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Working capital management and firm performance: A comparative analysis of developed and emerging economies

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ABSTRACT

The literature on working capital management (WCM) provides mixed evidence on the effect of working capital on firm profitability and performance. We use firms from developed and emerging economies to explore how working capital and its components relate to firms' performance while controlling for firm-specific and macroeconomic factors. The findings show that the cash conversion cycle (CCC) is inversely related to firm performance in developed and emerging economies—however, there are differences in the CCC's components. While firms in developed economies exhibit higher firm performance with longer days' inventory on hand, firms in emerging economies have lower firm performance with longer days' inventory on hand, extended collection periods, and longer payable periods. Company-specific factors, such as firm size, growth, profitability, and leverage, influence the efficiency of WCM. We also find that country-specific variables such as gross domestic product (GDP), interest rate, and inflation have varying impacts on a firm's WCM.

1. Introduction

Working capital management is a critical aspect of financial management that is pivotal in determining a firm's overall performance and sustainability. It entails managing payables and receivables and reducing inventory. The working capital cycle encompasses the conversion of raw materials into finished goods, the sale of goods, and the subsequent collection of receivables, known as the cash conversion cycle. Effectively managing this cycle is essential for maintaining liquidity, supporting day-to-day operations, and ultimately influencing a firm's financial health. A company's liquidity management is becoming increasingly complex with the rise of digital transformation, ever-changing market conditions, globalization, and geopolitical uncertainty.

The literature on WCM holds two opposing views about the impact of working capital investment on firm profitability. One view advocates that an extended cash conversion period and a relaxed receivable collection period increase sales and firm performance (i.e., Deloof, 2003; Sharma and Kumar, 2010; Charitou et al., 2012). Another view documents a negative association between higher working capital and profitability because additional working capital requires more financing, which increases financing and opportunity costs (i.e., Alipour, 2011; Ren et al., 2019; Kayani et al., 2019a; Banerjee and Deb, 2023; Kamlesh et al., 2023). So, having excessive working capital may drag a firm's financial performance because of the high cost of carrying working capital.

This paper investigates the impact of WCM on corporate performance, comparatively analyzing a sample of developed and emerging economies. Most previous empirical works on this subject manifest mixed results, with each working capital component showing varying influence over a firm's performance (i.e., Jose et al., 1996; Deloof, 2003; Lefebvre and Hamelin, 2022; Garg and Meentu, 2022; Charitou et al., 2012). The mixed results are partially because most previous studies are country-specific or industry-specific and use various measurements and models. The presence of mixed empirical findings provides an opportunity for exploring a comparative analysis of developed versus emerging economies concerning the impact of working capital management on firm performance. A comparative study of developed versus emerging economies on WCM can provide significant insight into these economies' financial dynamics. First, emerging economies have more advanced financial systems, established financial infrastructure, and efficient financial markets. Emerging economies may have relatively inefficient markets, less developed infrastructure, and less strict

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disclosure requirements. A comparative study can highlight the effectiveness of WCM in developed economies and reveal areas in which emerging economies can improve the efficiency of their WCM.

Second, access to financial markets is essential in WCM. Developed economies have better access to capital compared to emerging economies. A comparative study may show how differences in the ability to access capital markets can influence working capital decisions and impact firm value. Third, a comparative analysis can analyze macroeconomic variables such as inflation, interest rates, and GDP growth, providing insights into how these factors affect WCM decisions in developed and emerging economies. Finally, these economies' cultural and behavioral characteristics are likely to differ and can influence working capital management practices differently. For example, business practices, payment habits, risk aversion, and business relationships may cause different working capital management practices and, hence, may impact firm value differently. In sum, a cross-country analysis involving developed and emerging economies remains relatively unexplored, providing an opportunity to investigate the issue further. Along with each component of the cash conversion cycle, we also incorporate firm-specific factors (firm size, growth, and financial leverage) and macroeconomic variables (inflation, GDP growth rate, and interest rates) to explain the variability among the sample countries.

Our research contributes to the existing literature in the following ways. First, we compare the impact of working capital management on firms' performance, using firms in six developed economies (Australia, France, Germany, Canada, Japan, the United States, and the United Kingdom) and five emerging economies (Bangladesh, India, Pakistan, Russia, and Turkiye). Second, besides working capital management variables, our study examines the impact of firm-specific variables, including size, growth, and leverage, on firms' performance. Third, we argue that the macroeconomic environment may impact firms' performance and working capital decisions. Hence, our analysis includes country-specific macroeconomic variables, including interest rates, GDP, and inflation.

Our findings show statistically significant differences between developed and emerging economies concerning working capital and firm-specific and country-specific variables. For example, the CCC is significantly higher for emerging economies than developed ones. Similarly, Days Sales Outstanding (DSO) and Days Sales in Inventory (DSI) are considerably higher for emerging economies, while there is no statistically significant difference in Days Payable Outstanding (DPO). In our further analysis, we find CCC is inversely related to the firms' performance in both emerging and developed economies. For working capital variables, we report that only DSI is directly related to firm performance in developed economies. For emerging economies, we find that all the components of the cash conversion cycle (DSO, DSI, and DPO) are inversely related to the firm performance.

We organize the rest of the research as follows. Section 2 provides a review of the related literature. In Section 3, we describe the data and method. Section 4 presents the empirical results, and the last section summarizes and concludes the paper.

2. Literature review

Managing a company's working capital helps to maximize a firm's financial performance. This theory has been substantiated in various empirical pieces of research through evidence, finding the influence of different components of working capital on profitability in varying degrees. A substantial body of empirical research can be found on the impact of working capital management on corporate performance across the globe, highlighting the varying significance of different working capital components. A summary of the empirical literature on the impact of working capital management on firm performance is reported in Table 1. We start our literature review with the developed economies and then continue with the evidence from emerging economies.

Table 1
Selected empirical studies.

Panel A: Developed economies

Authors	Country	Period	Sample	Findings
Jose et al. (1996)	U·S.	1974–1993	2718	Lower CCC →higher firm value
Shin and Soenen (1998)	U·S.	1975–1994	58,985	↓WC→higher profitability and ↓CCC→higher stock returns
Mun and Jang (2015)	U·S.	1963–2012	5812	↓CCC→higher ROA
Kayani et al. (2019a)	U·S.	2007–2016	3730	WCM with good governance →higher ROA and ROE
Banerjee and Deb (2023)	U·S.	1988–2018	12,637	Efficient WCM→ higher managerial ability →higher performance
Baños-Caballerbo et al. (2014)	U·K.	2001–2007	258	Inverted U-shaped relationship between WC and Tobin's Q
Afrifa et al. (2014)	U·K.	2007–2014	141	A concave relationship between WC and Tobin's Q
Tsuruta (2019)	JAP	2008	53,333	↓WC→ ROA↑ during the global financial crisis
Madhou et al. (2015)	AUS	2003–2008	1751	AR (+), AP (−), Size (+), DR (−) influence ROA and Net Profit
Kayani et al. (2019b)	AUS, NZ	2008		CCC↓ and DSI↓ → higher performance
Deloof (2003)	BEL	1992–1996	1009	DSO↓ DSI↓ and DPO↓ → higher operating income
Lefebvre and Hamelin (2022)	GER, FRA, ITA	2010–2017	53,286	Group affiliations facilitates financing for small firms
Enqvist et al. (2014)	FIN	1990–2008	1136	Efficient CCC is needed during an economic downturn.

Panel B: Emerging economies

Authors	Country	Period	Sample	Findings
Ren et al. (2019)	CHI	2010–2017	8201	CCC↓ → higher ROA while controlling market factors
Lin and Wang (2021)	CHI	2008–2019	3447	CCC↓ → higher firm performance
Garg and Meentu (2022)	IND	2011–2020	122	CCC↓ and DSI↓ → higher performance
Kamlesh et al. (2023)	IND	2012–2021	700	CCC↓ → higher market value while controlling cash holdings
Charitou et al. (2012)	INDO	1998–2010	56	CCC↑ and DSI↑ → higher performance
Itan and Angellina (2023)	INDO	2017–2021	114	WC has a partial mediating role in firm performance
Alarussi & Alhaderi (2018)	MAL	2012–2014	120	WC↓ → higher performance
Abdullah and Iqbal (2022)	PAK	2014–2019	150	↑ Family ownership → lower firm performance and liquidity
Jaworski and Czerwonka (2022)	POL	1998–2016	326	CCC↓ → higher profitability influenced by GDP growth
Phassawan (2023)	THA	2010–2020	5187	No direct relationship between WC and sustainable growth
Çakir and Küçükkaplan (2012)	TUR	2000–2009	122	No significant relationship between WC and ROE or mkt value

(*continued on next page*)

Table 1 (*continued*)

Panel B: Emerging economies				
Authors	Country	Period	Sample	Findings
Abdioglu (2016)	TUR	2005–2014	1110	WC↑ → lower firm performance
Hung and Dinh (2022)	VIET	2010–2020	405	WC measures↓ → higher profitability after a debt threshold

2.1. Empirical studies from developed economies

Several studies provide evidence of the impact of working capital management on firm performance in developed economies. Smith (1980) finds an inverse relationship between liquidity and profitability, supported by many subsequent research papers. In various studies, the cash conversion cycle appears to be the most befitting measurement of working capital management. CCC depicts a firm's overall management of receivables, inventories, and payment policy. For example, in earlier U.S. studies, Jose et al. (1996) used 2718 firms and found that aggressive working capital policies (lower CCC) enhance profitability. Similarly, using a large sample of U.S. firms between 1975 and 1994, Shin and Soenen (1998) use CCC as a proxy to investigate the connection between working capital management and firms' profitability. Consistent with the previous research, they identify a negative relationship between CCC and profitability and stock return.

Deloof (2003) explores the subject further, working with a sample of 1009 large Belgian non-financial firms from 1992 to 1996. The author suggests reducing the accounts receivable and inventory turnover period would maximize shareholder value. García-Teruel and Martínez-Solano (2007) and Afrifaet al. (2014) analyze the relationship between WCM and the profitability of SMEs. They report a concave relationship, supporting an optimal level of working capital where such a relationship increases profitability.

In a more recent study on U.S. firms, Kieschnicket, LaPlante, & Moussawi, 2013 investigate the impact of net operating working capital management on firm value by examining net working capital investment. They explore the factors that influence incremental investment on net working capital. The findings show that the value of additional dollar investment is impacted by expected sales, access to external capital, bankruptcy risk, and the firm's use of debts.

Some of the most recent works on developed economies expand on the relationship between WCM and firms' performance by incorporating other firm-specific factors. For example, Hahn et al. (2016) denote a high correlation between growing ROE and efficient working capital management using a sample of 405 U.S. firms. Using U.S.-listed firms, Kayani et al. (2019a) raise the importance of Corporate Governance and working capital management to maximize firms' performance. The authors conclude that when WCM can be a good short-term performance indicator, the corporate policy should be along with WCM for the long-term performance evaluation.

Boisjoly et al. (2020) note that although large firms continuously improve working capital management practices over a long period, resulting in a change in the probability distribution of standard working capital measures, this improvement may vary from industry to industry. More recently, Banerjee and Deb (2023) examined how managerial ability influences working capital management and firm performance. Using 12,637 U.S. firms between 1988 and 2018, the authors find a negative relationship between managerial ability and WCM efficiency, showing that managers with higher ability drive better working capital efficiency and, hence, higher firm performance.

Among the studies on European firms, Enqvist et al. (2014) demonstrate the significance of working capital management policies for Finnish companies during an economic downturn. In a related study, Baños-Caballero et al. (2014) found an inverted U-shaped relationship between working capital investment and firm performance for a sample of non-financial firms in the U.K. This supports the optimal level of working capital that improves the firm's value. Madhou et al. (2015) further examine the relationship between WCM, profitability, and firms' characteristics using economic value added as a proxy for corporate profitability and find a significant influence of accounts receivable and accounts payable along with firm size and growth on corporate profitability. Tsuruta (2019) and Kayani et al. (2019b) report an inverse relationship between WC and firm performance. Tsuruta (2019) notes that this inverse relationship intensified during the global financial crisis but trailed away over a long period. Lefebvre and Hamelin (2022), using a large sample of privately held firms in Germany, France, and Italy, report that business groups play an essential role in the WCM of small firms as business groups relax financing constraints for their affiliates. Another recent study by Jaworski and Czerwonka (2022) examines the impact of working capital management on firm profitability in Poland and reports a negative relationship between CCC and profitability. Industry and GDP growth also influence the results.

2.2. Empirical studies from emerging economies

A good number of scholarly works on the strategic role of working capital management have come from emerging economies such as—China, India, Turkiye, Indonesia, Malaysia, Pakistan, Vietnam, and Eastern European countries. For Instance, the negative association between WCM and profitability is substantiated further by Akbulut (2011), Coşkun and Kök (2011), Abdioglu (2016), and Yilmaz-Turkmen and Soylemez (2019) for Turkish firms. Çakir and Küçükkaplan (2012) find no significant influence of WCM on firms' profitability. He et al. (2017), Laghari and Chengang (2019), Ren et al. (2019), and Lin and Wang (2021) report a negative association between WCM and firm performance among Chinese firms. He et al. (2017) posit that a market reformation reduced the working capital investment, leading to improved market performance. Ren et al. (2019) demonstrate that ownership structure and legal system remarkably influence the inverse relation between CCC and corporate profitability.

Multiple studies focus on WCM and firm performance in the Indian market. Arunkumar and Ramanan (2011), Singhania et al. (2014), and Kaushik and Chauhan (2019) suggest that a shorter CCC improves the profitability of a company. Their findings acknowledge that decreasing the number of days of receivables and increasing the number of days payable to a firm can benefit the companies. More recently, Garg and Meentu (2022) reported a significant negative relationship between the components of WCM and profitability for 122 firms listed on the Bombay Stock Exchange. Kamlesh et al. (2023) explore the effect of WCM on the market value of 700 Indian firms during the 2012–2021 period. The findings show that a shorter net working capital cycle creates higher market value. Moreover, the authors report that cash holdings interact with the relationship between WCM and the firm's market value.

Among the studies on Malaysian firms, Siew and Ali (2020) find no solid proof of the relationship between WCM and profitability. In contrast, Haron and Nomran (2016), using panel regression of 57 Malaysian listed firms, report a stable negative relationship between WCM and corporate profitability before, during, and after the financial crisis of 2007–2008. Another actively investigated market in Asia is Pakistan. Nazir and Afza (2009) prove that conservative working capital management policies maximize firm value. Muhammad et al. (2012), focusing on firms in the textile industry, conclude that increasing cash, inventory, and credit sales also increase profit. Abdullah and Iqbal (2022) include the role of family ownership in investigating the impact of working capital management on firm profitability using a group of firms from the Pakistan Stock Exchange and find that family ownership has a negative association between WCM and firm profitability and liquidity. Le (2019), using a panel data set of 497 Vietnamese firms from 2007 to 2016, documents an optimal level of net working capital for these firms. The study further suggests that working capital management is vital for firms with less access to capital and trying to expand

their investment during an economic recovery.

In a similar study of the Vietnamese market, Hung and Dinh, 2022 report that WCM variables negatively impact the firm profitability. After a threshold level of leverage, the impact is more pronounced. For Indonesian firms, Setianto and Pratiwi (2019) reveal the optimal level of working capital. In a follow-up study, Nastiti et al. (2019) add that when WCM does not directly influence sustainable growth, it has an indirect influence. More recently, Itan and Angellina (2023) report that WCM partially mediates the relationship between independent commissioners and firm performance. Phassawan (2023) examines WCM and sustainable growth while considering profitability as a mediator for a sample of Thai firms. Findings show no significant relationship between NWC and sustainable growth, and profitability is a mediating factor.

In sum, the empirical studies of working capital management on firm performance report mixed results for developed and emerging economies simply because of the various measurements and models employed. This provides an opportunity for exploring a comparative study of developed versus emerging economies concerning the impact of working capital management on firm performance.

3. Data and methodology

3.1. Data and sample

Table 2 reports the sample distribution by year and country. The sample appears to be dispersed for emerging and developed economies across the years. Panel B of Table 2 also reports the sample distribution across countries. The sample for developed economies comprises 1525 firms across six countries–Australia, Canada, Germany, France, the United Kingdom, and the United States – between 2010 and 2020. Within the developed economies, 28.0 percent of firms are U.S. firms, followed by 20.5 percent of U.K. firms. Australia, France, and Canada are next, with 17.1 percent, 16.7 percent, and 15.0 percent of the sample. The sample for the emerging economies includes 1811 firms from five countries—Bangladesh, India, Pakistan, Russia, and Turkiye.

Table 2
Sample distribution.

Panel A: Distribution by years

Year	Developed economies		Emerging economies		Total	
	# of Obs	Percent	# of Obs	Percent	# of Obs	Percent
2010	1525	45.32	1840	54.68	3365	9.16
2011	1525	45.27	1844	54.73	3369	9.17
2012	1525	45.31	1841	54.69	3366	9.17
2013	1525	45.29	1842	54.71	3367	9.17
2014	1525	45.43	1832	54.57	3357	9.14
2015	1525	45.77	1807	54.23	3332	9.07
2016	1525	45.71	1811	54.29	3336	9.08
2017	1525	45.85	1801	54.15	3326	9.06
2018	1525	45.75	1808	54.25	3333	9.08
2019	1525	46.03	1788	53.97	3313	9.02
2020	1525	46.78	1735	53.22	3260	8.88
Total	16,775	45.68	19,949	54.32	36,724	100.00

Panel B: Distribution of firms by countries

Countries	Developed economies		Countries	Emerging economies	
	# of Firms	Percent of Total		# of Firms	Percent of Total
U·K.	427	28.0	Russia	100	5.5
USA	313	20.5	India	1337	73.8
Canada	229	15.0	Pakistan	169	9.3
Germany	42	2.7	Bangladesh	31	1.7
France	254	16.7	Turkiye	174	9.7
Australia	260	17.1			
Total	1525	100.0		1811	100.00

Notes: Data is obtained from FactSet.

Among these countries, Indian firms are first in the sample, followed by firms in Turkiye, Pakistan, Russia, and Bangladesh. The classification of countries is based on various economic, social, and institutional factors. Our rationale for including the United States, the United Kingdom, France, Germany, Canada, and Australia in our sample comprises: First, these countries consistently exhibit different business cycles, having well-established industrial sectors and advanced technology; the economies of these countries are mature and stable, with diversified economic structures. These selected six developed economies are among the top seven developed economies globally. The selection of emerging economies of Bangladesh, India, Pakistan, Russia, and Turkiye is arbitrary and reflects the choice of authors to match the sample size with the developed market's sample. Compared to developed economies, these markets have characteristics at the opposite end of the spectrum. The selection of the study period of 2010–2020 was motivated by providing more recent evidence on the issue following the global financial crises.

3.2. Methodology

We use a panel data regression analysis to investigate WCM's impact. Return on Assets (ROA) is the dependent variable using the same control variables illustrated below for developed and emerging country samples. We use the panel regression model as it controls for the time-invariant unobserved firm features that may correlate with our model's explanatory variables. By pooling samples at different points in time, we can get more precise estimators and test statistics with more power. We also use a fixed-effect model with white cross-section standard errors and covariance to control for heteroscedasticity.

$$ROA_{it} = \beta_0 + \beta_1 CCC + \varepsilon \quad (1)$$

$$ROA_{it} = \beta_0 + \beta_1 DSI + \beta_2 DSO + \beta_3 DPO + \varepsilon \quad (2)$$

$$ROA_{it} = \beta_0 + \beta_1 DSI + \beta_2 DSO + \beta_3 DPO + \beta_4 SIZE + \beta_6 GRO + \beta_7 LEV + \varepsilon \quad (3)$$

$$ROA_{it} = \beta_0 + \beta_1 CCC + \beta_2 GRO + \beta_3 LEV + \beta_4 INTR + \beta_5 GDP + \beta_6 CPI + \varepsilon \quad (4)$$

$$ROA_{it} = \beta_0 + \beta_1 DSI + \beta_2 DSO + \beta_3 DPO + \beta_4 SIZE + \beta_5 GRO + \beta_6 LEV + \beta_7 INTR + \beta_8 GDP + \beta_9 CPI + \varepsilon \quad (5)$$

Where CCC = Cash conversion cycle; DSI = Days sales in inventory; DSO = Days sales outstanding; DPO = Days payables outstanding; SIZE = Company size measured as the natural logarithm of the total assets; GRO = Company's growth rate of sales relative to the previous year; LEV = Debt ratio; INTR = Interest rate measured as short-term interest rate; GDP = GDP growth rate relative to the prior year; and CPI = Inflation measured as the change in the consumer price index (CPI). Table 3 provides variable descriptions in the following categories: (1) firm profitability and performance, (2) WCM measures, (3) firm-specific variables, and (4) macroeconomic variables. The FactSet database is

Table 3
Variable descriptions.

Variables	Description	Expected sign
ROA	Return on Asset	
Fundamental Working Capital Management Variables:		
CCC	Cash Conversion Cycle	–
DSI	Days Sales in Inventory	–
DSO	Days Sales Outstanding	–
DPO	Days Payable Outstanding	+
Firm-Specific Variables:		
SIZE	Size of the firm measured as Ln of total asset	+
GRO	Growth of the firm measured as 1-year growth rate	+
LEV	Leverage measured as a percentage of long-term debt	+
Country-Specific Variables:		
INTR	Market Interest Rate	+
GDP	Gross Domestic Product	+
CPI	Consumer Price Index	–

the data source for profitability, WCM measures, and firm-specific and macroeconomic variables. The sample excludes firm-year observations with null and error values. The final firm-year observations for the developed market sample are 16,775, including 2,885 for Australia, 2,526 for Canada, 2,852 for France, 456 for Germany, 4,615 for the United Kingdom, and 3,440 for the United States. Similarly, the final firm-year observations for the emerging economies are 19,949, including 343 for Bangladesh, 14,710 for India, 1863 for Pakistan, 557 for Russia, and 1,921 for Turkiye.

We use ROA as a proxy performance measure because it isolates the impact of financing decisions and changes in tax law on profitability (i.e., Jose et al., 1996). The components of the CCC—DSO, DSI, and DPO—are used to test WCM's impact on corporate profitability (i.e., Jose et al., 1996; Gill et al., 2010; Christian and Raisa, 2017). Polarized views exist about WCM's effect on profitability. Some scholars view a longer CCC as pivotal to sales increase and protection against stockouts. Yet, others find a positive association between a lower CCC and profitability. This way, the manager can put unproductive assets to better use. This study examines how the CCC's different impact components affect firm performance.

Among firm-specific variables, the study uses firm size (measured by the natural logarithm of total assets), leverage (measured by debt ratio), and growth (measured by annual sales growth) as firm-specific control variables (Anton and Nucu, 2020). Macroeconomic variables like inflation, GDP growth, and interest rates may affect profitability.

The following section discusses the empirical findings about WCM's impact on firm profitability and performance. Efficient WCM is essential for enhancing firm performance and shareholder returns. Although excessive use of current assets may reduce a firm's profitability, a low level of existing assets may lead to lower liquidity and stockouts, resulting in difficulties in maintaining smooth operations. A standard measure of WC is the CCC, and various studies examine how the CCC relates to firm performance or profitability.

Table 4
Summary statistics.

Panel A: Summary statistics for developed economies						
Variables	N	Mean	Median	Std. Dev	Min	Max
ROA	16,775	2.3573	4.1074	13.233	−98.3176	168.01
CCC	16,775	76.973	66.728	76.268	−302.16	361.95
DSI	16,775	67.664	54.284	61.926	0.0035	348.98
DSO	16,775	66.762	59.233	45.198	0.0332	348.80
DPO	16,775	57.454	47.283	42.772	0.0000	349.24
SIZE	16,775	6.6858	6.6414	2.6707	−1.0690	13.680
GRO	16,775	0.1996	0.0460	5.7005	−1.0000	676.71
LEV	16,775	0.2894	0.2276	0.6573	−0.3300	44.449
INTR	16,775	0.0072	0.0038	0.0108	−0.0078	0.0469
GDP	16,775	0.0179	0.0250	0.0525	−0.1456	0.1738
CPI	16,775	1.7548	1.7323	0.9713	0.0000	4.4743
Panel B: Summary statistics for emerging economies						
Variables	N	Mean	Median	Std. Dev	Min	Max
ROA	19,949	4.622	3.870	9.392	−101.00	160.89
CCC	19,949	104.24	94.386	76.022	−106.05	357.13
DSI	19,949	82.352	71.488	57.065	1.000	345.89
DSO	19,949	79.837	67.554	56.490	1.000	350.168
DPO	19,949	57.936	49.164	42.800	1.000	354.060
SIZE	19,949	8.430	8.279	2.171	1.667	16.980
GRO	19,949	0.184	0.083	2.900	−0.980	323.172
LEV	19,949	0.159	0.092	0.195	0.000	5.500
INTR	19,949	0.073	0.074	0.020	0.016	0.128
GDP	19,949	0.048	0.055	0.040	−0.080	0.112
CPI	19,949	6.940	6.600	2.844	2.500	16.300

4. Empirical results

4.1. Descriptive statistics

Table 4 reports summary statistics of variables for both developed and emerging economies. Panel A provides the summary statistics for developed economies. Among working capital variables, the average CCC is 76.97 days, with a standard deviation of 76.23 days, the lowest of −302.16 days, and the highest of 361.95 days. The average DSI is 67.66 days, while the average DSO is 66.76 days. The average DPO is 57.45 days. Panel B reports the summary statistics for emerging economies. Among working capital variables, the average CCC is 104.24 days with a standard deviation of 76.02 days, the lowest of −106.05 days, and the highest of 357.13 days. The average DSI is 82.35 days, while the average DSO is 79.83 days. The average DPO is 57.94 days. The large standard deviation of different variables, especially inventory turnover in days, average receivable period, average payment period, and CCC, is because of the different WCM policies practiced in other countries. The developed country sample has an average growth rate of 19 percent with 28.9 percent leverage for firm-specific control variables. The average GDP growth rate for these developed economies is 1.79 percent. The short-term borrowing rate is 0.72 percent, and the average annual inflation rate is 1.75 percent during the study period.

Among the emerging country sample, the average growth rate is 18.4 percent, while the leverage is 15.9 percent. The average GDP growth rate for these emerging economies is 4.80 percent. The short-term borrowing rate is 7.30 percent, and the average annual inflation rate is 6.94 percent during the study period.

Table 5 reports the correlation matrix for both developed and emerging country samples. Panel A provides the correlation coefficients among the independent variables. The results do not exhibit a high correlation that could impede our interpretations. The only exception is the high correlation of 0.767 between DSI and CCC. We do not use the DSI and CCC variables in the same model, which does not influence our interpretations. Panel B reports the correlation matrix for the emerging country's sample. The results are similar to the previous panel's conclusions for developed economies.

4.2. Preliminary analysis

We use a parametric *t*-test to examine whether the variables are statistically different based on the dichotomization of developed and emerging economies. Table 6 shows the *t*-test results of the variables used in our analysis. The preliminary findings show that firms in emerging economies exhibit a higher ROA of 2.26 percent. We find statistically significant differences in working capital management variables. For example, the emerging economies' average cash conversion cycle is approximately 27 days longer. This may result from firms in developed economies using more advanced technologies in working capital management, including inventory management systems and better receivable tracking and collection policies.

Similarly, the firms in emerging economies hold inventories, on average, 14 days longer and collect their receivables 13 days later. The number of days firms pay their suppliers is the same. Concerning firm-specific factors, firms in emerging economies are significantly larger and have substantially lower leverage. We find no statistically significant difference in firms' growth rates. However, we find statistically significant differences concerning all country-specific factors. Firms in emerging economies face significantly higher economic growth, inflation, and interest rates.

4.3. Panel regression results

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

Table 5
Correlation matrix.

Panel A: Correlation matrix for developed economies

	ROA	CCC	DSI	DSO	DPO	SIZE	GRO	LEV	INTR	GDP	CPI
ROA	1										
CCC	−0.065**	1									
DSI	0.007	0.767**	1								
DSO	−0.293**	0.438**	0.071**	1							
DPO	−0.184**	−0.210**	0.156**	0.379**	1						
SIZE	0.294**	−0.143**	−0.045**	−0.238**	−0.061**	1					
GRO	−0.020**	−0.004	−0.001	−0.006	0.000	−0.027**	1				
LEV	−0.047**	−0.051**	−0.036**	−0.036**	0.001	0.130**	−0.006	1			
INTR	−0.060**	0.002	0.025**	−0.089**	−0.062**	−0.092**	0.028**	−0.034**	1		
GDP	0.067**	−0.042**	−0.008	−0.084**	−0.025**	0.055**	0.013	0.000	0.128**	1	
CPI	0.041**	−0.030**	0.001	−0.089**	−0.039**	−0.086**	0.030**	−0.030**	0.361**	0.440**	1

Panel B: Correlation matrix for emerging economies

	ROA	CCC	DSI	DSO	DPO	SIZE	GRO	LEV	INTR	GDP	CPI
ROA	1										
CCC	−0.054**	1									
DSI	−0.046**	0.688**	1								
DSO	−0.175**	0.548**	0.044**	1							
DPO	−0.196**	−0.135**	0.169**	0.405**	1						
SIZE	0.114**	−0.111**	−0.028**	−0.094**	0.035**	1					
GRO	0.019**	−0.018**	−0.012	−0.01	0.001	−0.014	1				
LEV	−0.260**	−0.099**	−0.025**	−0.030**	0.103**	0.244**	0.005	1			
INTR	0.01	−0.002	−0.004	−0.066**	−0.089**	0.034**	0.009	0.038**	1		
GDP	−0.013	0.019**	−0.013	0.012	−0.034**	−0.132**	0.015*	−0.034**	0.243**	1	
CPI	0.009	0.012	−0.013	0.019**	−0.013	−0.125**	0.014	0.043**	0.531**	−0.137**	1

Notes: **, * shows the statistical significance at 1 % and 5 %, respectively.

Table 6
Developed and emerging economies comparison.

Variables	Developed economies (N = 16,775)		Emerging economies (N = 19,949)					
	Mean	Median	Mean	Median	Mean Diff.	Median Diff.	*Sig*[a)].	*Sig*[b)].
ROA	2.357	4.107	4.622	3.870	−2.265***	0.238***	0	0.0001
CCC	76.97	66.73	104.2	94.39	−27.27***	−27.66***	0	0
DSI	67.66	54.28	82.35	71.49	−14.69***	−17.20***	0	0
DSO	66.76	59.23	79.84	67.55	−13.07***	−8.320***	0	0
DPO	57.45	47.28	57.94	49.16	−0.481	−1.880	0.283	0.678
SIZE	6.686	6.641	8.430	8.279	−1.745***	−1.638***	0	0
GRO	0.200	0.046	0.184	0.083	0.016	−0.037***	0.733	0
LEV	0.289	0.228	0.159	0.092	0.130***	0.135***	0	0
INTR	0.007	0.004	0.073	0.074	−0.066***	−0.070***	0	0
GDP	0.018	0.025	0.048	0.055	−0.031***	−0.030***	0	0
CPI	1.755	1.732	6.940	6.600	−5.185***	−4.868***	0	0

Notes.
***, **, * shows the statistical significance at 1%, 5%, and 10%, respectively.
a) Significant level of *t*-test.
b) Significant level of Kruskal Walls test.

panel regression model as it controls for the time-invariant unobserved firm features that may correlate with our model's explanatory variables. Furthermore, by pooling samples at different points in time, we can get more precise estimators and test statistics with more power. Our findings are reported in Table 7. We use five models described while controlling firm-specific and country-specific factors. Panel A of Table 7 provides the regression results for developed economies. The number of observations is 16,775.

The adjusted R^2 ranges from 0.492 to 0.515, while the F-values are all statistically significant at a 1 percent level, showing that independent variables collectively explain variation in our dependent variable. Column 1 examines the relationship between the cash conversion cycle and firm performance. The coefficient of CCC is −0.014 and is statistically significant at a 1 percent level. This finding shows that firm performance is inversely related to CCC in developed economies, and firms with longer CCC perform poorly. These findings align with the previous empirical studies (i.e., Mun and Jang, 2015; Shin and Soenen, 1998; Banerjee and Deb, 2023). In Column 2, we use the components of the cash conversion cycle (DSI, DSO, and DPO) to explain firm performance. We only find a statistically significant relation between DSI and firm value among these. We see a positive coefficient of 0.001 that is statistically significant at a 1 percent level, showing that firms with higher inventory on hand days perform better. This may be interpreted as a result of holding more inventories, reflecting management's optimism about future sales.

The other two variables (DSO and DPO) have a negative coefficient, but none are statistically significant. In Column 3, we add firm-specific factors to our analysis's cash conversion cycle components. In this specification, we find that a longer collection period (DSO) reduces the firm performance. The DSO variable has a coefficient of −0.063 and is statistically highly significant. The remaining two cash conversion cycle components (DSI and DPO) are not statistically significant. Among the

Table 7
Panel regression analysis.

Panel A: Developed economies (N = 16,775)					
Variables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
C	3.425***	6.826	–	–	–
			14.230***	17.271***	14.333***
	(19.08)	(0.000)	(−7.188)	(−9.1903)	(−8.340)
CCC	–	–	–	−0.015***	–
	0.014***				
	(−5.95)	–	–	(−7.021)	–
DSI	–	0.001***	0.000	–	0.000
	–	(0.769)	(0.042)	–	(−0.001)
DSO	–	−0.061	−0.063***	–	−0.063***
	–	(0.000)	(−16.13)	–	(−16.97)
DPO	–	−0.008	−0.006	–	−0.006
	–	(−1.478)	(−1.233)	–	(1.337)
SIZE	–	–	3.206***	3.127***	3.198***
	–	–	(10.58)	(10.61)	(11.17)
GRW	–	–	0.004	0.009	0.003
	–	–	(0.176)	(0.382)	(0.158)
LEV	–	–	−1.106***	−1.153***	−1.111***
	–	–	(−5.581)	(−5.574)	(−5.905)
INTR	–	–	–	24.234**	25.224**
	–	–	–	(2.071)	(2.302)
GDP	–	–	–	4.683***	4.932***
	–	–	–	(3.142)	(3.247)
CPI	–	–	–	−0.025	−0.052
	–	–	–	(−0.087)	(−0.189)
Adj. R^2	0.492	0.505	0.515	0.503	0.515
N	16,775	16,775	16,775	16,775	16,775
F-value	11.587	12.114	12.562	11.995	12.550

Panel B: Emerging economies (N = 19,949)					
Variables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
c	6.091***	8.953***	−3.325**	−5.374***	−2.815*
	(40.52)	(21.89)	(−2.299)	(−2.757)	(−1.739)
CCC	−0.014***	–	–	−0.015***	–
	(−9.775)	–	–	(−9.651)	–
DSI	–	−0.014***	−0.014***	–	−0.015***
	–	(−5.464)	(−5.745)	–	(−5.219)
DSO	–	−0.026***	−0.027***	–	−0.027***
	–	(−9.275)	(−9.774)	–	(−9.879)
DPO	–	−0.020***	−0.016***	–	−0.016***
	–	(−6.664)	(−6.2869)	–	(−6.496)
SIZE	–	–	1.595***	1.626***	1.654***
	–	–	(9.100)	(6.711)	(7.842)
GRW	–	–	0.108***	0.119***	0.107***
	–	–	(2.585)	(2.516)	(2.579)
LEV	–	–	−7.926***	−8.601***	−8.018***
	–	–	(−12.35)	(−12.45)	(−13.68)
INTR	–	–	–	7.011	5.466
	–	–	–	(0.822)	(0.644)
GDP	–	–	–	−16.86***	−18.99***
	–	–	–	(−3.130)	(−3.795)
CPI	–	–	–	−0.064	−0.058
	–	–	–	(−0.779)	(−0.722)
Adj. R^2	0.423	0.436	0.447	0.437	0.448
N	19,949	19,949	19,949	19,949	19,949
F-value	8.522	8.908	9.273	8.939	9.302

***, **, * shows the statistical significance at 1%, 5%, and 10% levels respectively.

firm-specific variables, we find that the size variable is positive, with a coefficient of 3.206 and statically significant at a 1 percent level, indicating that larger firms, on average, experience better firm performance. We also find that firms with higher leverage perform worse than firms with lower leverage. The LEV variable has a coefficient of −1.106 and is statistically significant at a 1 percent level. In Column 4, we examine the impact of the cash conversion cycle on firm performance while controlling for firm-specific and country-specific variables. The CCC variable continues to have a statistically significant coefficient of −0.015. Among the firm-specific control variables, the size and leverage variables have statistically significant coefficients of 3.237 and −1.153, respectively. Among country-specific variables, we report that the GDP variable has a positive and statistically significant coefficient of 4.683, indicating that higher economic growth translates to better firm performance.

Similarly, the INTR variable has a positive coefficient and is statistically weakly significant at 5 percent. Finally, Column 5 includes three components of the cash conversion cycle (DSI, DSO, and DPO) with firm-specific and country-specific variables. Our findings are like what we reported previously in Columns 3 and 4. Among the cash conversion components, DSO remains negatively associated with firm performance, showing that firms with more extended collection periods experience lower firm performance. The remaining two net working capital variables are not statistically significant. Among the firm-specific and country-specific control variables, we find that larger firms with lower leverage have better firm performance. Also, higher GDP growth and interest rates translate into higher firm performance.

Panel B of Table 7 provides the regression results for emerging economies. The number of observations is 19,949. The adjusted R^2 ranges from 0.423 to 0.448, while the F-values are all statistically significant at a 1 percent level, showing that independent variables collectively explain variation in our dependent variable. Column 1 examines the relationship between the cash conversion cycle and firm performance. The coefficient of CCC is −0.014 and is statistically significant at a 1 percent level. This finding shows that firm performance is inversely related to CCC in emerging economies, and firms with longer CCC perform poorly. This is in line with some of the previous studies (i.e., Lin and Wang, 2021; Garg and Meentu, 2022). In Column 2, we use the components of the cash conversion cycle (DSI, DSO, and DPO) to explain firm performance. Among these, we find a statistically significant relationship between all three components and firm performance. We see a negative coefficient of 0.014 and 0.026 for DSI and DSO, which is statistically significant at a 1 percent level. This result shows that firms with lower inventory and fewer outstanding days sales perform better. The results align with the expectation that lower inventories show less idle money being tied up in inventory, which translates to a higher profit.

Similarly, a lower collection period means that the firms get the receivables quickly and can invest the money in profitable ventures to generate higher profits. In contrast, we find a negative coefficient of 0.020 for DPO that is statistically significant at a 1 percent level, showing that firms with fewer payable days perform better. This finding does not align with the conventional relationship that we expect between DPO and firm performance. However, this can be interpreted as enhancing profit margin by availing supplier trade discounts by making an early payment. In Column 3, we add firm-specific factors to our analysis's cash conversion cycle components. In this specification, we find that both DSI and DSO variables have coefficients of −0.014 and −0.027, respectively statistically significant at a 1 percent level, showing that lower inventory and shorter collection periods enhance firm performance. We also find a statistically significant (at the 1 percent level) inverse relationship between DSO and firm performance, which contradicts the conventional relationship. This can be interpreted as a mechanism for firms in emerging economies to enhance profit margins by availing trade discounts on purchases. Among the firm-specific variables, we find that the size variable is positive, with a coefficient of 1.60 and statically significant at a 1 percent level, showing that larger firms, on average, experience better firm performance. There is also a statistically significant (at a 1 percent level) positive relationship between firm growth and firm performance, with a coefficient of 0.108, which shows that firms with higher growth perform better. We also find that firms with higher leverage perform worse than firms with lower leverage. The LEV variable has a coefficient of −7.92 and is statistically significant at a 1 percent level. In Column 4, we examine the impact of the cash conversion cycle on firm performance while controlling for firm-specific and country-specific variables. The CCC variable continues to have a statistically significant coefficient of −0.015. The size, growth, and leverage (firm-specific) variables have statistically

significant coefficients of 1.62, 0.119, and −8.601, respectively.

Among country-specific, we report that the GDP variable has a negative and statistically significant coefficient of −16.86, showing that higher economic growth translates to higher inflation and higher cost of credit, which may cause lower firm performance. Finally, in Column 5, we include three parts of the cash conversion cycle (DSI, DSO, and DPO) with firm-specific and country-specific variables. Our findings are similar to what we reported in Columns 3 and 4. Among the cash conversion components, all three parts, DSI, DSO, and DPO, remain statistically significant and are negatively associated with firm performance, showing that firms with lower inventory and shorter collection periods experience higher firm performance. It also shows that a shorter payment period enhances firm performance. Among the firm-specific and country-specific control variables, we find that larger and growing firms with lower leverage have better firm performance. Also, higher GDP growth translates to lower firm performance.

5. Conclusion

Our research examines the impact of working capital management on corporate performance for a group of firms in developed and emerging economies. We find statistically significant differences between developed and emerging economies concerning working capital and firm-specific and country-specific variables. For example, the CCC is significantly higher for emerging economies than developed ones. Similarly, DSO and DSI are considerably higher for emerging economies, while there is no statistically significant difference in DPO. In our further analysis, we note the following similarities and differences between developed and emerging economies concerning the impact of working capital management on firm performance. First, CCC is a significant determinant of firm performance for both developed and emerging economies. Notably, a longer cash conversion cycle is associated with lower firm performance. These findings are supported by Jose et al. (1996), Kayani et al. (2019a), Kayani et al. (2019b) and Deloof (2003) for developed economies and by Lin and Wang (2021), Garg and Meentu (2022), and Jaworski and Czerwonka (2022) for emerging economies. We find significant differences between developed and emerging economies for the components of CCC. For example, only the DSI component of CCC has a statistically significant direct impact on firm performance in developed economies. For emerging economies, all components of CCC (i.e., DSI, DSO, and DPO) have a statistically significant impact on firm performance. In particular, a higher inventory holding period, receivable collection period, and days' payables are associated with lower firm performance.

Adding firm-specific and macroeconomic control variables into our analysis provides additional insights into comparing developed and emerging economies while the impact of working capital on firm performance remains the same. CCC is still an important variable influencing firm performance in developed and emerging economies. For emerging economies, CCC components remain inversely related to firm performance while controlling firm and country-specific variables. The average collection period appears to be the only factor significantly associated with firm performance in the sample of developed economies. For both emerging and developed economies, larger firms with lower leverage experience better firm performance, while firms with higher growth rates also perform significantly better in emerging economies.

Regarding country-specific variables, we find significant differences between developed and emerging economies. For example, contrary to the findings for developed economies, we note that higher economic growth rates are positively associated with firm performance. Interest rates also appear to influence firm performance in emerging economies.

The implications of our findings for management include the following. Working capital management is crucial for a company's financial health and operational efficiency. It involves managing a company's short-term assets and liabilities to ensure smooth day-to-day operations. Firms must have proper working capital policies, including optimizing operating capital and inventory management, accounts receivable, and accounts payable. Efficient management in these areas reduces the cash conversion cycle, enhancing overall efficiency. Our findings show an inverse relationship between the cash conversion cycle and the firm performance measured by ROA in developed and emerging economies. These findings align with most of the existing studies in various countries (i.e., Mun and Jang, 2015; Shin and Soenen, 1998; Banerjee and Deb, 2023; Lin and Wang, 2021; Garg and Meentu, 2022). Using the components of the cash conversion cycle, we note that a reduced holding period for inventory and a shorter collection period are more essential factors in emerging economies than developed economies, as they may improve firm profitability and performance. In contrast, for developed economies, we find a positive relationship between the holding period for inventory and firm performance. This finding would support the view that increased inventory holdings may boost sales and improve firm performance (i.e., Deloof, 2003; Sharma and Kumar, 2010; Charitou et al., 2012).

Managing working capital has implications for investors, as efficient working capital management can contribute to higher profitability by optimizing inventory holding costs while managing accounts receivables to ensure timely cash inflows. Effective receivable management is often viewed positively by investors. It shows a firm's ability to convert sales into cash and manage its financial resources efficiently.

Policies influencing working capital management can also significantly affect the broader economy. For example, policies such as improved credit availability and the development of diverse financing instruments may help firms access financing at reasonable costs and positively impact working capital management. Furthermore, government policies related to credit management can influence the cost and availability of credits in emerging economies.

The main limitations of this study include the following. First, a research sample based only on selected emerging economies prevents our results from being more conclusive. An extension of the sample firms from other emerging economies may help. Second, one measure of performance (ROA) applied to our sample may not fully describe the impact of WCM on firm performance. Third, narrow and uneven sample distribution across and within developed and emerging market samples may yield lower reliability of our findings. Finally, our sample period includes an expansionary period of the economy following a global financial crisis; hence, we interpret our results cautiously.

CRediT authorship contribution statement

Halil Kiymaz: Conceived and designed the analysis, Collected the data, Contributed data or analysis tools, Performed the analysis, Wrote the paper, Other contribution. **Samina Haque:** Contributed data or analysis tools, Performed the analysis, Wrote the paper. **Ahmed Abir Choudhury:** Collected the data, Contributed data or analysis tools, Wrote the paper.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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