WORKING CAPITAL DYNAMICS AND FIRM PERFORMANCE: EVIDENCE FROM MALAYSIAN TECHNOLOGY FIRMS

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ABSTRACT

This study examines how working capital management influences the financial performance of technology firms listed in the FTSE Bursa Malaysia Top 100 Index, addressing gaps in sector-specific evidence in Malaysia. Based on recent empirical findings linking WCM practices to profitability, we investigate the effects of the Cash Conversion Cycle, Average Payment Period, Current Ratio, and Leverage in relation to Return on Assets and Return on Equity. Using panel data from 12 firms over 2019–2023, and panel data regression, the Fixed Effects Model (FEM) shows that only LEV significantly and positively affects both ROE and ROA, supporting the Trade-Off Theory. To address endogeneity, the Generalized Method of Moments (GMM) confirms LEV's significance and further indicates that CCC and CR also influence ROE when dynamic factors are considered. The findings suggest that financial leverage is the primary driver of performance, while efficient WCM enhances shareholder returns under advanced modelling. These findings highlight the critical role of leverage management as part of working capital strategy for Malaysian technology firms.

Keywords: *Working Capital Management, Cash Conversion Cycle, Average Payment Period, Current Ratio, Leverage, Firm Performance, Return on Equity, Return on Assets, Malaysian Technology Firms, Panel Data Analysis*

INTRODUCTION

Efficient working-capital management (WCM) is essential for firms to balance liquidity and profitability. Firms with poor WCM, such as prolonged cash conversion cycles, overdue payables, or excessive leverage, would often tie up resources in non-productive assets, incur higher financing costs, and suffer reduced profitability and financial flexibility. These effects particularly hurt technology companies operating in fast-moving and innovation-driven markets, where timely access to cash and efficient working capital turnover are critical to fund R&D, scale operations, and respond to market changes.

In emerging economies such as Malaysia, the cost of poor WCM can be substantial. For example, a recent study of Malaysian listed firms during 2021–2023 found average cash conversion cycles around 105 days; longer CCC was significantly associated with lower profitability (Akbar et al., 2021). Firms that fail to optimize working capital may therefore forego returns, lose competitive advantage, and risk liquidity pressures, especially in downturns or when growth opportunities demand agility (Anton & Nucu, 2020).

If firms do nothing, the consequences may include persistent underperformance, limited capacity to invest in innovation, deteriorating creditworthiness, and heightened vulnerability during economic shocks. Indeed, inefficient WCM may also impair firms' ability to meet short-term obligations, hampering supplier relationships and undermining operational continuity. Prior international evidence supports this: excessive working capital beyond optimal levels

tends to erode firm profitability and value (Essel & Brobbey, 2021). Study by Akbar et al. (2021) also shows that for listed firms, inefficient WCM often manifests as lower return on assets (ROA) or equity (ROE), reduced financial flexibility, higher risk of stock volatility, and in severe cases, increased likelihood of liquidity shortfalls or insolvency.

Given the lack of evidence focusing on Malaysian technology firms, this study aims to fill that gap. The general objective is to investigate the impact of working capital management on the firm performance of technology companies in Malaysia, specifically those represented in the FTSE Bursa Malaysia Top 100 Index for 2023. The specific objectives are:

i. To assess the impact of the Cash Conversion Cycle (CCC) on the financial performance (ROA and ROE) of technology companies listed on the FTSE Bursa Malaysia Top 100.
ii. To evaluate the impact of the Average Payment Period (APP) on their financial performance (ROA and ROE).
iii. To examine the impact of the Current Ratio (CR) on their financial performance (ROA and ROE).
iv. To investigate the impact of Leverage (LEV) on their financial performance (ROA and ROE).

By focusing on this niche, which is technology firms in a prominent Malaysian equity index, the research contributes to both academic and practical discussion. It will inform corporate managers, investors, and policymakers about which WCM components matter most for enhancing profitability and financial resilience in Malaysia's technology sector.

LITERATURE REVIEW

Working capital management has increasingly been examined as a critical determinant of firm performance, particularly in technology-driven sectors where liquidity and financial flexibility shape competitive outcomes. Recent studies highlight that components such as the cash conversion cycle, liquidity ratios and leverage materially influence profitability across emerging markets. However, empirical evidence specific to Malaysian technology firms remains limited, creating a need for more focused sectoral analysis.

The Cash Conversion Cycle (CCC), or cash cycle, measures in days how long a firm takes to convert cash tied in inventory into cash from sales (Hayes, 2024). A shorter CCC improves liquidity, which is especially important for Malaysian technology firms operating in fast-changing markets. A stable or declining CCC signals efficiency, while an increasing CCC requires further examination. CCC is a key indicator of operational efficiency, and its management becomes even more critical under financial constraints (Zeidan and Shapir, 2017) or during expansion (Campello et al., 2011). Excessive working capital can hinder growth (Albuquerque and Hopenhayn, 2004). Since working capital substitutes for cash (Opler et al., 1999) and competes with fixed investment for limited financing (Fazzari and Petersen, 1993), firms in emerging markets should treat CCC management as central to value creation.

Existing research suggests that simply investing in working capital does not necessarily lead to substantial gains; instead, effectively managing the cash conversion cycle (CCC) enhances company's margin profit. Hill et al. (2010) examine this connection and demonstrate that net operating working capital reflects various aspects of a firm's adjustments to both operational and financial position. They argue that factors such as revenue expansion, sales uncertainty, expensive external funding, and fiscal stress prompt businesses to adopt more assertive working capital strategies. The study categorizes firms into two groups: those with better internal funding policies and access to capital markets, which typically follow more cautious working capital strategies, and those that are financially constrained or experiencing

rapid growth, which tend to pursue more aggressive strategies. In the end, firms facing cash shortages should take more proactive steps to release cash tied up in operations. Efficient working capital management can help Malaysian firms mitigate the challenges posed by financing constraints on fixed investments.

The trade-off theory explains how firms balance the benefits of debt, primarily interest tax shields, against the costs of financial distress to determine an optimal capital structure (Ai et al., 2020). Although initially developed for long-term financing decisions, recent work extends the theory to short-term policies, noting that working capital management also involves a liquidity–profitability trade-off (Joshua, 2023). Empirical findings are mixed: some studies argue that longer cash conversion cycles can support customer relationships and boost profitability, while others show that excess working capital destroys value through financing and opportunity costs (Halil Kiymaz et al., 2024). The trade-off perspective helps explain these outcomes by emphasizing the need to balance the benefits of holding working capital against its associated costs (Luo, 2025; Ahmad et al., 2022). Applied to working capital, the theory suggests that firms enhance performance by optimizing current assets and liabilities to avoid waste and improve efficiency (Kademi, 2014; Joshua, 2023).

The pecking order theory proposes that firms follow a financing hierarchy, preferring internal funds first, then debt, and lastly equity, due to information asymmetry between managers and investors (Myers and Majluf, 1984). Because external financing can send negative signals and incur higher costs, firms benefit from maintaining sufficient liquidity to meet operational needs without relying heavily on outside funds (Chen and Paulraj, 2004). The theory also implies that conservative financing policies and efficient working capital management strengthen creditworthiness and reduce dependence on external financing. In volatile environments, the pecking order framework becomes particularly relevant, as it highlights how information asymmetry shapes financing choices and supports strategies that preserve financial flexibility.

Cash Conversion Cycle (CCC) and Firm Performance

A company's current assets and current liabilities are balanced optimally by effective working capital management, which also increases liquidity, lowers expenses, and boosts profitability. The Cash Conversion Cycle (CCC), one of the most important aspects of working capital management, has attracted a lot of interest in earlier research because of its effect on business performance. The cash conversion cycle incorporates three key components of management efficiency: production, inventory management, and supply chain management (Mansoori & Muhammad, 2012). Numerous previous studies have focused on the cash conversion cycle (CCC), a key component of working capital management, and its influence on firm performance. An empirical study from Scandinavia done by Yeboah and Kjærland (2024) reported that effective management of CCC leads to higher profitability, particularly in industries like technology where rapid innovation and demand fluctuations occur. This is because optimal control over the various elements of working capital, including inventories, accounts receivable, and accounts payable, results in increased cost efficiency and greater overall performance. Also, organisations can achieve higher profitability by effectively transforming their inventory and receivables into cash and obtaining early payments. Vlismas (2023) stated CCC is a crucial metric for companies, helping them balance liquidity with profitability.

However, some studies indicate that a longer CCC may have a negative impact on firm performance. Lin and Wang (2021) investigate how working capital management, and the industry conditions influence business performance in China. They found that the cash conversion cycle (CCC) negatively correlated with return on assets (ROA). This is due to the

extended cash conversion cycle (CCC), which may result in increased inventory and accounts receivable levels, which in turn will necessitate external financing with significant associated expenses. The result is the same as Kayani et al. (2020), which investigated working capital management and firm performance relationships in Australasian firms. The findings indicate that reducing the cash conversion cycle (CCC) can help improve firm performance. A shorter CCC means the company locks in less capital in stock and receivables. This reduces the need for external financing, leading to lower interest expenses.

Average Payment Period (APP) and Firm Performance

The average payment period (APP) reflects how long a company takes to pay its suppliers and is often linked to cash flow and liquidity management. Umar and Al-Faryan (2023) emphasizes the importance of managing working capital effectively and find that a longer APP is positively associated with improved firm profitability, as firms can retain cash for a longer period to support operations**.** Similarly, Nguyen et al. (2020) also argue that companies with a longer APP tend to reduce their working capital requirements, thus improving liquidity and profitability. The empirical findings reveal significant negative impacts of working capital management, as measured by the cash conversion cycle (CCC) and its three components which is accounts receivable turnover in days (ARD), inventory turnover in days (INVD), and accounts payable turnover in days (APD) on a firm's profitability, as assessed by return on assets (ROA) and Tobin's Q. This suggests that companies can enhance their profit margins by optimizing their working capital management, as measured by the CCC. This entails cutting down on client payment collection time, increasing inventory turnover, and preserving shorter creditor payment terms. Moreover, Nguyen et al. (2020) also revealed that the profit margins of firms were impacted by the sales expansion, company scale, borrowing capacity, and company tenure. However, Wang et al. (2020) caution that excessively delaying payments may damage supplier relationships and lead to less favourable terms, which could negatively affect performance in the long run. Therefore, while a longer APP can be associated with improved profitability, it is important to achieve equilibrium between retaining cash and maintaining healthy supplier relationships.

Current Ratio (CR) and firm performance

The current ratio (CR) which measures a company's ability to fulfill its current liabilities with its current assets, represents another important aspect of working capital management. Current ratio should be well-maintained from working capital perspective so as to enable both liquidity and stability to keep pace with sustainability performance. The current ratio and implications on firm performance has been well-studied, with mixed results. It is likely both sides (too much and too little) involved in addressing the relationship of the current ratio and firm performance. On the one hand, an ideal current ratio is a proxy for management ability to operate the firm efficiently, without costly errors due to uncertainty (unexpected costs) or navigating through the challenges of both stable and unstable economic conditions. Yousaf and Bris (2021) found that significant gains in firm performance occurred in companies with heightened current ratios with respect to financial stability - that is, a current ratio that serves the operational needs of the firm. The potential subsequently increases investor or stakeholder confidence in the firm sustaining the level of operation (as it signifies the firm's authority to manage short-term liabilities). Furthermore, Altaf and Shah (2017) pointed out in their data, that balanced CR is important. They found that balanced CR can help firms to weather economic shocks - like recessions and downturns. If firms have short-term assets available, doing business as commonly occurs, avoid reductions in needed business activities (e.g., capital expenditures on

innovation projects related to R&D or production); some of which may be vital on-going investments for the future prospects of the firm. In this way, companies may remain in a growth phase during economy downturns and then improve through changes in timing for their limitations after an economic event.

However, Sawani and Ayyalusamy (2020) argue that excessively high current ratios might indicate inefficiency in using resources, potentially leading to lower profitability. A firm that holds too many current assets relative to its liabilities may be failing to fully utilize its resources. For instance, it may have large amounts of inventory or receivables that are not generating income or returns. Higher returns might have been possible if this idle capital had been used more wisely in other areas of the company. Therefore, Sawarni and Ayyalusamy (2020) caution that an unusually high CR may indicate that the company is not effectively managing its assets to generate profits, which may ultimately result in decreased profitability. Liquidity is important, but too much of it without matching investment or return can hurt a company's performance.

Leverage (LEV) and Firm Performance

Leverage involves utilizing borrowed capital (debt) to finance a firm's operations and investments, which can amplify potential returns. When the return on assets surpasses the cost of debt, leverage can enhance profitability by enabling firms to generate greater returns without increasing their equity base. This is particularly relevant in high-investment sectors like technology, where capital expenditures for innovation, research, and expansion are substantial. Leverage allows firms to scale quickly and seize growth opportunities without diluting ownership. However, it also introduces financial risk, especially if the company has trouble satisfying its debt commitments or if revenues fluctuate unexpectedly. Thus, the key challenge for firms is managing leverage carefully to balance the advantages of increased profitability with the risks of financial distress and over-indebtedness.

Empirical findings on the connection between leverage and firm performance are inconsistent. Higher leverage may increase technology companies' profitability by allowing them to finance expansion, enhance operational effectiveness, and acquire a competitive edge, according to some research (Umar and Al-Faryan, 2023). Nguyen et al. (2020) discovered that excessive leverage can result in high loan costs and financial strain, which can reduce profitability. In a similar vein, Kayani et al. (2020) contend that leverage can be advantageous when used responsibly but warn that carrying too much debt can impair performance over the long run. This opinion is supported by Chen and Paulraj (2004), who contend that businesses can finance expansion with moderate leverage without paying exorbitant interest rates. However, Wang et al. (2020) warn that companies with high levels of leverage are more vulnerable to financial risks, especially in sectors like technology that demand large sums of money for innovation. According to Reyad et al. (2022), effectively managed leverage, especially in working capital, can boost performance by supplying the money required for growth. However, because leverage can increase financial risks, Campello et al. (2011) advise businesses in financially constrained environments to exercise caution when using it, particularly during economic downturns.2.2.5 Empirical Review on Working Capital Management (WCM) and Firm Performance

The literature has extensively debated the relationship of Working Capital Management (WCM) to a firm’s performance; the many studies have reported mixed results for their findings. Effective WCM is important for enhanced liquidity, resulting in lower operating costs and possibly enhanced profitability. Yousaf & Bris (2021) argue that effective WCM allows competing firms to avert unnecessary investment in current assets, while maintaining an optimal trade-off between profitability and liquidity, ultimately providing superior market

competition. The case for focusing on efficient working capital practices via industry-specific methods, particularly inventory optimization, accounts receivable, and accounts payable, is vital for firms looking to improve their financial performance.

A recent study has also examined industry-specific practices of WCM, and the role that these practices have on improving firm performance. Altaf and Shah (2017) reported that using efficient WCM practices, especially during periods of economic distress when maintaining both liquidity and operational flexibility was critical, worked for a population of non-financial firms in India. Those firms that utilized more advanced strategies like analytics and automation (describing their inventory as just in time inventory), or accounts receivables and accounts payables management, reported improvements in profitability. It is evident that firms must assess the dimensions of their WCM practices to maintain the most appropriate approach to fit the industry they are in; each industry has unique practices and models, and economics are a consideration in the balance between solvency and liquidity. Furthermore, Abuhommous et al. (2022) disclosed a concave relationship existing between WCM and credit ratings, which illustrates a cognitively optimal (ideal) level of working capital results in less financial risk and improved creditworthiness. If firms departed from the cognized working capital level, it would decrease its credit rating, and its associated financial health.

The role of digital tools and financial inclusion in enhancing WCM has been further emphasized by recent studies. Vukovic et al. (2023) suggest that firms in transition economies can improve profitability by combining traditional WCM strategies with modern digital tools. These tools improve performance and liquidity by streamlining WCM procedures and strengthening communication tactics. In a similar vein, Bhattacharyya et al. (2023) demonstrated that SMEs that have better access to financial inclusion and effective WCM practices typically perform better. Efficient WCM helps reduce the cash conversion cycle (CCC) for SMEs, leading to higher operating performance by allowing these firms to invest in innovation and growth more effectively. Furthermore, Hussain et al. (2021) highlighted the role of macroeconomic factors, including interest rates and exchange rates, in influencing WCM practices and firm performance. Their study indicated that firms utilizing advanced forecasting techniques to manage working capital tend to have better profitability, as they can more effectively manage liquidity and costs during fluctuating macroeconomic conditions.

Empirical studies have also explored the influence of specific components of WCM on financial performance. Nguyen et al. (2020) examined how the components of the cash conversion cycle (CCC), such as accounts receivable turnover, inventory turnover, and accounts payable turnover, impact firm profitability. According to their findings, companies with shorter CCCs were able to increase liquidity and profitability by lowering the amount of capital invested in working capital. Reyad et al. (2022) discovered that better debt management through working capital leverage could enhance firm performance by giving businesses the money they need to grow. However, they also noted that firms should be cautious when leveraging debt, as it can exacerbate financial distress, especially during economic downturns. Campello et al. (2011) support this perspective, highlighting that firms facing financial constraints should be cautious with leverage, as it can amplify risks during times of economic uncertainty.

In addition to WCM practices, the role of leverage in firm performance has been widely discussed. In their study, Umar and Al-Faryan (2023) discovered that leveraging debt can benefit technology companies by giving them access to funding to support expansion, improve operational capacity, and invest in competitive advantages. Excessive levels of leverage can be negative overall, as noted by Kayani et al. (2020), stressing that excessive debt puts a firm in jeopardy of financial distress and there is less ability to maximize profitability. Chen & Paulraj (2004) and Wang et al. (2020) have similarly argued that moderate leverage can enhance profitability by facilitating growth without burdening firms with excessive interest payments,

while high leverage can increase financial risk, particularly in capital-intensive sectors like technology. Therefore, firms must carefully manage leverage to balance the benefits of financial growth with the risks of over-indebtedness. WCM strategies, including leveraging working capital and maintaining an optimal cash conversion cycle, play a crucial role in determining firm performance. Firms must adapt their strategies to the dynamics of the industry, macroeconomic factors, and firm-specific characteristics to ensure sustained profitability and financial stability.

METHODOLOGY

The sample consists of Malaysian publicly listed firms, specifically technology companies within the FTSE Bursa Malaysia Top 100. After assessing data availability and completeness, 12 firms with uninterrupted and reliable financial information for the years 2019 to 2023 were selected. Annual report data for this five-year period ensure consistency and validity, and firms with missing dependent or independent variables were excluded to preserve methodological integrity. The study examines working-capital measures including the cash conversion cycle (CCC), average payment period (APP), current ratio (CR) and leverage (LEV), alongside performance indicators return on assets (ROA) and return on equity (ROE). The resulting dataset provides sufficient depth for analysing how working-capital practices influence firm performance in the Malaysian technology sector.

The panel data are used in this study to provide a larger number of observations, which increases statistical power and yields more precise estimates than cross-sectional or time-series data alone. They also allow the analysis to control for unobserved firm-specific heterogeneity, thereby reducing omitted variable bias and improving causal inference, particularly when examining financial policies that evolve over time. As Hsiao (2007) notes, the principal advantage of panel data lies in its ability to capture dynamic behaviour by tracking entities across periods rather than relying on single snapshots.

The study's dataset consists of an unbalanced panel of 12 technology companies, selected after excluding firms with incomplete or missing observations. Unbalanced panels can introduce complications, such as potential biases arising from attrition or systematic data gaps, which may affect the consistency and reliability of the estimates (Arellano, 1993). To mitigate these issues, the analysis will employ appropriate estimation techniques capable of handling unbalanced structures and will incorporate rigorous data-cleaning procedures to address potential non-response, measurement errors, or anomalies in financial reporting. These steps ensure that the findings remain empirically sound and robust despite the inherent challenges of working with firm-level financial data.

In terms of the empirical model, the study will employ Pooled Ordinary Least Squares (OLS) panel regression to examine the correlation or impact of all independent variables (related to working capital management) on company effectiveness in Malaysia. The panel regression, as described below, will be based on the Generalized Method of Moments (GMM), a well-established estimator known for its effectiveness in addressing endogeneity issues. The analysis will consist of two models as outlined:

Model 1: Return on Equity (ROE)

$$ROE_{it} = \beta_0 + \beta_1 CCC + \beta_2 APP + \beta_3 CR + \beta_4 LEV + \varepsilon$$

Return of Equity (ROE) has been selected as the dependent variable for measuring firm performance. This selection is based on the premise that ROE is largely considered to be a major indicator of both an organization's profitability and efficiency to provide returns to

shareholders on an equity investment. The decision is also supported by established researchers Chambers and Cifter (2022), who have regularly used ROE as a critical measure of firm performance. ROE is also a part of a comprehensive view of firm performance by simultaneously taking into account, the basic fact that ROE defines profitability as well as efficiency with respect to using the shareholders's own equity to earn money. This model also includes independent variables such as a component of working capital management, Cash Conversion Cycle (CCC), Average Payment Period (APP), current ratio, to the financial metric, Leverage (LEV). Therefore, the model aims to leverage their respective relationship between independent variables, and ROE to measure different determinants of company performance. This analysis offers a valuable implication for both stakeholders and decision makers.

Model 2: Return on Assets (ROA)

$$ROA_{it} = \beta_0 + \beta_1 CCC + \beta_2 APP + \beta_3 CR + \beta_4 LEV + \varepsilon$$

Jose et al. (1996) state that Return on Assets (ROA) isolates the effects of financing choices and alterations in tax legislation on a company's profitability. Consequently, in respect of supporting analysis, ROA is employed as the proxy to measure and indicate how the working capital management, encompassing independent variables including Cash Conversion Cycle (CCC), Average Payment Period (APP), Current Ratio (CR) and Leverage (LEV) influences the performance of 12 technologies firms from the FTSE Bursa Malaysia Top 100 Index. The previous studies have indicated that the management effectiveness of working capital such as cash conversion cycle (Kiymaz et al., 2024) and average payment period (Kayani et al., 2020), can significantly impact a company's profitability, as measured by ROA. Additionally, factors such as Current Ratio (CR) and Leverage (LEV) have also been found to influence firm performance (Kayani et al., 2020). The objective of this model is to investigate how variations in these independent variables affect ROA, providing insight into the relationship between working capital management practices and firm profitability in the context of Malaysian technologies firms.

RESULTS AND DISCUSSION

To understand the basic distribution and central tendencies of the key variables, descriptive statistics for working capital measures and performance indicators are examined. The descriptive statistics results are summarized in table below:

Table 1. Descriptive Statistics for All Variable (independent and dependent)

	ROE	ROA	CCC	CR	APP	LEV
Mean	27.56629	10.62835	320.4667	2.562375	165.4168	2.435796
Median	18.87500	9.620000	263.5000	2.270000	86.50000	1.615000
Maximum	221.4200	24.84000	831.0000	7.770000	762.0000	13.51000
Minimum	0.010000	0.010000	67.00000	0.390000	27.00000	1.130000
Std. Dev.	42.23452	5.961906	179.4884	1.907348	178.1455	2.520544
Skewness	3.927704	0.175051	0.956356	1.027236	1.752883	3.502278
Kurtosis	17.22865	2.041367	3.155253	3.374511	5.184544	14.77206
Jarque-Bera	660.4046	2.603873	9.206432	10.90278	42.65658	469.1132
Probability	0.000000	0.272005	0.010020	0.004290	0.000000	0.000000
Sum	1653.978	637.7010	19228.00	153.7425	9925.008	146.1478
Sum Sq. Dev.	105241.5	2097.115	1900749.	214.6405	1872413.	374.8355

Observations	60	60	60	60	60	60

The descriptive statistics reveal contrasting distributional characteristics between ROE and ROA. ROE exhibits substantial variation across firms, with a high mean of 27.57, a standard deviation of 42.23, and a maximum value of 221.42, compared to a median of 18.88. The distribution is highly positively skewed (skewness = 3.93) and leptokurtic (kurtosis = 17.23), indicating the presence of firms with exceptionally high returns on equity that distort the average. In contrast, ROA has a more moderate mean of 10.63 and a median of 9.62, with a standard deviation of 5.96. Its near-symmetric distribution (skewness = 0.18) and kurtosis of 2.04, along with a non-significant Jarque-Bera test (p = 0.272), suggest that ROA is approximately normally distributed. This indicates that asset-based profitability is more evenly distributed across firms compared to equity-based returns.

Among the explanatory variables, CCC, APP, and LEV show signs of non-normality. Both CCC and APP have large standard deviations (179.49 and 178.15, respectively), indicating substantial variation in working capital management practices among firms. These variables are also positively skewed, suggesting that a few firms maintain significantly longer cash conversion cycles and payable periods than the majority. LEV is particularly noteworthy, with a mean of 2.44 and a median considerably lower at 1.62, combined with extreme skewness (3.50) and high kurtosis (14.77), reflecting the existence of firms with unusually high levels of financial leverage. All three variables have significant Jarque-Bera statistics ($p < 0.05$), confirming non-normal distributions. These distributional characteristics imply that standard ordinary least squares (OLS) regression assumptions may be violated, potentially leading to biased or inefficient estimates. Therefore, this study has applied robust estimation techniques for panel data, such as Fixed Effects Model (FEM) and Generalized Method of Moments (GMM), which are better suited to handle heteroscedasticity and non-normality in the data. These approaches assist in reducing the effects of outliers and asymmetry in the data distribution that help estimate the relationships among the working capital management variables and firm performance more accurately.

Pearson correlation analysis was conducted to assess the linear relationships between the dependent and independent variables. The results are displayed below:

Table 2. Pearson Correlation between Components of Working Capital Management and Firm Performance

	ROE	**ROA**	**CCC**	**CR**	**APP**	**LEV**
ROE	1	-	-0.2833	-0.2255	-0.1646	0.9234
ROA	-	1	-0.5812	0.3271	-0.4920	0.0858
CCC	0.2833	-0.5812	1	-0.1706	0.8568	-0.0458
CR	-0.2255	. 0.3271	-0.1706	1	-0.4862	-0.4471
APP	-0.1646	-0.4920	0.8568	-0.4862	1	0.1109
LEV	0.9234	0.0858	-0.0458	-0.4471	0.1109	1

The correlation matrix is quite informative. With respect to ROE, the strongest positive correlation is with LEV (r = 0.9234), indicating that higher `returns on equity' firms have more financial leverage. This aligns with financial theory, which states that more leverage infers enhanced returns to equity holders. However, ROE is negatively correlated with CCC, CR, and APP. It appears that if working capital is managed ineffectively or liquidity is in excess, equity profitability will decline. ROE exhibited weak negative correlations with CCC (r = –0.28), CR (r = –0.23), and APP (r = –0.16). This indicates that firms with high returns on equity have a modestly associated shorter cash conversion cycle, slightly lower current ratio, and shorter

payment period. These relationships, though weak, may reflect the tendency of more profitable firms to manage working capital more aggressively and maintain leaner liquidity positions.

For ROA, the pattern differs slightly. CCC (r = –0.5812) and APP (r = –0.492) exhibit stronger negative correlations with ROA, suggesting that longer cash conversion cycles and delayed payments to suppliers are detrimental to asset-based returns. Interestingly, CR shows a moderate positive correlation with ROA (r = 0.3271), indicating that a healthy liquidity position may improve overall firm efficiency.

A significant concern is the strong positive correlation between CCC and APP (r = 0.8568), which suggests the possibility of multicollinearity. This may inflate the standard errors in regression models, thereby reducing the statistical significance of coefficients. This issue will be addressed further in the regression analysis section.

Model Selection and Diagnostic Test

The three primary estimation techniques were employed: Pooled Ordinary Least Squares (POLS), Fixed Effects Model (FEM), and Random Effects Model (REM). Model selection are based on the reported results of the Breusch-Pagan Lagrange Multiplier (BPLM) test, Hausman test, and Chow test. Each test helps determine whether firm-specific unobserved heterogeneity should be modelled, guiding the choice among Pooled OLS, FEM, and REM.

Model Selection for ROE

A. Chow Test

Table 3. The Test Result for Model Selection for Return on Equity

Test	**P-Value**
Chow Test	0.0004
Breusch-Pagan Lagrange Multiplier (BPLM) test	0.0432
Hausman test	0.0073

The Chow test was also conducted to determine whether the Fixed Effects Model (FEM) provides a better fit than the Pooled OLS model. It tests for the presence of individual-specific fixed effects.

Decision rule for the Chow test:

- **H_0:** Pooled OLS is appropriate (no fixed effects)
- **H_1:** Fixed Effects Model is preferable

Based on table 3, the Chow test for ROE produced a p-value of 0.0004, indicating significant differences across firms. Thus, the null hypothesis is rejected, and the Fixed Effects Model (FEM) is preferred over Pooled OLS (Achmad Faridz Jauhari et al., 2019).

B. Breusch-Pagan Lagrange Multiplier (BPLM) Test

The Breusch-Pagan Lagrange Multiplier (BPLM) test was performed to assess whether a panel data model (Random Effects or Fixed Effects) is more appropriate than the Pooled Ordinary Least Squares (POLS) model. This test evaluates the presence of unobserved individual heterogeneity for example, whether firm-specific effects exist that would invalidate the assumptions of the POLS model. The null hypothesis (H_0) states that no panel effects exist, meaning the POLS model is adequate. The alternative hypothesis (H_1) suggests that random effects are present and thus a panel model is more suitable. For the ROE model, based on table

3, the BPLM test reported a p-value of 0.0432. Since the p-value is below the 5% significance threshold, the null hypothesis of no panel effects is rejected. This confirms the presence of significant cross-sectional effects across firms, justifying the use of a panel data model over pooled OLS. The rejection of H_0 indicates that firm-specific differences must be accounted for to avoid biased and inconsistent estimates.

C. Hausman Test

The Hausman test has conducted to help determine whether the Fixed Effects or Random Effects model is more appropriate by testing whether the unique errors (firm-specific effects) are correlated with the regressors.
The decision rule for the Hausman test as below:

- **H_0:** Random Effects model is appropriate (no correlation with regressors)
- **H_1:** Fixed Effects model is preferable (correlation exists)

Based on table 3, the Hausman test yielded a p-value of 0.0073, leading to the rejection of the null hypothesis in favor of FEM and suggesting that the Random Effects estimates would be biased. This confirms that FEM is the most appropriate model for ROE**.**

Based on the results of the BPLM test, Hausman test, and Chow test, it can be concluded that the Fixed Effects Model (FEM) is the most appropriate specification for analyzing the determinants of ROE in this study. FEM effectively captures the unobserved heterogeneity across firms and provides consistent and reliable parameter estimates.

Model Selection for ROA

A. Chow Test

Table 4. The Test Result for Model Selection for Return on Asset

Test	**P-Value**
Chow Test	0.0001
Breusch-Pagan Lagrange Multiplier (BPLM) test	0.0119
Hausman test	0.0134

In the context of the ROA model, the Chow test was conducted to determine whether the Pooled OLS model or the Fixed Effects Model (FEM) provides a better fit for the data. Based on table 4, the test returned a p-value of 0.0001 (F=4.65), supporting the use of Fixed Effects over Pooled OLS for the ROA model. According to the decision rule, the null hypothesis (H_0) assumes that Pooled OLS is suitable while the alternative hypothesis (H_1) assumes that the Fixed Effects Model is more appropriate than Pooled OLS. With such a low p-value (0.0001) is well below the 5% significance level, the null hypothesis is rejected. Therefore, it can reasonably conclude firm specific effects are significant and this study should use the Fixed Effects model in the analysis of return on asset.

In summary, refer to the result of the diagnostic tests that have been conducted, it can conclude that the Fixed Effects Model (FEM) is also suitable for the most appropriate model for analyzing ROA.

B. Breusch-Pagan Lagrange Multiplier (BPLM) Test

Based on test result in table 4, the BPLM test for ROA yielded a p-value of 0.0119. This value is lower than the conventional significance level of 0.05, which guides decision-making in panel data model selection.
The decision rule for the BPLM test is as follows:

- **H_0:** No panel effects (Pooled OLS is appropriate)
- **H_1:** Random Effects model is preferable

Since the BPLM test p-value is 0.0119, which is lower than 0.05. the null hypothesis is rejected. This indicates the presence of significant panel effects and confirms that a panel data model (either Random Effects or Fixed Effects) is more appropriate than the Pooled OLS model for the ROA estimation.

C. Hausman Test

To determine whether the Fixed Effects Model (FEM) or the Random Effects Model (REM) is more appropriate for the ROA model by testing whether the regressors are correlated with the unobserved firm-specific effects, the Hausman test was applied. The decision rule for the Hausman test is as follows: H_0 assumes that the Random Effects model is appropriate, which means that the regressors and the unobserved firm-specific effects are uncorrelated; H_1 suggests that the Fixed Effects model is more appropriate because the regressors and unobserved firm effects are correlated. Based on table 4, the Hausman test produced a p-value of 0.0134 which shows that Fixed Effects model is more appropriate than Random Effects model for understanding variations in ROA. Again, since the p-value is below the 5% significance level, the null hypothesis is rejected. This also shows that the regressors are correlated with the individual firms' effects which means Random Effects model would result in biased and inconsistent estimates for the model.

After conducting model specification tests including the Chow test, Breusch-Pagan LM test, and Hausman test, the Fixed Effects Model (FEM) was identified as the most appropriate specification for analyzing both ROE and ROA. Although a Difference Panel Data Model (DPDM) was initially estimated for comparison, the results were statistically insignificant and exhibited issues such as poor model fit and increased serial correlation, rendering the model unsuitable for interpretation (Hsiao, 2014). Consequently, alternative panel data approaches, such as Difference Panel Data Models (DPDM) and Dynamic Panel Data Models, were not employed in the main analysis.

This exclusion is grounded in several key justifications. First, the diagnostic tests consistently indicated the presence of significant unobserved, time-invariant firm-specific effects that are correlated with the regressors, thereby supporting the use of FEM and offering no empirical rationale for employing differencing or dynamic modelling techniques (Wooldridge, 2010). Second, the primary objective of this study is to estimate the contemporaneous impact of working capital management variables on firm performance, rather than to model dynamic adjustment processes or address endogeneity common justifications for using DPDM or GMM-based dynamic models. Further, the panel data cover a relatively short period (T), so the advantages of being a dynamic model are limited. Not only could the first-difference estimator be more susceptible to efficiency loss and serial correlation, but the data do not exhibit distressing levels of autocorrelation or omitted variable bias that would necessitate more extensive estimation methodologies.

By employing the fixed-effects model (FEM), the study can achieve parsimony in modes, a clear interpretation of results, and sufficient control for unobserved heterogeneity. Although advanced methods such as GMM are considered for robustness purposes, the

decision to exclude DPDM and related models is both empirically and theoretically justified within the scope of this research (Arellano & Bond, 1991; Roodman, 2009).

Multicollinearity Diagnostics

Multicollinearity occurs, also referred to as multicollinear relationships or multicollinearity, when two or more independent variables in a regression model are highly correlated with one another. Multicollinearity inflates the variances of the estimated coefficients then presupposes a diminishing of the individual predictability of each independent variable. Consequently, high multicollinearity can affect regression results causing wide confidence intervals and statistical significance that is misleading.

In this research, the presence of multicollinearity was explored using the independent Variable Inflation Factor (VIF) for each of the independent variables. VIF measures multiple correlations between any one predictor and the other variables (independent variables). VIF shows how much the variance of a regression coefficient is increased because of multicollinearity. As a rule of thumb, VIF values greater than 5 signal moderate multicollinearity among independent variables, whereas values higher than 10 raise serious concern for multicollinearity.

Table 5. Multicollinearity between Independent Variables

Variable	R^2	**VIF Value**	**Interpretation**
CCC	0.813541	5.363119	Moderate to high
CR	0.53969	2.172451	Low
APP	0.853268	6.815129	Moderate to high
LEV	0.215828	1.27523	Low

The results reveal that the Cash Conversion Cycle (CCC) and Average Payment Period (APP) with values greater than 5, but lower than 10 indicating moderate to high multicollinearity. Current Ratio (CR) and Leverage (LEV) show low VIF values, indicating little concern. Given that CCC and APP are both theoretically important for modeling working capital management, both variables were retained in the regression analysis. However, the coefficients should be treated with caution with respect to possible inflation due to the standard errors. Abonazel (2016) noted that robust panel data estimating techniques (FEM and GMM) also reduced the effect on the reliability of the results that were caused by multicollinearity.

In conclusion, there is some level of moderate to high multicollinearity evident in the results, mainly between the CCC and APP variables, but it does not reach the threshold of considerable attention. The findings remain interpretable, but the limitations imposed by multicollinearity are acknowledged and addressed in the analysis.

Regression Results

Fixed Effects Model for ROE (Main Model)

Table 6. The Summary of the Result of Fixed Effects Model for Return on Equity (Main Model)

Variable	Coefficient	p-value	Significant
CCC	0.000950	0.9780	insignificant
CR	0.671123	0.7149	insignificant
APP	0.055727	0.1554	insignificant
LEV	18.07652	0.0000	significant
C	-27.70683	0.0127	

*Significant level = 5%
Additional model statistics:

- Observation = 60
- F-statistics (p-value) = 0.000000
- R-squared = 0.969035

In contrasting fixed effects model regression results for ROE, it is notable now that only leverage (LEV) was statistically significant at the 5% level for the regression, especially in terms of the working capital management variables such as cash conversion cycle (CCC), current ratio (CR), and average payment period (APP) are not significant. The coefficient for LEV is +18.0876, while the p-value is 0.0000, suggesting statistically a strong and positive linear relationship between leverage and return on equity (ROE), thus as these firms increase their financial leverage is also experienced in increased profitability, at least in terms of equity returns. Thus, Hypothesis H_4, which proposed a significant relationship between leverage and financial performance, is supported. This finding is in line with the trade-off theory and empirical evidence from Berger and Bonaccorsi di Patti (2006), who stated that optimal use of debt can enhance shareholder returns through tax shields and financial discipline.

Conversely, in terms of the cash conversion cycle (CCC) showed as per the regression output led to a coefficient of +0.00095 (p-value = 0.9780), which indicates there is no statistically significant effect of CCC on ROE. Therefore, the indicated Hypothesis H_1 that assumed a significant relationship between CCC and ROE is rejected. This result starkly stands in opposition to Deloof (2003) and a study by Baños-Caballero et al., (2020) that determined a shorter ccc has been shown to improve profitability for firms. Nonetheless, other more experience evidence contains the current finding. For example, Mohsen et al. (n.d) found CCC to be statistically insignificant in determining ROE for firms listed on the Egyptian Stock Exchange. Similarly, Nguyen and Mohanlingam (2018) reported significantly negative coefficients for CCC in relation to ROE, suggesting that extended cash cycles may reduce profitability. A study by Bakwenabatsile (2023) also confirmed that CCC has no significant impact on firm performance. One possible reason for this insignificance could be that the sample of technology firms exert flexible and innovation-oriented working capital cycles that do not associate directly with equity-based returns.

The current ratio (CR), which measures short-term liquidity, also shows an insignificant relationship with ROE, with a coefficient of +0.6711 and a p-value of 0.7149. It was determined that hypothesis H_3, which proposed a significant relationship between CR and firm performance, is rejected. The lack of significance implies that higher liquidity does not necessarily lead to better shareholder returns, possibly because excess liquidity may reflect underutilized assets or inefficiencies, as argued by Jose et al. (1996). This notation of poor or mismanagement of liquidity is supported by prior studies, notably in the work of Nguyen and

Mohanlingam (2018) and Mohsen et al., as neither found support for the current ratio in their results on ROE, which further feeds the thought that while critically for the daily operations of a firm, liquidity management or current ratio will not always yield direct influence on equity performance or profitability, especially in situations where firms placing more emphasis on strategic capital reinvestment and/or reserves to sustain operational liquidity, over maintaining high liquidity settlements.

Similarly, the average payment period (APP) has a coefficient of +0.0557 (p-value = 0.1554), meaning it does not have a significant effect on ROE. Therefore, Hypothesis H_2, which assumed that there was a strong relationship between APP and ROE, will not be supported. This finding is consistent with recent empirical evidence. For instance, a 2019 study published in *Information Management and Business Review* by T and Roseline (2019) found that APP exerted no significant effect on return on capital employed among listed manufacturing firms. Likewise, a publication in the *European Journal of Business and Management* by Danga (2024) reported conflicting outcomes across sectors, with some showing insignificant or even negative relationships between APP and firm profitability. A study of Hossain (2020) also observed that while shortening the APP may improve profitability in theory, the relationship is not always statistically significant across industries. Additionally, an earlier IDEAS/RePEc (Malik, 2014) study found APP to have an insignificant link with return on assets, despite some association with gross profit margins.

These findings indicate that delaying payments to suppliers does not reliably enhance profitability, particularly in technology sectors where supplier relationships and innovation cycles are critical. Lazaridis and Tryfonidis (2006) similarly caution that excessive payment delays can erode supplier goodwill and weaken operating performance. Consequently, the effect of APP on profitability and ROE is likely indirect or dependent on factors such as industry norms, firm strategy, and market conditions.

Table 4. The Summary of Hypothesis Testing Results of Fixed Effects Model for ROE

Hypothesis	**Statement**	**Support**
H_1	There is a significant relationship between cash conversion cycle (CCC) and firm performance (ROE).	Rejected
H_2	There is a significant relationship between average payment period (APP) and firm performance (ROE).	Rejected
H_3	There is a significant relationship between current ratio (CR) and firm performance (ROE).	Rejected
H_4	There is a significant relationship between leverage (LEV) and firm performance (ROE).	Supported

In conclusion, the fixed effects model indicates that of the four independent variables that have included in the analysis that only leverage had a significant impact on return on equity. The R-squared statistic of 0.9690 indicates that approximately 96.9% of the variation of ROE is captured by my model indicating a strong explanatory power. The insignificance of CCC, CR, and APP suggests that the working capital management components may not directly influence equity-based profitability in this sample, whereas capital structure decisions play a more critical role in enhancing firm performance.

Fixed Effects Model for ROA (Supporting Model)

Table 5. The Summary of the Result of Fixed Effects Model for Return on Asset (Supporting Model)

Variable	Coefficient	p-value	Significant
CCC	-0.004915	0.7173	insignificant
CR	-0.002945	0.9967	insignificant
APP	0.023247	0.1329	insignificant
LEV	1.093500	0.0006	significant
C	5.702209	0.1812	
*Significant level = 5% Additional model statistics: • Observation = 60 • F-statistics (p-value) = 0.000000 • R-squared = 0.759012			

In the fixed effects model for ROA, only leverage (LEV) is statistically significant at the 5% level, while other working capital management variable such as cash conversion cycle (CCC), current ratio (CR), and average payment period (APP) are not significant. The coefficient for LEV is +1.0935, with a p-value of 0.0006, indicating a strong positive association between financial leverage and return on assets. This finding supports Hypothesis H_8, which posits that leverage is significantly correlated with firm performance. This finding is consistent with capital structure theory that posits that a moderate amount of debt can improve firm performance, by deriving tax benefits and forcing financial discipline. Recent empirical studies further reinforce this result. UNIMAS Review of Accounting and Finance (2024) reported a significant positive relationship between financial leverage and ROA especially within the Malaysian context. Arhinful and Radmehr (2023) also found that both, the interest coverage ratio and equity multiplier (both are measures of leverage) positively impacted ROA and ROE which also suggests that companies competent in debt utilization will improve their performance valuation metrics. As such based on the results of this study suggests that companies that effectively manage their debt structure will gain returns on its assets. Moreover, although Primadonna Ratna Mutumanikam and Dessy Adelin (2024) observed a negative relationship between the debt-to-equity ratio and ROA in certain industries, they emphasize that the effect of leverage on performance is highly context-dependent. This nuance reinforces the relevance of the current study's results, particularly within the technology sector, where strategic use of leverage may be more beneficial due to innovation-driven growth models and scalable asset-light structures.

In contrast, CCC has a coefficient of –0.0049 and a p-value of 0.7173, demonstrating no statistically significant impact on ROA. As a result, Hypothesis H_5, which proposed a significant relationship between CCC and firm performance, is rejected. The insignificance here may reflect the sectoral nature of the sample, where cash flow timing is less critical due to technology-driven operational flexibility. This finding is consistent with John (2023), who concluded that CCC does not significantly affect profitability measures such as ROA. Additionally, Doğan and Kevser (2020) showed that CCC may be contributing, but only explains approximately 10% of the variance of ROA which suggests that it is not a strong predictor of firm performance. Likewise, Nguyen and Mohanlingam (2018) also found a negative association between CCC and ROA but acknowledged that the effect size was small, and not statistically significant in all of the model specifications.

The current ratio (CR) also has a statistically insignificant, with a coefficient of –0.0029 (p-value = 0.9967). and consequently, Hypotheses H_7 regarding a significant relationship

between liquidity and firm performance will not be supported. This suggests that holding high amounts of current assets will not guarantee higher asset returns, possibly due to inefficiency in the use of short-term resources, or simply hoarding cash. There is some evidence apparant in Doğan and Kevser (2020) and Nguyen and Mohanlingam (2018) that CR is not a significant predictor of ROA, particularly when controlling for other idiosyncratic factors specific to the firm.

Similarly, the average payment period (APP) maintains a coefficient of +0.0232 with a p-value of 0.1329, which is exceeds the 5% threshold. This indicates an insignificant effect on ROA and leads to the rejection of Hypothesis H_6. This result may imply that delaying payments to suppliers does not strongly influence firm asset returns and could even reflect a neutral strategy in managing payables in stable environments. This aligns with the findings by Nguyen and Mohanlingam (2018) wherein APP was found not to present a significant relation to ROA in most of the model specifications available. Doğan and Kevser (2020) have shown that there is a relatively weak positive association of APP to profitability, however, again, it is not consistently significant across the various models thereby indicating that APP is likely not a decisive factor of firm performance.

Table 9. The Summary of Hypothesis Testing Results of Fixed Effects Model for Return on Asset

Hypothesis	**Statement**	**Support**
H_5	There is a significant relationship between cash conversion cycle (CCC) and firm performance (ROA).	No supported
H_6	There is a significant relationship between average payment period (APP) and firm performance (ROA).	No supported
H_7	There is a significant relationship between current ratio (CR) and firm performance (ROA).	No supported
H_8	There is a significant relationship between leverage (LEV) and firm performance (ROA).	Supported

Overall, the fixed effects model shows that among the selected variables, only leverage has a meaningful and statistically significant effect on return on assets. The R-squared value of 0.7590 indicates that approximately 75.9% of the variation in ROA is explained by the model. Despite the high explanatory power, the insignificance of CCC, CR, and APP implies that working capital management practices do not significantly drive asset-based profitability in this sample, whereas leverage continues to play a decisive role.

Robustness Tests

To strengthen the reliability of the study's findings and address potential endogeneity and dynamic panel bias, the Difference Generalized Method of Moments (GMM) estimator was applied to the return on equity (ROE) model. This technique serves as a robustness check to complement the fixed effects model (FEM). Prior research (Boubaker et al., 2020; Naveed et al., 2020; Boubaker, Dang et al., 2022) advocates the use of dynamic panel methods and instrumental variable approaches like GMM when working with financial panel data, especially in the presence of possible simultaneity, omitted variable bias, or when past firm performance may influence current outcomes.

GMM for ROE

Table 60. The Summary of the Result of GMM for Return on Equity

Variable	Coefficient	p-value	Significant
CCC	-0.071001	0.0044	significant
CR	3.997221	0.0015	significant
APP	0.023757	0.3963	insignificant
LEV	14.89760	0.0000	significant

*Significant level = 5%
Additional model statistics:

- Sample = 60
- J-statistic = 0.118401
- Prob(J-statistic) = 0.730776
- R-squared = 0.931819

To ensure the robustness of the findings, a GMM estimation was conducted for ROE to address potential endogeneity and dynamic panel bias. Unlike the fixed effects model (FEM), which identified only leverage (LEV) as a significant predictor, the GMM results reveal that three working capital management variables such as cash conversion cycle (CCC), current ratio (CR), and leverage (LEV) are statistically significant at the 5% level, while average payment period (APP) remains insignificant. This divergence is expected and meaningful. FEM is based on strict exogeneity which means it can only explore contemporaneous effects, while GMM provides deeper dynamic relationships and corrects for reverse causality or autocorrelated errors, allowing for a more comprehensive understanding of how working capital strategies affect firm performance over time.

The coefficient for CCC is –0.0710 (p = 0.0044), which indicates a significant and negative relationship with return on equity. This supports Hypothesis H_1, since it indicates that shorter cash conversion cycles are associated with greater ROE, which accords with Deloof (2003), who indicated that firms accomplish improved profits when they can turn over inventory, and collect receivables more effectively. Similarly, Yazdanfar and Öhman (2014) found that a shorter CCC significantly enhances profitability, emphasizing that firms benefit from improved cash flow efficiency. Supporting this, Oseifuah (2016) report highlighted that a reduced CCC reflects stronger cash management practices, leading to improved firm value.

Similarly. the current ratio (CR) also exhibits a statistically significant and positive effect on ROE, with a coefficient of +3.9972 (p = 0.0015). This finding supports Hypothesis H_3 and implies that firms with stronger liquidity positions tend to achieve higher shareholder returns. This is consistent with Eljelly (2004), who found that adequate liquidity facilitates better cash flow management and reduces financial distress costs. Lazaridis and Tryfonidis (2006) further supported this view, suggesting that maintaining optimal levels of working capital components, including liquidity, contributes to better performance.

The coefficient for leverage (LEV) remains strongly positive and significant at the 1% level (coefficient = +14.8976, p = 0.0000), further reinforcing Hypothesis H_4. The result reflects the benefit of financial leverage in amplifying equity returns when managed effectively. Deloof (2003) also acknowledged the role of leverage in firm profitability, noting that more profitable firms tend to manage payables more effectively. The Oseifuah (2016) findings support this by emphasizing that leveraging accounts payable as part of working capital management can increase shareholder value when aligned with a firm's overall strategy.

On the other hand, the average payment period (APP) is found to be statistically insignificant (p = 0.3963), leading to the rejection of Hypothesis H_2 under the GMM model. This implies that delaying payments to suppliers does not have a material effect on ROE,

possibly reflecting a neutral or firm-specific approach to payables management. This finding aligns with the Yazdanfar and Öhman (2014) emphasized that the correlation coefficients for such working capital components tend to be small, indicating limited explanatory power. This further supports the interpretation that APP may not significantly influence firm performance in all contexts or sectors.

The Hansen J-statistic reported in the GMM estimation supports its validity as it tests for overidentifying restrictions. The J-statistic is 0.1184 with a p-value of 0.7308 and well above the 5% significance level. This indicates that the instruments used in the model are valid and the GMM estimates are reliable.

The variation between FEM and GMM findings is not contradictory but rather complementary. While FEM provides insights under the assumption of exogenous regressors, while GMM addresses deeper structural concerns such as endogeneity, simultaneity, and dynamic effects by using lagged variables as instruments (Ullah et al., 2018; Tillburg Science ub,2023). GMM is particularly well-suited for situations where regressors may be endogenous or where lagged effects are theoretically relevant, as it utilizes internal instruments (lagged variables) to obtain consistent estimates.

The significance of CCC and CR in the GMM model but not in FEM suggests that their impact on firm performance may operate with lagged or feedback effects that FEM fails to capture. This deviation shows the potential for the existence of endogeneity or dynamic adjustment in working capital and profitability, meaning that GMM shows working capital efficiency, and particularly the effect of the CCC and liquidity management has a higher degree of impact on better performance of firms when dynamic financial behavior and potential reverse causality is considered.

It is important to note this difference in findings is not unusual. GMM is expected to be more sensitive to firm-specific and time-varying unobserved factors, and to provide a greater chance of revealing relationships that may be concealed in models that assume strict exogeneity. Thus, in addition to consistency across approaches, the robustness tests that employed GMM to strengthens the study's overall conclusion by demonstrating that the main results are not an artifact of model choice but rather reflect underlying economic dynamics.

In conclusion, the analyses conducted with FEM and GMM of firm performance offer an improved understanding of the determinants of firm performance. FEM is appropriate when regressors are strictly exogenous and the focus is on contemporaneous effects, whereas GMM is required to explore endogeneity and capturing dynamic effects. The consistency or divergence across the two methodologies demonstrates lessons to be learned and highlights the importance of using robust estimation methods in panel data analysis to accurately capture the true dynamics between working capital policies and profitability.

Table 71. The Summary of Hypothesis Testing Results of GMM for Return on Equity

Hypothesis	**Statement**	**Support**
H_1	There is a significant relationship between cash conversion cycle (CCC) and firm performance (ROE).	Support
H_2	There is a significant relationship between average payment period (APP) and firm performance (ROE).	Support
H_3	There is a significant relationship between current ratio (CR) and firm performance (ROE).	Rejected
H_4	There is a significant relationship between leverage (LEV) and firm performance (ROE).	Supported

To sum up the discussion, this study primarily focused on Return on Equity (ROE) as the main performance measure, with Return on Assets (ROA) serving as a supporting or

additional analysis to validate and complement the main findings. Notably, variables such as the cash conversion cycle (CCC), average payment period (APP), and leverage (LEV) displayed non-normal distributions and high dispersion, supporting the need for robust panel data techniques. Model specification and diagnostic tests including the Chow test, Breusch-Pagan LM test, and Hausman test confirmed that the Fixed Effects Model (FEM) as the most suitable model for both ROE and ROA. Based on these results, FEM was adopted as the core estimation technique. Meanwhile, Difference Panel Data Models (DPDM) were excluded from further analysis due to statistical invalidity and poor performance in preliminary diagnostic checks.

The FEM regression for ROE (main model) revealed that leverage (LEV) is the only variable with a statistically significant and positive effect on firm performance. CCC, CR, and APP were found to be statistically insignificant. This suggests that capital structure decisions are more influential for equity-based returns than traditional working capital metrics in this sector, echoing findings from prior Malaysian studies that highlight the nuanced or sector-dependent effects of WCM on profitability (Siew & Ali, 2020; Hameer et al., 2021; Wong et al., 2019). Similar patterns were observed in the ROA model (supporting analysis)**,** where LEV remained the only significant predictor, further reinforcing the robustness of this result.

To strengthen the validity of the findings, a Generalized Method of Moments (GMM) estimation was employed as a robustness test for ROE. The GMM results identified CCC, CR, and LEV as significant predictors of ROE when dynamic effects and potential endogeneity are considered, while APP remained insignificant. The Hansen J-statistic confirmed the validity of the instruments and reliability of the GMM estimates. The divergence between FEM and GMM findings is consistent with the literature, as GMM models are better equipped to capture dynamic and endogenous relationships that static models may overlook.

CONCLUSION

This study examined the relationship between working capital management (WCM) and firm performance from 2019 to 2023 among Malaysian technology firms in the FTSE Bursa Malaysia Top 100 Index. Four WCM indicators which were Cash Conversion Cycle (CCC), Average Payment Period (APP), Current Ratio (CR), and Leverage (LEV), were analysed in relation to firm performance, primarily measured by Return on Equity (ROE) and supplemented by Return on Assets (ROA).

Using the Fixed Effects Model (FEM), results showed that only LEV had a consistent, statistically significant positive effect on both ROE and ROA, supporting the Trade-Off Theory. CCC, APP, and CR were not significant under FEM, suggesting that traditional WCM indicators may not directly affect performance in Malaysia's technology sector.

To address endogeneity, the Generalised Method of Moments (GMM) was applied for ROE. GMM confirmed LEV's significance and additionally showed that CCC and CR influence performance when dynamic factors are considered, indicating that efficient cash flow and liquidity management enhance shareholder returns. Overall, leverage is the dominant factor, while WCM effects emerge under advanced modelling.

This study has several practical and theoretical implications. For managers, the results highlight that financial leverage is a key driver of firm performance in Malaysian technology firms, emphasising the need to optimise debt levels while maintaining financial stability. Although traditional working capital indicators such as CCC and CR were not significant in static models, the GMM results show that efficient cash flow and liquidity management can enhance performance when dynamic and endogeneity factors are considered. This underscores the importance of actively managing current assets and liabilities to improve operational efficiency and financial flexibility.

For investors and stakeholders, leverage and WCM indicators can serve as signals of firm value and financial health, helping identify firms likely to deliver sustainable returns. Policymakers may also benefit by promoting transparent reporting of short-term financial practices, which influence firm performance and sector competitiveness.

Theoretically, the study extends the Trade-Off and pecking order frameworks to short-term financial policies, demonstrating that working capital decisions interact with capital structure to affect performance. It also highlights that static models may underestimate WCM effects, supporting the use of dynamic approaches like GMM in corporate finance research.

The study is limited by its small sample (12 firms), short time horizon (2019–2023), and reliance on publicly available financial data, which may exclude qualitative managerial factors. Future research could expand the sample, include other sectors, extend the study period, integrate qualitative insights, and compare findings across emerging and developed markets to enhance generalizability and refine theoretical frameworks.

Overall, the findings emphasise that financial leverage is a dominant determinant of performance, while efficient working capital management further enhances shareholder returns when properly modelled, offering both practical guidance and theoretical insight for firms in Malaysia's technology sector.

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