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Determinants influencing liquidity of pharmaceutical firms listed on the Hanoi Stock Exchange

VAN HAU NGUYEN[1], DUC TAI DO[2*], THI BICH LIEN NGUYEN[3], THI THU THUY TRAN[4]

[1]Finance and Accounting 1 Department, Posts and Telecommunications Institute of Technology, Vietnam. Email ID: haunv@ptit.edu.vn

[2*]Corresponding Author. Faculty of Accounting, University of Labor and Social Affairs, Vietnam. Email ID: taiketoanquocte@gmail.com

[3]Department of Economics, Vinh University, Vietnam. Email ID: liennguyen190882@gmail.com

[4]Department of Accounting, University of Labor and Social Affairs, Vietnam; Email ID: violetsdoll@yahoo.com

Abstract: The study investigates factors affect the liquidity of pharmaceutical firms listed on the Hanoi Stock Exchange (HNX). The study employs a set of aggregated data from 10 pharmaceutical firms listed on the HNX. The research uses both qualitative and quantitative research methods. For the quantitative research method, the supporting tool is Stata13 software. The results show that assets structure (AS) factor and Return on sales (ROS) factor have a positive impact on liquidity with two observed variables, Quick Ratio-QR and Current Ratio-CCR; Return on equity (ROE) factor negatively effects the current ratio (CCR) and quick ratio (QR); Debt ratio (DR) has a negative relationship with current ratio (CCR); the rest of factors do not affect QR, CRR. Based on the findings, some recommendations have been proposed to help the pharmaceutical firms listed on the Hanoi Stock Exchange improving better the liquidity in the future.

Keywords: liquidity, assets structure (AS), debt ratio (DR), Return on equity (ROE), Return on sales (ROS)

JEL Classification code: G30, M41, L25, G32, O16, P33

INTRODUCTION

Ensuring liquidity of a company contributes to helping enterprises maintain and strengthen their operating system to continue investing and developing to make profit in the future. On the other hand, when understanding the solvency situation, managers will have a more accurate orientation for their capital investment, reducing unfortunate risks.

The current pharmaceutical firms listed on the Vietnamese stock market are the biggest manufacturers or distributors in the pharmaceutical market of Vietnam, with annual net sales of between VND 100 and 10,000 billion. Therefore, working capital management, in

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particular the management of receivables and payables, is extremely complex and will affect the business performance of these enterprises (Bui, 2017).

Recently, the domestic and global economy has been volatile and the outbreak of Covid19 has affected the production and business of many companies, including pharmaceutical firms. In addition, the pharmaceutical industry is one of the most strongly influenced industry by state regulation.

Although banks have lowered interest rates for firms, the loan interest rates for firms are still quite high. Firms have many difficulties in mobilizing capital, managing the increasing production costs, and handling the production processes of multiple stages and dependent of a lot of input factors, etc. Therefore, many enterprises suffer from production and business difficulties in general and the liquidity problem in particular. The authors propose the questions: What factors affect the liquidity of pharmaceutical firms listed on the Hanoi Stock Exchange; and what is the degree of these factors affecting the liquidity?

This study is conducted to measure the impact of factors (i) the size of the firm (Size), (ii) the operating period of the firm (age), (iii) assets structure (AS), (iv) ROA, (v) ROE, (vi) ROS and (vii) debt ratio (DR) on the liquidity of enterprises.

This paper comprises six sections. Following this introduction is a brief synopsis of the literature on the liquidity and determinants of liquidity. The next section outlines the methodology, research results; discussions and implications; and recommendations.

THEORETICAL BACKGROUND AND LITERATURE REVIEW

The liquidity

The liquidity includes: Cash ratio (CR), Quick ratio (QR) and Current ratio. Yucel and Kurt (2002) analyzed data of 167 listed companies on the Turkish stock market over the period of 1995-2000. The research results clearly showed that the loan structure has a negative correlation with liquidity, including Cash ratio (CR) and Quick ratio (QR). Janbaz (2010) uses CR to represent the liquidity when studying the relationship between solvency and capital structure and profitability of 70 listed companies on the Iranian stock exchange during 2006-2007.

Tahir et al. (2020) used data from 63 firms from 2010 to 2018, excluding 17 outliers. To analyze the data, they used the Seemingly Unrelated Regression (SURE) model and nlcom-Stata test. The findings support the mediating role of liquidity on the link between corporate governance and performance. In addition, the results show that corporate governance improves performance. Furthermore, the study supports a significant positive association of liquidity and performance.

In Vietnam, Nguyen (2014) used the dependent variable: solvency which is represented as liquidity when studying the solvency of listed firms in Hanoi Stock Exchange. When researching the relationship of capital structure with the liquidity of the group of non-financial enterprises in Vietnam, Le (2015) stated that liquidity includes: (i) the ability to pay short-term principals, measured by the current ratio, and (ii) the ability to pay interest costs, measured by interest coverage ratio. The solvency of the enterprise according to Nguyen (2017) includes: cash ratio, quick ratio, short-term debt payment ratio (current ratio) and long-term liabilities solvency.

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Determinants of liquidity

Isshaq and Bokpin (2009) study the determinants of liquidity in Ghana. The authors collect data from 1991 to 2007 of firms listed on the Ghanaian Stock Exchange to evaluate the impact of factors: firm size, working capital, investment rate and return on assets on liquidity. The study uses a dynamic panel model, in which a lagged reliable variable is included as the explanatory variable. The independent variables selected in the model are size, return on assets and working capital, and rate of investment. The results show that size, return on assets, working capital, and the investment rate are positively correlated with the liquidity of the company.

Gill and Mathur (2011) conduct a research with a sample of 164 firms in three years from 2008 to 2010 on the Toronto stock market in Canada. The study used ANOVA Test to test Pearson's correlation, multi-collinearity, and model suitability to examine factors affecting the company's liquidity. The independent variables include size, net working capital, debt ratio, short-term debt, investment rate and industry factor, debt ratio, net working capital and investment rate. The test results indicate that size, net working capital, short-term debt, investment rate and industry factor are positively related to the liquidity of the company. The variables that have a negative relationship with firms' liquidity are debt ratio, net working capital and investment rate.

In addition to international studies, domestic studies on factors affecting the liquidity of enterprises are also quite diverse, typically:

Nguyen (2014) uses secondary data from audited financial statements of firms listed on Hanoi Stock Exchange (HNX). The data used in the study is deprived of the financial statements from 2007 to 2013 of 620 firms listed on the stock market. The authors use the Forward Stepwise method, multi-collinearity test to examine the correlation between variables. Models that are built and tested in research to find the best model for the selected data and variables are: (1) Ordinary Least Squares (OLS); (2) Fixed Effect (FEM); (3) Random Effect (REM); (4) Weighted Least-Squares, etc. The independent variables are the price-to-book ratio of a security (P/B), the price-to-earnings of a share (P/E), rate of return on total assets (ROA), debt ratio, net cash flow rate, working capital ratio. Research results show that: the net working capital ratio and the P/B ratio have the strongest influence on the liquidity of listed firms in the period of 2007-2013. The factors of P/E ratio and net cash flow ratio also have the positive effect on firms' liquidity; and the ratio of debt and return on total assets are negatively correlated to liquidity.

Le (2015) studies the relationship between capital structure and liquidity of non-financial enterprises in Vietnam. The research sample is 230 listed firms in the period 2010 – 2013. Data is accessed from audited financial statements. The author performs regression analysis method in the study. The research results show that the level of debt in the capital structure has a significant negative impact on the ability of settling short-term debt and interest expenses. The research results suggest that liquidity is a binding condition for enterprises when making capital structure decisions.

Tran (2017) with the research scope of enterprises in food manufacturing industry, the author states that capital structure is one of the most important concerns in corporate financial management. The basic goal of enterprises is to have high profitability with strong liquidity.

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The author has analyzed the impact of capital structure (debt ratio) on profitability and liquidity of food manufacturing enterprises, thereby drawing some suggestions financial management strategies for enterprises in the industry. Research results have indicated that the profitability, liquidity and debt ratio of enterprises in the 2010 - 2016 period have a significant negative relationship.

In studies of listed pharmaceutical firms, Bui (2017) said that: Working capital management plays an important role for each enterprise, because it helps dormant capital investment be invested effectively, ensuring liquidity as well as affecting the business performance. The author presents the survey results on current working capital management of 14 pharmaceutical firms listed on Vietnam's stock market. Since then, some recommendations are given to improve working capital management in order to improve the efficiency of these listed pharmaceutical firms in particular and of Vietnamese pharmaceutical firms in general.

Dang (2020) used robust regression techniques in the fixed effects linear panel data using data collected from companies listing on the stock market in Vietnam during 2008-2019, with a total of 6,700 observations. Liquidity of Vietnamese listed enterprises is measured by current assets to current liabilities, whereas firm size, capital adequacy, profitability, leverage are used as internal determinants. Further, economic activity, inflation rate, exchange rate, and interest rate are the external factors which are considered. The research results indicate that capital adequacy, return on equity, leverage, economic activity have a positive effect on firm's liquidity, whereas return on assets and exchange rate have a negative effect on firm's liquidity and firm size, inflation rate and lending rate have no correlation with firm's liquidity.

Vu et al. (2020) examined the factors that affect firm's liquidity in manufacturing companies listed in Vietnam. Factors studied include the board size, the board independence, the firm size, the firm age, and its return. They used different metrics to measure firm's solvency status, including the cash ratio, the quick ratio, and the cash conversion cycle. Accordingly, three econometric models are built to test hypotheses proposed by researchers in order to explain the relationship between the five factors above and liquidity's measures. The study used the data set of manufacturing companies listed on the Ho Chi Minh City Stock Exchange in the period from 2015 to 2019. The final sample group comprises 139 firms with 633 observations. The results show that in manufacturing firms, while the cash ratio and the quick ratio are positively associated to the board size, the board independence, and the firm's profitability, the net operating cycle is negatively correlated to the board size, the firm size, the board independence, and the profitability.

Thus, it can be seen that there are many different studies on determinants of firms' liquidity in the world and in Vietnam. Most of studies focus on the firm-specific characteristics. However, there are few studies for a specific industry where each industry has their own characteristics. On the other hand, the study period was not long, the variables put into the regression model were not comprehensive; and the far-reaching impact of international economic integration has not been as strong and profound as at present. Therefore, this study focuses on the surveyed object of Pharmaceutical firms listed on the Hanoi Stock Exchange with a specific sample size, updated research period, and some factors included in the model will be more diverse and comprehensive.

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METHODOLOGY

Qualitative method of the research

We use the techniques of synthesis, analysis, comparison and revision to evaluate the factors affecting the liquidity of pharmaceutical firms listed on HNX. In addition to collecting previous studies' results, we interviewed experts who are leading lecturers in finance and accounting; chief accountants and financial directors at pharmaceutical firms. In order to facilitate the collection of data for the research, the interviewees were contacted and arranged in advance. The interview was about 30-minute length; the interviewing location was chosen to suit interviewees. Interview contents are prepared in advance and will be recorded. After each interview, experts' opinions will be added to make the research data more complete. Only when there is no new opinion, be the last interviewee added to the collected data.

The qualitative research method orients and refines the research results of previous studies. By combining with experts' opinions, from there, this research will inherit and apply those outcomes.

Quantitative research methods

Quantitative research method is based on tabular data, using Stata 13 software. The implementation steps include: Descriptive Statistics, Correlation Analysis, Scale Regression Modeling, Regression Model Appropriateness.

Data collection and research sample

In this study, the data collected by the authors is mainly secondary data, collected from reputable websites (https://finance.vietstock.vn/, http: // cafef.vn/), from some data service firms and from fully audited annual financial statements of pharmaceutical firms listed on the Hanoi Stock Exchange (HNX) during the period of 5 years from 2015 to 2019. In addition, the authors also refer to many other sources such as past domestic and international studies, economic papers, economic research analyses of forums and firms and so on.

The sample takes into account 10 pharmaceutical firms listed at cophieu68.vn/, corresponding to 50 observations for each observed variable of the dependent variable and independent variable (10 enterprises in 5 years). Thus, 5 (five) independent variables with 7 (seven) observations, the total number of observations of the study sample is 350.

Research model

Inheriting previous studies and the opinions of interviewed experts, we build the research model as follows:

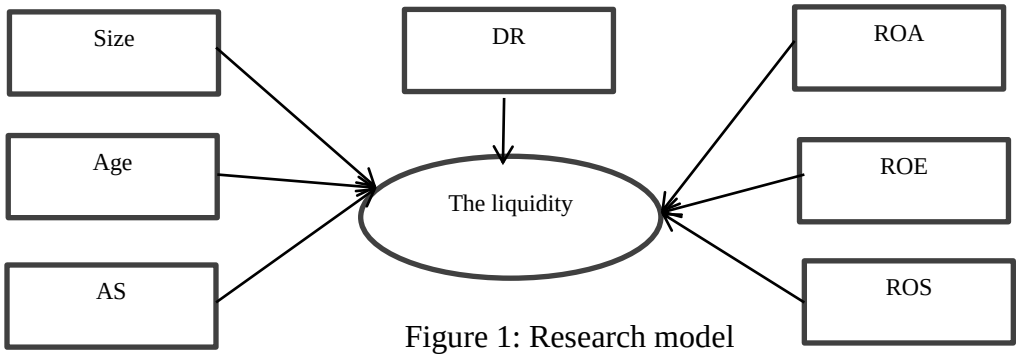

Figure 1: Research model

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Describe the independent variable and dependent variable (see table 1).

Table 1: Measurement scales

Code	Description	Sources
Describe the independent variable		
Size	The size of the firm	Bruinshoofd and Kool (2004), Isshaq et al. (2009), Gill and Mathur (2011), Thai (2018), Opler et al. (1999), Ferreira and Vilela (2004)
Age	The operating period of the firm	The authors propose based on theory and opinion of interviewed experts
AS	Assets structure	Bruinshoofd and Kool (2004)
ROA	Return on total assets	Isshaq et al. (2009), Bruinshoofd and Kool (2004), Nguyen (2014)
ROE	Return on equity	Vu (2015), Thai (2018)
ROS	Return on sales	The authors propose based on theory and opinion of interviewed experts
DR	Debt ratio	Ferreira and Vilela (2004), Gill and Mathur (2011), Nguyen (2014), Le (2015), Tran (2017)
Describe the dependent variable		
S1	Quick Ratio-QR	Lyroudi and Lazaridis (2000), Yucel and Kurt (2002), Nguyen (2017)
S2	Current Ratio-CCR	Lyroudi and Lazaridis (2000), Le (2015), Nguyen (2017)

RESEARCH RESULTS

Descriptive statistics results

Table 2: General descriptive statistics and detail descriptive statistics

General descriptive statistics (Summarize)					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Dependent variable					
QR	50	1.5526	1.996068	.36	12.79
CCR	50	2.269	2.071627	.89	13.33
Independent variable					
Size	50	431615.7	419367.3	8055	2042235
Age	50	35.2	12.13697	13	57
AS	50	.658036	.1970847	.1752	.9207
DR	50	.453106	.1802168	.0922	.7472
ROA	50	.10337	.097545	-.0736	.4032
ROE	50	.170616	.1278006	-.2081	.4901
ROS	50	.086278	.1190089	-.0812	.5448

Detail descriptive statistics (Tabstat statistics)		
Dependent variable		
stats	**QR**	**CCR**
N	50	50
sum	77.63	113.45
range	12.43	12.44
variance	3.984289	4.291638
cv	1.28563	.9130132
skewness	3.896845	3.430451
kurtosis	21.38518	17.5823

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p50	.73			1.55			
Independent variable							
stats	**Size**	**Age**	**AS**	**DR**	**ROA**	**ROE**	**ROS**
N	50	50	50	50	50	50	50
sum	2.16e+07	1760	32.9018	22.6553	5.1685	8.5308	4.3139
range	2034180	44	.7455	.655	.4768	.6982	.626
variance	1.76e+11	147.3061	.0388424	.0324781	.009515	.016333	.0141631
cv	.971622	.3448004	.2995045	.3977366	.943649	.7490538	1.379366
skewness	2.098786	.1303996	-.5022544	-.4297494	1.142043	-.0105636	2.517979
kurtosis	7.576482	2.135586	2.06786	2.050289	4.05802	3.824129	9.487859
p50	339298.5	34.5	.7084	.46255	.0768	.15365	.0483

Sources: The authors synthesize and software Stata 13

Table 2 shows: The dependent variable includes 2 observed variables; the independent variable includes 7 observed variables; each observed variable is described by 50 observations. Basic indicators such as mean, maximum value (max), minimum value (min), standard deviation (sd), variance, skewness, kurtosis, distribution degree (p50), sum, range, coefficient of variation (cv) of each observed variable has been identified and these basic indicators reflect the true state of liquidity of pharmaceutical firms listed on the HNX.

Correlation analysis results

Table 3: Correlation analysis results of Independent variable

Correlate Size Age AS DR ROA ROE ROS
(Obs=50)

	Size	Age	AS	DR	ROA	ROE	ROS
Size	1.0000						
Age	0.4366	1.0000					
AS	0.4852	0.0731	1.0000				
DR	0.2627	0.2357	-0.0227	1.0000			
ROA	0.1675	-0.0007	0.2039	-0.7807	1.0000		
ROE	0.4267	0.2154	0.3499	-0.5207	0.9061	1.0000	
ROS	-0.0466	-0.2807	0.0220	-0.7398	0.7812	0.6124	1.0000

Sources: The authors synthesize and software Stata 13

Table 3 shows the results of correlation analysis, also known as multicollinearity analysis. The results present that all the absolute value of each correlation coefficient between 2 independent variables are less than 0.8, except for that of the two independent variables ROA and ROE with the correlation coefficient of 0.961. Therefore, the multicollinearity phenomenon occurs between the two variables ROA and ROE, the remaining pair of independent variables do not suffer from multicollinearity. Thus, the independent variable ROA will be excluded from the regression model (Bryman and Cramer, 2001). The regression model then has 6 independent variables with 6 observed variables and 1 dependent variable with 2 observed variables.

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Regression results and robustness test

Ordinary Least Squares regression model (OLS)

Table 4: OLS regression results

Regress QR Size Age AS DR ROE ROS

Source	SS	df	MS	Number of obs = 50
				F(6, 43) = 50.19
Model	170.835959	6	28.4726598	Prob > F = 0.0000
Residual	24.3942034	43	.567307057	R-squared = 0.8750
				Adj R-squared = 0.8576
Total	195.230162	49	3.98428902	Root MSE = .7532

QR	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Size	-2.40e-07	4.03e-07	-0.60	0.555	-1.05e-06	5.73e-07
Age	-.0137297	.0113827	-1.21	0.234	-.036685	.0092257
AS	3.68286	.6683171	5.51	0.000	2.335071	5.03065
DR	-1.580772	1.05072	-1.50	0.140	-3.699751	.5382074
ROE	-6.665019	1.555535	-4.28	0.000	-9.802054	-3.527984
ROS	15.98607	1.639983	9.75	0.000	12.67873	19.29341
_cons	.1902075	.8482213	0.22	0.824	-1.520394	1.900809

Regress CCR Size Age AS DR ROE ROS

Source	SS	df	MS	Number of obs = 50
				F(6, 43) = 45.20
Model	181.508845	6	30.2514741	Prob > F = 0.0000
Residual	28.7814054	43	.66933501	R-squared = 0.8631
				Adj R-squared = 0.8440
Total	210.29025	49	4.29163776	Root MSE = .81813

CCR	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Size	3.33e-08	4.38e-07	0.08	0.940	-8.50e-07	9.17e-07
Age	-.013989	.012364	-1.13	0.264	-.0389233	.0109453
AS	4.185112	.7259308	5.77	0.000	2.721133	5.649091
DR	-3.492934	1.1413	-3.06	0.004	-5.794584	-1.191284
ROE	-6.398243	1.689633	-3.79	0.000	-9.805713	-2.990773
ROS	13.88506	1.781362	7.79	0.000	10.2926	17.47752
_cons	1.469405	.9213441	1.59	0.118	-.3886627	3.327472

Sources: The authors synthesize and software Stata 13

With 95% of confidence degree, table 4 shows:

For QR: F = 50.19 > 1.96 and Prob>F = 0.0000 < 0.05: Thus the model is consistent and statistically significant (Bryman & Cramer, 2001).

R-Squared = 0.8750 means that the independent variables of the research model can explain 87.5% of the influence of independent variables on the dependent variable. Therefore, the research results are temporarily accepted, but still need to be tested the suitability of the model (Bryman & Cramer, 2001).

For CCR: F = 45.2 > 1.96 and Prob>F = 0.0000 < 0.05: Thus the model is consistent and statistically significant (Bryman & Cramer, 2001).

R-Squared = 0.8631 means that the independent variables of the research model can explain 86.31% of the influence of independent variables on the dependent variable. Therefore, the research results are temporarily accepted, but still need to be tested the suitability of the model (Bryman & Cramer, 2001).

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Evaluate and test the autocorrelation by VIF coefficient

Table 5: Result of the autocorrelation by VIF coefficient (estat vif)

Variable	VIF	1/VIF
ROE	3.41	0.292952
ROS	3.29	0.303937
DR	3.10	0.322892
Size	2.47	0.404819
Age	1.65	0.606613
AS	1.50	0.667346
Mean VIF	2.57	

Sources: The authors synthesize and software Stata 13

Table 5 shows that there are two observed variables of two independent variables with VIF coefficient less than 2, so it can be confirmed that these two independent variables are not autocorrelated to each other; 5 observed variables of the five independent variables all have VIF coefficient in the range 2 <VIF <5; therefore, it can be concluded that no autocorrelation occurs (Bryman & Cramer, 2001).

Evaluation of residual phenomenon (heteroskedasticity)

Table 6: Results of heteroskedascity (estat hottest)

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity Ho: Constant variance Variables: fitted values of QR chi2(1) = 46.44 Prob > chi2 = 0.0000	Breusch-Pagan / Cook-Weisberg test for heteroskedasticity Ho: Constant variance Variables: fitted values of CCR chi2(1) = 46.02 Prob > chi2 = 0.0000

Sources: The authors synthesize and software Stata 13

Table 6 presents that Prob> chi2 = 0.0000 <0.05; thus, there is a phenomenon of heteroskedascity which means that the model is not suitable with the input data yet. Therefore, it is necessary to use another model at a higher level (Bryman & Cramer, 2001). The higher-level models are the fixed-effect factors (FEM) regression model and the random-effect factors (REM) model.

FEM model

Table 7: FEM model with the observed variable

```
Xtreg QR Size Age AS DR ROE ROS, fe

Fixed-effects (within) regression               Number of obs      =        50
Group variable: ID                              Number of groups   =        10

R-sq:  within  = 0.9134                         Obs per group: min =         5
       between = 0.4858                                        avg =       5.0
       overall = 0.6037                                        max =         5
                                                F(6,34)           =     59.75
corr(u_i, Xb)  = -0.5732                        Prob > F          =    0.0000
```

QR	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Size	2.74e-09	6.04e-07	0.00	0.996	-1.22e-06	1.23e-06
Age	-.0627772	.0665478	-0.94	0.352	-.1980186	.0724642
AS	9.507153	.9021329	10.54	0.000	7.673799	11.34051
DR	-2.79133	1.611386	-1.73	0.092	-6.066061	.4834005
ROE	-5.471317	1.147758	-4.77	0.000	-7.803843	-3.138791

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ROS	10.04367	1.613946	6.22	0.000	6.76374	13.32361
_cons	-1.163159	2.668804	-0.44	0.666	-6.586821	4.260503
sigma_u	1.5226213					
sigma_e	.4637714					
rho	.91510268	(fraction of variance due to u_i)				

F test that all u_i=0: F(9, 34) = 9.25 Prob > F = 0.0000

Xtreg CCR Size Age AS DR ROE ROS, fe

Fixed-effects (within) regression — Number of obs = 50
Group variable: ID — Number of groups = 10

R-sq: within = 0.8908 — Obs per group: min = 5
between = 0.5079 — avg = 5.0
overall = 0.6251 — max = 5
F(6,34) = 46.23
corr(u_i, Xb) = -0.4620 — Prob > F = 0.0000

CCR	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
Size	-1.16e-07	6.85e-07	-0.17	0.867	-1.51e-06	1.28e-06
Age	-.0322018	.0754905	-0.43	0.672	-.1856168	.1212133
AS	9.792678	1.023361	9.57	0.000	7.712959	11.8724
DR	-3.548765	1.827923	-1.94	0.061	-7.263551	.1660209
ROE	-5.562846	1.301993	-4.27	0.000	-8.208815	-2.916878
ROS	9.080615	1.830826	4.96	0.000	5.359928	12.8013
_cons	-1.21795	3.027436	-0.40	0.690	-7.370439	4.934539
sigma_u	1.4006574					
sigma_e	.52609258					
rho	.87636397	(fraction of variance due to u_i)				

F test that all u_i=0: F(9, 34) = 8.12 Prob > F = 0.0000

Sources: The authors synthesize and software Stata 13

REM model

Table 8: REM model with the observed variable

xtreg QR Size Age AS DR ROE ROS, re

Random-effects GLS regression — Number of obs = 50
Group variable: ID — Number of groups = 10

R-sq: within = 0.8111 — Obs per group: min = 5
between = 0.9199 — avg = 5.0
overall = 0.8719 — max = 5
Wald chi2(6) = 264.26
corr(u_i, X) = 0 (assumed) — Prob > chi2 = 0.0000

QR	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Size	-4.39e-07	4.22e-07	-1.04	0.297	-1.27e-06	3.87e-07
Age	-.013664	.0127026	-1.08	0.282	-.0385606	.0112326
AS	4.236333	.7065679	6.00	0.000	2.851485	5.62118
DR	-1.449488	1.103068	-1.31	0.189	-3.611462	.7124858
ROE	-6.600216	1.489245	-4.43	0.000	-9.519083	-3.681348
ROS	15.55715	1.648936	9.43	0.000	12.3253	18.789
_cons	-.1238057	.8777994	-0.14	0.888	-1.844261	1.596649
sigma_u	.15393866					
sigma_e	.4637714					

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rho	.09924202	(fraction of variance due to u_i)

xtreg CCR Size Age AS DR ROE ROS, re

Random-effects GLS regression — Number of obs = 50
Group variable: ID — Number of groups = 10

R-sq: within = 0.7742 — Obs per group: min = 5
between = 0.9253 — avg = 5.0
overall = 0.8626 — max = 5
Wald chi2(6) = 255.71
corr(u_i, X) = 0 (assumed) — Prob > chi2 = 0.0000

CCR	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Size	-6.24e-08	4.45e-07	-0.14	0.888	-9.35e-07	8.10e-07
Age	-.0135404	.0128726	-1.05	0.293	-.0387703	.0116894
AS	4.427366	.7410083	5.97	0.000	2.975016	5.879715
DR	-3.401056	1.16049	-2.93	0.003	-5.675574	-1.126537
ROE	-6.430262	1.656749	-3.88	0.000	-9.677432	-3.183093
ROS	13.79762	1.781781	7.74	0.000	10.30539	17.28985
_cons	1.306912	.9316519	1.40	0.161	-.5190919	3.132916
sigma_u	.10331719					
sigma_e	.52609258					
rho	.03713523	(fraction of variance due to u_i)				

Sources: The authors synthesize and software Stata 13

Hausman test is employed to choose the optimal model between the two models FEM and REM.

Table 9: Results comparing FEM and REM models

---- Coefficients ----

	(b) FEMQR	(B) REMQR	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
Size	2.74e-09	-4.39e-07	4.42e-07	4.32e-07
Age	-.0627772	-.013664	-.0491132	.0653242
AS	9.507153	4.236333	5.270821	.5608972
DR	-2.79133	-1.449488	-1.341842	1.174652
ROE	-5.471317	-6.600216	1.128899	
ROS	10.04367	15.55715	-5.513478	

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic
chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 82.49
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)

---- Coefficients ----

	(b) FEMCCR	(B) REMCCR	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
Size	-1.16e-07	-6.24e-08	-5.31e-08	5.20e-07
Age	-.0322018	-.0135404	-.0186614	.0743848
AS	9.792678	4.427366	5.365312	.7058143
DR	-3.548765	-3.401056	-.1477094	1.412291
ROE	-5.562846	-6.430262	.8674163	
ROS	9.080615	13.79762	-4.717005	.42093

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

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chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 57.58
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)

Sources: The authors synthesize and software Stata 13

Table 9 shows that, H0: difference in coefficients not systematic, which means that there is no difference between the two models FEM and REM, so the REM model is chosen (Bryman & Cramer, 2001). However, it is necessary to verify the heteroskedascity with the estate hottest test. Before performing this test, we run the REM model of the observed QR and CCR variable again to comply with the Stata software browser requirement.

Table 10: Results of the estat hottest test of the observed variable

Breusch and Pagan Lagrangian multiplier test for random effects
QR[ID,t] = Xb + u[ID] + e[ID,t]
Estimated results:

	Var	sd = sqrt(Var)
QR	3.984289	1.996068
e	.2150839	.4637714
u	.0236971	.1539387

Test: Var(u) = 0
chibar2(01) = 0.29
Prob > chibar2 = 0.2956

CCR[ID,t] = Xb + u[ID] + e[ID,t]
Estimated results:

	Var	sd = sqrt(Var)
CCR	4.291638	2.071627
e	.2767734	.5260926
u	.0106744	.1033172

Test: Var(u) = 0
chibar2(01) = 0.96
Prob > chibar2 = 0.1631

Sources: The authors synthesize and software Stata 13

Table 10 shows: Prob > chibar2 > 0.05; conclusion, there is no heteroskedascity, or the model is consistent with input data (Bryman & Cramer, 2001). Thus, with the observed variable of QR and CCR, the REM model is suitable.

Based on Table 8, column p> |z| and column Coef, with a significance level of 95%,

The regression equation of factors affecting QR is as follows:

QR = 4.236333 x AS - 6.600216 x ROE + 15.55715 x ROS

The regression equation of factors affecting CCR is as follows:

CCR = 4.427366 x AS – 3.401056 x DR – 6.430262 x ROE + 13.79762 x ROS

Conclusion: AS and ROS have the positive effect on QR while ROE has an opposite effect on QR, the rest of factors do not affect QR; AS and ROS have the positive effect on CRR while DR, ROE has an opposite effect on CRR, the rest of factors do not affect CRR.

DISCUSSIONS AND IMPLICATIONS

Assets structure (AS)

Asset structure (AS) has a positive impact on liquidity with two observed variables, QR and CCR. In the research scope of this topic, the asset structure is determined by the ratio of total short-term assets to total assets. Therefore, when the short-term assets increase, the quick ratio

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and the current ratio of an enterprise also increase, because these debts are guaranteed to be paid by short-term assets. In the current period, especially when the Covid 19 epidemic has broken out and persisted, the economy slowed down and experienced several changes. Although the economy has been gradually recovering, most of industries in the Vietnamese economy has been affected in particular and that of the world in general. Pharmaceutical sector is one of the highly specific industries which covers the actitivities of drugs pharmaceutical products supplying to treat diseases, to improve human health. Now the industry is also affected by the gloomy economy although the impact is not too heavy as some of other industries. The firm performance, the average revenue and profit of the whole industry are in moderate level. At that time, short-term assets are guaranteed and tend to increase, so the asset structure increases. Debts are guaranteed to be paid on time. By ensuring the repayment of short-term debts, businesses not only improve their financial reputation but also maintain good liquidity.

Return on sales ratio

Return on revenue (ROS) has a positive impact on liquidity with two observed variables of QR and CRR. The reason that ROS has a clear impact on QR and CCR is because that an increase in ROS can prove the optimal cost management of the company, which indicates the good performance of that firm. At the same time, it can be seen that when the costs decrease, firms will cut their cash spending, which makes QR and CRR increase.

Debt ratio (DR)

Debt ratio (DR) has a negative relationship with current ratio (CCR). The results of this study are also confirmed in the studies of Ferreira and Vilela (2004) and Gill and Mathur (2011), which showed a negative impact of debt ratio on liquidity. When the debt ratio increases, it means that the higher level of debts the enterprise is borrowing, which lead the firm to face a gradual loss of financial autonomy, thereby reducing their liquidity. When an enterprise cannot guarantee repayment of its debts, an enterprise will lose credibility with its suppliers and customers. In contrast, when enterprises maintain a moderate level of debt, they can both take advantage of the loan capital and ensure liquidity in order to build prestige in the market and attract more investors and lending institutions.

Return on equity ratio (ROE)

Return on equity (ROE) negatively effects the current ratio (CCR) and quick ratio (QR). When enterprises maintain low liquidity, it means that they are taking advantage of debts for investment, production and business activities to obtain profits. When the level of debt increases, equity will decrease. Along with taking advantage of loans to invest, costs of capital will be lower, leading to the higher profit of the enterprise, thereby the company will present a higher ROE. Thereby, it is reasonable that ROE has a negative impact on liquidity. Because when the enterprise uses more debt for short-term debts and short-term debts, even if it is used to invest and make profits, they must pay off immediately. This can put the enterprise under the pressure to repay their loans. Meanwhile, short-term assets for investment are unable to immediately recover to ensure the payment of short-term debts which require a quick repayment. Therefore, it accidentally reduces the liquidity of the firm.

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RECOMMENDATIONS

For assets structure

The pharmaceutical firms listed on the HNX need to perfect the appropriate asset structure to improve business performance to the fullest extent possible in use. Reasonable asset structure is one in which short-term assets account for a suitable proportion to meet the normal production and business process which is not redundant or lack and exploited to gain its maximum profit. The excess in short-term assets will lead to stagnation, while the insufficience can lead the production and business process to be delayed. Both of these cases can reduce the efficiency of the enterprise's use of assets. In order to implement and gradually improve the asset structure, an enterprise can: In each period, it is necessary to make a plan of cash holdings; keep the proportion of inventories at a moderate level to meet the needs of production, make a strict decision of assets using, plan an asset investment reasonably; measure the risk before investing, because the higher the profit, the greater the risk; receivables need to be as small as possible and be maintained in control. From there, firms can improve the efficiency of assets and ensure to the liquidity for firms.

For ROE, ROS

Enterprises in the industry also need to pay attention to improve its business performance (profitability of enterprises), because this is one of the most important factors that have a two-side impact on liquidity. In order to improve the efficiency of production and business, enterprises need to perfect some following processes: strict capital resources management, a reasonable plan of investing in new assets, customers' needs research, new products advertisements in order to build a new number of customers in its new-entering products. The firm needs to maintain production of orders, of old products that have been affirmed with quality and position; look for new partners, new customers; improve the skills of workers, enhance the quality of human resources.

Pharmaceutical firms need to modernize their technology in production and business. Under the pressure of price competition between similar products in the same industry of domestic and foreign competitors, reducing input costs while maintaining the quality is a big concern of enterprises. In the era of rapid science and technology development, the industrial revolution 4.0 is taking place and its applications in the production of the pharmaceutical industry are becoming more and more popular in the world. Of course, Vietnamese pharmaceutical firms in Vietnam can not stand out of the innovation; especially by the production of vaccines against pandemic Covid 19. Pharmaceutical firms need to promote investment in innovation of modern machinery and equipment, in order to improve their product quality, which is a regular and long-term job of each enterprise. By prioritizing investments in new machinery, equipment and technologies with prices that are suitable to the financial capacity of each enterprise, firms can achieve high profitability of production and business and also to minimize the cost of purchasing raw materials. Firms can also take advantage of the available resources of the firm. From there, businesses will get a great source of income; improve the position and brand of enterprises, shorten the debt collection period to bring advantages in liquidity for firms. In addition to investing in new modern equipment, pharmaceutical firms need to transfer the technology process and the technology using instruction of those modern equipment to avoid the situation of inappropriate using, causing serious consequences.

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For Debt ratio (DR)

Pharmaceutical enterprises need to improve and increase the efficiency of debt use. Debts of enterprises include both short-term debt and long-term debt. The debt ratio helps investors to have an overview of the financial strength, financial structure of a firm and how the company can pay for its activities. The problem of all pharmaceutical firms is that how to use debt optimally. Therefore, enterprises need to estimate their business needs, calculate breakeven revenue and complete information about credit risk score calculation, lending interest rate, ability to access commercial credit, and so on. Then firms can calculate the appropriate debt ratio. In practice, a reasonable capital structure is only determined in a certain period of time and it is therefore difficult to determine the general optimal capital structure for all firms. However, the above steps that help firms to identify when to increase or decrease their debt ratio to achieve the highest efficiency also is an effective method for pharmaceutical firms listed on HNX.

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