Journal of Entrepreneurship, Business and Economics
ISSN 2345-4695
2025, 13(1), 1–54

NEXUS BETWEEN WORKING CAPITAL EFFICIENCY AND FIRM RISK-TAKING: EVIDENCE FROM MENA COUNTRIES

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Received September 2024; accepted November 2024

Abstract

This paper explores the interrelationship between the working capital management efficiency (WCME) and firm risk-taking (FRT) of 555 non-financial firms listed in the stock exchanges of key MENA countries, namely, Bahrain, Egypt, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, and the U.A.E over the period 2016 to 2021. The study utilises net working capital as a measure of WCME, and capital expenditure ratio (CAPEX) as well as stock price movement (SPM) as proxies for FRT. The secondary annual quantitative data of 3,077 firm-year observations were collected from standards and poor's global market intelligent database (SP, 2021). The study provides interesting perceptions. The coefficients of endogenous relationships between the WCME and the FRT measures are significant negative, indicating that MENA firms finance their investments in fixed capital through their working capital- a less costly internal source of financing- compared to external sources of financing. Further, MENA firms are a type of risk-averse firms by investing in low risk and return projects; and they adopt conservative working capital management and keep higher levels of their working capital. These insights assist corporate managers of firms in MENA countries in the adoption of efficient working capital practices to ensure liquidity and hinting at potential future growth prospects.

Research Paper

Keywords: Working Capital Management Efficiency, Firm Risk-taking, MENA Countries

Reference to this paper should be made as follows: Alrahamneh, L.S.M., Chu, E.Y., & Hong, M. (2025). Nexus between Working Capital Efficiency and Firm Risk-Taking: Evidence from MENA Countries. *Journal of Entrepreneurship, Business and Economics*, *13*(1), 1–54.

Introduction

The working capital management efficiency (WCME) is a method through which companies organize and oversee their short-term assets and short-term liabilities to mitigate liquidity risk and prevent excessive investment in these assets (Eljelly, 2004). It aids businesses in preserving their liquidity, preventing financial difficulties, and is essential for the continuation of business overtime (Padachi & Howorth, 2014). It allows companies to use their less utilised resources towards more valuable uses, thereby, improving their performance (Aktas et al., 2015; Salamzadeh et al., 2023, 2024). The working Capital (WC) is the core and pivotal point of a business (Mahajan & Sidhu, 2019) and a vital element influencing the firm's profitability, risk, and shareholders wealth (Le, 2019; Masri & Abdulla, 2018). The working capital refers to the surplus of a company's current assets beyond its current liabilities (e.g., Mun & Jang, 2015).

The working capital management (WCM) is an essential function since it influences the company's liquidity and overall financial well-being, where managers are responsible for overseeing cash, receivables, inventories, payables, risks, or any mixture of these elements. Inefficient WCM leads to the financial distress, and therefore to a higher probability of bankruptcy or business failure (Ramiah et al., 2016). Inefficient WCM restrains the firm ability to take risky corporate decisions that may result in higher profits in the uncertain environment. Thus, the efficient WCM is aligned with firm' risk-taking decisions in certain types of investing and financing activities like research and capital expenditures spending, acquisition spending, subprime

lending or borrowing, and competitive actions. Yet, the study in the area of WCME and risk-taking of firms is still limited.

Despite working capital management (WCM) is crucial for businesses of all sizes in both developed and developing regions, it holds particular significance for firms in emerging markets, where many are small and face challenges in securing financing (Abuzayed, 2012). The Middle East and North Africa (MENA) region experiences instability due to various influences such as dependence on the oil market, political instability, and ongoing territorial conflicts (Andreano et al., 2013). The MENA region is central to the global energy framework, containing fifty percent of the world's recognized oil and gas reserves (Tagliapietra, 2019).

WCME is crucial to ascertain the sustainability of the firms in order to continue growing to compete with others (Kasiran et al., 2016). WCME is a significant element for firms to manage in the times of weak economic conditions and worldwide uncertainties (Demir et al., 2019). Companies in the manufacturing and service sectors within the MENA region have struggled with effectively managing their inventories and receivables, often delaying payments to their suppliers as a strategy to handle working capital (Ernst & Young, 2018). The WCME serves as an important indicator of business competitiveness, and currently, it is starting to indicate signs of decline. Nevertheless, the COVID-19 pandemic has compelled companies in the MENA region to reassess their cash collection processes and enhance their supply chains and inventory management to improve capital usage and tackle cost efficiencies (Farzadi et al., 2021). Further, the economies in MENA countries depend heavily on the industrial and service sectors.

In the ever-changing economic environment of MENA region, the WCME plays a vital role. Improving working capital not only releases considerable value and boosts liquidity but also fortifies resilience against market fluctuations. By concentrating on sustainable enhancements in working capital, businesses can maintain their financial heath, foster growth strategies, and set the foundation for enduring success. Approximately $50 billion is presently tied up on the balance sheets of publicly listed firms, leading to an expense of up to $5 billion for shareholders in financing, based on an assumed weighted average cost of capital of 10% (Farzadi et al., 2024). Firms in MENA countries can efficiently manage their working capital to release $44 billion of cash, which could be invested elsewhere in other strategic priorities towards future growth (Farzadi et al., 2023; Afjal et al., 2023; Anwar et al., 2024). The 2021 was yet another year when the capital expenditure was not a cash allocation priority for firms in MENA countries. Spending remained stable from 2020 to 2021, but capital expenditures as a percentage of revenue decreased severely on average from 12.4% to 10% (Farzadi & Georgescu, 2022).

Companies having optimal WC level and companies that shift to that optimal WC levels, either by increasing insufficient levels or reducing excessive levels, can improve their stock and operating performance (Aktas et al., 2015). As MENA firms invest heavily in working capital and has the lowest investment in fixed capital during the last years, they are type of risk-averse firms that ensure the liquidity at the expense of growth prospects. These firms have an opportunity to increase their capital expenditures without extra financing or pressuring their cash flows, if they improve the WC efficiency and

release a cash, and consequently, can deliver margins and returns and have better stock prices.

The MENA region is made up of 21 different countries that consist of Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syrian Arab Republic, UAE, Yemen Republic, Algeria, Djibouti, Egypt, Libya, Malta, Morocco, and Tunisia (World Bank, 2018). The diverse MENA region is affected by political and economic changes; however, it has enormous opportunities and potential for a better growth. The economies of MENA are implementing reforms to enhance economic growth, diversification, development and integrity of private sector, governance structures, and employment (OECD, 2018b).

In the MENA region, the Gulf Cooperation Council (GCC), which was set up in 1981 as an economic and political union of six gulf countries, namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and UAE, aimed to attain unity among its countries of similar political and cultural identities for improving the integration of economies and the harmonisation of politics (Miniaoui, 2020). According to Saidi and Prasad (2018), the countries in MENA region have undertaken investment reforms to provide investors with a more accessible and stable environment. Recently, to achieve reforms, the GCC countries updated company laws and investments, allowed foreign investors to enter capital markets, and opened up major industries for foreign direct investment. Historically, the GCC countries have been supportive of MENA economies with aids for economic and humanitarian needs, which has been recently evidenced by Jordan and Egypt.

MENA eight countries that consist of Bahrain, Egypt, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, and UAE have many economic, political, social,

cultural interrelations. However, six of them constituted a GCC alliance. Further, Jordan might become a member in this alliance as it has economic, financial labor, strategic, security, and cultural relations with the GCC countries. Egypt has also political and economic connections with the GCC countries.

According to World Bank (2021) , the MENA region contributes 3.87% to world's GDP in 2021. Nevertheless, the size of stock markets in MENA is considered very small at 5% of world market capitalisation and the capitalisation of stock market as a percent of GDP varies devilishly among the MENA countries. During the period 2016-2021, the development of stock market in MENA in terms of market capitalisation of listed domestic firms, percent of GDP, peaked at 181.1% in 2020 and bottomed at 46.1% in 2016. As of 2021, the equity markets in the selected MENA countries consists of 1,137 listed firms, which have approximately $3,666 billion market capitalisation, where, Saudi Arabia is the MENA largest country in terms of market capitalisation ($2,671 billion).

Table 1 shows the distribution of MENA 1,137 domestic listed companies by Country in 2021. In this year, the MENA equity market capitalisation of listed domestic companies, which is $3.666 trillion, represents approximately 166% of GDP with around 18% increase from the previous number of $3.096 trillion for 2020, which represents approximately 165% of GDP (World Bank, 2021).

Table 1. The Statistics of Domestic Listed Companies on the MENA Stock Markets in 2021

Country	Number of listed Domestic companies	Percentage of total listed domestic companies (%)
Bahrain	41	03.61
Egypt	241	21.20
Jordan	172	15.13
Kuwait	159	13.98
Oman	110	9.67
Qatar	47	04.13
Saudi Arabia	224	19.70
UAE	143	12.58
Total	1,137	100.00

Source: The World Bank, World Bank Development Indicators Database (2021).

In 2021, the stock market developments in the MENA countries -as measured by market capitalisation of listed domestic firms, percent of GDP, - were 73% for Bahrain, 11.5% for Egypt, 47.2% for Jordan, 96.4% for Kuwait, 21.4% for Oman, 103% for Qatar, 305.6% for Saudi Arabia, and 133.7% for the UAE. The largest MENA country in terms of market capitalisation (% of GDP) was the Saudi Arabia and the smallest country was Egypt (Figure 1).

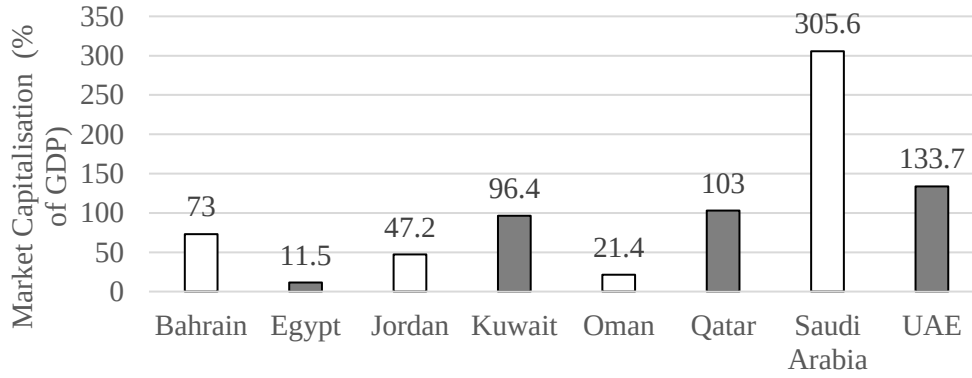

Figure 1. The MENA Countries' Market Capitalisation (% of GDP) in 2021

Source: The World Bank, World Bank Development Indicators Database (2021).

Banking markets, which are considered as one of the key pillars supporting the countries' economies, often dominate financial industry. According to World Bank (2018), the banking markets play an increasingly important role in the economies of MENA, where the percentage of bank deposits to GDP in 2015 is 80% as compared to the world's percentage of 50%. During 2016-2021, the bank deposits to GDP percentages exceeded 80% in countries such as Jordan, Kuwait, Qatar, the UAE. In contrast, in other countries, the bank deposits to GDP percentages were around 50% (e.g., Oman) or less (e.g., Saudi Arabia) (World Bank, 2020). Table 2 sheds the light on the bank deposits to GDP (%) in selected MENA countries during 2016-2021.

Table 2. The Bank Deposits to GDP (%) in Selected MENA Countries during 2016-2021-

Year MENA Countries	2016	2017	2018	2019	2020	2021
Bahrain	-	-	-	-	-	-
Egypt	84.04	80.54	71.82	67.71	74.04	80.76
Jordan	97.88	93.73	90.73	91.65	95.26	98.75
Kuwait	103.26	96.70	86.50	-	-	-
Oman	56.13	54.54	52.67	56.24	-	-
Qatar	87.92	100.91	82.83	88.49	110	91.15
Saudi Arabia	40.35	38.75	-	-	-	-
UAE	88.67	85.29	79.80	86.27	105	-

Source: The World Bank Development Indicators Database (2021).

Access to finance is one of the challenges for SMEs and some large firms in the MENA region. This challenge is due to regional conflicts, large

equity market concentration, high banking concentration, large collateral requirements, and limited diversified sectors. The domestic credit to private sector for the MENA region was mostly provided by banking systems. It is clear that the domestic credit to private sector by banks, percent of GDP, was 55% in 2018. This percentage was large in some countries like Lebanon and Kuwait. Figure 2 shows the domestic credit to private sector by banks, percent of GDP in 2021.

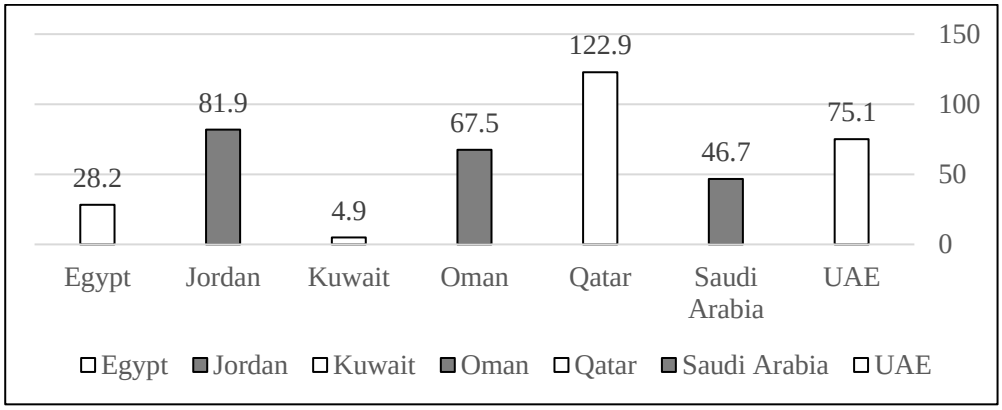

Figure 2. Domestic Credit to Private Sector by Banks (% of GDP) for MENA Countries in 2021

Source: The World Bank, World Bank Development Indicators Database (2021).[1]

As noticed in the figure, MENA countries vary in terms of their reliance on banks financing. The domestic credit to private sector provided by banks, percentage of GDP, was the highest in Qatar with 122.9% and the lowest in Kuwait with around 5%.

[1] Due to limited data in 2021, Bahrain was excluded. To the latest data, domestic credit to private sector by banks (% of GDP) for Bahrain in 2015 was 74% and bank non-performing Loans to total loans percentage in 2018 was 5.6%.
Domestic credit to private sector by banks for Saudi Arabia and Non-performing loans to total loans data for Bahrain, Oman, and Qatar were taken from their Central Banks reports.

To the best of the authors' knowledge, there are scant WCME studies of MENA region in the current literature. Particularly, there are limited studies covering the relationship between the WCME and the FRT of firms in MENA region and possibly globally. Therefore, the study could contribute to the literature by elucidating the endogeneity between the WCME and FRT of firms in MENA countries, so that financial managers can adopt efficient working capital practices to maintain liquidity and seek potential future growth prospects. The study endeavours to answer the following research questions: does the WCME have a negative impact on the FRT? does the FRT have a negative impact on the WCME?. In the light of this, the study aims to investigate the interrelationship between the WCME and the FRT measures of CAPEX and SPM.

The remainder of this article is structured as follow: in Section 2, the extant literature is reviewed in terms of theories and past studies; and the hypotheses are developed; in Section 3, the study methodology is described including the research design, measurement of variables, equation specifications, and statistical analysis; in Section 4, the results and related discussions are presented; and in Section 5, the conclusions are outlined.

Literature Review and Hypotheses Development

Theoretical Review in terms of the Risk and Return Theory

Most finance textbooks such as Moyer (1984) typically start their WC sections with a discussion of the trade-off of risk-return ingrained in alternative policies of WC. The WC investing and financing strategies with high risk and return are known as aggressive; strategies with intermediate risk and return are referred to as moderate or matching; and strategies with lower risk

and return are termed as conservative (Weinraub & Visscher, 1998). The trade-off theory recognises that there is a balance between risk and return, and companies may elect to implement more aggressive working capital management strategies to improve profitability even if it results in a reduction in liquidity (Vo & Ngo, 2023).

Firm risk-taking demonstrates management's willingness to invest in the face of uncertainty. High-quality enterprise development is primarily distinguished by "steady progress". Academics typically utilize earnings volatility, stock volatility, capital expenditure, and debt ratio to measure firm risk-taking (Wu et al., 2024). A large degree of risk-taking can optimise the allocation of the firm resources, and boost its competitive edge and corporate value (Koirala et al., 2020). As acknowledged by Casavecchia and Suh (2017), the higher the degree of firm risk-taking, the more likelihood that the high-risk projects with a positive projected net present value are to be chosen when firms invest.

As long as companies have to make risky investments to operate their businesses, the value of a firm could be harmed and its existence could be endangered by both overinvestment (i.e., a high risk-taking attitude) or underinvestment (i.e., an undue risk-averse attitude). Corporate investment can be measured by the capital spending, the expenditures of R&D, and the expenditures of acquisition (Harjoto et al., 2018). As argued by Lee et al. (2021), a significant higher risk-taking attitude is linked to a larger ratio of elected board directors as evidenced by more volatile stock prices and greater standard deviation of Tobin's Q.

The WC investment and financing policies have the most considerable impact on profitability. These policies are associated with the risk and return

theory because the conservative WCM policy reduces both return and risk in contrast to aggressive WCM policy which has the opposite impact. The balance between these policies contribute to positive results (Morshed, 2020). There is a trade-off in WCM between a firm risk and profitability which makes a WCM a task of optimisation. Profitability is the revenue-expense relationship resulted from the use of firm assets -both current and non-current- in productive activities. To be profitable, firms must increase revenues or decrease expenses. Within the context of short-run financial management, risk is the company inability to settle its current liabilities when they mature. The greater the firm net WC, the more liquidity it has and the less risk it carries, and vice versa. Thus, the short-run financial management emphasises on managing current assets and current liabilities of a business to balance its risks and profitability, which positively contributing to the value of company (Gitman, 2002).

Investors are concerned with returns; the larger the risk, the greater the expected return. As net working capital increases, so does the firm's liquidity, the risk for investors is reduced. Accordingly, the expected rate of return will be lower, although economic value added will rise as the weighted average cost of capital falls (Hatane et al., 2023).

Le (2019) argued that managers must make a trade-off between their objectives for profitability and risk control. According to Aminu and Zainudin (2015), the liquidity-profitability trade-off is one of the essential WCM decisions. Firms can adopt risk-averse policy to be more liquid at the expense of the profitability or alternatively adopt risk-seeking policy to achieve higher profits at the expense of liquidity. Any of these policies may lead to either inadequate or excessive components of WC. When assessing the capability

of a company or its corporate manager to decide on combination of assets or portfolios for acquisition, the theory of risk-return is an integral part of the portfolio theory that can be associated with the WC, where decisions with regard to receivables, inventories, incentives, and stocks are taken related to profitability. Baños-Caballero et al. (2014) acknowledged that the WC has an inverted U-shaped association with business performance indicating that the costs and benefits are balanced and the company profitability is maximised by an optimal investment level of WC. Additionally, for companies with financial constraints, the optimum level is smaller.

Firms need to manage their working capital in appropriate manner to utilise their resources efficiently and have a sustainable competitive advantage. When corporate managers rationally balance the benefits against the costs associated with it, they can reach the optimal level of WC for liquidity holding (Zimon et al., 2024). A crucial element of effective financial decisions is the link between the risk and return. Determining the optimal balance of liquid asset considers the classic trade-off of risk-return business managers face. In view of the relatively low rate of return of liquid asset, a company minimises the balances of liquid asset to improve its profitability on an asset base. However, low levels of liquid asset subject a company to the risk of illiquidity. Thus, efficient cash management requires a careful balance between risks and returns in the area of cash management (Moyer et al., 2012).

Past Studies Review and Hypotheses Development

In emerging and developing economies, the instability of the financial markets and the environment of uncertainty make firms' investing and financing decisions riskier. Furthermore, these decisions are frequently significantly

dependent on the availability of financial resources and the banking systems (Alvarez et al., 2021). When economic policy uncertainty is large, companies are less likely to invest in fixed and intangible assets because they are unsure about their future financial conditions and the potential impact of policy changes on their investment decisions. Companies could keep their cash in such a circumstance rather than investing it in potentially losing assets. Companies are more likely to invest in fixed and intangible assets when economic policy uncertainty is small because they are more confident in the economy's status and the potential returns on their investments. It could be the consequence of constant government action, an expanding economy, or advantageous market conditions (Hussain et al., 2023).

Le and Tran (2021) claimed that the negative effect of geopolitical risk on business investment should be more severe for companies with a larger degree of fixed investment irreversibility. As per Almustafa et al. (2023), countries with better national governance systems tend to stimulate firms to pursue risky operations and projects, notably due to small levels of government predatory behaviour and efficient resource allocation (Ebrahimi et al., 2022; Salamzadeh et al., 2021). Koirala et al. (2020) argued that stricter corporate governance reform results in greater firm risk-taking. This stricter reform can have a positive impact on firm risk-taking and business investment decisions in an evolving regulatory context. Wang and Mao (2021) noted that Short-term financial investments reduce firm incentives to pursue risky and profitable investment opportunities. The negative relationship between financialisation of firms and firm risk-taking is stronger in state-owned enterprises and firms with smaller institutional ownership, indicating that financialisation

causes managers to become more myopic and diminish long-term investments.

According to Ahmad et al. (2022), Asian enterprises may have had challenges in obtaining short-term financing for operations. Furthermore, Asian corporations invested in current assets rather than fixed assets. It shows that businesses are not risk-takers. As noted by Lefebvre (2022), when external financing is unavailable, small business managers turn to customer-related practices like late payments for financing. They keep small levels of working capital to finance the fixed capital or to cover the operating expenses. Furthermore, fixed asset investment and working capital levels compete with each other for financing, investment and growth because companies have limited capacity or sources of funds availability (Seth et al., 2020).

As argued by Akbar et al. (2021), higher levels of WC are associated with lower volatility in company stock prices, indicating that shareholders prefer a conservative working capital management policy. Akbar et al. (2022) posited that excessive working capital have a negative effect on the investment portfolio. Additionally, a negative link between change in fixed capital and excess net working capital indicates that companies utilise idle resources tied up in working capital to boost their investment in fixed assets. Diaw (2021) found a significant negative association between the cash ratio (CR) and capital expenditures (CAPEX).. Large companies in emerging countries reduce their cash levels to a great extent, compared to small companies, to respond to increasing intangibles and R&D expenses.

The WCME can affect the company's investments in capital expenditures. Altaf and Shah (2018a) posited that investments in WC and fixed capital in financially constrained companies are much sensitive to shocks in cash

flow when compared to no-constrained companies with investment in WC being highly sensitive. Companies use WC to smooth investment in fixed capital and companies with high level of WC are better capable to perform this function.

During the period 2013-2017, global capital expenditure of total revenues ratio was at the lowest level which means that firms manage cash flows through reducing the investments. This underinvestment threatens companies' expansion on the long-term period. Global firms can free up the cash required to continue their investments without jeopardising the cash flows through the optimisation of their WC. These firms have an opportunity to increase their capital expenditures by 55%, without extra financing or pressuring their cash flows, if companies in the MENA region improve the WC efficiency and release a cash of €1.3 trillion (Windaus et al., 2018).

According to Windaus et al. (2018), the Middle East region with the highest net WC days position of 76 days, has the smallest return on capital employed and a net debt ratio of 60.7% of its revenues, which means that it is the world's most indebted region. The debt levels of African firms have generally decreased, but this has been at the expense of lesser profits and capital expenditures, thus return on capital employed. These firms need to reduce net WC days as a tool to decrease debt levels while maintaining investments and enhancing returns.

The investment of WC relies on company's CCC. When companies increase WC, they tie up financial resources, and when they reduce WC, they increase free cash flow. Hence, companies can release cash for other activities by managing WC which makes companies more financially flexible with uncertain future contingencies (Baños-Caballero et al., 2020). Companies prefer

to maintain a constant level of fixed investment. Financially constrained companies prefer to smooth fixed investment by decreasing the investment in WC through raising short-term financing (Fazzari & Petersen, 1993). According to Nicolas (2022), even though WC is considered a source of buffering investments in fixed capital from temporary changes in the available sources of financing, SMEs cannot easily convert their liquid assets into cash, consequently they adjust their investments in WC and fixed capital. Further, constraints on cash credit impose the allocation of extra cash flows to finance the increased WC requirements at the expense of long-lived assets.

Besides, capital expenditures have a significant impact on WCM of the companies. By being knowledgeable about this, corporate managers can efficiently manage WC (Appuhami, 2008). Companies with large level of fixed capital are characterised by low liquidity as converting fixed capital into cash is difficult and therefore, a large fixed capital inversely affects liquidity (Masri & Abdulla, 2018). Companies with large WC levels show small sensitivity to cash flows on fixed capital investment and large sensitivity to cash flows on WC investment. This indicates that companies use WC as a source of internal financing thereby mitigating the impacts of financial constraints on fixed capital investment (Ding et al., 2013). Also, companies finance R&D expenditures using internal sources of funds (Sasidharan et al., 2015). Companies can adopt aggressive WCM approach, which is a high risk and high return policy coupled with small investment levels of WC, or follow conservative WCM approach, which is a low risk and low return policy coupled with large investment levels of WC (Altaf & Shah, 2018b).

Banerjee et al. (2021) argued that companies and their shareholders seek a maximum WC investment due to variabilities in the supply chains. If

the CCC exceeds the maximum level of WC, surplus share returns of companies drop significantly, whereas if the CCC is below the maximum level, there is no influence. Thus, managers can maintain the WC below the maximum level and investors can use the maximum WC criterion in order to value and select shares. As argued by Chauhan (2021), the allocations of WC often vary around their long-running averages in a short time period, and the mean reversion of these variations is also rapid despite that short-term variations in WC are not systematically attributed to effective trade-off between the WC and fixed capital. Further, the WC and fixed capital are positively correlated with each other suggesting the existence of persistent WC allocations. Also, companies follow their company-related optimal allocations of WC in an active manner even if there are no industry-specific optimal allocations of WC.

The investment in WC is sensitive to the investment in fixed capital and the fluctuations in cash flows. Therefore, good WCM may enable companies to mitigate the impacts of financial constraints on fixed assets investment (Kwenda, 2015). Large CEO social capital as a result of less WC could lead to riskier investment and financial decisions in markets with poor corporate governance (Ferris et al., 2019). Therefore, the study argues that efficient WCM could lead to value-creation firm risk-taking activities, such as capital expenditures, R&D, acquisition expenditures, which managers can adopt to improve firm performance and maximise the shareholders' value. The study posits that the WCME is endogenously linked to the FRT measures of CAPEX and SPM of MENA firms.

Based on the background theory and past studies, the research two main hypotheses and its sub-hypotheses are formulated as follow:

H_1: The WCME has a negative impact on the FRT of firms in selected MENA countries. More specifically,

H_{1a}: The WCME has a negative impact on the CAPEX of firms in selected MENA countries.

H_{1b}: The WCME has a negative impact on the SPM of firms in selected MENA countries.

H_2: The FRT has a negative impact on the WCME of firms in selected MENA countries. More specifically,

H_{2a}: The CAPEX has a negative impact on the WCME of firms in selected MENA countries.

H_{2b}: The SPM has a negative impact on the WCME of firms in selected MENA countries.

Methodology

Research Design

The study is embarked on a quantitative panel data design to investigate the endogenous relationship between the WCME and FRT of non-financial firms in eight selected Arab MENA countries, namely Bahrain, Egypt, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, and UAE. The selection of these countries was based on the political and economic interrelationships among them. However, six of them are Gulf Cooperation Council countries and the others are about to join. The final sample of total population of consists of 555 non-financial listed companies out of 1,122 total listed companies from

2016 to 2021, which compromises 3,077 firm-year observations. These non-financial listed companies consist of 239 manufacturing firms and 316 service firms. The source of data, which are annual and secondary, is S&P global market intelligence database (S&P, 2021). The listed companies in the financial sectors like banks, insurance companies are excluded from the study because they have different natures. Further, non-financial firms, whose required data of study variables are not available in S&P database, are dropped. The outliers were removed by winsorising continuous variables at the 1 percent and 99 percent percentiles. Table 3 presents the statistics of non-financial listed companies in eight MENA countries in 2021 by division.

Table 3. The Statistics of Non-financial Listed Companies of the MENA Countries by Division in 2021 after Excluding the Financial Companies

Country / Division	Bahrain	Egypt	Jordan	Kuwait	Oman	Qatar	Saudi Arabia	UAE	Total
Agriculture, Forestry, & Fishing	1	8	1	1	4	1	9	1	26
Mining	-	4	1	7	5	1	3	4	25
Construction	1	17	-	7	5	1	7	7	45
Manufacturing	3	87	36	19	33	7	75	18	278
Transportation, Communication, Electric, Gas, & Sanitary Service	3	8	11	13	13	7	15	9	79
Wholesale Trade	2	3	6	9	4	4	17	3	48
Retail Trade	2	-	2	2	-	-	10	1	17
Services	5	28	23	19	13	4	23	13	128
Public Administration	1	2	1	5	-	4	2	6	21
Total listed non-financial Companies	18	157	81	82	77	29	161	62	667
Less: non-availability data Companies	1	16	6	11	7	5	21	18	85
Availability data Companies	17	141	75	71	70	24	140	44	582
Less: Firms with missing values dropped by Stata during analysis	0	12	7	1	3	0	1	3	27

Final Sample	17	129	68	70	67	24	139	41	555

Source: S&P global market intelligence database (2021).

Definition and Measurement of Variables

Endogenous variables

The endogenous variables are those that are affected by external factors. This is frequently known as the dependent variable. The endogenous variable for the firm ($_i$) at year ($_t$) in this study is the firm risk-taking ($\boldsymbol{FRT_{it}}$), which has two proxies: the capital expenditures ratio ($CAPEX_{it}$) and the stock price movement (SPM_{it}).

The firm risk-taking ($\boldsymbol{FRT_{it}}$) is the risk level a firm is willing to assume in order to maximize earnings in the face of uncertainties in the foreseeable future. It indicates the firm risk attitude when making investment decisions (Song et al., 2021). It is a result of a firm's profit-seeking business operations and is a key aspect of investment decisions (Cucculelli & Ermini, 2012). According to Wright et al. (1996) , the firm risk-taking is the level of volatility associated with predicted outcomes and cash flows resulting from new investments.

Harjoto and Laksmana (2018) deployed five different measures for firms' risk-taking; that include capital expenditures, R&D expenditures, the acquisition spending, the change in accounting return, and the change in stock return. According to Zhang et al. (2021), the firm risk-taking was measured by the standard deviation of ROA over three overlapping years, and the difference between the highest and lowest ROA over three overlapping years.

Faccio et al. (2016) employed three measures of corporate risk-taking. The first measure is the leverage that indicates the riskiness of corporate financing choices as proxied by the ratio of debt divided by the sum of debt and

equity. The second measure is the volatility of ROA that indicates the riskiness of investment decisions as proxied by the ratio of income before interest and taxes to total assets (Batrancea et al., 2019, 2022). The third measure denoting whether the company survived over a five-year period.

However, the corporate risk-taking was measured by employing three ways. Firstly, calculating the standard deviation of daily stock returns in each year and utilising this variable as a proxy of total risk. Secondly, regressing daily stock returns on daily market returns and utilising this variable as a measure of systematic risk. Thirdly, calculating the standard deviation of the residuals from the regression and utilising this variable as a measure of idiosyncratic risk (Jiraporn & Lee, 2018; Lee et al., 2021).

Firm risk-taking is basically reflected by the trade-off between the cash flow and the uncertain risks in the investment decisions (Acharya et al., 2011).

$\boldsymbol{CAPEX_{it}}$ is a measure of riskiness of corporate investment decisions -that is the money utilised by the business to buy, upgrade, and maintain physical assets such as property, plant, and equipment- proxied by the ratio of capital expenditures scaled by the total assets. Following Harjoto and Laksmana (2018), the capital expenditure ratio ratio ($CAPEX_{it}$) is measured as follows

$$\boldsymbol{CAPEX_{it}} = \frac{Capital\ Expenditures}{Total\ Assets}$$

$\boldsymbol{SPM_{it}}$ is a firm risk-taking measure to describe the degree by which the stock price values fluctuate. Higher stock price movement indicates higher risk-taking as proxied by the standard deviation of the annual stock

prices. Similar to Jiraporn and Lee (2018) , the study utilizes the standard deviation of the sum of random stock prices to measure the stock price movement (SPM_{it}) as follows

$$\boldsymbol{SPM_{it}} = \sigma X + Y = \sqrt{\sigma^2 X + \sigma^2 Y} = \sigma X^2 + \sigma Y^2$$

Where, $\sigma X + Y$ is the standard deviation of the sum of random stock prices.

Exogenous variables

The exogenous variables do not depend on or have their values modified by other model variables. Every external variable always constitutes an independent variable. The exogenous variable for the firm ($_i$) at year ($_t$) in this study is the working capital management efficiency (***WCME*$_{it}$**).

The working capital management efficiency (***WCME*$_{it}$**) is a metric that shows how well a business is balancing the money customers owe on account from credit sales and the money invested in inventories against the money it owes to suppliers for purchasing inventories. According to Akbar et al. (2021), it refers to the firm policies by which corporate managers make appropriate adjustments to their current assets and current liabilities in a manner that maturing obligations are paid on time and fixed assets are organised for profitability, which is regarded the cornerstone of business survival in today's competitive environment.

Hawawini (1986) used the net WC, -(the difference between current assets and current liabilities)- as a measure of WCME. The current assets are made up of cash, short-term tradable securities, accounts receivable, and in-

ventory whereas the current liabilities consist of short-term borrowings, accounts payable, short-term net accruals. Thus, the Net WC is equal to the total of cash, accounts receivable, and inventory minus the total of short-term borrowings, accounts payable, and net accruals. Pass and Pike (1987) differentiated gross WC, which represents the total of current assets, and the net WC, which is the total of current assets (inventories, debtors, trade credit, cash, and short-term securities) minus the total current liabilities (payment due to trade creditors, bank overdraft, short-term loans, tax payables, dividends payables, and interest payables).

According to Bin et al. (2019), the WCME is measured by deploying the net liquid balance and WC requirement. The net liquidity balance is equal to the total of cash and cash equivalents, and short-term investments minus the total of short-term debt, commercial paper payable, and long-term debt amounts due within a year; whereas the WC requirement is equal to the total of accounts receivable and inventory minus the total of accounts payable, accrued expenses, and other payables.

$\boldsymbol{WCME_{it}}$ refers to the difference between the firm current assets and current liabilities. Following Smart et al. (2018), the working capital management efficiency ($\boldsymbol{WCME_{it}}$)is measured as follows

$$\boldsymbol{WCME_{it}} = \text{Cash} + \text{Cash Equivalents} - \text{Current Debts} + \text{Accounts Receivable} + \text{Inventories} - \text{Accounts Payable}.$$

Where, *cash equivalents* are defined according to International Accounting Standard 7 (IAS 7) as short-term, highly liquid investments that are readily convertible to known amounts of cash and are subject to an insignificant risk of changes in value.

Control variables

The study employs four control variables for the firm ($_i$) at year ($_t$) as follow:

(A) Firm size (FS_{it}): Following Hadlock and Pierce (2010), the study utilises the logarithm of total assets as a measure for firm size as in the following

$$\boldsymbol{FS}_{it} = \textit{The logarithm of total assets}.$$

(B) Sales growth (SG_{it}): The percentage change in sales is used as a proxy for sales growth (Hill et al., 2010) as follows

$$\boldsymbol{SG}_{it} = \frac{\textit{Current Year Sales}}{\textit{Previous Year Sales}} - 1$$

(C) Profitability (ROE_{it}): Similar to Wasiuzzaman and Arumugam (2013), the research deploys the return on equity as a measure of the profitability as in the following

$$\boldsymbol{ROE}_{\boldsymbol{it}} = \frac{\textit{Net Income}}{\textit{Total Equity}}$$

(D) Industry type ((IT_{it}): it is a dummy variable that takes the value of 1 for manufacturing company and 0 otherwise (Beck et al., 2008) as follows

$$\boldsymbol{IT}_{\boldsymbol{it}} = 1 \textit{ if the company falls within the manufacturing sector and equals } 0 \textit{ o}$$

Appendix A presents the acronyms and definition of measurements of the study variables.

Equation Specifications

The impact of WCME on FRT of firms in MENA countries

The following equation was deployed to examine the impact of working capital management efficiency on firm risk-taking

$$FRT_{it} = \alpha_{0it} + \beta_{1it}WCME_{it} + \beta_{2it}FS_{it} + \beta_{3it}SG_{it} + \beta_{4it}ROE_{it} + \beta_{5it}IT_{it} + \varepsilon_{it}. \quad (1)$$

In the Equation (1), the subscript i represents firms and the subscript t represents years; α: constant term; β: the corresponding coefficient vectors; ε: the idiosyncratic error term; FRT_{it}: the firm risk-taking; $WCME_{it}$: the working capital management efficiency; FS_{it}: the firm size; SG_{it}: the sales growth; ROE_{it}: the return on equity; and IT_{it}: the industry type.

The impact of FRT on WCME of firms in MENA countries

To investigate the impact of the firm risk-taking on the working capital management efficiency, the following equation is utilized

$$WCME_{it} = \alpha_{0it} + \beta_{1it}FRT_{it} + \beta_{2it}FS_{it} + \beta_{3it}SG_{it} + \beta_{4it}ROE_{it} + \beta_{5it}IT_{it} + \varepsilon_{it}. \quad (2)$$

In the Equation (2), the subscript i represents firms and the subscript t represents years; α: constant term; β: the corresponding coefficient vectors; ε: the idiosyncratic error term; $WCME_{it}$: the working capital management efficiency; FRT_{it}: the firm risk-taking; FS_{it}: the firm size; SG_{it}: the sales growth; ROE_{it}: the return on equity; and IT_{it}: the industry type.

Statistical Analysis

Utilising Stata software, the statistical methods deployed in the data analysis were: descriptive statistics, such as mean and median, to obtain a feel

for the data by checking the central tendency and dispersion of the study variables; and ordinary least squares (OLS) regression to get the unbiased real value estimates for alpha and beta. Furthermore, the assumption tests of normality, multicollinearity, and heteroskedasticity were employed. In particular, the data were tested for normality using skewness kurtosis test, Jaquebera test, and Q-Q plot test, tested for multicollinearity by Pearson correlation coefficient and variance inflation factor; and tested for heteroskedasticity by White test.

Results and Discussions

Descriptive Statistics

Table 4 reports the descriptive statistics for the combined sample of 3077 firm-year observations over the period 2016-2021. The number of observations (N), the mean, the median, the standard deviation (SD), the minimum values (Min), and the maximum values (Max) are shown in Table 4.

Table 4. Descriptive Statistics of All Study Variables for 2016-2021

Variables	N	Mean	Median	Standard Deviation (SD)	Min	Max
WCME	3077	53.4	11.2	294	-1176	1931
CAPEX	3077	0.0354	0.0193	0.0449	0	0.254
SPM	3077	30.2	28.5	18.6	0	96.4
FS	3077	5.33	5.28	1.86	1.53	10.2
SG	3077	0.0332	0.0091	0.38	-0.999	1.89
ROE	3077	5.69	6.12	19.7	-88.1	63.6

Note: WCME is the working capital management efficiency measured by current assets minus current liabilities, CAPEX is capital expenditures ratio measured by scaling capital expenditures to total assets, SPM is stock price movement computed by the standard deviation of stock prices, FS is firm size measured by Logarithm of total assets, SG is firm sales growth measured by annual percentage change in sales, ROE is return on equity which equals net income divided by total equity.

According to Table 4, the WCME of MENA firms, which equals current assets less current liabilities, has an average value of $53.4 million, with a standard deviation of 294. Some firms struggle with their WCME, as seen by firms with a maximum discretionary value of $1,931 million and a minimum value of $-1,176 million, which point out the imbalance in the WCME of firms in the eight MENA countries over the period 2016-2021.When the WCME was impacted by COVID-19 during 2020-2021, the smallest and largest values were $43.2 million in 2020 and $70.43 million in 2021, respectively. These numbers vary significantly among the eight countries.

In terms of the FRT measures, the CAPEX, measured as capital expenditures divided by total assets, is on average 3.54%, which is deemed to be very low. Nevertheless, the maximum value of the CAPEX, which is 25.4%, points out that some companies invest heavily in the capital expenditures as a percentage of total assets. Further, the SPM, calculated as the standard deviation of stock prices, has an average value of $30.2 and a maximum value was $96.4.

Companies in MENA countries vary significantly in terms of their sizes, sales growth, and profitability. The FS, calculated as logarithm of total assets, varies from 1.53 (represents $4.618 million) to 10.2 (represents $26.903 billion) with an average value of 5.33 (represents $206.438 million). The SG, measured as the annual percentage change in sales ranges from -99.9% to 189% with a mean value of only 3.32%, which is considered very low. Furthermore, the profitability of firms, proxied by the ROE, ranges from -88.1% to 63.6% and has a mean value of 5.69%.

Robustness Tests of Regression

Tests for normality

Appendix B.1 presents that the probabilities of skewness and kurtosis have zero values, which indicate the abnormal distribution of data. The Chi^2 value equals 0 (less than 0.05). Further, the Jarque-bera test results in Appendix B.2 reveal a p-value of 0. This points out that the model residuals are abnormally distributed because they are significant at the level of 5%. Additionally, the Q-Q plot in Appendix B.3 shows that residuals deviate from the 45-degree line, especially on the tail ends, which indicates that they have abnormal distribution. Hence, the Q-Q plot confirms that the findings of the skewness kurtosis test and Jarque-bera test.

Tests for multicollinearity

Appendix C.1 reports the Pearson correlation coefficients with significance levels of ≤ 0.10. The largest correlation coefficient among the variables is 0.21, that is between the WCME and FS, which is low, suggesting that multicollinearity is not an issue in the regression as coefficient values do not violate the limit introduced by Field (2005) of 0.80 for positive correlations and -0.80 for negative correlations. In Appendix C.2 and C.3, equation (1) and equation (2) produce mean values of variance inflation factor (VIF) of 1.06 and 1.04, respectively, which are less than a mean value of 10; and tolerance values with a minimum of 0.92, that are more than 10 as per the rule of thumb. The FS and ROE variables have the highest individual VIF values of 1.08 and the lowest tolerance values of approximately 0.92. The VIF values of variables and tolerances values met the rule of thumb of VIF values < 10 and tolerance Values >10 as per Field (2005). Accordingly, these findings confirm the Pearson correlation coefficient test results.

Tests for heteroskedasticity

As per Appendix D.1, the white test results of heteroskedasticity reveal a probability value of chi2 statistic that is less than 0.05. The null hypothesis of homoskedasticity can be extremely rejected at 5% significance level suggesting the existence of heteroskedasticity in the residuals. Further, Appendix D.2 presents a graphical depiction of heteroskedasticity, with the fitted values on the X-axis and the residuals on the Y-axis. There is some heterogeneity in the residuals.

Multiple Regression Analysis and Discussions

Equations (1) and (2) are employed to examine the endogenous effect of working capital management efficiency (WCME) and the firm risk-taking (FRT) in selected MENA countries. The regression results are as follow:

4.3.1 Equation (1): The impact of WCME on FRT of firms in MENA countries

Equation (1) is used to examine the effect of WCME on the FRT in selected MENA countries in the presence of the control variables of the FS, the SG, the ROE, and the IT, where the FRT is measured by the capital expenditures ratio (CAPEX) and stock price movements (SPM).

Table 5 presents the regression results of the OLS for equation (1). It can be noticed that the FRT in its two measures (i.e. CAPEX, SPM) is the dependent variable and the WCME is the independent variable. The Table has two regression columns: column (1) is for CAPEX and column (2) is for SPM.

Table 5. The Impact of WCME on the FRT of MENA Firms

Variables	CAPEX	SPM
	(1)	(2)
WCME	-0.00001***	-0.0025***
	(<0.001)	(0.001)
FS	0.0007	-0.964***
	(0.146)	(<0.001)
SG	0.0026	3.870***
	(0.204)	(<0.001)
ROE	0.0004***	-0.123***
	(0)	(<0.001)
IT	-0.0047***	1.895***
	(0.003)	(0.005)
Constant	0.0322***	35.22***
	(0)	(0)
Observations	3,077	3,077
R-squared	0.033	0.038
Adj. R-squared	0.0312	0.0366
Time Effect	NO	NO
Firm Effect	NO	NO

Note: WCME is the working capital management efficiency measured by current assets minus current liabilities, CAPEX is capital expenditures ratio measured by scaling capital expenditures to total assets, SPM is stock price movement computed by the standard deviation of stock prices, FS is firm size measured by Logarithm of total assets, SG is firm sales growth measured by annual percentage change in sales, ROE is return on equity which equals net income divided by total equity, and IT is industry type variable that takes the value of 1 if the firm main business is in the manufacturing sector, and 0 otherwise.

Robust standard errors (p-value) in parentheses: *** The coefficient is significant at 1% level. ** The coefficient is significant at 5% level. * The coefficient is significant at 10% level.

In column (1), the results show a significant negative impact of the WCME on the CAPEX and the finding is significant at a significance level of 1%. The coefficient value is -0.00001. The FS and the SG have coefficients of 0.0007 and 0.0026, respectively. They are insignificantly positively related

to the CAPEX. In contrast, the ROE has coefficient of 0.0004 and it is significantly positively linked to the CAPEX at 1% significance level. Additionally, the IT has a coefficient of -0.0047 and it has a significant negative influence on the CAPEX at 1% significance level.

Column (2) presents a significant negative effect of the WCME on the SPM with a coefficient of -0.0025 and the result is significant at 1% significance level. Each of the FS and the ROE has a significant negative impact on the SPM with coefficients of -0.964 and -0.123 and the result is significant at 1% level, whereas, each of the SG and the IT has a significant positive influence on the SPM with coefficients of 3.870 and 1.895 and the result is significant at 1% level.

According to the results, there is a significant negative impact of the WCME on the FRT measures of CAPEX and SPM. These findings support the hypothesis H_1 that the WCME has a negative impact on the FRT of firms in MENA countries. Furthermore, hypothesis H_{1a}, that postulates negative effect of the WCME on CAPEX as well as hypothesis H_{1b}, that assumes negative influence of the WCME on SPM are confirmed.

Equation (2): The impact of FRT on WCME of firms in MENA countries

Equation (2) is used to examine the influence of the FRT on the WCME in selected MENA countries in the presence of the control variables of the FS, the SG, the ROE, and the IT, where the FRT is calculated by the CAPEX and the SPM.

The OLS regression results for equation (2) are given in Table 6. The WCME is the dependent variable and the FRT in its two measures (i.e.

CAPEX, SPM) is the independent variable. The table has two regression columns: column (1) is for CAPEX on WCME and column (2) is for SPM on WCME.

Table 6. The Impact of FRT on the WCME of MENA Firms

VARIABLES	WCME	WCME
	(1)	(1)
CAPEX	-465.4***	
	(<0.001)	
SPM		-0.602***
		(0.002)
FS	33.57***	32.79***
	(<0.001)	(<0.001)
SG	-3.374	-2.257
	(0.846)	(0.898)
ROE	1.983***	1.749***
	(0)	(0)
IT	33.14***	36.62***
	(<0.001)	(<0.001)
Constant	-135.0***	-129.3***
	(<0.001)	(<0.001)
Observations	3,077	3,077
R-squared	0.069	0.066
Adj. R-squared	0.0678	0.0643
Time Effect	NO	NO
Firm Effect	NO	NO

Note: WCME is the working capital management efficiency measured by current assets minus current liabilities, CAPEX is capital expenditures ratio measured by scaling capital expenditures to total assets, SPM is stock price movement computed by the standard deviation of stock prices, FS is firm size measured by Logarithm of total assets, SG is firm sales growth measured by annual percentage change in sales, ROE is return on equity which equals net income divided by total equity, and IT is industry type variable that takes the value of 1 if the firm main business is in the manufacturing sector, and 0 otherwise.

Robust standard errors (p-value) in parentheses: *** The coefficient is significant at 1% level. ** The coefficient is significant at 5% level. * The coefficient is significant at 10% level.

In column (1), the CAPEX is significantly negatively linked to the WCME. The result is significant at a significance level of 1% and the coefficient is -465.4. Each of the FS, ROE, and IT has a significant positive effect on the WCME at a significance level of 1% with coefficients of 33.57, 1.983, and 33.14, respectively while the SG is insignificantly negatively related to the WCME with a coefficient of -3.374.

The results in column (2) reveal a significant negative influence of the SPM on the WCME with a coefficient of -0.602. This finding is significant at 1% significance level. The coefficients of the FS, ROE, and IT are 32.79, 1.749, and 36.62, respectively. Each of them is significantly positively associated with the WCME at 1% significance level. In addition, the SG has an insignificant negative impact on the WCME where the magnitude of the coefficient is -2.257.

The findings show that the FRT measures of the CAPEX and SPM significantly negatively affect the WCME. These results confirm hypothesis H_2 of negative impact of FRT on the WCME of firms in MENA countries. Moreover, hypothesis H_{2a}, that assumes negative influence of the CAPEX on WCME as well as hypothesis H_{1b}, that postulates negative effect of the SPM on WCME are substantiated. Moreover, the endogenous effect between the WCME and FRT of firms in MENA countries is summarised in Table 7.

Table 7. The Effect between the WCME and FRT of Firms in MENA Countries

VARIABLES	CAPEX	SPM	WCME	WCME
	(1)	(2)	(3)	(4)
WCME	-0.00001***	-0.0025***		
	(<0.001)	(0.001)		
CAPEX			-465.4***	
			(<0.001)	
SPM				-0.602***
				(0.002)
FS	0.0007	-0.964***	33.57***	32.79***
	(0.146)	(<0.001)	(<0.001)	(<0.001)
SG	0.0026	3.870***	-3.374	-2.257
	(0.204)	(<0.001)	(0.846)	(0.898)
ROE	0.0004***	-0.123***	1.983***	1.749***
	(0)	(<0.001)	(0)	(0)
IT	-0.0047***	1.895***	33.14***	36.62***
	(0.003)	(0.005)	(<0.001)	(<0.001)
Constant	0.0322***	35.22***	-135.0***	-129.3***
	(0)	(0)	(<0.001)	(<0.001)
Observations	3,077	3,077	3,077	3,077
R-squared	0.033	0.038	0.069	0.066
Adj. R-squared	0.0312	0.0366	0.0678	0.0643
Time Effect	NO	NO	NO	NO
Firm Effect	NO	NO	NO	NO

Note: WCME is the working capital management efficiency measured by current assets minus current liabilities, CAPEX is capital expenditures ratio measured by scaling capital expenditures to total assets, SPM is stock price movement computed by the standard deviation of stock prices, FS is firm size measured by Logarithm of total assets, SG is firm sales growth measured by annual percentage change in sales, ROE is return on equity which equals net income divided by total equity, and IT is industry type variable that takes the value of 1 if the firm main business is in the manufacturing sector, and 0 otherwise.

Robust standard errors (p-value) in parentheses: *** The coefficient is significant at 1% level. ** The coefficient is significant at 5% level. * The coefficient is significant at 10% level.

The empirical results in Table 7 show an endogenous relationship between the WCME and FRT. In terms of the capital expenditures, this result indicates that MENA firms finance their investments in fixed capital through their working capital- a less costly internal source of financing- compared to external sources of financing. Further, in terms of stock price movement, when MENA firms are risk-seeker by investing in high risk and return projects, they adopt aggressive working capital management and keep lower levels of their working capital. Thus, these acts may jeopardise their liquidity which is a common issue in these countries.

Several studies ascertained the existence of negative relationship between the investments in fixed assets and working capital management efficiency such as Akbar et al. (2022), Appuhami (2008), Baños-Caballero et al. (2010), Fazzari and Petersen (1993), Jabbouri et al. (2023), Mielcarz et al. (2018), and Rehman et al. (2017).

Fazzari and Petersen (1993) argued that the working capital competes with fixed capital for the limited pool of finance. Furthermore, other things equal, when firms select to decrease (increase) working capital investment, fixed capital investment rise (fall). As noted by Salehi (2012), the investments in working capital and fixed capital are alternative uses of financial resources and the investment in fixed assets is not independent from the liquidity position and cash flow patterns.

Jabbouri et al. (2023) found a significant negative relationship between the investment in fixed assets and working capital management efficiency of firms in MENA region. The larger investments in fixed assets are

associated with aggressive working capital management applied by managers. Appuhami (2008) documented a significant negative impact of capital expenditures on the working capital management. Companies tend to efficiently manage working capital when they tend to invest in capital expenditures with the purpose of having profit from growth opportunities. According to Mielcarz et al. (2018), capital expenditures were found to exercise a negative influence on the working capital investments for financially constrained firms. However, when firms have insufficient internal cash flows and external funds for smoothing capital investments, they finance capital expenditures by primarily depleting cash reserves and increasing trade payables.

Akbar et al. (2022) established a significant negative impact of working capital on the capital expenditures. Excess funds tied up in the working capital adversely affect the firm's ability to make long-term capital expenditures. Firms use their idle resources tied up in the working capital to boost investments in fixed assets. Moreover, Ding et al. (2013) argued that working capital management efficiency can allow firms to channelise their excess funds towards capital investments and alleviate financial constraints. As argued by Banerjee and Dutta (2022), firms shift their investments from working capital to capital expenditures when the economic environment is more favourable for investment.

Baños-Caballero et al. (2014) found an inverted U-shape relationship between the net working capital and stock performance which implies the existence of optimal level of working capital investment that balances the costs with benefits and maximise the firm's value. Faulkender and Wang (2006) claimed that, on average, an additional dollar invested in net working capital is worth less than an additional dollar held in cash. The increase in net

working capital, on average, would decrease the excess stock return, and this reduction would be larger for firms with limited access to external sources of financing. Also, Bandara (2015) found a negative relationship between the degree of aggressiveness of working capital investment policy and the market value of stock prices.

Moreover, according to Aktas et al. (2015), the investment channel suggests that future stock performance is negatively linked to positive excess net working capital because the release of cash allow the firm to undertake additional efficient investment. Hence, MENA Firms with positive excess net working capital have, on average, significantly lower stock performance. These firms invest, on average, less in capital expenditures, but undertake slightly more cash acquisition.

As a result, the endogenous relationship between the working capital management efficiency and firm risk-taking in MENA countries can be better utilised to improve the financial performance and maximize the shareholders' wealth.

Summary of Hypotheses Testing

Table 8 concisely presents the results of the hypothesised relationships of the study. The results from the analyses are considered after the data analysis and all hypotheses are confirmed.

Table 8. The Results of Hypotheses Testing

			Results of Analysis		
Hypothesis	Relationship	Hypothesis Sign	Coefficient	P-Value	Result
$H_{1:}$	WCME ↔ FRT	-			
H_{1a}	WCME → CAPEX	-	-0.00001	<0.001	Accepted
H_{1b}	WCME → SPM	-	-0.0025	0.001	Accepted

$H_{2:}$	FRT ↔ WCME	-			
H_{2a}	CAPEX → WCME	-	-465.4	<0.001	Accepted
H_{2b}	SPM → WCME	-	-0.602	0.002	Accepted

Conclusions

The aim of this study is to find out the nexus between the working capital management efficiency and risk-taking of firms in MENA countries. The findings reveal that there is a negative endogenous relationship between the working capital management efficiency and firm risk-taking measures of capital expenditure ratio as well as stock price movement. Firms in MENA countries with high working capital are perceived as risk-averse firms which invest less in capital expenditures or they have low stock performance. This risk-taking attitude might be due to several reasons such as financing the day-to-day activities and improving the performance, the existence of investment constraints, the fragility-competition, or the unavailability of proper investment opportunities. Conversely, MENA firms with low working capital are risk-seeking firms as they invest more in capital expenditures or they have high stock performance, with the aim of improving profitability and facilitating future growth, but this risk-taking attitude might be at the expense of liquidity.

Firms in MENA countries must cautiously manage their working capital to smooth their operations, while also considering the risks that can lead to growth opportunities. Firms can better understand their economic landscape as they experience fluctuations in oil market, exchange rates, and inflation so they can adjust their working capital strategies to ensure that they are not too reliant on external factors. For instance, firms can utilise financial hedging tools or keeping foreign currency reserves to mitigate the effect of

exchange rate movements on their working capital. Also, firms in the oil and gas sector need to manage large capital expenditures while maintaining working capital efficiency; and firms in retailer and consumer goods -that face seasonality in sales, changes in consumer demands, and supply chain disruptions- can balance their working capital with the risk-taking in terms of market expansion or product innovation.

Firms in MENA countries can also consider the political risks that affect the flow of goods, services, and capital which aid them in taking informed decisions about working capital efficiency and political risk exposure. For example, firms can diversify their operations across multiple MENA countries in order not to depend on one market as well as seek local partnerships to share some of the risks when entering new markets. Moreover, firms can optimise their working capital and cash conversion cycle with a view to delivering countless benefits which include increased cash flow, reduced costs, enhanced profitability, and improved shareholders value. By regularly forecasting their cash flows, MENA firms can maintain liquidity while planning for high-risk investments such as launching new products or expending into new markets.

As MENA firms face high financing costs due to interest rates, developing strong and long run relationships with banks and financial institutions can better provide better financing options, more favourable terms, and access to short run liquidity when needed. Further, the strategic use of debt via managing the risk of over-leveraging and the related financial instability can free up capital for growth and expansion. Strong corporate governance procedures are necessary for firms to gain the confidence of their clients, investors, and financial partners. Firms will be able to make better balanced decisions about

working capital and strategic investments with the support of clear and transparent financial reporting, which will also assist control risk perception.

Firms in MENA countries can strike a balance between working capital efficiency and risk-taking by concentrating on strategic risk reduction, liquidity management, financial discipline, and local market dynamics. Assuring that risk-taking is in line with the company's long-term objectives and financial stability requires constant observation of the political, economic, and competitive environment.

In conclusion, the study shows that there is a negative endogenous association between the working capital management efficiency and risk-taking of firms in MENA countries. The study is expected to yield valuable insights and serve as a springboard for further investigation into the efficiency of working capital management.

Acknowledgements

The authors would like to thank the editor and anonymous referees who kindly reviewed the earlier version of this manuscript and provided insightful comments.

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Appendices

Appendix A The Acronyms and Definition of Measurements of Study Variables

Variables	Acronym	Definition
Endogenous variables		
Firm risk-taking:	*FRT*	
Capital expenditures	*CAPEX*	Capital expenditures scaled by the total assets
Stock price movement	*SPM*	Standard deviation of the sum of random stock prices
Exogenous variables		
Working capital management efficiency	*WCME*	Current assets - current liabilities
Control variables		
Firm size	*FS*	Logarithm of total assets
Sales growth	*SG*	(Current year sales/ previous year sales) - 1
Return on equity	*ROE*	Net income/ total equity
Industry type	*IT*	This dummy variable takes the value of 1 if the firm main business is in the manufacturing sector, and 0 otherwise.

Appendix B.1-B.3 Normality Tests

Appendix B.1 Skewness Kurtosis Test

Skewness and kurtosis tests for normality

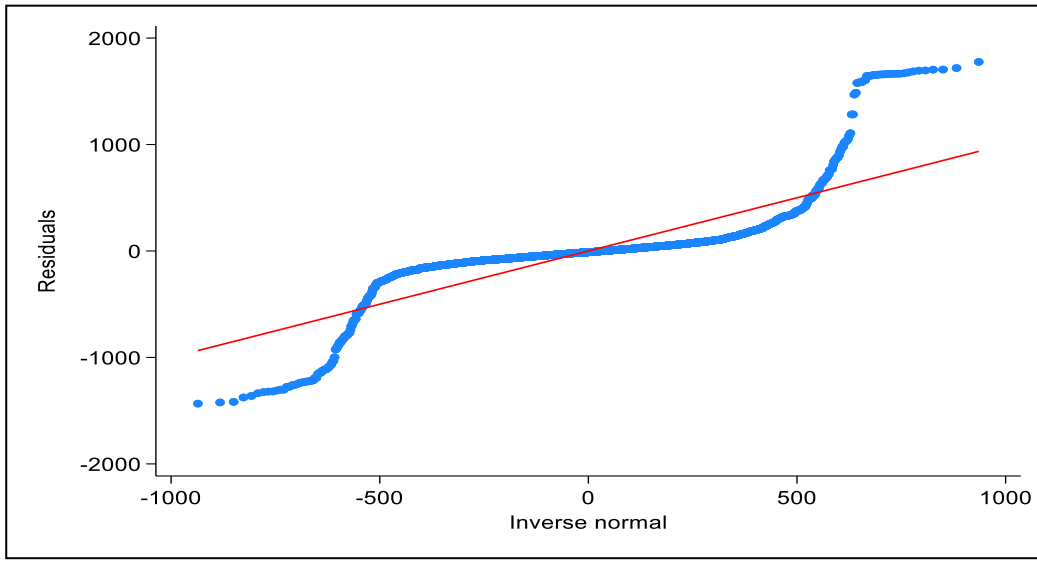
		----- Joint test -----			
Variable |	Obs	Pr(skewness)	Pr(kurtosis)	Adj chi2(2)	Prob>chi2
resid |	3,077	0.0000	0.0000	953.32	0.0000

Appendix B.2 Jarque-Bera Test of Normality

Jarque-Bera normality test: 4.2e+04 Chi(2) 0

Jarque-Bera test for Ho: normality:

Appendix B.3 Normality Test via Q-Q Plot for Residuals



Appendix C.1-C.3 Multicollinearity Tests

Appendix C.1 Pearson Correlation Coefficient

	CAPEX	SPM	WCME	FS	SG	ROE	IT
CAPEX	1						
SPM	-0.0732	1					
WCME	-0.046	-0.0744	1				
FS	0.0386	-0.1187	0.2147	1			
SG	0.0507	0.0461	0.0318	0.0767	1		
ROE	0.1535	-0.1314	0.143	0.1031	0.1816	1	
IT	-0.0589	0.0617	0.0311	-0.1378	-0.0107	0.0001	1

Appendix C.2 Variance Inflation Factor for Equation (1)

Variance Inflation Factor for the Impact of WCME on CAPEX

Variable	VIF	1/VIF
FS	1.09	0.916485
ROE	1.08	0.928889
WCME	1.07	0.934169
SG	1.04	0.957627
SPM	1.04	0.961822
IT	1.03	0.974582
Mean VIF	1.06	

Variance Inflation Factor for the Impact of WCME on SPM

Variable	VIF	1/VIF
ROE	1.08	0.922134
FS	1.08	0.923837
WCME	1.07	0.930662
SG	1.04	0.963138
CAPEX	1.03	0.967176
IT	1.03	0.974418
Mean VIF	1.06	

Appendix C.3 Variance Inflation Factor for Equation (2)

Variable	VIF	1/VIF
ROE	1.08	0.923879
FS	1.05	0.956575
SG	1.04	0.956984
SPM	1.04	0.960731
CAPEX	1.03	0.969719
IT	1.03	0.975591
Mean VIF	1.04	

Appendix D.1-D.2 Heteroskedasticity Tests

Appendix D.1 White Test Results of Heteroskedasticity

White's test		
H0: Homoskedasticity		
Ha: Unrestricted heteroskedasticity		
	Equation (1)	Equation (2)
chi2(116)	1695.08	1785.81
Prob > chi2	0.0000	0.0000

Appendix D.2 Graphical Depiction of Heteroskedasticity