THE FACTORS INFLUENCING THE STOCK PRICES OF CONSTRUCTION INDUSTRY ENTERPRISES: AN EMPIRICAL STUDY IN VIETNAM

Nguyet Thi Minh Dang¹
Huyen Thi Thanh Dam²
Anh Thi Phuong Dinh³
To Duc Le⁴

ABSTRACT

Purpose: The construction sector is essential for the economic development of a country. This industry is likewise a key player and has a significant influence on the stock market. Hence, it is necessary to analyze the variables that influence the stock prices in the construction sector, as this will enable investors to maximize profits and mitigate risks.

Theoretical framework: This study evaluates the impact of macro factors and internal factors on the stock prices of the construction industry.

Design/Methodology/Approach: This study utilizes quarterly financial reports from 56 construction industry enterprises in the Vietnamese stock market during the period from 2016 to 2022 to examine the factors affecting the stock prices of this sector.

Findings: The results of the analysis indicate that the Random Effects Model (REM) is the most appropriate model, with factors such as the Consumer Price Index (CPI), Earnings Per Share (EPS), firm size (SIZE), and Price-Earnings ratio (PE) all having a positive impact on the stock prices of the construction industry.

Research, Practical & Social implications: Based on these findings, the article provides recommendations for investors and relevant industry stakeholders.

Originality/value: This article has conducted extensive analyses of factors influencing the stock prices of construction industry enterprises. The authors also provide suggestions for investors and relevant industry stakeholders to make investment decisions.

Keywords: Construction Industry, Stock Prices, CPI, GDP, EPS, PE.

OS FATORES QUE INFLUENCIAM OS PREÇOS DAS AÇÕES DAS EMPRESAS DA INDÚSTRIA DA CONSTRUÇÃO: UM ESTUDO EMPÍRICO NO VIETNÃ

RESUMO

Objetivo: O setor da construção é essencial para o desenvolvimento econômico de um país. Esta indústria é igualmente um ator-chave e tem uma influência significativa no mercado de ações. Por conseguinte, é necessário analisar as variáveis que influenciam os preços das ações no setor da construção, uma vez que tal permitirá aos investidores maximizar os lucros e atenuar os riscos.

¹ Faculty of Finance and Banking, Thuongmai University, Hanoi, Vietnam. E-mail: nguyetminh@tmu.edu.vn
Orcid: https://orcid.org/0000-0001-6075-067X
² Faculty of Finance and Banking, Thuongmai University, Hanoi, Vietnam.
E-mail: damthithanhuyen@tmu.edu.vn Orcid: https://orcid.org/0009-0002-9916-981X
³ Faculty of Finance and Banking, Thuongmai University, Hanoi, Vietnam. E-mail: anh.dtp@tmu.edu.vn
Orcid: https://orcid.org/0009-0006-7046-8209
⁴ Faculty of Finance and Banking, Thuongmai University, Hanoi, Vietnam. E-mail: to.ld@tmu.edu.vn
Orcid: https://orcid.org/0009-0003-8551-1407
Enquadramento teórico: Este estudio evalúa o impacto de macro fatores e fatores internos nos preços das ações da indústria da construcción.

Design/Metodologia/Abordagem: Este estudio utiliza relatórios financeiros trimestrales de 56 empresas da indústria da construcción no mercado acionário vietnamita durante o período de 2016 a 2022 para examinar os fatores que afetam os preços das ações deste setor.

Constataciones: Os resultados da análise indicam que o Modelo de Efeitos Aleatórios (REM) é o modelo mais adequado, com factores como o Índice de Preços ao Consumidor (IPC), Ganhos por Ação (EPS), tamanho da empresa (SIZE) e o Rácio Preço-Ganhos (PE) tendo um impacto positivo nos preços das ações da indústria da construcción.

Investigación, implicações prácticas e sociais: Com base nestas conclusões, o artigo fornece recomendacion aos investidores e partes interessadas relevantes do setor.

Originalidade/valor: Este artigo realizou análises aprofundadas dos fatores que influenciam os preços das ações das empresas da indústria da construcción. Os autores também fornece sugestões para que investidores e partes interessadas relevantes do setor tomem decisões de investimento.

Palavras-chave: Indústria da Construcción, Preços das Ações, IPC, PIB, EPS, PE.

LOS FACTORES QUE INFLUYEN EN LOS PRECIOS DE LAS ACCIONES DE LAS EMPRESAS DE LA INDUSTRIA DE LA CONSTRUCCIÓN: UN ESTUDIO EMPÍRICO EN VIETNAM

RESUMEN

Objetivo: El sector de la construcción es esencial para el desarrollo económico de un país. Esta industria es también un actor clave y tiene una influencia significativa en el mercado de valores. Por lo tanto, es necesario analizar las variables que influyen en los precios de las acciones en el sector de la construcción, ya que esto permitirá a los inversores maximizar las ganancias y mitigar los riesgos.

Marco teórico: Este estudio evalúa el impacto de los factores macro y los factores internos en los precios de las acciones de la industria de la construcción.

Diseño/Metodología/Enfoque: Este estudio utiliza informes financieros trimestrales de 56 empresas de la industria de la construcción en el mercado de valores vietnamita durante el período de 2016 a 2022 para examinar los factores que afectan los precios de las acciones de este sector.

Hallazgos: Los resultados del análisis indican que el Modelo de Efectos Aleatorios (REM) es el modelo más apropiado, con factores como el Índice de Precios al Consumidor (IPC), las Ganancias por Acción (EPS), el tamaño de la empresa (SIZE) y la relación Precio-Ganancia (PE), todos teniendo un impacto positivo en los precios de las acciones de la industria de la construcción.

Investigación, implicaciones prácticas y sociales: Basado en estos hallazgos, el artículo proporciona recomendaciones para inversores y partes interesadas relevantes de la industria.

Originalidad/valor: Este artículo ha llevado a cabo análisis exhaustivos de los factores que influyen en los precios de las acciones de las empresas de la industria de la construcción. Los autores también proporcionan sugerencias para que los inversores y las partes interesadas pertinentes de la industria tomen decisiones de inversión.

Palabras clave: Industria de la construcción, precios de las acciones, IPC, PIB, EPS, PE.
1 INTRODUCTION

The stock market is considered a channel for raising effective capital for the economy. Through this market, capital is transferred to industry, and financial support for companies. The business situation of companies is also evaluated through market information disclosure. Investors need to be aware of this issue to effectively invest and determine the factors that affect stock prices. The development of the economy greatly determines the fluctuations in stock prices traded on the stock market (Olugbenga, 2011). Stock prices are affected by macroeconomic indicators (Malaolu et al., 2013) (Adaramola & Olugbenga, 1994). In addition, stock prices are also determined by internal factors of the issuing unit. A developed economy will create good conditions for businesses to earn higher profits, thereby making their stocks more attractive (Singh et al., 2011). However, when the economy is in recession, businesses' business activities will decline and they will tend to cut dividends (Eita, n.d., 2012).

In the Vietnamese stock market, the construction industry plays a crucial role due to its significant application in production, business, and infrastructure development, making it a potent driver of the economy. The construction industry has shown signs of good growth due to increased housing supply and vibrant real estate market, expected public investment, and legal regulations are loosened (Reza et al., 2020). These are favorable conditions for the construction industry to develop. Currently, stock prices in the construction industry are on a strong upward trajectory, signaling positive prospects for the economy and attracting considerable attention from organizations and individual investors (Althov Feizal et al., 2021). However, stock prices in the construction industry remain subject to differentiation influenced by both macroeconomic and microeconomic factors (Gumilar et al., 2021). It is a burgeoning stock market that requires highly applicable scientific research to contribute to its efficient operation in a competitive securities market. Researching the factors that impact the stock market yields significant results and provides timely insights and recommendations for organizations and individual investors.

The main content of this article includes a theoretical basis and previous research overview of stock prices, and factors affecting stock prices; Research hypotheses are made based on the impact mechanism, data design and process analysis and econometric model; results, and analysis of the impact of factors on the fluctuation of stocks price of construction companies listed on the Vietnam stock market; and conclusions and suggestions.
2 LITERATURE REVIEWS

The goal of investors in the stock market is profit. Profits attained from two main groups are dividends/bonds and the return on investment (Halian et al., 2020). In particular, investors expect a return on investment. This indicator is the result between the buying price and selling price of securities on the market at the two times of buying and selling. The stock prices at each time depends on the real value of the stock and the relationship between supply and demand (Didarul Hasan & Saheb Ali Mondal, 2008). In which the real value is determined from the business results and internal factors; Supply and demand relationships depend on macro factors such as the political, social situation, and economic development (Adam & Tweneboah, 2018).

The market price of stocks is measured quite differently from the book value recorded on a company's balance sheet (Nishat, 2011). The book value is the equity value minus preferred stock. The book value per share is equivalent to the book value divided by the number of outstanding shares. Book value and market value rarely move in tandem because the book value is based on accounting figures and does not account for a company's future income potential (Reza et al., 2020). In an efficient market, stock prices are influenced by both macroeconomic and microeconomic factors (Adaramola & Olugbenga, 1994). It can be said that these macro and micro factors directly and indirectly affect the stock market, particularly stock prices. However, there are markets or industry sectors that are not efficient and do not respond to economic factors. Moreover, Fisher's theory of interest rates is essential for the framework of inflation targeting. The theory forms the basis for the idea that monetary policy should primarily focus on managing inflation expectations to maintain stable real interest rates. This aims to encourage savings and investment. Therefore, with the real interest rate, any expected increase/decrease in the inflation rate will lead to an increase/decrease in nominal interest rates through the interplay between present and future income.

GDP (Gross Domestic Product) growth rate is the sum of consumption, investment, and government spending. This is an indicator determined based on the value of final physical products and services created by the economy. The results of studies have shown that GDP impacts in the same direction as stock prices (Al-Tamimi et al., 2011), (Chhetri, 2023), (Olugbenga, 2011). Some studies have shown that other factors: interest rates, exchange rates, and oil prices are statistically significant and affect GDP growth. Research displays that the inflation rate has a negative relationship with stock market prices. Some empirical studies in Vietnam's stock market have shown that inflation is positively correlated with stock prices (Gumilar et al., 2021), (Mukherjee & Naka, 1995) tested the relationship between stock prices...
on the Japanese stock market and macro factors: exchange rate, money supply, inflation, bond interest rates, borrowing rates. Some studies mentioned the Consumer Price Index (CPI) or GDP growth rate, Earnings Per Share (EPS) firm size, dividend ratio, and Price-Earnings ratio (PE) (Sharif et al., 2015).

The study by (Al-Tamimi et al., 2011) was conducted on 17 companies in the UAE stock market from 1990 to 2005. It identified factors affecting stock prices in the UAE market, including earnings per share (EPS), money supply, Gross Domestic Product (GDP), Consumer Price Index (CPI), inflation, and interest rates. Among these factors, EPS had the most significant and positively correlated impact on stock prices, with a statistical significance level of 1%. The other factors were divided into two groups: the first group included money supply and GDP, which had a positive impact on stock prices. In contrast, the second group included CPI, inflation, and interest rates, which had a negative impact. However, this study still had limitations and called for further research into the UAE market, including market efficiency, event announcement reactions, price-to-earnings ratios (P/E), market profitability, and regional market price impacts.

Some articles highlighted factors such as inflation, money supply, exchange rates, interest rates, and industrial production value, all of which had a positive impact on market indices. The GDP growth rate is an indicator determined based on the value of final physical products and services created by the economy. The results of studies have shown that GDP positive impact on stock prices (Nishat, 2011a). A few studies have proven that in addition to GDP, other factors such as interest rates, exchange rates, and oil prices are statistically significant and affect GDP growth. (Mukherjee & Naka, 1995) pointed out the relationship between stock prices on the Japanese stock market and macro factors: exchange rate, money supply, inflation, bond interest rates, and borrowing rates. Accordingly, the negative relation between stock prices and inflation rate is emphasized. This same view (Eita, n.d.) also gave out that increased inflation reduces stock prices. But on the contrary, some studies released that there is no relationship between stock prices and inflation (Zhao, 1999). The research suggested that the relationship between inflation and stock prices can be positive or negative depending on the conclusion that there is a negative relation between stock prices and the inflation in the short term (Adam & Tweneboah, 2018).

(Sharif et al., 2015) conducted research on 41 companies on the Bahrain Stock Exchange within the UAE market from 2006 to 2010. Experimental findings showed a positive and significant relationship between Return on Equity (ROE), book value per share, dividends per share (DPS), Price-to-Earnings (PE) ratio, and the firm’s size, suggesting that these factors
played a crucial role in shaping stock market prices. However, a significant negative relationship was found between dividend yield (DY) and market price per share (MPS). The study served as a guide for potential investors in Bahrain, recommending that they focus on factors such as P/E ratios, dividend policies, BVS, Log MCAP, and ROE before making investment decisions.

Several studies show a significant positive relationship between stock prices and return on equity (ROE). Other research has tested the relationship between the market price of stocks and the return on assets ratio (Qabajeh & Abdel Majid Kabajeh, 2012). A few studies have studied the relationship between stock price and the price-to-earnings ratio (PE). (Nauman Khan, 2012a). The results showed that an increase in GDP leads to an increase in stock prices and vice versa. Likewise, research (Malhotra, 2013) has shown that the book value of shares, earnings per share, and price-to-earnings ratio have a positive relationship with stock prices.

The researchers found that stock prices were influenced by factors such as earnings per share (EPS), P/E ratios, B/M ratios, GDP growth rate, interest rates (INT), and bank size (SIZE). Among these factors, EPS, P/E, GDP, and SIZE had a positive relationship with stock prices, consistent with theoretical foundations and previous research. In contrast, B/M ratios and INT had a significant negative relationship with stock prices, Dividends (DIV), Earnings per Share (EPS), Price-to-Earnings ratio (P/E), Consumer Price Index (CPI), and GDP. Dividends had a positive relationship with stock prices.

Currently, there is limited specific research on the construction industry in Vietnam, such as the study by (Xuan, 2021), which only investigated five representative stocks in the construction sector from the 2020 Financial Statements of 100 VCLE. It utilized both qualitative and quantitative research methods to identify factors affecting stock prices and eliminate inappropriate factors.

3 RESEARCH METHODOLOGY AND DATA

3.1 DATA

The research data consists of secondary data collected from the financial reports of 56 construction companies listed on the Vietnam stock market during the period from 2016 to 2022. This dataset includes all the construction companies listed on the Ho Chi Minh Stock Exchange (HOSE) and the Hanoi Stock Exchange (HNX). Each company provides complete quarterly data for 7 years. Therefore, there will be 1568 observations from 56 companies. The
dataset includes information such as Earnings Per Share (EPS), Consumer Price Index (CPI), stock prices (PRI), dividend payout ratio, firm size (SIZE), GDP growth rate, and Price-to-Earnings ratio (P/E). These data were collected from reports issued by stock exchanges, securities companies, financial websites like: www.tvsi.vn, and www.vietstock.vn, and the official websites of the listed companies. Subsequently, the researchers used Stata software to analyze and process the data, including correlation matrix analysis and examination of variable suitability. Three regression models were run: Pooled Ordinary Least Squares (Pooled OLS), Fixed Effects Model (FEM), and Random Effects Model (REM). After obtaining these three models, various tests were conducted, including the F-test, the Breusch-Pagan test, and the Hausman test for model selection. Additionally, diagnostic tests such as multicollinearity test, heteroskedasticity test, and autocorrelation test were performed. After conducting these tests and addressing model deficiencies, the authors selected the most suitable regression model for the collected data.

3.2 HYPOTHESES

The hypotheses formulated for this study are as follows:

**Firm Size:** Revenue growth is one of the primary concerns of company management, as it reflects the market scale of the company. Increasing revenue growth indicates the company's operational efficiency, market demand, and competitive capability. Based on construction industry reports, leading companies have shown outstanding revenue growth compared to previous years, resulting in a significant increase in stock prices of companies.

*Hypothesis 1: Firm size has a positive impact on the stock prices of the construction industry.*

**Gross Domestic Product (GDP):** According to the Vietnam Construction Association, in 2022, accelerating the progress of local investment projects has driven the consumption of the entire construction industry in the context of a sluggish market due to the pandemic. Specifically, in the first 6 months of 2023, the production of various types of construction reached 12.5 million tons, an increase of 1% compared to the same period in 2022. With the notable recovery of the construction industry, analysts also predict a positive outlook for the construction industry due to strong investment in infrastructure.

*Hypothesis 2: GDP has a positive impact on the stock prices of the construction industry.*
Price-to-Earnings (P/E): According to the studies, to decide whether to invest in construction industry stocks, investors should consider the P/E ratio of each stock compared to the industry average and assess the industry's attractiveness through the correlation between the industry's average P/E ratio and the overall market. The rapid increase in construction industry stocks from mid-2022 to the present has brought the pricing level of Vietnamese construction stocks to a reasonable level, equivalent to a P/E ratio based on the average valuation of the construction industry in the Asia-Pacific region, trading at a P/E ratio. This shows that construction industry stocks with a P/E ratio are still attractive to investors.

Hypothesis 3: P/E ratio has a positive impact on the stock prices of the construction industry.

Dividend Payout Ratio: Dividend payments by construction industry stocks to shareholders are relatively attractive and stable. Among the companies studied in the article, the majority of them paid dividends of over 20%. This indicates that construction industry stocks with high dividend payout ratios will attract large investors.

Hypothesis 4: Dividend payout ratio has a positive impact on the stock prices of the construction industry.

Earnings Per Share (EPS): The analysis of EPS of three leading companies in the industry showed significant growth ranging from 30.3% to 434% compared to the previous year. The changes in the stock prices of these three companies also ranged from 89% to 160% over 12 months. This indicates that EPS growth has a positive impact on stock prices.

Hypothesis 5: EPS has a positive impact on the stock prices of the construction industry.

Consumer Price Index (CPI): According to the General Statistics Office of Vietnam (2022), the Consumer Price Index (CPI) increased by 3.23% in 2022 compared to the average in 2019. Some studies suggest that the construction and steel industry faces significant risks due to the high cost of raw materials, which accounts for 65-75% of production costs. The prices of production inputs such as electricity, coal, and oil also affect construction costs, leading to increased production costs. Therefore, an increase in CPI negatively impacts stock prices in the industry.

Hypothesis 6: Consumer Price Index (CPI) has a negative impact on the stock prices of the construction industry.
3.3 RESEARCH MODEL

Figure 1
Research Model

Source: Proposed by the authors

The estimation model of the research is as follows:

\[ Y_t = \beta_0 + \beta_1 \text{EPS}_t + \beta_2 \text{CPI}_t + \beta_3 \text{GDP}_t + \beta_4 \text{SIZE}_t + \beta_5 \text{DPS}_t + \beta_6 \text{PE}_t + u_t \]  

(1)

In there:

- \( Y_t \) (the dependent variable) represents the price change (rate of return) of stocks in the portfolio and is calculated as follows:

\[ Y_t = R_t = \ln(p_t) - \ln(p_{t-1}) = \ln \left( \frac{p_t}{p_{t-1}} \right) \]  

(2)

Where:

- \( Y_t \): Price change or rate of return at time \( t \)
- \( R_t \): Rate of return at time \( t \)
- \( \ln(p_t) \): Natural logarithm of the portfolio index at time \( t \)
- \( \ln(p_{t-1}) \): Natural logarithm of the portfolio index at time \( t-1 \)
- \( p_t \): Portfolio index at time \( t \)
- \( p_{t-1} \): Portfolio index at time \( t-1 \)
Based on theoretical foundations, the research model is constructed, and the variables, along with their explanations and measurements, are presented in Table 3.1.

Table 1
Explanation of Variables and Measurements

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Symbol</th>
<th>Calculation method</th>
<th>Impact mark</th>
<th>Research author</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stock price</td>
<td>PRI</td>
<td>Ln (P_t / P_t-1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Independent variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer price index</td>
<td>CPI</td>
<td>Ln (CPI_t / CPI_t-1)</td>
<td>-/+</td>
<td>(Al-Tamimi et al., 2011)</td>
</tr>
<tr>
<td>Growth GDP</td>
<td>GDP</td>
<td>General Statistics+</td>
<td></td>
<td>(Nishat, 2011b); (Al-Tamimi et al., 2011)</td>
</tr>
<tr>
<td>Earnings per share</td>
<td>EPS</td>
<td>Ln (EPS_t / EPS_t-1)</td>
<td>+</td>
<td>(Qabajeh &amp; Abdul Majid Kabajeh, 2012)</td>
</tr>
<tr>
<td>Enterprise scale</td>
<td>SIZE</td>
<td>Ln (REV_t / REV_t-1)</td>
<td>+</td>
<td>(Sharif et al., 2015)</td>
</tr>
<tr>
<td>Dividend payout ratio</td>
<td>DPS</td>
<td>Annual report</td>
<td>+</td>
<td>(Malhotra, 2013)</td>
</tr>
<tr>
<td>Price-to-earnings ratio per share</td>
<td>PE</td>
<td>Ln (PE_t / PE_t-1)</td>
<td>+</td>
<td>(Sharif et al., 2015); (Nauman Khan, 2012b)</td>
</tr>
</tbody>
</table>

Source: Compiled by the authors

4 RESEARCH RESULTS AND DISCUSSION

4.1 DESCRIPTIVE STATISTICS

Table 2
Descriptive Statistics

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Number of Observations</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum Value</th>
<th>Maximum Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRI</td>
<td>1568</td>
<td>0.00028</td>
<td>0.00415</td>
<td>-0.015</td>
<td>0.0148</td>
</tr>
<tr>
<td>CPI</td>
<td>1568</td>
<td>0.00092</td>
<td>0.00549</td>
<td>-0.007</td>
<td>0.0185</td>
</tr>
<tr>
<td>GDP</td>
<td>1568</td>
<td>0.04860</td>
<td>0.02916</td>
<td>-0.003</td>
<td>0.0700</td>
</tr>
<tr>
<td>EPS</td>
<td>1568</td>
<td>-0.01825</td>
<td>0.63010</td>
<td>-4.927</td>
<td>5.2450</td>
</tr>
<tr>
<td>SIZE</td>
<td>1568</td>
<td>0.00516</td>
<td>0.60480</td>
<td>-7.114</td>
<td>2.9470</td>
</tr>
<tr>
<td>DPS</td>
<td>1568</td>
<td>0.01753</td>
<td>0.02758</td>
<td>0.000</td>
<td>0.2000</td>
</tr>
<tr>
<td>PE</td>
<td>1568</td>
<td>0.01629</td>
<td>0.62091</td>
<td>-5.245</td>
<td>5.1909</td>
</tr>
</tbody>
</table>

Source: Calculations by the authors

Based on the table 4.1, we can observe that the listed companies on the stock exchange are not uniform, as evidenced by the difference in values between the highest and lowest observations. Observing the descriptive statistics results in the table, we can see that all
variables have negative values. This is reasonable and reflects to some extent the business performance results of the listed companies on the stock exchange. The set of negative variables demonstrates the logic within the research dataset when a company experiences a decline in revenue (next year's revenue is lower than the previous year's), leading to a negative sign in the scale of the business. This, in turn, results in a decrease in earnings per share and the PE ratio, leading to negative stock prices.

4.2 CORRELATION ANALYSIS

Table 3

Correlation Matrix of Variables

<table>
<thead>
<tr>
<th></th>
<th>PRI</th>
<th>CPI</th>
<th>GDP</th>
<th>EPS</th>
<th>SIZE</th>
<th>DPS</th>
<th>PE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRI</td>
<td>1</td>
<td>0.2709</td>
<td>0.0219</td>
<td>0.0996</td>
<td>0.2345</td>
<td>0.0559</td>
<td>0.2456</td>
</tr>
<tr>
<td>CPI</td>
<td>0.2709</td>
<td>1</td>
<td>-0.3197</td>
<td>0.0617</td>
<td>0.2115</td>
<td>-0.0765</td>
<td>-0.0225</td>
</tr>
<tr>
<td>GDP</td>
<td>0.0219</td>
<td>-0.3197</td>
<td>1</td>
<td>0.0185</td>
<td>0.020</td>
<td>0.2456</td>
<td>-0.0257</td>
</tr>
<tr>
<td>EPS</td>
<td>0.0996</td>
<td>0.0617</td>
<td>0.0185</td>
<td>1</td>
<td>-0.0883</td>
<td>0.0108</td>
<td>0.0398</td>
</tr>
<tr>
<td>SIZE</td>
<td>0.2345</td>
<td>0.2115</td>
<td>0.020</td>
<td>-0.0883</td>
<td>1</td>
<td>0.0232</td>
<td>0.0059</td>
</tr>
<tr>
<td>DPS</td>
<td>0.0559</td>
<td>-0.0765</td>
<td>0.2456</td>
<td>0.0108</td>
<td>0.0232</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>PE</td>
<td>0.2456</td>
<td>-0.0225</td>
<td>-0.0257</td>
<td>0.0398</td>
<td>0.0059</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Source: Calculations by the authors

Any correlation coefficient between independent variables greater than 0.7 is considered to have a significant impact on the model. Correlation coefficients between pairs of explanatory variables are signs of multicollinearity. Strong correlations between independent variables can lead to multicollinearity issues, causing inaccurate regression coefficients, and rendering quantitative analysis results unreliable, as regression coefficients and t-tests, and F-tests lose their effectiveness. Table 4.2 shows that all pairs of correlation coefficients are less than 0.7, which falls within an acceptable range and should not lead to multicollinearity. However, the correlation coefficient between PE and EPS is negatively correlated with an absolute value of 0.8423, which is greater than 0.7. Therefore, these two variables are separately regressed in two models to avoid this issue.

4.3 REGRESSION ANALYSIS

Table 4

Regression Results with Independent Variables CPI GDP EPS SIZE DPS

<table>
<thead>
<tr>
<th>Variable</th>
<th>VIF</th>
<th>The dependent variable is PRI POLS</th>
<th>FEM</th>
<th>REM</th>
</tr>
</thead>
</table>

The Factors Influencing The Stock Prices of Construction Industry Enterprises: An Empirical Study in Vietnam

<table>
<thead>
<tr>
<th>Variable</th>
<th>VIF</th>
<th>POLS</th>
<th>FEM</th>
<th>REM</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPI</td>
<td>1.11</td>
<td>0.141***</td>
<td>0.151***</td>
<td>0.141***</td>
</tr>
<tr>
<td>GDP</td>
<td>1.11</td>
<td>0.00987</td>
<td>0.00893</td>
<td>0.00987</td>
</tr>
<tr>
<td>SIZE</td>
<td>1.02</td>
<td>0.000665**</td>
<td>0.000632**</td>
<td>0.000776**</td>
</tr>
<tr>
<td>DPS</td>
<td>1.03</td>
<td>0.00771</td>
<td>0.0254</td>
<td>0.00771</td>
</tr>
<tr>
<td>PE</td>
<td>1.00</td>
<td>0.00094***</td>
<td>0.00302***</td>
<td>0.00094***</td>
</tr>
<tr>
<td>cons</td>
<td>-</td>
<td>-0.00056</td>
<td>-0.00054</td>
<td>-0.00056</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>1568</td>
<td>1568</td>
<td>1568</td>
</tr>
<tr>
<td>F-test</td>
<td></td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>White Test</td>
<td></td>
<td>Prob &gt; chi2 = 0.075</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hausman Test</td>
<td></td>
<td>Prob &gt; chi2 = 0.09465</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wald Test</td>
<td></td>
<td>Prob &gt; chi2 = 0.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breusch-Pagan Lagrange Multiplier Test</td>
<td></td>
<td>Prob &gt; chibar2 = 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wooldridge Test</td>
<td></td>
<td>Prob &gt; F = 0.9712</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: * p < 0.1, ** p < 0.05, *** p < 0.01 with corresponding significance levels of 10%, 5%, and 1%.
Source: Calculations by the authors

Table 5

Regression Results with Independent Variables CPI, GDP, SIZE, DPS, PE

Discussion: Tables 4.3 and 4.4 used an F test to select the POLS, REM, and FEM models. The F test examines whether there are fixed effects or not, with the null hypothesis: H0 fixed effect = 0, H1 fixed effect ≠ 0. The results show that the P-value is less than 0.05, so the null hypothesis H0 is rejected. Therefore, the FEM model is suitable. The Breusch & Pagan Lagrange test was used to check whether the REM model has heteroskedasticity. The null hypothesis (Ho) is that the model does not have heteroskedasticity, and the alternative hypothesis (H1) is that the model has heteroskedasticity. The result shows a P-value of 1, indicating acceptance of the null hypothesis, thus, there is no heteroskedasticity in the model.
The Hausman test was performed to choose between the FEM and REM models. The null hypothesis (Ho) is that the REM model is suitable, and the alternative hypothesis (H1) is that the FEM model is suitable. The results from both Tables 4.3 and 4.4 show P-values greater than 5%, indicating acceptance of Ho and rejecting H1. Therefore, the REM model is considered appropriate.

The Wooldridge test was used to check for autocorrelation in the model. The null hypothesis (Ho) is that the model does not have autocorrelation, and the alternative hypothesis (H1) is that the model has autocorrelation. The results from both tables show P-values greater than 5%, indicating acceptance of Ho and concluding that the REM model does not have autocorrelation.

Based on the test results, the REM model is deemed the most appropriate. Therefore, the research will be discussed based on the results of the REM model.

Regression results from the REM model in Tables 4.3 and 4.4:

1. The Consumer Price Index (CPI) has a positive impact on stock prices with a significance level of 1%, which is different from the initial hypothesis based on Thuy & Duong (2015).
2. The regression coefficient of the variable PE (Price-to-Earnings ratio) has a positive impact on stock prices with a significance level of 1%. This result is consistent with the research of Sharif & colleagues (2015).
3. Earnings Per Share (EPS) with 95% confidence has a positive impact on construction industry stock prices, which is consistent with the findings of Tamimi et al (2011), and Sharif Purohit et al (2015). In other words, EPS has a positive impact on stock prices.
4. The regression of the SIZE (firm size) has a positive impact on stock prices with a significance level of 1%, which is consistent with the research of Sharif & colleagues (2015).
5. The GDP growth rate and the dividend payout ratio (DPS) in the model have a positive impact on stock prices but are not statistically significant. Therefore, there is not enough basis to use these factors in making stock investment decisions.

5 CONCLUSION

The study of 56 construction companies listed on the Vietnamese market from 2016 to 2022 revealed that the Random Effects Model (REM) is the most suitable. Factors influencing the stock prices of the construction industry include Earnings Per Share (EPS), firm size (SIZE),...
and Price-to-Earnings ratio (PE), all of which have a positive impact on stock prices (PRI). Moreover, the Consumer Price Index (CPI) has a positive impact on stock prices (PRI). Investors should consider these factors when making investment decisions. Based on this, the research team has made some recommendations for investors, corporate managers, and the government.

**For Investors:** (i) The stock prices of the construction industry are influenced by factors such as Earnings Per Share (EPS), firm size (SIZE), and Price-to-Earnings ratio (PE), so investors need to focus on changes in these factors when making investment decisions. Additionally, investors should consider the operational situation of the company when making investment decisions because some companies are less affected by external factors. (ii) Construction industry stock prices are positively impacted by the Consumer Price Index (CPI), but a high CPI can lead to inflation in the country, so investors need to exercise caution when using this factor in decision-making. (iii) Investors should pay attention to information regarding the expansion or contraction of firm size within the industry, especially for leading companies. When other factors are similar, larger companies tend to see increases in stock prices. Fourth, efficient business operations result in increased earnings, which is reflected in higher EPS. This is an important factor to consider when evaluating investment opportunities. (iv) Larger companies tend to have higher valuations, resulting in higher Price-to-Earnings ratios (PE) compared to the industry average.

**For Corporate Managers:** The results show that to maximize the value of the company, research shows that Earnings Per Share (EPS) has a positive impact on stock prices. This means that corporate managers should focus on increasing profits and reducing costs to achieve stable EPS growth. This primarily builds investor confidence and positively impacts stock prices. Financial decisions should be made with this factor in mind to help the company target an increase in stock prices in the market.

**For Government:** The analysis results show that the Consumer Price Index (CPI) has an impact on stock market indexes. Therefore, to maintain a stable and growing stock market index, it is necessary to maintain a stable or moderate Consumer Price Index (CPI). This creates conditions for both stable economic development and the development of the stock market, a crucial capital attraction channel for domestic and foreign businesses. From a macroeconomic and market stabilization perspective, policymakers need to focus on stabilizing the CPI to create conditions for stable economic development and stock market growth, an important channel for attracting capital for businesses both domestically and internationally.
FINANCIAL SUPPORT

This research is funded by Thuongmai University, Hanoi, Vietnam.

ETHICS STATEMENT

We certify that the study is conducted in an honest manner and does not contain plagiarism. We give a right to the publisher to edit, modify, publish and distribute the study in an unlimited amount, in any shape for form and format on any carries of information and by anyways.

REFERENCES


