
Impact of Several Factors on the Change Speed of Capital Structure of Listed Firms in Vietnam

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Abstract: Information of capital structure and changes in capital structure plays an important role in corporate financial management. Many researches have shown that the information about changes in capital structure is meaningful and reflects firms' financial position in many aspects. Therefore, studying factors that affect the fast or slow change of firms' capital structure is also meaningful. Based on results of previous researches on the capital structure of enterprises and some proposals for researching impact of some factors on firms' capital structure change, a regression model including the dependent variable and the 8 independent variables were selected. Data of 174 listed firms in Vietnam and other related data for the period 2015 - 2020 were collected to conduct an empirical research. Our research's aim to clarify the impact of factors including firm size, revenue, asset turnover, ROA, ROE, debt ratio, firm age and GDP growth on the change speed of capital structure of listed firms in Vietnam. Results of the regression analysis show a positive relationship between firm size, asset turnover, debt ratio, ROE and firm age with rapid or slow change of firms' capital structure, while firms' revenue has a negative relationship with this change speed. Implications the research's results, limitations and future research directions are discussed.

Keywords: Capital Structure, Change Speed, Impact Factor

1. Introduction

After the research of Modigliani & Miller [13], there have been many studies on the capital structure of firms which have been supplemented, updated, and further developed. Former researches often focus on assessing the impact of capital structure, assessing the factors affecting capital structure and its adjustment of firms. In which, when studying capital structure adjustment and adjustment speed, it is often assumed that there exists a target capital structure of firms and the decision to adjust capital structure usually revolves around about this target structure. Thus, when there are no assumptions about the existence of an optimal or target capital structure, and changes in the firms' capital structure do not result only from subjective adjustment decisions, how is the change speed of firms' capital structure? Which inside and outside factors impact on change speed of firms' capital structure? Researches by DeAngelo & Roll [5],

Chong & Kim [2] have found that capital structure changes convey meaningful information about firm performance, and initially refer to the impacting relationship between several factors on the fast or slow change of firms' capital structure. Next, the assessment of the fast or slow change of capital structure continues to be made by Campbell & Rogers [1] in research with American enterprises, which emphasizes the difference in capital structure changes between enterprises which are different in firms' size and performance. Kieschnick & Moussawi [9] when studying the capital structure adjustment of firms, also mentioned to the relationship between firm age and fast or slow movements of capital structure. Previously, Oino & Ukaegbu [14] also proposed to further research the impact of GDP growth on speed change of capital structure. With the aim of finding out about the change speed of capital structure of listed firms in Vietnam, contributing to clarifying the impact relationship of some factors on change speed of firms' capital structure. This research analyzes the impact relationship of several factors

such as firm size, business performance, firm age, GDP growth on the change speed of the capital structure of listed firms in Vietnam in the period 2015 - 2020.

2. Theoretical Background

Masulis [11] in fairly early research on firms' capital structure had positivistic conclusions about the relationship between capital structure change and enterprises' tax shield, enterprises stock price in the market. After that, Masulis [12] developed research to give empirical evidence about the relationship between capital structure change and stock price and firm value, which was reliable evidence confirming that rapid or slow change in capital structure conveying important financial information of the business to the market. These statements were supported by results of research of Shah [15], which emphasized that increasing or decreasing financial leverage (reflecting capital structure) conveys information about the financial position of enterprises. When studying change in corporate capital structure, Shah [15] determined the change by comparing the capital structure at the end of each year with the capital structure at the end of the preceding year. It is clear that the rapid or slow change of capital structure suggests initial assumptions about the meaning of capital structure change speed when studying corporate financial management.

Also approaching capital structure in this direction, DeAngelo & Roll [5] in a research related to capital structure of US firms has focused on assessing the volatility or stability of corporate capital structure in an operating period. This approach was assessed by Campbell & Rogers [1] as opening a research direction on capital structure, focusing on the volatility of debt ratio over time while other research often approached the value of debt ratio at a point in time, or in other word, it was an approach to change speed of enterprises' capital structure. In fact, in addition to the study by Campbell & Rogers [1], Chong & Kim [2] also approached capital structure in the direction of understanding the speed of change, reflecting strong or weak, rapid or slow fluctuations of the debt ratio.

Besides empirical research confirming the important informational significance of rapid/slow change of capital structure such as the researches of Masulis [12], Shah [15], DeAngelo & Roll [5], Campbell & Rogers [1], Chong & Kim [2], there are also researches on capital structure that show the impact relationship of several factors on the change of enterprises' capital structure.

When studying with data of European companies from 2006 to 2016, Campell & Rogers [1] had valuable analyzes on the relationship between firm size and debt ratio fluctuations, in which the Firms with the most variable capital structure tend to be smaller firms. Although authors said that it was necessary to test this relationship further, this result was similar to the research results of Shah [15]. On the other hand, Campell & Rogers [1] also assessed the impact relationship between firm performance and capital structure change, specifically, in this research, firms with lower

business performance (reflected by profitability) had the debt ratio changing more strongly.

In another research related to capital structure of firms, the relationship between firm age and capital structure change speed was mentioned by Kieschnick & Moussawi [9] when studying capital structure decision, in which firm age and corporate governance characteristics were factors affecting the capital structure decision - leading to changes in debt ratio. Regarding the relationship to the state of the economy, Cook & Tang [3] used US data over a 30-year period to examine the relationship between macroeconomic conditions and capital structure change by adjusting, showing that in better economic conditions change of firms' capital structure faster than in bad economic conditions. In research comparing the impact of profitability on capital structure as well as on capital structure change of listed companies in Nigeria, Oino & Ukaegbu [14] also proposed a research to evaluate the relationship between macroeconomic growth (via GDP growth) and the speed of capital structure adjustment.

3. Research Method

For the purpose of analyzing the impact relationship of impact factors on the change speed of firms' capital structure, on the basis of inheriting the research results of Shah [15], Campbell & Rogers [1], Kieschnick & Moussawi [9], selected factors include (i) firm size, (ii) business performance, (iii) firm age, (iv) GDP growth. In which capital structure is determined by the ratio of debt to total assets as Thies & Klock [16], change in capital structure is determined by comparing the debt ratio at year-end with the debt ratio at the end of the preceding year, since the debt ratio of enterprises mostly fluctuates between 0 - 1, in very few cases greater than 1 (except for companies with negative equity), therefore, the periodic change in debt ratio also reflects the rapid/slow change speed of capital structure. In statistical science, often this change is compared with the original value to determine the speed of change. This study also approach by calculating this change speed of capital structure.

When referring to firms' business performance in the research, a number of indicators reflecting operational efficiency were used such as ROA, ROE, asset turnover as in the researches of Dang [4], Duong [6], Hoang [8]. In addition, when studying the theory of firms' business performance, revenue was also mentioned by Duong [6] as an important indicator, the initial result of business activities, and a premise to determine profitability and firms' business performance. From the judgment of Shah [15] given that the change speed of capital structure reflects the financial position of the enterprise, the debt ratio and revenue were also included in the research model to find out the relationship between the business performance (revenue) and the debt ratio itself to the change speed of capital structure.

Cook & Tang [3], when studying the relationship between macroeconomic conditions and firms' capital structure, made statements about the difference between capital structure changes in the case of a good economy and the case of bad

economy, is the basis for this research to consider the independent variable of GDP growth in the proposed research model. Similarly, the proposal from the study of Oino &

Ukaegbu [14] is the basis for adding GDP growth to the model.

Summary of independent and dependent variables of the research model in Table 1:

Table 1. Proposed variables in the research model.

Variable code	Variable name	Determine/ Measure	Source/ Proposed research
<i>Dependent variable:</i>			
CSC	change speed of capital structure	Year-end debt ratio - Debt ratio at the end of the preceding year	Shah [15]
<i>Independent variables:</i>			
SZ	Firm size	Total Asset	Campell & Rogers [1]
SALE	Revenue	Revenue in Financial Statement	Duong [6]
AT	Asset turnover	Revenue / Average total assets	Duong [6]
ROA	Return on Asset	Net income / Average total assets	Dang [4]
			Campell & Rogers [1]
			Hoang [8]
ROE	Return on Equity	Net income / Average equity	Dang [4]
			Duong [6]
			Hoang [8]
DEBT	Debt Ratio	Total debt / Total assets	Thies & Klock [16]
AGE	Firm age	Year of Financial Statement - Founding year	Kieschnick & Moussawi [9]
GDP	GDP growth	% of GDP growth	Cook & Tang [3]
			Oino & Ukaegbu [14]

To analyze the relationship between independent variables and dependent variable in the research model, data were collected from the financial statements of listed firms in Vietnam. Listed firms were randomly selected among non-financial firms listed in Vietnam, period of 2015 - 2020. In this research, the data of financial firms and commercial banks are not used because of difference in characteristics of their industries. After excluding listed firms with intermittently disclosed data in the years from 2015 to 2020, remaining 174 firms, the annual financial statements of 174 firms were collected from the website <https://finance.vietstock.vn>. GDP growth data from the annual publication of the General Statistics Office of Vietnam.

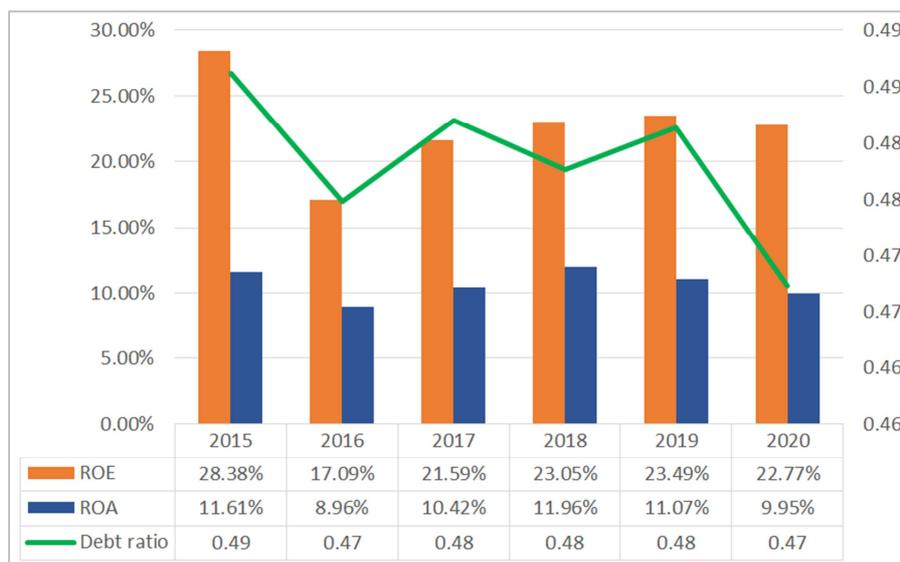
Collected and calculated data were analyzed using STATA16, panel data were used for regression analysis by OLS, fixed effects model FEM, random effects model (REM), F-test to choose OLS or FEM, Hausman test to choose a

suitable model (FEM or REM), after checking the model's errors such as multicollinearity (by VIF - Variance Inflation Factor), Heteroskedasticity (by Wald -test), autocorrelation (by Wooldridge test), if any, would be overcome by GLS regression. When analyzing regression, independent variables with observed values were absolute numbers (SIZE, SALE, AGE) then logarithmic values would be used.

4. Results

4.1. General Description

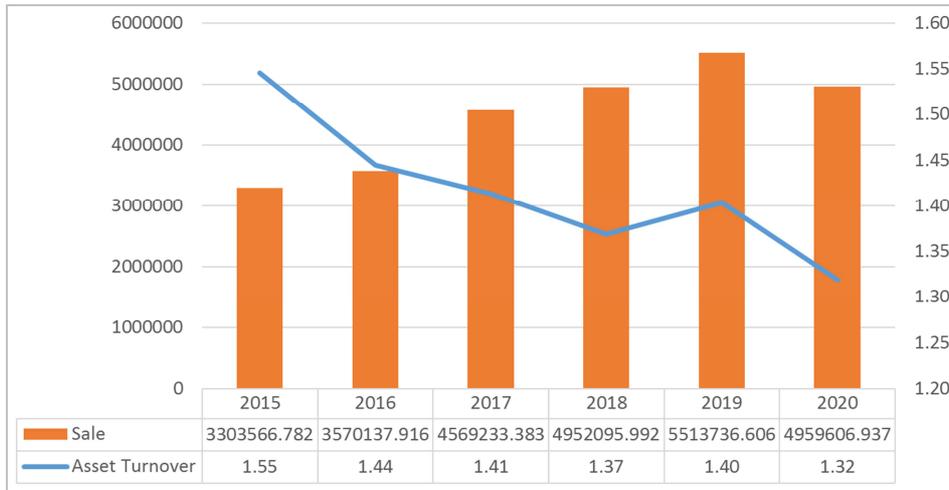
Regarding the changes in capital structure of listed firms in the sample, from the results of data aggregation, the chart in Figure 1 reflects the evolution of the average value of Debt Ratio, ROA, ROE.



Source: Financial statements of 174 listed firms in Vietnam

Figure 1. Debt ratio, ROA, ROE in the period of 2015 - 2020 of listed firms in Vietnam.

The average of revenue and Asset Turnover of listed firms in Vietnam in the period of 2015 - 2020 is presented in the graph Figure 2:



Source: Compiled from financial statements of 174 listed firms in Vietnam

Figure 2. Sales and Asset Turnover in the period of 2015 - 2020 of listed firms in Vietnam.

Annual GDP growth and average value of capital structure change of listed companies in Vietnam in the period 2015 - 2020 are presented in the graph Figure 3.

According to Figure 3, during this period, Vietnam's GDP grew quite well and evenly, the GDP growth rate of 2020 decreased sharply due to the impact of the COVID-19 pandemic. The difficult situation of 2020 was also reflected in the decrease in the debt ratio of firms, firms downsized their operations due to the difficult situation and complied with the State's anti-epidemic measures, narrowing operations reduces the need for capital mobilization, including the need for loans, that was the main reason for the sharp decrease in loans, making capital structure fluctuate strongly in the direction of decreasing debt ratio. Also, during this period, the average debt ratio increased sharply in 2017 and 2019. From the second half of 2016, the Government of Vietnam implemented many policies to promote economic development, taking the private economy as the growth motivation. The results were partly reflected in the fact that GDP growth in 2017 started to increase and in 2018 reached a very high level. Since 2016, in general, the trend of business expansion, increasing debt,

and changes in capital structure of firms was also more evident.

4.2. Descriptive Statistics Results

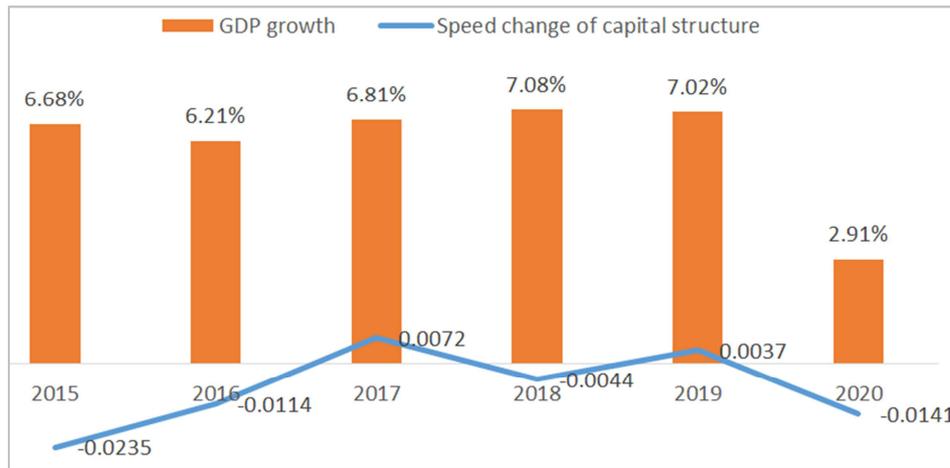
The results of descriptive statistics of the variables in the research model are presented in Table 2.

According to Table 2, with 1,044 observations, the change of capital structure (CSC) had an average value of -0.007057, the lowest (strongest decrease) was -0.810945 and the strongest increase was 0.8308664. Firm size (SIZE) and sales (SALE) of listed firms in the sample have the highest standard deviation, reflecting the strongest variability. Firm age (AGE) also has a strong variation, standard deviation 16,53013, the lowest is 1 and the highest is 130 years (by the time the firms published financial statements). Asset Turnover, ROA and ROE are also variables with strongly variable observed values, quite high standard deviation. Debt Ratio (DEBT) has the lowest value of 0.0249242 and the highest value of 0.9759297. In Table 2, the values included in the descriptive statistics of scale variables such as SIZE, SALE, AGE are absolute values or collected baseline values.

Table 2. Descriptive statistical results of the research model variables.

Variable	Obs	Mean	Std. Dev.	Min	Max
CSC	1,044	-.007057	.1123898	-.8109445	.8308664
SIZE	1,044	5120361	2.46e+07	392	4.24e+08
SALE	1,044	4478063	1.40e+07	28.52	1.54e+08
AT	1,044	1.451724	1.623526	.0000808	21.25069
ROA	1,044	.1066211	.224047	-.4089317	3.001422
DEBT	1,044	.4782036	.2182098	.0249242	.9759297
AGE	1,044	24.81609	16.53013	1	130
GDP	1,044	.0611833	.014632	.0291	.0708
ROE	1,044	.227284	.6988866	-1.753446	16.67015

Source: Analysis results by STATA16.



Source: General Statistics Office of Vietnam and financial statements of 174 firms listed in Vietnam

Figure 3. Vietnam GDP growth and changes in capital structure of listed firms in Vietnam in the period 2015 – 2020.

The results of the analysis of the correlation coefficients of the variables in the research model are presented in Table 3.

Table 3. Correlation coefficient analysis of the variables of the research model.

	CSC	SIZE	SALE	AT	ROA	DEBT	AGE	GDP	ROE
CSC	1.0000								
SIZE	0.0182	1.0000							
SALE	-0.0273	0.8481	1.0000						
AT	-0.0550	-0.1411	0.2133	1.0000					
ROA	-0.0295	-0.0225	0.0782	0.2397	1.0000				
DEBT	0.2539	0.2458	0.2268	-0.0412	-0.1220	1.0000			
AGE	0.0219	-0.0044	0.1206	0.0510	0.0874	-0.0189	1.0000		
GDP	0.0355	-0.0287	-0.0044	0.0297	0.0210	0.0231	-0.0814	1.0000	
ROE	0.0851	0.0144	0.0808	0.1315	0.8197	0.0786	0.0668	0.0045	1.0000

Source: Analysis results by STATA16.

According to Table 3, the independent variables of the model have a rather low level of pairwise correlation, which is correlated with the dependent variable CSC. However, also from the results of Table 3, the correlation coefficient of SALE with SIZE and of ROE with ROA is >0.8 , so when analyzing regression, it is necessary to pay attention to the multicollinearity test.

4.3. Regression Analysis Results

From the collected data of the research sample of 174 firms listed in Vietnam in the period 2015 - 2020, analyzed by STATA16, the results of the regression analysis are shown in Table 4.

Table 4. Regression analysis results on the impact of variables SIZE, SALE, AT, ROA, DEBT, AGE, GDP, ROE on the dependent variable CSC.

	CSC			
	Pooled OLS	FEM	REM	GLS
SIZE	0.00920**	0.00724	0.00920**	0.0132***
SALE	-0.0129***	-0.0301***	-0.0129***	-0.0179***
AT	0.00229	0.00406	0.00229	0.00442**
ROA	-0.0839***	-0.0196	-0.0839***	-0.0487
DEBT	0.120***	0.704***	0.120***	0.0870***
AGE	0.0103*	0.106***	0.0103*	0.00605*
GDP	0.305	0.392*	0.305	0.107
ROE	0.0341***	0.0152	0.0341***	0.0177*
_cons	-0.0667*	-0.384**	-0.0667*	-0.0161
N	1044	1044	1044	1044
R-square	0.092	0.363		
	Prob>F=0.0000	Prob>F=0.0000	Prob>chi2=0.0000	Prob>chi2=0.0000
	F test: Prob>F=0.0000		Hausman test: Prob>chi2=0.0000	

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: Analysis results by STATA16.

Table 4 shows the results of regression analysis by Ordinary Least Square (OLS), by fixed effects regression model (FEM), by random effects model (REM) and by GLS regression.

1. Regression results by OLS: The variables that have an impact on CSC, the correlation coefficients with statistical significance are SIZE, SALE, ROA, DEBT, AGE, ROE. The variables that are not statistically significant are AT and GDP. The results of the F test on the suitability of the model have $Prob>F=0.0000$, that is, the model is statistically significant. However, the R-square is quite low, at about 9.2%, which means that with the results estimated by OLS, the independent variables can only explain about 9.2% of the variation of CSC.
2. Regression results by FEM scale: There are some differences from regression results by OLS: The variables that have an impact on CSC, the correlation coefficients with statistical significance are SALE, DEBT, AGE, GDP; variables that are not statistically significant are SIZE, AT, ROA and ROE. In the FEM model, the GDP variable has a positive effect with CSC, the significance level $\alpha=0.1$, this result is also different from the regression results by OLS and by REM. Regarding the suitability of the model, the FEM model is also statistically significant with $Prob>F=0.0000$, the independent variables explain about 36.3% of the change of the dependent variable CSC.

The results of the F test show that the FEM regression model is more suitable than the OLS model with $Prob>F=0.0000$.

3. The regression results by REM model are similar to the regression results by OLS. $Prob>chi2=0.0000$ shows that the model has statistical significance.

Hausman-test is used to compare and choose between FEM and REM. The results show that $Prob>chi2=0.0000$ means that the FEM regression model is more suitable. However, it is necessary to continue to check the errors of the model.

The results of the error testing of the model are shown in Table 5.

Table 5. Results of testing the errors of the research model.

Errors	Results	Yes/No
Multicollinearity	VIF<8 (Mean VIF=3.11)	NO
Heteroskedasticity	$Prob>chi2=0.0000$	YES
Autocorrelation	$Prob>F=0.0000$	YES

Source: Analysis results by STATA16.

Overcoming model errors (Heteroskedasticity and Autocorrelation) by GLS regression, GLS regression results in Table 4.

Regression results by GLS: The variables SIZE, SALE, AT, DEBT, AGE, ROE have an impact on the dependent variable CSC, the correlation coefficient is statistically significant; ROA and GDP variables do not show an impact relationship

with CSC or more precisely, the correlation coefficient of these two independent variables is not statistically significant.

5. Discussion

1. Firm size (SIZE) has a positive effect on the change speed of capital structure (CSC), 1% significance level, this implies that if the asset size of the enterprise increases by 1 unit, the capital structure will change strongly by 0.0132 units. This result contrasts with the previous study by Campbell & Rogers [1]. Related to the fact, this result can be caused by the tendency to prefer to use debt to finance the capital needs of the business when increasing the scale of the business. On the other hand, larger firms may have an advantage when using debt sources, so it is easier to change the capital structure to change the debt ratio.
2. SALE revenue has the opposite effect with the change speed of capital structure, significance level 1%, this result reflects that if the revenue of the enterprise increases, the change in capital structure of the listed company will slow down. It can be explained that firms' revenue increase, they have financial resources to self-finance their operations, reducing the level of debt dependence in the capital mobilization policy. This result is consistent with the conclusion of Shah [15] that capital structure changes reflect information about firms' financial position, adds empirical evidence on the relationship between capital structure stability of firms and performance in the study of Campbell and Rogers [1].
3. Asset turnover AT fluctuates in the same direction as the change speed of capital structure, 95% confidence level. The faster a firm's assets turn around, the stronger the capital structure changes. It can be explained that when the asset turnover increases, firm's capital circulates stronger, leading to the capital demand also fluctuates more strongly. This result adds to the evidence on the relationship between performance and capital structure stability in the study Campbell & Rogers [1]. However, the experimental results of this research add to the positive relationship of ROE with capital structure change, while ROA does not show a statistically significant relationship. Obviously, the results of testing the relationship between ROE, AT and CSC using the data of listed firms in Vietnam support the research results on changes in capital structure with financial information of firms such as Shah [15] and Campbell & Roger [1].
4. Firm age (AGE) fluctuates in the same direction as the change speed of capital structure of the enterprise, the significance level is 10%. This implies that the longer firms operate, the stronger their capital structure change because the longer the operating time, the more

favorable they are in accessing different sources of capital, thus making firms easier to change the capital structure. This result supports the research of Kieschnick & Moussawi [9], which adds empirical evidence on the relationship between firm age and changes in firm capital structure.

5. Debt ratio (DEBT) has a positive effect on the speed of capital structure change, 99% confidence level, the higher the debt ratio, the faster the change in capital structure of the firms. This result is consistent with the fact that firms with a large debt ratio, having a high level of debt using, are prone to fluctuations in capital structure. The higher debt ratio, the more likely it is that the debt ratio fluctuates, even with a stronger volatility. This result is not inconsistent with previous researches on corporate capital structure.

With data of 174 listed companies in Vietnam from 2015 to 2020, ROA and GDP growth do not show an impact relationship with capital structure change, in other words, with this data and regression results, it is not enough to conclude on the relationship between ROA and GDP growth with rapid or slow capital structure change of listed firms in Vietnam. It is necessary to continue to research with a larger sample size or combine other analytical methods to evaluate and conclude. On the other hand, the macroeconomic situation is not only shown by GDP growth, there are many other variables and approaches, which will require additional and experimental studies.

6. Conclusion

Using data of 174 companies listed on Vietnam's stock market in the period of 2015 - 2020, regression analysis results have added empirical evidence on the relationship between firm size, firm age, business performance, firm capital structure status and capital structure change speed. In which, firm size, asset turnover, firm age and ROE have a positive impact on the change speed of capital structure, while revenue has a negative impact. The research results also complement previously published research on capital structure and capital structure volatility, in which the dependent variable was approached not as the debt ratio value at the point time, but as the volatility or change of the debt ratio of a period. The rapid or slow change of capital structure could be also affected by many factors inside firms and macroeconomic factors, there is a need for further research to expand and test the relationship between the factors affecting firms' capital structure, whether they explain the rapid or slow change of the debt ratio or not.

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