THE IMPACT OF INTERNAL FINANCIAL DETERMINANTS ON THE FINANCIAL PERFORMANCE OF LISTED MINERAL FIRMS ON THE VIETNAM STOCK EXCHANGE

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Abstract

This study aims to investigate the impact of internal financial factors on the financial performance of mineral firms listed on the Vietnam Stock Exchange. The research uses quantitative and qualitative methods to process the data collected. The results reveal that determinants of internal financial factors, including solvency, have a negative correlation with return on sales (ROS); firm growth rate (RG) has a positive correlation with ROS; capital structure influences the return on equity (ROE) positively, and capital structure negatively affects ROE; capital structure and DR have a negative impact on return on assets (ROA); current assets structure have a positive correlation with the ROA; CR has a negative impact on ROA; while firm RG and age have a positive correlation with ROA; the remaining determinants do not influence financial performance. Nhung, Daphné, and Huyen (2021) concluded that two variables consisting of total assets turnover ratio (ATR) and growth in sales significantly influence financial performance (FP) when it is measured by return on equity (ROE) or return on sales (ROS). However, this impact level of internal financial determinants is different. Finally, some suggestions are shown to enhance the financial performance of listed mineral firms in Vietnam.

Keywords: Financial Factors, Financial Performance, Assets, Capital Structure, Mineral Firms

Authors' individual contribution: Conceptualization — H.N.; Methodology — D.T.D. and V.H.P.; Resources — T.H.T.N. and Thi T.N.; Writing — Review & Editing — M.D.T.; Visualization — H.N. and Thu T.N.; Funding Acquisition — T.T.T.N. and Thi T.N.

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1. INTRODUCTION

The capital structure of the firm, as defined by Baker and Martin (2011), is the mixture of debt and equity that the firm employs to finance its productive assets, operations, and future growth. It is a direct determinant of the overall costs of capital and contributes to the firm's total level of risks.

Mousavi and Jari (2012) and Lartey, Antwi, and Boadi (2013) found a significant positive influence of liquidity on financial performance.

Always does the high financial performance draw the main attention of every manager, because it plays a vital position within the structure and development of a firm, however, that aim is often challenged by many factors, leading to a low level of firm performance (Nhung, Daphné, & Huyen, 2021).

The COVID-19 pandemic is one of the biggest challenges facing global economies in the twenty-first century, the pandemic of COVID-19 damages the financial and non-financial performance of the firms in all sectors listed on the Amman Stock Exchange in Jordan (Shahwan, Sa'adeh, Hamza, Al-Ramahi, & Swiety, 2022). And, Vietnam's extremely dynamic market has been integrating deeply with the world economy, which simultaneously induces both opportunities and challenges for firms. In the context of the complicated pandemic of COVID-19, the war between Russia and Ukraine, unexpected variations of oils and others influence the world economy in general and the economy of each country at different levels. So, the performance of firms is influenced also. Performance with financial and non-financial aspects is much influenced by many determinants including internal and external factors.

In the dimension of this paper, we used internal determinants for analyzing and evaluating financial performance and then, projecting future performance. Based on the impact level of internal factors on financial performance, some strengths, weaknesses, and then some suggestions proposed for enhancing and improving financial performance with the case of listed firms in the context of emerging countries like Vietnam.

Minerals are nonrenewable resources and the input materials for industries, such as metallurgy, chemicals, mechanics, construction, and others. Mineral exploitation is crucial for the people's necessities and the socio-economic development of the country. Besides, the mining processes of firms can be categorized based on specific features, such as surface mining, strip mining with immediate transport (stone mining), dredging along the riverbank by excavators (sand extraction), continuous mining method, internal dumping, replacing sand in mining pits after exploitation (ore mining), completely self-flowing mineral water aquifers (mineral water and freshwater), and others. These processes influence the structure of assets, resources (liabilities and equity), and financial indicators of mineral firms as well.

Mineral firms play a certain role in socio-economic development. While firms listed on Vietnam Stock Exchange reported a positive vision, some firms, in contrast, still had a poor financial performance.

Previous studies whose topic is the impact of capital structure (one of the internal factors) on financial performances came to inconsistent findings, i.e., capital structure influences financial performance on both negative and positive sides. So, investigating this issue of firm performance with case studies of mineral firms in the context of Vietnam adds more empirical studies to this theme.

The remainder of this paper is structured as follows. Section 2 presents the relevant literature review. Section 3 describes the data sample collection and methodology employed in the research. Section 4 sets out a key result. Section 5 portrays the discussion, while Section 6 concludes the paper.

2. LITERATURE REVIEW

The topic of determinants influencing financial performance has been much investigated in different sectors, firms, and contexts. Determinants are diverse and in some cases different in different studies. The determinants also consist of internal, external, or both in prior studies. Some typical studies are synthesized as follows.

Mara and Nicoleta (2019) and Que, Hung, and Dung (2021) used return on equity (ROE) to evaluate the financial performance of studied companies. Do, Pham, Tran, and Tran (2021) used return on assets (ROA) and ROE to investigate the impact level of corporate governance on the financial performance of warehouse transportation firms listed on the Hanoi Stock Exchange of Vietnam. Abbadi, Abuaddous, and Alwashah (2021) used ROA and Tobin's Q to explore the significance of board gender diversity and its impact on the financial performance of the manufacturing and service companies listed on the Amman Stock Exchange between 2013–2018. Mamo, Feyisa, and Yitayaw (2021) indicated that the composite governance index, trade openness, and internet access have a positive and statistically significant effect on the financial performance of commercial banks as measured by their ROA. Meanwhile, the financial performance index of enterprises, that is used consistently throughout the study of Tuyen and Huong (2022), is ROA.

Dessí and Robertson (2003) and Wei, Xie, and Zhang (2005) all employed capital structure as the independent variable of debt ratio; and financial performance as the dependent variable of ROE. However, Dessí and Robertson (2003) confirmed that the debt ratio positively influences financial performance because debtors try to take advantage of growth and investment opportunities for increasing firm profits. As a result, it enhances the financial performance of the firm. Meanwhile, Wei et al. (2005) assumed that the debt ratio has a positive association with financial performance when it is at a low rate (between 24.52% and 1.13%) and has a negative impact if the rate is higher.

Margaritis and Psillaki (2010) conducted research with firms in France in the fields of textiles, pharmaceuticals, and computer industry, research, and development (R&D). They employed the proportion of fixed assets, the proportion of current assets, and capital structure (with the debt ratio as the proxy) as independent variables. They concluded that the above-mentioned determinants have a positive association with financial performance.

Amato and Amato (2004) and Amato and Burson (2007) chose firm size as the independent variable. They also used ROE being a proxy of financial performance. They revealed that firm size has a positive impact on ROE.

Onaolapo and Kajola (2010) used 30 non-financial firms listed on Nigeria's stock market for the period from 2001 to 2007. Two independent variables were debt ratio and firm size, while ROA and ROE were surrogates of financial performance as dependent variables. They revealed that the debt ratio negatively affects financial performance, whereas the firm size positively influences ROE.

Almajali, Alamro, and Al-Soub (2012) applied a mixed method and selected 25 insurance enterprises listed on the Amman Stock Exchange. The independent variable was current solvency, and the dependent variable was financial performance. The results illustrated that current solvency has a positive influence on financial performance.

Kanwal and Nadeem (2013) collected 22 construction firms in Pakistan during the period from 2007 to 2011. They employed quantitative research methods and multiple regression models with financial performance (proxied by ROE) as a dependent variable and seven independent variables of firm size, business growth rate, asset structure, capital structure (debt/equity ratio), current solvency, economic growth rate (proxy by GDP), and inflation. The findings indicated that the firm size, capital structure, and asset structure positively affect ROE, inflation negatively affects ROE and the remaining three factors do not affect ROE.

Saleh, Abu Afifa, and Alsufy (2020) developed the model of econometrics about the influence of the qualities of profits on firm financial performance. In addition, they used the panel data with the sample of listed joint-stock industrial firms in Jordan for the period 2010–2018. The results showed that ROA, ROE, and earnings per share (EPS) are surrogates of financial performance and they were influenced by the quality of profit. This indicates the importance of profit quality as well as its positive impacts on financial performance.

In the context of developing countries like Vietnam, Thuy (2015) collected the data of 230 non-financial firms listed on the Ho Chi Minh Stock Exchange (HOSE) in the period from 2011 to 2013. By using mixed research methods, the results indicated that the financial performance is significantly influenced by the rate of capital, financial leverage, management capacity, scales of firms, quick solvency, and production cycle in the positive direction, whereas the debt ratio (a proxy of capital structure) has a negative influence on ROA.

Chi (2018) adopted the quantitative method and collected data from 116 service firms listed on Vietnam Stock Exchange in the period from 2010 to 2016. ROA (a proxy of financial performance) and structure of debt including structures of short-term debt (SD), structures of long-term debt (LD), structures of total debt (TD); and seven control variables including enterprise-scale (Size), asset structure (AS), liquidity (LQ), growth (GRW), operating duration (YR), management ability (MA), and market interest rates (Rate). Chi (2018) employed three research models, i.e., Model 1 includes SD as the independent variable, ROA as the dependent variable, and seven observable variables; Model 2 includes LD as the independent variable, ROA as the dependent variable, and seven observable variables; Model 3 includes the independent variable TD, ROA as the dependent variable, and seven observable variables. The results showed that in all three models, the structured debt had a negative correlation with ROA at a 99% reliability rate; three control variables of GRW, YR, and MA do not impact ROA; other control variables have different impact levels on ROA in all three models. Based on the findings, Phuong, Vinh, Ha, and Hung (2021) gave some suggestions for improving the performance of Vietnamese service firms. In addition, based on the distribution function of finance, enterprises are responsible for paying the interest regardless of business results.

With the scope of 41 listed firms in the agricultural sector on the Vietnam Stock Exchange from 2012 to 2016, Hang and Giang (2018) designed the model with financial performance as a dependent variable (ROA, ROE, and return on sales (ROS)); and independent variables of firm size (Size), forms of ownership (State), operating duration (Age), degree of financial leverage (DFL), liquidity (L), business cycle (BS), GDP growth (G) and inflation (I). The results illustrated that quick repayment (QR: a proxy of liquidity) had a negative correlation with ROS; solvency ratio (H: a proxy of liquidity) and DFL have a positive correlation with ROS; factors of DFL, BS, and L with overall solvency ratio (H) had a positive correlation with ROA, factor L with current repayment (CR) has a negative correlation with ROA; Size also had a positive correlation with the ROE; three factors of DFL, BS, and L with overall solvency ratio (H) had a negative correlation with ROE; ROA, ROE, and ROS are not affected by the remaining independent variables.

Studying determinants of financial performance is getting necessary to companies in Vietnam, especially food processing firms because their business results are not good, meanwhile, there are a lot of advantages of the macro economy and many priorities given to them (Nhung et al., 2021).

According to Vinh and Phuong (2022), a few recent studies have been interested in the regulation of firm size on the impact of financial leverage on financial performance at firms, but the research results are also inconsistent. Ochieng' Wayongah and Mule (2019) suggest that the existence of a regulatory relationship is in a mitigating direction, while Meshack, Nyamute, Okiro, and Duncan (2020) and Santosa (2020) give the opposite conclusion.

The prior studies above have presented several internal and external determinants that influence firm financial performance in the different business lines. However, limitations have been shown in a number of studies such as methodologies (many studies only used the qualitative research), the scope (time, contents), and sample size in the context of a stable economy. But in the context of unexpected events and the complicated pandemic of COVID-19 in the world and Vietnam is not exceptional. Besides, the impact of internal factors on firm financial performance in the field of mineral industry with some own characteristics should be discovered.

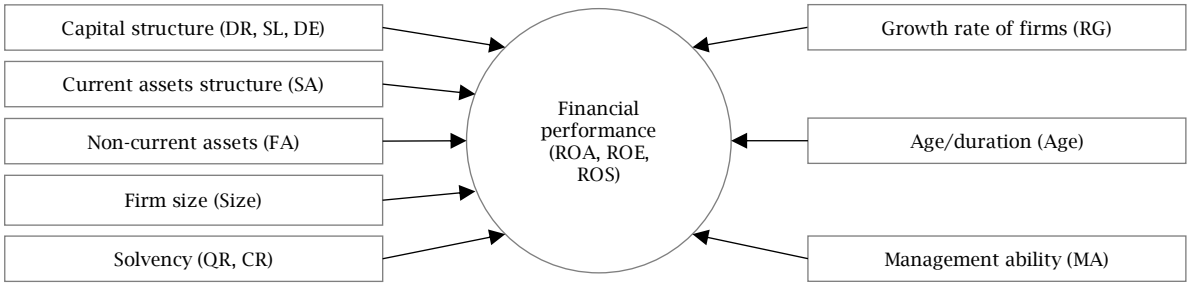
3. RESEARCH METHODOLOGY

In this study, we used mixed research methods, including qualitative and quantitative research methods.

Qualitative method: We used in-depth interviews combined with consulting experts' opinions to determine the influence levels of internal financial factors on the financial performance (FP) of the listed firms. From what we reviewed above, the final findings would create a foundation for designing research models. We took four in-depth interviews with four firms in the mineral field with the interviewees of chief accountants. Then, we interviewed three senior lecturers in the accounting and finance fields in high-ranked universities in Vietnam.

Quantitative method: We gathered secondary data from audited financial statements of listed minor firms in Vietnam on the Vietnam Stock Exchange. Currently, there are 43 mineral firms listed on Vietnam's stock market; however, only 38 firms provided sufficient information for conducting this study. Data of 38 listed firms from 2017 and 2020 were collected, categorised, screened, and then processed through Stata to conduct analysis of variance, autocorrelation, and regression with ordinary least squares (OLS), fixed-effects model (FEM), random-effects model (REM), and generalized least squares (GLS) for investigating the impact levels of internal financial determinants on FP of listed mineral firms in the context of Vietnam as an emerging country.

Figure 1. Research model proposed



4. RESEARCH RESULTS

4.1. The results of correlation analysis

The correlation analysis of independent variables given in Table 1 showed that the absolute value of each correlation coefficient between two independent variables is less than 0.8; except for *QR* and *CR* with a correlation coefficient of 0.9918. Therefore, multicollinearity occurs between the two independent variables of *QR* and *CR* (Ditzen, 2018). The remaining regression model has seven independent variables with ten attributes and one dependent variable with three surrogates.

Table 1. The results of the correlation analysis

	DR	*SL*	*DE*	*SA*	*FA*	*Size*	*QR*	*CR*	*RG*	*Age*	*MA*
DR	1										
SL	-0.4506	1									
DE	0.4705	-0.2840	1								
SA	-0.1706	0.3478	-0.1511	1							
FA	0.5223	-0.4861	0.2810	-0.4615	1						
Size	0.1377	-0.4533	0.0635	-0.2257	0.3119	1					
QR	-0.3709	0.1788	-0.1799	0.4009	-0.3699	-0.0778	1				
CR	-0.4073	0.1896	-0.1974	0.3976	-0.3904	-0.0842	0.9918	1			
RG	-0.1318	0.1036	0.0038	0.0200	-0.1308	-0.0369	0.5657	0.5431	1		
Age	0.0865	-0.1598	0.2297	0.1113	0.0092	-0.0608	-0.0417	-0.0133	-0.0102	1	
MA	-0.0293	-0.1668	-0.0302	-0.0378	0.0608	0.0029	-0.0820	-0.0699	-0.1315	0.3273	1

4.2. OLS regression results

With a 95% confidence degree, Tables 2a, 2b, 2c reveal that:

1. For return on sales (*ROS*): The value of *F* is equal to 3.42 (> 1.96) and the value of Prob. is greater than the value of *F* by 0.0005 (< 0.05). Thus, the model is consistent and statistically significant, R-squared is 0.1953, meaning that the independent variables in the research model explain 19.53% of the impact of the independent variables on the dependent variable. Therefore, the findings are accepted temporarily but need to test the suitability of the model (Torres-Reyna, 2007).

2. For return on equity (*ROE*): $F = 8.83 > 1.96$ and Prob. > $F = 0.0000 < 0.05$. The result of this model with R-squared is 0.3415, meaning that the independent variables in the research model explain 34.15% of the influence of the independent variable on the dependent variable. According to Kohler and Kreuter (2005), the findings are accepted temporarily but need to test the suitability of the model.

3. For return on assets (*ROA*): $F = 7.66 > 1.96$ and Prob. > $F = 0.0000 < 0.05$. This result is similar to the result of the ROE model. R-squared is 0.3521 showing that the independent variables in the research model explain 35.21% of the influence of the independent variable on the dependent variable. Therefore, the findings are accepted temporarily but need to test the suitability of the model (Kohler & Kreuter, 2005).

Table 2a. OLS regression results (for *ROS*)

Regression of ***ROS*** *DR SL DE SA FA Size CR RG Age MA*						
Source	***SS***	***df***	***MS***	Number of obs. = 152 F(10, 141) = 3.42 Prob. > F = 0.0005 R-squared = 0.1953 Adj. R-squared = 0.1382 Root MSE = 3897.9		
Model	519869235	10	51986923.5			
Residual	2.14235709	141	5193411.1			
Total	2.66215109	151	7630067.6			
ROS	***Coef.***	***Std. Err.***	***t***	***P > |t|***	***[95% Conf. interval]***	
DR	-538.138	1468.298	-0.37	0.715	-3440.863	2364.587
SL	-905.8996	2061.966	-0.44	0.661	-4982.265	3170.466
DE	-119.0704	150.0649	-0.79	0.429	-415.7385	177.5977
SA	-411.7758	1789.541	-0.23	0.818	-3949.576	3126.025
FA	-521.0463	2224.328	-0.23	0.815	-4918.39	3876.298
Size	-9.66e-0	.0000712	-0.14	0.892	-.0001503	.000131
CR	-319.1182	67.42705	-4.73	0.000	-452.4168	-185.8195
RG	438.8527	131.196	3.35	0.001	179.4872	698.2181
Age	114.0346	81.76129	1.39	0.165	-47.60185	275.6711
MA	-211.9557	391.6003	-0.54	0.589	-986.1227	562.2114
_cons	2296.213	3136.811	0.73	0.465	-3905.048	8497.474

Table 2b. OLS regression results (for *ROE*)

Regression of ***ROE*** *DR SL DE SA FA Size CR RG Age MA*						
Source	***SS***	***df***	***MS***	Number of obs. = 152 F(10, 141) = 8.83 Prob. > F = 0.0000 R-squared = 0.3851 Adj. R-squared = 0.3415 Root MSE = 0.25556		
Model	5.76807397	10	0.576807397			
Residual	9.20870998	141	0.06531			
Total	14.976784	151	0.099184			
ROE	***Coef.***	***Std. Err.***	***t***	***P > |t|***	***[95% Conf. interval]***	
DR	0.5242043	0.0962668	5.45	0.000	0.3338915	0.7145172
SL	-0.2538489	0.1351897	-1.88	0.062	-0.5211098	0.0134119
DE	-0.0751573	0.0098388	-7.64	0.000	-0.0946079	-0.0557067
SA	0.0629834	0.1173286	0.54	0.592	-0.1689672	0.2949341
FA	0.1291628	0.1458347	0.89	0.377	-0.1591424	0.4174681
Size	-8.11709	4.66109	-1.74	0.084	-1.73208	1.11609
CR	0.0042038	0.0044208	0.95	0.343	-0.0045357	0.0129434
RG	-0.0039417	0.0086017	-0.46	0.647	-0.0209466	0.0130633
Age	0.0061348	0.0053606	1.14	0.254	-0.0044627	0.0167322
MA	0.0095325	0.0256747	0.37	0.711	-0.0412246	0.0602896
_cons	0.0024995	0.2056604	0.01	0.990	-0.4040769	0.409076

Table 2c. OLS regression results (for *ROA*)

Regression of ***ROA*** *DR SL DE SA FA Size CR RG Age MA*						
Source	***SS***	***df***	***MS***	Number of obs. = 152 F(10, 141) = 7.66 Prob. > F = 0.0000 R-squared = 0.3521 Adj. R-squared = 0.3061 Root MSE = 0.0834		
Model	0.532890499	10	0.05328905			
Residual	0.980696649	141	0.006955295			
Total	1.51358715	151	0.010023756			
ROA	***Coef.***	***Std. Err.***	***t***	***P > |t|***	***[95% Conf. interval]***	
DR	-0.1670384	0.0314155	-5.32	0.000	-0.2291447	-0.104932
SL	-0.1600439	0.0441176	-3.63	0.000	-0.2472613	-0.0728264
DE	-0.0004025	0.0032108	-0.13	0.900	-0.00675	0.0059449
SA	0.2334636	0.0382888	6.10	0.000	0.1577692	0.3091579
FA	0.0734598	0.0475915	1.54	0.125	-0.0206252	0.1675449
Size	-3.234210	1.525209	-0.21	0.832	-3.33e-09	2.693109
CR	-0.0059779	0.0014427	-4.14	0.000	-0.00883	-0.0031259
RG	0.0069246	0.0028071	2.47	0.015	0.0013752	0.0124739
Age	0.0041628	0.0017494	2.38	0.019	0.0007045	0.0076212
MA	0.0058631	0.0083786	0.70	0.485	-0.0107008	0.0224271
_cons	0.0624015	0.0671148	0.93	0.354	-0.0702799	0.195083

Additionally, Table 3 also demonstrates the correlation among independent variables. The outcome shows that VIF coefficients < 2; two attributes of independent variables have VIF coefficients from 2 to 5; so it can be confirmed that 100% of all independent variables do not have autocorrelation (Ditzen, 2018).

The result of Table 4 with Prob. > Chi^2 = 0.0000 < 0.05 relevant to a phenomenon of variable variance. That means the research model is not consistent with the input data. Therefore, there is a need to use the model at a higher level (Bryman & Cramer, 2001). The higher-level models are the FEM and the REM (Kohler & Kreuter, 2005).

Table 3. Result of the autocorrelation by VIF coefficient (Test for the multicollinearity)

Variable	*VIF*	*1/VIF*
CR	2.19	0.456532
DR	2.02	0.495914
SL	1.90	0.524963
FA	1.87	0.535150
SA	1.67	0.599540
RG	1.60	0.624145
DE	1.39	0.718910
Size	1.33	0.749973
Age	1.27	0.785897
MA	1.20	0.832619
Mean VIF	**1.64**	

Table 4. Results of heteroskedasticity (Breusch–Pagan heteroscedasticity test)

Breusch–Pagan/Cook–Weisberg test for heteroskedasticity	*Breusch–Pagan/Cook–Weisberg test for heteroskedasticity*	*Breusch–Pagan/Cook–Weisberg test for heteroskedasticity*
H_0: Constant variance.	*H_0: Constant variance.*	*H_0: Constant variance.*
Variables: fitted values of *ROS.*	Variables: fitted values of *ROE.*	Variables: fitted values of *ROA.*
Chi^2 (1) = 2048.79; Prob. > Chi^2 = 0.0000	*Chi^2 (1) = 516.35;* Prob. > Chi2 = 0.0000	*Chi^2 (1) = 100.05;* Prob. > Chi^2 = 0.0000

Table 5a. FEM model with attributes (for *ROS*)

xtreg ***ROS*** *DR SL DE SA FA Size CR RG Age MA fe*

Fixed-effects (within) regression — Number of obs. = 152
Group variable: *No.* — Number of groups = 38

R-squared: within = 0.1065 — Obs. per group: min = 4
between = 0.0578 — avg = 4.0
overall = 0.0546 — max = 4
F(10, 104) = 1.24
corr(u_i, Xb) = -0.6069 — Prob. > F = 0.2751

ROS	***Coef.***	***Std. Err.***	***t***	***P>|t|***	***[95% Conf. interval]***	
DR	3365.793	5975.702	0.56	0.574	-8484.249	15215.83
SL	1512.016	5939.902	0.25	0.800	-10267.03	13291.06
DE	39.73886	267.8205	0.15	0.882	-491.3592	570.8369
SA	45.36478	5123.981	0.01	0.993	-10115.68	10206.41
FA	-554.6883	7666.849	-0.07	0.942	-15758.34	14648.96
Size	0.0000411	0.0004036	0.10	0.919	-.0007592	0.0008414
CR	-266.0159	123.2904	-2.16	0.033	-510.5054	-21.52639
RG	294.093	161.6086	1.82	0.072	-26.38295	614.5689
Age	-308.9292	342.8177	-0.90	0.370	-988.7496	370.8912
MA	-629.016	662.6784	-0.95	0.345	-1943.132	685.1001
_cons	2425.149	7279.43	0.33	0.740	-12010.23	16860.53
sigma_u	2776.842					
sigma_e	4155.4153					
rho	0.30870166	(fraction of variance due to u_i)				
F test that all u_i = 0:		F(37, 104) = 0.54			Prob. > F = 0.9819	

Table 5b. FEM model with attributes (for *ROE*)

xtreg ***ROE*** *DR SL DE SA FA Size CR RG Age MA fe*

Fixed-effects (within) regression — Number of obs. = 152
Group variable: *No.* — Number of groups = 38

R-squared: within = 0.4437 — Obs. per group: min = 4
between = 0.0151 — avg = 4.0
overall = 0.1529 — max = 4
F(10, 104) = 8.29
corr(u_i, Xb) = -0.7427 — Prob. > F = 0.0000

ROE	***Coef.***	***Std. Err.***	***t***	***P > |t|***	***[95% Conf. interval]***	
DR	0.1622001	0.3749226	0.43	0.666	-0.5812855	0.9056856
SL	-0.3807821	0.3726764	-1.02	0.309	-1.119814	0.3582492
DE	-0.1135063	0.0168034	-6.75	0.000	-0.146828	-0.0801846
SA	0.0126196	0.3214846	0.04	0.969	-0.6248964	0.6501356
FA	0.5420354	0.4810271	1.13	0.262	-0.4118593	1.49593
Size	1.40e-08	2.53e-08	0.55	0.581	-3.62e-08	6.42e-08
CR	-0.0007152	0.0077354	-0.09	0.927	-0.0160548	0.0146243
RG	-0.0005084	0.0101395	-0.05	0.960	-0.0206154	0.0195987
Age	-0.0257571	0.0215088	-1.20	0.234	-0.0684099	0.0168956
MA	0.0498184	0.0415772	1.20	0.234	-0.0326308	0.1322676
_cons	0.2047782	0.45672	0.45	0.655	-0.7009147	1.110471
sigma_u	0.2909548					
sigma_e	0.26071564					
rho	0.55464961	(fraction of variance due to u_i)				
F test that all u_i = 0:		F(37, 104) = 0.85			Prob. > F = 0.7068	

Table 5c. FEM model with attributes (for *ROA*)

xtreg ***ROA*** *DR SL DE SA FA Size CR RG Age MA fe*						
Fixed-effects (within) regression					Number of obs. = 152	
Group variable: *No.*					Number of groups = 38	
R-squared: within = 0.1224					Obs. per group: min = 4	
between = 0.0205					avg = 4.0	
overall = 0.0311					max = 4	
					F(10, 104) = 1.45	
corr(u_i, Xb) = -0.5041					Prob. > F = 0.1687	
ROA	***Coef.***	***Std. Err.***	***t***	***P > |t|***	***[95% Conf. interval]***	
DR	-0.0645508	0.0974973	-0.66	0.509	-0.2578916	0.1287899
SL	-0.0476212	0.0969132	-0.49	0.624	-0.2398037	0.1445613
DE	-0.0065996	0.0043697	-1.51	0.134	-0.0152648	0.0020656
SA	0.1732066	0.0836009	2.07	0.041	0.0074229	0.3389903
FA	-0.0956471	0.1250894	-0.76	0.446	-0.343704	0.1524098
Size	-2.452109	6.587609	-0.37	0.711	-1.550808	1.062508
CR	-0.0046033	0.0020116	-2.29	0.024	-0.0085923	-0.0006143
RG	0.0071653	0.0026367	2.72	0.008	0.0019365	0.012394
Age	-0.0074296	0.0055933	-1.33	0.187	-0.0185213	0.0036621
MA	0.0032442	0.010812	0.30	0.765	-0.0181964	0.0246848
_cons	0.0937489	0.1187684	0.79	0.432	-0.1417733	0.3292711
sigma_u	0.09462723					
sigma_e	0.06779816					
rho	0.66079081	(fraction of variance due to u_i)				
F test that all u_i = 0:		F(37, 104) = 2.96			Prob. > F = 0.0000	

Table 6a. REM model with attributes (for *ROS*)

xtreg ***ROS*** *DR SL DE SA FA Size CR RG Age MA re*						
Random-effects GLS regression					Number of obs. = 152	
Group variable: *No.*					Number of groups = 38	
R-squared: within = 0.0826					Obs. per group: min = 4	
between = 0.5961					avg = 4.0	
overall = 0.1953					max = 4	
					Wald Chi^2 (6) = 34.22	
corr(u_i, X) = 0 (assumed)					Prob. > Chi^2 = 0.0002	
ROS	***Coef.***	***Std. Err.***	***z***	***P > |z|***	***[95% Conf. interval]***	
DR	-538.138	1468.298	-0.37	0.714	-3415.95	2339.674
SL	-905.8996	2061.966	-0.44	0.660	-4947.279	3135.48
DE	-119.0704	150.0649	-0.79	0.428	-413.1922	175.0515
SA	-411.7758	1789.541	-0.23	0.818	-3919.212	3095.661
FA	-521.0463	2224.328	-0.23	0.815	-4880.649	3838.556
Size	-9.662906	0.0000712	-0.14	0.892	-0.0001491	0.0001298
CR	-319.1182	67.42705	-4.73	0.000	-451.2728	-186.9636
RG	438.8527	131.196	3.35	0.001	181.7132	695.9921
Age	114.0346	81.76129	1.39	0.163	-46.21457	274.2838
MA	-211.9557	391.6003	-0.54	0.588	-979.4782	555.5669
_cons	2296.213	3136.811	0.73	0.464	-3851.824	8444.25
sigma_u	0					
sigma_e	4155.4153					
rho	0	(fraction of variance due to u_i)				

Table 6b. REM model with attributes (for *ROE*)

xtreg ***ROE*** *DR SL DE SA FA Size CR RG Age MA re*						
Random-effects GLS regression					Number of obs. = 152	
Group variable: *No.*					Number of groups = 38	
R-squared: within = 0.4049					Obs. per group: min = 4	
between = 0.4824					avg = 4.0	
overall = 0.3851					max = 4	
					Wald Chi^2 (6) = 88.32	
corr(u_i, X) = 0 (assumed)					Prob. > Chi^2 = 0.0000	
ROE	***Coef.***	***Std. Err.***	***z***	***P > |z|***	***[95% Conf. interval]***	
DR	0.5242043	0.0962668	5.45	0.000	0.3355249	0.7128838
SL	-0.2538489	0.1351897	-1.88	0.060	-0.518816	0.0111181
DE	-0.0751573	0.0098388	-7.64	0.000	-0.0944409	-0.0558736
SA	0.0629834	0.1173286	0.54	0.591	-0.1669764	0.2929433
FA	0.1291628	0.1458347	0.89	0.376	-0.156668	0.4149937
Size	-8.115609	4.662509	-1.74	0.082	-1.731708	1.037309
CR	0.0042038	0.0044208	0.95	0.342	-0.0044607	0.0128684
RG	-0.0039417	0.0086017	-0.46	0.647	-0.0208006	0.0129173
Age	0.0061348	0.0053606	1.14	0.252	-0.0043717	0.0166413
MA	0.0095325	0.0256747	0.37	0.710	-0.0407889	0.059854
_cons	0.0024995	0.2056604	0.01	0.990	-0.4005874	0.4055864
sigma_u	0					
sigma_e	0.26071564					
rho	0	(fraction of variance due to u_i)				

Table 6c. REM model with attributes (for *ROA*)

xtreg ***ROA*** *DR SL DE SA FA Size CR RG Age MA re*

Random-effects GLS regression — Number of obs. = 152
Group variable: *No.* — Number of groups = 38

R-squared: within = 0.0548 — Obs. per group: min = 4
between = 0.5069 — avg = 4.0
overall = 0.3402 — max = 4
Wald Chi² (6) = 40.50
corr(u_i, X) = 0 (assumed) — Prob. > Chi² = 0.0000

ROA	***Coef.***	***Std. Err.***	***z***	***P > |z|***	***[95% Conf. interval]***	
DR	-0.1314429	0.0373746	-3.52	0.000	-0.2046957	-0.0581901
SL	-0.1348956	0.0535644	-2.52	0.012	-0.23988	-0.0299113
DE	-0.0038727	0.0030826	-1.26	0.209	-0.0099145	0.002169
SA	0.2241773	0.0475041	4.72	0.000	0.1310709	0.3172836
FA	0.0470597	0.0609526	0.77	0.440	-0.0724051	0.1665246
Size	-7.00e561	2.001709	-0.04	0.972	-3.992909	3.857409
CR	-0.0055956	0.0014956	-3.74	0.000	-0.008527	-0.0026642
RG	0.0067712	0.0025021	2.71	0.007	0.0018672	0.0116753
Age	0.003551	0.0022359	1.59	0.112	-0.0008312	0.0079333
MA	0.0074121	0.0084528	0.88	0.381	-0.0091551	0.0239793
_cons	0.0372235	0.0733677	0.51	0.612	-0.1065745	0.1810216
sigma_u	0.04603369					
sigma_e	0.06779816					
rho	0.31554467	(fraction of variance due to u_i)				

Table 7a. Results comparing FEM and REM models (coefficients for *ROS*)

Variable	***(b)*** ***FEM***	***(B)*** ***REM***	***(b–B)*** ***Difference***	***sqrt(diag(V_b-V_B))*** ***S.E.***
DR	3365.793	-538.138	3903.931	5792.505
SL	1512.016	-905.8996	2417.915	5570.524
DE	39.73886	-119.0704	158.8092	221.8295
SA	45.36478	-411.7758	457.1406	4801.325
FA	-554.6883	-521.0463	-33.64207	7337.093
Size	0.0000411	-9.666406	0.0000507	0.0003973
CR	-266.0159	-319.1182	53.10226	103.2188
RG	294.093	438.8527	-144.7597	94.36607
Age	-308.9292	114.0346	-422.9638	332.9251
MA	-629.016	-211.9557	-417.0603	534.595

b = consistent under H_0 and *Ha*; obtained from xtreg
B = inconsistent under *Ha*, efficient under H_0; obtained from xtreg
Test: H_0: difference in coefficients not systematic
Chi² (8) = (b–B)'[(V_b-V_B)^(-1)](b–B) = 8.12
Prob. > Chi² = 0.5219
(V_b-V_B is not positive definite)

Table 7b. Results comparing FEM and REM models (coefficients for *ROE*)

Variable	***(b)*** ***FEM***	***(B)*** ***REM***	***(b–B)*** ***Difference***	***sqrt(diag(V_b-V_B))*** ***S.E.***
DR	0.1622001	0.5242043	-0.3620043	0.3623529
SL	-0.3807821	-0.2538489	-0.1269332	0.3472916
DE	-0.1135063	-0.0751573	-0.038349	0.0136217
SA	0.0126196	0.0629834	-0.0503638	0.2993098
FA	0.5420354	0.1291628	0.4128726	0.4583877
Size	1.406208	-8.117209	2.215608	2.494908
CR	-0.0007152	0.0042038	-0.0049191	0.0063477
RG	-0.0005084	-0.0039417	0.0034333	0.0053685
Age	-0.0257571	0.0061348	-0.0318919	0.0208301
MA	0.0498184	0.0095325	0.0402859	0.0327028

b = consistent under H_0 and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under H_0; obtained from xtreg
Test: H_0: difference in coefficients not systematic
Chi² (9) = (b–B)'[(V_b-V_B)^(-1)](b–B) = 17.97
Prob. > Chi² = 0.0355
(V_b-V_B is not positive definite)

Table 7c. Results comparing FEM and REM models (coefficients for *ROA*)

Variable	*(b)* *FEM*	*(B)* *REM*	*(b–B)* *Difference*	*sqrt(diag(V_b-V_B))* *S.E.*
DR	-0.0645508	-0.1314429	0.0668921	0.0900492
SL	-0.0476212	-0.1348956	0.0872744	0.0807652
DE	-0.0065996	-0.0038727	-0.0027269	0.003097
SA	0.1732066	0.2241773	-0.0509707	0.068793
FA	-0.0956471	0.0470597	-0.1427069	0.1092343
Size	-2.454809	-7.002611	-2.381809	6.274309
CR	-0.0046033	-0.0055956	0.0009923	0.0013451
RG	0.0071653	0.0067712	0.000394	0.0008318
Age	-0.0074296	0.003551	-0.0109807	0.005127
MA	0.0032442	0.0074121	-0.0041679	0.0067416
b = consistent under H_0 and Ha; obtained from xtreg B = inconsistent under Ha, efficient under H_0; obtained from xtreg Test: H_0: difference in coefficients not systematic Chi² (9) = (b–B)'[(V_b-V_B)^(-1)](b–B) = 10.94 Prob. > Chi² = 0.2796 (V_b-V_B is not positive definite)				

Tables 7a, 7b, 7c show that H_0 (null hypothesis) difference in coefficients, meaning that there is no difference between FEM and REM models; therefore, the REM model is selected (Kohler & Kreuter, 2005). However, it is necessary to retest heteroscedasticity with the Breusch–Pagan heteroscedasticity test.

Table 8. Results of the Breusch–Pagan heteroscedasticity test of the observed variable

Breusch and Pagan Lagrangian multiplier test for random effects		
$\boldsymbol{ROS}[STT,t] = Xb + u[STT] + e[STT,t]$		
Estimated results:		
Parameter	***Var***	***d = sqrt(Var)***
ROS	1.765407	4198.817
e	1.734307	4155.415
u	0	0
Test: Var(u) = 0 Chibar² (01) = 0.00 Prob. > Chibar² = 1.0000		
$\boldsymbol{ROE}[STT,t] = Xb + u[STT] + e[STT,t]$		
Estimated results:		
Parameter	***Var***	***sd = sqrt(Var)***
ROE	0.099184	0.3149349
e	0.0679726	0.2607156
u	0	0
Test: Var(u) = 0 Chibar² (01) = 0.00 Prob. > Chibar² = 1.0000		
$\boldsymbol{ROA}[STT,t] = Xb + u[STT] + e[STT,t]$		
Estimated results:		
Parameter	***Var***	***sd = sqrt(Var)***
ROA	0.0100238	0.1001187
e	0.0045966	0.0677982
u	0.0021191	0.0460337
Test: Var(u) = 0 Chibar² (01) = 14.78 Prob. > Chibar² = 0.0001		

As can be seen in Table 8, we understand that:

ROS and *ROE*: Prob. > Chibar² = 1.00 > 0.05. Therefore, there is no phenomenon of variable variance, i.e., the research model is consistent with the collected data. The regression equation of internal financial determinants influencing financial performance with proxies of *ROS* and *ROE* is below:

$$ROS = -319.1182 * CR + 438.8527 * RG \quad (1)$$

$$ROE = 0.5242043 * DR - 0.0751573 * DE \quad (2)$$

ROA: Prob. > Chibar² = 0.0001 < 0.05. This means there is a phenomenon of variable variance, i.e., the research model is inconsistent with the input data. Thus, the observed variable *ROA* need to use the final regression which is GLS regression (Torres-Reyna, 2007).

Table 9. Cross-sectional time-series FGLS regression

xtgls ROA DR SL DE SA FA Size CR RG Age MA panels(iid) corr(independent)						
Estimated covariances = 1 Estimated autocorrelations = 0 Estimated coefficients = 11 Log likelihood = 167.6177					Number of obs. = 152 Number of groups = 38 Time periods = 4 Wald Chi² (10) = 82.59 Prob. > Chi² = 0.0000	
ROA	***Coef.***	***Std. Err.***	***z***	***P > |z|***	***[95% Conf. interval]***	
DR	-0.1670384	0.0302574	-5.52	0.000	-0.2263419	-0.1077349
SL	-0.1600439	0.0424912	-3.77	0.000	-0.2433252	-0.0767626
DE	-0.0004025	0.0030924	-0.13	0.896	-0.0064636	0.0056585
SA	0.2334636	0.0368773	6.33	0.000	0.1611853	0.3057418
FA	0.0734598	0.0458371	1.60	0.109	-0.0163791	0.1632988
Size	-3.23570	1.474609	-0.22	0.826	-3.208109	2.557609
CR	-0.0059779	0.0013895	-4.30	0.000	-0.0087013	-0.0032546
RG	0.0069246	0.0027036	2.56	0.010	0.0016256	0.0122235
Age	0.0041628	0.0016849	2.47	0.013	0.0008605	0.0074651
MA	0.0058631	0.0080698	0.73	0.467	-0.0099533	0.0216796
_cons	0.0624015	0.0646407	0.97	0.334	-0.064292	0.1890951

Note: Coefficients: generalized least squares. Panels: homoskedastic. Correlation: no autocorrelation.

In Table 9, we see that the regression equation of internal financial determinants affecting *ROA* is:

$$ROA = -0.1670384 * DR - 0.1600439 * SL + 0.2334636 * SA - 0.0059779 * CR + 0.0069246 * RG + 0.0041628 * Age \quad (3)$$

5. DISCUSSION

5.1. The factor of current assets structure

The proportion of short-term assets has a positive impact on *ROA*. Therefore, short-term assets increase, *ROA* also increases and vice versa. In the current period, especially during the outbreak of COVID-19 and its long-term existence, the economy has witnessed many fluctuations, which affect most sectors in Vietnam and the world. Minerals — one of the highly specialized industries — are the main source of raw materials for many key industries such as limestone, used for the production of cement and building materials; iron ore used for metallurgy and mechanical engineering; coal, oil, and gas are viewed as the main source of energy for economic sectors as well as for daily life; mineral water and natural hot water are regarded as highly valuable resources to protect people's health and special sources of energy for some industries. This industry is also influenced by the depressing economy, but not as detrimental as some of the others. Financial performance was achieved, and the average revenue and profit of the whole industry are at the medium level. Short-term assets are also secured and raised, which improve the assets structure and debts are paid on time. As short-term debts are solved, firms cannot only enhance their financial reputation but also maintain proper solvency and liquidity, then improve financial performance.

Mineral firms listed on Vietnam's stock market should organize their appropriate asset structures in order to enhance their efficiency. In each period, firms need to plan a capital in terms of cash; maintain the proportion of inventory at a moderate level to meet production needs, use assets carefully and appropriately investment plan; thoroughly consider risks before conducting investment, because the higher the profit is, the greater the risk is; maintaining costs under control and as low as possible, can enhance assets efficiency, business performance in general and FP in particular.

5.2. The solvency factor

Solvency with current solvency (*CR*) has a negative impact on *ROS* and *ROA*. When a firm maintains its solvency at a low level, meaning that the firm is taking advantage of debts for investment, production, and business. As debt increases (*CR* decreases), equity decreases; along with taking advantage of loans to invest, the financial costs decrease, so the profit increases, thereby increasing the *ROA*. Therefore, it is completely reasonable that *CR* has the negative effect on *ROS* and *ROA*. Because when firms use more debt, even though they used for profitable investment, for short-term debts that should be paid immediately, firms also face pressure to repay. Meanwhile, short-term assets are brought to investment, and cannot immediately recover capital to ensure payment of short-term loans, so it inadvertently reduces the solvency of the firms.

Therefore, in order to maintain their position and product quality with foreign firms, Vietnamese firms in the mineral industry need to improve product quality; product variety, price competition, etc. Improving product quality may also be the key to attract foreign partners. Therefore, with market expansion and product quality improvement, it will contribute to increase revenue and attract domestic and foreign orders. From there, it is possible to ensure the ability of firm to pay its due debts; ensure and improve solvency appropriately, thereby indirectly contributing to improve performance.

5.3. The capital structure factor

Two variables are *DR* and *SL* which have a negative influence on *ROA* as the negative relationship between FP and *DR*, *SL*. On the contrary, *DR* has a positive relationship with *ROE*. Moreover, the relation between capital structure and firm performance are mutual, other factors including business strategy, industry, characteristics of each industry can also be potential sources of controversial discovery. However, they have not been appreciated with appropriate level of emphasis (Dao & Ta, 2020).

When *DR* and *SL* increase, meaning that a firm takes more debt, faces gradually losing financial autonomy. When a firm is not able to pay its debts, the firm will lose belief from suppliers and customers, leading to a decrease in revenue, an increase in expenses, a decrease in profit and ROA. In constrast, when the firm maintains a suitable debt ratio, it can both take advantage of mobilized capital and ensure its solvency to reinforce its reputation in the market, attract investors and lending institutions.

Firms in the mineral industry utilize debt inefficiently, the benefit from borrowing cannot make up for the expenses of the debt. On the other hand, one reason for using ineffectively debt is because the firms still depend much on debt themselves. In addition, the fluctuating inflation rate greatly influences the interest rate and loan repayment situation of firms. In particular, in the period from 2019 to 2020, the COVID-19 pandemic outbreak greatly affects the development the economy in general and the mineral industry in particular in all countries and Vietnam is not an exceptional case.

Capital structure includes debt and equity, the choice of capital structure is based on the trade-off between risk and return (Thuy, 2019). So, mineral firms need to reduce short-term loans by increasing the use of long-term loans. In addition, mineral firms need to identify specific funding sources. Identify which business activities the firm's own capital is not enough to meet or if using loan capital will bring benefits more profitable to make rational decisions. Mineral firms listed on Vietnam's stock market need to have specific measures to issues such as recovering receivables and lending.

The accounting department needs to prepare management accounting reports on payables, plan to pay planned debts for the sake of the firm's credibility, apply accounting procedures and regulations as well as other supplier's policies to recommend a payment discount or an extension of the payment period.

Firms should focus on raising capital from issuing shares to existing shareholders, employees in the firm to strategic partners, or issuing widely on the stock market. This is an effective form of capital mobilization. Listed firms can both mobilize capital in large quantities and stay fixed for a long time. From there, firms can make long-term production and business plans, without having to consider borrowing expenses that fluctuate like bank loans. Mineral firms can raise capital from investment funds and need to improve and increase the efficiency of debt use.

5.4. Debt-to-equity (DE) ratio

Debt-to-equity (*DE*) has a negative effect on *ROE*. The majority of minerals firms listed on the Vietnamese stock market are financed by debt and are likely to face difficulties in repayment; while the remaining firms have assets financed mainly by equity, so they are less likely to face financial hazard.

5.5. Growth rate of firms (RG)

Growth rate (*RG*) has a positive effect on *ROS* and *ROA*. Therefore, listed mineral firms need to focus on marketing solutions besides market expansion to increase annual revenue, which can effectively motivate business activity to keep growing. This result is in line with findings of Pouraghajan et al. (2012). High labor productivity together with the reduced staff and appropriate wage structure would motivate firm's financial performance.

Mineral firms should come out with specific solutions such as downsizing in management apparatus. When one staff can take over many tasks, it is necessary that the labor workforce be reduced. To enhance labor productivity, firms also had better pay attention to reorganizing their human resources, especially concerning the income problem of staff salesmen and managers. In addition, it is important that mineral firms maintain the growth speed of revenue at a steadily high and suitable rate. Suitable growth choice plays an important and conclusive part in decreasing interest expense.

5.6. The firm's age

The firm's age has a positive relationship with *ROA*. The sooner a firm launched its stock, the more manufacturing business experience it would get. In such a long time, that listed firms could set up a system of traditional suppliers and customers. Owing to that, they easily make use of the suppliers' appropriated capital for their production and performance. In contrast, in case the firm has launched its stocks or just been established in a short period of time, it is difficult to receive high appreciation and belief from a large number of customers. In addition, suppliers might be less willing about payment terms. They would require a prompt payment term instead of delay.

6. CONCLUSION

Solvency has a negative correlation with ROS, while revenue growth has a positive correlation. Apart from those determinants, others in the research model have small impacts on ROS.

The capital structure affects ROE positively. In contrast, the observed variable DE negatively affects ROE. The other factors have little clear influence.

The capital structure has negative impact ROA while current assets structure a positive correlation. Similarly, solvency has a negative correlation, while revenue growth has positive correlation. Other factors have little effect on ROA.

Further research on both internal and external determinants in the same field of mineral industry or a comparison of internal factors in different fields in the context of developing countries like Vietnam is identified and discussed.

This study has some limitations such as the research sample is not large and the scope of research on space includes only mineral enterprises listed on Vietnam's stock market.

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