International Journal of Sustainable Development and Planning
Vol. 21, No. 6, June, 2026, pp. 2533-2545
Journal homepage: http://iieta.org/journals/ijsdp

Working Capital Management and Firm Profitability in ASEAN: A Cross-Country Panel Analysis

Thuy Duong Phan[1], Thu Hang Dang[2*]

[1] Finance - Accounting and Sustainable Management Research Group, University of Transport Technology, Hanoi 100000, Vietnam
[2] Faculty of Accounting and Auditing, VNU University of Economics and Business, Hanoi 100000, Vietnam

Corresponding Author Email: danghang@vnu.edu.vn

https://doi.org/10.18280/ijsdp.210612

Received: 12 April 2026
Revised: 10 June 2026
Accepted: 21 June 2026
Available online: 30 June 2026

Keywords:
working capital management, cash conversion cycle, firm performance, return on assets, ASEAN, feasible generalised least squares, emerging markets

ABSTRACT

This study analyzes the influence of working capital management (WCM) on the financial performance of firms across six Association of Southeast Asian Nations (ASEAN) economies—Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam—utilizing an unbalanced panel of 19,900 firm-year observations from 1,990 non-financial listed firms from 2010 to 2022. Applying feasible generalised least squares (FGLS) to mitigate panel heteroskedasticity and serial autocorrelation, the findings indicate that, at the pooled ASEAN level, all four WCM proxies—cash conversion cycle (CCC), days sales in inventory (DSI), days sales outstanding (DSO), and days payable outstanding (DPO)—exhibit a negative and statistically significant correlation with return on assets (ROA) on average; however, this pooled DPO effect is not uniform across countries, reversing to positive and significant in the Philippines and losing significance in Thailand. Of the components, DSO demonstrates the most substantial standardized negative impact ($\beta = -0.086$), followed by DPO ($\beta = -0.078$) and DSI ($\beta = -0.039$). Sector-specific analysis indicates that the adverse association between WCM and performance is most significant in the Energy, Healthcare, and Consumer Defensive sectors, whereas the Communication Services sector displays an unusual positive correlation. Country-specific findings indicate that Vietnam and Thailand demonstrate the highest sensitivity of WCM to performance, whereas the Philippines exhibits the lowest overall sensitivity across all four WCM proxies, a pattern driven by conglomerate buyer power rather than financial market depth, and Singapore's more advanced financial sector mitigates, though does not eradicate, the performance detriment associated with working capital inefficiencies. These findings align with existing trends in the global WCM literature and provide significant cross-country data from the ASEAN region.

1. INTRODUCTION

A company's profitability, risk, and financial planning are all influenced by working capital management (WCM) [1]. Furthermore, WCM practices are not inflexible; they change over time [2]. These dynamics carry particular relevance for emerging markets, where institutional conditions shape how firms manage working capital [1], underscoring the need for context-specific evidence [2]. While the relationship between firm performance and WCM has been extensively investigated in developed markets [3, 4], the evidence from Association of Southeast Asian Nations (ASEAN) remains limited. The ASEAN region provides a particularly advantageous environment, as it refers to a variety of financial development, institutional quality, and corporate governance levels in six major nonfinancial economies. This enables researchers to investigate how country-specific conditions influence the outcomes of WCM. Vietnam and Indonesia face more restrictive financing environments, whereas Singapore serves as a well-developed financial centre. The impact of working capital decisions on profitability may be significantly altered by this institutional diversity.

Prasad et al. [5] conducted a systematic evaluation of 75 highly cited studies and found that approximately 79% reported a negative correlation between profitability and WCM. Nevertheless, recent research [6, 7] has challenged this linear perspective, identifying nonlinear patterns with optimal WCM levels. Additionally, the positive effects of WCM on market power [8] and economic uncertainty [9] have been observed. Research conducted within ASEAN, with a particular emphasis on Vietnam, consistently demonstrates the detrimental effects of the cash conversion cycle (CCC) [7, 10]. Additionally, research conducted in Malaysia supports the inverse relationship between economic value added and WCM [11]. However, there is a scarcity of cross-country evidence that encompasses the entire ASEAN region.

The objective of this study is to address this gap by examining 19,900 firm year observations from 1,990 nonfinancial listed firms in Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam from 2010 to

2022. The analysis further analyses the results by ten Global Industry Classification Standard industry sectors and six nations to identify sources of differences, utilising feasible generalised least squares (FGLS) to address confirmed heteroskedasticity and autocorrelation in the panel data. The paper is organised as follows: Section 2 provides a literature review; Section 3 delineates the data and methodologies; Section 4 presents the results and discussion; and Section 5 concludes.

2. LITERATURE REVIEW

The trade-off between liquidity and profitability constitutes the core theoretical framework for research on WCM. Firms that invest heavily in current assets—by extending trade credit to customers, accumulating inventory, or paying suppliers promptly—maintain operational flexibility but divert capital away from productive investment. Conversely, aggressive policies that compress the CCC free internal resources but may impair supply chain reliability. Shin and Soenen [12] formalised this trade-off by demonstrating that the net trade cycle is inversely related to stockholder value. Deloof [3] extended the framework to accounting-based performance, attributing the negative CCC–profitability relationship to the financing cost imposed on firms that carry excess current assets. Agency theory [13] further predicts that managers may overinvest in working capital to build operational slack, thereby creating a wedge between actual and optimal working capital levels. Dynamic trade-off theory resolves these tensions by positing that firms target an optimal working capital level, with deviations in either direction imposing performance costs [5].

The systematic review by Prasad et al. [5], encompassing 75 highly cited studies across multiple markets, found that approximately 79% document a negative WCM–profitability relationship, establishing this as the empirical consensus. Within developed and upper-middle-income markets, Lyngstadaas and Berg [4] confirm a significant inverse CCC–return on assets (ROA) relationship for Norwegian firms using pooled ordinary least squares (OLS) and two-stage least squares, and recommend flexible, aggressive working capital policies as a value-enhancing strategy. Kumar et al. [14] corroborate this for Indian listed firms, showing that shorter CCC and inventory days increase the probability of achieving superior composite financial performance. In Pakistan, Kafeel et al. [15] employ system generalised method of moments (GMM) alongside static panel estimators and find that reducing the payable deferral period and CCC consistently improves ROA and operating profit, a finding partially supported by Khan et al. [16] who note that cash holdings negatively affect operating profitability, though WCM effects on stock prices vary across manufacturing sectors. Al-Mawsheki et al. [11] extend the evidence to Malaysia, demonstrating that the CCC has a statistically significant negative effect on Economic Value Added, suggesting that WCM inefficiency reduces value creation beyond what accounting-based measures capture.

Within the ASEAN region, evidence specific to Vietnam and adjacent emerging markets reinforces the negative WCM–performance hypothesis. Nguyen and Van Nguyen [10] apply fixed-effects panel regression to Vietnamese non-financial firms and find that the CCC and its components—inventory conversion period, accounts collection period, and accounts payable period—significantly and negatively affect ROA and gross operating income. Their analysis further reveals that trade credit usage in the Vietnamese corporate sector is largely incidental rather than strategically deployed, indicating that firms do not fully exploit trade credit as a financing instrument. Toy et al. [17], using the Driscoll-Kraay estimator for the Fragile Five economies, including Indonesia, show that WCM effects vary with the choice of performance metric and country-specific macroeconomic conditions, highlighting the importance of cross-country heterogeneity. Contrasting evidence comes from Godswill et al. [18] for Nigerian deposit money banks which report positive associations between the payable period and profitability. These divergences are attributable to structural differences: banking firms operate under a distinct intermediation model, and credit-constrained small and medium-sized enterprises (SMEs) in underdeveloped financial environments derive genuine financing benefits from extended payables—conditions that do not apply to the listed non-financial firms examined in the present study.

A distinct strand of the literature challenges the linear specification, providing evidence of non-linear, concave WCM–profitability dynamics that imply an optimal level of working capital. Korent and Orsag [6] estimated an inverted-U relationship between the net trade cycle and ROA for Croatian software firms using the Arellano-Bond dynamic panel estimator. Anton and Nucu [19] replicated this pattern for Polish listed firms using OLS, fixed-effects, and panel-corrected standard error estimators, and Sensini and Vazquez [20] extended the inverted-U finding to Argentine SMEs for each CCC component individually. In the Norwegian market, Lyngstadaas and Berg [4] include quadratic WCM terms and confirm that performance costs arise from both over- and under-investment in working capital, with over-investment imposing larger penalties. Nguyen and Van Nguyen [10] estimate GLS models with squared WCM terms and identify a U-shaped CCC–ROA relationship, implying that at low working capital levels, further reduction is detrimental. Huang and Dinh [7] adopt Hansen's panel threshold model, with firm leverage as the threshold variable, and find that the negative WCM–ROE relationship intensifies markedly when the debt ratio exceeds 78.45%, thereby establishing leverage as a first-order moderator of WCM effects in Vietnam. A recent study on 88 listed transportation firms in Vietnam (2014–2023) found that the relationship between WCM and profitability is nonlinear and depends on a cash-holding threshold. Below the threshold, longer receivables, payables, and inventory periods significantly reduce ROA. Above the threshold, however, the effects of days sales outstanding (DSO), days payable outstanding (DPO), CCC, and OCC turn positive, suggesting that more flexible working capital policies may enhance profitability when firms maintain sufficient liquidity [21]. Prasad et al. [22] frame non-linearity through the concept of target working capital, demonstrating for Indian firms that deviations from the target net trade cycle—regardless of direction—reduce gross operating income, consistent with the dynamic trade-off prediction. While the present study employs a linear specification, the non-linear evidence implies that ASEAN firms primarily operate on the descending portion of the inverted-U curve, where further CCC reduction yields profitability improvements.

Recent research has identified several firm- and environment-level factors that condition the strength and direction of the WCM–performance relationship. Koroma and

Bein [9] show for UK-listed firms that the CCC has a positive baseline association with profitability, but that elevated economic policy uncertainty (EPU) weakens and ultimately reverses this relationship, indicating that macro-level instability introduces time variation into WCM–performance dynamics. This finding is relevant for the ASEAN context, given the region's susceptibility to macroeconomic and policy shocks. Bashir and Ahmad [8] demonstrate for Pakistani firms that market power moderates the CCC–firm value relationship: firms with high market power sustain profitability under aggressive (longer CCC) working capital strategies without incurring the penalties that competitive firms face. El-Ansary and Al-Gazzar [23] show for MENA consumer goods firms that firms' cash levels determine whether the net working capital requirement translates into operating performance, highlighting the role of internal liquidity buffers as a boundary condition. Ahmad et al. [24] further demonstrate, using system GMM for firms in Malaysia, Thailand, and Pakistan, that COVID-19 produced deeper profitability declines than the 2008 financial crisis and temporarily reversed the CCC–ROA relationship as firms extended payables to preserve liquidity—while capital markets continued to penalise working capital inefficiency through lower Tobin's Q. Akgün and Karataş [25] corroborate the crisis argument for EU-28 firms, finding that the 2008 financial crisis substantially suppressed WCM cash-flow dynamics, reducing the translation of working capital efficiency into performance gains.

Despite the breadth of the evidence, several gaps remain. Cross-country panel evidence encompassing the institutional diversity of ASEAN, ranging from the financially developed Singapore to the credit-constrained corporate sectors of Vietnam and Indonesia, is limited. Methodologically, many prior studies rely on OLS or random-effects estimators that do not account for panel heteroskedasticity or serial autocorrelation [5], limiting the reliability of their estimates. Sector-level disaggregation, identified by Prasad et al. [5] as a priority research direction, has been addressed only partially by Khan et al. [16] and Sensini and Vazquez [20] for single-country samples. The present study addresses these gaps through a six-country ASEAN panel estimated by FGLS, with systematic disaggregation by ten Global Industry Classification Standard (GICS) sectors and six countries.

3. DATA AND METHODOLOGY

3.1 Data and sample

The sample comprises non-financial listed firms from Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam over 2010–2022, sourced from Bloomberg. Financial firms (Standard Industrial Classification (SIC) 6000–6999) are excluded; regulated utilities are retained in the sample and are analysed separately as a distinct GICS sector in the sector-level results reported in Section 4. To ensure data quality and the reliability of panel estimation, only firms with at least three consecutive years of observations were retained. After applying these selection criteria, the final sample comprises 19,900 firm-year observations drawn from 1,990 unique firms across the six countries. Table 1 presents the sample distribution by country. Malaysia contributes the largest share of observations (25.83%), followed by Thailand (22.71%) and Vietnam (19.75%). Indonesia, Singapore, and the Philippines account for 12.21%, 12.91%, and 6.58% of the sample, respectively.

Figure 1 shows the WCM by country. Vietnam records the longest CCC at 120 days, driven primarily by an elevated days sales in inventory (DSI) of 99 days, suggesting that inventory accumulation is the principal source of working capital inefficiency in the Vietnamese corporate sector. The Philippines and Singapore exhibit the highest DPO values (122 and 120 days, respectively), indicating that firms in these markets rely more extensively on trade credit extension as a short-term financing mechanism, a pattern that may partly explain the positive DPO–ROA relationship observed in the country-level regressions.

Table 1. Sample distribution by country

Country	Freq.	Percent
IDN	2,430	12.21
MYS	5,140	25.83
PHL	1,310	6.58
SGP	2,570	12.91
THA	4,520	22.71
VNM	3,930	19.75
Total	19,900	100

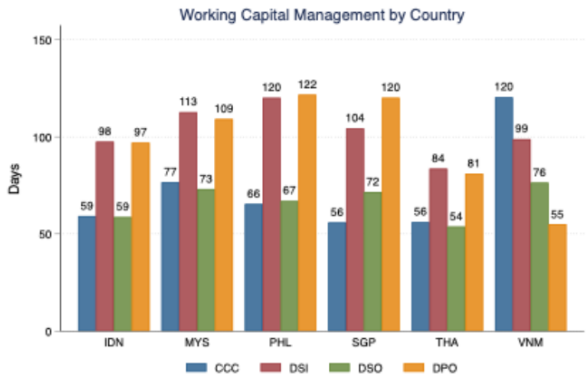

Figure 1. Working capital management (WCM) by country

Figure 2. Working capital management (WCM) by Sector

Thailand maintains the shortest DSO at 54 days and a comparatively low CCC of 56 days, reflecting relatively efficient receivables collection practices. Indonesia presents a broadly balanced working capital profile across all four metrics, with values ranging from 59 to 98 days, while Malaysia is characterised by a notably high DSI of 113 days, consistent with the observed insignificance of the inventory management variable in the joint regression specification for that country. Across the full sample, DSI and DPO exhibit the greatest cross-country dispersion, whereas DSO is

comparatively uniform, ranging from 54 days in Thailand to 76 days in Vietnam. These descriptive patterns motivate the country-level disaggregation conducted in Section 4 and underscore the institutional heterogeneity that characterises WCM practices across ASEAN.

Figure 2 illustrates the mean values of the four WCM proxies aggregated by industry sector. Real Estate is a clear outlier, recording exceptionally high DSI (approximately 530 days) and CCC (approximately 200 days), reflecting the extended asset conversion periods inherent in property development and landholding. This structural characteristic distinguishes Real Estate from all other sectors and warrants careful interpretation of its sector-level regression results.

3.2 Methodology

We use a panel data regression analysis to investigate WCM's impact. ROA is the dependent variable, with the same control variables as illustrated below, for developed- and emerging-country samples.

$$ROAit = \beta 0 + \beta 1CCC + \beta 2\Delta SIZE + \beta 3\Delta DE + \beta 4LIQ + \beta 5GRO + \beta 6CAPEX + \beta 7GDPG + \beta 8INF + \varepsilon \quad (1)$$

$$ROAit = \beta 0 + \beta 1DSI + \beta 2\Delta SIZE + \beta 3\Delta DE + \beta 4LIQ + \beta 5GRO + \beta 6CAPEX + \beta 7GDPG + \beta 8INF + \varepsilon \quad (2)$$

$$ROAit = \beta 0 + \beta 1DSO + \beta 2\Delta SIZE + \beta 3\Delta DE + \beta 4LIQ + \beta 5GRO + \beta 6CAPEX + \beta 7GDPG + \beta 8INF + \varepsilon \quad (3)$$

$$ROAit = \beta 0 + \beta 1DPO + \beta 2\Delta SIZE + \beta 3\Delta DE + \beta 4LIQ + \beta 5GRO + \beta 6CAPEX + \beta 7GDPG + \beta 8INF + \varepsilon \quad (4)$$

$$ROAit = \beta 0 + \beta 1DSI + \beta 2DSO + \beta 3DPO + \beta 4\Delta SIZE + \beta 5\Delta DE + \beta 6LIQ + \beta 7GRO + \beta 8CAPEX + \beta 9GDPG + \beta 10INF + \varepsilon \quad (5)$$

As detailed in Section 3.3, SIZE and DE are non-stationary in levels and are therefore entered as first differences (ΔSIZE, ΔDE) in all regression specifications; for brevity, the regression tables in Section 4 retain the labels "SIZE" and "DE" to denote these first-differenced series. Table 2 defines all variables in this study. The components of the CCC—DSO, DSI, and DPO—are used to test WCM's impact on corporate profitability.

Among firm-specific variables, we include firm size (measured as the natural logarithm of total assets), leverage (measured by the debt ratio), liquidity (measured as current assets divided by current liabilities), investment intensity (measured as capital expenditure divided by net sales), and sales growth (measured as the log change in net sales) as control variables. Macroeconomic variables such as inflation and GDP growth may affect profitability.

This study examines the impact of WCM on corporate profitability by analysing the components of CCC—DSO, DSI, and DPO—across industry sectors and ASEAN countries.

Table 2. Variable definition and measurement

Variable	Definition	Measurement
Dependent Variables		
ROA	Return on Assets	Net profit after tax / Total assets
ROE	Return on Equity	Net profit after tax / Shareholders' equity
Independent Variables (WCM)		
DSI	Days Sales in Inventory	Average inventory / Cost of goods sold × 365
DSO	Days Sales Outstanding	Average accounts receivable / Net sales × 365
DPO	Days Payable Outstanding	Average accounts payable / Cost of goods sold × 365
CCC	Cash Conversion Cycle	DSI + DSO − DPO
Control Variables		
SIZE	Firm size	Natural logarithm of total assets
GRO	Sales growth	Log change in net sales
DE	Leverage	Total liabilities / Shareholders' equity
LIQ	Liquidity	Current assets / Current liabilities
CAPEX	Investment intensity	Capital expenditure / Net sales
Macroeconomic Variables		
GDPG	GDP growth	Annual GDP growth rate
INF	Inflation	Annual inflation rate

4. RESULTS AND DISCUSSION

4.1 Descriptive statistics

Table 3 presents descriptive statistics. The mean ROA is 0.041 (SD = 0.086), consistent with the lower profitability of emerging market firms relative to those in the US and Europe. The mean CCC of 75.14 days reflects substantial variation across firms (SD = 126.07). The average DSI (100.93 days) exceeds DSO (67.08 days), suggesting inventory management is a more binding constraint than receivables for the typical ASEAN firm. The mean DPO of 92.87 days indicates substantial reliance on supplier trade credit. The debt-to-equity ratio (DE) exhibits a wide range (−1.979 to 390.738); the negative minimum reflects a small number of firm-year observations with negative shareholders' equity arising from accumulated losses, while the high maximum reflects thinly capitalised firms with very small equity bases. Because such extreme values can disproportionately influence coefficient estimates, all continuous variables, including DE, are winsorised at the 1st and 99th percentiles before estimation, which limits the effect of these outlying observations on the baseline results reported in Section 4.3.

Table 3. Descriptive statistics

Variable	Obs	Mean	Std. dev.	Min	Max
ROA	19,900	0.041	0.086	-0.484	0.678
CCC	19,900	75.139	126.069	-285.188	975.666
DSI	19,900	100.932	117.251	0.687	1120.668
DSO	19,900	67.080	57.815	0.719	798.158
DPO	19,900	92.873	71.398	7.577	669.176
SIZE	19,900	18.774	1.881	11.440	25.367
DE	19,900	1.353	5.764	-1.979	390.738
LIQ	19,900	2.458	2.410	0.050	19.928
GRO	19,900	0.036	0.296	-2.875	10.854
CAPEX	19,900	0.073	0.186	0.000	13.888
GDPG	19,900	3.947	3.321	-9.518	9.757
INF	19,900	2.113	1.994	-1.611	8.478

4.2 Correlation matrix

Table 4 presents the pairwise correlation coefficients among all variables. ROA is negatively correlated with all four WCM proxies, with DSO (r = −0.166) and DPO (r = −0.158) exhibiting the largest negative associations, followed by DSI (r = −0.046) and CCC (r = −0.030). These preliminary correlations are consistent with the hypothesised negative WCM–performance relationship. Among the WCM proxies, the highest intercorrelations are observed between CCC and DSI (r = 0.807), which is expected, given that inventory days is a direct component of CCC, and between DSO and DPO (r = 0.320). The remaining inter-variable correlations are modest in magnitude, with the highest involving GRO–ROA (r = 0.236) and LIQ–ROA (r = 0.107), both in the expected direction. All correlation coefficients among the independent variables fall below 0.81, and formal Variance Inflation Factor (VIF) tests confirm that multicollinearity does not pose a concern for the regression estimates (Table 5). These preliminary associations are consistent with the expectation that longer CCC are associated with lower profitability, a finding that has been documented extensively in the literature [3, 26].

Table 4. Correlation matrix

	ROA	CCC	DSI	DSO	DPO	SIZE	DE	LIQ	GRO	CAPEX	GDPG	INF
ROA	1.000											
CCC	-0.030	1.000										
DSI	-0.046	0.807	1.000									
DSO	-0.166	0.394	0.126	1.000								
DPO	-0.158	-0.122	0.320	0.320	1.000							
SIZE	0.036	-0.128	0.040	-0.137	0.181	1.000						
DE	-0.104	-0.041	-0.019	-0.007	0.036	0.047	1.000					
LIQ	0.107	0.178	0.098	0.045	-0.118	-0.178	-0.112	1.000				
GRO	0.236	-0.096	-0.099	-0.188	-0.145	0.025	0.005	-0.068	1.000			
CAPEX	-0.020	-0.068	-0.013	0.012	0.110	0.058	-0.004	-0.021	0.010	1.000		
GDPG	0.097	0.050	-0.005	0.020	-0.080	-0.065	0.018	-0.027	0.156	0.013	1.000	
INF	0.021	0.034	0.015	0.007	-0.031	0.067	0.025	-0.029	0.057	-0.004	0.404	1.000

Table 5. Variance inflation factor test

Variable	VIF	1/VIF
DPO	1.35	0.738
GDPG	1.24	0.805
INF	1.21	0.827
DSO	1.2	0.835
DSI	1.14	0.873
SIZE	1.12	0.891
LIQ	1.08	0.924
GRO	1.08	0.926
CAPEX	1.02	0.983
DE	1.01	0.985
Mean VIF	1.15	

Table 6. Harris-Tzavalis panel unit-root test

Variable (in Level)	Statistic	Variable (in Difference)	Statistic
ROA	0.3258***		
CCC	0.6049***		
DSI	0.5855***		
DSO	0.5052***		
DPO	0.4521***		
SIZE	0.7576	D.SIZE	-0.0642***
DE	0.8195	D.DE	-0.1485***
LIQ	0.5106***		
GRO	-0.0612***		
CAPEX	0.1623***		
GDPG	-0.0220***		
INF	0.0754***		

Table 6 shows the Harris-Tzavalis panel unit-root test results, which indicate that the majority of variables are stationary in levels, as evidenced by test statistics that are negative or significantly below unity (ROA, CCC, DSI, DSO, DPO, LIQ, GRO, CAPEX, GDPG, INF, all significant at the 1% level). SIZE and DE are the exceptions: their level statistics (0.7576 and 0.8195, respectively) are not significant, indicating the presence of a unit root. Both variables attain stationarity upon first differencing (D.SIZE = −0.0642, D.DE = −0.1485, both significant at 1%). Accordingly, SIZE and DE are entered in first-difference form in all regression specifications.

Table 7. Model diagnostics

Model with (Indep)	LM_Test	Hausman	Modified Wald	Wooldridge
CCC	1.7e+04***	249.0339***	2.5e+06***	330.0548***
DSI	1.7e+04***	226.7818***	2.4e+06***	335.8334***
DSO	1.6e+04***	249.2043***	2.4e+06***	331.7496***
DPO	1.6e+04***	303.7738***	2.3e+06***	343.4453***
DSI, DSO, DPO	1.6e+04***	328.9158***	2.5e+06***	337.7144***

Table 7 presents the model diagnostic results. The Breusch-Pagan Lagrange Multiplier (LM) test rejects the null hypothesis of zero cross-sectional variance across all five model specifications (statistics ranging from 1.6×10^4 to 1.7×10^4, $p < 0.01$), confirming the presence of individual-specific effects and ruling out pooled OLS. The Hausman test rejects the null hypothesis of no systematic difference between fixed- and random-effects estimators in all specifications (statistics from 226.78 to 328.92, $p < 0.01$), indicating that fixed effects is the preferred specification. The Modified Wald test detects significant groupwise heteroskedasticity across all models (statistics exceeding 2.3×10^6, $p < 0.01$), and the Wooldridge test confirms first-order serial autocorrelation in the idiosyncratic errors (statistics ranging from 330.05 to 343.45, $p < 0.01$).

Although the Hausman test favours fixed effects on consistency grounds, the confirmed panel heteroskedasticity and first-order serial autocorrelation render the standard fixed-effects estimator inefficient, since its standard errors are not robust to these disturbances. We therefore adopt FGLS as the primary estimator—specifically, the panel-heteroskedastic,

AR(1)-corrected FGLS specification (equivalent to Stata's xtgls with panels(heteroskedastic) and corr(ar1)). Unobserved firm-level heterogeneity is addressed by demeaning the data before FGLS estimation, so that the reported coefficients reflect within-firm variation consistent with the fixed-effects specification favoured by the Hausman test; FGLS is used specifically to correct the standard errors and improve efficiency under heteroskedasticity and autocorrelation, not to override the fixed-effects choice.

4.3 Baseline regression results

Table 8 shows the FGLS baseline results. All WCM proxies are negative and significant at the 1% level across all model specifications. The CCC coefficient in Model 1 ($\beta = -0.0000$, $p < 0.01$) confirms that longer CCC are associated with lower ROA. These results are consistent with the studies [3, 4] for developed markets, and with Nguyen and Van Nguyen [10] and Al-Mawsheki et al. [11] for the ASEAN context.

Table 8. Baseline regression results

VARIABLES	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA
CCC	-0.0000***				
	(0.000)				
DSI		-0.0000***			-0.0000***
		(0.000)			(0.000)
DSO			-0.0001***		-0.0001***
			(0.000)		(0.000)
DPO				-0.0001***	-0.0001***
				(0.000)	(0.000)
SIZE	0.0014***	0.0017***	0.0010***	0.0024***	0.0016***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
DE	-0.0030***	-0.0030***	-0.0031***	-0.0029***	-0.0030***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LIQ	0.0042***	0.0042***	0.0040***	0.0038***	0.0039***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GRO	0.0440***	0.0438***	0.0404***	0.0423***	0.0390***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CAPEX	-0.0071***	-0.0060***	-0.0045***	-0.0004	-0.0017
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
GDPG	0.0013***	0.0013***	0.0014***	0.0013***	0.0014***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
INF	-0.0007***	-0.0007***	-0.0007***	-0.0008***	-0.0007***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.0055**	-0.0006	0.0197***	-0.0062**	0.0131***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	19,900	19,900	19,900	19,900	19,900
Number of ID	1,990	1,990	1,990	1,990	1,990

Standard errors in parentheses
*** p < 0.01, ** p < 0.05, * p < 0.1

The dominance of DSO as the largest WCM driver reflects the weak legal enforcement and underdeveloped credit information systems in several ASEAN countries, which amplify the performance cost of extended receivables collection. The negative pooled DPO effect—which contrasts with the trade credit financing hypothesis—suggests that, on average across the ASEAN sample, stretching payables signals financial distress rather than deliberate financial management, although this pooled pattern masks substantial cross-country heterogeneity discussed in Section 4.6: the negative DPO effect reverses to positive and significant in the Philippines and becomes insignificant in Thailand, consistent with Hung and Dinh [7] and Toy et al. [17]. In Model 5, all three components retain individual significance, confirming independent effects.

Control variables behave as expected: SIZE ($\beta \approx +0.001$–0.002, $p < 0.01$) reflects economies of scale; DE ($\beta \approx -0.003$, $p < 0.01$) is consistent with the trade-off theory prediction that excessive debt increases financial distress costs; LIQ ($\beta \approx +0.004$, $p < 0.01$) captures liquidity benefits; GRO ($\beta \approx +0.040$–0.044, $p < 0.01$) is the strongest positive predictor; GDPG is positive and INF is negative, as expected.

4.4 Robustness check using standardised variables

To further assess the robustness of our baseline findings and enable a direct comparison of economic effect sizes across variables measured on different scales, we standardise all variables to have a mean of zero and a standard deviation of one before re-estimating the models. The standardised regression results are shown in Table 9. This specification allows us to interpret the estimated coefficients in standard deviation terms, thereby providing clearer evidence on the relative importance of each WCM proxy and control variable in explaining firm financial performance.

The findings are qualitatively consistent with the baseline results and provide additional insights into relative effect magnitudes. Among the WCM proxies, DSO has the largest standardised effect on ROA ($\beta = -0.086$ in Model 3), followed by DPO ($\beta = -0.078$ in Model 4), CCC ($\beta = -0.035$ in Model 1), and DSI ($\beta = -0.039$ in Model 2). The larger standardised coefficient on DSO compared to DSI suggests that, holding other factors constant, inefficiencies in the receivables management cycle are particularly detrimental to firm performance in the ASEAN context. This may reflect weaker contract enforcement and less developed credit information systems in several ASEAN countries, which amplify the costs

of delinquent receivables.

In the joint model (Model 5), the standardised coefficients for DSO ($\beta = -0.068$, $p < 0.01$) and DPO ($\beta = -0.048$, $p < 0.01$) remain the dominant WCM drivers of ROA, while DSI's contribution is substantially reduced ($\beta = -0.012$, $p < 0.01$). Among the control variables, DE (leverage) consistently has the strongest negative effect on profitability, with a beta ranging from −0.2072 to −0.1972 across all models. This indicates that excessive debt remains the principal constraint on firm performance. In contrast, GRO (sales growth) is the strongest positive determinant of ROA, with a beta ranging from 0.1350 to 0.1523, highlighting the importance of revenue expansion for profitability. LIQ (liquidity) is also positive and significant, with beta ranging from 0.1058 to 0.1192, implying that stronger short-term solvency supports operating performance. SIZE remains positively associated with ROA, with beta ranging from 0.0217 to 0.0522, consistent with economies of scale and better access to resources for larger firms.

Regarding macroeconomic factors, GDPG (GDP growth) is positively associated with ROA, with a beta ranging from 0.0499 to 0.0537, suggesting that favourable economic conditions enhance firm profitability. By contrast, INF (inflation) has a small but consistently negative effect, with a beta ranging from −0.0186 to −0.0153, indicating that rising costs and macroeconomic instability erode returns. CAPEX is negative across all models, with beta ranging from −0.0155 to −0.0008, although its statistical significance disappears in the later specifications.

Table 9. Robustness check using standardised variables

VARIABLES	(1)	(2)	(3)	(4)	(5)
CCC_std	-0.0352***				
	(0.003)				
DSI_std		-0.0393***			-0.0121***
		(0.003)			(0.003)
DSO_std			-0.0860***		-0.0675***
			(0.003)		(0.004)
DPO_std				-0.0780***	-0.0480***
				(0.003)	(0.004)
SIZE_std	0.0299***	0.0382***	0.0217***	0.0522***	0.0347***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
DE_std	-0.2015***	-0.2001***	-0.2072***	-0.1972***	-0.2030***
	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)
LIQ_std	0.1192***	0.1184***	0.1129***	0.1058***	0.1099***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
GRO_std	0.1523***	0.1515***	0.1399***	0.1463***	0.1350***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
CAPEX_std	-0.0155***	-0.0130***	-0.0099***	-0.0008	-0.0038
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
GDPG_std	0.0513***	0.0504***	0.0537***	0.0499***	0.0532***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
INF_std	-0.0170***	-0.0171***	-0.0153***	-0.0186***	-0.0161***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Constant	-0.0050	-0.0073**	-0.0015	-0.0103***	-0.0022
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	19,900	19,900	19,900	19,900	19,900
Number of ID	1,990	1,990	1,990	1,990	1,990

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.5 Impact of WCM on FP by sector using standardised variables

Table 10 summarises the standardised regression coefficients of all WCM proxies and control variables across 10 GICS sectors. Each coefficient (β) represents the change in ROA in standard deviation units for a one standard deviation increase in the corresponding variable, enabling direct cross-sector and cross-variable comparisons.

The CCC coefficient is negative and statistically significant in 8 of 10 sectors, supporting the hypothesis that longer CCC reduce firm profitability in the ASEAN context. The effect is most pronounced in the Energy sector ($\beta = -0.274$***), reflecting the sector's reliance on large-volume commodity transactions, long settlement periods with state-owned counterparties, and high capital costs for inventory holding. Consumer Defensive ($\beta = -0.165$***) and Healthcare ($\beta = -0.118$***) follow, consistent with the thin operating margins characteristic of these industries: every additional day of capital tied in working capital directly erodes profitability when margins leave little buffer. These findings align with Trade-off Theory — firms operating in high-capital-cost environments bear disproportionately large opportunity costs for each incremental day of idle working capital.

The sole exception is Communication Services ($\beta = +0.166$***), where a longer CCC is associated with higher profitability. ASEAN telecommunications firms combine subscription-based services with hardware distribution, meaning that inventory accumulation reflects deliberate investment in market expansion rather than operational inefficiency. In this high-growth context, the positive coefficient is consistent with the investment hypothesis of working capital: WCM investment precedes and generates performance improvements [27].

The Days Sales of Inventory results closely mirror CCC findings. Negative and significant effects persist across 8 sectors, with Energy ($\beta = -0.265$***) and Consumer Defensive ($\beta = -0.121$***) recording the largest impacts,

confirming that inventory accumulation is a primary channel through which WCM inefficiency erodes value in commodity-intensive and fast-moving consumer goods sectors. Prolonged inventory holding in these industries entails carrying costs, spoilage risk, and elevated financing costs in ASEAN's higher-rate credit environment.

Table 10. Impact of WCM on FP by sector

Sector	CCC	DSI	DSO	DPO	GRO	CAPEX	GDPG	INF	LIQ	DE
Basic Materials	−0.045***	−0.080***	−0.107***	−0.114***	0.212***	−0.031**	0.040***	−0.003	0.078***	−0.683***
Comm. Services	0.166***	0.320***	−0.045*	−0.040	0.169***	−0.038*	0.057**	−0.032	0.024	−0.063
Consumer Cyclical	−0.020***	−0.068***	−0.054***	−0.139***	0.184***	−0.098***	0.068***	−0.029***	0.088***	−0.182***
Consumer Def.	−0.165***	−0.121***	−0.157***	+0.008	0.164***	−0.103***	0.051***	−0.008	0.071***	−0.675***
Energy	−0.274***	−0.265***	−0.344***	−0.099***	0.124***	−0.070***	0.095***	−0.025	0.082***	−0.691***
Healthcare	−0.118***	−0.076***	−0.183***	−0.047*	0.246***	−0.031**	0.045***	−0.013	0.289***	−0.221***
Industrials	−0.013***	−0.018***	−0.060***	−0.073***	0.113***	0.030***	0.056***	−0.019***	0.159***	−0.092***
Real Estate	−0.012**	−0.016***	−0.021**	−0.035***	0.073***	−0.010	0.042***	0.027*	0.167***	−0.127***
Technology	−0.084***	−0.094***	−0.125***	−0.121***	0.183***	−0.056*	0.028**	−0.035***	0.047***	−0.179***
Utilities	0.013	−0.030	−0.014	−0.031***	0.058***	−0.013**	0.025***	−0.015	0.166***	−1.062***

****p<0.01, **p<0.05, *p<0.10.*

Communication Services again registers the most striking result (β = +0.320***), the largest effect magnitude across the entire DSI table. This reinforces the interpretation that ASEAN telecom firms leverage inventory as a competitive asset: maintaining an adequate stock of devices and equipment enables them to capture customers in markets experiencing rapid growth in smartphone and internet penetration. Utilities (β = −0.030, insignificant) and Real Estate (β = −0.016***) register minimal effects, consistent with their limited reliance on physical inventories.

DSO yields the most consistent negative effects across sectors. Energy records the largest standardised coefficient in the study (β = −0.344***), underscoring that receivables management is the most financially sensitive WCM dimension for ASEAN energy firms. This reflects the sector's heavy dependence on B2B and B2G contracts, which typically have long, uncertain payment timelines, compounded by a high cost of capital that amplifies losses from each deferred collection. Healthcare (β = −0.183***) is the second most sensitive sector, reflecting the fragmented payer landscape across ASEAN, where private pay, limited insurance coverage, and government reimbursement schemes converge to create extended and uncertain collection cycles.

Technology (β = −0.125***) and Basic Materials (β = −0.107***) exhibit substantial DSO sensitivity. Across all sectors, the negative DSO relationship reflects a core principle of the Asymmetric Information framework: rising receivables signal either weak enforcement of payment discipline or extension of credit to lower-quality counterparties — both of which undermine firm value in ASEAN's information-sparse commercial environment. Utilities registers an insignificant DSO effect, consistent with its billing model, which structurally limits the accumulation of receivables.

The DPO results present the most theoretically distinctive findings. Conventional trade credit theory predicts that extending payment periods retains cash and improves profitability. However, 8 of 10 ASEAN sectors record negative DPO coefficients, with Consumer Cyclical (β = −0.139***), Technology (β = −0.121***), and Basic Materials (β = −0.114***) showing the largest effects.

This persistently negative DPO pattern may reflect the relationship-based commercial structures that characterise many ASEAN business environments. In the Confucian-influenced, network-driven business cultures prevalent across Southeast Asia, payment punctuality serves as a reputational signal. Firms that delay payments risk losing preferential supplier terms, face input price increases, or jeopardise long-term supply relationships that are difficult to replace in concentrated supplier markets. This mechanism — the relational cost of delayed payment — is not captured by standard trade credit models developed for arm's-length transactions in developed economies. The single exception, Consumer Defensive (β = +0.008, insignificant), reflects the structural dominance of large FMCG multinationals in this sector, whose bargaining power enables payment extension without relational penalty.

Sales growth (GRO) exerts the most uniformly positive and significant effects across all sectors (ranging from +0.058*** in Utilities to +0.246*** in Healthcare), consistent with the expectation that revenue expansion directly drives improvements in profitability. Capital expenditure (CAPEX) is predominantly negative, reflecting the short-term earnings dilution of investment spending; the exception is Industrials (+0.030***), where capital investment is more immediately productive. GDP growth (GDPG) is positive and significant across all sectors, with Energy recording the highest sensitivity (β = +0.095***), underscoring that ASEAN firm profitability is tightly bound to the regional macroeconomic growth cycle. Inflation (INF) effects are largely insignificant, suggesting that firms partially adjust prices in response to inflationary pressures, with notable exceptions in Consumer Cyclical (β = −0.029***) and Technology (β = −0.035***), where pricing power is more constrained.

The debt-to-equity ratio (DE) is negative and highly significant across all sectors — most severely in Utilities (β = −1.062***) — confirming Agency Theory predictions: in ASEAN's institutional environment, where investor protection and creditor rights remain comparatively weak, high leverage imposes severe financial distress costs. Liquidity (LIQ) is positive and significant across all sectors, with Healthcare recording the highest sensitivity (β = +0.289***), consistent with Pecking Order Theory: firms with strong internal liquidity buffers outperform peers by avoiding the high cost of external financing in underdeveloped regional capital markets

4.6 Impact of WCM on FP by country

The country-level regressions provide further evidence of heterogeneity in the WCM–performance nexus across the six ASEAN economies. Table 11 summarises the direction and statistical significance of key WCM coefficients by country.

Table 11. Standardised working capital management (WCM) coefficients by country

Country	CCC	DSI	DSO	DPO
Indonesia	−0.029***	−0.027***	−0.117***	−0.079***
Malaysia	−0.031***	−0.028***	−0.110***	−0.057***
Philippines	−0.015**	0.010	−0.033***	0.010*
Singapore	−0.034***	−0.035***	−0.057***	−0.040***
Thailand	−0.120***	−0.087***	−0.120***	0.005
Vietnam	−0.148***	−0.124***	−0.119***	−0.156***

****p<0.01, **p<0.05, *p<0.10*

The country-level findings are summarised in Table 11. This is in accordance with Nguyen and Van Nguyen [10] and Hung and Dinh [7], who ascribe Vietnam's corporate sector's high inventory holding periods and constrained short-term bank financing to the country's strongest WCM–performance sensitivity (β_std_CCC = −0.148). In a manner that is broadly consistent with Ahmad et al. [24], Thailand also exhibits substantial negative CCC and DSO effects. Indonesia exhibits uniformly negative and substantial WCM effects across all proxies, including a negative DPO effect that is consistent with Toy et al. [17]. This is indicative of the concentrated supplier markets and increased financial distress risk in the economy.

Malaysia's findings are consistent with those of Al-Mawsheki et al. [11], DSI becomes negligible in Model 5, indicating that receivables and payables management are the primary focus in that market. Table 11 shows that the Philippines records the lowest standardised WCM coefficients across all four proxies in the sample (β_std_CCC = −0.015; DSI insignificant; DSO = −0.033; DPO = +0.010). Rather than reflecting financial market depth, this pattern is consistent with the conglomerate-dominated ownership structure of the Philippine corporate sector: large, diversified business groups exercise sufficient buyer power over suppliers and, in some cases, customers to decouple working capital timing from performance outcomes, extending payables without incurring the relational or financing penalties observed elsewhere in ASEAN. This interpretation is reinforced by the joint-model results (Table 12, discussed below), where DSI is insignificant for the Philippines while DPO remains positive and significant (β = +0.045, $p < 0.01$), and parallels the findings of Bashir and Ahmad [8] for high market-power Pakistani firms, where market power similarly insulates aggressive working capital strategies from performance penalties.

Singapore records the second-lowest standardised WCM sensitivity in the sample (β_std_CCC = −0.034), consistent with the hypothesis that the performance cost of working capital inefficiency is reduced in more financially developed markets. This prediction aligns with Lyngstadaas and Berg [4] for Norway and Akgün and Karataş [25] for EU-28 countries. Unlike the Philippines, Singapore's comparatively low sensitivity operates through the conventional financial-development channel — deeper capital markets, stronger contract enforcement, and lower financing constraints — rather than through buyer-power dynamics, indicating that two distinct institutional mechanisms can independently produce a muted WCM–performance relationship within ASEAN.

Table 12 presents the results of the joint regression model (Model 5), in which DSI, DSO, and DPO are entered simultaneously alongside the full set of control variables. This specification serves two analytical purposes. First, it tests the robustness of the individual WCM effects documented in Models 1–4 after controlling for the interdependencies among working capital components — since DSI, DSO, and DPO are algebraically related through the CCC identity (CCC = DSI + DSO − DPO), partial correlations among these variables may inflate or deflate individual coefficients in single-variable specifications. Second, the joint model reveals the incremental — net — contribution of each WCM component to financial performance, holding the effects of the others constant, providing a more nuanced decomposition of working capital efficiency.

Table 12 indicates that the DSI remains negative and statistically significant in four out of six countries: Vietnam (β = −0.087***), Thailand (β = −0.098***), Indonesia (β = −0.019***), and Singapore (β = −0.026***). The DSI coefficient for Thailand (β = −0.098***) is larger in absolute value in the joint model than in the single-variable specification (β = −0.087***), suggesting that accounting for DSO and DPO uncovers a more pronounced pure inventory effect in the Thai setting. This pattern aligns with Thailand's manufacturing-export focus, where inventory management serves as a unique operational driver of efficiency, apart from the dynamics of receivables and payables.

The DSI coefficient for Malaysia is not statistically significant in the joint model (β = −0.007, n.s.), but it is significant in the single-variable specification (β = −0.028***). This outcome indicates that the inventory effect in Model 2 for Malaysia was predominantly influenced by its relationship with DSO; when receivables management is accounted for, inventory holding itself does not independently diminish profitability for Malaysian listed companies. This conclusion is credible given Malaysia's sectoral structure, where large-cap government-linked companies, plantation enterprises, and financial services predominantly influence the exchange and exhibit lower sensitivity to inventory costs than in manufacturing-centric economies like Thailand or Vietnam.

The DSO remains negative and highly significant across all six nations in the joint model, with coefficient magnitudes essentially retained compared to the single-variable specification, demonstrating that the receivables effect is not an artefact of collinearity with inventory or payables cycles. The robustness of DSO establishes it as the paramount and most dependable WCM determinant of financial performance within the ASEAN environment, applicable to both individual-variable and joint specifications.

Table 12. Standardised coefficients of DSI, DSO, DPO and control variables by country

Country	DSI	DSO	DPO	SIZE	DE	LIQ	GRO	CAPEX	GDPG	INF
Indonesia	−0.0190***	−0.0986***	−0.0428***	0.1395***	−0.1653***	0.3500***	0.1940***	−0.0338***	0.0478***	0.0213
Malaysia	−0.0068	−0.0949***	−0.0285***	0.0665***	−0.0405***	0.0821***	0.1632***	−0.0276**	0.0058	0.0559***
Philippines	0.0113	−0.0769***	0.0453***	0.0084	−0.6629***	0.1910***	0.0919***	0.0007	0.0516***	−0.0604***
Singapore	−0.0260***	−0.0487***	−0.0195*	0.2118***	−0.5262***	0.1303***	0.2094***	−0.0190	0.0158	−0.0185**
Thailand	−0.0979***	−0.1343***	0.0573***	−0.0233***	−0.6483***	0.0979***	0.1877***	−0.0224**	0.0307***	−0.0305***
Vietnam	−0.0874***	−0.1057***	−0.0062	−0.0043	−0.2406***	0.2872***	0.0405***	−0.0157***	0.0343***	−0.0638***

Significantly, in three nations — Philippines (β = −0.077***), Thailand (β = −0.134***), and Vietnam (β =

−0.106***) — the DSO coefficient in the combination model is markedly greater than in the single-variable model. In the Philippines, the single-variable DSO coefficient was −0.033***, increasing to −0.077*** in the combined model. This amplification arises because the single-variable model conflates DSO with DPO: Philippine enterprises that provide credit to customers also tend to extend payables to suppliers, resulting in a positive partial correlation that diminishes the DSO coefficient when DPO is omitted. Upon controlling for the independently favourable effect of DPOs, the whole cost of extending receivables becomes apparent. This discovery underscores the notion that receivables management is a vital — and hitherto undervalued — performance determinant, especially in economies dominated by conglomerates.

Thailand demonstrates the highest DSO coefficient in the combined model (β = −0.134***), surpassing its substantial single-variable estimate (β = −0.120***). The amplification demonstrates a similar confounding mechanism: Thai companies with extended receivables cycles typically exhibit prolonged payables cycles (positive DPO), which, in the univariate model, somewhat mitigate the DSO effect. Accounting for DPO's beneficial impact in Model 5 elucidates the full extent of Thailand's receivables inefficiency costs — a notably significant finding for Thai export-oriented manufacturing enterprises, where delays in international buyers' payments constitute a continual operational obstacle.

The joint-model DSO coefficient for Vietnam (β = −0.106***), although marginally lower than the single-variable estimate (β = −0.119***), remains among the highest in the sample. The slight decrease confirms that Vietnam's DSO and DSI effects are predominantly autonomous: Vietnamese enterprises concurrently experience both inventory accumulation expenses and collection inefficiencies, with these two WCM deficiencies operating through separate mechanisms rather than being driven by a shared underlying factor. This outcome aligns with the structural assessment of Vietnam's working capital landscape: an inadequate trade finance infrastructure incurs expenses at both stages of the working capital cycle — in acquiring and maintaining inputs and in receiving payments from clients.

The combination model yields the most theoretically informative DPO results of the comprehensive analysis. Three separate groups of countries arise, each embodying a unique institutional equilibrium for trade credit within ASEAN:

The initial group — Indonesia (β = −0.043***), Malaysia (β = −0.029***), Singapore (β = −0.020*), and Vietnam (β = −0.006, not significant) — exhibits negative or neutral DPO effects in the combined model, affirming that the relational cost of delayed payment endures despite adjustments for inventory and receivables management. The DPO coefficient for Vietnam, which was significant in the univariate model (β = −0.156***), becomes statistically insignificant in the multivariate model (β = −0.006, not significant). This significant reduction is attributed to the high collinearity between DPO and DSO in Vietnam: companies with extended receivables cycles tend also to have prolonged payables cycles, indicative of a pervasive 'slow payment' culture. Once DSO is accounted for, DPO loses its independent explanatory capacity. This does not diminish the economic significance of DPO management in Vietnam; rather, it suggests that, in the Vietnamese context, delayed payments to suppliers and delayed collections from customers are two expressions of the same systemic WCM inefficiency, more comprehensively captured by DSO in the integrated model.

The second group — Thailand (β = +0.057***) — demonstrates a strong positive DPO effect in the combined model, but its unimpressive outcome in the single-variable analysis. This reversal is analytically significant: it demonstrates that, after eliminating the confounding effect of Thailand's substantial negative DSO coefficient, extending payables yields a net liquidity advantage for Thai enterprises. The contingent nature of this outcome — favourable solely when DSO is accounted for — indicates that Thai companies who adeptly handle receivables can convert prolonged payables into authentic enhancements in profitability. This aligns with the formalised contractual trade credit standards set by Japanese multinational supply chains in Thailand, where the extension of DPO is a negotiated and generally recognised practice rather than an indication of financial difficulty [28]. The favourable joint-model DPO effect in Thailand indicates a developed trade credit relationship that functions independently of, and is obscured by, Thailand's significant receivables management issue.

The third group — the Philippines (β = +0.045***) — has a sustained positive DPO effect in the joint model, the most substantial in the sample. The consistency of this coefficient between Models 4 and 5 suggests that the buyer power mechanism influencing the Philippines' positive DPO effect is robust and not due to collinearity. Philippine conglomerates utilise their supply chain supremacy to delay payables without incurring relational costs, irrespective of their receivables management strategies—demonstrating that the trade credit dynamics in the Philippines operate under a fundamentally distinct institutional logic from those in Vietnam, Indonesia, or Thailand.

The control-variable outcomes in the joint model strengthen the institutional narrative. Firm size (SIZE) exerts a substantial positive influence in Indonesia (β = +0.140***) and Singapore (β = +0.212***), a moderate influence in Malaysia (β = +0.067***) and the Philippines (β = +0.008, not significant), and a negative influence in Thailand (β = −0.023***) and Vietnam (β = −0.004, not significant). The positive SIZE effect in Singapore aligns with the prevalence of large, well-managed firms on the Singapore Exchange, which benefit from economies of scale, enhanced capital market access, and lower financing costs. The adverse SIZE impact in Thailand is paradoxical and may indicate the existence of large, capital-intensive corporations characterised by substantial fixed costs and narrow operating margins, in which scale fails to yield short-term profitability.

The leverage penalty (DE) is the most consistently observed phenomenon across all six nations and all model configurations. The Philippines has the most pronounced effect (β = −0.663***), succeeded by Thailand (β = −0.648***) and Singapore (β = −0.526***). The substantial leverage penalties in the Philippines and Thailand indicate elevated financial distress costs associated with concentrated debt structures in economies characterised by protracted bankruptcy resolution and inadequate enforcement of creditor rights. The relatively minor leverage penalty in Malaysia (β = −0.041***) aligns with the financial robustness of prominent GLCs and blue-chip corporations on Bursa Malaysia, which maintain investment-grade credit ratings and secure diverse, low-cost funding sources. The intermediate leverage effect in Vietnam (β = −0.241***) indicates that leverage among publicly listed companies is increasing, many of which are former state-owned enterprises with legacy debt frameworks, and that the banking system continues to pose a systemic issue

due to non-performing loans.

Liquidity (LIQ) is both positive and significant across all six countries, with the largest effects in Indonesia (β = +0.350***) and Vietnam (β = +0.287***). This discovery offers the most robust empirical validation for Pecking Order Theory within the ASEAN framework: in nations where external borrowing is the most expensive and least attainable, domestic liquidity emerges as the most important financial asset for enterprises. The substantial liquidity premium in Indonesia and Vietnam—approximately quadruple the Malaysian coefficient (β = +0.082***)—correlates directly with the relative underdevelopment of their capital markets and a heightened dependence on bank lending, which is both rationed and costly for non-blue-chip borrowers.

Sales growth (GRO) is consistently positive in all six countries, with Indonesia (β = +0.194***) and Singapore (β = +0.209***) exhibiting the most significant benefits. The strength of the growth-profitability relationship in Singapore is significant: in a mature, low-growth economy, companies that attain above-average revenue growth do so through authentic competitive advantage rather than market expansion, and this competitive advantage directly results in a profitability premium. Capital expenditure (CAPEX) is generally negative, except in the Philippines (β = +0.001, not significant), indicating that CAPEX generally leads to short-term earnings dilution across most ASEAN economies. However, the positive, albeit insignificant, result for the Philippines suggests a more efficient capital allocation within conglomerate structures featuring integrated project pipelines.

GDP growth (GDPG) is both positive and substantial in Indonesia (β = +0.048***), the Philippines (β = +0.052***), Thailand (β = +0.031***), and Vietnam (β = +0.034***), which are the four economies exhibiting the highest cyclical sensitivity of firm performance to domestic production. Conversely, GDPG is negligible in Singapore (β = +0.016, not significant) and Malaysia (β = +0.006, not significant), indicating that publicly traded companies in these more open, trade-dependent economies are predominantly influenced by global rather than domestic economic factors. The inflation coefficient (INF) persists in demonstrating the cross-country heterogeneity observed in earlier model specifications: positive in Malaysia (β = +0.056***) and Indonesia (β = +0.021, not significant), and negative in the Philippines (β = −0.060***), Thailand (β = −0.031***), Vietnam (β = −0.064***), and Singapore (β = −0.019**). This disparity supports the notion that large-cap firms in Malaysia and Indonesia have the pricing power to capitalise on inflationary conditions, but firms in the Philippines, Thailand, Vietnam, and Singapore experience margin compression during inflationary surges.

The studies whose findings differ from ours [8, 9, 18] share specific contextual features that elucidate the reasons for their difference. These characteristics include the following: the examination of firms with exceptional market power that enables them to mitigate the adverse effects of long working capital cycles, the focus on banks and financial institutions with working capital structures that differ from those of nonfinancial firms, and the use of developed financial markets with lower financing constraints.

Interestingly, our conclusions are not actually contradicted by the nonlinear findings from some studies [6, 7, 19]. However, they contribute to a deeper understanding of the relationship between profitability and WCM. In particular, our discovery of a negative linear impact of the currency conversion cycle on profitability is entirely consistent with the notion that firms in the Southeast Asian region are operating on the downward sloping portion of an inverted U-shaped profitability curve. Performance improves until an optimal point is reached on this portion of the curve, as additional reductions in the CCC are implemented. Consequently, the nonlinear studies do not refute our findings; rather, they provide an additional layer of significance: the adverse effects of extending the working capital cycle may not be strictly linear. The effect may become greater or weaker as it exceeds a certain threshold. This implies that future research on Southeast Asian markets should formally test for nonlinearity using methods such as threshold regression or smooth transition regression.

The country-level results indicate that financial market development, corporate ownership structure, and the dominant commercial relationship model in each economy are systematically correlated with WCM sensitivity across ASEAN. The Pecking Order Theory predicts that internal financing capacity is most valuable where external capital is most costly, and frontier and bank-dominated markets (Vietnam, Indonesia) exhibit the largest WCM sensitivity and the strongest liquidity premia. The availability of trade finance instruments that enable decoupling of operational and financial working capital cycles is consistent with the smaller, more balanced WCM effects observed in more institutionally advanced economies (e.g., Singapore and Malaysia). By contrast, the Philippines' comparatively low WCM sensitivity arises through a different channel — concentrated conglomerate ownership and buyer power — rather than financial market depth, illustrating that muted WCM sensitivity in ASEAN can arise from either institutional advancement or structural market concentration.

The structural distinction between SME-dominated, network-governed supply chains (where relational costs of delayed payment are high) and conglomerate-dominated, power-asymmetric supply chains (where delayed payment confers a genuine liquidity benefit) is reflected in the DPO heterogeneity, which is negative in Vietnam and Indonesia, positive in the Philippines, and insignificant or conditionally positive in Thailand. This discovery emphasises the importance of institutional conditioning in WCM research for emergent market contexts.

The macroeconomic findings further substantiate institutional heterogeneity. In Vietnam and the Philippines, inflation is negative due to margin compression, while it is positive in Malaysia and Indonesia (pricing power and inflation tolerance), and negative in Singapore and Thailand (low-inflation, cost-sensitive environments). In frontier economies (Vietnam, Indonesia, Philippines), GDP growth is more significant than in more globalised economies (Singapore, Malaysia), where firm performance is decoupled from domestic output cycles.

5. CONCLUSIONS

This study provides comprehensive cross-country evidence on the WCM–firm performance relationship for six ASEAN economies over 2010–2022. At the pooled ASEAN level, the FGLS results confirm that all four WCM proxies (CCC, DSI, DSO, DPO) are negatively and significantly associated with ROA, supporting all four hypotheses on average across the region; however, this negative DPO effect is not uniform

across countries—it reverses to positive and significant in the Philippines and is insignificant or only conditionally positive in Thailand—underscoring that payables management operates under distinct institutional logics in different ASEAN markets. DSO is identified as the most economically significant WCM driver at the pooled level ($\beta\_std = -0.086$), followed by DPO ($\beta\_std = -0.078$), reflecting the amplified cost of receivables inefficiency and, on average, aggressive payables stretching in environments with weaker contract enforcement and more concentrated supplier markets.

The study makes three contributions. First, it extends cross-country WCM evidence to a comprehensive six-country ASEAN panel with institutional heterogeneity. Second, it employs FGLS—an estimator better suited to the confirmed panel heteroskedasticity and autocorrelation than the OLS or random-effects approaches used in many prior studies. Third, the sector and country disaggregation reveals that WCM effects are systematically moderated by industry operating characteristics and financial development, with Vietnam and Thailand most sensitive and Singapore least.

For managers, the dominant implication is that prioritising receivables collection efficiency and avoiding excessive payables stretching are the most high-leverage WCM actions for improving ROA across ASEAN. Firms in Vietnam, Thailand, and Indonesia stand to gain the most from improvements in working capital efficiency. For policymakers, the inverse relationship between financial development and WCM-performance sensitivity suggests that policies strengthening credit information systems, commercial contract enforcement, and short-term capital market depth will reduce the productivity cost of working capital inefficiency, particularly in Vietnam, Indonesia, and the Philippines.

Several limitations point to future research directions. First, this study assumes a linear WCM–performance relationship; future research should formally test non-linearity using threshold regression or panel smooth transition models. Second, extending the performance measure to Tobin's Q or stock returns would reveal whether WCM effects differ between accounting-based and market-based profitability. Third, incorporating the COVID-19 period as a structural break could examine whether the pandemic temporarily altered WCM–performance dynamics in ASEAN. Finally, the moderating roles of corporate governance, ownership concentration, and leverage thresholds remain underexplored for ASEAN contexts and represent valuable directions for future work.

REFERENCES

[1] Enqvist, J., Graham, M., Nikkinen, J. (2014). The impact of working capital management on firm profitability in different business cycles: Evidence from Finland. Research in International Business and Finance, 32: 36-49. https://doi.org/10.1016/j.ribaf.2014.03.005

[2] Filbeck, G., Krueger, T.M. (2005). An analysis of working capital management results across industries. Mid-American Journal of Business, 20(2): 11-20. https://doi.org/10.1108/19355181200500007

[3] Deloof, M. (2003). Does working capital management affect profitability of Belgian firms? Journal of Business Finance & Accounting, 30(3-4): 573-588. https://doi.org/10.1111/1468-5957.00008

[4] Lyngstadaas, H., Berg, T. (2016). Working capital management: Evidence from Norway. International Journal of Managerial Finance, 12(3): 295-313. https://doi.org/10.1108/ijmf-01-2016-0012

[5] Prasad, P., Narayanasamy, S., Paul, S., Chattopadhyay, S., Saravanan, P. (2018). Review of literature on working capital management and future research agenda. Journal of Economic Surveys, 33(3): 827-861. https://doi.org/10.1111/joes.12299

[6] Korent, D., Orsag, S. (2018). The impact of working capital management on profitability of Croatian software companies. Zagreb International Review of Economics and Business, 21(1): 47-66. https://doi.org/10.2478/zireb-2018-0007

[7] Hung, N.T., Dinh, T.S. (2022). Threshold effect of working capital management on firm profitability: Evidence from Vietnam. Cogent Business & Management, 9(1): 2141090. https://doi.org/10.1080/23311975.2022.2141090

[8] Bashir, R., Ahmad, M. (2025). Determining the effect of working capital policies optimization and market power on firm value: A developing country perspective. Asian Economic and Financial Review, 15(4): 563-579. https://doi.org/10.55493/5002.v15i4.5357

[9] Koroma, S., Bein, M. (2024). The moderating effect of economic policy uncertainty on the relationship between working capital management and profitability: Evidence from UK non-financial firms. Sage Open, 14(2): 1-19. https://doi.org/10.1177/21582440241242552

[10] Nguyen, A.T.H., Van Nguyen, T. (2018). Working capital management and corporate profitability: Empirical evidence from Vietnam. Foundations of Management, 10(1): 195-206. https://doi.org/10.2478/fman-2018-0015

[11] Al-Mawsheki, R.M.S.A., Ahmad, N.B., Nordin, N.B. (2019). The effects of efficient working capital management and working capital policies on firm performance: Evidence from Malaysian manufacturing firms. International Journal of Academic Research in Accounting, Finance and Management Sciences, 9(3): 59-69. https://doi.org/10.6007/ijarafms/v9-i3/6333

[12] Shin, H.H., Soenen, H.L. (1998). Efficiency of working capital and corporate profitability. Financial Practice and Education, 8(2): 37-45.

[13] Jensen, M.C., Meckling, W.H. (2019). Theory of the firm: Managerial behavior, agency costs and ownership structure. Corporate Governance, pp. 77-132.

[14] Kumar, S.S., Sawarni, K.S., Roy, S., G, N. (2024). Influence of working capital efficiency on firm's composite financial performance: Evidence from India. International Journal of Productivity and Performance Management, 73(9): 2787-2806. https://doi.org/10.1108/ijppm-07-2023-0374

[15] Kafeel, A.J., Ud Din, M., Waris, A., Tahir, M., Khan, S. (2020). Working capital management and firms' profitability: Dynamic panel data analysis of manufactured firms. Journal of Financial Risk Management, 9(4): 494-517. https://doi.org/10.4236/jfrm.2020.94027

[16] Khan, N., Bilal, M., Malik, I.R. (2020). Relationship of working capital to corporate performance and stock price: Evidence from the manufacturing sector of Pakistan. International Transaction Journal of

Engineering, Management, & Applied Sciences & Technologies 11(13): 11A13U.
[17] Toy, A., Kapusuzoğlu, A., Ceylan, N.B. (2022). The effect of working capital management on the performance of the textile firms: Evidence from Fragile Five Countries (FFCs). Ekonomi, Politika & Finans Araştırmaları Dergisi, 7(4): 814-838. https://doi.org/10.30784/epfad.1205427
[18] Godswill, O., Ailemen, I., Osabohien, R., Chisom, N., Pascal, N. (2018). Working capital management and bank performance: Empirical research of ten deposit money banks in Nigeria. Banks and Bank Systems, 13(2): 49-61. https://doi.org/10.21511/bbs.13(2).2018.05
[19] Anton, S.G., Nucu, A.E.A. (2020). The impact of working capital management on firm profitability: Empirical evidence from the polish listed firms. Journal of Risk and Financial Management, 14(1): 9. https://doi.org/10.3390/jrfm14010009
[20] Sensini, L., Vazquez, M. (2021). Effects of working capital management on SME profitability: Evidence from an emerging economy. International Journal of Business and Management, 16(4): p85. https://doi.org/10.5539/ijbm.v16n4p85
[21] Phan, T.D., Nguyen, M.H., Hong, L.H.T., Thanh, N.N.T. (2025). Working capital management and profitability: Cash threshold effects in Vietnam's transportation sector. Investment Management and Financial Innovations, 22(3): 293-306. https://doi.org/10.21511/imfi.22(3).2025.22
[22] Prasad, P., Sivasankaran, N., Shukla, A. (2019). Impact of deviation from target working capital on firm profitability: Evidence from India. International Journal of Productivity and Performance Management, 68(8): 1510-1527. https://doi.org/10.1108/ijppm-11-2018-0407
[23] El-Ansary, O., Al-Gazzar, H. (2020). Working capital and financial performance in MENA region. Journal of Humanities and Applied Social Sciences, 3(4): 257-280. https://doi.org/10.1108/jhass-02-2020-0036
[24] Ahmad, M., Bashir, R., Waqas, H., Quirós, M.D.M.M. (2022). Working capital management and firm performance: Are their effects same in covid 19 compared to financial crisis 2008? Cogent Economics & Finance, 10(1): 2101224. https://doi.org/10.1080/23322039.2022.2101224
[25] Akgün, A.I., Karataş, A.M. (2023). Do impact of cash flows and working capital ratios on performance of listed firms during the crisis? The cases of EU-28 and Western European countries. Journal of Economic and Administrative Sciences, 41(3): 1081-1100. https://doi.org/10.1108/jeas-01-2023-0018
[26] Deari, F., Kukeli, A., Barbuta-Misu, N., Virlanuta, F.O. (2022). Does working capital management affect firm profitability? Evidence from European Union countries. Journal of Economic and Administrative Sciences, 40(5): 1060-1080. https://doi.org/10.1108/jeas-11-2021-0222
[27] Baños-Caballero, S., Teruel, G., J, P., Martínez-Solano, P. (2011). How does working capital management affect the profitability of Spanish SMEs? Small Business Economics, 39(2): 517-529. https://doi.org/10.1007/s11187-011-9317-8
[28] Kohpaiboon, A. (2006). Foreign direct investment and technology spillover: A cross-industry analysis of Thai manufacturing. World Development, 34(3): 541-556. https://doi.org/10.1016/j.worlddev.2005.08.006