

Working Capital Requirements Determinants - Case of Listed Plastic Firms in Vietnam

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Abstract

Our paper explores determinants of plastic firms' working capital requirements (WCR). The study used panel data obtained from 37 listed plastic firms on Vietnamese stock exchange for the period 2016-2020. Different estimation methods were employed to test all the hypothesis, namely, pooled OLS, FEM, REM, SGMM and Quantile regression. The research result shows that the internal factors such as: receivables, cash, inventory, revenue growth, return on total assets, operating cycle have a statistically significant positive relationship with the working capital requirements of plastic companies while accounts payable, firm size have a statistically significant negative relationship with the former. In terms of external factors, inflation has a statistically significant positive relationship with WCR while changes in exchange rate have a negative correlation (significantly) with that of listed plastic companies.

Keywords

Determinants, Working Capital Requirements, Plastic Firms, Vietnam.

JEL codes: G3.

Introduction

WCR performs a pivotal role in the business performance of enterprises; as a result, it is always a matter of special concern to managers. The importance of working capital is reflected in its impact on a company's profitability, risk and, therefore, its value (Smith, 1980). Identifying factors affecting the WCR helps the managers to ensure the appropriate working capital level for their business activities.

As an essential industry in the economy, the plastic industry produces a variety of items. Plastic makes a great contribution to social life as well as the development of other fields. Vietnam's plastic industry has a relatively fast growth rate and the number of firms and the scale of firms in this industry is increasing. As a result, competition in this field is fierce. The increasingly fierce competition in the plastic industry has required firms to focus on working capital management. Thus, in order to improve firms' profitability, managers need to know what are WCR determinants. However, to date, no research on this issue has been conducted for plastic companies in Vietnam. Therefore, there is a research gap. The main goal of the study is to identify factors affecting WCR at listed plastic firms in Vietnam. It is expected that the results of this study will be useful for managers to have better working capital management.

Literature Review

Many researchers have studied in different aspects of working capital management. Among these studies, many researchers conduct theoretical and empirical researches on the determinants of working capital requirements. Various determinants associated with the specific characteristics of the enterprise and economic conditions have been discovered through experimental studies such as cash flow, financial leverage, business size, age of the enterprise, total assets, GDP, interest rates.... Here is a summary of some prominent studies:

Olayinka Olufisayo Akinlo (2012) studied that FL-financial leverage negatively affect working capital requirements.

Suleiman et al (2013) studied that ROA and cash conversion cycle, have positive relationship with WCR.

Joseph et al (2018) empirically investigated 28 companies listed were used over an 8-year period, spanning from 2007 to 2014. The authors used dynamic model and SGMM to test hypotheses. According to the research results, the firm age, operating cycle and profitability have positive impact on working capital requirements. GDP growth, revenue growth and leverage ratio negatively impact on working capital demand. Dinh Tran Ngoc Huy et al (2020) mentioned net working capital (NWC) in Waste Tire Pyrolysis Project. Nguyen Dinh Trung et al (2020) also stated quality management for input materials is needed when estimating NWC, and confirmed by Ngo Chi Thanh et al (2020). And bank roles in financing are important also (NN Thach, DTN Huy, 2021; Hac, L.D et al, 2021; Huy, D.T.N., Loan, B.T.T., Anh, P.T., 2020; Huy, D.T.N, 2015; Hanh, H.T., Huy, D.T.N., 2021;

Nguyen Thi Ngoc Lan et al, 2021; ND Trung et al, 2021; DTN Huy, 2012; DT Ngu et al, 2021) while Le, K., & Nguyen, M. (2021) mentioned aspects of critical education.

Damot et al (2019) tested the impact of factors on working capital requirements of 35 companies Addis Ababa's food and beverage company using a quantitative approach to research. For research purposes, financial statements of enterprises in 5 years collected. They find significant positive relationship between net WCR and cash conversion cycle.

In previous studies, the determinants affecting the net working capital of enterprises include both internal and external factors. Regarding internal factors, the WCR of firms depend on the needs of the parts constituting the working capital of firms such as: cash, inventory, receivables, payables as well as other factors associated with business characteristics of the enterprise such as: business size, financial leverage, revenue growth, level of investment in fixed assets, cash flow from business activities, seasonality in business activities, firm age, the credit rating. In addition, the characteristics related to corporate governance also affect the WCR of the business. Regarding external factors, working capital requirements of enterprises are also influenced by important macro factors such as GDP, inflation, exchange rate and other factors.

Methodology

1. Hypotheses and Panel Data Model

In order to study the determinants of working capital requirements, the authors have proposed the following hypotheses:

In WCR, cash, inventory, and receivables are the most important parts that determine the working capital requirement. Accordingly, the following hypotheses are proposed:

H₁: Cash has significantly affect working capital requirements.

H₂: Inventories has significantly affect working capital requirements.

H₃: Accounts Receivable has significantly affect working capital requirements.

H₄: Accounts payable has significantly affect working capital requirements.

* The relationship between debt ratio and working capital needs of enterprises:

According to the arguments of Wasiuzzaman and Arumugam (2013) explained that it is more expensive to use external funding than it is to use the equity. The following hypothesis is proposed:

H₅: Debt ratio has significantly affect working capital requirements

* The relationship between business size and working capital needs:

According to Kieschnick (2006), large-sized firms will require greater investment in working capital due to higher turnover and larger scale of operations. The following hypothesis is proposed:

H₆: Firm size has significantly affect working capital requirements.

* The relationship between revenue growth and working capital needs:

Companies can accumulate inventory when they predict future sales growth (Nwankwo and Osho, 2010). From that, the following hypothesis is proposed:

H₇: Sale growth has significantly affect working capital requirements.

* The relationship between profitability and working capital needs:

According to the pecking order theory (Myers & Majluf, 1984), there exists an negative relationship between profitability and expected working capital requirement. Enterprises with huge profits are likely to invest those profits back into long-term positive net present value projects. In contrast, Nazir (2009) argued that more profitable enterprises are more concerned with effective working capital management, so they have higher level of working capital. Most of the empirical researches has confirmed a statistically significant positive relationship between profitability and working capital (Onoalapo and Kajola, 2015). However, some studies have also found a negative relationship between profitability and working capital requirements (Fatimatuzzahra & Kusumastuti, 2016). Therefore, the following hypothesis is proposed:

H₈: ROA has significantly affect working capital requirements.

*The relationship between Operating cash flows and firms' working capital requirement.

Hill et al. (2010) stated that enterprises with high cash flow from operating activities can pursue flexible capital investment policy as can use internal resources at a lower cost than using external funding. On the contrary, businesses with low and negative cash flow from operating activities need financial sources from additional sources to invest in working

capital. Therefore, these companies face difficulties in capital investment (Mathuva, 2013). Therefore, the following hypothesis is proposed:

H₉: Operating cash flow has significantly affect working capital requirements.

* The relationship between the operating cycle and firms' working capital requirement:

Theoretically, the longer a business takes to collect debt or sell off its inventory, the higher the working capital requirement of the business is. Many empirical studies have confirmed this argument such as the study of Onaolapo & Kajola (2015). Therefore, the following hypothesis is proposed:

H₁₀: Operating cycle has significantly affect working capital requirements.

* The relationship between gross domestic product growth and firms' working capital needs.

Chiou et al. (2006) argued that firms face challenges in accelerating inventory turnover and receivables collection during recessions, so that investment in working capital can be maintained at a high level to ensure that business operations take place without interruption. On the contrary, during a period of good economic growth, enterprises expand their business activities, so the demand for working capital in this period also increases. Besides, Wasiuzzaman and Arumugam (2013) said that when the economy is growing well, businesses have the opportunity to access finance more easily, so they can reduce the level of working capital. In contrast, during a macroeconomic downturn, the cash supply is relatively tight and as a result, companies try to extract cash from wherever possible and shorten their cash conversion cycle. On the contrary, enterprises will choose secure working capital management policy during the period of negative GDP growth. Therefore, the following hypothesis is proposed:

H₁₁: GDP has significantly affect working capital requirements.

* The relationship between inflation and working capital needs of enterprises.

This is one of the important macro factors affecting the working capital management policy of enterprises. When inflation is high, businesses have to increase the cost of capital investment because the price of raw materials, tools or goods increases (Najmeh Khodabakhshi, 2018). In addition, when inflation is high, businesses will hold inventories

or securities instead of cash (Emmanuel Oseifuah, 2016, Olufsayo Akinlo, 2012). Therefore, the following hypothesis is proposed:

H₁₂: Inflation has significantly affect working capital requirements.

* The relationship between the exchange rate and the working capital needs of the business:

For enterprises that have import and export activities, the change of exchange rate directly affect their working capital management activities. Indeed, when the domestic currency depreciates against foreign currencies, enterprises will promote export activities and recover debts in foreign currencies. However, in this case, enterprises may reduce the scale of importing materials. The opposite situation will occur when the domestic currency appreciates against the foreign currency. At this time, enterprises have to adjust their working capital management policies appropriately to ensure their economic benefits (Sedat Yenice, 2015; Emmanuel Oseifuah, 2016). Therefore, the following hypothesis is proposed:

H₁₃: Exchange rate has significantly affect working capital requirements.

On the basis of the traditional approach in determining the firms' working capital requirements with independent variables such as cash, receivables, payables, inventory, the authors has selected net working capital as dependent variable. Additionally, new independent variables in modern studies of working capital requirements such as operating cash flow, gross domestic product growth, inflation rate, exchange rate fluctuations are included in the regression model as follows:

Static regression model:

$$WC = \alpha_{it} + \alpha_1 AP_{it} + \alpha_2 AR_{it} + \alpha_3 IV_{it} + \alpha_4 CASH_{it} + \alpha_5 OC_{it} + \alpha_6 OCF_{it} + \alpha_7 ROA_{it} + \alpha_8 SIZE_{it} + \alpha_9 GROWTH_{it} + \alpha_{10} LEV_{it} + \alpha_{11} GDP_{it} + \alpha_{12} INF_{it} + \alpha_{13} EX_{it} \varepsilon_{it}$$

Dynamic regression model:

$$WC = \alpha_{it} + \gamma WC_{i,t-1} + \alpha_1 AP_{it} + \alpha_2 AR_{it} + \alpha_3 IV_{it} + \alpha_4 CASH_{it} + \alpha_5 OC_{it} + \alpha_6 OCF_{it} + \alpha_7 ROA_{it} + \alpha_8 SIZE_{it} + \alpha_9 GROWTH_{it} + \alpha_{10} LEV_{it} + \alpha_{11} GDP_{it} + \alpha_{12} INF_{it} + \alpha_{13} EX_{it} \varepsilon_{it}$$

2. Variables

Table 1 Variables & Measurements

Variables	Variables' name	Formula	Expected sign
Dependent variable	Working capital requirements (WC)	(Current assets – current liabilities)/ Total assets	
Independent variable			
Internal factors	Accounts Payable (AP)	Average accounts payable /Total assets	negative
	Accounts Receivable (AR)	Average accounts receivable / Total assets	positive
	Inventory (IV)	Average inventory/ Total assets	positive
	Cash and cash equivalents	Cash and cash equivalents / Total assets	positive
	Operating Cycle (OC)	Operating Cycle = Inventory Period + Accounts Receivable Period	positive
	Operating Cash Flow (OCF)	Operating cash flow/ Total assets	positive
	Return on asset (ROA)	Net income/ Total assets	positive
	Leverage (LEV)	Total debts/ Total assets	negative
	Firm size (SIZE)	Natural logarithm of total assets	positive/negative
	Sales growth (Growth)	(Sale _(t) - Sale _(t-1))/ Sale _(t-1)	positive/negative
External factors	GDP growth rate	GDP growth rate	positive/negative
	Inflation (INF)	Inflation rate	positive/negative
	Change in exchange rate (EX)	(Exchange rate _(t) – exchange rate _(t-1))/ Exchange rate _(t-1)	positive/negative

3. Data

In order to conduct this research, financial data of 37 listed plastic companies listed on HOSE and HNX for five years period (2015-2019) was collected. Moreover, Stata 15 software was used to run regression models to test the impact of internal and external factors on working capital requirements of companies. OLS, FEM, REM, SGMM and Quantile regression were used in the panel data analysis.

Analysis and Results

1. Panel Unit Root Test

The test for the existence of unit roots for panel data was taken. The Levin-Chin-Chu test is carried out to test whether the time series contain a unit root. T.

Table 2 Levin, Lin and Chu panel unit root test results

Variable	P-value	Status
WC	0.0000	Level
AP	0.0000	Level
AR	0.0000	Level
Cash	0.0000	Level
Inventory	0.0000	Level
Lev	0.0000	Level
Size	0.0000	Level
Growth	0.0000	Level
GDP	0.0000	Level
Inflation	0.0000	Level
EX	0.0000	Level
ROA	0.0000	Level
OCF	0.0000	Level
OC	0.0000	Level

(Data Source: Stata output)

2. Descriptive Data

Observations are 185 observations.

Table 3 Summary

Variable	Observations	Mean	Std. Dev.	Min	Max
WC	185	0.2107	0.2819	-1.4535	0.9123
AP	185	0.4037	0.2182	0.05597	0.9913
AR	185	0.4037	0.2182	0.05597	0.9913
Cash	185	0.0872	0.0987	0.00062	0.4377
Inventory	185	0.1982	0.1295	0.012	0.6772
Lev	185	0.46	0.237	0.031	0.94
Size	185	26.72	1.28	23.72	29.47
Sale growth	185	0.097	0.37845	-1.000	2.973
GDP	185	0.0676	0.0031	0.0621	0.0708
Inflation	185	0.0322	0.0106	0.0279	0.0354
EX	185	0.0181	0.0229	-0.0031	0.0612
ROA	185	0.078	0.268	-3.148	0.446
OCF	185	-0.000302	0.0709	-0.233	0.224
OC	185	187.50	127.289	50.85	872.013

(Data Source: Stata output)

The net working capital of plastic firms in the period 2016-2020 has an average value of 0.2107. Thus, the average net working capital of plastic firms accounts for 20% of total assets. However, the s.Dev is quite large at 0.2819. The minimum and maximum values are -1.4535 and 0.9123 respectively.

Accounts payable to total assets ratio of plastic enterprises in the period 2016-2020 has an average value of 0.4037. The minimum value of this indicator is 0.05597 and the maximum value is 0.9913 with a relatively large standard deviation of 0.2182.

Accounts receivable to total assets ratio of enterprises in this industry has an average value of 0.4037. The s.dev is 0.2182 with the min and max values being 0.05597 and 0.9913, respectively.

Cash on total assets ratio in the last 5 years of plastic enterprises reached an average of 0.0872. Thus, it can be seen that, cash is the smallest part of current assets. The standard deviation of this indicator is 0.0987. The min and max values are 0.00062 and 0.4377 respectively.

Inventory to total assets ratio of enterprises in the plastic industry in the last 5 years reached an average of 0.1982 with a relatively large standard deviation of 0.1295. Accordingly, the minimum and maximum values of this ratio reach 0.012 and 0.6772.

The financial leverage of the enterprise expressed through the ratio of total debt to total assets. This ratio has an average value of 46% with a standard deviation of 23.7%. The min and max values of financial leverage are 3.1% and 94%. Therefore, it can be seen that the financial autonomy of enterprises in the industry is not equal.

Firm size: The mean value is 26,564 and the standard deviation is 1.3071. Accordingly, the min value of this indicator is 23,745 and the max value is 29,417.

The industry average revenue growth rate during this period reached 9.7%/year with a rather large standard deviation of 37.84%. The minimum value of this indicator is -100% and the maximum value is 297.3%. Statistical results show that the revenue growth rate among enterprises in the plastic industry is uneven. Besides businesses with very good revenue growth rates such as PLP (2016, 2017 and 2019), NHP (2016 and 2017), HII (2017) that achieved revenue growth of over 100%/year, there are also businesses that have poor sales growth such as NHP (2019 and 2020), SPP (2020) with negative revenue growth rate of more than 50%/year.

The mean value of Vietnam's GDP growth rate during this period is 6.76% with a rather small s.dev of 0.31%. The minimum value is 6.21% and the highest value is 7.08%. It can be seen that Vietnam's economy has had a fairly stable GDP growth rate in recent years. The inflation rate for this period has the mean value of 3.224% with a standard deviation of 1.06%. The lowest and highest values of the inflation rate were 2.79% in 2019 and 3.54% in 2018.

The average value of the change of exchange rate between the Vietnamese Dong and the US Dollar during this period was 1.81%. In which, the standard deviation is 2.29%, the lowest value is -0.31% and the highest value is 6.12%.

S.dev of this indicator-ROA is quite large at 26.8%. The maximum and minimum values is -314.8% and 44.6% respectively. While enterprises such as BMP (2019 and 2020), VNP (2017), HBD (2020), SDG (2020) have very good return on assets ratio (ROA over 30%), there are also businesses that have inefficient business activities with quite large negative ROA (small ROA negative over 110%) such as NNG (2019), NHP (2019 and 2020), SPP (2020), BTG (2019).

Firm size in the industry is measured by the natural log of total assets. The average value is 26.72 with a standard deviation of 1.28. The minimum and maximum values of this indicator are 23.72 and 29.47, respectively. The largest enterprise in the industry is AAA with total assets of VND 6,281,461 billion. The smallest enterprise in the industry is BTG with total assets of VND 20,022 billion.

3. Correlation

Table 4 Correlation matrix between variables

	WC	AP	AR	Cash	Inventor y	Lev	Size	Growt h	GDP	Inflatio n	EX	ROA	OCF	OC
WC	1.00													
AP	-0.7483*	1.00												
AR	0.2078*	0.2030*	1.00											
Cash	0.4846*	-0.3801*	-0.2452*	1.00										
Inventor y	0.3545*	-0.0408	0.0740	0.2805*	1.00									
Lev	-0.8236*	0.6244*	0.0977	-0.3926*	-0.1448*	1.00								
Size	-0.4338*	0.3734*	0.0467	-0.2237*	-0.3425*	0.4227*	1.00							
Growth	0.1631*	0.1477*	0.0920	-0.0822	0.0153	0.2325*	0.2954*	1.00						
GDP	-0.0928	0.0606	0.0009	-0.1443	0.0024	-0.0115	0.0773	0.0008	1.00					
Inflation	0.0546	0.0285	-0.0051	-0.1796*	-0.0498	0.0151	0.0947	0.0282	0.3140*	1.00				
EX	-0.2614*	-0.0174	0.0531	0.1389	0.0536	-0.0141	-0.0864	0.0121	-0.0992	-0.3761*	1.00			
ROA	0.3780*	-0.4124*	-0.0968	0.2765*	-0.0481	-0.4352*	0.0646	-0.0188	-0.1164	-0.0204	0.0051	1.00		
OCF	0.1021	-0.0490	-0.1404	0.4241*	0.1055	-0.0593	-0.0640	0.0299	-0.0808	-0.2187*	0.1260	0.0579	1.00	
OC	-0.2361*	0.1310	0.1867*	-0.3079*	-0.0630	0.1335	0.1552*	0.0550	0.0579	0.0281	-0.0192	-0.2833*	0.0441	1.00

(Data Source: Stata output)

The correlation coefficient matrix table showed that the net working capital of the enterprises has a statistically significant positive relationship with receivables, cash, inventory, sales growth and return on total assets. In addition, the firm's net working capital has a statistically significant negative relationship with payables, leverage, firm size, changes of exchange rate and OC.

4. Regression Model in Vietnam

System GMM regression method was used. This, therefore, makes our results more efficient and reliable. Besides, quantile regression was used to estimate the relationship between dependent and independent variables across different quantiles. This advantage shows many regression functions for many quantiles, showing that the different effects of the independent variable correspond to many quantiles of the dependent variable.

Table 5 Regression results for static and dynamic model

Variable	VIF (Static model)	VIF (Dynamic model)	Pool OLS	FEM	REM	GLS	Dynamic model
WC L1.		3.59					0.26304*** 0.07208
AP	2.39	4.68	-0.954*** (0.0454)	-0.881*** (0.0720)	-0.933*** (0.0546)	-0.884*** (0.0353)	-0.904728*** 0.1138
AR	1.21	1.59	0.690*** (0.0447)	0.556*** (0.0559)	0.605*** (0.0488)	0.637*** (0.0324)	0.44435*** 0.10063
Cash	1.74	2.44	0.585*** (0.0856)	0.239*** (0.0845)	0.352*** (0.0775)	0.549*** (0.0671)	0.48481** 0.2188
Inventory	1.34	1.67	0.633*** (0.0573)	0.451*** (0.113)	0.595*** (0.0757)	0.625*** (0.0538)	0.6655*** 0.1226
Size	1.48	1.54	-0.00737 (0.00597)	-0.0109 (0.0243)	-0.0111 (0.00905)	-0.0107* (0.00556)	-0.0016 0.0126
Growth	1.1	1.15	0.0452** (0.0178)	0.0515*** (0.0187)	0.0487*** (0.0172)	0.0320*** (0.00917)	0.01223 0.05202
GDP	1.37	1.65	-1.714 (2.408)	-2.825 (1.835)	-2.307 (1.747)	-0.686 (1.186)	-2.0362 2.08716
Inflation	5.92	1.62	1.978 (1.462)	1.992* (1.018)	1.944* (1.047)	1.462** (0.588)	1.48177 1.7401
EX	5.31	1.05	-0.348 (0.644)	-0.599 (0.458)	-0.461 (0.464)	-0.516** (0.247)	0.46920 0.62007
ROA	2.3	2.9	0.164** (0.0689)	0.228*** (0.0732)	0.203*** (0.0636)	0.230*** (0.0412)	0.20579 0.35874
OCF	1.35	1.5	0.0187 (0.101)	0.109 (0.0807)	0.0666 (0.0791)	0.0166 (0.0563)	-0.00081 0.20482
OC	1.38	1.44	-3.48e-05 (5.82e-05)	-3.30e-05 (8.28e-05)	-4.09e-05 (6.59e-05)	1.61e-05 (3.67e-05)	0.00014 0.00013
Constant			0.497** (0.204)	0.729 (0.613)	0.675*** (0.246)	0.497*** (0.163)	0.32399 0.31631
Observations			185	185	185	185	185
R-squared			0.911	0.861	0.857		
Number of name				37	37	37	37
Prob>F/Prob>Wald Chi 2			0.0000	0.0000	0.0000	0.000	0.000
Hausman Prob>chi2				0.1946			
Breusch and Pagan Lagrangian multiplier test (Prob > chibar2)					0.0000		
Wooldridge test F-stats Prob > F					0.0007		
Arellano-Bond test for AR(2) (Pr > z)							0.786
Sargan test (Prob > chi2)							0.074

Standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1
(Data source: Stata output)

*** Multicollinearity Test Results**

The results of the multicollinearity test show that the variance inflation factor (VIF) of the leverage and payables to total assets ratio variables are higher than 10. Hence, there exists a multicollinearity in the model. To solve the multicollinearity phenomenon, the leverage variable was removed from the model. After removing this variable, the multicollinearity test result shows that all the variables have VIF less than 10. Therefore, all these remain variables can be used in this regression model.

*** Static Model Regression Results**

The results of the OLS estimation show that the F-statistic is statistically significant at the 1% level. The result indicates that the OLS estimate could be a suitable estimate.

The Hausman test result showed that P-value of chi-squared greater than 0.05. Therefore, the random effect model is more suitable than the fixed effect model.

The Breusch and Pagan Lagrangian tests showed that chi-squared statistics have p-value less than 0.05, therefore the heteroscedasticity exists in the model.

The Wooldridge test showed that the F-statistic have p-value less than 0.05, hence the model exists autocorrelation phenomenon.

The existence of heteroscedasticity and autocorrelation phenomenon make the estimate not be the most efficient estimate anymore. Therefore, GLS method was used to deal with this phenomenon. Below are the regression results:

Regression results show that there exists a statistically significant negative relationship between account payables and net working capital of the enterprise. Thus, the higher account payables of company has, the lower the net working capital the company need.

Accounts receivable has a statistically significant positive relationship with net working capital. That means the more accounts receivable is, the higher net working capital of the business is and vice versa.

Between NWC and Cash, inventory, ROA, inflation, sales growth: there is statistically significant positive relationship.

Firm size has a statistically significant negative relationship with net working capital. That means the larger the business is, the smaller net working capital need of the business is and vice versa.

Change of exchange rate has a statistically significant negative relationship with net working capital. This means the higher the rate of change in the exchange rate, the lower net working capital is and vice versa.

The variables GDP growth, inflation, operating cash flow and operating cycle do not have a statistically significant relationship with the net working capital of enterprises.

*** Dynamic Model Regression Results**

The results of the dynamic model regression by the systematic GMM method shows that the chi-squared value of the Sargan test with a P-value of 0.07 (greater than 0.05) and the Arellano-Bond test (AR2) with p-value reached 0.786 (greater than 0.05), so the GMM model ensures reliability in the analysis. The relationship between the variables in the dynamic model is shown in detail as follows:

The previous period net working capital has a statistically significant positive relationship with this period net working capital. In other words, the higher the previous period net working capital is, the higher this period net working capital is and vice versa.

Regression results show that there exists a statistically significant negative relationship between account payables and net working capital of the enterprise. Thus, the higher account payables of company has, the lower the net working capital the company need.

Accounts receivable has a statistically significant positive relationship with net working capital. That means the more accounts receivable is, the higher net working capital of the business is and vice versa.

Cash, inventory and NWC: there is significant positive relationship.

Meanwhile, firm size, sales growth, change of exchange rate, inflation rate, operating cash flow and operating cycle have no statistically significant relationship with net working capital.

* Quantile regression results

Table 6 Quantile regression results

Variable	Q10	Q25	Q50	Q75	Q90
AP	-0.9310*** (0.05703)	-0.8827877*** (0.038136)	-0.8883932*** 0.0584037	-0.868599*** 0.087164	-0.93172*** 0.071077
AR	0.7794*** (0.05722)	0.7884424*** (0.0382672)	0.7528288*** 0.0586045	0.6406714*** 0.0874638	0.53074*** 0.0713214
Cash	0.7325*** (0.11655)	0.8075892*** (0.0779433)	0.6339517*** 0.1193667	0.3908718** 0.1781478	0.0191101 0.1452687
Inventory	0.7535*** (0.07376)	0.6801754*** (0.04932)	0.6900911*** 0.0755454	0.59669*** 0.112747	0.4728191*** 0.0919384
Size	0.005029 (0.00803)	0.0002245 (0.0053728)	-0.0013388 0.0082282	-0.0119088 0.0122801	-0.0175868* 0.0100137
Sales growth	0.037121 (0.03620)	0.0143575 (0.0242102)	0.0457612 0.0370769	0.1125047** 0.0553351	0.0832485* 0.0451224
GDP	-2.673667 (2.93031)	-1.257577 (1.959567)	0.0388495 3.000991	0.5410876 4.4788	-1.623683 3.65219
Inflation	2.657013 (1.79054)	1.113199 1.197375	1.685253 1.833728	0.0803858 2.736731	0.1052208 2.231638
EX	(0.65260) 0.786818	0.108181 0.5261636	0.5183855 0.8057966	0.0741237 1.202604	-0.3084394 0.9806502
ROA	0.12851 (0.20718)	0.1552689 0.1385492	0.3538228* 0.2121821	0.6318656** 0.3166692	0.5644058* 0.2582245
OCF	0.0741928 (0.14446)	0.0547097 0.0966081	0.0967267 0.1479511	0.0752879 0.2208083	0.1515837 0.1800557
OC	-0.000072 (0.00010)	0.0000416 0.000067	-3.58e-06 0.0001027	-0.0000197 0.0001532	-0.0002367* 0.0001249
Cons	0.0633867 (0.261657)	0.2665572 0.1749763	0.128359 0.2679686	0.5452358 0.3999272	1.067985 0.3261163

Standard errors in parentheses. *** p <0.01, **p<0.05, *p<0.1

(Data source: Stata output)

The quantile regression results show that accounts payable has a statistically significant negative relationship with the firm's net working capital at all quantiles. In which the highest coefficient is at the 90th quantile. Thus, the higher the enterprise's payables, the lower net working capital of the enterprise is and vice versa.

Accounts receivable has a statistically significant positive relationship with the net working capital of the enterprise at all quantiles. In which the highest coefficient is at the 25th quantile. Thus, the higher the enterprise's accounts receivable is, the higher net working capital of the enterprise is and vice versa.

Cash, ROA, inventory and NWC: there is significant positive relationship.

Firm size has a statistically significant negative relationship with the net working capital of the enterprise at the 90th quantile. Thus, the larger the size of the enterprise, the smaller the net working capital of the enterprise and vice versa.

Sales growth of firms has a statistically significant negative relationship with the net working capital of the enterprise at the 75th and 90th quantiles. Thus, the higher the sales growth rate of the enterprise is, the greater the net working capital is and vice versa.

Operating cycle has a statistically significant negative relationship with net working capital of firms at the 90th quantile. Thus, the higher operating cycle is, the smaller net working capital of the enterprise is and vice versa.

The GDP growth, inflation, change of exchange rate and firm's operating cash flow do not have a statistically significant relationship with net working capital.

From the results of empirical research on the factors affecting the net working capital of enterprises in the plastic industry, we can come to the following conclusions:

Accounts payable has a statistically significant negative relationship with the firm's net working capital in both the static and dynamic model and quantile regression results. This result shows that in general, the higher the company's accounts payable is, the lower net working capital of the enterprise is. The results are quite consistent with earlier studies by Chiou and Cheng (2006).

Firm size has a statistically significant negative relationship with net working capital of plastic enterprises in static model and quantile regression. Thus, the larger firm size is, the smaller net working capital is. Therefore, it can be seen that enterprises in the large-scale plastic industry will have more advantages in mobilizing capital for business activities or in negotiating with suppliers. The results of this study are consistent with the thesis made by researchers Chiou et al. (2006), Baños-Caballero et al. (2010), Nwankwo and Osho (2010).

Inflation has a statistically significant positive relationship with the net working capital of firms in the industry in the static model. Therefore, it can be seen that the management decisions of enterprises' current assets are quite sensitive to fluctuations in the purchasing power of money in the economy. When inflation is at a high level, businesses will have to increase costs for investment in current assets because the prices of raw materials, tools, or

goods increase. The results of this study are consistent with the results of Nazir and Afza (2009), Mongrut, S (2014), Kwenda, F., & Holden, M. (2014).

Changes in exchange rate have a statistically significant negative relationship with net working capital of plastic enterprises in the static model. Therefore, when the exchange rate increases, firms will decrease the size of their net working capital. Thus, in the plastic industry, payables in foreign currencies are larger than receivables in foreign currencies. This result is associated with the actual production of the plastic industry because Vietnamese plastic enterprises currently mainly import raw materials abroad. This research result is also consistent with the research results of Reşit Çelik et al (2016) and Narendre (2009).

The return on total assets ratio has a statistically significant positive relationship with the net working capital of plastic enterprises in the static model and quantile regression model. Thus, businesses with high profitability on total assets will invest more in working capital. The results of this study are consistent with the results of Abbadi & Abbadi (2012); Nazir (2009), Onaolapo, A., & Kajola, S. O. (2015).

Conclusion

Working capital is a substantial part of assets in enterprises, especially plastic enterprises. Effective working capital management directly impacts the business performance and the risks that the enterprise may have to bear. Therefore, it is necessary to understand the determinants influencing the net working capital requirements of enterprises. Based on the results of this study, plastic enterprises can clearly know which factors affect their net working capital requirements, thereby make appropriate decisions on working capital. At the same time, the authors proposes some recommendations for working capital management of enterprises as follows:

- Enterprises need to closely monitor fluctuations in exchange rates and inflation to make appropriate decisions on investment in working capital requirements. Not only that, firms also need to actively prevent risks related to exchange rate and inflation.
- Firms may have faster collection of receivables by offering discounts to customers to promote them to make their payment earlier, prioritizing customers with good payment ability to optimize its receivables.
- Firms can reduce inventory cycles with an efficient inventory forecasting method. Moreover, the company can also apply various methods to increase sales in order to reduce inventory time and enhance the working capital cycle.

- Firms can extend payment terms by better negotiations with debtors.

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