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Liquidity and Profitability: An Investigation of Firm Value and Financial Performance of Thai Listed Firms During COVID-19 Pandemic

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Abstract

The paper investigated the relationship between liquidity and profitability of the top 100 Thai companies listed in the Stock Exchange of Thailand during COVID-19 pandemic. About 18% of firms can maintain both higher profitability and higher liquidity with firms in Electronic Components sector performed the best due to the strong nationwide and worldwide customer demand and tight supply in key electronic components from COVID-19 pandemic. The statistical testing of the differences in the means of significant variables among firms classified by profitability and liquidity showed that firms that can achieve profitability-liquidity dual goals have higher sales growth, shorter cash conversion cycle and average inventory period, and higher return on equity compared to firms in other groups. The results from the multiple regression models showed that more profitable firms had higher return on equity and return on assets. Firms with higher profitability and liquidity had lower return on assets supporting the explanation that there is a trade-off between dual goals.

Keyword: Profitability, Liquidity, Cash conversion cycle, Tobin's Q, Return on equity, Return on assets, COVID-19 pandemic

Introduction

COVID-19 gradually hit Thailand since the beginning of year 2020. The spread of virus peaked and created the first wave of pandemic and caused the lockdown when the Prime Minister announced the nationwide state of emergency during end of March till end of April (Thanthong-Knight, 2020). The second wave hit again during the end of year 2020 due to the

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spread of virus in Samut Sakhon province in the central part of Thailand. The pandemic caused significant changed of people's lives and business activities. People worked from home and business activities disrupted nationwide. The International Monetary Fund forecasted a decline in Thailand GDP of 6.7% in year 2020 (Paweewun, 2020).

At microeconomics level during the COVID-19 pandemic, business activities declined, sales of goods and services rendered significantly dropped, production processes were disrupted, and inventories were stocked up, customers were unable to pay bills creating liquidity shortage which in turn causing firms were unable to pay suppliers and decline in profit. Based on the study by Krungsri Research (2020), approximately 30% of 473,324 firms in Thailand had tight liquidity, about 28% of firms were at risk of having liquidity problem and only about 33% of firms were financially healthy. Liquidity is vital for business to survive. At the same time, profitability is important to generate return to owners. However, both goals are difficult to be achieved even in normal business situation. Thus, it is interesting to study if the relationship between liquidity and profitability can still be achieved during the COVID-19 pandemic.

Research objectives

There are three research questions raised in the paper. First, what businesses can maintain both high liquidity and high profitability during COVID-19 pandemic. Second, what were the characteristics of firms that were less vulnerable to the crisis. Third, what were the effects of profitability and liquidity on corporate value measured by Tobin's Q and accounting returns measured by return on equity and return on assets.

Literature review and hypothesis development

Firms operate activities to generate return on assets invested to return to their owners and maximize value. Profitability is vital to business success while sufficient liquidity is also important, however, these dual goals are difficult to be achieved simultaneously. Firms try to boost up sales by offering long credit period, but it hurts their liquidity. Firms may want to increase liquidity by offering short credit period, but that would hurt sales and shrink profit. Firms may delay payment to suppliers to avoid liquidity shortage but that can hurt the relationship with them.

Profitable firms as measured by gross profit-to-assets generate higher return than unprofitable firms (Novy-Marx, 2013). Higher expected earnings imply higher expected return (Fama and French, 2006) and firms with productive assets generate higher return than those with unproductive assets (Novy-Marx, 2013). The profitability factors such as profit margin, return on equity and return on assets are the common determinants of high-expected-return stock (Haugen and Baker, 1996; Fama and French, 2006; Hou et al., 2015). In the *q*-factor model, return on equity can predict stock return (Hou et al., 2015). Maintaining higher sales and profit margin is hardly to be achieved especially when COVID-19 seriously hit nationwide, thus, we expected the value of firms with growth in gross profit margin (GPM) to be higher which drives higher return on assets invested and generates higher return to equity holders. The paper compared GPM of a particular firm during 2019 and 2020. Firms with GPM growth were those having higher GPM in 2020 as compared to 2019.

Hypothesis 1a: Firms with GPM growth have higher value measured by Tobin's Q.

Hypothesis 1b: Firms with GPM growth have higher return on equity.

Hypothesis 1c: Firms with GPM growth have higher return on assets.

Cash conversion cycle (CCC) is the length of time in which company sells inventories (Average Inventory Period, AIP), collects accounts receivable (Average Collection Period, ACP) minus time spent to pay for accounts payable (Average Payment Period, APP). Shorter CCC implies more efficient in managing working capital, helps increasing liquidity and decreasing short-term external financing needs. Gitman (1974) firstly used the cash conversion cycle to estimate the minimum level of firm's liquidity requirement. Firms with shorter CCC earns higher return than firms with longer CCC (Wang, 2019) and there is a negative relation between aggregate stock return and aggregate CCC (Lin and Lin, 2021). Liquidity is crucial for day-to-day business activities especially during the crisis when sales decline, inventories pile up and cash is needed to pay suppliers, workers, and banks. The efficient of working capital management relates to higher valuation and firms with shorter CCC have higher Tobin's Q (Gentry, Vaidyanathan, and Lee, 1990, Johnson and Soenen, 2003; Zeidan and Shapir, 2017; Jalal and Khaksari, 2019). During COVID-19 pandemic, thus, firms that can sustain higher liquidity indicating more working capital management efficiency should have higher value compared to firms with lower liquidity. The paper compared CCC of a particular firm during 2019 and 2020. Firms with higher liquidity were those having shorter CCC in 2020 as compared to CCC in 2019.

Hypothesis 2a: Firms with shorter CCC have higher value measured by Tobin's Q.

CCC negatively relates with profitability. Shorter CCC implies more efficient working capital management, helps increasing overall liquidity and decreasing short-term external financing needs. Shorter ACP makes shorter CCC, however, it creates lower profitability, while longer ACP through generous credit period hurts liquidity but increases sales and profit. There is a trade-off between maintaining high liquidity and achieving high profitability (Shin and Soenen, 1998; Wang 2002; Deloof, 2003; Nobanee, Abdullatif, and AlHajjar, 2011, Yazdanfar and Öhman, 2014; Chang 2018). Thus, firms with higher liquidity (lower CCC) have lower return on assets invested and yield lower return to owners.

Hypothesis 2b: Firms with shorter CCC have lower return on equity.

Hypothesis 2c: Firms with shorter CCC have lower return on assets.

The dual goals of profitability and liquidity are difficult to be achieved, thus, firms with higher GPM *and* shorter CCC are more valuable than firms with lower GPM *and* longer CCC.

Hypothesis 3a: Firms with GPM growth *and* shorter CCC have higher value measured by Tobin's Q.

Due to an inverse relation between liquidity and profitability, we expected firms with higher GPM *and* shorter CCC have lower return on equity and return on assets.

Hypothesis 3b: Firms with GPM growth *and* shorter CCC have lower return on equity.

Hypothesis 3c: Firms with GPM growth *and* shorter CCC have lower return on assets.

Conceptual framework

This research paper was an empirical study to investigate the liquidity and profitability during COVID-19 pandemic of the top 100 Thai companies listed in the Stock Exchange of Thailand. Liquidity is proxied by the cash conversion cycle (CCC) while the profitability is proxied by the growth rate of gross profit margin (GPM). In particular, the study aimed to examine the effects of changes in cash conversion cycle and gross profit margin on corporate value (Tobin's Q) and accounting profits (return on equity and return on assets) during 2019-2020. Figure 1 shows the relationship among the variables and hypotheses.

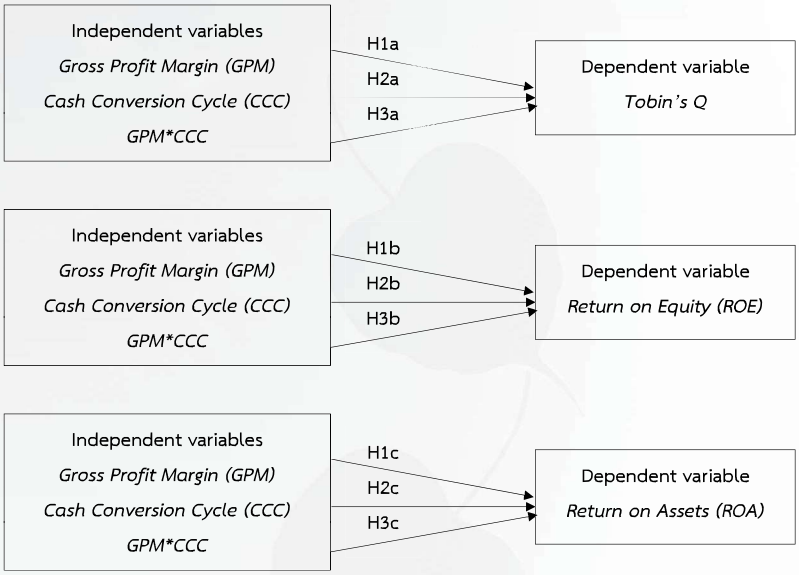

Figure 1 Relationship among variables and hypotheses

Research methodology

Data

The paper used the data of Thai companies listed in the Stock Exchange of Thailand 100 (SET100) in 2019. The SET100 index includes the top 100 Thai listed firms in term of market capitalization. Out of 100 firms, we excluded 14 financial firms and one company since it was delisted in 2020, thus, the remaining firms included in the study are 85. We classified firms into 4 groups based on (1) profitability using GPM and (2) liquidity using CCC. Specifically, we compared GPM and CCC in 2020 with those in 2019. Shorter (longer) CCC increases (decreases) firm's liquidity.

- Group 1 (H-GPM_H-LIQ): Firm with higher GPM *and* more liquidity (shorter CCC).
- Group 2 (H-GPM_L-LIQ): Firm with higher GPM *but* lower liquidity (longer CCC).
- Group 3 (L-GPM_H-LIQ): Firm with lower GPM *but* more liquidity (shorter CCC).
- Group 4 (L-GPM_L-LIQ): Firm with lower GPM *and* lower liquidity (longer CCC).

Out of 85 firms, there were 17.65% (15 firms), 23.53% (20 firms), 20.00% (17 firms), and 38.82% (33 firms) in Group 1, 2, 3, 4, respectively.

Regression models

$$Dependent\ variable_i = \beta_0 + \beta_1 D_H\text{-}GPM_i + \beta_2 D_H\text{-}LIQ_i + \beta_3 D_H\text{-}GPM_i * D_H\text{-}LIQ_i + \beta_4 BETA_i + \beta_5 Debt\text{-}to\text{-}Equity_i + \beta_6 SalesGrowth_i + \beta_7 LnTA_i + \beta'_8 X_i + \varepsilon_i \quad (1)$$

Dependent variables included (1) Tobin's Q to test hypotheses 1a, 2a, and 3a, (2) Return on Equity (ROE) to test hypotheses 1b, 2b, and 3b, and (3) Return on Assets (ROA) to test hypotheses 1c, 2c, and 3c. Tobin's Q is the summation of total market value of equity and total book value of liabilities divided by the summation of total book value of equity and total book value of liabilities. Tobin's Q measures the change in the market value of firm's physical assets with their replacement cost and Tobin's Q of individual firm can be used to measure its over or under valuation. (Tobin, 1969). ROE is net profit divided by average shareholders' equity. ROA is earnings before interest and taxes divided by average total assets.

D_H-GPM is a dummy variable equal to 1 if a firm has higher GPM in 2020 compared to 2019 and 0 otherwise. GPM is sales minus cost of goods sold divided by sales.

D_H-LIQ is a dummy variable equal to 1 if a firm has higher liquidity (shorter CCC) in 2020 compared to 2019 and 0 otherwise. CCC is defined as average collection period (ACP) plus average inventory period (AIP) minus average payment period (APP). ACP is 365 days divided by accounts receivables turnover (ARTO) where ARTO is net sales divided by average net accounts receivables. AIP is 365 days divided by inventory turnover (INVTO) where INVTO is costs of goods sold divided by average inventories. APP is 365 days divided by accounts payables turnover (APTO) where APTO is costs of goods sold divided by average net accounts payables. The formulas to calculate CCC, ACP, AIP, and APP are as follows.

$$CCC = ACP + AIP - APP \qquad (2)$$

$$ACP = \frac{365}{ARTO} = \frac{365}{\frac{Net\ sales}{Avg.\ net\ accounts\ receivables}} \qquad (3)$$

$$AIP = \frac{365}{INVTO} = \frac{365}{\frac{Costs\ of\ goods\ sold}{Avg.\ inventories}} \qquad (4)$$

$$APP = \frac{365}{APTO} = \frac{365}{\frac{Costs\ of\ goods\ sold}{Avg.\ net\ accounts\ payables}} \qquad (5)$$

D_H-GPMxD_H-LIQ is a dummy variable equal to 1 if a firm has higher GPM in 2020 compared to 2019 *and* higher liquidity (shorter CCC) in 2020 compared to 2019 and 0 otherwise.

BETA is a market risk estimated from the market model.

Debt-to-Equity ratio where debt is the total book value of liabilities and equity is total shareholders' equity.

SalesGrowth is sales in 2020 minus sales in 2019 divided by sales in 2019.

LnTA is the natural logarithm of a firm's total assets.

X_i is a (k*1)-vector of industry dummy variables, β_8 is a (k*1)-vector with regression coefficients, and ε_i is the error term.

All data was retrieved from SET Market Analysis and Reporting Tool (SETSMART), except Tobin's Q was manually estimated. The study used yearly data for all the variables.

Research results and discussions

Based on Table 1, approximately 27% and 15% out of 85 total firms were those in Energy & Utilities and Property Development sector, respectively. The average of GPM ranged between 6%-36% with five sectors including Property Development, Commerce, Health Care Services, Tourism & Leisure, and Transportation & Logistics, having average GPM above 30%. Sectors with negative CCC included Constructions Services, Energy & Utilities, Tourism & Leisure, Transportation & Logistics, and Information & Communication Technology, while Property Development had very long CCC. Sectors with ACP less than 30 days included Agribusiness, Property Development, Commerce, and Tourism & Leisure while Media & Publishing had a very short AIP of about 8 days. Agribusiness had the shortest APP of less than 30 days while Transportation & Logistics had the longest APP.

Based on Table 2, H-GPM group were firms with higher GPM in 2020 compared to GPM in 2019, thus, they were firms that can sustain GPM growth during COVID-19 pandemic. H-LIQ group were firms with shorter CCC in 2020 compared to CCC in 2019, thus, they were firms that can increase liquidity due to shorter CCC during COVID-19 pandemic.

During the first two waves of COVID-19 pandemic in Thailand in 2020, all firms in Agribusiness, Construction Materials and Electronic Components can still increase their GPM while all firms in Construction Services and Tourism & Leisure sectors suffered from lower GPM. Fifty percent of firms in Health Care Services sector and Petrochemicals & Chemicals sector can increase GPM during the crisis. Although suffering from a decline in GPM, all firms in Tourism & Leisure sector had lower CCC which indicated higher liquidity while all firms in Agribusiness and Construction Services suffered from lower liquidity. During COVID-19 pandemic, sixty-seven percent of firms in Electronic Components sector can maintain both

profitability-liquidity dual goals (Group 1) while all firms in Construction Services sectors suffered the most from lower profitability and lower liquidity (Group 4).

There are three important reasons why firms in Electronic Components sector still performed well during the pandemic. First, the strong nationwide and worldwide customer demand and tight supply in key electronic components from COVID-19 pandemic (DELTA, 2020). Second, the electronics industry has generally weathered the storm and the "work from home (WFH)" increased demand for electronic devices i.e., computer notebooks (HANA, 2020). Third, firms are the major supplier of electronic components such as printed circuit boards (PCBs) which are experiencing the same growth patterns after the recovery of worldwide economies from COVID-19 pandemic (KCE, 2020).

Panel A of Table 4 showed the results of hypothesis testing on the difference in the means of Tobin's Q, ROE and ROA among firms classified by profitability (H-GPM vs. L-GPM) to test hypotheses H1a, 1b, 1c. Firms with higher GPM had higher Tobin's Q (difference in means = 0.60, p-value = 0.067), ROE (difference in means = 10.58%, p-value = 0.000), and ROA (difference in means = 5.12%, p-value = 0.019) than firm with lower GPM, supporting hypotheses H1a, H1b, and H1c, respectively. Panel A also showed the results of hypothesis testing on the difference in the means of Tobin's Q, ROE and ROA among firms classified by liquidity (H-LIQ vs. L-LIQ) to test hypotheses H2a, 2b, 2c. The mean of Tobin's Q of firms with higher liquidity was higher than that of firms with lower liquidity but the difference was insignificant (difference in means = 0.26, p-value = 0.264), thus, hypothesis H2a was not supported. In contrast to our hypothesis H2b, the mean of ROE of firms with higher liquidity was higher than that of lower liquidity but the difference was insignificant (difference in means = 0.98%, p-value = 0.396), thus, hypothesis H2b was not supported. The mean of ROA of firms with higher liquidity was lower than that of firms with lower liquidity but the difference was not significant (difference in means = -1.36%, p-value = 0.302).

Table 1 Firms classified by industry and sector and the average of GPM, CCC, ACP, AIP, and APP in 2020

Industry	Sector	Listed Company		GPM (%)	CCC (Days)	ACP (Days)	AIP (Days)	APP (Days)
		Number of firms	Percentage	MEAN	MEAN	MEAN	MEAN	MEAN
Agro & Food Industry	Agribusiness	2	2%	22	113	29	111	27
Agro & Food Industry	Food & Beverage	7	8%	24	55	44	81	70
Industrials	Petrochemicals & Chemicals	2	2%	8	37	39	57	59
Property & Construction	Construction Materials	4	5%	27	72	60	95	83
Property & Construction	Construction Services	2	2%	6	-4	59	13	77
Property & Construction	Property Development	13	15%	35	997	27	1,080	108
Resources	Energy & Utilities	23	27%	23	-19	53	31	102
Services	Commerce	8	9%	31	52	29	123	101
Services	Health Care Services	4	5%	34	27	58	15	47
Services	Media & Publishing	3	4%	20	4	97	8	101
Services	Tourism & Leisure	2	2%	34	-28	19	23	70
Services	Transportation & Logistics	7	8%	36	-354	41	29	420
Technology	Electronic Components	3	4%	20	90	77	95	82
Technology	Information & Communication Technology	5	6%	29	-58	92	13	160
	Total	85	100%					

Table 2 Firms classified by groups

Industry	Sector	All Groups	H-GPM		H-LIQ		G1 H-GPM_H-LIQ		G2 H-GPM_L-LIQ		G3 L-GPM_H-LIQ		G4 L-GPM_L-LIQ	
		No. of firms	No. of firms	%*	No. of firms	%*	No. of firms	%*	No. of firms	%*	No. of firms	%*	No. of firms	%*
Agro & Food Industry	Agribusiness	2	2	100%	0	0%	0	0%	2	100%	0	0%	0	0%
Agro & Food Industry	Food & Beverage	7	5	71%	3	43%	3	43%	2	29%	0	0%	2	29%
Industrials	Petrochemicals & Chemicals	2	1	50%	1	50%	1	50%	0	0%	0	0%	1	50%
Property & Construction	Construction Materials	4	4	100%	1	25%	1	25%	3	75%	0	0%	0	0%
Property & Construction	Construction Services	2	0	0%	0	0%	0	0%	0	0%	0	0%	2	100%
Property & Construction	Property Development	13	3	23%	3	23%	0	0%	3	23%	3	23%	7	54%
Resources	Energy & Utilities	23	7	30%	8	35%	3	13%	4	17%	5	22%	11	48%
Services	Commerce	8	2	25%	3	38%	1	13%	1	13%	2	25%	4	50%
Services	Health Care Services	4	2	50%	1	25%	1	25%	1	25%	0	0%	2	50%
Services	Media & Publishing	3	1	33%	1	33%	0	0%	1	33%	1	33%	1	33%
Services	Tourism & Leisure	2	0	0%	2	100%	0	0%	0	0%	2	100%	0	0%
Services	Transportation & Logistics	7	3	43%	5	71%	2	29%	1	14%	3	43%	1	14%
Technology	Electronic Components	3	3	100%	2	67%	2	67%	1	33%	0	0%	0	0%
Technology	Information & Communication Technology	5	2	40%	2	40%	1	20%	1	20%	1	20%	2	40%
Total firms		85	35		32		15		20		17		33	

Note: * denotes percentage of firms out of total firms in the sector.

Table 3 Summary statistics of variables classified by groups

Variable	Statistics	H-GPM	L-GPM	H-LIQ	L-LIQ	G1 H-GPM_H-LIQ	G2 H-GPM_L-LIQ	G3 L-GPM_H-LIQ	G4 L-GPM_L-LIQ
Tobin Q (Times)	Max	10.94	5.66	10.94	7.11	10.94	7.11	5.66	4.61
	Mean	2.34	1.74	2.15	1.89	2.48	2.24	1.86	1.68
	Min	0.74	0.47	0.47	0.74	0.96	0.74	0.47	0.79
ROE (%)	Max	38.06	41.26	41.26	38.06	28.35	38.06	41.26	25.32
	Mean	14.15	3.57	8.53	7.55	13.63	15.21	4.83	2.91
	Min	-3.88	-43.39	-35.83	-43.39	1.00	-3.88	-35.83	-43.39
ROA (%)	Max	27.20	20.43	20.43	27.20	17.71	27.20	20.43	12.30
	Mean	8.65	3.53	4.79	6.15	5.10	11.31	4.51	3.02
	Min	-54.96	-15.05	-54.96	-15.05	-54.96	-0.86	-11.50	-15.05
GPM (%)	Max	55.06	92.32	92.32	66.05	55.06	50.84	92.32	66.05
	Mean	26.72	27.61	30.68	25.17	26.28	27.06	34.56	24.03
	Min	6.82	-50.24	-50.24	-5.38	6.82	10.15	-50.24	-5.38
CCC (Days)	Max	2,455	1,557	832	2,455	107	2,455	832	1,557
	Mean	158	118	(38)	239	(11)	285	(63)	211
	Min	(343)	(2,015)	(2,015)	(124)	(343)	(31)	(2,015)	(124)
ACP (Days)	Max	200	146	119	200	109	200	119	146
	Mean	55	44	48	49	53	57	44	45
	Min	3	0.35	2	0.35	18	3	2	0.35
AIP (Days)	Max	2,565	1,624	855	2,565	126	2,565	855	1,624
	Mean	201	212	101	272	56	311	142	273
	Min	0.27	2	4	0.27	4	0.27	5	1.55
APP (Days)	Max	475	2,125	2,125	282	475	282	2,125	211
	Mean	98	138	188	81	119	82	248	81
	Min	19	11	11	19	24	19	11	28

Table 3 Summary statistics of variables classified by groups (continue)

Variable	Statistics	H-GPM	L-GPM	H-LIQ	L-LIQ	G1 H-GPM_H-LIQ	G2 H-GPM_L-LIQ	G3 L-GPM_H-LIQ	G4 L-GPM_L-LIQ
BETA (Times)	Max	1.71	1.65	1.71	1.61	1.71	1.42	1.65	1.61
	Mean	1.02	1.13	1.06	1.10	1.01	1.03	1.11	1.14
	Min	0.43	0.47	0.43	0.55	0.43	0.61	0.47	0.55
Debt-to-Equity (Times)	Max	6.21	19.13	6.21	19.13	6.21	4.27	4.40	19.13
	Mean	1.27	2.00	1.77	1.66	1.74	0.93	1.80	2.11
	Min	0.17	0.17	0.17	0.17	0.44	0.17	0.17	0.28
SalesGrowth (%)	Max	25.20	39.17	39.17	25.20	23.52	25.20	39.17	23.46
	Mean	-7.76	-15.18	-7.27	-15.06	-2.85	-11.45	-11.17	-17.25
	Min	-73.53	-66.07	-73.53	-61.67	-73.53	-51.62	-66.07	-61.67
Total assets (Million Baht)	Max	761,719	2,544,183	761,719	2,544,183	761,719	256,656	675,637	2,544,183
	Mean	134,739	175,059	172,440	150,014	231,736	61,991	120,120	203,361
	Min	4,516	1,082	4,516	1,082	4,516	6,201	9,207	1,082

Table 4 Summary of statistical testing of variables classified by groups (continue)

Variable		HYPOTHESIS 1 All H-GPM vs. All L-GPM	HYPOTHESIS 2 All H-LIQ vs. All L-LIQ	HYPOTHESIS 3 G1 vs. Others
APP (Days)	Hypothesis	H1: μAll H-GPM − μAll L-GPM < 0	H2: μAll H-LIQ − μAll L-LIQ > 0	H3: μH_GPM_H_LIQ − μOthers > 0
	Difference in means	-39.90	106.38*	-2.39
	t-stat	-0.85	1.52	-0.05
		Panel C: Control variables		
BETA	Hypothesis	H1: μAll H-GPM − μAll L-GPM < 0	H2: μAll H-LIQ − μAll L-LIQ < 0	H3: μH_GPM_H_LIQ − μOthers < 0
	Difference in means	-0.11**	-0.04	-0.09
	t-stat	-1.75	-0.54	-1.04
Debt to Equity (Times)	Hypothesis	H1: μAll H-GPM − μAll L-GPM < 0	H2: μAll H-LIQ − μAll L-LIQ < 0	H3: μH_GPM_H_LIQ − μOthers < 0
	Difference in means	-0.78**	0.05	-0.29
	t-stat	-1.76	0.12	-0.59
SalesGrowth (%)	Hypothesis	H1: μAll H-GPM − μAll L-GPM > 0	H2: μAll H-LIQ − μAll L-LIQ > 0	H3: μH_GPM_H_LIQ − μOthers > 0
	Difference in means	7.42*	7.79*	11.27**
	t-stat	e1.53	1.37	1.80
Total assets (Million Baht)	Hypothesis	H1: μAll H-GPM − μAll L-GPM > 0	H2: μAll H-LIQ − μAll L-LIQ > 0	H3: μH_GPM_H_LIQ − μOthers > 0
	Difference in means	-40,320.70	22,426.12	88,981.94
	t-stat	-0.64	0.35	1.10

Note: A significant level of 10%, 5%, and 1% are marked *, **, and *** respectively. All H-GPM were firms that have higher GPM in 2020 compared to 2019. All L-GPM were firms that have lower GPM in 2020 as compared to 2019. All H-LIQ were firms that had higher liquidity (or shorter CCC) in 2020 compared to 2019. All L-LIQ were firms that have lower liquidity (or longer CCC) in 2020 compared to 2019. Group 1 were firms with higher GPM *and* more liquidity (lower CCC). Others included firms in Group 2, 3 and 4 where Group 2 were firms with higher GPM *but* lower liquidity (higher CCC), Group 3 were firms with lower GPM *but* more liquidity (lower CCC) and Group 4 were firms with lower GPM *and* lower liquidity (higher CCC).

In sum, hypotheses H2a, 2b, and 2c were not supported, Tobin's Q, ROE, and ROA among firms with higher liquidity vs. lower liquidity were not statistically significant difference from each other.

Panel A also showed the results of hypothesis testing on the difference in means of Tobin's Q, ROE, and ROA among four groups. The mean of Tobin's Q of firms in Group 1 was higher than that of other groups but the difference was not significant (difference in means = 0.59, p-value = 0.195), thus, hypothesis H3a was not supported. In contrast to our hypothesis H3b, the mean of ROE of firms in Group 1 was higher than that of other groups (difference in means = 5.83%, p-value = 0.026). Based on hypothesis H3b, we expected ROE of firms in Group 1 to be lower than other groups based on the trade-off between profitability-liquidity dual goals. Thus, hypothesis H3b was not supported. The mean of ROA of firms in Group 1 was lower than that of firms in other groups, but the difference was not significant (difference in means = -0.65%, p-value = 0.444). Thus, hypothesis H3c was not supported. In sum, Tobin's Q and ROA of firms in Group 1 were not significant difference from firms in other groups while ROE of firms in Group 1 were significantly higher than that of firms in other groups.

Panel B of Table 4 showed the results of hypothesis testing on the difference in the means of GPM, CCC, ACP, AIP, and APP among firms in different groups. There was insignificant difference in the mean of GPM among firms in different groups. The mean of CCC of firms with high liquidity was significantly shorter than that of firms with low liquidity (difference in means = -277.77 days, p-value = 0.006) and the mean of CCC of firms in Group 1 was significantly shorter than that of firms in other groups (difference in means = -176.77 days, p-value = 0.008). Thus, firms with shorter CCC had higher liquidity. The mean of ACP of firms with higher GPM was significantly longer than that of firms with lower GPM (difference in means = 11.21 days, p-value = 0.067), thus, firms in this group may boost up sales to increase profit by extending longer credit period during COVID-19 pandemic. The means of AIP for firms in high liquidity group was significantly shorter than that of firms in lower liquidity group (difference in means = -170.63 days, p-value = 0.021) and the mean of AIP of firms in Group 1 was significantly shorter than that of firms in other groups (difference in means = -184.58 days, p-value = 0.001). During the crisis, firms may still have excess capacity due to demand shrinkage and tried to speed up the shipment once goods were produced to avoid inventory stock ups in the warehouse.

The mean of APP of firms in high liquidity group was significantly longer than that of firms in lower liquidity group (difference in means = 106.38 days, p-value = 0.069), thus, firms may negotiate with suppliers to stretch accounts payable during crisis to avoid liquidity drying up. In sum, during COVID-19 pandemic, firms tried to increase profit by extending credit period as well as shortening inventory cycle and stretching payable to increase liquidity.

Panel C of Table 4 showed the results from hypothesis testing of control variables in regression models. More profitable firms had lower market risk, lower leverage, and higher sales growth than less profitable firms. Firms with shorter CCC had higher sales growth compared to firms with longer CCC. Firms in Group 1 had higher sales growth compared to firms in other groups.

Overall conclusion showed that firms in Group 1 had higher sales growth, shorter CCC and average inventory period, and higher return on equity compared to firms in other groups.

Table 5 Summary of regression models

Dependent variable		Tobin Q		ROE		ROA
Independent variable	Hypothesis		Hypothesis		Hypothesis	
Constant		7.95		33.35		27.96
		(1.61)		(12.88)		(8.88)
D_H-GPM	H1a: +	-0.17	H1b: +	5.93*	H1c: +	4.28*
		(0.41)		(3.31)		(2.28)
D_H-LIQ	H2a: +	-0.32	H2b: -	-1.54	H2c: -	-0.19
		(0.42)		(3.37)		(2.33)
D_H-GPMxD_H-LIQ	H3a: +	0.54	H3b: -	-3.61	H3c: -	-7.61**
		(0.64)		(5.13)		(3.54)
BETA		0.71		-18.78***		-7.42**
		(0.63)		(5.04)		(3.47)
Debt-to-Equity		-0.20**		-2.46***		-0.54
		(0.08)		(0.61)		(0.42)
SalesGrowth (%)		0.02**		0.31***		0.23***
		(0.01)		(0.06)		(0.04)
LN_TA		-0.39***		0.61		-0.76
		(0.13)		(1.01)		(0.70)
Industry dummies		Yes		Yes		Yes

Table 5 Summary of regression models (continue)

Dependent variable	Tobin Q	ROE	ROA
Independent variable	Hypothesis	Hypothesis	Hypothesis
Adj. R^2	0.319	0.530	0.471
F-statistic	4.278***	8.888***	7.234***
Observations	85	85	85

Note: Number shown in the parenthesis is the standard error. A significant level of 10%, 5%, and 1% are marked *, **, and *** respectively.
The adjusted R^2 for the model with Tobin's Q as a dependent variable is 32% which implied that the independent variables explain 32% of the variation in Tobin's Q.
The adjusted R^2 for the model with ROE as a dependent variable is 53% which implied that the independent variables explain 53% of the variation in ROE.
The adjusted R^2 for the model with ROA as a dependent variable is 47% which implied that the independent variables explain 47% of the variation in ROA.

Table 5 showed the results from regression models. The results from model with Tobin's Q as dependent variable did not support H1a, H2a, and H3a. The results were inconsistent with Jalal and Khaksari (2019) which documented that firms with shorter cash conversion cycle have higher Tobin's Q. The plausible explanation is that Tobin's Q is estimated using end-of-year stock price while GPM and CCC are computed using accounting data which was disclosed around Quarter 2 in 2021. Thus, the end-of-year stock price disclosed in year 2020 was not reflected by the accounting data of Quarter 4/2020 which was disclosed around Quarter 2 in the year 2021. The results from models with ROE and ROA as dependent variable showed that more profitable firms had higher ROE and ROA, supporting H1b and H1c, the growth in GPM drives higher return on assets invested and yields higher return to equity holders. The results were consistent with Novy-Mark (2013) in that profitable firms generate higher return than unprofitable firms. However, the results did not support H2b and H2c which were inconsistent with Yazdanfar and Öhman (2014) which found a negative relation between cash conversion cycle and return on assets. Firms with higher profitability *and* higher liquidity had lower ROA supporting H3c that there is a trade-off between dual goals. Firms with lower debt, lower assets invested, and higher sales growth had higher corporate value. There was a negative relationship between market risk and accounting return. There was a positive relationship between sales growth and accounting return as well as corporate value.

Conclusions

COVID-19 pandemic seriously affected our lives and businesses globally. The crisis affected both liquidity and profitability of the business. The results from the study can answer three research questions raised in the paper. Firstly, what businesses can maintain both high liquidity and high profitability during COVID-19 pandemic. The results found that about 18% of Thai listed firms in SET100 can still maintain higher profitability and higher liquidity with firms in Electronic Components sector performs the best. Secondly, what were the characteristics of firms that were less vulnerable to the crisis. The resulted found that firms that can achieve profitability-liquidity dual goals had higher sales growth, shorter cash conversion cycle and average inventory period, and higher return on equity compared to firms in other groups. In addition, during the crisis, firms increased profit margin by extending credit period as well as shortening inventory cycle and stretching payables to increase liquidity. Thus, the suggestions from this study for firms to increase profits and maintain liquidity during the crisis included (1) firm may consider extending longer credit period to its customers because they may have tight liquidity to pay back and to maintain good relationship with them, (2) firm should avoid holding too much of its raw materials and/or finished products to lower its inventory carrying costs, and (3) firm should negotiate with its supplier to extend the credit period so that firm can delay the payments in order to maintain its liquidity. Thirdly, what were the effects of profitability and liquidity on corporate value and accounting returns. The results from the regression models showed that more profitable firms had higher ROE and ROA. Firms with higher profitability and liquidity had lower ROA supporting the explanation that there is a trade-off between dual goals.

Recommendations for future research

The author proposed three issues for future research. Firstly, the study can extend to cover all Thai listed firms in the Stock Exchange of Thailand (SET) and the Market for Alternative Investment (MAI). Secondly, it is interesting to study the dividend policy of firms with higher profitability and liquidity during COVID-19 pandemic and thirdly, how these firms managed their excess liquidity during the crisis.

References

Chang, C. (2018). Cash Conversion Cycle and Corporate Performance: Global Evidence. *International Review of Economics and Finance, 56*, 568-581.

Deloof, M. (2003). Does Working Capital Management Affect Profitability of Belgian Firms? *Journal of Business Finance and Accounting, 30*(3-4), 573-588.

Delta Electronics (Thailand) Public Company Limited. (2020). *Annual Report 2020.* Retrieved October 2, 2022. Website: https://deltathailand.com/en/ir-annual

Fama, E. F., & French, K. R. (2006). Profitability, Investment and Average Returns. *Journal of Financial Economics, 82*(3), 491-518.

Gentry, J. A., Vaidyanathan, R., & Lee, H. W. (1990). A Weighted Cash Conversion Cycle. *Financial Management, 19*(1), 90-99.

Gitman, R. (1974). Estimating Corporate Liquidity Requirements: A Simplified Approach. *Financial Review, 9*(1), 79-88.

Haugen, R. A., & Baker, N. L. (1996). Commonality in the Determinants of Expected Stock Returns. *Journal of Financial Economics, 41*(3), 401-439.

Hou, K., Xue, C., & Zhang, L. (2015). Digesting Anomalies: An Investment Approach. *Review of Financial Studies, 28*(3), 650-705.

Jalal, A., & Khaksari, S. (2019). Cash Cycle: A Cross-Country Analysis. *Financial Management, 49*(3), 635-671.

Johnson, R., & Soenen, L. (2003). Indicators of Successful Companies. *European Management Journal*, *21*(3), 364-369.

KCE Electronics Public Company Limited. (2020). *Annual Report 2020.* Retrieved October 2, 2022. Website: https://investor.kce.co.th/en/download/annual-report

Krungsri Research. (2020). *COVID-19 Crisis: The Impact on Businesses and Choice of Policy Tools.* Retrieved April 15, 2020. Website: https://www.krungsri.com/en/research/research-intelligence/ri-covid19-crisis-en

Lin, Q., & Lin, X. (2021). Cash Conversion Cycle and Aggregate Stock Returns. *Journal of Financial Markets*, *52*, 1-27.

Microelectronics Public Company Limited. (2020). *Annual Report 2020.* Retrieved October 2, 2022. Website: https://www.hanagroup.com/Investor/Annual

Nobanee, H., Abdullatif, M., & AlHajjar, M. (2011). Cash Conversion Cycle and Firm's Performance of Japanese Firms. *Asian Review of Accounting, 19*(2), 147-156.

Novy-Marx, R. (2013). The Other Side of Value: The Gross Profitability Premium. *Journal of Financial Economics, 108*(1), 1-28.

Paweewun, O. (2020, April 16). IMF: Thai GDP Down 6.7%. *Bangkok Post.* Retrieved April 25, 2020. Website: https://www.bangkokpost.com/business/1900795/imf-thai-gdp-down-6-7-

Shin, H. H., & Soenen, L. (1998). Efficiency of Working Capital Management and Corporate Profitability. *Financial Practice and Education, 8*(2), 37-45.

Thanthong-Knight, R. (2020, March 25). Thailand to Impose Broad Lockdown to Fight Novel Coronavirus. *Bloomberg.* Retrieved April 25, 2020. Website: https://www.bloomberg.com/news/articles/2020-03-25/thailand-to-impose-broad-lockdown-to-fight-spread-of-coronavirus

Tobin, J. (1969). A General Equilibrium Approach to Monetary Theory. *Journal of Money, Credit and Banking*, *1*(1), 15-29.

Wang, Y. (2002). Liquidity Management, Operating Performance, and Corporate Value: Evidence from Japan and Taiwan. *Journal of Multinational Financial Management, 12*(2), 159-169.

Wang, B. (2019). The Cash Conversion Cycle Spread. *Journal of Financial Economics, 133*(2), 472-497.

Yazdanfar, D., & Öhman, P. (2014). The Impact of Cash Conversion Cycle on Firm Profitability: An Empirical Study Based on Swedish Data. *International Journal of Managerial Finance, 10*(4), 442-452.

Zeidan, R., & Shapir, O. M. (2017). Cash Conversion Cycle and Value-Enhancing Operations: Theory and Evidence for a Free Lunch. *Journal of Corporate Finance, 45*, 203-219.