

The Dynamic Relationship between Working Capital Management and Financial Performance: Evidence from Asia

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The literature on working capital management and financial performance is inconclusive as it presents contradictory evidence. This study attempts to highlight the impact of working capital management on firm performance by drawing a large sample of non-financial sector of fourteen Asian Economies that include Bangladesh, China, Hong Kong, India, Indonesia, Japan, Malaysia, Pakistan, Sri Lanka, Singapore, Thailand, Vietnam, South Korea and Taiwan from 2000 to 2018. The analysis is conducted separately for each country to bring new insights into dynamic environment of each country. Factor analysis is used to streamline the indicators of working capital. EGLS' results show that effect of working capital on firm performance varies across countries. Most importantly, the study uses partial adjustment model to analyze the long run relationship and speed of adjustment to desired performance. The results elucidate changing speed of adjustment across different countries. The variation in speed of adjustment calls attention to the fact that same approach can not be used across countries to chalk out the policy. The findings of the study bring new insights by enunciating empirical evidence from 14 different countries and lay down base for comparative analysis. The findings have widespread implications for management as results can be used to decide optimal level working and the time required to reach at desired level.

Keywords: Working Capital, Profitability, Speed of Adjustment, Asian Economies

1. INTRODUCTION

Working capital and strategic choices are widely discussed in the previous studies as they reveal an effect on many of the business activities through financial management. Inadequate management of working capital exposes the firms to technical bankruptcy. On the other hand, maintaining higher level of working capital results in reduction of profitability. Firms try to maintain these figures within the permissible boundaries of efficiency to create value for shareholders in the manufacturing sector. Efficient working capital involves controlling and planning the current liabilities and current asset in a better way that eliminates the risk of insolvency and also avoid extreme investment in current assets (Eljelly, 2004).

Consistent with the importance of working capital management (WCM), there is increasing research interest in the relationship between WCM and firm performance (Wang 2002; Deloof, 2003; García-Teruel & Martínez-Solano,

2007; Raheman, Afza, Quyyum, & Bodla, 2010; Kostini & Marliasari, 2017; Prafitri, Rachmina & Maulana, 2017). These studies are a reflection of the importance of WCM to all size of businesses (Grablowsky, 1984; Peel & Wilson, 1996; Howorth & Westhead, 2003). For instance, a study by García-Teruel & Martínez-Solano (2007) established that 69 % of Spanish SMEs assets are represented by current assets at the same time their current liabilities represent more than 50% of their total liabilities. The WCM decision holds high importance as it influences the profitability, risk and market value of the firm (Smith, 1980; Moss & Stine, 1993; Uyar, 2009). Many businesses were closed because of the inefficiency of finance manager in controlling the current liabilities and assets (Smith, 1973).

Although importance is attributed to WCM yet the previous studies mainly remained focused on measuring the impact of WCM on financial performance and did not analyze the long-term sustainability of performance of the businesses through working capital management. Moreover, the sample of the studies is most confined to one economy that restricts the comparative insights. In addition to that, existing research is yet to embark on the speed of adjustment of working capital to desired level. This study adds to the existing strand of literature by empirically analyzing the long run and short run relationship of WCM and firm's performance and also highlights the speed of adjustment of WCM to desired level. Furthermore, the study is drawn on a large sample of 14 Asian countries and results are enunciated separately to bring comparative insights. The Asian economies picked in these demographics are Bangladesh, China, Hong Kong, India, Indonesia, Japan, Malaysia, Pakistan, Sri Lanka, Singapore, Thailand, Vietnam, South Korea and Taiwan. These economies give picture of market dynamics and showcase elements in developing Asian region and the outcomes acquired might be interpreted to give a summed-up result to effect of WCM on firm's profitability.

2. LITERATURE REVIEW

Literature outlines mixed evidences about the relationship between WCM and firm performance. For instance, Abuzayed (2012) report positive relation between WCM and firm's performance. Similarly, Eljelly (2004) also divulge positive impact of WCM on firm's performance. In the same way, Ng et al. (2017) establish the positive relation of WCM's components and firm's performance. Recently, Dhole, Mishra and Paul (2019) have discussed the importance of working capital management and purport positive effect of WCM on financial performance of financially constrained firms. Moreover, Ahmadi, Arasi and Garajafary (2012) find positive relationship among WCM and performance of the firm. Similarly, Nobanee, Abdullatif and Hajjar (2011) find strong positive relation between WCM and firm performance in Japan.

In addition to that, Ukaegbu (2014) empirically investigates the relationship between corporate profitability and working capital efficiency in case of Industrial firms in Egypt, South Africa, and Nigeria. The results outline negative relationship between net operating profit and cash conversion cycle in different types of industries of these economies. By the same token, negative association between WCM and economic performance is also reported by many other studies (DeLoof, 2003; Shrivastava, Kumar, & Kumar, 2017; Tran, Abbot & Yap, 2017). In the same manner, Prafitri et al. (2017) also find negative relationship between ROI and WCM. Tsuruta (2019) highlights the negative

association between WCM and firm performance and further elaborates that negative effect is further aggravated during crisis. Along with these findings, literature also highlights insignificant association between WCM and firm performance (Kostini& Marliasari, 2017). Furthermore, Meena and Reddy (2016) examine the relationship between firm performance and WCM and find an insignificant relationship. In this way, by examining the literature, different views came about the relationship of WCM and performance. The review of literature highlights a clear gap as contemporary research is yet to embark on dynamic nature and speed of adjustment of WCM to 100% performance.

3. RESEARCH METHODOLOGY

The sample of the study is drawn from fourteen Asian Economies which include Bangladesh, China, Hong Kong, India, Indonesia, Japan, Malaysia, Pakistan, Sri Lanka, Singapore, Thailand, Vietnam, South Korea and Taiwan. Listed companies of the non-financial industry are chosen from these countries. The indexes that had been used for these economies were BSE Sensex 30 Index, PSX 100, Colombo Stock Exchange, Dhaka Stock Exchange, FTSE Straits Times Index, Thai Set100 Index, Bursa Malaysia, Jakarta Composite Index, Ho Chi Minh City Stock Exchange, Hang Seng Index, Nikkie 225, Shanghai Shenzhen CSI 300 Index, KOSPI100 and Taiwan TSEC 50 Index respectively. Data required for this study is gathered from the Thomson database and only companies with data of at least five consecutive years are analyzed. The time period of the study is 2000-2018. The study empirically examines the short run as well as long run effect of various components of WCM on firm's performance. Table 1 shows the indicators along with their formulation.

Table1

Variable	Measurement	Empirical Evidence
Return on Equity	$ROE = \frac{Net\ Income}{Total\ Equity}$	Abuzayed (2012)
Accounts receivable period	$AR = \frac{Accounts\ Receivable}{Net\ Sales} * 365$	Vural, Gokhen&Cetenak (2012)
inventory holding period	$INV = \frac{Inventory}{Cost\ of\ goods\ sold} * 365$	Iqbal&Zhuquan (2014)
accounts payable period	$AP = \frac{Accounts\ Payable}{Purchases} * 365$	Ng, Ye, Ong&Teg (2017)
Current Assets to Total Assets Ratio	$CATA = \frac{Current\ Assets}{Total\ Assets}$	Ng, Ye, Ong&Teg (2017)
Current Liabilities to Total Assets Ratio	$CLTA = \frac{Current\ Liabilities}{Total\ Assets}$	Shrivastava et al. (2016)
Current Ratio (CR)	$CR = \frac{Current\ assets}{Current\ Liabilities}$	Mohamad and Saad (2010)
Financial Debt Ratio	$FD = \frac{Financial\ Debt}{Total\ Assets}$	Mohamad and Saad (2010)

4. DATA ANALYSIS

In order to bring robustness in the analysis, factor analysis is performed to avoid high correlation among the indicators of working capital. This method gives better results as it removes the issue of multicollinearity as well. Furthermore, EGLS method is used to analyze the impact of WCM in Firm's performance. The estimates of EGLS method are robust even in the case of Heteroscedasticity or auto-correlation. Equation (1) shows the Panel EGLS regression model

$$FP_{it} = \beta_0 + \beta_1 WCM_{it} + \beta_2 FP_{t-1} + \varepsilon_{it} \quad (1)$$

FP_{it} : ROE of firm performance I at time t;

β_0 : The intercept of the equation

β_1, β_2 : Coefficients of variables

WCM_{it} : The different independent variables include CATA CLTA CR INV DR AR AP CCC

ε_{it} : The error term.

In order to analyze the dynamics of structural adjustments, partial adjustment model is applied. Moreover, Partial adjustment model compares maturity and working capital management. Very few studies use geometric lag model for the estimation of long and short-run relationships. Partial adjustment models are employed for this purpose. For the specification of the general model Hsiao's testing procedure (Hsiao, 1986) is used. In addition to this, the same model also highlights the adjustment time for actual performance to reach at desired level. Equation (2) shows partial adjustment model.

$$y_t^* = \alpha + \beta x_t + \varepsilon_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

Equation (1) and (2) are used to derive adjustment equation (3) that is used to calculate adjustment period and is expressed as:

$$y_t - y_{t-1} = (1 - \lambda)(y_t^* - y_{t-1}) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3)$$

By solving both equations and putting values of x and y the partial adjustment model is as follow:

$$FP_t = \alpha' + \beta' WCM_1 + \lambda FP_{t-1} + \varepsilon_t' \quad \dots \quad \dots \quad \dots \quad \dots \quad (4)$$

Where FP_t is Return on Equity (ROE), WCM_1 represents the Working Capital Management and it includes Assets Composition (AC), Net Operating Cycle (NOP), Inventory Holding Period (INV) and Current Ratio (CR). This equation of partial adjustment model has many practical benefits. This model has intrinsic linear parameters and has non-auto correlated disturbance with ε_t . The parameters of the partial adjustment model are consistent in estimation and efficient by LS. In this revised model, the short run multiplier for the independent variable is β , whereas the

long run effect is λ . When the variables are in log form, these effects are the short and long-run elasticities.

5. RESULTS AND DISCUSSION

Table 1 discusses the mean, median, variance, skewness of the data.

Table 1

Descriptive Stats

	AP	CATA	CCC	CLTA	CR	ELEV	FD	INV	ROE
Mean	70.069	39.38	-13.303	33.72	138.9734	46.793	38.78	32.855	11.04
Median	52.973	35.864	1.7061	23.18	124.7929	48.04	32.11	28.014	11.06
Maximum	654.84	86.250	135.95	98.50	956.9032	735.48	109.8	199.14	113.4
Minimum	4.9527	7.0465	-615.46	4.80	40.73284	2.625	0	6.638	-288.2
Std. Dev.	72.852	19.644	73.925	24.04	72.56525	23.852	25.74	14.11	17.40
Skewness	2.6030	0.4849	-2.1235	1.044	4.533008	6.781	0.6250	2.951	-5.910
Kurtosis	13.694	2.0016	11.338	2.578	36.81376	157.01	2.2767	19.13	72.67
Jarque-Bera	30163.	413.08	18672	968	261300.2	5098326	444.69	63295	1064699
Coefficient of Variation	1.0397	0.498	-5.5569	0.713	0.5221521	0.5097	0.6636	0.430	1.575
Probability	0	0	0	0	0	0	0	0	0
Sum	358547	201548.6	-68072	172569	711126.8	239462	198442	168123	56533
Sum Sq. Dev.	27152868	1974198	27958527	2958664	26939403	2910808	3391938	1025890	1550309

As the probability of all the variables is equal to zero which shows that all variables are skewed. The value of skewness is zero for all the variables which depict that some indicators of firm performance are positively skewed whereas return on equity is negatively skewed and all indicators of working capital management are positively skewed except CCC whose skewness value is negative. The value of Kurtosis is greater than 3 in all the variables except CATA, CLTA and FD which depicts that tails of all other variables are heavy. Table 2 shows the 4 latent factors which are developed because of high multicollinearity between the independent variables.

Table 2

Factor Analysis

Country	Cutoff Point	Independent Variables Assets Composition	Net operating cycle	Current Ratio	Inventory period
Bangladesh	0.52				
China	0.51				
Hong Kong	0.49				
India	0.42				
Indonesia	0.51	CATA, AR, CLTA, FD	CCC, AP	CR	Inv
Pakistan	0.4				
South Korea	0.54				
Sri Lanka	0.51				
Thailand	0.4				
Vietnam	0.41				
Japan	0.58	Assets Composition	Current Ratio	Inventory period	Net operating cycle
Malaysia	0.59	CATA, AR, CLTA, FD, CCC	CR	INV	AP
		Assets Composition	Net operating cycle	Cash Conversion Cycle	Current Ratio
Singapore	0.55	CATA, AR, CLTA, FD Assets Composition	AP, INV	CCC	CR
			Cash Conversion Cycle	Net operating cycle	Current Ratio
Taiwan	0.65	CATA, AR, CLTA, FD	CCC	AP, INV	CR

After analyzing the correlation on indicators of working capital management it is found that there is high multi-collinearity due to which this study applies factor analysis and the eight indicators were transformed into four main non-collinear components. In case of Bangladesh, China, Hong Kong, India, Indonesia, Pakistan, South Korea, Sri Lanka, Thailand, and Vietnam the cutoff points are 0.52, 0.51, 0.49, 0.42, 0.51, 0.40, 0.54, 0.51, 0.40 and 0.41 respectively.

Table 3

Regression Model

	Panel EGLS (Cross-section weights)						Adjusted R-squared	F-statistic
	NOC	INV	CR	AC	C	ROE(-1)		
Bangladesh	0.1978***	-0.0656	-0.0018	-0.3488***	24.91***	0.6391***	0.8632	85.572
China	0.1343	-0.0856	0.0270	-0.4550***	43.19***	0.3617***	0.7494	38.617
Hongkong	0.2324***	-0.0910	0.0052	-0.3582***	30.83***	0.5234***	0.8092	59.048
India	0.4367***	-0.0608	-0.7060	-0.3755***	25.63***	0.4587***	0.7078	33.194
Indonesia	-0.0581***	-0.3162	-0.0019	0.1729***	24.35***	0.6588***	0.8798	101.14
Japan	-0.390***	0.3076***	0.0116	-0.1900***	15.79***	0.6861***	0.8972	120.40
Malaysia	-0.494***	0.3326***	0.0211	-0.1894***	15.66***	0.6605***	0.8966	112.92
Pakistan	0.4815***	-0.1220	0.0301***	-0.3486***	31.17***	0.2718***	0.6514	26.046
Singapore	-0.0656	0.1340***	-0.0079	-0.3718***	25.98***	0.6522***	0.8557	80.620
South Korea	0.1734***	-0.0829	-0.3187***	9.66E-05	27.07***	0.6236***	0.8787	100.13
Sri Lanka	0.7776***	-0.3510***	0.0318***	-0.7787***	48.28***	0.1877***	0.3540	19.232
Taiwan	-0.0864**	0.1009	-0.0049***	-0.3144***	26.54***	0.6518***	0.8762	99.446
Thailand	0.4608***	-0.1386***	0.0315	-0.3147***	34.03***	0.2662***	0.6568	26.646
Vietnam	0.6633***	-0.3012***	0.0291***	-0.6692***	48.60***	0.1880***	0.3548	37.857

Note: *** $p < 0.01$, ** $p < 0.05$

For Malaysia and Japan, NOC consider as AP and for Singapore and Taiwan, INV consider as CCC

Where, ROE is Return on Equity, NOC is Net Operating Cycle, INV is Inventory Holding period, CR is Current Ratio, AC is Assets Composition, C is Constant, ROE (-1) is lagged value of Return on Equity, AP is Account Payable period and CCC is Cash Conversion Cycle

This study applies the Panel EGLS with respect to ROE as the dependent variable and finds significant relationship in case of Bangladesh, China, Hong Kong, India and Indonesia with NOC. Moreover, ROE also shows long-term relationship and it also gets affected from its previous lagged values. By the same token, long-term relationship is also observed in China and India as ROE is affected from its previous lagged values.

Besides that, ROE has significant relationship with AP in Japan and Malaysia. Moreover, ROE in case of Japan, Malaysia and South-Korea, also shows long-term relationship and it also gets affected from its previous lagged values. Similarly, in case of Pakistan, ROE has a significant relationship with NOC. Though in case of Singapore ROE, has insignificant negative relationship with NOC and CR but ROE also shows long-term relationship and it also gets affected from its previous lagged

values. Furthermore, in case of Taiwan, ROE has insignificant relationship with NOC and CCC but lag of ROE is significant. Correspondingly, in case of Thailand, ROE has significant relationship with NOC and ROE shows long-term relationship and lag is also significant in this case.

Partial Adjustment Model

Table 4 shows the comparison of short run and long-term effect of working capital management on firm's performance and also describes the adjustment period that how much time it takes to 100% matching between actual and desired performance. The λ of ROE of Bangladesh is 0.639 in order to calculate the partial adjustment coefficient, this study subtracts this value from 1 and results in 0.360 which is $1-\lambda$, for 100% matching between actual and desired performance the required period is 2.72 years. The λ of ROE of China is 0.361 and 0.63 which is $1-\lambda$, for 100% matching between actual and desired performance the required period is 1.5 years. The λ of ROE of Hong Kong is 0.523 and 0.476 which is $1-\lambda$, this shows that for 100% matching between actual and desired performance the required period is 2.09 years. The λ of ROE of India is 0.458 and 0.541 which is $1-\lambda$ and it indicates that for 100% matching between actual and desired performance the required period is 1.84 years. The λ of ROE of Indonesia is 0.658 and 0.342 which is $1-\lambda$, this elucidates that for 100% matching between actual and desired performance the required period is 2.92 years. The λ of ROE of Japan is 0.686 and 0.314 which is $1-\lambda$, this shows that for 100% matching between actual and desired performance the required period is 3.18 years. The λ of ROE of Malaysia is 0.66 and 0.34 which is $1-\lambda$, this depicts that for 100% matching between actual and desired performance the required period is 2.94 years. The λ of ROE of Pakistan is 0.27 and 0.73 which is $1-\lambda$, this shows that for 100% matching between actual and desired performance the required period is 1.37 years. The λ of ROE of Singapore is 0.65 and 0.35 which is $1-\lambda$, this shows that for 100% matching between actual and desired performance the required period is 2.87 years. The λ of ROE of South Korea is 0.62 and 0.38 which is $1-\lambda$, this shows that for 100% matching between actual and desired performance the required period is 2.65 years.

The λ of ROE of Sri Lanka is 0.19 and 0.81 which is $1-\lambda$, this shows that for 100% matching between actual and desired performance the required period is 1.23 years. The λ of ROE of Taiwan is 0.65 and 0.35 which is $1-\lambda$, this shows that for 100% matching between actual and desired performance the required period is 2.86 years. The λ of ROE of Thailand is 0.27 and 0.73 which is $1-\lambda$, this shows that for 100% matching between actual and desired performance the required period is 1.36 years. The λ of ROE of Vietnam is 0.18 and 0.81 which is $1-\lambda$, this shows that for 100% matching between actual and desired performance the required period is 1.23 years. Return on Equity took less time for 100% matching between actual and desired performance in the case of Malaysia and ROE took almost 3 years. It means there is a gap between equity and debt which can be fulfilled by taking good decision in financial management.

Table 4

Partial Adjustment Model

Country	Short Run Equation	Long Run Equation	Adj-Period
	$ROE_t = 24.93 + .19NOC$	$ROE_t = 86.7 + 0.68NOC$	
Bangladesh	$-.06INV$ $-.001CR$ $-.34AC$	$- 0.22 INV$ $- 0.07 CR$ $- 1.21 AC$	2.7 Years
China	$ROE_t = 43.18 + .13NOC - .08INV + .02CR - .45AC$	$ROE_t = 150.17 + 0.46NOC - 0.29 INV + 0.09 CR + 1.58 AC$	1.5 Years
HongKong	$ROE_t = 30.87 + .23NOC - .09INV + .005CR - .35AC$	$ROE_t = 107.37 + 0.80NOC + .31 INV + .01 CR - 1.24 AC$	2.0 Years
India	$ROE_t = 25.64 + .43NOC - .06INV - .7CR - .37AC$	$ROE_t = 89.19 + 1.51NOC - 0.21 INV - 2.45 CR - 1.30 AC$	1.8 Years
Indonesia	$ROE_t = 24.35 - .05NOC - .31INV - .001CR + .17AC$	$ROE_t = 84.71 - 0.20NOC - 1.10 INV - 0.007 CR + .60 AC$	2.9 Years
Japan	$ROE_t = 15.79 - .39NOC + .30INV + .01CR + .19AC$	$ROE_t = 54.93 - 1.35NOC + 1.07 INV + .04 CR - 0.66 AC$	3.1 Years
Malaysia	$ROE_t = 15.63 - .49NOC + .33INV + .02CR + .18AC$	$ROE_t = 54.36 - 1.72.NOC + 1.15 INV + .07 CR - 0.65 AC$	2.9 Years
Pakistan	$ROE_t = 31.17 + .48NOC - .12INV + .03CR - .34AC$	$ROE_t = 108.43 + 1.67NOC - 0.42 INV + .10 CR - 1.21 AC$	1.3 Years
Singapore	$ROE_t = 25.6 - .06NOC + .13INV - .007CR - .37AC$	$ROE_t = 90.34 - 0.22NOC + .46 INV - 0.02 CR - 1.29 AC$	2.8 Years
South Korea	$ROE_t = 27.07 + .17NOC - .08INV - .31CR$	$ROE_t = 94.15 + .60NOC - 0.288 INV - 1.10 CR + 0.0 AC$	2.6 Years
Sri Lanka	$ROE_t = 48.27 + .77NOC - .35INV + .03CR - .77AC$	$ROE_t = 167.892 + 2.70NOC - 1.22 INV + .11 CR - 2.70 AC$	1.2 Years
Taiwan	$ROE_t = 26.54 - .08NOC + .10INV + .004CR - .31AC$	$ROE_t = 92.31.030NOC + .35 INV - 0.01 CR - 1.09 AC$	2.8 Years
Thailand	$ROE_t = 34.01 + .46NOC - .13INV + .03CR - .31AC$	$ROE_t = 118.29 + 1.60NOC - 0.48 INV + .11 CR - 1.09 AC$	1.3 Years
Vietnam	$ROE_t = 48.7 + .67NOC - .30INV + .02CR - .66AC$	$ROE_t = 169.04 + 2.30NOC - 1.04 INV + 0.10 CR - 2.32 AC$	1.2 Years

6. CONCLUSION AND IMPLICATION

This study sought to examine the impact of working capital management on the firm financial performance of non-financial sector of fourteen Asian Economies which include Bangladesh, China, Hong Kong, India, Indonesia, Japan, Malaysia, Pakistan, Sri Lanka, Singapore, Thailand, Vietnam, South Korea and Taiwan in the period 2000 to 2018. The study is motivated by inadequate scholarly attention in this area and more particularly, the recent trend of non-financial companies being placed under statutory management due to poor performance emanating from poor financial management. The study particularly is narrowed down to the relationship between working capital management and firm's financial performance as measured by ROE.

The findings of the study highlight the changing impact of WCM on ROE across different countries. The results outline that same policy across countries and that different countries can yield different results. The results lay down foundation for comparative insights across different countries and outlines similarities and difference in response of ROE to WCM. The study is valuable for industries which have existence in different economies. The study indicates that WCM is positively linked with ROE. The linear association between profitability and WCM, discussed in the study, outline that industries in Bangladesh, China, Hong Kong, Pakistan and South Korea can improve ROE by preserving a particular level of WCM. Industries in Japan, Sri Lanka, Indonesia, Malaysia, India, and Singapore maintaining a higher level of WCM may negatively mark their performance by steadily declining their profitability. Contrary to that, China, Pakistan, Bangladesh, Hong Kong, South Korea, Taiwan, Thailand and Vietnam managers may bring appreciation in net value of organization by preserving an advanced level of WCM. Moreover, the study brings into focus the dynamic relationship between WCM and ROE and identifies the speed of adjustment. The variation in speed of adjustment ranges from 1.23 to 3.18. The variation in speed of adjustment calls attention to the fact that same approach should not be used to chalk out policy across countries.

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