

Determinants of Stock Valuation Multiples: The Case of Listed Construction Companies in Vietnam

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Abstract: The study examines the factors affecting stock valuation multiples, represented by the P/E and EV/EBITDA ratios, of listed construction firms in Vietnam for 2016 – 2020. The authors employed two regression models corresponding to each multiple. Since the calculation of the P/E ratio does not consider firms with negative profits in the fiscal year, 57 companies in the model for the P/E ratio and 75 companies in the model for the EV/EBITDA ratio are selected. After performing panel data regression and FGLS regression, the research results show that GDP growth, dividend payout ratio, financial leverage, profitability, liquidity, and Tobin's Q ratio all have impacts on stock valuation multiples, which shows investors' focus on financial risk, profitability, and efficiency of listed construction companies. Our results provide support for the fundamental factors affecting stock valuation, especially for the EV/EBITDA ratio.

Keywords: Construction Industry, EV/EBITDA, P/E, Stock Valuation, Vietnam.

JEL Classification Code: G11, G12, G14, D53, L74.

1. INTRODUCTION

Stock valuation has attracted much attention from scholars in recent years. There are two main approaches: absolute and relative valuation. This study focuses on the relative valuation method with two representative ratios, the Price to Earnings (P/E) ratio and the Enterprise Value to Earnings before Interest, Taxes, Depreciation, and Amortisation (EV/EBITDA) ratio. The P/E ratio indicates how much investors are willing to pay for a dollar of profit and reflects expectations regarding the quality of the company's earnings and growth. In contrast, the EV/EBITDA ratio shows how many years it will take all investors across the capital structure to recover their capital. Both P/E and EV/EBITDA multiples have been shown empirically to be useful tools in valuing a company's stock.

Vietnam is a country with an especially dynamic economy, in which the construction industry plays a strategic role in the overall economic structure. From 2016 to 2020, the construction industry experienced strong development and an impressive growth rate. Although the year 2020 witnessed the lowest growth rate in the period, estimated at 6.76 percent (General Statistics Office of Vietnam, 2021), this is still major progress in the complicated situation caused by the COVID-19 pandemic. Moreover, in recent years, the con-

struction industry has benefited from the Government's public investment disbursement policies with a series of key national infrastructure projects and social housing projects for low-income workers. With great prospects in the future, the market believes that construction stocks will be more popular and valuable. Understanding the factors affecting the P/E and EV/EBITDA ratios of construction companies is important for investors to select profitable stocks and for construction companies to increase efficiency and attract investors. In Vietnam, there have been some studies on the topic of P/E and EV/EBITDA ratios, but not many, especially those specialised in the construction industry. Therefore, the topic of factors affecting the stock valuation multiples of construction companies listed in Vietnam in the period 2016 - 2020 was selected.

2. BACKGROUND AND LITERATURE REVIEW

In the fundamental analysis of stocks, investors aim to find the intrinsic value of a stock. According to Graham and Dodd (1934), the intrinsic value of a stock is the price backed by the fundamental factors related to the listed company, such as assets, profitability, dividend, and growth prospects, which is distinguished from artificial manipulation and distortion caused by psychological excesses. Investors widely use the relative method of equity valuation with multiples.

The P/E method of equity valuation originated from the basis of the Gordon growth model, with the assumption that a company exists eternally, and its dividend grows at a constant rate. The current price of a stock is calculated by divid-

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ing its next-year dividends by the difference between the required rate of return on equity (discount rate) and the constant dividend growth rate.

$$P_0 = \frac{DPS_1}{r - g} \quad (A)$$

in which:

P_0 : current stock price

DPS_1 : expected next-year dividend per share

r : required rate of return on equity

g : annual dividend growth rate

If $DPS_1 = EPS_0 \times (\text{dividend payout ratio}) \times (1 + g)$, in which EPS_0 is the trailing twelve-month earnings per share, the formula can be converted into:

$$\frac{P_0}{EPS_0} = P/E = \frac{(\text{dividend payout ratio}) \times (1 + g)}{r - g} \quad (B)$$

The EV/EBITDA method of equity valuation stemmed from the concept of enterprise value. The EV/EBITDA is calculated by dividing the enterprise value of the firm by its earnings before interest, taxes, depreciation, and amortisation (EBITDA).

$$EV/EBITDA = \frac{\text{Enterprise value}}{\text{Earnings before interest, taxes, depreciation, and amortisation (EBITDA)}} \quad (C)$$

in which:

Enterprise value = Market capitalisation + Market value of preferred stock and minority interest + Market value of debt - Cash and cash equivalents (Damodaran, 2006) (D)

EBITDA = Net income before taxes + Interest expenses + Depreciation + Amortisation (E)

Several studies attempted to find out the determinants of the P/E ratio in a collective sample of firms in different financial markets. Ramcharran (2002) stressed the importance of economic growth when it comes to determining the market value of stocks by studying the factors affecting the P/E ratio in 21 developing financial markets. Rahman and Shamsuddin (2019) carried out another study that concentrated on the effect of investor sentiment on the P/E ratio of G7 nations. According to their results, the dividend payout ratio had a significantly positive effect on the quarterly P/E ratio in these markets. In contrast, short-term interest rates and market volatility had a negative effect on the P/E ratio.

Other studies focused on the P/E of one distinct industry or financial market. Itemgenova and Sikveland (2019) demonstrated a negative relationship between the return on equity and the P/E ratios of 8 seafood companies listed on the Oslo Stock Exchange (OSE) in Norway. The authors also pointed out a positive correlation between the dividend payout ratio and the P/E ratios of these firms, which was consistent with the dividend discount model. Shamsuddin and Hillier (2004) also discovered the positive influence of the dividend payout ratio and GDP growth rate on the P/E ratio of the Australian Stock Exchange (ASX 200) index. In addition, Alford (1992) attributed the accuracy of the P/E method of valuation to the selection of comparable firms based on industry and some fundamentals such as total assets, book return on equity, risk, and earnings growth.

Regarding the determinants of the EV/EBITDA ratio, the amount of research is still modest. Loughran and Wellman (2011) found an inverse relationship between discount rates and realised stock returns and the EV/EBITDA ratio of non-financial firms with ordinary common equity, listed on the New York Stock Exchange (NYSE), the American Stock Exchange (AMEX), and NASDAQ. The negative relationship between the EV/EBITDA ratio and discount rates was consistent with the fundamental theory of the determinants of the EV/EBITDA ratio since the authors interpreted EV/EBITDA as a proxy for the weighted average cost of capital - the typical discount rates in computing enterprise value.

Since the combination of many relative valuation multiples remains popular in the field of valuation, some researchers attempted to study the effect of some fundamental factors on several multiples at once, instead of only one valuation multiple. According to Drăgoi et al. (2016), market capitalisation displayed a positive correlation with both the P/E and EV/EBITDA ratios of 5 financial investment companies listed in Romania during the 10-year period between 2004 and 2014, while some other fundamental factors such as return on asset, return on equity, and reinvestment rate were negatively correlated with the P/E and EV/EBITDA ratios of these companies. In addition, Mauboussin (2018) found that the P/E and EV/EBITDA ratios of 1,500 industrial companies in the United States demonstrated a high correlation of 0.79. These studies demonstrated a theoretical relationship between the P/E and EV/EBITDA multiples and the fact that some fundamental factors displayed the same sign of correlation for both multiples. This serves as the basis for our hypotheses, with the expected impact of the independent variables on both dependent variables of P/E and EV/EBITDA being similar in our regression models.

The results of the aforementioned studies substantially deviated from each other due to the differences in firm sizes, financial situations, and profits of the surveyed firms. Besides, factors related to the uniqueness of each sector and the timing of the studies also contributed to the differences in the results, since the data used for computation and comparison of the stocks greatly depended on these factors.

The construction industry of Vietnam has not witnessed much research despite its strategic role in Vietnam's economy. Although relative multiples are important indicators in stock valuation, the number of studies concerning this topic remains small, especially in Vietnam. In addition, existing studies mostly focus on the P/E multiple while not paying much attention to other valuation ratios, such as EV/EBITDA, and often take account of the unique factors pertaining to each specific company. The contribution of our study lies in the analysis of the impact of firm-specific factors and the risk-related factors on the valuation multiples of construction companies in Vietnam, as well as concentrating on the EV/EBITDA multiple, which is still not thoroughly studied, along with the more widely studied P/E multiple.

3. DATA AND METHODOLOGY

3.1. Research Scope

This study focused on the evaluation of the factors affecting stock valuation multiples, which herein were represented by

the P/E and EV/EBITDA ratios, of listed companies in the construction sector in Vietnam. The basic business model of the firms in this sector is relatively similar and the sector is becoming increasingly competitive, which reduced the differences among firms when establishing a peer group in a relative valuation model. In addition, during the research period, Vietnam's construction sector had strong development, and in the medium to long term, it would have great growth potential.

The study focused on 75 companies in the construction sector that were listed on the Ho Chi Minh Stock Exchange and Hanoi Stock Exchange during the period between 2016 and 2020. Companies were selected based on the condition that all annual valuation multiples were positive during the 5 years, meaning that firms having negative or unrealistic values were neglected. The number of observations was different among each multiple, mainly because some companies having negative net income still achieved positive EBITDA. In total, the P/E multiple had 285 observations (or 57 companies) and the EV/EBITDA multiple had 375 observations (or 75 companies).

3.2. Data Collection

Data used in the research was collected from audited financial statements, including the balance sheets, income statements, and cash flow statements of 75 construction companies listed in Vietnam in the period 2016 - 2020. Out of these, 27 companies were listed on the Ho Chi Minh Stock Exchange, and 48 companies were listed on the Hanoi Stock Exchange. Subsequently, the authors calculated the necessary indicators that the financial statements did not show based on the formula learned on the theoretical basis. In addition, data was also collected from governmental sources, including the General Statistics Office of Vietnam, the website of the Ministry of Finance of Vietnam; resolutions of general shareholders' meetings of the sample companies; FiinTrade - a trader platform in Vietnam; and other documents related to the topic both in Vietnam and abroad.

3.3. Research Method and Hypothesis

In this research, the authors used descriptive statistics, Pearson correlation coefficient and carried out three regression models: Pooled ordinary least squares (OLS), Fixed effect model (FEM), and Random effect model (REM). Afterward, the authors used the F-test and the Hausman test to evaluate if the research model corresponded to the data, then used three methods to test the defects of the regression model, including the multicollinearity test using the Variance Inflation Factor coefficient, autocorrelation test using the Wooldridge test, and heteroscedasticity test using the Breusch and Pagan Lagrangian Multiplier test. Lastly, the authors used the Feasible generalised least squares (FGLS) model to rectify the defects of the regression model before some robustness checks were conducted.

To compute the P/E ratio for each year in the study period, the authors used the closing price on the last trading day of January for the subsequent year (for example, the closing price on 31st January 2018 was used to compute the P/E of 2017), which was when companies disclosed their business performance of the previous year. The closing price was then

divided by the trailing twelve-month basic earnings per share to yield the P/E ratio.

The EV/EBITDA ratio was calculated by dividing the enterprise value of each sample firm by its EBITDA during the same fiscal year in the study period. For the market capitalisation figure used to calculate the enterprise value, the authors also used the number published on the last trading day of January for the subsequent year.

The authors expected the following explanatory variables to affect the P/E and EV/EBITDA ratio of listed construction companies in Vietnam:

Gross Domestic Product (GDP) Growth

Molodovsky (1953) contended that the P/E ratio was often high at the bottom of the economic cycle because of low earnings. In contrast, a positive relationship between GDP growth rate and the P/E ratio was advocated by Shamsuddin and Hillier (2004) when studying the determinants of the P/E ratio of firms in the Australian Stock Exchange 200 (ASX 200) index.

Inflation Rate

The inflation rate can be measured using the GDP deflator or the consumer price index (CPI). In this research, the second method was used to calculate inflation. The negative effect of inflation on some relative valuation multiples was agreed upon by many researchers. Sharpe (1999) discovered a negative effect of the expected 10-year inflation rate on the P/E ratio of the firms in the Standard and Poor's (S&P) 500 Index. Another study by White (2000) on the P/E ratio of S&P 500 firms from 1926 to 1997 also identified the expected negative influence, which was concurrent with the results of Reilly *et al.* (1983).

Risk-free Interest Rate

This study used the 10-year term treasury note rate, which was the annual interest rate on treasury notes issued by the State Treasury of Vietnam, as a proxy for the risk-free rate of financial assets in Vietnam. Jitmaneroj (2017) found an inverse relationship between the risk-free rate and the P/E ratio when studying market sentiment in various industries in the U.S. A study by Reilly *et al.* (1983) also found a significant negative relationship between the yield on Moody's AAA corporate bond series, adjusted for inflation, used as a proxy for the risk-free interest rate and the P/E ratio of S&P 400.

Stock Beta

Damodaran (2006) conducted a regression model that found a negative relationship between the beta coefficient and the P/E ratio. In contrast, Huang and Wirjanto (2012) found a positive effect of the historical beta on the P/E ratio of U.S. and Chinese firms, using three years' return, which was inconsistent with their initial expectation.

Financial Leverage

The debt-to-equity ratio is a common solvency ratio used to measure the extent of leverage of a company. Fadjar *et al.*

(2021) discovered a negative relationship between the debt-to-equity ratio and the P/E ratio of 62 listed consumer goods companies in Indonesia from 2018 to 2020. Sadler *et al.* (2016) also found a negative relationship between financial leverage and the enterprise value multiple.

Dividend Payout Ratio

Many studies reached a similar conclusion of a positive influence of dividend payout ratio on the P/E ratio, which was consistent with the theoretical background literature as mentioned above. Itemgenova and Sikveland (2019) demonstrated a positive effect of the dividend payout ratio on the P/E of 8 listed seafood companies in the Norwegian aquaculture industry, which was consistent with the dividend signaling theory: dividends are signals of management’s viewpoint of future return; therefore, high present dividend payout bodes well for high future profitability, increasing the share price and thus, the P/E ratio. Shamsuddin and Hillier (2004), Jitmaneroj (2017), and Rahman and Shamsuddin (2019) find similar results.

Profitability

The authors used return on equity as the profitability ratio, calculated by dividing net income by the average shareholders’ equity of two consecutive periods. Penman (1996) contended that since P/E was related to future earnings growth, it had a positive relationship with the expected return on equity but a negative relation with the current return on equity. Itemgenova and Sikveland (2019) also discovered a negative relationship between the return on equity and P/E of seafood companies in Norway. In addition, Drăgoi *et al.* (2016) found a negative correlation between the return on equity – the most relevant fundamental factor in their model and the EV/EBITDA ratio of 5 financial investment companies listed in Romania between 2004 and 2014.

Firm Size

In this study, the authors used the natural logarithm of total assets as a proxy for firm size, which “measures the firm’s total resources”, according to Dang *et al.* (2018). Anderson and Brooks (2006) contended that larger companies with higher market capitalisation usually required a higher P/E ratio than smaller firms because fund managers tended to invest in larger companies. Huang and Wirjanto (2012)

found that the effect of firm size on the P/E ratio was insignificant for U.S. firms and significantly negative for Chinese firms.

Liquidity

In this study, the current ratio is a liquidity ratio calculated by dividing the current assets by the current liabilities. Fadjar *et al.* (2021) discovered a positive effect of the current ratio of consumer goods companies listed in Indonesia on the P/E ratio from 2018 to 2020.

Tobin’s Q Ratio

Badrinath and Kini (1994) discovered a substantially negative correlation between the P/E ratio and Tobin’s Q. Sum (2014) also examined the dynamic effect of Tobin’s Q on the P/E ratio, and the author indicated that the percentage change in the P/E ratio of the S&P 500 index was attributable to the change in aggregate Tobin’s Q ratio, using Granger-causality tests.

Earnings Growth

In this study, earnings growth was measured by the percentage growth in net income of the firms on an annual basis. Malkiel and Cragg (1970) contended that the P/E ratios of 178 corporations from 1961 to 1965 were positively influenced by the average “normalised” earnings (earnings not resulting from non-recurring events) and forecasted short-term (one-year) earnings growth. White (2000) expected a direct relationship between earnings growth and the P/E ratio of S&P 500 firms from 1926 to 1997 and found the results consistent with the initial hypothesis.

Two multivariate regression models were designed for the study:

$$P/E_{it} = \beta_1GDPg_t + \beta_2Inf_t + \beta_3T-note_t + \beta_4Beta_{it} + \beta_5D/E_{it} + \beta_6DR_{it} + \beta_7ROE_{it} + \beta_8Size_{it} + \beta_9CR_{it} + \beta_{10}TobinQ_{it} + \beta_{11}Egrowth_{it} + \epsilon_i \text{ (Model 1)}$$

$$EV/EBITDA_{it} = \beta_AGDPg_t + \beta_BInf_t + \beta_CT-note_t + \beta_DBeta_{it} + \beta_ED/E_{it} + \beta_FDR_{it} + \beta_GROE_{it} + \beta_HSize_{it} + \beta_ICR_{it} + \beta_JTobinQ_{it} + \beta_KEgrowth_{it} + \epsilon_i \text{ (Model 2)}$$

where i stands for a firm, t stands for a year.

The meanings of variables are illustrated in Table 1 below.

Table 1. Specification of Variables.

Variables	Meaning	Formula	Referred studies	Source of Data
P/E	Price to Earnings ratio	$\frac{\text{Price}}{\text{Earnings per share}}$		Audited financial statements, FiinTrade
EV/EBITDA	Enterprise Value to EBITDA ratio	$\frac{\text{Enterprise value}}{\text{EBITDA}}$		Audited financial statements, FiinTrade
GDPg	Gross domestic product growth	$\frac{\text{GDP year (t)} - \text{GDP year (t-1)}}{\text{GDP year (t-1)}} \times 100\%$	Molodovsky (1953), Shamsuddin and Hillier (2004)	General Statistics Office of Vietnam

Inf	Inflation rate	$\frac{\text{CPI year (t)} - \text{CPI year (t-1)}}{\text{CPI year (t-1)}} \times 100\%$	Reilly <i>et al.</i> (1983), Sharpe (1999), White (2000)	General Statistics Office of Vietnam
T-note	Treasury note rate (10-year term)		Reilly <i>et al.</i> (1983), Jitmaneeroj (2017)	Website of the Ministry of Finance of Vietnam
Beta	Equity risk	$\frac{\text{Covariance of return on stock i with market return}}{\text{Variance of market return}}$	Damodaran (2006), Huang and Wirjanto (2012)	FiinTrade
D/E	Debt to Equity ratio	$\frac{\text{Total debt}}{\text{Total equity}}$	Sadler <i>et al.</i> (2016), Fadjar <i>et al.</i> (2021)	Audited financial statements
DR	Dividend payout ratio	$\frac{\text{Dividends per share}}{\text{Earnings per share}}$	Shamsuddin and Hillier (2004), Jitmaneeroj (2017), Itemgenova and Sikveland (2019), Rahman and Shamsuddin (2019)	Audited financial statements, Resolutions of general shareholders' meeting
ROE	Return on Equity ratio	$\frac{\text{Net income}}{\text{Average total equity}}$	Penman (1996), Drăgoi <i>et al.</i> (2016), Itemgenova and Sikveland (2019)	Audited financial statements
Size	Natural logarithm of Total assets	$\text{Log}_e(\text{Total assets})$	Anderson and Brooks (2006), Huang and Wirjanto (2012), Dang <i>et al.</i> (2018)	Audited financial statements
CR	Current ratio	$\frac{\text{Current assets}}{\text{Current liabilities}}$	Fadjar <i>et al.</i> (2021)	Audited financial statements
TobinQ	Tobin's Q ratio	$\frac{\text{Total market value of firm}}{\text{Total asset value of firm}}$	Badrinath and Kini (1994), Sum (2014)	Audited financial statements
Egrowth	Earning growth	$\frac{\text{Net income year (t)} - \text{Net income year (t-1)}}{\text{Net income year (t-1)}} \times 100\%$	Malkiel and Cragg (1970), White (2000)	Audited financial statements

Table 2. Descriptive Statistics of Variables.

Variable	Obs	Mean	Std. dev.	Min	Max
P/E	285	10.77955	11.63394	0.892384	80.0000
EV/EBITDA	375	16.96624	12.06053	1.090974	70.65478
Size	375	27.49912	1.416662	23.98845	31.017
D/E	375	2.708155	1.910842	0.012159	13.43604
DR	375	0.622177	0.458516	0	4.301601
ROE	375	0.088645	0.096007	-0.230504	0.646668
CR	375	1.60212	2.572358	0.264648	47.82507
Beta	375	0.342871	0.613239	-2.666564	2.046891
Egrowth	375	0.286427	3.999699	-32.9571	32.75547
TobinQ	375	0.873972	0.202110	0.262264	2.451569
T-note	375	0.0424	0.013884	0.022	0.060
GDPg	375	0.06006	0.015803	0.0291	0.0708
Inf	375	0.01808	0.003349	0.0141	0.0231

Table 3. Changes in Average Values of Independent Variables by Year between 2016 and 2020.

Year Variable	2016	2017	2018	2019	2020
P/E	7.9441	7.4501	9.7039	9.4301	19.3695
EV/EBITDA	15.4218	14.0268	16.1525	16.5625	22.6675
Size	27.3706	27.4339	27.5201	27.5460	27.6251
D/E	2.7979	2.6491	2.7464	2.6397	2.7077
DR	0.5868	0.6645	0.6875	0.5547	0.6173
ROE	0.1041	0.1170	0.0848	0.0772	0.0602
CR	1.4428	1.4416	2.0524	1.6206	1.4532
Beta	0.5337	0.1349	0.3622	0.2240	0.4595
TobinQ	0.8557	0.8709	0.8593	0.8538	0.9302
Egrowth	0.3094	1.6412	0.1936	0.0110	-0.7231
T-note	0.0600	0.0510	0.0480	0.0310	0.0220
GDPg	0.0621	0.0681	0.0708	0.0702	0.0291
Inf	0.0183	0.0141	0.0148	0.0201	0.0231

4. RESEARCH RESULTS AND DISCUSSION

4.1. Descriptive Statistics of Variables

From Table 2, the average values for the dependent variables of the P/E ratio and EV/EBITDA ratio between 2016 and 2020 were 10.78 and 16.97, respectively. The standard error values for both multiples were around 12, meaning that there were considerable differences between different construction firms in the value of stock valuation ratios. In addition, firms' policies concerning the use of leverage, dividend payment, and liquidity substantially differed among listed construction companies, considering the number for the D/E, DR, and CR variables. Companies' ability to generate income and to experience growth also significantly varied.

Table 3 illustrated the changes in the average value of the P/E ratio and EV/EBITDA ratio of listed construction companies in Vietnam from 2016 to 2020. The average P/E value fluctuated with an upward trend from 2016 and 2019, before surging exclusively in 2020. Meanwhile, there was a slight decrease in the index for the EV/EBITDA ratio between 2016 and 2017, followed by a steady increase in subsequent years.

Table 3 also showed further information about the changes in the annual average value of 11 independent variables.

Table 4. Pearson Correlation Coefficient.

Correlation	P/E	EV/EBITDA	Size	D/E	DR	ROE	CR
P/E	1.0000						
EV/EBITDA	0.4514***	1.0000					
Size	0.0476	-0.1242**	1.0000				
D/E	-0.0690	0.2349***	0.2070***	1.0000			
DR	0.2245***	-0.0417	0.0536	-0.0083	1.0000		

4.2. Pearson Correlation Coefficient

Considering the relative movements of variables in the P/E equation and EV/EBITDA equation shown in Table 4, the correlation coefficients were all different from zero, implicating that all variables had relations with each other. Specifically, apart from the numbers related to macroeconomic variables (GDPg, Inf, and T-note), most correlation coefficients of independent variables were lower than 0.5, with the highest figure being 0.3760 for the relation between ROE and Egrowth. However, the multicollinearity phenomenon was still likely to happen due to high correlation coefficients (higher than 0.5) between macroeconomic variables. Among the independent variables, ROE was the variable having the strongest correlation with both P/E and EV/EBITDA (-0.4158 and -0.4887, respectively).

4.3. Verification of Conformity of the Model

For this research, the authors conducted the F-test and the Hausman test to figure out the best-suited model. Results from these tests suggested that the REM model should be chosen for continued analysis.

ROE	-0.4158***	-0.4887***	0.2010***	0.0050	-0.0353	1.0000	
CR	0.0834	-0.1303**	-0.1990***	-0.2090***	0.0381	-0.0006	1.0000
Beta	0.0244	-0.0232	0.2168***	-0.0597	-0.0276	0.0808	-0.0245
Egrowth	-0.2191***	-0.2037***	0.0356	-0.0896*	-0.0750	0.3760***	0.0042
TobinQ	0.1454**	0.1352***	0.2728***	0.2511***	0.0087	0.2236***	-0.2039***
T-note	-0.3036***	-0.2021***	-0.0592	0.0157	0.0308	0.1811***	0.0065
GDPg	-0.3532***	-0.2274***	-0.0357	-0.0037	0.0121	0.1297**	0.0396
Inf	0.2912***	0.2077***	0.0376	-0.0003	-0.0720	-0.1638***	-0.0369
	Beta	Egrowth	TobinQ	T-note	GDPg	Inf	
Beta	1.0000						
Egrowth	0.0530	1.0000					
TobinQ	0.0639	-0.0090	1.0000				
T-note	0.0154	0.1274**	-0.0963*	1.0000			
GDPg	-0.1219**	0.1218**	-0.1360***	0.6226***	1.0000		
Inf	0.1125**	-0.1603***	0.0882*	-0.7512***	-0.7643***	1.0000	

Note: ***, ** and * are 1%, 5% and 10% significance level, respectively.

4.4. REM Model Regression

For follow-up analysis, the REM regression’s results show that four factors did not statistically influence the dependent variables in both models, including Inf, T-note, Beta, and Size. These variables are omitted from the two models and the REM regression is rerun. The results were shown in Table 5.

Table 5. REM Regression.

Variables	P/E	EV/EBITDA
	Coef.	Coef.
GDPg	-189.3887***	-112.6313***
D/E	-0.383766	1.947739***
DR	3.676477**	-0.392457
ROE	-46.65119***	-47.44511***
CR	0.445355**	-0.476403***
Egrowth	-0.713601	-0.238876**
TobinQ	12.43741***	6.932283***
Cons	14.28076***	17.6791***
R-squared	0.3390	0.3183

Note: *** and ** are 1% and 5% significance level, respectively.

In Model 1, considering the statistically significant variables: GDPg and ROE had negative effects on P/E, while the effect of DR, CR, and TobinQ was positive. As for the variables that were statistically significant in Model 2, those having negative impacts on EV/EBITDA include GDPg, ROE, CR, and Egrowth, while D/E and TobinQ had positive influences.

4.5. Defect Testing of the REM Model

To identify any defects in the research models, the authors carried out the multicollinearity test using the Variance Inflation Factor coefficient, the autocorrelation test using the Wooldridge test, and the heteroscedasticity test using the Breusch and Pagan Lagrangian Multiplier test. The results suggested that the REM models of both dependent variables did not suffer from multicollinearity and autocorrelation but had changing variances. Therefore, to overcome this defect, the correction method using the FGLS model was used.

4.6. The FGLS Model

Table 6. FGLS Regression.

Variables	P/E	EV/EBITDA
	Coef.	Coef.
GDPg	-130.6968***	-58.4743***
D/E	-0.402569***	1.403232***
DR	3.626385***	0.328035
ROE	-41.65223***	-54.23099***
CR	0.622495***	0.215193
Egrowth	-0.584702	-0.079879
TobinQ	12.87497***	10.27583***
Cons	7.821836***	10.39536***

Note: *** is 1% significance level.

In both models, the only macro variable, GDPg, negatively affected the P/E and EV/EBITDA ratios. Meanwhile, D/E

negatively affected the P/E ratio but had a positive impact on the EV/EBITDA ratio. In addition, DR and CR positively affected the P/E ratio but did not significantly affect EV/EBITDA. Egrowth was not statistically significant in both models (Table 6).

Robustness Checks

To test the robustness of the two selected models, the researchers modified the regression specification by removing and adding regressors, then regressed the models in turn. The authors decided to remove variables Egrowth and CR from the models for estimation, and added a risk control variable, Beta, to the models for the robustness check. Effectively, there was not much difference between the estimated results of the new models and those of the baseline models.

DISCUSSION

Based on the estimation results of three regression models (the Pooled OLS model, the REM model, and the FGLS model), with the ability to overcome defects, the authors selected the FGLS model as the most appropriate and effective model in the study.

Overall, the EV/EBITDA multiple of listed construction firms seemed affected by the gross domestic product growth (GDPg), financial leverage (D/E), profitability (ROE), and Tobin's Q ratio (TobinQ). The statistically significant variables affecting the P/E multiple of listed construction companies included the gross domestic product growth (GDPg), financial leverage (D/E), dividend payout ratio (DR), profitability (ROE), liquidity (CR), and Tobin's Q ratio (TobinQ). Our findings of the factors affecting the P/E ratio displayed similarities and differences compared to previous studies. However, since there had not been much research into the EV/EBITDA ratio, it was difficult to compare our results with previous studies.

Gross domestic product growth had negative influences on the two multiples, showing opposite conclusions to the research of Shamsuddin and Hillier (2004). Our result generally reflected the Molodovsky effect theory (Molodovsky, 1953), which argued that investors' expectations were ahead of the economic condition. An expected increase in economic growth was reflected in stock prices and valuation multiples. In 2020 in Vietnam, despite witnessing the lowest GDP growth in 5 years (Table 3) due to the COVID-19 pandemic, hopes for an upcoming recovery in businesses had motivated investors to disburse funds into stocks, thus increasing the valuation ratios.

Profitability had a negative impact on both multiples, which was similar to the conclusion by Penman (1996), Drăgoi *et al.* (2016), and Itemgenova and Sikveland (2019). P/E and EV/EBITDA ratios reflected the investors' expectations of future growth in earnings. Penman (1996) argued that while P/E was positively associated with projected ROE, current ROE had a negative impact on the valuation ratio. For construction firms in Vietnam, during the time of rapid growth in profitability in 2016 - 2017, expectations of lower industry growth resulted in low valuation values. However, when

profitability was relatively low in the following years, hopes for an upcoming recovery had boosted P/E and EV/EBITDA. Additionally, since the denominators of both valuation ratios were figures related to a firm's income, an increase in profitability would lead to a decline in the number for both P/E and EV/EBITDA, according to Drăgoi *et al.* (2016).

The dividend payout ratio had a positive impact on the P/E multiple, similar to the results attained by Jitmaneroj (2017), Rahman and Shamsuddin (2019), and Itemgenova and Sikveland (2019) since investors were more likely to favour companies paying persistent large dividends. This was consistent with the dividend signalling theory whereby a high dividend payout was also a signal for the company's ability to achieve high earnings and be able to pay better dividends in the future. Throughout the research period, enterprises in this study were able to pay a considerably high dividend, ranging from 50% to 70% of total profits (Table 3).

Financial leverage had a negative impact on the P/E ratio, the same result reported by Fadjar *et al.* (2021). Companies with large amounts of debt in their capital structure carried a high risk of default, which might discourage investors from buying their stocks. This was especially true in the construction industry since most firms in this sector relied exclusively on debt to raise funds, while the capital recovery pace in building projects was generally slow. Companies studied in this research had an average D/E of 2.7082 (Table 2), meaning that almost three-quarters of total capital was funded by debt. Meanwhile, financial leverage had a positive link to the EV/EBITDA ratio, opposite to the finding by Sadler *et al.* (2016). A high financial leverage multiple indicated a high level of debt, and in turn, increased the enterprise value and EV/EBITDA.

Liquidity positively affected the P/E multiple, which was similar to the result of Fadjar *et al.* (2021). A higher current ratio meant firms had a greater ability to cover their short-term debt, leading investors to feel safer with their investment and thus, making stocks more attractive and increasing the valuation figures. Construction firms in Vietnam had an average current ratio higher than 1, meaning that they had the resources needed to cover all short-term liabilities.

Tobin's Q ratio influenced both dependent variables positively, which concurred with the study by Sum (2014), but in contrast with the result by Badrinath and Kini (1994). According to Damodaran (2012), a high Tobin's Q value suggested that the company was efficiently using its assets to generate revenues, thereby creating a positive valuation among investors of the company. Companies in this research witnessed a similar upward trend by years between Tobin's Q ratio and valuation multiples, especially in 2020 when they all increased remarkably.

Besides the similarities, there were differences in our results surrounding the impact of dividend payout ratio to P/E, and the sign of GDP growth to P/E, compared to previous studies, such as the one conducted by Shamsuddin and Hillier (2004). These could be attributed to the level of financial market development and industry-specific factors of the construction industry in Vietnam.

5. CONCLUSION

This study fills the gap in the literature by analyzing the factors affecting the stock valuation of construction companies listed in Vietnam in the period 2016 - 2020. The results show that only GDP growth in the group of macroeconomic factors has a significantly negative impact on both P/E and EV/EBITDA ratios. Meanwhile, within the group of endogenous factors, the statistically significant factors affecting the P/E multiple are the dividend payout ratio, liquidity ratio, and Tobin's Q ratio with positive effects, while financial leverage and profitability have negative impacts. As for the EV/EBITDA multiple, only profitability affects negatively, whereas financial leverage and Tobin's Q ratio have positive influences.

Our results contribute to the literature on the general theoretical basis of stock valuation along with fundamental factors affecting stock valuation. Given the limited number of studies on the EV/EBITDA ratio, this is one of the first studies to examine the determinants of a specific industry's EV/EBITDA ratio, specifically the construction industry in Vietnam. The empirical findings derived from this study create a basis for proposing recommendations to achieve reasonable valuations, ensure harmonious benefits for related parties, and develop transparent securities markets in developing countries. In particular, policymakers need to improve market management mechanisms and policies to enhance information efficiency. Meanwhile, construction companies should consider developing a stable dividend policy, coming up with solutions to expand business activities, and sustaining solid yearly growth to continue inviting investors. Additionally, the use of debt needs to be maintained at a reasonable level combined with a strong financial foundation. Regarding investors, they should pay attention to the financial risks along with the efficiency of construction companies, and only invest in businesses having stable growth, high profitability, strong financial resources, and consistently paying dividends. Moreover, it is necessary for both construction firms and investors to regularly update the macroeconomic situation to quickly find appropriate responses.

Aside from the obtained results, the study still has some limitations. Firstly, the research is limited to the construction industry with data collected from 2016 to 2020. This causes an unbalanced sample size since the calculation of the P/E ratio did not consider firms with negative profits in the fiscal year. Secondly, the limited explaining power of the REM models, which are approximately 33 percent, suggests that other factors have not been taken into account to explain P/E and EV/EBITDA ratios.

Subsequent studies are suggested to examine more deeply other factors affecting stock valuation multiples, such as investor psychology, risk appetite, and stock market trends. Furthermore, expanding the research to other stock valuation methods (Price to Book value ratio, Enterprise Value to Sales ratio, etc.) will also help the topic to develop.

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CONFLICT OF INTEREST

The authors reported no potential conflict of interest.

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