

# “Relationship of cash conversion cycle and PRGap with firm performance: an empirical study of Taiwanese companies”

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## Relationship of cash conversion cycle and PRGap with firm performance: an empirical study of Taiwanese companies

### Abstract

The study investigates how working capital management (WCM) impacts the profitability and operating performance of publicly traded companies in Republic of China, Taiwan. The authors use the quarterly data of 539 stocks listed on the Stock Exchange of Taiwan from 2008 to 2015, containing 17,248 observations. The study examines whether two WCM variables, namely, the cash conversion cycle (CCC), as well as the gap between days of payables outstanding and days of sales outstanding (PRGap) have any significant effects on firm profitability and operating performance. The findings demonstrate that there are significantly negative relationships between the CCC and performance indicators, whereas there are consistent positive relationships between PRGap and performance indicators.

**Keywords:** working capital management, performance, cash conversion cycle, PRGap, Tobin's Q.

**JEL Classification:** G30, G31, G32, M10.

### Introduction

The corporate finance literature focuses on the study of long term financial decisions, particularly on investment, capital structure, dividends to firm performance. However, working capital management (WCM) has a significant influence on firm profitability and hence, plays a crucial role in a firm's financial management (Shin and Soenen, 1998). Gitman (1974) concluded that the most critical factor in WCM is the cash conversion cycle (CCC), which represents the average number of days between a firm paying for raw materials and receiving payment from accounts receivable.

An extensive strain of literature, largely emanating from Jose et al. (1996), examines the relationship between corporate returns and the CCC. Day-to-day management of a firm's short-term assets and liabilities influences the success of the firm. The CCC is normally defined as a metric that represents the length of time a firm takes to convert its products into cash. The CCC can be expressed as days of sales outstanding (DSO) plus days of inventory outstanding (DIO) minus days of payables outstanding (DPO).

$$CCC = DSO + DIO - DPO$$

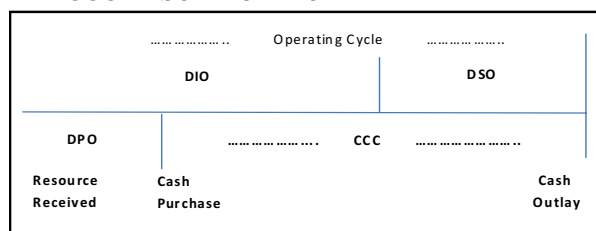


Fig. 1. Cash conversion cycle

Many researchers have reviewed the relationship between firm profitability and the CCC; the majority showed a negative relationship, some showed a positive relationship. Methods for shortening the company CCC are employed, such as shortening the periods of selling goods or services, as well as accounts receivable, to increase firm profitability and performance (Wilner, 2000; Ng et al., 1999). Deloof (2003) observed that the relationship between WCM and corporate performance involves a tradeoff; specifically, a balance must be achieved between the higher cost and lower profitability, but lower default risk attained by maximizing the level of working capital and the lower cost and higher profitability, but higher default risk attained by minimizing the level of working capital. A company must have the most appropriate level of working capital for maximizing firm value, and high inventory policy and longer receivable conditions can decrease firm profit. Wang (2002) indicated that high inventory policy can reduce the risk of insufficient stock, and a longer payment term can boost sales. A higher number of days of accounts receivable enhances long-term customer relations (Ng et al., 1999).

To observe the results obtained after subtracting DIO, we use PRGap, the difference between DPO and DSO, to represent the bargaining power among suppliers' and customers' credit policies. DSO is a proxy for the willingness of a firm to lend to its customers, and DPO captures the supply of trade credit to a given firm from all suppliers. Fisman et al. (2004) found that monopoly power is negatively associated with credit provision. Giannetti et al. (2011) indicated that firms with more creditworthiness and higher buyer market power receive larger early payment discounts. How PRGap influences the profitability and operating performance is not known, but one theory suggests that the longer a firm's PRGap, the more it benefits from conserving cash. A negative correlation of firm performance to DSO and a positive correlation of firm performance to DPO have been identified by

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Mathuva (2010) and Hsieh and Wu (2013). By contrast, Sharma and Kumar (2011) suggested that a healthier firm has a shorter PRGap and higher performance.

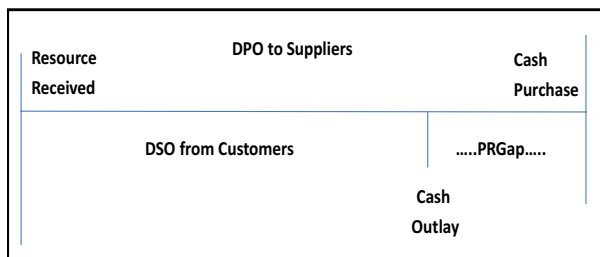


Fig. 2. PRGap

The main purpose of this study is to ascertain how WCM affects the profitability and operating performance of publicly traded companies in Taiwan. This study contributes to the literature in the following ways. First, this is one of the first studies to analyze the influence of the CCC on Taiwanese companies of all industries and all sizes. Second, the study investigates not only firm profitability, but also operating performance to determine how these react to the CCC and PRGap. Finally, for the first time, we use PRGap as a measure, in addition to the CCC, for performance analysis.

This paper is organized as follows: section 1 provides a literature review and hypotheses. Section 2 describes the data and methodology. Section 3 presents the empirical results. The final section provides the conclusion together with the limitations of this study and recommendations for future research.

## 1. Literature review and hypotheses

The CCC has been suggested to be superior to classic working capital measures such as the current ratio proposed by Gitman (1974) and Gitman and Sachdeva (1982). The CCC represents the length of time a firm takes to convert its resources into cash flow and reflects firm profitability and the effectiveness of firm management.

The relationship between firm profitability and the CCC differs among previous studies. Most studies conclude a negative relationship, whereas some conclude a positive relationship.

Deloof (2003) found WCM to have a negative, but not statistically significant, correlation with corporate profitability in a study of 1009 Belgian firms for 1992-1996. According to his results, DSO, DIO, and DPO have negative relationships with profitability. Lazaridis and Tryfonidis (2006) found WCM to have a significant correlation with firm profitability in a study of the Athens Stock Exchange by using a sample of 131 firms for the period 2001-2004. According to their results, DSO and DPO have a negative relationship with profitability, and DIO also has a negative

relationship with profitability, but this relationship is not statistically significant. Bolek (2013) found the CCC to have a negative correlation with the operating profit margin and income net margin in a study of Polish firms for the period 2007-2012. Linderhof (2014) found WCM to have a negative correlation with corporate profitability in a study of 67 Dutch firms for the period 2004-2012. According to his results, DSO, DIO, and DPO have negative relationships with profitability. Garanian (2015) found the CCC to have a negative correlation with the return on net operating assets in a study of 720 Russian firms for the period 2001-2012.

Gill et al. (2010) found WCM to have a positive correlation with firm profitability in a study of 88 American manufacturing firms for the period 2005-2007. The dependent variables representing firm profitability were gross operating profit and net operating income. According to their results, DSO has a negative relationship with firm profitability; however, DIO and DPO have no significant relationship. Ching et al. (2011) found WCM to have a positive correlation with return on assets (ROA), return on equity (ROE) and return on sales of corporate profitability in a study of 32 Brazilian firms for the period 2005-2009. According to their results, DIO has a negative relationship with profitability. Sharma and Kumar (2011) found WCM to have a positive correlation with the ROE of corporate profitability in a study of 263 Indian firms for the period 2000-2008. According to their results, DSO has a positive relationship, and DIO and DPO have negative relationships with profitability.

Afeef (2001) and Al-Shubiri et al. (2013) found no significant association between WCM and firm profitability.

The results of previous studies listed in Table 1 suggest that the relationship between the CCC and firm profitability may vary among countries and performance indicators. This leads to our first hypothesis:

**Hypothesis 1: CCC has negative (positive) effect on the firm performance in Taiwan.**

Studies have generally concluded a positive association between monopoly power and provision of credit, the suppliers of credit in competitive markets face difficulties in enforcing payment, because buyers may simply switch to alternative credit suppliers. Giannetti et al. (2011) indicated that the use of trade credit is associated with firm characters and that firms with more creditworthiness and buyer market power receive larger early payment discounts. However, Fisman et al. (2004) found that monopoly power is negatively associated with credit provision in Africa.

How PRGap influences the profitability and operating performance is not clear, but one theory suggests that the longer the PRGap of a firm, the more it gains from conserving cash and generating interest income. A negative correlation for firm performance with DSO and a positive

correlation with DPO have been identified by Mathuva (2010), and Hsieh and Wu (2013). By contrast, Sharma and Kumar (2011) suggested that a healthier firm has a shorter PRGap, lower DPO, higher DSO, and higher performance. This leads to our second hypothesis.

## Hypothesis 2: PRGap has positive (negative) effect on firm performance in Taiwan.

Table 1. Summary of literature

Author	Year	Profitability to CCC	Profitability to DSO	Profitability to DIO	Profitability to DPO	Profitability proxy
Bolek	2013	negative	na	na	na	GM, INM, OPM, ROA, ROE
Deloof	2003	negative	negative	negative	negative	GOI, NOI
Garanian	2015	negative	na	na	na	RNOA
Hsieh & Wu	2013	negative	negative	negative	positive	ROA
Jose et al	1996	Negative	na	na	na	ROA, ROE
Lazaridis & Tryfonidis	2006	negative	negative	negative	negative	GOP
Linderhof	2014	negative	negative	negative	negative	ROA, GOP
Mathuva	2010	negative	negative	positive	positive	NOP
Ching et al.	2011	positive	na	negative	na	ROA, ROE, ROS
Gill et al.	2010	positive	negative	not significant	not significant	GOP
Osundina	2014	positive	positive	positive	positive	TobinQ
Sharma & Kumar	2011	positive	positive	negative	negative	ROA
Afeef	2011	not significant	negative	negative	not significant	OPS, ROA
Al-Shubiri et al.	2013	not significant	na	na	na	ROA

Note: The table presents the relationship between firm profitability and CCC, DSO, DIO, DPO from prior researches. The abbreviations mean Gross Margin (GM), Income Net Margin (INM), Operating Profit Margin (OPM), Return On Assets (ROA), Return On Equity (ROE), Gross Operating Income (GOI), Net Operating Income (NOI), Return on Net Operating Assets (RNOA), Gross Operating Profit (GOP), Net Operating Profit (NOP), Tobin's Q (Tobin Q), Operating Profit to Sales (OPS).

## 2. Data and methodology

Data for this study are obtained from the Taiwan Economic Journal (TEJ). The TEJ provides comprehensive financial data including balance sheets, income statements, and cash flow statements covering China, Taiwan, Hong Kong, Japan, Korea, Malaysia, the Philippines, Singapore, and Thailand.

Our study, firstly, excludes financial service companies as prior studies do due to non-availability of inventory and, then, s real estate industry because of high volatility of DSO and DIO and, to avoid bias, finally we include only firms with complete data for all variables, namely, Return of Assets (ROA), the Operating Profit Ratio (OPR), Tobin's Q (Tobin Q), the CCC, PRGap, log market value (logMV), and Debt Ratio (DR) for the period from 2008 to 2015 on a quarterly basis. The data are ultimately reduced to 539 companies, yielding a balanced panel of 17,248 firms and quarterly financial observations. The data are classified into six sectors, namely electronic-backend, electronic-frontend, manufacturing, energy, retail, and others.

The research variables used in this study are defined as follows:

The dependent variables are ROA and the OPR, representing firm profitability, and Tobin's Q, representing firm operating performance.

1.  $ROA = \text{net income} / \text{total assets}$ .
2.  $OPR = \text{operating income} / \text{net sales}$ .
3.  $\text{Tobin Q} = (\text{equity market value} + \text{total liabilities}) / \text{total assets}$ .

The independent variables are the CCC, a measure used in most studies, and PRGap, a newly established measure.

$DSO = \text{average accounts receivables} / \text{net sales} \times 365 \text{ days}$ ;

$DIO = \text{average inventory} / \text{cost of goods sold} \times 365 \text{ days}$ ;

$DPO = \text{average accounts payables} / \text{cost of goods sold} \times 365 \text{ days}$ ;

1.  $CCC$  (representing the length of cash cycle) =  $DSO + DIO - DPO$
2. PRGap (representing the position of bargaining power) =  $DSO - DPO$ .

Control variables are logMV for controlling for firm size together with DR for controlling for debt ratio as suggested by Deloof (2003), Gill et al. (2010), and Afeef (2011).

1.  $\log MV = \log(\text{market value})$ .
2.  $DR = \text{total liabilities} / \text{total assets}$ .

Table 2. Description of variables

Variables	Abbreviations	Measurements	Remarks
Dependent variables			
Return on assets	ROA	net income / total assets	profitability
Operating profit ratio	OPR	operating income / net sales	profitability
Tobin's Q	Tobin Q	(equity market value + total liabilities) / total assets	operating performance
Independent variables			
Cash Conversion Cycle	CCC	DSO+DIO-DPO	length of cash cycle
Payable receivable gap	PRGap	DPO-DSO	bargaining power
Control variables			
Log market value	logMV	log(price × shares)	size, TWD K
Debt ratio	DR	total liabilities / total assets	financial leverage

**2.1. Methodology.** To test hypothesis 1 (the CCC has negative effect on firm performance) and hypothesis 2 (PRGap has positive effect on firm performance), the following equations are formulated:

$$Y_{it} = \alpha + \beta_0 Y_{it-1} + \beta_1 CCC_{it} + \beta_2 \log MV_{it} + \beta_3 DR_{it} + \varepsilon_{it}, \tag{1}$$

$$Y_{it} = \alpha + \beta_0 Y_{it-1} + \beta_1 PRGap_{it} + \beta_2 \log MV_{it} + \beta_3 DR_{it} + \varepsilon_{it}, \tag{2}$$

where  $Y_{it}$  denotes a firm's performance according to  $ROA$ , the  $OPR$ , and Tobin  $Q$  at time  $t$ , and  $Y_{it-1}$  denotes the performance of firm  $i$  at time  $t-1$ .

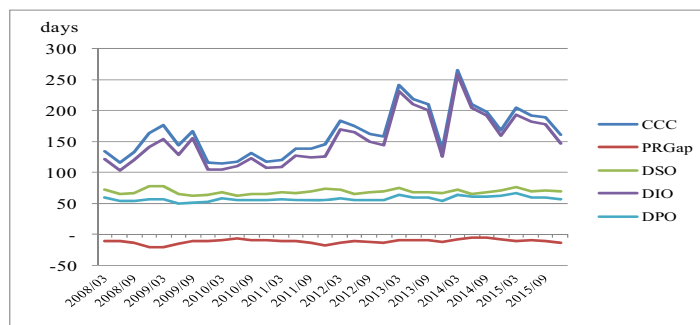
**2.1.1. Empirical results.** This section presents the results of an analysis of descriptive statistics and regressions performed using the Pearson correlation coefficient, the panel unit root test, the Hausman test, and fixed effects test.

**2.2. Descriptive statistics.** Table 3 displays the summary statistics of the regression variables along with the minimum, maximum, median, mean, and standard deviations of 17,248 observations. The means and standard deviations of the dependent variables  $ROA$  (2.07, 2.97) and Tobin's  $Q$  (1.25, 0.65) are relatively stable compared with those of the  $OPR$  (1.96, 36.95). The mean value of the  $CCC$  of 163.99 days is higher than previous findings of 117 days by Afeef (2011), and 88 days by Linderhof (2014). To elucidate this result, the  $CCC$ ,  $PRGap$ ,  $DSO$ ,  $DIO$ , and  $DPO$  from 2008 to 2015 are illustrated in Figure 3.  $DIO$  and the  $CCC$  range from 104 to 258 days, peaking in 2009, 2013, and 2014. The curve of the  $CCC$  is considerably close to the curve of  $DIO$ , implying that the  $CCC$  is dominated by  $DIO$ .  $PRGap$  is negative, indicating that the  $DPO$  is smaller than the  $DSO$  and, therefore, the bargaining power of Taiwanese companies is weak.

Table 3. Summary statistics of regression variables

Variable	Mean	Median	Maximum	Minimum	Std. dev.	Observations
ROA	2.07	2.00	92.94	-72.70	2.97	17,248
OPR	1.96	4.03	62.91	-1,779.10	36.95	17,248
Tobin Q	1.25	1.07	8.87	0.32	0.65	17,248
CCC	163.99	85.57	48,379.47	-984.11	835.07	17,248
PRGap	-11.70	-12.79	2,660.82	-1,450.90	63.44	17,248
logMV	6.78	6.71	9.58	5.11	0.64	17,248
DR	0.43	0.43	0.98	0.01	0.17	17,248

Note: The data above are obtained through TEJ database. The sample includes 539 firms for 2008-2015 of Taiwanese listed firms concluding 17,248 observations. Return On Assets (ROA) is calculated through (net income/total assets), Operating Profit Ratio (OPR) through (operating income/net sales), Tobin's Q (Tobin Q) through ((equity market value – total liabilities)/total assets), Cash Conversion Cycle (CCC) through (days sales outstanding + days inventory outstanding-days payable outstanding), Payable Receivable Gap (PRGap) through (days payable outstanding – days receivable outstanding), log market value (logMV) through log(price×shares) and Debt Ratio (DR) through (total liabilities/ total assets). \*, \*\* and \*\*\* denote significant at 10%, 5% and 1%, respectively.



Note: The data above are obtained through TEJ database. The sample includes 539 firms for 2008-2015 of Taiwanese listed firms concluding 17,248 observations. The figures shown are used arithmetic means. Cash Conversion Cycle (CCC), Payable Receivable Gap (PRGap), Days of Sales Outstanding (DSO), Days of Inventory Outstanding (DIO), Days of Payable Outstanding (DPO).

Fig. 3. Trend analysis

Table 4 presents the summary statistics for different sectors, namely, electronic-backend, electronic-frontend, manufacturing, energy, retail, and others. The sample sizes range from 21 in the energy industry to 181 in the electronic-backend industry.

Therefore, industry average ROA for all industries is positive and ranges from 1.69 to 2.32, whereas the CCC is volatile and ranges from 71.19 days (retail industry) to 318.92 days (manufacturing industry).

Table 4. Mean of variables by industries

Variable	Electronic backend	Electronic frontend	Manufacturing	Retail	Energy	Others	All
ROA	2.28	2.32	1.69	1.73	2.21	2.30	2.07
OPR	3.66	-1.26	2.26	2.40	4.15	-0.85	1.96
Tobin Q	1.27	1.43	1.11	1.20	1.09	1.47	1.25
CCC	88.92	103.85	318.92	71.19	72.74	98.24	163.99
PRGap	-11.79	-17.80	-12.39	19.08	-13.53	-15.18	-11.70
logMV	6.73	7.01	6.67	6.85	7.05	6.86	6.78
DR	41.27	37.87	45.14	56.44	41.60	40.67	42.73
No. of firms	181	82	172	28	21	55	539
Observations	5,792	2,624	5,504	896	672	1,760	17,248

Note: The data above are obtained through TEJ database. The sample includes 539 firms for 2008~2015 of Taiwanese listed firms concluding 17,248 observations. Return On Assets (ROA) is calculated through (net income/total assets), the Operating Profit Ratio (OPR) through (operating income/net sales), Tobin's Q (Tobin Q) through ((equity market value- total liabilities)/total assets), Cash Conversion Cycle (CCC) through (days sales outstanding + days inventory outstanding-days payable outstanding), Payable Receivable Gap (PRGap) through (days payable outstanding – days receivable outstanding), log market value (logMV) through  $\log(\text{price} \times \text{shares})$  and Debt Ratio (DR) through (total liabilities/ total assets). \*, \*\* and \*\*\* denote significant at 10%, 5% and 1%, respectively.

**2.2. Pearson correlation coefficient.** Table 5 displays the Pearson correlation analysis of the independent and control variables. As Table 5

illustrates, all absolute correlation coefficients are less than 0.8; therefore, collinearity probably does not exist.

Table 5. Correlation analysis

Probability	CCC	PRGap	logMV	DR
CCC	1			
PRGap	0.49***	1		
logMV	-0.03***	0.09***	1	
DR	0.05***	0.12***	0.07***	1

Note: Cash Conversion Cycle (CCC), Payable Receivable Gap (PRGap), log market value (logMV) and Debt Ratio (DR). \*, \*\* and \*\*\* denote significant at 10%, 5% and 1%, respectively.

**2.3. Panel unit root tests.** When the data of 17,248 observations are examined through the unit root test, we find the data to be stationary at the 1% significance level. The results of the Levin, Lin, and Chut test reject

the hypothesis that a common unit root exists; therefore, no common unit root exists in ROA, OPR, Tobin's Q, CCC, PRGap, logMV, and DR, indicating that the data are stationary.

Table 6. Panel unit root tests

	Levin, Lin & Chut*	Im, Pesaran & Shin W-stat	ADF - Fisher Chi <sup>2</sup>	PP - Fisher Chi <sup>2</sup>
ROA	-37.61***	-41.43***	3990.59***	6258.82***
OPR	-32.65***	-35.99***	3535.65***	5099.65***
Tobin Q	-12.20***	-21.81***	2299.49***	2189.64***
CCC	-23.18**	-24.90***	2717.64***	3058.63***
PRGap	-26.77***	-28.56***	2935.43***	2704.71***
logMV	-8.90***	-15.43***	1858.11***	1429.19***
DR	-13.15***	-16.15***	2189.99***	2850.20***

Note: Return On Assets (ROA), Operating Profit Ratio (OPR), Tobin's Q (TobinQ), Cash Conversion Cycle (CCC), Payable Receivable Gap (PRGap), log market value (logMV) and Debt Ratio (DR).\*, \*\* and \*\*\* denote significant at 10%, 5% and 1%, respectively.

**2.4. Hausman tests and fixed effects tests.** A Hausman test is performed to determine whether a fixed effects regression model or random effects regression model is appropriate for the dependent

variables ROA, the OPR, and Tobin Q. The null hypothesis of the random effects model is valid. All p-values of the Hausman test for regressions 1 to 6 are lower than 0.01%. As shown in Table 8, the null

hypothesis is strongly rejected as apparent from chi-squared test statistics and the level of significance. According to the results, the fixed effects regression model appears to describe the empirical data the most adequately.

Table 7. Hausman tests and fixed effect tests

	Hausman test	Fixed effect test
	Chi-sq. statistic	F statistic
Reg. 1 ROA-CCC	3516***	6.65***
Reg. 2 OPR-CCC	1607***	3.03***
Reg. 3 Tobin Q-CCC	5365***	10.53***
Reg. 4 ROA-PRGap	3465***	6.55***
Reg. 5 OPR-PRGap	1611***	3.04***
Reg. 6 Tobin Q-PRGap	5355***	10.51***

Note: \*, \*\* and \*\*\* denote significant at 10%, 5% and 1%, respectively.

**2.5. Regression analysis.** To examine the impact of the CCC and PRGap on firm performance (ROA, OPR, Tobin's Q), the study uses balanced panel data and fixed effects regression models. The results of the regression models are presented in Table 9.

The regression coefficients of the CCC with ROA, the OPR, and Tobin's Q in panel A are -8.43, -6.50, and -3.13 and are negative and significant at 99%, 99%, and 95% confidence levels, respectively. These negative results are consistent with those of Deloof (2003), Lazaridis and Tryfonidis (2006), and Bolek (2013), explaining that a decrease in the CCC probably increases firm profitability in terms of

ROA and the OPR. This negative relationship is also an indication that a decrease in the CCC increases a firm's operating performance in terms of Tobin's Q. Therefore, our study concludes that by reducing the length of time a firm takes to convert its products into cash, a firm can increase its performance.

The regression coefficients of PRGap with ROA, the OPR, and Tobin's Q in panel B are 2.06, 11.19, and 2.40 and are positive and significant at 95%, 99%, and 95% confidence levels, respectively. These positive results are consistent with those of Mathuva (2010), and Hsieh and Wu (2013), explaining that increasing PRGap by increasing DPO and reducing DSO to attain stronger bargaining power most likely increases firm profitability. PRGap, the independent variable, exhibits a consistent relationship with the three indicators of firm performance.

The empirical results of this study are generally consistent with our hypothesis that both independent variables, the CCC and PRGap, have a strong and consistent relationship with all three dependent variables serving as proxies of firm performance, ROA, the OPR, and Tobin's Q. The CCC has negative effect on firm performance, while PRGap has positive effect on firm performance, therefore, the Taiwanese companies could reduce the CCC and or increase PRGaps to enhance firm performance in terms of ROA, the OPR and Tobin's Q.

Table 8. Regression results of all industries

	Panel A			Panel B		
	ROA	OPR	Tobin Q	ROA	OPR	TobinQ
Intercept	-18.90***	-6.96***	-47.49***	-18.10***	-6.06***	-4.66***
AR(1)	20.63***	95.46***	181.25***	57.91***	95.58***	396.86***
CCC	-8.43***	-6.50***	-3.13**			
PRGap				2.06**	11.19***	2.40**
logMV	22.33***	7.00***	52.09***	25.98***	6.34***	10.60***
DR	-4.42***	1.51***	-5.15***	-11.34***	0.16	-4.54***
R <sup>2</sup>	0.40	0.60	0.90	0.26	0.61	0.91
adj R <sup>2</sup>	0.37	0.59	0.90	0.26	0.59	0.91
Durbin-Watson stat	1.98	2.19	1.60	2.14	2.17	-0.12
F stat	19.48	45.47	359.91	1,466.58	45.85	4,794.02

Note: The data above are obtained through TEJ database. The sample includes 539 firms for 2008~2015 of Taiwanese listed firms concluding 17,248 observations. Return On Assets (ROA) is calculated through (net income/total assets), Operating Profit Ratio (OPR) through (operating income/net sales), Tobin's Q (Tobin Q) through ((equity market value- total liabilities)/total assets), Cash Conversion Cycle (CCC) through (days sales outstanding + days inventory outstanding-days payable outstanding), Payable Receivable Gap (PRGap) through (days payable outstanding - days receivable outstanding), log market value (logMV) through log(price×shares) and Debt Ratio (DR) through (total liabilities/ total assets). \*, \*\* and \*\*\* denote significant at 10%, 5% and 1%, respectively.

## Conclusions

The objective of this study is to provide a deeper understanding of how the CCC and PRGap affect firm performance in terms of ROA, the OPR, and Tobin's Q in Taiwan. The study has three main empirical findings: first, our regression results reveal that the CCC exhibits a negative relationship with firm

profitability in terms of ROA and the OPR and firm operating performance of Tobin's Q. Second, we find that PRGap is positively correlated with all three performance indicators. Third, the CCC and PRGap both significantly affect firm performance by reducing the length of cash flow and strengthening firm bargaining power; thus, the firm achieves high profitability and operating performance.

This study makes several contributions to the literature. First, this is one of the first studies to analyze the influence of the CCC on Taiwanese companies of all industries and sizes. Second, the study investigates not only firm profitability according to ROA and the OPR but also operating performance according to Tobin's Q, concluding that the lower the CCC is, the higher the firm's profitability and operating performance. This correlation can be applied as evidence for facilitating decision-making by firm management. Finally, for the first time, we use PRGap as a measure in addition to the CCC for performance analysis. According to the results, consistency of the

relationships of both PRGap and the CCC with firm performance in Taiwan is established. The CCC and PRGap both significantly affect firm performance, by decreasing the length of cash flow to improve the CCC and by strengthening bargaining power to increase PRGap, thus, registering high profitability and operating performance of the firms. We suggest that the Taiwanese companies should invest more resources on reducing the CCC and increasing PRGaps. Accounts receivables financing, factoring, might be a workable solution. This study is limited to Taiwanese firms. Further research should investigate the generalize ability of the findings to s outside Taiwan.

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