



温州肯恩大学
WENZHOU-KEAN UNIVERSITY

**Relationship between liquidity and profitability: Evidence from small and medium
(SMEs) in China**

In Partial Fulfillment of the Requirements
for the Bachelor of Science in Accounting

by

CHEN Yu

1025572

May, 2020

Relationship between Liquidity and Profitability: Evidence from Small and Medium (SMEs) in China

Chen Yu (1025572)
Wenzhou-Kean University

Abstract

The aim of this study is to investigate whether a firm's liquidity has an impact on a firm's profitability in Chinese SMEs. I employ multiple proxies to measure SMEs performance: (1) Return on Asset, (2) Return on Equity, and (3) Net Profit Ratio. Using a large sample of Chinese SMEs from 2009 to 2018, this paper finds that Cash Conversion Cycle has significant negative relationship with SMEs performance. In the robustness test, I use pair-wise Granger Casualty Test and also find that firm's liquidity has an impact on a firm's profitability in Chinese SMEs, especially between Return on Asset and Cash Ratio and between Net Profit Ratio and Cash Conversion Cycle. These results allow managers of Chinese SMEs to have clear ideas in managing working capital to generate more profits based on their relationship.

Keywords: Liquidity, profitability, Chinese small and medium enterprises (SMEs), Granger Casualty

I. INTRODUCTION

In this study, I examined the relationship and effect between the profitability and liquidity among Chinese Small and Medium-size Enterprises (SMEs). According to previous studies, the relationship between liquidity and profitability seems that a firm pursues one side will mean a trade-off of the other (e.g. Ben-Caleb et al. 2013; Chatterjee 2012; Mohanty and Menrotra 2018). That's mainly because maintaining adequate liquidity is crucial to ensure the smooth running of a business and meets a firm's short-term obligation, yet it sacrifices potential profits by investing the money in short-term securities (Owolabi and Obida 2012). Most scholars drew the conclusion that liquidity has a negative relationship with profitability (e.g. Mohanty and Menrotra 2018; Eljelly 2004), but Hirigoyen (1985) demonstrated that the relationship between liquidity and profitability could be positive. Further, Bagchi (2015) found both bilateral causality and unidirectional causality among some specific profitability and liquidity measures.

In China, liquidity management becomes a very important financial decision due to financing constraints, and many Chinese companies may tend to retain cash flows or cash equivalents for precautionary or speculative reasons (Lian et al. 2010). Yet the widely accepted trade-off theory believes that the high liquidity will sacrifice the profitability of firms (Eljelly 2004). Unfortunately, there are limited related studies that could support managers of Chinese SMEs to make right decisions, and I only found Mohanty and Mehrotra (2018) in India investigated liquidity and profitability's relationship of SMEs. Other papers I found studied liquidity and profitability relationships did not exclusively focus on SMEs (e.g. Lazaridis and Tryfonidis 2005; Owolabi and Obida 2012; Periyathampy and Karthika 2003). Therefore, the main aim of this study is to figure out a comprehensive relationship between liquidity and profitability in Chinese SMEs. To be more specific, two questions will be figured out in this study: First, Is there any effect between liquidity and profitability in selected Chinese SMEs? Second, Is there any causal relationship between liquidity and profitability measures in selected Chinese SMEs?

The research does matter because Small and Medium-size Enterprises (SMEs) are playing an important role especially in the developed and newly industrialized countries. China has implemented the market-oriented economy since 40 years ago, which triggered the prosperous development of SMEs in China and enhanced their vital economic status (Liu and Tian 2009). Therefore, further knowledge about SMEs is desired by Chinese SMEs managers and CEOs. For no matter what kind of company, capital structures and working capital management are basic deals of corporate finance. Therefore, realizing that insufficient evidence available for Chinese SMEs to support their profitability and liquidity management, this research tries to provide more comprehensive information in this field.

In the study, I used the latest 10 years data of 249 Chinese SMEs from 2009 to 2018 and collected financial ratios from CSMAR to conduct tests in effect and causal relationships between selected measures of liquidity and profitability simultaneously. Current Ratio (CR), Cash Ratio (CAR), Quick Ratio (QR), and Cash Conversion Cycle (CCC) were set as independent variables; Return on capital employed (ROCE), Net Profit Ratio (NPR), and Return on Asset (ROA). The panel regression showed that these three liquidity ratios had a positive, insignificant influence on NPR and ROA, but had a negative, significant influence on ROE. Yet CCC had a negative, significant influence on all dependent variables. The Granger causality showed that there existed both bilateral causality and unidirectional causality relationships among some specific profitability and liquidity measures.

The findings of this study contribute some new ideas to the existing literature. First, to be best of our knowledge, it might be the first study that deeply focuses on the relationship between liquidity and profitability of Chinese SMEs. Second, the study involved all available and qualified companies listed on Shenzhen Stock Exchange (SZSE) in China during the ten-year span. Therefore, the results could be applied to most SMEs in China. Finally, this study involved more financial ratios which can provide useful advice for managers to make wiser decisions in capital budgeting and utilization in Chinese SMEs.

The remainder of this research will be organized as follows. In the second section, I do the literature reviews to present more available knowledge related to this topic. In section three, I introduce the data selected and various quantitative tests in my research. In the fourth section, I present the results and discuss the findings, and in the last section, I draw conclusions and present research limitations and further work.

II. LITERATURE REVIEW

Scholar Mohanty and Menrotra (2018) claimed that liquidity and profitability are the two main elements of working capital management (WCM). The Liquidity management of SMEs, to be more specific, is the performance of cash flow and cash conversion efficiency. This refers to a company's ability to generate cash from their daily transactions and to collect account receivables. In their research, they explored the relationship between liquidity and profitability among SMEs in India, and they found that measures of liquidity CR and QR has a negative relationship with profitability measure NPM, ROA, and ROCE. They also suggested that financial leverage and sales growth had a significant influence on performance on selected SMEs. When EMSs have more debt, the more returns firms will earn.

Eljelly (2004) used CR to measure the liquidity of firms in his study, and he found that when CR was lower, the firm had better performance. The result demonstrated that there was a significant negative relationship between liquidity and profitability in his studies. The study also found cash gap and size of firms are other important elements to measure the liquidity.

However, Hirigoyen (1985) found that the relationship between liquidity and profitability could be positive in the medium and long run when poor liquidity management leads to a greater need for loans, thus increasing financial expenses, which causes low profitability. Yet poor profitability management would sequentially fail to generate enough cash flow.

Vishnani and Shah (2007) used CR as a measure of liquidity and Return on investment as the measure of profitability in their study. They found that a higher CR indicates more investment in current assets and less return on investment in the firm, thus the excessive investment in current assets would hurt the profitability of firms. On the other hand, lower CR could indicate less investment in current assets, which means a potential higher return on investment. However, low investment in current can cause operation problems such as frequent stock-out and more accounts payable.

Other studies showed that CCC has a significant negative effect on the firm's profitability- the shorter Cash conversion cycle can prove the performance of the firm (Lazaridis and Tryfonidis 2005; Garcia-Teruel and Martinez-Salano 2007; Ben-Caleb et al. 2013). Padachi (2006) provided much further information that elongating CCC may enhance profitability due to an increase in sales to some extent, but it leads to a negative effect if the cost of fund block outnumbers advantages.

Bagchi (2015) found causalities between some specific profitability and liquidity ratios, such as bidirectional causality between ROA and absolute liquid ratio and unidirectional causality exists among other selected variables, such as from CCC to ROA. So these ratios can be used to predict the other. Alom (2018) recently claimed in his study that profitability not only influences the liquidity significantly in the short-run but also has co-integration relationship with liquidity in the long run. And he also found that CR has a strong bidirectional causality relationship with ROA.

Shen (2010) suggested that there were many problems existing in Chinese SMEs' working capital management, such as poor management of cash and bank accounts, wrong decision makings in short-term investments, and insufficient arrangements in operation cycles. These problems cause Chinese SMEs operation difficulties.

Liu and Tian (2018) found Chinese SMEs suffer from “size discrimination”, which means smaller the size of the firm, the harder for it to get financing from banks and financial institutions. Van and Yang (2014) found that most Chinese SMEs mainly rely on owners’ savings or family investments, so they face with illiquidity problems due to the lack of capital. They also found that SMEs owners’ limited abilities in financial statement interpretation lead to failure in decision making.

III. RESEARCH METHODOLOGY

Sampling Technique and Study Design

The study obtains secondary data form CSMAR database from 2009 to 2018. The data provided by CSMAR is free from the bias and accurate and available for download and operation. Therefore the data used in the study is objective and justified. The purposive sampling method is adapted in the data sampling process.

Data Source and Sample Size

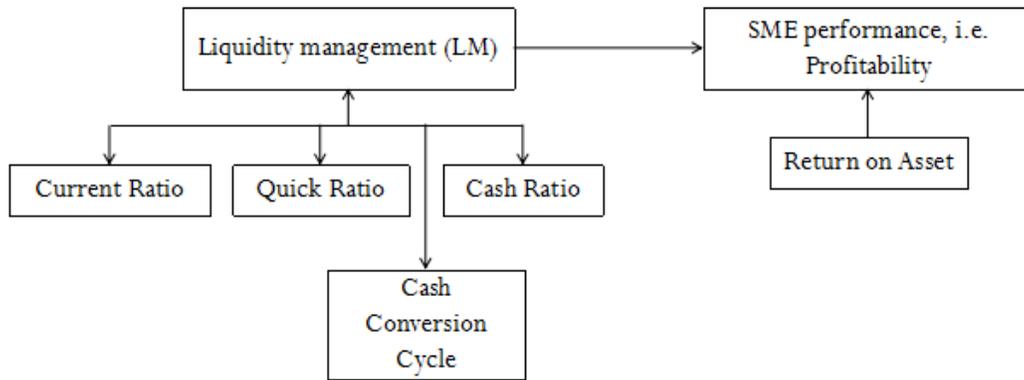
To analyze the relationship between liquidity and profitability of Chinese SEMs, the data used in this research is collected from the CSMAR database of Chinese SMEs listed on Shenzhen Stock Exchange (SZSE). But we excluded financial firms due to their distinct capital structures compared to other industries. Special Treatment companies (“ST firms” operate two consecutive years of losses with delisted risk warning stock), negative-equity firms, and firms who have significant changes that happened in their operations activities are also supposed to exclude (Liu and Tian 2018). There are totally of 249 SMEs firms listed on the market before 2008 and meet all criteria. Hence, consolidated statements of these 249 SMEs are extracted and the study is made for 10 years ranging from 2009 to 2018.

Research Framework and Data Analysis

Financial ratio analysis is chosen as the measurement of the liquidity and profitability management, since this method has been applied and justified by previous studies (Mohanty and Menrotra 2018), and the analysis can be conducted by using the information post in financial statements. The measures of liquidity management chosen in this study are Current ratio (CR), Quick Ratio (QR), Cash Ratio (CAR), and Cash Conversion Cycle (CCC). The measures of profitability management used by previous studies, such as Net Profit Ratio (NPR), Return on Asset (ROA), and Return on Equity (ROE). The profitability evaluates the efficiency with generating profit form the investment in plant, equipment, and current assets, in this study, the measures of profitability are defined as dependent variables. The independent variables are represented by liquidity measures which reflect the effectiveness of SME’s performance. In addition, according to the previous studies, other factors such as sales growth ratio (SGR) and financial debt ratio (FDR) will affect the profit performance, thus set them as

control variables in this study. Therefore, the research framework of the study is structured as shown in Figure 1.

FIGURE 1
Research Framework and Data Analysis



To achieve the research on the relationship between profitability and liquidity:

1. Correlation analysis is conducted to study the interrelationship (strength and direction of the linear relationship) between dependent and independent variables.
2. Panel regression analysis is conducted to study the cross-sectional and time-series data and analyze the effect between liquidity and profitability measures.
3. The main regression model of effect analysis between liquidity and profitability measures of selected SMEs are as follows:

$$\text{Profitability}_{it} = \alpha_1 + \alpha_2 \text{Liquidity}_{it} + \alpha_3 \text{SGR}_{it} + \alpha_4 \text{FDR}_{it} + \varepsilon$$

Where profitability is measured by ROA, ROE, NPR, and liquidity is measured by CR, QR, CAR, and CCC. And *it* in the equation means the figure of companies *i* at the time *t*; *i* = 1, 2 ...249 and *t*=1, 2...10 years. Measurements of variables are shown in Table 1.

TABLE 1
The Computations of Variables

Variables	Measures	Sources
Net profit Ratio (NPR)	Net Profit/Sales	CSMAR
Return on Asset (ROA)	Net income/Total asset	CSMAR
Return on Equity (ROE)	Net income/ Total capital employed	CSMAR
Current Ratio (CR)	Current Assets/Current Liabilities	CSMAR
Quick Ratio (QR)	(Cash + Cash Equivalents + Short-Term Investments + Current Receivables)/ Current Liabilities	CSMAR
Cash Ratio (CAR)	Cash/Current Liabilities	CSMAR

TABLE 1
The Computations of Variables (continued)

Variables	Measures	Sources
Cash Conversion Cycle (CCC)	Inventory Period + Account Received Period - Account Payable Period	CSMAR
Sales Growth Ratio (SGR)	Current Period Net Sales - Prior Period Net Sales / Prior Period Net Sales	CSMAR
Financial Debt Ratio (FDR)	Total Debt/Total Assets	CSMAR

IV. RESULTS

This paper applies two main kinds of analysis: descriptive statistics and quantitative analysis. The results and findings for different measures of liquidity and profitability are presented in this section.

Descriptive Statistics

The information about mean, maximum, minimum, and standard deviation figures of selected data from 249 Chinese SMEs during the period 2009 to 2018 is represented in the Table 2. As the results show, the mean value of independent variable CCC was 172.1330 with a maximum value 5016.7070 and a minimum value -580.5794, and the standard deviation was 326.4132. The average CR was 2.3213 with a maximum value of 48.4713 and a minimum value 0.0747, and the standard deviation was 2.5841. The CAR has mean value of 0.8400 with a maximum value of 0.3645 and a minimum value of 41.7531, and the standard deviation was 1.7575. The QR ranges from 0.0499 to 47.6673 with mean value of 1.5365, and the standard deviation is 2.1730.

For the dependent variables, the mean value of ROA was 0.0430 with a maximum value 0.3840 and a minimum value -1.6479, and the standard deviation is 0.0780. The average ROE is 0.0619 with a maximum value of 0.7149 and a minimum value -8.4851, and the standard deviation was 0.2465. The NPR had mean value of 0.0702 with the maximum of 0.8420 and the minimum of -7.2612, and the standard deviation was 0.2308. As for the control variables, The FDR had mean value of 0.4190 with the maximum of 0.9155 and the minimum of 0.0178, and the standard deviation was 0.1909. The SGR ranged from -0.8344 to 23.9984 with mean value of 0.2299, and the standard deviation was 0.8721.

TABLE 2
Descriptive statistics for all variables

	CCC	CR	CAR	QR	ROA	ROE	NPR	FDR	SGR
Mean	174.1330	2.3213	0.8400	1.5365	0.0430	0.0619	0.0702	0.4190	0.2299
Maximum	5016.7070	48.4713	41.7531	47.6673	0.3840	0.7149	0.8420	0.9155	23.9984
Minimum	-580.5794	0.0747	-0.0518	0.0499	-	-	-	0.0178	-0.8344
Std. Dev.	326.4132	2.5841	1.7575	2.1730	1.6479	8.4851	7.2612	0.2308	0.8721

Note: 249 Chinese SMEs, 2009-2018: 2490 firm year observation

Quantitative Analysis

Correlation Analysis

The results of correlation are summarized in Table-3, from which I can see that correlations between dependent variables NPR and independent variables such as CAR (0.1878), CR (0.2189), and QR (0.2013) were positive, weak, and significant, but NPR had negative, weak, and significant correlations with independent variable CCC (-0.0691). And NPR had a negative, weak, and significant relationship with control variables FDR (-0.2514) and SGR (0.0830). The correlations between dependent variable ROE and independent variables such as CAR (0.0669), CR (0.0796), and QR (0.0738) were positive, weak, and significant, but ROE had negative, weak, and significant relationships with independent variable CCC (-0.0648). And ROE had a negative, weak, and a significant relationship with control variable FDR (-0.1495) and a positive, weak, and significant relationship with SGR (0.0943). The correlations between dependent variable ROA and independent variables such as CAR (0.2050), CR (0.2341), and QR (0.2197) were positive weak, and significant, but ROA had a negative weak, and significant relationships with independent variable CCC (-0.0947). And ROA had a negative, weak, and significant relationships with control variables FDR (-0.3245) and a positive, weak, and significant correlation with SGR (0.0943).

Overall, the liquidity measures had significant associations with profitability measures. The liquidity ratios CAR, CR, and QR had positive correlations with profitability measures, whereas CCC had a negative correlation with profitability measures. In addition, control variable FDR had a negative correlation with dependent variables, whereas SGR showed a positive correlation with dependent variables.

Regression model: Pooled least squares method

To test the effect between liquidity measures and firm performance, separated regression models should be conducted for individual variables. Table-4 shows the summary of the pooled regression test.

The result of panel A

In the first model tested, the dependent variable is ROA, the variable of interest is CCC, and FDR and SGR are controlled variables. The results from the first test show that the coefficient of CCC was negative and significant at $\alpha= 0.01$ (p-value=0.0000), which indicated CCC had a negative significant effect on profitability performance ROA. Among control variables, FDR had a negative significant influence on ROA, but SGR had a positive significant influence on ROA. The adjusted was 30.62% followed by the F-statistics of 5.374. The mean of VIF value of CCC (1.02), FDR (1.02), and SGR (1.01) was 1.01.

In the second model test, the dependent variable is still ROA, the variable of interest is CAR, and FDR and SGR are controlled variables. The results from the second test show that the coefficient of CAR was positive but p-value was insignificant, which indicated CAR had a weak positive effect on profitability performance ROA. Among control variables, FDR had a negative significant influence on ROA, but SGR had a positive significant influence on ROA just as what have seen in the first test. The adjusted was 29.80% followed by the F-statistics of 5.210. The mean of VIF value of CAR (1.28), FDR (1.28), and SGR (1.01) was 1.19.

In the third and fourth model tests, the variables of interests are CR and QR respectively. In both tests, CR and QR showed positive but insignificant influences on ROA. The influence pattern between dependent variable ROA and Control variables FDR and SGR remained similar. The adjusted was 29.76% followed by the F-statistics of 5.202 in the third test, and the adjusted was 29.78% followed by the F-statistics of 5.205 in the fourth test. The mean of VIF value of CR (1.51), FDR (1.51), and SGR (1.01) was 1.34, and the mean of VIF value of QR (1.40), FDR (1.41), and SGR (1.04) was 1.27.

The result of panel B

In the fifth regression, the dependent variable is ROE, the variable of interest is CCC, and FDR and SGR are controlled variables. The results from the fifth test show that the coefficient of CCC was negative significant at $\alpha= 0.01$ (p-value=0.0004), which suggested that CCC had a negative significant effect on ROE. Among control variables, FDR had a negative significant influence on ROE, but SGR had a positive significant influence on ROE. The adjusted was 12.76% followed by the F-statistics of 2.450. The mean of VIF value of CCC (1.02), FDR (1.02), and SGR (1.01) was 1.01.

In the sixth model test, where the dependent variable is still ROE, the variable of interest is CAR, and FDR and SGR are controlled variables. The results from the sixth test show that the coefficient of CAR was negative and insignificant (p=0.2963), which indicated CAR had a negative effect on profitability performance ROE but insignificant.

TABLE 3
The Results of Correlation Analysis

Correlation Probability		CAR	CCC	CR	FDR	NPR	QR	ROA	ROE	SGR
CAR	Pearson Correlation	1.0000								
	sig.(two tailed)	-----								
CCC	Pearson Correlation	-0.038031	1.0000							
	sig.(two tailed)	0.0578	-----							
CR	Pearson Correlation	0.907885**	0.045016*	1.0000						
	sig.(two tailed)	0.0000	0.0247	-----						
FDR	Pearson Correlation	0.465398**	0.105191**	0.579371**	1.0000					
	sig.(two tailed)	0.0000	0.0000	0.0000	-----					
NPR	Pearson Correlation	0.187835**	-0.06911**	0.218933**	0.251377**	1.0000				
	sig.(two tailed)	0.0000	0.0006	0.0000	0.0000	-----				
QR	Pearson Correlation	0.962355**	-0.032870	0.955104**	0.536457**	0.201296**	1.0000			
	sig.(two tailed)	0.0000	0.1011	0.0000	0.0000	0.0000	-----			
ROA	Pearson Correlation	0.204977**	-0.09465**	0.234057**	0.324542**	0.666787**	0.219709**	1.0000		
	sig.(two tailed)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-----		
ROE	Pearson Correlation	0.066938**	0.064794**	0.079563**	0.149509**	0.760691**	0.073841**	0.772953**	1.0000	
	sig.(two tailed)	0.0008	0.0012	0.0001	0.0000	0.0000	0.0002	0.0000	-----	
SGR	Pearson Correlation	-0.016567	0.053136**	-0.029284	0.075507**	0.083004**	-0.023667	0.112385**	0.09433**	1.0000
	sig.(two tailed)	0.4087	0.0080	0.1441	0.0002	0.0000	0.2379	0.0000	0.0000	-----

Notes: **Correlation is significant at the 0.01 level (two-tailed); *Correlation is significant at the 0.05 level (two-tailed).

Table- 4
The results of Pooled Regression Analysis

Panel A – Dependent Variable ROA												
	(1)			(2)			(3)			(4)		
	EFFICIENCY	t-test	VIF									
model												
CCC	-0.00004**	-5.291834	1.02									
CAR				0.001484	1.285633	1.28						
CR							-0.000623	-0.665701	1.51			
QR										0.000952	0.966884	1.40
FDR	-0.206506**	-14.25093	1.02	-0.205843**	-13.67453	1.28	-0.214895**	-13.60216	1.51	-0.206224**	-13.47548	1.41
SGR	0.013491**	8.511701	1.01	0.014408**	9.097888	1.01	0.014443**	9.117598	1.01	0.014422**	9.105402	1.04
Constant	0.1334**	21.34257		0.124708**	18.56147		0.131184**	16.79799		0.124648**	17.50586	
Adjusted R^2	0.306184			0.298021			0.297642			0.297796		
F-statistics	5.374368			5.209929			5.202299			5.2054		
Prob.	0.0000			0.0000			0.0000			0.0000		
Mean vif	1.01			1.19			1.34			1.27		

Panel B - Dependent Variable ROE												
	(5)			(6)			(7)			(8)		
	EFFICIENCY	t-test	VIF	EFFICIENCY	t-test	VIF	EFFICIENCY	t-test	VIF	EFFICIENCY	t-test	VIF
model												
CCC	-0.0000944**	-3.528684	1.02									
CAR				-0.004258	-1.044587	1.28						
CR							-0.007465*	-2.263137	1.51			
QR										-0.004686	-1.347867	1.41
FDR	-0.525764**	-10.24028	1.02	-0.55015**	-10.34943	1.28	-0.58498**	-10.49757	1.51	-0.558452**	-10.33686	1.41
SGR	0.034788**	6.194744	1.01	0.037086**	6.631388	1.01	0.037133**	6.645885	1.01	0.037071**	6.629982	1.04
Constant	0.290623**	13.123		0.28747**	12.11633		0.315806**	11.46469		0.294575**	11.71907	
Adjusted R^2	0.127603			0.123196			0.124771			0.297796		
F-statistics	2.449855			2.3933			2.413658			5.2054		
Prob.	0.0000			0.0000			0.0000			0.0000		
Mean vif	1.01			1.19			1.34			1.27		

Notes: **Efficiency is significant at the 0.01 level (two-tailed); * Efficiency is significant at the 0.05 level (two-tailed).

TABLE- 4
The results of Pooled Regression Analysis (continued)

Panel C - Dependent Variable NPR

	(9)			(10)			(11)			(12)		
	EFFICIENCY	t-test	VIF	EFFICIENCY	t-test	VIF	EFFICIENCY	t-test	VIF	EFFICIENCY	t-test	VIF
model												
CCC	-0.000202**	-8.571325	1.02									
CAR				0.003811	1.045019	1.28						
CR							0.000171	0.058039	1.51			
QR										0.003276	1.053301	1.41
FDR	-0.434734**	-9.591624	1.02	-0.44371**	-9.329814	1.28	-0.455323**	-9.122406	1.51	-0.440691**	-9.11607	1.41
SGR	0.019791**	3.992078	1.01	0.024527**	4.902005	1.01	0.024588**	4.913174	1.01	0.024552**	4.907228	1.04
Constant	0.283106**	14.48101		0.247317**	11.65119		0.254972**	10.33419		0.244213**	10.85766	
Adjusted R^2	0.224537			0.199502			0.199112			0.199508		
F-statistics	3.870138			3.47137			3.465347			3.471466		
Prob.	0.0000			0.0000			0.0000			0.0000		
Mean vif			1.01			1.19			1.34			1.27

Notes: ** Efficiency is significant at the 0.01 level (two-tailed); * Efficiency is significant at the 0.05 level (two-tailed).

Among control variables, FDR had a negative significant influence on ROE, and SGR had a positive significant influence on ROE. The adjusted was 12.32% followed by the F-statistics of 2.393. The mean value of VIF of CAR (1.28), FDR (1.28), and SGR (1.01) was 1.19.

In the seventh model tests, the variable of interest is changed to CR. The results show that the coefficient value of CR was a negative and significant influence on ROE at $\alpha= 0.05$ (p-value=0.0237), which suggested CR had a significant negative influence on ROE. The influence pattern between dependent variable ROE and Control variables FDR and SGR remained similar to previous results. The adjusted was 12.47% followed by the F-statistics of 2.41. The mean value of VIF of CR (1.51), FDR (1.51), and SGR (1.01) was 1.34.

In the eighth model test, where the dependent variable is still ROE, the variable of interest is QR, and FDR and SGR are controlled variables. The results from the eighth test show that the coefficient of QR was negative and insignificant (0.1778). The adjusted was 12.35% followed by the F-statistics of 2.40. The mean value of VIF of QR (1.40), FDR (1.41), and SGR (1.04) was 1.27.

The result of panel C

Finally, in the ninth regression, the dependent variable is NPR, the variable of interest is CCC, and FDR and SGR are controlled variables. The results from the ninth test show that the coefficient of CCC was negative and significant at $\alpha= 0.01$ (p-value=0.0000), which indicated that CCC had a significant negative effect on profitability performance NPR. Among control variables, FDR had a negative significant influence on ROE, but SGR had a positive significant influence on ROE. The adjusted was 22.45% followed by the F-statistics of 3.870. The mean value of VIF of CCC (1.02), FDR (1.02), and SGR (1.01) was 1.01.

In the tenth model test, where the dependent variable is still NPR, the variable of interest is CAR, and FDR and SGR are controlled variables. The results from the tenth test show that the coefficient of CAR was positive with an insignificant p-value (0.2691), which indicated that CAR had a positive effect on profitability performance ROE but not significant. Among control variables, FDR had a negative significant influence on ROE, and SGR had a positive significant influence on ROA just as what have seen in the previous tests. The adjusted was 12.32% followed by the F-statistics of 2.393. The mean value of VIF value of CAR (1.28), FDR (1.28), and SGR (1.01) was 1.19.

In the eleventh and twelfth model tests, the variable of interest is changed to CR and QR respectively. The coefficient value and p-value showed that CR and QR had

positive but insignificant influences on NPR. The influence pattern between dependent variable ROE and Control variables FDR and SGR still remained similar to previous tests. The adjusted was 19.91% followed by the F-statistics of 3.465 for the eleventh test and the adjusted was 19.95% followed by the F-statistics of 3.471 for the twelfth test. The mean of VIF value of CR (1.51), FDR (1.51), and SGR (1.01) was 1.34, and the mean of VIF value of QR (1.40), FDR (1.41), and SGR (1.04) was 1.27

Overall, independent variable CCC demonstrated significant negative influences on dependent variables ROA, ROE, and NPR. However, other liquidity ratios CAR, CR, and QR presented positive insignificant influences on profitability measures in most conditions. Besides, control variable FDR always expressed significant negative influences on profitability measures, whereas SGR showed positive significant influences on profitability measures.

Robustness Test

In addition, the granger causality test is performed to determine the direction of the relationship between liquidity measures and profitability performance. The result can be used to explain whether one cross-section time-series variable is useful in forecasting another. To be more specific is that a time series $\{X_t\}$ has granger-causality to another time series $\{Y_t\}$ if the observation of past data of X can use to predict future Y values, or the prediction error is decreasing when compared current Y with predicted figure that generated from analyzing past trends of Y and X (Granger 1969). The models are shown as follows:

$$X_t = \mu_1 + \sum_{s=1}^p \beta_{1,s} X_{t-s} + \sum_{s=1}^p \gamma_{1,s} Y_{t-s} + \varepsilon_{1,t} \dots (1)$$

$$Y_t = \mu_2 + \sum_{s=1}^p \beta_{2,s} X_{t-s} + \sum_{s=1}^p \gamma_{2,s} Y_{t-s} + \varepsilon_{2,t} \dots (2)$$

In the above equation, p denotes the lag length, if $\gamma_{1,s} \neq 0$, which means that there exists short-run causality relationship running from variable Y to X. Equation 2 assumes a similar behavior for Y. If $\beta_{2,s} \neq 0$, there is short-run causal relationship running from X to Y. However, the granger causality test does not imply the real cause-effect relationship, but it only suggests the direction of prediction effect. In addition, the granger causality test can only be applied to variables that have linear relationships among them, but it fails to capture any non-linear causal relationship. In this paper, pairwise granger causality tests are conducted by EViews version 10.

Granger causality test

All the data series passed unit root test with p-value less than 0.01 at level, which indicated these data were stationary and could be used to conduct granger causality test.

Results of pair-wise granger causality test with the purpose to reveal the causal relationships between dependent variables and independent variables are shown in **Table-5**. It has been observed that CCC (F-statistics = 4.3502, $p = 0.0130$), CAR (F-statistics = 7.7737, $p = 0.0004$), CR (F-statistics = 12.3762, $p = 0.0000$), and QR (F-statistics 10.7190, $p = 0.0000$) index were granger caused by ROA at the 5% significance level. Yet ROA were not caused by CCC, CR and QR at the 5% significance level, except by CAR (F-statistics = 3.1117, $p = 0.0447$). Therefore, there were bilateral causalities running between ROA and CAR. However, no independent relationships were suggested between the selected variables and ROA.

Similarly, it has been observed that CCC (F-statistics = 5.0784, $p = 0.0063$) index was granger caused by ROE at the 5% significance level, but CAR (F-statistics = 1.6349, $p = 0.1952$), CR (F-statistics = 2.9610, $p = 0.0520$), and QR (F-statistics 2.4280, $p = 0.0885$) index were not granger caused by ROE at the 5% significance level. Again, ROE were not granger caused by CCC, CAR, CR and QR at the 5% significance level, either. Therefore, there were unilateral causalities running from ROE to CCC. However, CAR, CR, and QR were independent with ROE.

Finally, it has been observed that CCC (F-statistics = 11.4154, $p = 0.0000$), CAR (F-statistics = 5.2554, $p = 0.0053$), and CR (F-statistics = 12.5093, $p = 0.0000$), index were granger caused by NPR at the 5% significance level, except QR (F-statistics 1.2995, $p = 0.2729$). NPR were granger causalities with CCC and QR at the 5% significance level (F-statistics = 8.2179 and 8.2089, $p = 0.0003$ and 0.0003). Therefore, there was a bilateral causality is running between NPR and CCC in the 5% significance level. However, there were unilateral causalities running from NPR to CRA and CR, and from QR to NPR.

Table-5
The Results of Granger Causality Test

Null Hypothesis	Lag	F-Statistic	Prob.	Causality Relationship
ROA does not Granger cause CCC	2	4.3502	0.0130**	ROA \longrightarrow CCC
CCC does not Granger cause ROA		1.2517	0.2863	
ROA does not Granger cause CAR	2	7.7737	0.0004**	ROA \longleftrightarrow CAR
CAR does not Granger cause ROA		3.1117	0.0447**	
ROA does not Granger cause CR	2	12.3762	0.0000**	ROA \longrightarrow CR
CR does not Granger cause ROA		2.8853	0.0561	
ROA does not Granger cause QR	2	10.7190	0.0000**	ROA \longrightarrow QR
QR does not Granger cause ROA		2.1840	0.1129	
ROE does not Granger cause CCC	2	5.0784	0.0063 **	ROE \longrightarrow CCC
CCC does not Granger cause ROE		2.9696	0.0516	
ROE does not Granger cause CAR	2	1.6349	0.1952	Independent
CAR does not Granger cause ROE		0.9625	0.3821	
ROE does not Granger cause CR	2	2.9610	0.0520	Independent
CR does not Granger cause ROE		1.0574	0.3476	

Table-5
The Results of Granger Causality Test (continued)

Null Hypothesis	Lag	F-Statistic	Prob.	Causality Relationship
ROE does not Granger cause QR	2	2.4280	0.0885	Independent
QR does not Granger cause ROE		0.9226	0.3977	
NPR does not Granger cause CCC	2	11.4154	0.0000**	NPR \leftrightarrow CCC
CCC does not Granger cause NPR		8.2179	0.0003**	
NPR does not Granger cause CAR	2	5.2554	0.0053**	NPR \rightarrow CAR
CAR does not Granger cause NPR		2.8088	0.0605	
NPR does not Granger cause CR	2	12.5093	0.0000**	NPR \rightarrow CR
CR does not Granger cause NPR		1.2309	0.2923	
NPR does not Granger cause QR	2	1.2995	0.2729	QR \rightarrow NPR
QR does not Granger cause NPR		8.2089	0.0003**	

Notes: ** means P-value is significant at the 0.05 level.

V. DISCUSSION

As showed in the results of correlation analysis, it seemed that liquidity ratios (CAR, CR, and, QR) had positive significant correlations with profitability measures (NPR, ROA, and ROE). And the panel regression also showed that these three liquidity ratios had positive, though insignificant influence on NPR and ROA. The result suggested that low liquidity levels may hurt the performance of SMEs, which was different from the common trade-off relationship between liquidity measures and profitability performance (Eljelly 2004).

The unexpected result may be caused by the different national economic environments from which data selected in different studies. China's economy has been affected by the financial crisis since 2008, and pressures for SMEs sales have increased and the expectations of market demand were not positive. Further, it was difficult for Chinese SMEs to get funding from banks due to relatively poor regulation and low creditability (Liu, 2009). According to Hirigoyen (1985), the relationship between liquidity and profitability could be positive in both mid-term and long-term. When the low profitability of the firm fails to generate enough cash flow, the firm is urgent for loans to meet its needs of expansion in terms of working capital and new fixed assets acquisitions, which results in the increasing financial costs and financial leverage. Increased finance expense and difficult in finance would exacerbate firms' profitability, leading to a vicious circle. Therefore, low liquidity could lead to low profitability in Chinese SMEs from 2009 to 2018.

The result of the regression test also showed that independent variables CCC had a significant negative effect on profitability performance, which is consistent with the results of previous studies (e.g. Lazaridis and Tryfonidis 2005; Garcia-Teruel and Martinez-Salano 2007). Therefore, firms could increase the value of shareholders by shortening the cash conversion cycle, such as lengthening account payable period and

shortening account receivable and inventory period to an optimal level. Control variable SGR had significant positive relationships with profitability measures, which indicated a higher sales growth rate, a better profitable performance. FDR had a negative significant relationship with profitability, which indicated that when firms have more debt they earn less. This result was consistent with Hirigoyen's (1985) theory as mentioned before.

According to the granger causality test suggested, managers can use time-series data to conduct bilateral forecast between ROA and CAR, and between NPR and CCC. It seems that when CRA increases, the ROA of a firm may also increase in the future. Similarly, when a firm has decreasing CCC, the increase in NPR could be expected. And CAR, CR could also be forecasted by NPR unilaterally, and data of QR could be used to forecast NPR as well.

Reliability and Validity

Ben-Caleb (2013) also found a positive relationship between liquidity and profitability when he analyzed data of 30 manufacturing companies listed on the Nigeria stock exchange from 2006 to 2010. He gave a possible reason that liberal trading policy in Nigeria led to a positive influence on profitability to companies, and suppliers were willing to provide trade credit to their customers. Therefore, liquidity and profitability showed a positive relationship in that certain situation. I agree with his explanation, the economic situation he described just contributed to a virtuous cycle that the opposite was true of China.

The results of VIF test shows that all vif figures and mean values were larger than 1 and smaller than 10, which means the relationship between variables of interests and control variables is free from multicollinearity, thus justifying the reliability and validity of the regression results.

Theoretical Contribution

Although many relative kinds of research have been done, there is less information to reflect the relationship between liquidation and profitability in contemporary Chinese companies. Therefore, in this study, I examine the more timely and comprehensive relationship between these two key items based on the current Chinese business environment. In addition, the independent variables include the most crucial ratios (CR, QR, CAQ, CCC) to represent liquidity management, which contain different components of cash flow and operation cycle and provide extensive insight on how to manage liquidity issues to maximize the profitability. Conducting effect and causality tests simultaneously can generate further information about their associations, which allow potential analysts to generate more accurate decisions according to available, previous data.

VI. CONCLUSION

The primary objective of this study is to analysis the various relationships between liquidity and profitability in Chinese SMEs. Therefore it can provide more comprehensive and helpful advice that allows decision-makers in Chinese SMEs to manage the working capital more wisely. In the research, profitability measures, CAR, CR, and, QR, CCC were independent variables; profitability measures NPR, ROA, and ROE were dependent variables; and FDR and SGR were control variables. Through analyzing the results of pooled regression analysis, profitability measures CAR, CR, and QR had a negative, significant influence on ROE. But they had positive relationships with ROA and NPR indicated that SMEs should be prudent in financing performance. Further, the control variable FDR had a negative significant relationship existed between FDR and the firm's profitability performance, which suggested that more debt, the SMEs earn less profit. Liquidity measure CCC inflected a negative significant relationship with profitability measures, which suggested that a shorter cash conversion cycle could lead to better profitability performance.

Finally, the Granger causality test suggested that there were bilateral causality relationships between ROA and CAR, and between NPR and CCC. Besides, there were unilateral causality relationships running from NPR to CAR and CR, and from QR to NPR. Therefore, managers can use available information about these ratios to predict another one through suggested directions.

However, my study has some limitations. In the previous studies which got a negative relationship between liquidity and profitability, Chatterjee (2012) and Eljelly (2004) took firm categories and size into consideration, whereas all industries were assumed performed similarly in this study. Therefore, the fluctuations crossed individual companies might influent the results. Therefore, future research can do comparisons among different kinds of firms with different sizes.

REFERENCE

- Alom, K., 2018. Liquidity and Profitability: A Co-Integration Study. *Review of Pacific Basin Financial Markets and Policies*, 21(02), p.1850011.
- Bagchi, B., 2015. A long-run and short-run cointegration model explaining relationship between liquidity management and profitability. *International Journal of Business Excellence*, 8(2), pp.123-145.
- Chatterjee, S., 2012. The impact of working capital on the profitability: Evidence from the Indian firms. *Available at SSRN 2125228*.
- Eljelly, A.M., 2004. Liquidity-profitability tradeoff: An empirical investigation in an emerging market. *International journal of commerce and management*, 14(2), pp.48-61.
- Garcia-Teruel, J.P. and Martinez-Solano, P., 2007. Effects of working capital management on SME profitability. *International Journal of managerial finance*, 3(2), pp.164-177.
- Granger, C.W., 1969. Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: Journal of the Econometric Society*, pp.424-438.
- Hirigoyen, G., 1985. Rentabilité et solvabilité [Profitability and solvency]. *Direction et Gestion*, 3, pp.13-26.
- Lazaridis, I. and Tryfonidis, D., 2006. Relationship between working capital management and profitability of listed companies in the Athens stock exchange. *Journal of financial management and analysis*, 19(1).
- Lian Y.J., Peng F.P., and Su Z., 2010. Financing Constraints and Liquidity Management [J]. *Journal of Financial Research*, 2010(10), pp. 44-62.
- Liu, Q. and Tian, G.G., 2009, August. Leverage ratio and determinants of capital structure in SMEs: evidence from China. In *22nd Australasian Finance and Banking Conference*.
- Mohanty, B. and Mehrotra, S., 2018. Relationship between Liquidity and Profitability: An Exploratory Study of SMEs in India. *Emerging Economy Studies*, 4(2), pp.169-181.
- Owolabi, S.A. and Obida, S.S., 2012. Liquidity management and corporate profitability: Case study of selected manufacturing companies listed on the Nigerian stock exchange. *Business Management Dynamics*, 2(2), pp.10-25.
- Padachi, K., 2006. Trends in working capital management and its impact on firms' performance: an analysis of Mauritian small manufacturing firms. *International Review of business research papers*, 2(2), pp.45-58.
- Periyathampy, E. and Karthika, T., 2003. An Analysis of Liquidity, Profitability and Risk-A Study of Selected Listed Food, Beverage and Tobacco Companies in Sri

- Lanka. *Profitability and Risk-A Study of Selected Listed Food, Beverage and Tobacco Companies in Sri Lanka (July 6, 2003)*.
- Shen S.C., 2010. Research on current assets management of SMEs. *Accountant*, 2010(01), pp. 44-46
- Van Auken, H. and Yang, K., 2014. Chinese SMEs' uses of financial statements in decision making. *Journal of Developmental Entrepreneurship*, 19(04), p.1450027.
- Vishnani, S. and Shah, B.K., 2007. Impact of working capital management policies on corporate performance—An empirical study. *Global business review*, 8(2), pp.267-281