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Article

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MANAGEMENT | RESEARCH ARTICLE

Does working capital management matter? A comparative case between consumer goods firms and construction firms in Vietnam

Thi Quy Vo^{1,2*} and Ngoc Cuong Ngo³

Abstract: This study investigates the effects of working capital management (WCM) through and its components (Days Sales Outstanding—DSO, Days Inventory Outstanding—DIO, and Days Payable Outstanding—DPO and Net Working Capital) on firm profitability in consumer goods and construction firms by applying Generalized Method of Moments (GMM). The independent samples t-test was used to study the difference of WCM between the two groups of firms. The data were collected from 21 consumer goods firms and 41 construction firms listed on Vietnam Stock Market in the period 2011–2020. This study indicates that WCM components impact differently on firm profitability of selected firms in the sample. The results provided empirical evidence supporting financial management theory and implied that WCM is a critical factor explaining firm profitability, and industry specificity is a factor explaining the difference in WCM and its influence on firm profitability in the study sample. The results recommend that financial managers should focus on managing working capital and consider industry characteristics as developing working capital management policy to improve firm profitability.

Subjects: Financial Management; Finance; Industry and Industrial Studies;

Keywords: working capital management; firm profitability; consumer goods; construction firms; GMM; Vietnam

1. Introduction

Working capital management (WCM) refers to management decisions influencing the size of current assets and current liabilities (Taurigana & Adjapong Afrifa, 2013) and affects firm's profitability and risk (Baños-Caballero et al., 2011). WCM includes cash, receivables, inventories, and payables management (Bhatia & Srivastava, 2016). A very stringent WCM policy can lead to a liquidity crisis, while a relaxed one can lead to a decline in profitability. For example, a flexible credit policy may boost sales but increase bad debts or firm financial risk; conversely, a tight credit policy often has an adverse effect on a company's earnings due to reducing sales. Applying a relaxed inventory holding policy can increase the cost of carrying, and retaining lower inventory amounts can result in situations of stockout and higher ordering costs. Delaying payments to suppliers can be very costly for the orders with a very high discount on cash payment.

The corporate finance literature emphasizes the importance of WCM because of the significant impact of short-term financial decisions on a firm's profitability and risk. Martinho (2021) conducted

the bibliometric analysis through bibliometric information from both the Web of Science Core Collection and the Scopus for the topic of “Working capital” (WC) and found that the studies on WCM increased sharply after 2007/2008, however decreased in 2020, and increased significantly over the last few years. The study highlighted that the four countries—the USA, China, India, and the United Kingdom—take a large part of the researches on “Working capital”. There are no studies on “Working capital” developed by researchers affiliated to institutions from Vietnam mentioned in the study. Martinho (2021) recommended that the topic should be studied in more countries around the world. We reviewed recent studies on the effect of WCM on profitability and found that these studies focused on one industry such as steel firms (Pham et al., 2020), and food companies (Phuong & Chau, 2020), or manufacturing firms listed in Vietnam stock markets (Nguyen & Dang, 2020). There is not a comparative study on the same topic conducted in Vietnam recently.

According to Ali and Khan (2011), the main factors that affect WCM are market cycles, firm conditions, and macroeconomic contexts. Therefore, it is expected that firms belonging to different industries have different WCMs, and the impact of WCM on firm profitability may be different. Moreover, most of studies on WCM focused on manufacturing firms, firm size, or one industry (Gill et al., 2010; Kieschnick et al., 2011; Pham et al., 2020; Raheman & Nasr, 2007; Stephen & Elvis, 2011; Tauringana & Adjapong Afrifa, 2013). The situation needs a comparative study on WCM and its influence on firm profitability between two industries with large differences in terms of market cycles, and firm specifics, and in a specific context like Vietnam. Thus, we want to close the gap by carrying out a comparative study on the impact of WCM on profitability between construction and consumer goods industries. Moreover, our motivation also stemmed from the statement of PwC Vietnam: Vietnamese companies use WC inefficiently, especially firms belong to engineering and construction, FMCG, and metals and mining industries. PwC Vietnam explained that the ineffective supply chain and inappropriate payment policy are primary causes for WCM inefficiency of these Vietnamese enterprises compared to their counterparts in the region and around the world.

Construction is one of the most important industries in the market economy. Products of construction enterprises are individual because of their large-scale, complex production techniques, single-unit production, and long production time. Therefore, it is required that WCM must be done well for the quality of the work to be carried out as originally planned. The consumer goods industry is an important and indispensable industry in the industrial system of all countries because it produces many common goods to serve first and foremost for the daily life of people. The consumer goods industry group includes many different industries and diverse products. Most notable industries are the textile—garment, leather—shoe, stationery, plastic, porcelain—glass industries, etc. Conspicuous features of the consumer goods industry in Vietnam are small capital, simple technical process, short production time, quick payback and profitable. Conducting the comparative study between the two groups of firms will provide empirical evidence that industry characteristics influence WCM practices and their effect on firm profitability in a specific research context like Vietnam to both managers and researchers. The next sections will be literature review, variable measurement, data processing and hypothesis testing, results and interpretation, discussion, and conclusion.

2. Literature review

2.1. Working capital and working capital management policy

WC is the sum of short-term assets (or current assets) of a firm including cash and cash equivalents, short-term financial investments, accounts receivable, inventories, and other short-term assets (prepaid expenses) used to finance the daily production and business activities (Ngo & Le, 2015). However, short-term financial investments are not a funding for the business operation of a firm; therefore, they should be excluded from WC. WC refers to a firm’s investment level in short-term assets and the fund needed to meet the day-to-day expenses (Bhatia & Srivastava, 2016). WC is managed through two policies, which are working capital investment policy (WCIP) and working

capital financing policy (WCFP), according to Eugene and Joel (2021). The investment policy of WC refers to the level of holding short-term assets and WCFP refers to the maturity of funds used to finance the current assets. WCM theory distinguishes the two concepts of WC—gross working capital (GWC) and net working capital (NWC). GWC refers to the level of holding short-term assets or the investment policy of WC of a firm. NWC is the difference between short-term assets' value and current liabilities indicating the level of long-term funds used to finance a firm's short-term assets.

WCM are decisions regarding a trade-off between risk and profit of a firm. Ideally, WCM needs to ensure sufficient WC to run business activities and short-term debt repayment obligations with the aim to guarantee that a firm can meet its operating costs and, furthermore, stay in a position to pay short-term obligations (Ukaegbu, 2014). The inefficient WCM may increase a firm's liquidity risk and put a firm in financial distress. According to Moyer et al. (1992) and Eugene and Joel (2021), there are three types of WCIP or three levels of investment in short-term assets. Applying conservative WCIP, a firm will hold a high level of cash and inventory. This policy helps a firm avoid the shortage costs, but it increases the firm's financial costs. For aggressive WCIP, a firm will invest in current assets at the minimum level (Eugene & Joel, 2021). This policy reduces a firm's financial costs, but it may increase shortage costs. Contrary to conservative investment, the policy is a risky policy, because the company can face potential liquidity issues (Vahid et al., 2012). Moderate WCIP is seen as a combination in balance between conservative investment policy and aggressive investment policy. This policy is the best policy standing balance between both angles of profits and risks.

Eugene and Joel (2021) and Firer et al. (2008) suggested that investment in current assets or WC needs to be financed from many sources of funds. The primary sources of capital for a firm's WC include trade credit, prepaid expenses, short-term loans, long-term debts, and owners' equity. Each source of funds has its own advantages and disadvantages. Therefore, firms need to make wise decision on their best source of capital. WCFP is measured using short-term debts and distinguished through three financing policies. Applying conservative financing policy, firms use more long-term funds including long-term debt and equity to finance all long-term assets, permanent current asset, and little of the needs of temporary WC (seasonal or unexpected increasing of inventory items) for increasing revenue strategy. Employing this policy, a firm does not face potential liquidity issues, but its profit may reduce, because using too much long-term debts results in high cost of capital compared to the use of short-term debt. Applying an aggressive financing policy, the firm uses short-term funds to finance its entire current assets and a portion of long-term assets. Employing this policy, a firm may face high liquidity risk due to rolling loans as well as increasing interest rates. However, short-term interest rates usually are lower than interest rates of long-term loans, and some companies are willing to sacrifice for a chance to raise higher profits. According to Eugene and Joel (2021), the reason for adopting a risky financing policy is the lower short-term rates (yield curve usually slopes upward). However, the strategy of financing for long-term assets by short-term funds really brings risk to firms. In some cases, firms may face temporary financial problems that they cannot pay the short-term liabilities coming due, and creditors and lenders may refuse to extend their maturity leading to bankruptcy. Briefly, a risky financing policy will generate a higher level of profitability, but increase payment risk as well. With a moderate financing policy, fixed assets and a portion of permanent current assets are financed by long-term capital including long-term liabilities and owners' equity, and a part of permanent current assets is financed by short-term liabilities. This policy falls between the two extremes of aggressive policy and conservative policy, so it brings about moderate risk and profitability compared to the two other financial policies.

2.2. Working capital management and firm profitability

The relationship between WCM and firm profitability can be explained based on the trade-off theory. An aggressive investment and financing policy in WCM is a risky policy producing higher risk and return. Contrary to that policy is the conservative policy, which produces lower risk and return to firm. Previous studies on WCM in different countries including countries in Asia, Europe, and Africa have shown that WCM is the management of current assets' components through the establishment and implementation of WCM policies (Bhatia & Srivastava, 2016; Eugene & Joel, 2021; Moyer et al., 1992; Vahid et al., 2012). The level of investment in current assets is considered the key factor explaining the effect of WCM

on firm profitability. Excessive investment in short-term assets has a negative impact on firm efficiency. Conversely, limited investment in current assets may increase firm risk due to the probability of solvency. For conservative financing policy, managers tend to maintain high cash holding and inventory level that may gain revenue growth and reduce the shortage costs, which in turn contributes to firm operating profit; however, the policy may increase firm's financial costs and inventory carry costs that may adversely affect its performance, versus aggressive financing policy. Therefore, to study the impact of WCM on firm profitability, we tested the impact of five components of WCM—cash conversion cycle (CCC), days inventory outstanding (DIO), days sales outstanding (DSO), days payable outstanding (DPO), and NWC—on firm's return on assets (ROA).

2.3. Hypothesis development

Shortening CCC will generate higher net operating cash flows to the firm and then increase the firm's profitability. Ngo and Le (2015) confirmed the existence of the relationship between net operating profit and average inventory days, account payable days, and CCC. They asserted that firms with a shorter CCC are profitable. Bagchi et al. (2012) examined the effect of WCM policy on firm profitability (ROA and ROI) of consumer goods companies. Their findings indicated a negative relationship between the components of WCM and profitability of selected companies. Nobanee (2017) studied the relationship between the efficiency of WCM and profitability of 12 construction companies listed in the stock markets of the United Arab Emirates and found that CCC is linked negatively and significantly with the profitability of construction firms. In the same country, Nobanee and Ellili (2015) also explored the relation between the efficiency of WCM and the performance of the 44 Kuwaiti Stock Exchange construction firms. Based on the above WCM theory and empirical findings, we hypothesized that (H₁) there is a relationship between the components of WCM (DIO, DSO, DPO, CCC, and NWC) and ROA of both construction firms and consumer goods firms, or:

H_{1a} DIO significantly impacts on ROA of both construction firms and consumer goods firms.

H_{1b} DSO significantly impacts on ROA of both construction firms and consumer goods firms.

H_{1c} DPO significantly impacts on ROA of both construction firms and consumer goods firms.

H_{1d} CCC significantly impacts on ROA of both construction firms and consumer goods firms.

H_{1e} NWC significantly impacts on ROA of both construction firms and consumer goods firms.

Ali and Khan (2011) confirmed that the main factors that affect the WC are market cycles, firm conditions, and macroeconomic contexts. The fact that market cycle and firm specificity belong to different industries is different. Financial managers may apply different WCM policies due to the change in firm financial constraints, market conditions, and economic conditions. Accordingly, the impact of the WCM policy applied on firm's profitability is expected to be different. Therefore, we hypothesized that:

H₂. There is a significant difference between consumer goods companies and construction companies in terms of WCM and

H₃. Their impacts on firm profitability are different.

3. Variable measurement

To test the research hypotheses above, research variables need to be defined and measured and are presented in Table 1. Data were collected from audited financial statements of the sample of 62 consumer goods and construction firms listed on Vietnam Stock Exchanges (HOSE and HNX) for a period of 10 years from 2011 to 2020, resulting in 620 firm-year observations (Appendix 1 - Company List)

Table 1. Variable's summary

Variable	Name	Meaning	Unit	Measurements	References
ROA	Return on Asset	A proxy of firm's profitability	%	Net Income to Average Total Asset	In (Martinho, 2021; Moyer et al., 1992; Nobanee, 2017)
DSO	Days Sales Outstanding	A reflection of a firm's collection policy	Days	(Average Account Receivables Balance to Net Sales) x 365	In (Afrifa et al., 2014; Bagchi et al., 2012; Baños-Caballero et al., 2011; Bhatia & Srivastava, 2016; Martinho, 2021; Moyer et al., 1992; Ngo & Le, 2015; Nguyen & Dang, 2020; Nobanee, 2017)
DIO	Days Inventory Outstanding	A reflection of a firm's inventory policy	Days	(Average Account Inventory Balance to Costs of Goods Sold) x 365	In (Afrifa et al., 2014; Bagchi et al., 2012; Baños-Caballero et al., 2011; Bhatia & Srivastava, 2016; Martinho, 2021; Moyer et al., 1992; Ngo & Le, 2015; Nguyen & Dang, 2020; Nobanee, 2017)
DPO	Days Payable Outstanding	A reflection of a firm's payment policy	Days	(Average Account Payables Balance to Costs of Goods Sold) x 365	In (Afrifa et al., 2014; Bagchi et al., 2012; Baños-Caballero et al., 2011; Bhatia & Srivastava, 2016; Martinho, 2021; Moyer et al., 1992; Ngo & Le, 2015; Nguyen & Dang, 2020; Nobanee, 2017)
CCC	Cash Conversion Cycle	The measures of the time it takes a firm to go from cash outflow to cash inflow	Days	DSO + DIO - DPO	In (Afrifa et al., 2014; Bagchi et al., 2012; Baños-Caballero et al., 2011; Bhatia & Srivastava, 2016; Martinho, 2021; Moyer et al., 1992; Ngo & Le, 2015; Nguyen & Dang, 2020; Nobanee, 2017)
NWC	Net Working Capital	A reflection of a firm's WCFP	Billions of VND	Current Assets - Current Liabilities	In (Baltagi, 2001; Bond et al., 2001)

(Continued)

Table 1. (Continued)

Variable	Name	Meaning	Unit	Measurements	References
SIZ	Size	Firm size	Log	Natural Logarithm of Net Sales	In (Bagchi et al., 2012; Baños-Caballero et al., 2011), [0], (Martinho, 2021; Moyer et al., 1992)
LEV	Financial Leverage	Debt ratio	%	Total Debt/Total Asset	In (Afrifa et al., 2014; Bagchi et al., 2012; Martinho, 2021; Moyer et al., 1992; Nobanee, 2017)
CR	Current Ratio	A reflection of a firm's liquidity risk	%	Current Assets/ Current Debt	In (Baños-Caballero et al., 2011; Martinho, 2021; Nguyen & Dang, 2020; Nobanee, 2017)
GRO	Growth Rate	A reflection of a firm's growth rate	%	Percentage Change in Net Sales	In (Bagchi et al., 2012; Baños-Caballero et al., 2011; Martinho, 2021; Moyer et al., 1992)

Source: Synthesized by the authors.

To test the impact of WCM on firm profitability, we applied the research model below. In the regression model, ROA is a dependent variable; CCC, DSO, DIO, DPO, and NWC are independent variables; and SIZ, LEV, CR, and GRO are control variables. CR is an interaction between WCIP and WCFP and is an indicator of firm liquidity risk, according to the financial management theory. Therefore, it is considered as a control variable in our research model.

$$ROA_{it} = \beta_0 + \beta_1 CCC_{it} + \beta_2 DSO_{it} + \beta_3 DIO_{it} + \beta_4 DPO_{it} + \beta_5 NWC_{it} + \beta_6 SIZ_{it} + \beta_7 LEV_{it} + \beta_8 CR_{it} + \beta_9 GRO_{it} + uit$$

(β_i is regression coefficient, and uit is unobserved variable)

4. Data processing and hypothesis testing

4.1. Statistics description

On average, consumer goods firms invest in receivables approximately 54 days (DSO) and in inventory approximately 119 days (DIO) and stretch their payment period roughly 43 days (DPO). As a result, their CCC is about 129 days (see Table 2). These companies have positive NWC (819.3 billion), implying a conservative financing policy applied or long-term funds used to finance the current assets; accordingly, the selected firms' liquidity risk is low (CR = 1.6).

In contrast, construction firms have longer CCC (310 days) equal to 3.2 times that of consumer goods firms. In detail, the DSO is 225 days, 4.2 times in comparison to that of consumer firms, and DIO is approximately 193 days and DPO is 107 days (see Table 3). This means that these companies must pay their suppliers before receiving payment from their customers. According to Vietnamese Accounting Standards (VAS), construction companies are allowed to recognize revenue after the construction works have been finished and accepted by their customers. In some cases, such as unfavorable weather conditions making production cycle longer than planned, construction companies must apply a relaxed credit policy. The selected firms' NWC is positive with a small size, implying that construction firms applied a moderate financing policy; accordingly, the selected firms' liquidity risk is moderate (CR = 1.3).

Table 2. Statistics description for surveyed consumer goods firms

Variable	Min	Mean	Median	Max	Std. Dev.
ROA	0.1	1.5	1.3	4.5	0.8
DSO	6.9	53.5	40.3	917.4	68.9
DIO	27.9	118.7	83.5	2150.7	160.4
DPO	3.0	42.8	33.3	1518.9	105.5
CCC	12.3	129.4	113.4	1549.2	124.3
NWC	-9114.0	819.3	111.1	15453.1	2502.2
SIZE	26.0	28.2	27.7	32.0	1.3
LEV	0.0	32.2	33.1	74.5	19.4
CR	0.5	1.6	1.4	4.6	0.7
GRO	-87.2	12.0	7.8	213.4	33.0

Source: Authors' estimation.

Table 3. Statistics description for surveyed construction firms

Variable	Min	Mean	Median	Max	Std. Dev.
ROA	0.0	0.8	0.7	3.7	0.4
DSO	13.0	224.7	164.3	13056.6	647.4
DIO	10.6	192.7	143.6	1870.3	194.6
DPO	3.3	107.0	84.0	1552.9	113.4
CCC	22.7	310.3	234.4	13374.1	675.0
NWC	-427.2	255.0	91.0	4404.8	550.7
SIZE	22.8	27.2	27.3	30.6	1.1
LEV	0.0	26.0	26.6	69.5	14.5
CR	0.4	1.3	1.2	6.4	0.6
GRO	-98.2	8.9	2.8	361.7	43.4

Source: Authors' estimation.

4.2. Correlation test

Before testing the impact of WCM on firm profitability, we tested the correlation between variables in the research model for consumer goods and construction firms separately, and the results are shown in [Tables 4 and 5](#). The correlation level is the level at which researchers often use to examine the possibility of multicollinearity in the research model. [Table 4](#) is the correlation matrix of all variables used in our research model for consumer goods firms. The test results show that there is an autocorrelation phenomenon between CCC and its components with correlation coefficients higher than 0.8 ([Table 4](#)). For construction firms, the value of correlation coefficients among independent and control variables in the study is small and less than 0.8, except for the case of CCC and DSO ([Table 5](#)).

The results of correlation matrix.

4.3. Multicollinearity test

VIF testing for consumer goods firms revealed that there is severe multicollinearity, with the VIF of CCC and DIO being 19.34 and 13.27, respectively. The VIF test for construction firms also resulted in the existence of significant multicollinearity issues, with the VIF of DSO and CCC being 20.56 and 18.37, respectively. After removing the variables with VIF higher than 10, VIF test for the two groups of firms was conducted again and resulted in multicollinearity issues being solved. The test's result implies that CCC and DPO should be removed from the regression model for consumer goods firms, and CCC should be removed from the regression model for construction firms. The results of VIF final test for consumer goods firms and construction firms are presented in [Table 6](#).

Table 4. Correlation matrix, n = 210 (consumer goods firms)

Consumer Goods	ROA	DSO	DIO	DPO	CCC	NWC	SIZE	LEV	CR	GRO
ROA	1									
DSO	-0.337	1								
DIO	-0.275	0.807	1							
DPO	-0.197	0.879	0.923	1						
CCC	-0.375	0.85	0.955	.829	1					
NWC	-0.078	-0.048	-0.107	-.021	-0.147	1				
SIZE	-0.145	-0.149	-0.241	-.118	-0.293	0.519	1			
LEV	-0.269	0.17	0.28	.139	0.339	-0.313	-0.103	1		
CR	0.073	-0.019	-0.152	-.095	-0.126	0.424	0.113	-0.652	1	
GRO	0.019	-0.179	-0.213	-.183	-0.218	0.019	0.221	0.075	-0.087	1

Source: Authors' estimation.

Table 5. Correlation matrix, n = 410 (Construction firms)

Construction	ROA	DSO	DIO	DPO	CCC	NWC	SIZE	LEV	CR	GRO
ROA	1									
DSO	-0.179	1								
DIO	-0.413	0.455	1							
DPO	-0.341	0.715	0.542	1						
CCC	-0.234	0.97	0.634	.674	1					
NWC	-0.161	0.003	-0.079	-.038	-0.014	1				
SIZE	0.249	-0.25	-0.356	-.363	-0.281	0.51	1			
LEV	0.013	-0.092	-0.041	-.103	-0.082	-0.115	0.261	1		
CR	-0.13	0.044	-0.031	-.115	0.052	0.229	-0.129	-0.4	1	
GRO	0.267	-0.178	-0.234	-.271	-0.193	-0.005	0.168	-0.053	0.02	1

Source: Authors' estimation.

Table 6. VIF test results

For consumer goods firms			For construction firms		
Variable	VIF	1/VIF	Variable	VIF	1/VIF
DIO	3.27	0.305996	DPO	2.73	0.366566
DSO	2.99	0.335007	DSO	2.16	0.462352
CR	2.00	0.500801	SIZE	2.12	0.471884
LEV	1.87	0.535464	NWC	1.73	0.578642
NWC	1.71	0.585571	DIO	1.53	0.655036
SIZE	1.55	0.646089	CR	1.42	0.704188
			LEV	1.34	0.746587
GRO	1.11	0.897161	GRO	1.12	0.893489
Mean VIF	2.87		Mean VIF	1.77	

4.4. Regression test

Endogenous issues could occur in our research model resulting from the formula relationships among variables (e.g., $CCC = DSO + DIO - DPO$) in the model, with data collected from firms' financial statements. In addition, endogeneity can result from unobserved variables such as economic conditions, or market cycles of industry in specific economy. To solve this problem, the most favored techniques to date that yield unbiased and consistent results are instrumental

variables (IVs) and generalized method of moments (GMM). However, the GMM estimator is used in the present study for two reasons: First, if there is heterogeneity, the GMM estimator is more efficient than the single IV instrumental variable estimator simple; whereas if there is no heterogeneity, the GMM estimator is no worse than the IV method (Baum et al., 2003). Second, the use of the IV method leads to robust but not necessarily efficient to estimates of the model parameters because it does not use the available moment conditions and does not consider the structure taking the difference of the residual (Baltagi, 2001). GMM estimators, including first-difference GMM (DIF-GMM), developed by Arellano and Bover (1995), and system GMM (SYS-GMM), developed by Blundell and Bond (1998), are becoming increasingly popular to estimate with dynamic panel data sets. Blundell and Bond (1998) and Bond et al. (2001) have shown that the DIF-GMM estimator is shown to have poor finite samples of bias and imprecision, when the series is persistent. They also show that DIF-GMM suffers from large downward finite sampling bias, especially when T is small. Therefore, a system GMM proposed by Arellano and Bover (1995) should be used to test the impact of WCM components on firm profitability (see Appendix 2).

Table 7 and Table 8 show our baseline results of the impact of WCM components on firm profitability of construction and consumer goods firms from 2011 to 2020 using the system GMM. The Sargan/Hansen test and the Arellano/Bond test for second-order autocorrelation have p-values for diagnostic tests that are statistically insignificant. When the moment conditions are met and the instruments are justified, this means that there are no overly restrictive constraints (Arellano & Bond, 1991). Further evidence that the system GMM is appropriate for use in our study comes from the fact that the coefficients of lagged measures of ROA (L1.ROA) are notably positive and significant, suggesting that ROA is persistent over time.

For consumer goods firms (Table 8), we found the significant positive impact of DSO on ROA ($\beta = 0.0003901$, t-value = -3.93), the significant negative impact of DIO on ROA ($\beta = -0.0009237$, t-value = -3.93), and the insignificant negative impact of NWC on ROA ($\beta = -0.0000102$, t-value = -0.95). We cannot make conclusions of the impact of CCC and DPO on ROA because these variables were omitted from the regression model. Thus, hypothesis 1 is partially accepted in the case of consumer goods firms.

Table 7. The results of our baseline model (consumer goods firms)						
ROA	Coef.	Std. Err.	t	P > t	95% Conf. Interval	
ROA L1.	0.6822356	0.082928	8.23	0.000	0.5092509	0.8552203
DSO	0.0003901	0.0009409	-3.93	0.001	-0.0015724	0.0023527
DIO	-0.0009237	0.000235	-3.93	0.001	-0.001414	-0.0004335
NWC	-0.0000102	0.0000108	-0.95	0.356	-0.0000326	0.0000123
SIZE	-0.0551704	0.0195075	-2.83	0.010	-0.0958623	-0.0144785
LEV	-0.0022372	0.0007856	-2.85	0.010	-0.003876	-0.0005984
CR	-0.0210277	0.0335433	-0.63	0.538	-0.0909977	0.0489423
GRO	0.0033064	0.001527	2.17	0.043	0.0001212	0.0064917
_cons	2.093289	0.6987367	3.00	0.007	0.63575	3.550828
No. of obs.				189		
No. of instruments				20		
AR1 (p-value)				0.060		
AR2 (p-value)				0.342		
Sargan test (p-value)				0.960		
Hansen test (p-value)				0.785		

Source: Authors' estimation.

Table 8. The results of our baseline model (Construction firms)

ROA	Coef.	Std. Err.	t	P > t	95% Conf. Interval	
ROA L1.	0.562607	0.0877114	6.41	0.000	0.3853356	0.7398784
DSO	-8.76e-07	0.0000595	-0.01	0.988	-0.0001211	0.0001193
DIO	-0.0003287	0.0001079	-3.05	0.004	-0.0005469	-0.0001106
DPO	-0.0001221	0.0003294	-0.37	0.713	-0.0007878	0.0005437
NWC	-0.000082	0.0000348	-2.36	0.024	-0.0001523	-0.0000116
SIZE	0.0324269	0.0178686	1.81	0.077	-0.0036868	0.0685406
LEV	-0.0009117	0.0008166	-1.12	0.271	-0.0025621	0.0007387
CR	-0.0418027	0.0155546	-2.69	0.010	-0.0732396	-0.0103657
GRO	0.0031289	0.0004684	6.68	0.000	0.0021821	0.0040756
_cons	-0.4369199	0.436441	-1.00	0.323	-1.319	0.4451603
No. of obs.				369		
No. of instruments				23		
AR1 (p-value)				0.009		
AR2 (p-value)				0.353		
Sargan test (p-value)				0.808		
Hansen test (p-value)				0.734		

Source: Authors' estimation.

For construction firms (Table 9), we found the insignificant negative impact of DSO and DPO on ROA ($\beta = -8.76e-07$, t-value = -0.01; $\beta = -0.0001221$, t-value = -0.37, respectively) and the significant negative impact of DIO and NWC on ROA ($\beta = -0.0003287$, t-value = -3.05; $\beta = -0.000082$, t-value = -2.36, respectively). We cannot make conclusions of the impact of CCC on ROA because the variable was omitted from the regression model. Thus, hypothesis 1 is partially accepted in the case of construction firms.

Comparison of the impact of WCM on firm profitability between consumer goods firms and construction firms is presented in Table 9. The comparison results show that the impact of DSO on ROA of consumer goods firms is different from that of construction firms (significantly positively vs. insignificantly negatively); the impact of DIO on ROA of consumer goods firms is similar to that of construction firms (significantly negatively); and the impact of NWC on ROA of consumer goods firms is different from that of construction firms (insignificantly negatively vs. significantly negatively). We found no evidence to support hypothesis 1 on the impact of CCC and DPO on ROA for the two groups of firms; therefore the comparison cannot be made.

4.5. Independent samples t-test for WCM between consumer goods and construction firms

The independent samples t-test is a statistical method used to compare the means of two distinct groups. When samples are drawn from two distinct populations, the sample's mean value may vary. In this study, mean difference between two groups is equal to mean (consumer goods) minus mean (construction). To compare the WCM policy of two groups, we proposed hypotheses: $H_0: \text{diff} = 0$; $H_a: \text{diff} < 0$: $\Pr(T < t)$; $H_a: \text{diff} = 0$: $\Pr(|T| > |t|)$; $H_a: \text{diff} > 0$: $\Pr(T > t)$. Where: $\Pr(T < t)$, $\Pr(T > t)$ are the one-tailed p-values for evaluating the alternatives (mean < H_0 value) and (mean > H_0 value), respectively. Like $\Pr(|T| > |t|)$, they are computed using the t-distribution. If the p-value is less than the pre-specified alpha level (usually 0.05 or 0.01), we conclude that the mean difference is statistically significantly greater than or less than zero. The test results (Table 10) show that CCC, DOS, DIO, and DPO of consumer goods firms are significantly shorter than those of construction firms. However, NWC of consumer goods firms is significantly larger than that of construction firms. The findings imply that the WCM of the two groups of firms is different due to industry specificity.

Table 9. Comparison of the impact of WCM components on firm profitability between consumer and construction firms

	Consumer goods	Construction	Comparative result
DSO	0.0003901***	-8.76e-07	Different
	(0.001)	(0.988)	
DIO	-0.0009237***	-0.0003287***	Similar
	(0.001)	(0.004)	
DPO	N/A	-0.0001221	Cannot conclude
	N/A	(0.713)	
NWC	-0.0000102	-0.000082**	Different
	(0.356)	(0.024)	

Notes: Bolded numbers are beta coefficients, number in bracket is p-value; **The significance at 5%; ***The significance level at 1%.

Table 10. Compare mean by industry for consumer goods and construction firms

WCM	Group	Obs	Mean	Mean difference	P-Value
DSO (days)	Consumer goods	210	53.50	-171.18	0.000
	Construction	410	224.68		
DIO (days)	Consumer goods	210	118.68	-73.97	0.000
	Construction	410	192.65		
DPO (days)	Consumer goods	210	42.79	-64.21	0.000
	Construction	410	107.00		
CCC (days)	Consumer goods	210	129.39	-180.94	0.000
	Construction	410	310.33		
NWC (in bil.)	Consumer goods	210	819.304	564.29	0.000
	Construction	410	255.01		

5. Discussion

Our study found that DSO impacts positively significantly and DIO impacts negatively significantly on ROA of consumer goods firms, while NWC impacts insignificantly negatively on ROA. DSO reflects the credit sales policy of a firm. Lengthening the sales collection period may increase a firm's revenues and then improve the firm's profit. DIO reflects the investment level of a firm's inventory. Maintaining a high-level inventory may reduce a firm's shortage cost but increase the firm's cost of funds, resulting in a decrease in the firm's profit. NWC reflects a firm's financing policy. A positive NWC confirms that a part of current assets are financed with long-term capital. The cost of long-term funds usually is higher than that of short-term funds; thus, a heavy use of long-term funds may reduce a firm's profit. Our findings are similar to those of the study of Phương and Chau (2020). Phương and Chau (2020) found that collection period impacts positively, but inventory period impacts negatively, on ROA of 17 listed food companies in Vietnam.

For construction firms, DSO and DPO impact insignificantly negatively on ROA. DIO and NWC impact significantly negatively on ROA. In average, NWC of selected construction firms is positive and smaller than that of selected consumer goods firms. Construction firms are characterized as a single-unit production organization due to the characteristics of their products. The time required

to complete a product is often long, even measured in years, and the product value is often high; thus, it can be assumed that DSO is not only influenced by credit sales term but also production period. DPO reflects the payment policy of a firm. Construction firms may buy construction materials in credit or use trade credit to finance current assets. The fact that trade credit is very costly compared to other short-term funds lengthens the payment period, increasing cost of funding and reducing the firm's profit. Our findings are different from those of the study of Pham et al. (2020). They found a positive influence of DPO, DIO, and DSO on ROA of 20 steel companies listed in Vietnam stock markets.

In summary, our study findings prove the impact of WCM on firm profitability and the moderating role of industry specificity on the relationship between WCM and firm profitability. Our findings also provide the explanation for the differences of previous studies' empirical findings on the same topic in Vietnam context. We provided empirical evidence in specific context like Vietnam to confirm the importance of WCM in financial management to reach management goals.

6. Conclusion

The study was conducted to compare the impact of WCM on firm profitability of consumer goods and construction firms listed in Vietnam Stock Markets from 2011 to 2020. Data were collected from the audited financial statements of 21 consumer goods companies and 41 construction firms, applying GMM econometric model to test the impact of WCM components on ROA. In data processing, we found autocorrelation and multicollinearity issues among variables in the research model. For consumer goods firms, both CCC and DPO variables were omitted in the running regression test with GMM; and for the case of construction firms, CCC was omitted. Regression test resulted in the different impact of WCM components on ROA of the two groups of firms. To investigate the difference in WCM policy between the two firm groups, the independent samples t-test was applied, which indicated that both consumer goods firms and construction firms have applied conservative WCFP.

The research findings imply that industry specificity may be a factor explaining the difference in the impact of WCM components on ROA between different industries. From the financial management theory perspective, the research findings confirmed the importance role of WCM in explaining firm profitability and the industry's characteristics in explaining the different impacts of WCM on firm profitability belonging to different industries. From a practical point of view, the findings imply that construction firms' management should focus on managing WC because WCM has a significant impact on construction firms' profitability. However, our findings may be generalized with caution of the specific context in which the study was undertaken. Further research may consider external factors such as economic conditions and market structure in the research model.

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Appendices
Appendix1: List of Companies

STK	Company Common Name	GICS Code	Company Activity	Date of Incorporation	Date Became Public	IPO Date
ABT	Bentre Aqua product Import and Export JSC	3020	Seafood Product Preparation & Packaging	25/12/2003	01/04/2021	01/04/2021
ANV	Nam Viet Corp	3020	Seafood Product Preparation & Packaging	01/01/1993	07/12/2007	07/12/2007
BCE	Binh Duong Construction & Civil Engineering JSC	2010	Construction & Engineering (NEC)	25/02/2002	28/06/2010	28/06/2010
BLF	Bac Lieu Fisheries JSC	3020	Seafood Product Preparation & Packaging	20/06/2006	02/06/2008	02/06/2008
C47	Construction JSC 47	2010	Construction & Engineering (NEC)	08/09/1975	30/03/2011	30/03/2011
C92	Construction and Investment JSC No 492	2010	Construction & Engineering (NEC)	30/08/1997	19/11/2007	19/11/2007
CAN	Ha Long Canned Food Joint Stock Corp	3020	Food Processing (NEC)	01/01/1957	22/10/2001	22/10/2001
CLC	Cat Loi JSC	3020	Cigars & Cigarette Manufacturing	19/02/2004	16/11/2006	16/11/2006
CMX	Camimex Group JSC	3020	Seafood Product Preparation & Packaging	12/01/2006	09/11/2010	09/11/2010
CSC	Cotana Group JSC	2010	Construction & Engineering (NEC)	04/02/2004	04/11/2009	04/11/2009
DBC	DABACO Group	3020	Animal Feed	23/12/2004	26/07/2019	26/07/2019

(Continued)

(Continued)

STK	Company Common Name	GICS Code	Company Activity	Date of Incorporation	Date Became Public	IPO Date
DJH	Development Investment Construction Hoi An JSC	2010	Construction & Engineering (NEC)	01/03/2006	27/04/2011	27/04/2011
FCN	Fecon Corp	2010	Construction & Engineering (NEC)	18/06/2004	24/07/2012	24/07/2012
HAS	Hacisco JSC	2010	Telecommunication Construction	18/12/1996	19/12/2002	19/12/2002
HBC	Hoa Binh Construction Group JSC	2010	Construction & Engineering (NEC)	01/12/2000	27/12/2006	27/12/2006
HHC	Haiha Confectionery JSC	3020	Chocolate & Confectionery	20/01/2004	20/11/2007	20/11/2007
IDJ	I.D.I International Development and Investment Corp	3020	Seafood Product Preparation & Packaging	15/07/2003	30/06/2011	30/06/2011
KDC	Kido Group Corp	3020	Chocolate & Confectionery	01/01/1993	12/12/2005	12/12/2005
L10	Lilama 10 JSC	2010	Construction & Engineering (NEC)	02/01/1996	25/12/2007	25/12/2007
L14	LICOGI 14 JSC	2010	Construction & Engineering (NEC)	02/01/1996	13/09/2011	13/09/2011
L18	Construction And Investment JSC No 18	2010	Construction & Engineering (NEC)	01/07/2008	23/04/2008	23/04/2008
LAF	Long An Food Processing Export JSC	3020	Food Processing (NEC)	01/01/2000	14/04/2021	14/04/2021

(Continued)

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STK	Company Common Name	GICS Code	Company Activity	Date of Incorporation	Date Became Public	IPO Date
LCS	Licogi 166 JSC	2010	Construction & Engineering (NEC)	18/05/2007	06/07/2010	06/07/2010
LIG	Licogi 13 JSC	2010	Construction & Engineering (NEC)	01/01/1996	22/04/2010	22/04/2010
LM8	Lilama 18 JSC	2010	Civil Engineers & Architects	02/01/1996	15/11/2010	15/11/2010
LUT	Luong Tai Investment Construction JSC	2010	Construction & Engineering (NEC)	27/02/2003	04/01/2008	04/01/2008
MCF	Mechanics Construction and Foodstuff JSC	3020	Food Processing (NEC)	18/02/2005	14/02/2011	14/02/2011
MCO	BDC Viet Nam Construction and Investment JSC	2010	Construction & Engineering (NEC)	05/07/2002	21/12/2006	21/12/2006
MSN	Masan Group Corp	3020	Food Processing (NEC)	18/11/2004	05/11/2009	05/11/2009
NSC	Vietnam National Seed Group JSC	3020	Grain (Crop) Production	06/02/2004	06/04/2021	06/04/2021
NST	Ngan Son JSC	3020	Tobacco Farming	20/07/1996	29/12/2006	29/12/2006
PXI	Petroleum Industrial and Civil Construction JSC	2010	Construction & Engineering (NEC)	26/11/2009	21/06/2010	21/06/2010
REE	Refrigeration Electrical Engineering Corp	2010	Building Contractors	29/12/1993	28/07/2000	28/07/2000
S55	Song Da 505 JSC	2010	Construction & Engineering (NEC)	09/08/2004	22/12/2006	22/12/2006

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STK	Company Common Name	GICS Code	Company Activity	Date of Incorporation	Date Became Public	IPO Date
S99	SCI JSC	2010	Construction & Engineering (NEC)	28/12/2007	22/12/2006	22/12/2006
SD2	Song Da 2 JSC	2010	Construction & Engineering (NEC)	18/02/1980	30/11/2007	30/11/2007
SD4	Song Da 4 JSC	2010	Construction & Engineering (NEC)	18/05/1989	25/06/2008	25/06/2008
SD5	Song Da No5 JSC	2010	Construction & Engineering (NEC)	03/05/1990	27/12/2006	27/12/2006
SD6	Song Da 6 JSC	2010	Construction & Engineering (NEC)	12/04/1983	25/12/2006	25/12/2006
SD9	Song Da No 9 JSC	2010	Construction & Engineering (NEC)	04/01/2006	20/12/2006	20/12/2006
SDC	Song Da Consulting JSC	2010	Civil Engineers & Architects	01/01/2001	25/12/2006	25/12/2006
SDT	Song Da No 10 JSC	2010	Construction & Engineering (NEC)	11/02/1981	14/12/2006	14/12/2006
SJ1	Hung Hau Agricultural Corp	3020	Seafood Product Preparation & Packaging	10/07/2000	08/06/2009	08/06/2009
SJE	Song Da No 11 JSC	2010	Construction & Engineering (NEC)	12/12/1989	14/12/2006	14/12/2006
SMB	Sai Gon Mien Trung Beer JSC	3020	Brewers (NEC)	26/09/2008	03/08/2018	03/08/2018
TAC	Tuongan Vegetable Oil JSC	3020	Starch, Vegetable Fat & Oil Manufacturing	27/09/2004	26/12/2006	26/12/2006

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STK	Company Common Name	GICS Code	Company Activity	Date of Incorporation	Date Became Public	IPO Date
TKC	Tan Ky Construction Real Estate Trading Corp	2010	Construction & Engineering (NEC)	12/05/1999	01/12/2009	01/12/2009
TS4	Seafood JSC No 4	3020	Seafood Product Preparation & Packaging	01/01/1995	08/08/2002	08/08/2002
TSC	Techno-Agricultural Supplying JSC	2010	Fruit & Vegetable Processing	31/10/1992	24/09/2007	24/09/2007
TV2	Power Engineering Consulting JSC 2	2010	Civil Engineers & Architects	01/07/1985	06/06/2019	06/06/2019
UDC	Urban Development and Construction Corp	2010	Construction & Engineering (NEC)	22/06/1995	05/07/2010	05/07/2010
V12	Viet Nam Construction JSC No 12	2010	Construction & Engineering (NEC)	03/12/1996	05/01/2010	05/01/2010
V21	Vinaconex 21 JSC	2010	Construction & Engineering (NEC)	10/03/2005	21/04/2010	21/04/2010
VC2	Vina2 Investment and Construction JSC	2010	Construction & Engineering (NEC)	24/10/2003	11/12/2006	11/12/2006
VC6	Visicons Construction and Investment JSC	2010	Construction & Engineering (NEC)	17/07/2000	28/01/2008	28/01/2008
VC9	Construction JSC No 9	2010	Construction & Engineering (NEC)	15/11/1977	05/11/2009	05/11/2009
VCC	Vinaconex 25 JSC	2010	Construction & Engineering (NEC)	01/01/1984	05/02/2009	05/02/2009
VCG	Viet Nam Construction and Import-Export Joint Stock Corp	2010	Construction & Engineering (NEC)	01/12/2006	29/12/2020	29/12/2020

(Continued)

(Continued)

STK	Company Common Name	GICS Code	Company Activity	Date of Incorporation	Date Became Public	IPO Date
VHC	Vinh Hoan Corp	3020	Seafood Product Preparation & Packaging	17/04/2007	24/12/2007	24/12/2007
VNE	Vietnam Electricity Construction Joint Stock Corp	2010	Construction & Engineering (NEC)	01/12/2005	09/08/2007	09/08/2007
VNM	Vietnam Dairy Products JSC	3020	Dairy Products	01/01/1992	19/01/2006	19/01/2006
VSI	Water Supply Sewerage Construction and Investment JSC	2010	Water & Sewage Construction	09/04/2008	24/12/2010	24/12/2010

Appendix2.

Regression tests with GMM

xtabond2 ROA L.ROA DSO DIO DPO NWC SIZE LEV CR GRO, gmm(L.ROA DSO DIO DPO NWC SIZE, lag (7 6)collapse) iv(SIZE LEV CR GRO) h(3)small t

> wostep

Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.

Dynamic panel-data estimation, two-step system GMM

Group variable: ID		Number of obs=		369		
Time variable : YR		Number of groups=		41		
Number of instruments = 23		Obs per group: min =		9		
F(9, 40) = 702.14		avg =		9.00		
Prob > F = 0.000		max =		9		
ROA	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ROA						
L1.	.562607	.0877114	6.41	0.000	.3853356	.7398784
DSO	-8.76e-07	.0000595	-0.01	0.988	-.0001211	.0001193
DIO	-.0003287	.0001079	-3.05	0.004	-.0005469	-.0001106
DPO	-.0001221	.0003294	-0.37	0.713	-.0007878	.0005437
NWC	-.000082	.0000348	-2.36	0.024	-.0001523	-.0000116
SIZE	.0324269	.0178686	1.81	0.077	-.0036868	.0685406
LEV	-.0009117	.0008166	-1.12	0.271	-.0025621	.0007387
CR	-.0418027	.0155546	-2.69	0.010	-.0732396	-.0103657
GRO	.0031289	.0004684	6.68	0.000	.0021821	.0040756
_cons	-.4369199	.436441	-1.00	0.323	-1.319	.4451603

Warning: Uncorrected two-step standard errors are unreliable.

Instruments for first differences equation

Standard

(SIZE LEV CR GRO)

GMM-type (missing = 0, separate instruments for each period unless collapsed) L(6/7). (L.ROA DSO DIO DPO NWC SIZE) collapsed

Instruments for levels equation Standard

SIZE LEV CR GRO

_cons

GMM-type (missing = 0, separate instruments for each period unless collapsed) DL5. (L.ROA DSO DIO DPO NWC SIZE) collapsed

Arellano-Bond test for AR(1) in first differences: $z = -2.62$ $Pr > z = 0.009$

Arellano-Bond test for AR(2) in first differences: $z = 0.93$ $Pr > z = 0.353$

Sargan test of overid. restrictions: $\chi^2(13) = 8.52$ $Prob > \chi^2 = 0.808$

(Not robust, but not weakened by many instruments.)

Hansen test of overid. restrictions: $\chi^2(13) = 9.50$ $Prob > \chi^2 = 0.734$

(Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:

GMM instruments for levels

Hansen test excluding group: $\chi^2(7) = 7.00$ $Prob > \chi^2 = 0.429$

Difference (null H = exogenous): $\chi^2(6) = 2.51$ $Prob > \chi^2 = 0.868$

iv(SIZE LEV CR GRO)

Hansen test excluding group: $\chi^2(9) = 8.72$ $Prob > \chi^2 = 0.463$

Difference (null H = exogenous): $\chi^2(4) = 0.78$ $Prob > \chi^2 = 0.941$