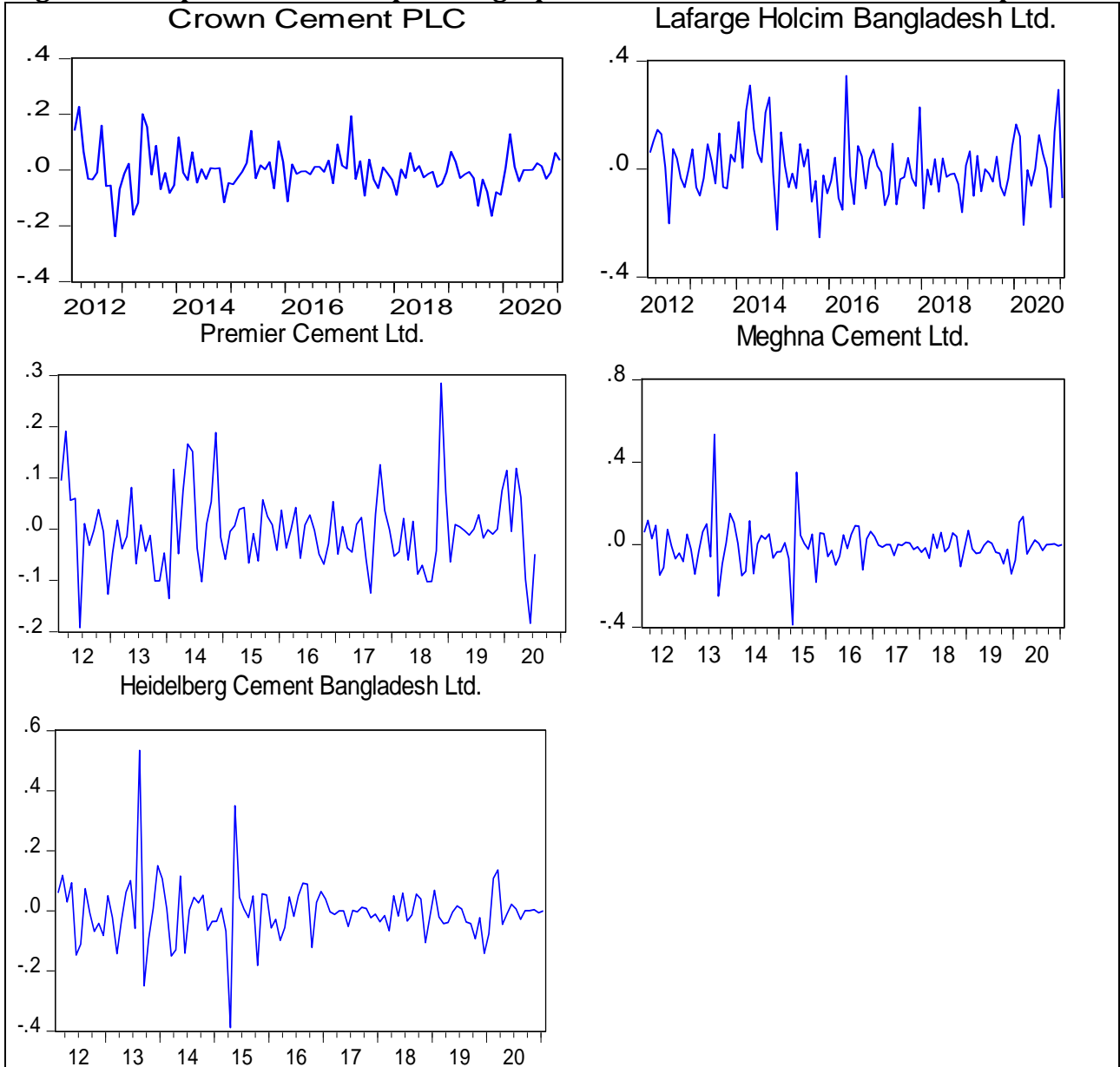
Descriptive Statistics: Descriptive statistics provides a summary of the dataset and helps to know data set is suitable for a regression or not. In this study, descriptive statistics are done on all the datasets.

Correlation Matrix: If there is any correlation between independent variables, the regression provides misleading results. Cause-and-effect correlation has a tendency to make significant variables insignificant toward the dependent variables. In this study, a correlation matrix is used to check if there is any multicollinearity or not.

Regression Analysis: In this study, the Ordinary Least Squares (OLS) method is used to predict the result.

2.0: Stylize Facts of the Sampled Companies

Figure 01: Represents the simple line graphs of stock returns on selected companies



The line graphs of the monthly return data for the five selected stocks from 2012 to 2021 are included in the aforementioned figure. The graphs show that all of the stock returns have fluctuated over time. However, except for Lafarge Holcim Bangladesh Ltd., relatively minimal variation was seen in the latter months, which may be attributed to the impact of the COVID-19 epidemic.

2.1 Descriptive Statistics

Table 01: Descriptive Statistics of the stock returns on selected companies

	Crown Cement Ltd.	Lafarge Holcim BD Ltd.	Premier Cement Ltd.	Meghna Cement Ltd.	Heidelberg Cement BD Ltd.
Mean	0.00	0.01	0.00	0.00	0.00
Median	-0.01	0.00	0.00	0.00	-0.01
Maximum	0.23	0.35	0.28	0.53	0.34
Minimum	-0.24	-0.25	-0.19	-0.39	-0.25
Std. Dev.	0.07	0.11	0.08	0.10	0.08
Skewness	0.47	0.53	0.66	1.09	0.83
Kurtosis	4.77	3.63	4.71	11.96	6.54
Jarque-Bera	18	7	20	383	69
Probability	0.00	0.03	0.00	0.00	0.00
Sum	-0.44	0.71	-0.27	-0.45	-0.03
Sum Sq. Dev.	0.58	1.33	0.59	1.09	0.74
Observations	108	108	102	108	108

Source: Authors' own calculations

The mean, median, maximum, minimum, standard deviation and other data of the dataset of the chosen companies are displayed in the above table. The mean value of a series, the median value after sorting the observations, and the mode value, which is the value that has been observed the most, are all described. It can be seen from the table that there is a significant disparity between the least and maximum value for each company in the dataset discussed above. A leptokurtic or positive kurtosis, which refers to a peaked curve, is indicated by the fact that almost all of the value of the kurtosis (chosen companies) is higher than 3. The degree of the series' asymmetry is measured by skewness. Positive skewness values for all the companies above suggest a long right tail. The results of the Jarque-Bera test as well as the kurtosis and skewness numbers demonstrate that the normalcy assumption does not apply to the returns of any of the sample companies that were chosen. The null hypothesis of normality is rejected since the likelihood of the Jarque-Bera test statistic for all the companies is less than 5% significant level.

2.2 Testing of Stationary

It is necessary to check whether the data is stationary or not prior to analyzing regression statistics. There are several tests to check for stationary data; here, two popular tests have been used to check for stationary data. One is the Augmented Dickey Fuller Test (1988), and the other is the Phillips-Perron Test (1987). The Augmented Dickey Fuller and Phillips-Perron Test has three equations to check for stationary. These are at intercept, trend, and intercept, and none. There are two hypotheses. These are: H_0 : Series contains a unit root; H_1 : Series is Stationary. From Appendix Table 02 to Table 7, we represent the unit root tests of macroeconomic factors and fundamental factors of selected companies. In most cases, maximum lag 12 is used. The same processes are followed in the Phillips-Perron Test.

Table 02 shows that interest rate, money supply, and exchange rate are stationary at level, foreign direct investment and inflation are stationary at the 1st difference, and GDP is stationary at the 2nd difference. Macroeconomic factors for all the companies are the same. Table-03 shows that price to earnings ratio (PE) and stock return are stationary at level; earning per share (EPS) and debt to equity (DTE) are stationary at 1st difference; and return on asset (ROA) and return on equity (ROE) are stationary at 2nd difference with maximum lag 5. Table-04 shows that PE, SR and ROA is stationary at level, DTE, ROE, EPS are stationary at 1st difference. Table 05 shows that PE, SR, ROE, and ROA are stationary at level, while DTE and EPS are stationary at the first difference. Table-06 explains that PE, SR, and ROA are stationary at level,

while DTE, EPS, and ROE are stationary at the first difference. Table-07 shows that in the augmented Dickey Fuller Test, the maximum lag of 5 is used, and we have seen that SR is stationary at level and DTE, EPS, and PE are stationary at the first difference. Other variables, such as ROA and ROE, are stationary at the second difference.

2.3 Testing of Correlations

Before regression analysis, it is required to test the correlation of different independent variables in the model. If there is a correlation between independent variables, there is a multicollinearity problem. And if a multicollinearity problem exists in a regression model, it leads to misleading results. So it is necessary to test multicollinearity between independent variables to analyze the regression perfectly. If the correlation matrix result is 0 to less than .30, there is low multicollinearity; 0.31 to less than 0.79, there is moderate multicollinearity; and 0.80 to 1 means High multicollinearity. From Appendix Table 08–12, the correlation matrix of independent variables

Table 08 shows that there exists moderate multicollinearity between ROA and DTE, between ROA and EPS, and between Ex and INF. The correlation levels are 33%, 73%, and 31%, respectively. There is high multicollinearity between ROE and EPS, with a 91% correlation. Table 9 displays that there is moderate multicollinearity between EPS and EX. There is a 34% correlation. As long as low and moderate multicollinearity are acceptable, there is no serious multicollinearity problem. Table 10 shows that there is moderate multicollinearity between GDP and DTE with a 53% positive correlation and between PE and Ex with a 44% positive correlation. As multicollinearity is acceptable at low and moderate levels, there is no serious multicollinearity problem. Table 11 shows there is moderate multicollinearity between DTE and GDP with a 45% correlation and between ROE and DTE with a 44% correlation. There is some other moderate multicollinearity between EPS and ROA, between EPS1 and ROE, between GDP and ROE, and between INF and PE. As multicollinearity is acceptable at low and moderate levels, there is no serious multicollinearity problem. Table 12 shows that there is moderate multicollinearity between ROA and ROE, with a 77% positive correlation. There is high multicollinearity between ROA and EPS with an 88% positive correlation and between EPS and ROE with a 96% positive correlation.

3.0 Results & Discussion

Table 13: Regression results of Crown Cement PLC

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.010321	0.007901	-1.306215	0.1947
DTE	0.726238	0.801977	0.905559	0.3675
EX	-2.408572	1.554546	-1.549374	0.1247
FDI	0.447148	2.265410	0.197381	0.8440
GDP	-0.366944	0.303719	-1.208169	0.2301
INF	-0.689975	0.530532	-1.300534	0.1967
INT	-0.759894	0.513470	-1.479919	0.1423
M2	0.115248	0.324663	0.354979	0.7234
PE	0.190307	0.043679	4.356948	0.0000
ROA	0.067770	0.063923	1.060194	0.2918
ROE	-0.050224	0.057595	-0.872030	0.3855
R-squared	0.255320	Mean dependent var		-0.003015
Adjusted R-squared	0.174377	S.D. dependent var		0.071662
S.E. of regression	0.065115	Akaike info criterion		-2.524677
Sum squared resid	0.390075	Schwarz criterion		-2.243298
Log likelihood	141.0208	Hannan-Quinn criter.		-2.410709
F-statistic	3.154306	Durbin-Watson stat		1.456325
Prob(F-statistic)	0.001640			

Source: Authors own calculation

The above table describes the regression analysis of Crown Cement PLC. Here, stock returns have been used as a dependent variable, and some fundamental and macroeconomic factors have been used as independent variables. The value of the coefficient defines how much it is possible to influence the dependent variable by the independent variable. As there has been an indication of high multicollinearity from correlation matrix analysis between ROE and EPS; EPS has been dropped from the regression. Out of the 10 exogenous variables of the regression, only the price-earnings ratio (PE) has been confirmed to be statistically significant at the 5% level, according to the results in Table 13. DTE, FDI, M2, and ROA were found to have a positive but insignificant impact on Crown Cement PLC's return, while EX, GDP, IMF, INT, and ROE had a negative but insignificant impact. The price-earnings ratio's (PE) regression coefficient is 0.190307, suggesting that PE has a positive impact on the returns of this stock. With the assumption that DTE, EX, FDI, GDP, INF, INT, M2, ROE, and ROA are constant, this suggests that if the PE value increases by 1 point, the stock price will increase by 0.19 points (Nugroho et al., 2022). The R^2 value represents the goodness of fit of the model. The higher the value of R^2 , the better the model fits. Here, the value of R^2 is 25%. The above value of R^2 indicates that only 25% of the variations in the dependent variable, i.e., the return of this stock, can be predicted from the joint influence of the above explanatory variables. Hence, this model can't fit so satisfactorily, and the inclusion of more/alternative variables may be required. Based on the results of the F statistic, it can be seen that the F value is 3.154306, with a probability of 0.002 less than 0.05. This means that the variables DTE, EX, FDI, GDP, INF, INT, M2, PE, ROE, and ROA simultaneously have a significant effect on the return of Crown Cement PLC. The study conducted by Alam et al. (2016) likewise produced similar results.

Table 14: Regression result of Lafarge Holcim Bangladesh Ltd.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.007945	0.009176	0.865906	0.3888
DTE	-0.080131	0.544169	-0.147254	0.8833
EPS	0.323974	0.166354	1.947496	0.0545
EX	-2.860468	1.893436	-1.510729	0.1343
FDI	0.673774	2.556168	0.263588	0.7927
GDP	-0.190048	0.352958	-0.538443	0.5916
INF	-0.368918	0.617698	-0.597247	0.5518
INT	0.103967	0.584552	0.177857	0.8592
M2	-0.100398	0.373308	-0.268940	0.7886
PE	0.526439	0.046375	11.35177	0.0000
ROA	0.027187	0.066983	0.405879	0.6858
ROE	-0.083078	0.446825	-0.185929	0.8529
R-squared	0.605392	Mean dependent var	0.007110	
Adjusted R-squared	0.558211	S.D. dependent var	0.111488	
S.E. of regression	0.074103	Akaike info criterion	-2.258563	
Sum squared resid.	0.505191	Schwarz criterion	-1.953441	
Log likelihood	129.4453	Hannan-Quinn criter.	-2.134949	
F-statistic	12.83116	Durbin-Watson stat	1.222164	
Prob(F-statistic)	0.000000			

Source: Authors own calculations

The above table 14 describes the regression analysis of Lafarge Holcim Bangladesh Limited. Here, stock return is used as a dependent variable, and some fundamental and macroeconomic factors are used as independent variables. For the return of this company, the price-earnings ratio (PE) has been found to be statistically significant at 1% level. Out of the eleven exogenous

variables used in the regression, only EPS and the price-earnings ratio (PE) have been confirmed to be statistically significant at the 5% and 1% levels, respectively. The variables DTE, EX, GDP, INF, M2, and ROE were found to have a positive but insignificant impact on the return of Lafarge Holcim Bangladesh Limited, while FDI, INT, and ROA had a negative but insignificant impact. The coefficient of EPS is 0.323974 and positive. That implies that if EPS increases by 1 point, the returns of this stock will increase by 0.3240 points, with the assumption that other factors are constant. The price-earnings ratio's (PE) regression coefficient is 0.526439, suggesting that PE has a positive impact on the returns of this stock. With the assumption that DTE, EPS, EX, FDI, GDP, INF, INT, M2, ROE, and ROA are constant, this suggests that if the PE value increases by 1 point, the stock price will increase by 0.53 point. Here the value of R² is 61%, which means the return variations of Lafarge Holcim Bangladesh Ltd. depend on the above independent variables by 61%, and the other 39% depend on other factors that are not included in the regression. The adjusted R-squared value of 55% also indicates a satisfactory figure in favor of the goodness of fit' of this regression model. The F-statistic 12.83116 with a probability of 0.0000 or less than 5% indicates that the variables DTE, EPS, EX, FDI, GDP, INF, INT, M2, PE, ROE, and ROA simultaneously have a significant effect on the returns of Lafarge Holcim Bangladesh Ltd.

Table 15: Regression results of Premier Cement Mills Ltd.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001030	0.009536	0.107971	0.9143
DTE	-1.908177	1.374107	-1.388667	0.1686
EPS	-0.408481	0.564662	-0.723407	0.4714
EX	0.126972	2.059925	0.061639	0.9510
FDI	1.437717	2.565744	0.560351	0.5767
GDP	0.422793	1.475240	0.286593	0.7751
INF	-0.257150	0.647691	-0.397026	0.6923
INT	0.643389	0.629945	1.021342	0.3100
M2	0.096010	0.386715	0.248269	0.8045
PE	-0.006518	0.009584	-0.680120	0.4983
ROA	0.069071	0.064965	1.063208	0.2907
ROE	0.076538	0.149319	0.512581	0.6096
R-squared	0.071673	Mean dependent var		-0.001540
Adjusted R-squared	-0.048463	S.D. dependent var		0.075267
S.E. of regression	0.077069	Akaike info criterion		-2.172867
Sum squared resid	0.504869	Schwarz criterion		-1.854346
Log likelihood	117.3841	Hannan-Quinn criter.		-2.044073
F-statistic	0.596600	Durbin-Watson stat		1.363168
Prob(F-statistic)	0.826668			

Source: Authors own calculation

The above table 15 describes the regression analysis of Premier Cement Mills Limited. Here, stock return has been used as a dependent variable, and some fundamental and macroeconomic factors have been used as independent variables. None of the explanatory variables were found to be statistically significant for this company, even at the 10% level of significance. Out of the eleven exogenous variables used in the regression, the variables EX, FDI, GDP, INT, M2, ROA, and ROE were found to have a positive but statistically insignificant impact, while DTE, EPS, INF, and PE had a negative but statistically insignificant impact on the return of Premier Cement Mills Limited. Here, the extremely low R² value (only 7%) and statistically insignificant F-statistic value (P value 0.826668 > 0.05) argue against building any regression model for Premier Cement Mills Limited using such exogenous variables.

Table 16: Regression results of Meghna Cement Mills Ltd.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.00	0.01	0.21	0.83
DTE	-0.01	0.13	-0.07	0.94
EPS	-0.33	1.09	-0.31	0.76
EX	0.72	2.31	0.31	0.76
FDI	-0.68	3.56	-0.19	0.85
GDP	0.10	0.52	0.20	0.84
INF	-3.57	0.78	-4.56	0.00
INT	0.43	0.73	0.59	0.56
M2	0.23	0.48	0.48	0.63
ROA	-0.04	0.08	-0.48	0.63
ROE	0.02	0.13	0.17	0.87
R-squared	0.19	Mean dependent var		0.00
Adjusted R-squared	0.10	S.D. dependent var		0.10
S.E. of regression	0.10	Akaike info criterion		-1.75
Sum squared resid	0.89	Schwarz criterion		-1.47
Log likelihood	104.54	Hannan-Quinn criter.		-1.64
F-statistic	2.24	Durbin-Watson stat		2.15
Prob(F-statistic)	0.02			

Source: Authors own calculation

The above table 16 describes the regression analysis of Meghna Cement Mills Limited. Here, stock return has been used as a dependent variable, and some fundamental and macroeconomic factors have been used as independent variables. Out of ten exogenous variables, only inflation has been found to be statistically significant at the 1% level of significance. The negative coefficient value of the inflation, i.e., -3.57, suggests that if the inflation of the economy of Bangladesh goes up by 1 point, the returns of Meghna Cement Mills Limited will go down by 3.57 points with the assumption that DTE, EPS, EX, FDI, GDP, INT, M2, ROE, and ROA are constant. Here the value of R^2 is 19%, which means that the return variations of this company can be predicted up to 19% with these explanatory variables. Based on the results of the F statistic, it can be seen that the F statistic is 2.24, with a probability of 0.02 less than 0.05. This means that the variables DTE, EPS, EX, FDI, GDP, INF, INT, M2, ROE, and ROA simultaneously have a significant effect on the return of Meghna Cement Mills Limited.

Table 17: Regression result of Heidelberg Cement Bangladesh Ltd.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.001082	0.007090	-0.152563	0.8791
DTE	-0.662919	0.579399	-1.144150	0.2555
EPS	0.544192	0.061606	8.833385	0.0000
EX	-2.353864	1.366321	-1.722775	0.0883
FDI	1.742732	1.999872	0.871422	0.3858
GDP	-0.247520	0.268841	-0.920690	0.3596
INF	0.185405	0.516211	0.359165	0.7203
INT	-0.342449	0.445283	-0.769060	0.4438
M2	0.064116	0.284615	0.225274	0.8223
PE	0.499896	0.051793	9.651866	0.0000
R-squared	0.567601	Mean dependent var		-0.000886
Adjusted R-squared	0.525756	S.D. dependent var		0.083174
S.E. of regression	0.057278	Akaike info criterion		-2.789744
Sum squared resid	0.305115	Schwarz criterion		-2.533945
Log likelihood	153.6718	Hannan-Quinn criter.		-2.686137
F-statistic	13.56433	Durbin-Watson stat		0.989323
Prob(F-statistic)	0.0000			

Source: Authors own calculations

The above table 17 describes the regression analysis for Heidelberg Cement Bangladesh Limited. Here, stock return has been used as a dependent variable, and some fundamental and macroeconomic factors have been used as independent variables. As there was an indication of high multicollinearity between ROA and EPS in correlation matrix analysis, ROA has been dropped from the construction of the model for this stock. With a 1% level of significance, earnings per share (EPS) and the price-earnings ratio (PE) were found to be statistically significant, respectively. The positive coefficient value of the EPS, i.e., 0.544192, suggests that if the EPS goes up by 1 point, the returns of Heidelberg Cement Bangladesh Limited will go up by 0.54 point with the assumption that DTE, EX, FDI, GDP, INF, INT, M2, and PE are constant. Again, the positive coefficient value of the PE, i.e., 0.499896, suggests that if the PE goes up by 1 point, the returns of Heidelberg Cement Bangladesh Limited will also go up by 0.50 point with the assumption that DTE, EPS, EX, FDI, GDP, INF, INT, and M2 are constant. Here, the value of R² is 57%, which means that the variations of the return of Heidelberg Cement Bangladesh Limited are possible to explain up to 57% using these exogenous variables. The F-statistic of 13.56433 with a probability of 0.0000 or less than 5% indicates that the variables DTE, EPS, EX, FDI, GDP, INF, INT, M2, and PE simultaneously have a significant effect on the returns of Heidelberg Cement Bangladesh Limited.

4.0 Overall Findings and Concluding Remarks

This study was conducted to identify the macroeconomic and fundamental factors that might have significant effects on the return variations of some sampled stocks from the cement industry listed on the Dhaka Stock Exchange Ltd. in Bangladesh. The returns of all of the sampled companies proved to be non-normal. The price-earnings ratio (PE), one of the variables in the model for Crown Cement PLC, was found to have a positive and statistically significant effect on its return. The goodness of fit as determined by R² was not as good for Crown Cement PLC, even though the combined influence of all exogenous variables was found to be significant (F-statistic). In the case of Lafarge Holcim Bangladesh Ltd., only EPS and PE were discovered to have positive and statistically significant results; nevertheless, the simultaneous impact of all external components was demonstrated to be extremely significant (F-statistic). Once more, the model's goodness of fit for this company, as measured by R², was reasonably satisfactory at 61%. However, surprising outcomes were found for the return of Premier Cement Mills Ltd. Out of eleven exogenous variables, none was found to be statistically significant for this stock. Even the non-significant value of the F-statistic did not justify the construction of the regression model with these selected variables for Premier Cement Mills Ltd. In the case of Meghna Cement Mills Ltd., inflation was found to have a negative and statistically significant impact on its return. Even though the aggregate impact of all exogenous factors was found to be significant (F-statistic), the goodness of fit as measured by R² wasn't as good for this company. Finally, EPS and PE were discovered to have a positive and statistically significant effect on the return of Heidelberg Cement Bangladesh Ltd. The total impact of all external elements was demonstrated to be extremely significant (F-statistic), even though only EPS and PE were determined to be statistically significant. R² once again indicated that the model's goodness of fit was satisfactory, with 57% for Heidelberg Cement Bangladesh Ltd.

4.1 Concluding Remarks

This study's main goal is to determine how fundamental and macroeconomic factors affect stock returns in Bangladesh. A total of five companies from the cement industry that are listed on the DSE in Bangladesh have been chosen at random as a sample for this study. The selected businesses are Heidelberg Cement Bangladesh Limited, Lafarge Holcim Bangladesh Limited, Premier Cement Mills Limited, and Lafarge Holcim Bangladesh Limited. The dataset consists of

time-series data that was gathered on a monthly basis between 2012 and 2021. To accomplish the research goal, a multiple regression model was built using this data, which mostly comprises fundamental and macroeconomic components as exogenous variables. A number of statistical tests, including descriptive statistics, correlation matrices, and multiple regression analyses, have been conducted to determine the main objective. According to the study's overall findings, among key variables, Lafarge Holcim Bangladesh Ltd. and Heidelberg Cement Bangladesh Limited both had positive and statistically significant EPS and PE ratios, whereas Crown Cement PLC only had a positive and statistically significant PE ratio. However, only inflation was determined to have a negative and statistically significant effect on Meghna Cement Mills Ltd. among all sample companies. None of the fundamental or macroeconomic factors was found to be statistically significant in the case of Premier Cement Mills Limited. This study distinguished itself from others for listed enterprises within the cement industry of DSE, Bangladesh, since it incorporates a wide range of macroeconomic variables in addition to the chosen fundamental variables. However, the inclusion of a ten-year span of data with eleven exogenous variables for each of the chosen five out of seven listed companies in the DSE's cement industry has made an important contribution to this field of study. Given that Bangladesh's cement business is expanding quickly and offers attractive investment opportunities, investors can utilize the findings of this study to predict stock returns by employing significant factors. Once more, other stakeholders and policymakers might find it useful while making management and other important decisions. Such a study may be more useful if it includes more exogenous factors and stocks listed in or out of the cement industry.

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Appendix:

Table 02: Results of unit root test on the monthly data of macroeconomic factors

Name of the Company	Level/difference	Test Equation	Augmented Dickey-Fuller Test				Phillips-Perron Test				Comment
			Test-Statistic	Critical Value		P-Value	Test-Statistic	Critical Value		P-Value	
				1% Level	5% Level			1% Level	5% Level		
Ex	Level	Intercept	-9.09	-3.49	-2.88	0.00	-9.54	-3.49	-2.88	0.00	Stationary at level
		Trend & Intercept	-9.92	-4.04	-3.45	0.00	-10.09	-4.04	-3.45	0.00	
		None	-9.12	-2.58	-1.94	0.00	-9.58	-2.58	-1.94	0.00	
INF	Level	Intercept	-2.63	-3.49	-2.88	0.08	-6.23	-3.49	-2.88	0.00	Non-Stationary at level
		Trend & Intercept	-6.78	-4.04	-3.45	0.00	-7.30	-4.04	-3.45	0.00	
		None	-2.22	-2.58	-1.94	0.02	-5.34	-2.58	-1.94	0.00	
	1 st Difference	Intercept	-11.60	-3.49	-2.88	0.00	-19.81	-3.49	-2.88	0.00	Stationary at 1 st Difference
		Trend & Intercept	-11.54	-4.04	-3.45	0.00	-19.71	-4.04	-3.45	0.00	
		None	-11.65	-2.58	-1.94	0.00	-19.92	-2.58	-1.94	0.00	
GDP	Level	Intercept	6.47	-3.49	-2.88	1.00	14.03	-3.49	2.88	1.00	Non-Stationary at level
		Trend & Intercept	6.35	-4.04	-3.45	1.00	13.80	-4.04	-3.45	1.00	
		None	6.48	-2.58	-1.94	1.00	14.45	-2.58	-1.94	1.00	
	1 st Difference	Intercept	4.68	-3.49	-2.88	1.00	5.99	-3.49	-2.88	1.00	Non-Stationary at 1 st Difference
		Trend & Intercept	4.05	-4.04	-3.45	1.00	4.62	-4.04	-3.45	1.00	
		None	4.91	-2.58	-1.94	1.0	6.62	-2.58	-1.94	1.00	
	2 nd Difference	Intercept	-8.75	-3.49	-2.88	0.00	-9.13	-3.49	-2.88	0.00	Stationary at 2 nd difference
		Trend & Intercept	-9.11	-4.04	-3.45	0.00	-9.39	-4.04	-3.45	0.00	
		None	-8.65	-2.58	-1.94	0.00	-9.06	-2.58	-1.94	0.00	
FDI	Level	Intercept	-1.09	-3.50	-2.89	0.71	-2.54	-3.49	-2.88	0.108	Non-Stationary at level
		Trend & Intercept	-2.07	-4.05	-3.45	0.55	-2.92	-4.04	-3.45	0.15	
		None	-1.47	-2.58	-1.94	0.13	-2.07	-2.58	-1.94	0.03	
	1 st Difference	Intercept	-7.11	-3.50	-2.89	0.00	-10.19	-3.49	-2.88	0.00	Stationary at 1 st difference
		Trend & Intercept	-6.97	-4.05	-3.45	0.00	-10.17	-4.04	-3.45	0.00	
		None	-7.03	-2.58	-1.94	0.00	-10.19	-2.58	-1.94	0.00	
m 2	L e	Intercept	-10.56	-3.49	-2.88	0.00	-21.72	-3.49	-2.88	0.00	St at io

		Trend & Intercept	-10.68	-4.04	-3.45	0.00	-24.49	-4.04	-3.45	0.00	
		None	-2.21	-2.58	-1.94	0.02	-12.514	-2.58	-1.94	0.00	
INT	Level	Intercept	-3.50	-3.49	-2.88	0.00	-5.37	-3.49	-2.88	0.00	Stationary at Level
		Trend & Intercept	-3.46	-4.04	-3.45	0.04	-5.39	-4.04	-3.45	0.00	
		None	-3.03	-2.58	-1.94	0.00	-4.87	-2.58	-1.94	0.00	

Source: Authors own Calculations

Table 03: Results of unit root test on the monthly stock return data and fundamental factors of Crown Cement PLC.

Name of the Company	Level/difference	Test Equation	Augmented Dickey-Fuller Test				Phillips-Perron Test				Comment
			Test-Statistic	Critical Value		P-Value	Test-Statistic	Critical Value		P-Value	
				1% Level	5% Level			1% Level	5% Level		
Crown Cement DTE	Level	Intercept	-0.821	-3.49	-2.88	0.80	-1.70	-3.49	-2.88	0.42	Non-Stationary at Level
		Trend & Intercept	-1.56	-4.04	-3.45	0.79	-2.45	-4.04	-3.45	0.35	
		None	-0.94	-2.58	-1.94	0.30	-1.75	-2.58	-1.94	0.07	
	1 st difference	Intercept	-15.87	-3.49	-2.88	0.00	-15.88	-3.49	-2.88	0.00	Stationary at 1st difference
		Trend & Intercept	-16.03	-4.04	-3.45	0.00	-16.19	-4.04	-3.45	0.00	
		None	-15.90	-2.58	-1.94	0.00	-15.91	-2.58	-1.94	0.00	
Crown cement ROA	Level	Intercept	4.19	-3.51	-2.89	0.99	-3.63	-3.49	-2.88	0.00	Non-Stationary at level
		Trend & Intercept	-1.42	-4.05	-3.45	0.84	-3.10	-4.04	-3.45	0.11	
		None	4.39	-2.59	-1.94	1.00	-3.71	-2.58	-1.94	0.00	
	1 st Difference	Intercept	-2.41	-3.50	-2.89	0.14	0.37	-3.49	-2.89	0.98	Non-Stationary at 1st difference
		Trend & Intercept	-1.50	-4.05	-3.45	0.82	-0.49	-4.05	-3.45	0.98	
		None	-2.17	-2.59	-1.94	0.02	1.17	-2.58	-1.94	0.93	
	2 nd Difference	Intercept	-8.91	-3.50	-2.89	0.00	-5.59	-3.49	-2.89	0.00	Stationary at 2nd difference
		Trend & Intercept	-8.77	-4.06	-3.46	0.00	-5.88	-4.05	-3.45	0.00	
		None	-8.95	-2.59	-1.94	0.00	-5.60	-2.58	-1.94	0.00	

Crown cement ROE	Level	Intercept	4.13	-3.50	-2.89	1.00	-9.70	-3.49	-2.88	0.00	Non-Stationary at level
		Trend & Intercept	1.00	-4.05	-3.45	0.99	-9.16	-4.04	-3.45	0.00	
		None	4.70	-2.59	-1.94	1	-9.67	-2.58	-1.94	0.00	
	1 st difference	Intercept	5.18	-3.50	-2.89	1.00	-8.95	-3.49	-2.89	0.00	Non-Stationary at 1 st difference
		Trend & Intercept	5.18	-4.05	-3.45	1.00	-9.41	-4.05	-3.45	0.00	
		None	4.50	-2.59	-1.94	1.00	-8.77	-2.58	-1.94	0.00	
	2 nd Difference	Intercept	-6.59	-3.50	-2.89	0.00	-9.64	-3.49	-2.89	0.00	Stationary at 2 nd difference
		Trend & Intercept	-6.61	-4.06	-3.45	0.00	-8.90	-4.05	-3.45	0.00	
		None	-6.57	-2.59	-1.94	0.00	-9.96	-2.58	-1.94	0.00	
Crown Cement EPS	Level	Intercept	-1.13	-3.49	-2.89	0.69	-10.19	-3.49	-2.88	0.00	Non-Stationary at level
		Trend & Intercept	-1.16	-4.05	-3.45	0.91	-9.87	-4.04	-3.45	0.00	
		None	-1.00	-2.58	-1.94	0.28	-10.38	-2.58	-1.94	0.00	
	1 st Difference	Intercept	-9.97	-3.49	-2.89	0.00	-9.97	-3.49	-2.89	0.00	Stationary at 1 st difference
		Trend & Intercept	-10.45	-4.05	-3.45	0.00	-10.38	-4.05	-3.45	0.00	
		None	-9.79	-2.58	-1.94	0.00	-9.74	-2.58	-1.94	0.00	
Crown Cement PE	Level	Intercept	-4.22	-3.49	-2.89	0.00	-11.03	-3.49	-2.88	0.00	Stationary at level
		Trend & Intercept	-4.09	-4.05	-3.45	0.00	-10.57	-4.04	-3.45	0.00	
		None	-4.23	-2.58	-1.94	0.00	-11.29	-2.58	-1.94	0.00	
Crown cement SR	Level	Intercept	-8.69	-3.49	-2.88	0.00	-8.61	-3.49	-2.88	0.00	Stationary at level
		Trend & Intercept	-8.67	-4.04	-3.45	0.00	-8.57	-4.04	-3.45	0.00	
		None	-8.69	-2.58	-1.94	0.00	-8.62	-2.58	-1.94	0.00	

Source: Authors own calculations

Table 04: Results of unit root test on the monthly data of stock return and fundamental factors of Lafarge Holcim Bangladesh Ltd.

Name of the Company	Level/ difference	Test Equation	Augmented Dickey-Fuller Test				Phillips-Perron Test				Comment	
			Test-Statistic	Critical Value		P-Value	Test-Statistic	Critical Value		P-Value		
				1% Level	5% Level			1% Level	5% Level			
Lafarge Holcim Cement DTE	Level	Intercept	-2.827	-3.49	-2.49	0.05	-4.46	-4.5	-3.49	0.004	Non-Stationary at Level	
		Trend & Intercept	-2.96	-4.04	-3.45	0.14	-4.64	-4.04	-3.45	0.001		
		None	-2.83	-2.58	-1.94	0.005	-4.46	-2.58	-1.94	0.00		
	1 st difference	Intercept	-16.29	-3.49	-2.88	0.00	-17.14	-3.49	-2.88	0.00		Stationary at 1 st difference
		Trend & Intercept	-16.21	-4.04	-3.45	0.00	-17.06	-4.04	-3.15	0.00		
		None	-16.36	-2.58	-1.94	0.00	-17.22	-2.58	-1.94	0.00		
Lafarge Holcim	Level	Intercept	-5.61	-3.49	-2.88	0.00	-5.59	-3.49	-2.88	0.00	Stationary at level	
		Trend & Intercept	-5.66	-4.04	-3.45	0.00	-5.65	-4.04	-3.45	0.00		
		None	-5.63	-2.58	-1.94	0.00	-5.62	-2.58	-1.94	0.00		
Lafarge Holcim cement ROE	Level	Intercept	-2.64	-3.49	-2.88	0.08	-2.69	-3.49	-2.88	0.078	Non-Stationary at Level	
		Trend & Intercept	-3.09	-4.04	-3.45	0.11	-3.17	-4.04	-3.45	0.096		
		None	-2.66	-2.58	-1.61	0.008	-2.70	-2.58	-1.94	0.007		
	1 st difference	Intercept	-10.27	-3.49	-2.88	0.00	-10.3	-3.49	-2.88	0.00		Stationary at 1 st difference
		Trend & Intercept	-10.23	-4.04	-3.45	0.00	-10.26	-4.04	-3.15	0.00		
		None	-10.32	-2.58	-1.94	0.00	-10.35	-2.58	-1.94	0.00		
Lafarge Holcim Cement EPS	Level	Intercept	-2.59	-3.49	-2.88	0.09	-4.18	-3.49	-2.88	0.00	Non-Stationary at level	
		Trend & Intercept	-2.91	-4.04	-3.45	0.16	-4.04	-4.04	-3.45	0.01		
		None	-2.76	-2.58	-1.94	0.00	-4.30	-2.58	-1.94	0.00		

	1 st Difference	Intercept	-5.63	-3.49	-2.89	0.00	-5.71	-3.49	-2.89	0.00	Stationary at 1 st difference
		Trend & Intercept	-6.13	-4.05	-3.45	0.00	-6.35	-4.05	-3.45	0.00	
		None	-5.53	-2.58	-1.94	0.00	-5.59	-2.58	-1.94	0.00	
Lafarge Holcim	Level	Intercept	-5.30	-3.49	-2.88	0.00	-5.05	-3.49	-2.88	0.00	Stationary at level
		Trend & Intercept	-5.56	-4.04	-3.45	0.00	-5.25	-4.04	-3.45	0.00	
		None	-5.32	-2.58	-1.94	0.00	-5.08	-2.58	-1.94	0.00	
Lafarge Holcim	Level	Intercept	-9.63	-3.49	-2.88	0.00	-9.68	-3.49	-2.88	0.00	Stationary at level
		Trend & Intercept	-9.70	-4.04	-3.45	0.00	-9.72	-4.04	-3.45	0.00	
		None	-9.65	-2.58	-1.94	0.00	-9.69	-2.58	-1.94	0.00	

Source: Authors own calculations

Table 05: Results of unit root test on the monthly data of stock return and fundamental factors Premier Cement Mills Ltd.

Name of the company	Level/difference	Test Equation	Augmented Dickey-Fuller Test				Phillips-Perron Test				Comment
			Test-statistic	Critical value		P-value	Test-statistic	Critical value		P-value	
				1% Level	5% Level			1% Level	5% Level		
Premier Cement DTE	Level	Intercept	-1.47	-3.49	-2.88	0.54	-1.39	-3.49	-2.88	0.58	Non-Stationary at level
		Trend & Intercept	-1.45	-4.04	-3.45	0.83	-1.45	-4.04	-3.45	0.83	
		None	-1.49	-2.58	-1.94	0.12	-1.43	-2.58	-1.94	0.14	
	1 st difference	Intercept	-11.30	-3.49	-2.88	0.00	-11.30	-3.49	-2.88	0.00	Stationary at 1 st difference
		Trend & Intercept	-11.48	-4.04	-3.45	0.00	-11.48	-4.04	-3.45	0.00	
		None	-11.35	-2.58	-1.94	0.00	-11.35	-2.58	-1.94	0.00	
Premier Cement ROA	Level	Intercept	-10.24	-3.49	-2.88	0.00	-10.25	-3.49	-2.88	0.00	Stationary at level
		Trend & Intercept	-10.38	-4.04	-3.45	0.00	-10.39	-4.04	-3.45	0.00	
		None	-10.29	-2.58	-1.94	0.00	-10.29	-2.58	-1.94	0.00	
Premier cement ROE	Level	Intercept	-4.90	-3.49	-2.88	0.00	-10.08	-3.49	-2.88	0.00	Stationary at level
		Trend & Intercept	-5.11	-4.04	-3.45	0.00	-10.35	-4.04	-3.45	0.00	
		None	-4.92	-2.58	-1.94	0.00	-10.12	-2.58	-1.94	0.00	
Premier cement	Level	Intercept	-3.23	-3.50	-2.89	0.02	-3.28	-3.49	-2.88	0.01	Non-Stationary at
		Trend & Intercept	-3.11	-4.05	-3.45	0.10	-3.05	-4.04	-3.45	0.12	

	1st Difference	None	-3.38	-2.58	-1.94	0.00	-3.29	-2.58	-1.94	0.00	Stationary at 1st difference
		Intercept	-7.01	-3.50	-2.89	0.00	-10.48	-3.49	-2.88	0.00	
		Trend & Intercept	-6.85	-4.05	-3.45	0.00	-10.57	-4.04	-3.45	0.00	
		None	-6.95	-2.58	-1.94	0.00	-10.52	-2.58	-1.94	0.00	
Premier cement PE	Level	Intercept	-9.30	-3.50	-2.89	0.00	-33.86	-3.49	-2.89	0.00	Stationary at level
		Trend & Intercept	-10.10	-4.06	-3.45	0.00	-34.45	-4.05	-3.45	0.00	
		None	-2.38	-2.59	-1.94	0.01	-33.61	-2.58	-1.94	0.00	
Premier cement SR	Level	Intercept	-8.04	-3.49	-2.89	0.00	-7.99	-3.49	-2.89	0.00	Stationary at level
		Trend & Intercept	-7.99	-4.05	-3.45	0.00	-7.92	-4.05	-3.45	0.00	
		None	-8.06	-2.59	-1.94	0.00	-7.99	-2.59	-1.94	0.00	

Source: Authors own calculations

Table 06: Results of unit root test on the monthly data of stock return and fundamental factor of Meghna Cement Mills Ltd.

Name of the Company	Level/difference	Test Equation	Augmented Dickey-Fuller Test				Phillips-Perron Test				Comment
			Test-Statistic	Critical Value		P-Value	Test-Statistic	Critical Value		P-Value	
				1% Level	5% Level			1% Level	5% Level		
Meghna Cement DTE	Level	Intercept	-1.18	-3.49	-2.88	0.67	-0.80	-3.49	-2.88	0.81	Non-Stationary at Level
		Trend & Intercept	-1.19	-4.04	-3.45	0.90	-1.19	-4.04	-3.45	0.90	
		None	-1.25	-2.58	-1.94	0.19	-0.90	-2.58	-1.94	0.32	
	1 st difference	Intercept	-11.22	-3.49	-2.88	0.00	-11.24	-3.49	-2.88	0.00	Stationary at 1st difference
		Trend & Intercept	-11.41	-4.04	-3.45	0.00	-11.51	-4.04	-3.45	0.00	
		None	-11.19	-2.58	-1.94	0.00	-11.21	-2.58	-1.94	0.00	
Meghna cement ROA	Level	Intercept	-4.13	-3.49	-2.88	0.00	-11.40	-3.49	-2.88	0.00	Stationary at level
		Trend & Intercept	-4.10	-4.04	-3.45	0.00	-11.37	-4.04	-3.45	0.00	
		None	-4.10	-2.58	-1.94	0.00	-11.41	-2.58	-1.94	0.00	

Meghna cement ROE	Level	Intercept	-1.69	-3.49	-2.88	0.43	-1.43	-3.49	-2.88	0.56	Non-Stationary at level
		Trend & Intercept	-1.79	-4.04	-3.45	0.69	-1.53	-4.04	-3.45	0.81	
		None	-1.69	-2.58	-1.94	0.08	-1.45	-2.58	-1.94	0.13	
	1 st difference	Intercept	-11.22	-3.49	-2.88	0.00	-11.31	-3.49	-2.88	0.00	Stationary at 1 st difference
		Trend & Intercept	-11.34	-4.04	-3.45	0.00	-11.51	-4.04	-3.45	0.00	
		None	-11.20	-2.58	-1.94	0.00	-11.27	-2.58	-1.94	0.00	
Meghna Cement EPS	Level	Intercept	-2.37	-3.49	-2.88	0.15	-2.49	-3.49	-2.88	0.11	Non-Stationary at level
		Trend & Intercept	-2.73	-4.04	-3.45	0.22	-2.87	-4.04	-3.45	0.17	
		None	-2.36	-2.58	-1.94	0.01	-2.41	-2.58	-1.94	0.01	
	1 st Difference	Intercept	-10.81	-3.49	-2.88	0.00	-10.81	-3.49	-2.88	0.00	Stationary at 1 st difference
		Trend & Intercept	-10.77	-4.04	-3.45	0.00	-10.77	-4.04	-3.45	0.00	
		None	-10.85	-2.58	-1.61	0.00	-10.85	-2.58	-1.94	0.00	
Meghna Cement PE	Level	Intercept	-12.31	-3.49	-2.88	0.00	-12.86	-3.49	-2.88	0.00	Stationary at level
		Trend & Intercept	-12.44	-4.04	-3.45	0.00	-13.42	-4.04	-3.45	0.00	
		None	-12.35	-2.58	-1.94	0.00	-12.92	-2.58	-1.94	0.00	
Meghna Cement SR	Level	Intercept	-12.50	-3.49	-2.88	0.00	-14.46	-3.49	-2.88	0.00	Stationary at level
		Trend & Intercept	-12.45	-4.04	-3.45	0.00	-14.43	-4.04	-3.45	0.00	
		None	-12.52	-2.59	-1.94	0.00	-13.96	-2.59	-1.94	0.00	

Source: Authors own calculations

Table 07: Results of unit root test on the monthly data of stock return and fundamental factors of Heidelberg Cement Bangladesh Ltd.

Name of the Company	Level/difference	Test Equation	Augmented Dickey-Fuller Test				Phillips-Perron Test				Comment
			Test-Statistic	Critical Value		P-Value	Test-Statistic	Critical Value		P-Value	
				1% Level	5% Level			1% Level	5% Level		
Heidelberg Cement DTE	Level	Intercept	-2.82	-3.49	-2.88	0.05	-2.95	-3.49	-2.88	0.04	Non-Stationary at Level
		Trend & Intercept	-2.81	-4.04	3.45	0.19	-2.94	-4.04	-3.45	0.15	
		None	-2.44	-2.58	-1.94	0.01	-2.53	-2.58	-1.94	0.01	
	1 st difference	Intercept	-10.43	-3.49	-2.88	0.00	-10.43	-3.49	-2.88	0.00	Stationary at 1 st difference
		Trend & Intercept	-10.39	-4.04	3.45	0.00	-10.39	-4.04	-3.04	0.00	
		None	-10.48	-2.58	-1.94	0.00	-10.48	-2.58	-1.94	0.00	
Heidelberg cement ROA	Level	Intercept	6.91	-3.49	-2.89	1.00	-3.92	-3.49	-2.88	0.00	Stationary at level
		Trend & Intercept	6.75	-4.05	-3.45	1.00	-2.64	-4.04	-3.45	0.26	
		None	7.09	-2.58	-1.94	1.00	-4.74	-2.58	-1.94	0.00	
	1 st Difference	Intercept	-2.26	-3.49	-2.89	0.18	-3.16	-3.49	-2.89	0.02	Non-Stationary at 1 st
		Trend & Intercept	-1.14	-4.05	-3.45	0.91	-3.77	-4.05	-3.45	0.02	
		None	-2.00	-2.58	-1.94	0.04	-2.86	-2.58	-1.94	0.00	
	2 nd Difference	Intercept	-5.29	-3.499	-2.89	0.00	-5.46	-3.49	-2.89	0.00	Stationary at 2 nd difference
		Trend & Intercept	-5.10	-4.05	-3.45	0.00	-5.17	-4.05	-3.45	0.00	
		None	-5.38	-2.58	-1.94	0.00	-5.61	-2.58	-1.94	0.00	
Heidelberg cement ROE	Level	Intercept	1.17	-3.49	-2.88	0.99	-2.75	-3.49	-2.88	0.06	Non-Stationary at level
		Trend & Intercept	1.42	-4.04	-3.45	1.00	-0.98	-4.04	-3.45	0.94	
		None	1.14	-2.58	-1.94	0.93	-3.52	-2.58	-1.94	0.00	
	1 st difference	Intercept	-1.20	-3.49	-2.89	0.66	-0.84	-3.49	-2.89	0.80	Non-Stationary at 1 st difference
		Trend & Intercept	-1.78	-4.05	-3.45	0.70	-2.24	-4.05	-3.45	0.45	

		None	-0.85	-2.58	-1.94	0.34	-0.38	-2.58	-1.94	0.54	
	2 nd Difference	Intercept	-6.51	-3.49	-2.89	0.00	-7.34	-3.49	-2.89	0.00	Stationary at 2 nd difference
		Trend & Intercept	-6.39	-4.05	-3.45	0.00	-7.18	-4.05	-3.45	0.00	
		None	-6.58	-2.58	-1.94	0.00	-7.43	-2.58	-1.94	0.00	
Heidelberg Cement EPS	Level	Intercept	6.02	-3.49	-2.89	1.00	-5.93	-3.49	-2.88	0.00	Non-Stationary at level
		Trend & Intercept	5.70	-4.05	-3.45	1.00	-5.42	-4.04	-3.45	0.00	
		None	6.35	-2.58	-1.94	1.00	-6.35	-2.58	-1.94	0.00	
	1 st Difference	Intercept	-7.64	-3.49	-2.89	0.00	-7.71	-3.49	-2.89	0.00	Stationary at 1 st difference
		Trend & Intercept	-8.20	-4.05	-3.45	0.00	-8.21	-4.05	-3.45	0.00	
		None	-7.34	-2.58	-1.94	0.00	-7.46	-2.58	-1.94	0.00	
Heidelberg Cement BD PE	Level	Intercept	0.82	-3.49	-2.89	0.99	-6.50	-3.49	-2.88	0.00	Non- Stationary at level
		Trend & Intercept	0.97	-4.05	-3.45	0.99	-6.01	-4.04	-3.45	0.00	
		None	1.11	-2.58	-1.94	0.93	-6.72	-2.58	-1.94	0.00	
	1 st Difference	Intercept	-10.85	-3.49	-2.89	0.00	-10.95	-3.49	-2.89	0.00	Stationary at 1 st difference
		Trend & Intercept	-11.44	-4.05	-3.45	0.00	-11.44	-4.05	-3.45	0.00	
		None	-10.55	-2.58	-1.94	0.00	-10.59	-2.58	-1.94	0.00	
Heidelberg Cement SR	Level	Intercept	-11.32	-3.49	-2.88	0.00	-11.27	-3.49	-2.88	0.00	Stationary at level
		Trend & Intercept	-12.23	-4.04	-3.45	0.00	-12.16	-4.04	-3.45	0.00	
		None	-11.37	-2.58	-1.94	0.00	-11.32	-2.58	-1.94	0.00	

Source: Authors own calculations

Table 08: Testing of correlation matrix of independent variables in Crown Cement PLC

	DTE	EPS	EX	FDI	GDP	INF	INT	M2	PE	ROA	ROE
DTE	1										
EPS	0.21	1									
EX	-0.06	-0.03	1								
FDI	-0.05	0.25	-0.24	1							
GDP	0.15	0.19	0.01	0.16	1						
INF	-0.04	-0.18	0.31	-0.36	-0.05	1					
INT	0.11	0.08	-0.13	0.15	0.18	-0.02	1				
M2	0.11	-0.01	-0.07	0.03	0.05	-0.05	-0.03	1			
PE	-0.15	-0.03	0.01	-0.05	-0.08	0.00	0.11	-0.01	1		
ROA	0.33	0.73	-0.01	0.16	0.31	-0.10	0.19	0.00	-0.44	1	
ROE	0.20	0.91	-0.02	0.26	0.19	-0.17	0.14	-0.03	-0.03	0.74	1

Remarks: Red numbers in the table indicate a high likelihood of multicollinearity, whereas green values suggest a moderate likelihood of multicollinearity. [Source: Authors own calculation]

Table 09: Testing of correlation matrix of independent variables in Lafarge Holcim Bangladesh Ltd.

	DTE	EPS	EX	FDI	GDP	INF	INT	M2	PE	ROA	ROE
DTE	1										
EPS	-0.16	1									
EX	-0.18	0.34	1								
FDI	-0.27	0.24	0.09	1							
GDP	-0.07	-0.07	0.01	-0.07	1						
INF	0.13	0.00	0.02	-0.12	0.04	1					
INT	0.04	-0.15	-0.12	-0.01	0.18	-0.01	1				
M2	-0.12	-0.11	-0.06	-0.01	0.05	-0.02	-0.04	1			
PE	-0.04	-0.13	0.04	0.03	0.00	-0.14	-0.13	0.05	1		
ROA	0.07	0.03	-0.04	0.12	-0.37	0.00	-0.22	0.01	-0.11	1	
ROE	0.04	0.21	0.09	0.07	-0.06	0.08	-0.09	0.05	-0.02	0.19	1

Remarks: Red numbers in the table indicate a high likelihood of multicollinearity, whereas green values suggest a moderate likelihood of multicollinearity. [Source: Authors own calculation]

Table 10: Testing of correlation matrix of independent variables in Premier Cement Mills Ltd.

	DTE	EPS	EX	FDI	GDP	INF	INT	M2	PE	ROA	ROE
DTE	1										
EPS	-0.49	1									
EX	-0.10	0.07	1								
FDI	-0.13	0.24	0.09	1							
GDP	0.53	-0.72	0.00	-0.15	1						
INF	-0.03	-0.02	0.02	-0.12	0.02	1					
INT	0.21	-0.10	-0.12	-0.01	0.26	-0.03	1				
M2	0.07	-0.03	-0.06	-0.01	0.00	-0.02	-0.03	1			
PE	0.00	0.02	0.44	0.02	-0.01	0.02	-0.19	-0.09	1		
ROA	-0.05	-0.02	-0.11	-0.01	-0.10	-0.11	-0.13	0.03	-0.10	1	
ROE	0.07	0.04	-0.11	0.05	-0.04	-0.01	-0.07	0.09	-0.08	0.29	1

Remarks: Green color in the above table indicates the possibility of moderate level of multicollinearity.

Table 11: Testing of correlation matrix of independent variables in Meghna Cement Mills Ltd.

	DTE	EPS	EX	FDI	GDP	INF	INT	M2	PE	ROA	ROE
DTE	1										
EPS	-0.25	1									
EX	0.00	-0.05	1								
FDI	-0.33	-0.06	0.09	1							
GDP	0.45	-0.15	0.01	-0.07	1						
INF	0.02	-0.01	0.02	-0.12	0.04	1					
INT	0.03	0.02	-0.12	-0.02	0.19	-0.04	1				
M2	0.01	0.02	-0.07	-0.01	0.05	-0.02	-0.03	1			
PE	0.02	-0.04	0.02	0.03	0.03	-0.42	0.07	0.05	1		
ROA	-0.01	0.33	-0.12	0.11	-0.02	-0.03	0.11	0.04	-0.04	1	
ROE	0.43	0.32	-0.02	0.05	0.42	0.00	0.19	0.01	0.00	0.46	1

Remarks: Red numbers in the table indicate a high likelihood of multicollinearity, whereas green values suggest a moderate likelihood of multicollinearity. [Source: Authors own calculation]

Table 12: Testing of correlation matrix of independent variables in Heidelberg Cement Bangladesh Ltd.

	DTE	EPS	EX	FDI	GDP	INF	INT	M2	PE	ROA	ROE
DTE	1										
EPS	0.14	1									
EX	-0.05	-0.01	1								
FDI	0.32	0.14	0.09	1							
GDP	0.01	-0.02	0.01	-0.01	1						
INF	0.01	0.03	0.02	-0.12	0.04	1					
INT	0.22	-0.01	-0.12	0.01	0.14	-0.04	1				
M2	0.00	0.06	-0.07	-0.01	0.05	-0.02	-0.03	1			
PE	-0.10	-0.71	0.01	-0.11	0.04	-0.31	-0.05	0.03	1		
ROA	0.18	0.88	-0.02	0.17	0.00	0.01	-0.01	0.05	-0.65	1	
ROE	0.09	0.96	-0.01	0.09	-0.03	0.03	0.00	0.07	-0.67	0.77	1

Remarks: Red numbers in the table indicate a high likelihood of multicollinearity, whereas green values suggest a moderate likelihood of multicollinearity. [Source: Authors own calculation]

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