Working Capital Management Efficiency, Cash Holdings, and Market Value of Indian Listed Firms

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Abstract

This study aims to empirically explore the effect of working capital management (WCM) efficiency on the market value of the firms. The study also aims to examine the role of cash holdings in the nexus between WCM efficiency and the market value of the sample firms. The generalized method of moments (GMM) has been used for empirical investigation based on data collected for 700 Indian-listed firms for ten years (2012-2021). We have found that firms with WCM efficiency {shorter net trade cycle (NTC)} have generated higher market value {higher earnings price (EP) ratio} in the Indian context. Cash holdings are observed to have an interactive impact on the positive connection between efficient WCM and the market value of the sample firms. In the case of firms with above-median operating working capital (OWC), this relationship is steeper if they have positive cash holdings instead of negative cash holdings. However, there is no interactive impact of cash holdings on this relationship in the case of firms with below-median OWC.

Keywords: Efficient Working Capital Management, Market Value, Cash Holdings, Nexus, Indian Listed Firms

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1. Introduction

Investment in working capital (WC) pertains to corporate finance's most crucial short-term decisions (Ben-Nasr, 2016). WC is traditionally viewed as the difference between current assets and current liabilities, where elements of current assets and current liabilities can be further categorized as operational and financial (Hawawini et al., 1986). The operational portion of WC is a measure of firms' liquidity, whereas the financial aspect of WC represents the sources of liquidity (Mazlan & Leng, 2018). Operating working capital (OWC) typically comprises components (inventories, receivables, and payables) pertaining to the day-to-day operations of firms (Kieschnick et al., 2013). The management of OWC has made a vital contribution to the enhancement of the market value of firms (Wasiuzzaman, 2015). A sound working capital management (WCM) policy can improve the competitive advantages of firms on a sustainable basis (Boisjoly et al., 2020). With an efficient WCM, a firm can decrease its dependency on external funding options and utilize the freed-up funds for its investments in growth assets and improve financial flexibilities (De Almeida & Eid Jr, 2014). Efficient WCM impedes the riskiness of a firm and facilitates cheaper financing (Autukaite & Molay, 2011). Efficient WCM reduces firms' likelihood of facing financial constraints in the future and generates higher share prices (Dhole et al., 2019).

The majority of the research in the area of WCM has focused on examining the impact of WCM efficiency on the profitability of firms (Deloof, 2003; Mun & Jang, 2015; Osama & Al-Gazzar, 2020). However, profit maximization may not always result in the market value enhancement of firms (Le, 2019). Profitability is a short-term measurement of performance, and its purpose as firm scrutiny is sometimes misgiving due to its manipulability, whereas firm value is a long-term measurement of firm performance (Wasiuzzaman, 2015). The market value appropriately incorporates firms' risks and minimizes distortions that may arise due to accounting conventions and tax laws (Baños-Caballero et al., 2014; Afrifa & Tingbani, 2018). Indeed, in the extant literature on efficient WCM, researchers have employed Tobins'Q (Afrifa & Tingbani, 2018), market-to-book ratio (MBR) (Le, 2019), and excess stock returns (Aktas et al., 2015) as proxies for the market value of firms. But, MBR, Tobin's Q, and excess stock returns are criticized in literature due to several empirical shortcomings. The earnings price (EP) ratio addresses the limitations of Tobins'Q and MBR as it does not require the market value of debt and replacement cost, and it reflects the growth opportunities of firms. Further, EP ratio computation is not complicated as that of excess returns. Despite the unique advantages of the EP ratio, it has not been considered as a market value measure in the body of knowledge on WCM efficiency. The financial portion of WC represents the cash holdings level. It is computed as the excess of the sum of cash and marketable securities over a sum of short-term debt and the current portion of long-term debt (Mun & Jang, 2015). Cash is the most liquid but highly uneconomical asset as it is associated with opportunity cost (Mun & Jang, 2015). Firms hold cash to make payments for their consumption of resources on time (Deloof,2003; Afrifa, 2016). Firms with a fluctuating trend in cash flow need higher cash holdings (Bates et al., 2009). As far as the impact of cash holdings on the nexus between OWC and the performance of firms (profitability or market value), the literature

is divided. For instance, (i) Mun and Jang (2015) observe an interactive impact of cash holdings in the case of firms with a positive level of WC and no significant interactive impact in the case of firms with a negative level of WC, (ii) Osama and Al-Gazzar (2020) find an absence of interactive impact of cash holdings on the nexus between OWC and profitability, and (iii) Afrifa (2016) finds that investment in OWC and firm market value has a concave (inverted U-shaped) association in the absence of cash flow effect. But the association becomes convex (U-shaped) between value and OWC considering with interaction effect of cash flow. With this backdrop, this paper attempts to conduct an empirical examination of the impact of WCM efficiency on the market value of firms (proxied by EP ratio) in an emerging market setting. Further, we explore whether cash holdings have an interactive impact on the efficient WCM-market value nexus in the Indian context. This study addresses the following research questions-

- How does efficient WCM influence the market value of the firms?
- How do the individual components of WCM efficiency impact the market value of the firms?
- Whether cash holdings have an interactive impact on the relationship between efficient WCM and the market value of the firms?

We have collected data for ten years (2012 to 2021) from the Centre for Monitoring Indian Economy (CMIE) database for 700 firms listed in the Bombay Stock Exchange (BSE), India. The generalized method of moments (GMM) system has been used in the empirical study to address the above-stated research questions. We find that WCM efficiency has a positive impact on the EP ratio of the sample firms. Further, the efficiency in individual components (inventory days, account receivable days, and accounts payable days) of WCM is also found to be having a positive influence on the EP ratio of the Indian listed firms. The cash holdings have a moderating effect on the association between efficient WCM and EP ratio for firms with above median OWC. The effect is steeper for a firm with positive cash holdings as compared to firms with negative cash holdings in the case of above-median OWC firms. However, there is no significant moderating effect of cash holdings in the case of below-median OWC firms. Further, we have performed a robustness test by using Tobin's Q as a proxy for the market value of firms in establishing an efficient WCM and market value relationship. We have also tested the robustness of the interaction effect of cash holdings in the upper and lower quartiles of firms based on NTC. The results of the robustness test are aligned with the main findings.

This research adds value to the extant literature and practitioners in four ways; first, to the best of our knowledge, this is perhaps the first study to establish efficient WCM-EP ratio nexus in the Indian context. Second, this study reveals the influence of individual components of WCM efficiency on the market value of firms. Third, the investors can leverage the findings of this study in the construction and rebalancing of their portfolios. Fourth, the interactive impact of cash holdings on the efficient WCM-EP ratio nexus enriches the insights to the managers on the varying degree of the

impact of efficient WCM on firm values with respect to the cash holdings of firms. The remainder of the paper is organized as follows: Section 2 deals with a review of the existing literature and formulation of hypotheses, section 3 provides details of data collection, description of variables and research methodology, section 4 deals with empirical results and its discussion, section 5 includes robustness test and, section 6 spells out the conclusion and scope for further research.

2. Literature review and formulation of hypotheses

2.1. Efficient WCM

A conversion cycle, being a holistic approach to liquidity analysis, measures the time period between the occurrence of cash outflows and cash inflows in the day-to-day operating activities of a firm (Richards & Laughlin, 1980). The conversion cycle is an extensively used metric for efficient working capital management. Cash conversion cycle (CCC) (Richards & Laughlin, 1980) and net trade cycle (NTC) (Shin & Soenen, 1998) are the most widely used variants of the conversion cycle in WCM literature, which is arrived at by subtracting accounts payable days(APD) from the sum of inventory days(IND) and accounts receivable days(ARD). NTC is relatively easy to use, and its construct considers sales as a common denominator (Shin & Soenen, 1998).

2.2. Impact of efficient WCM

WCM literature documents evidence for the benefits of efficient WCM, such as efficient WCM reduces the level of reinvestment (Boisjoly et al., 2020), increases free cash flows(Le, 2019; Kieschnick et al., 2013), enables the firm to pursue long term investments(Aktas et al., 2015; Akbar et al., 2020), reduces refinancing and interest rate risks (Baños-Caballero et al., 2016), eases the financial constraints (Dhole et al., 2019), acts as a new source of funds (Aktas et al., 2015), reduces debt(Akbar et al.,2020), and leads to higher firm value (Adam & Quansah, 2019).Efficient WC practices enhance liquidity and performance and not necessarily one at the expense of the other, rather, it reduces the level of OWC reinvestment necessary for maintaining the going concern value of the firm (Boisjoly et al., 2020). The investment in OWC is one of the important determinants of the free cash flows (FCF) of a firm (Kieschnick et al., 2013). The total present value of expected future FCF is used to measure a firm's value under the discounted cash flow method of firm valuation (Le, 2019; Kieschnick et al., 2013). Efficient WCM influences FCF and consequently enhances firms' value (Le, 2019). An additional fund tied up in OWC resources in the form of inventories and receivables reduces the availability of funds for taking up growth-oriented projects, which have the potential to create firm value (Akbar et al.,2020). Efficient WCM practices enable a firm to take up long-term investment opportunities and fund a cash acquisition; this investment is a potential channel by which efficient WCM influences firm value (Aktas et al., 2015).

A positive OWC requirement needs financing, and different sources of finance may differ in terms of the associated cost and risk. How firm finance its WC requirements also determines its performance (Baños-Caballero et al., 2016). An aggressive WC financing strategy involves a larger portion of short-term debt, whereas a conservative WC financing strategy involves the dominance of

long-term debt. Short-term debt has the advantage of low-interest cost, favorable credit conditions, and low agency cost (Mahmood et al., 2019). However, excessive employment of short-term debt in WC financing may outweigh its advantages due to higher interest costs and refinancing risks (Baños-Caballero et al., 2016). Firms that are inefficient in WCM rely more on short-term debt (Wang, 2019), which pushes a firm toward bankruptcy risk. Under the conservative financing policy, the firm finances its non-current assets and a portion of current assets with long-term sources of funds. Conservative WC financing policies reduce the cost of capital and thereby enhance the market value of a firm (Adam & Quansah, 2019). Further, a firm with WCM efficiency has a higher degree of financial flexibility. Financial flexibility represents the ability of a firm to access its financing needs at a low cost (Mahmood et al., 2019). Therefore, a firm with efficient WCM can finance a greater portion of its WC requirements with short-term debt without adversely affecting its performance due to lower refinancing and interest rate risks (Baños-Caballero et al., 2016).

Financially constrained firms experience difficulties in raising external funds, and therefore, they generate higher internal funds by improving their WC efficiency. Cash holdings increase for those firms which have reduced inventory days and reduced receivable days (Bates et al., 2009). A firm with higher liquidity can smoothen its investments in fixed assets without the need for costly external funds (Fazzari & Petersen,1993). Efficient WCM can provide a firm with the newest source of internally generated funds to take up new growth investment opportunities (Aktas et al., 2015). Thus, efficient WCM reduces the exposure of firms to financial constraints (Baños-Caballero et al., 2014; Dhole et al., 2019). There is a positive association between WCM inefficiency and leverage ratio such that higher WCM inefficiency leads to a higher leverage level, and firms that fall in the WCM-leverage vicious cycle pay the price of inefficient WCM in the form of a higher cost of debt caused by larger external finance, which may push these firms to face the risk of bankruptcy (Akbar et al.,2020). Aggressive current asset investment policies involve a lower level of investment in OWC resources (efficient WCM), whereas conservative policies involve holding a larger amount of OWC resources (inefficient WCM). Firms following conservative WC policy try to reduce their short-term liquidity risk at the expense of decreased return on investment (Akbar et al.,2020). Thus, shareholders are willing to offer higher value to firms that adopt an aggressive OWC investment policy (Adam & Quansah, 2019).

2.3. Impact of efficient WCM on the market value of firms

In the studies on the impact of efficient WCM on the market value of the firms, researchers have used various proxies for market value, such as Tobins'Q (Mohamad & Saad, 2010; Abuzayed, 2012; Wasiuzzaman, 2015; Baños-Caballero et al., 2014; Ben-Nasr, 2016; Saravanan et al., 2017; Chang, 2018; Afrifa & Tingbani, 2018, Boisjoly et al., 2020; Sawarni et al., 2020), market to book ratio (MBR) (Le, 2019), excess stock returns (Autukaite & Molay, 2011; De Almeida & Eid Jr, 2014; Aktas et al., 2015; Salehi et al., 2019). Literature is divided on the existence and direction of the impact of WCM efficiency on the market value of firms. The first group of researchers have

documented that the efficient WCM has a linear impact on the market value of firms. The second group has found the existence of a nonlinear impact of WCM efficiency on the market value of firms. The third group of studies has reported that WCM efficiency does not affect the market value of firms.

2.3.1. Linear impact of WCM efficiency on the market value of firms

Most of the previous studies have reported the linear impact of WCM efficiency on the market value of firms. In an empirical study of 172 Malaysian listed firms for five years (2003-2007), Mohamad and Saad (2010) find that efficient WCM has a positive association with Tobin's Q of firms. Wasiuzzaman (2015), in the empirical study of 192 Malaysian listed firms for eight years (2000-2007), has found that firms minimize their investment in WC resources to enhance higher market value. In a global sample of 31,612 listed firms pertaining to 46 countries for the period of 1994–2011, Chang (2018) finds that industry-adjusted CCC has a negative impact on the industry-adjusted Tobin's Q, indicating that aggressive WC policy enhances the market value of firms. Afrifa and Tingbani (2018), in their study of 802 British quoted firms for the period 2004-2013, have found that reducing the level of WC reduces the requirement of external financing and cost of capital and hence improves the firms' Tobin's Q. Boisjoly et al. (2020), in their study on US listed firms for a sample period of 27 years (1990-2017) have observed that firms engage continuously in improving WC efficiency in order to generate higher market value (proxied by Tobin's Q).In an empirical study of 414 Indian listed firms for seven years (2012-2018), Sawarni et al. (2020) have depicted that efficient WCM results in superior firm performance and commands higher market value measured as Tobin's Q. Le (2019), in an empirical study of a sample of 497 Vietnamese listed firms for ten years (2007-2016), has observed that a decrease in CCC is strongly associated with an increase in MBR. In a study of 276 listed firms in France over the 2003–2009 period, Autukaite and Molay (2011) have found that shareholders undervalue the additional investment in WC resources. De Almeida and Eid Jr (2014), using samples of Brazilian firms for the period 1995 to 2009, have found that increasing investment in OWC negatively influences the excess stock returns of the sample firms.

Some researchers have also established the causal relationship between the components of OWC and the market value of firms. In a study of the relationship of efficient management of components of OWC on firm value, Sawarni et al. (2020) have found that a reduction in inventory holding days and prompt payment to suppliers have increased Tobin's Q of Indian listed firms. Firms with shorter collection periods have higher Tobin's Q (Nguyen et al., 2020). A reduction in days payable has a positive influence on the market value of Vietnamese-listed firms (Boisjoly et al., 2020). Inventory turns, and receivable turns positively impact Tobin's Q (Boisjoly et al., 2020).

2.3.2. Nonlinear impact of WCM efficiency on the market value of firms

Some researchers have reported the nonlinear nexus of efficient WCM-market value. In the study of listed non-financial firms of the United Kingdom for the period 2001-2007, Baños-Caballero et al. (2014) have reported an inverted U-shaped (concave) affiliation between investments in OWC and the firm's market value (proxied by Tobin's Q). In an empirical investigation of US-listed firms

from the period 1982 to 2011, Aktas et al. (2015) have found the relation between the level of OWC and excess stock return to be nonlinear, and the relationship is positive for firms with negative excess OWC and negative for firms with positive excess OWC, and consequently, the firm that converges to optimal OWC level improves its performance in terms of higher stock returns. Using a multinational sample consisting of 558 listed firms from 54 countries for the period 1981 to 2012, Ben-Nasr (2016) has reported the inverted U-shaped nexus between OWC and market value (proxied by Tobin's Q). Further, they have observed that OWC has a positive influence on the market value of firms that operate below the optimal level of OWC, whereas firms with above optimal OWC have a negative effect on their market value. Saravanan et al. (2017), using 261 Indian listed firms for 12 years (2004-2015), have found a positive relationship between investment in OWC and Tobin's Q at the low level of OWC and a negative relationship at the higher level of OWC.

2.3.3. No impact of WCM efficiency on the market value of firms

Diverse from a linear or nonlinear view, some researchers have found no effect of OWC on the market value of firms. In an empirical investigation of 52 Jordanian listed firms for nine years (2000-2008), Abuzayed (2012), has observed that the market has ignored liquidity in assessing the performance of sample firms and found an insignificant impact of OWC on Tobin's Q. In a study of 91 Iranian listed firms for eight years (2009-2016), Salehi et al. (2019) have not found a significant influence of OWC on the excess stock returns of sample firms.

2.4. Hypotheses on the impact of WCM efficiency and efficiency of WCM components on the market value of firms

The proxies for the market value that were employed by the previous studies have the following drawbacks. Tobin's Q and MBR are criticized on account of (i) the numerator of these ratios requires the estimation of the market value of debt while the market value of debt is not easily available as debt securities of most of the firms are not traded in the emerging markets, (ii) the book value of assets may not be equivalent to market replacement value and, (iii) these ratios are used for several reasons such as measuring the performance of management, intangibles, and agency problems while, not focusing on growth opportunities of firms (Adam and Goyal, 2008). The original version of Tobin's Q morphed into a simplified version of Tobin's Q and is frequently used in finance and law literature, but macroeconomists reject this simplistic version on account of measurement errors. The simplified Tobin's Q is derived based on the book value of assets that may produce biased estimates on account of the omitted assets (for example, intangibles), and it does not consider the differences among firms in terms of the composition of assets and depreciation methods (Bartlett and Partnoy, 2018). Some researchers have used excess stock returns as an outcome measure, but they have employed various approaches to computing the benchmark returns in arriving at the excess stock returns. For example, while formulating the benchmark return, Aktas et al. (2015); De Almeida and Eid Jr (2014); Autukaite and Molay (2011); and Chauhan (2021) have used a combination of book-to-market (BMR) ratio and size characteristics to formulate benchmark portfolios, whereas Salehi et

al., (2019) have taken capital asset pricing model to assign expected return, and Lin and Lin (2021) have used risk-free rate as a benchmark rate.

EP ratio, a popular valuation metric, its construct portrays earnings generated per unit of equity investment (Umutlu et al., 2021). EP ratio signals whether a firm is under or overvalued (Umutlu et al., 2021), and a high (low) ratio indicates undervalued (overvalued) stock. EP ratio provides a fundamental valuation perspective and explains variation in stock return (Arshad, 2021). The portfolio with high EP ratio stocks has a high risk-adjusted return than the portfolio with low EP ratio stocks (Basu, 1983). The EP ratio influences the trading activities of market participants (Camilleri & Galea, 2019) in rebalancing their portfolios. Liu et al. (2019) find the EP ratio as a significant factor in capturing the value effect in the world's second-largest stock market (China stock market). In the study of the emerging market of Taiwan, Hsu et al. (2015) depict that the EP ratio is superior to the book-to-market ratio as a value-growth proxy. Therefore, the EP ratio is another unique and appropriate proxy for the market value of firms due to the above-stated reasons. However, the extant literature on WCM does not document empirical investigations on the impact of WCM efficiency on the market value of firms proxied by the EP ratio. Further, the body of knowledge on WCM is silent on the influence of individual components of WCM on the market value of firms proxied by the EP ratio. Hence, this study formulates the following hypotheses to empirically examine the impact of WCM efficiency and efficiency in the individual components of WCM on the market value of firms.

- H1.1 Efficient WCM (proxied by NTC) positively influences the market value (proxied by EP ratio) of the Indian listed firms.

- H1.2 Efficient Management of inventories of Indian listed firms (proxied by IND) has a positive influence on their market value (proxied by EP ratio).

- H1.3 Efficient Management of accounts receivables Indian listed firms (proxied by ARD) positively influence their market value (proxied by EP ratio).

- H1.4 Efficient Management of accounts payables of Indian listed firms (proxied by APD) positively influences their market value (proxied by EP ratio).

2.5. Impact of cash holdings on the nexus between efficient WCM and market value of firms

2.5.1. Cash holdings

Firms hold cash to circumvent the risk of unanticipated cash shortfall, even though it involves opportunity costs (Mun & Jang, 2015). Bates et al. (2009) support the view that a precautionary motive explains holding a high cash balance, i.e., the firm holds cash to make it ready to manage adverse shocks. A firm with higher investment opportunities has large cash holdings so that it can finance the investment requirements and insulates itself against possible adverse macroeconomic shocks and financial distress (Maheshwari & Rao, 2017). The negative aspect of cash holdings involves opportunity cost, as firms do not invest in profitable opportunities to hold cash. Further, as

per the free cash flow hypothesis, managers tend to mismanage cash when they are given excess cash (Jensen, 1986). Cash holdings increase agency conflicts between managers and shareholders because of the potential of its subjective use in favor of the former. If a firm holds more cash, then it does not have a need to raise funds from the issuance of debt securities. However, managers become undisciplined in the absence of debtholders (Park & Jang, 2013).

2.5.2. Cash holdings and working capital efficiency

The cash holdings level can be used as a proxy for the capability of a firm to generate cash in the management of WC resources (Mun & Jang, 2015; Osama et al., 2020). In the case of firms with positive OWC, a positive (negative) cash holdings level indicates inefficient (efficient) cash generation capabilities (Mun & Jang, 2015).

2.5.3. Impact of cash holdings on WCM efficiency -market value nexus

In the empirical study of 298 US restaurant firms for the years 1963–2012, Mun and Jang (2015) have partitioned sample firms into two WC groups (positive and negative) and have made an investigation of the interactive role of cash holdings (positive and negative) on WC-profitability relationship and report that the presence of positive cash holdings steepens the prevailing positive effect of WC efficiency on the profitability in case of firms having positive WC. They further state that the presence of negative cash holdings does not affect the positive impact of efficient WCM on the profitability of firms with positive WC. However, they observe that both positive and negative cash holdings do not influence the efficient WCM profitability nexus in the case of firms with negative WC. Afrifa (2016), in the empirical study of 6926 small and medium enterprise firms of the United Kingdom for ten years (2004-2013), have found an inverted U-shaped impact on the nexus of OWC-market value of sample firms in the absence of cash holdings, while it has got converted into a U shaped impact on the OWC-market value nexus after taking cash holdings interactive impact into consideration. In the study of 134 consumer-goods firms in the Middle East and North Africa, Osama et al. (2020), have divided the firms into two OWC groups(positive and negative) and observed the absence of the interactive impact of cash holdings (positive and negative) on the efficient WCM-market value nexus.

2.6. Hypotheses on the impact of cash holdings on the nexus between WCM efficiency and market value of firms

The study of Mun and Jang (2015) has the following limitations (i) it is based on data for the restaurant sector only, (ii) it does not investigate the impact of WCM efficiency on the market value of firms, and (iii) it has grouped firms based on conventional WC rather than OWC. In this context, the studies by Afrifa (2016) and Osama et al. (2020) have addressed some of these three limitations of the work of Mun and Jang (2015), i.e., Afrifa (2016) has employed market value as the dependent variable and Osama et al. (2020) grouped firms based on OWC. However, Afrifa (2016) and Osama et al. (2020) have considered the data from the SMEs / consumer goods sector, i.e., the findings of these studies cannot be generalized as they are not based on the broader sample. Further, these studies

have employed either profitability (Osama et al., 2020) as an accounting performance measure or Tobin's Q (Afrifa, 2016) as a proxy for market value. Therefore, our study aims to address the limitations of the previous studies by considering a broader sample representing all the sectors of the Indian economy, EP ratio as a proxy for the market value of firms. We have classified the sample firms into two groups based on their NTC in relation to the median NTC of the sample. Based on the above discussion on the interactive impact of cash holdings on the nexus between WCM efficiency and firm performance, we presume that Indian listed firms with above-median NTC to be having a steeper influence of positive cash holdings on the impact of efficient WCM on their market values and state the hypothesis as below:

- H2.1: Cash holdings (both positive and negative) have a positive impact on the efficient WCM-market value nexus of Indian firms with above-median NTC.

We also presume that Indian listed firms with below-median NTC to be having no impact of cash holdings (both positive and negative) on the influence of efficient WCM on their market values and state the hypothesis as below:

- H2.2: Cash holdings (both positive and negative) have no influence on the efficient WCM-market value nexus of Indian firms with below-median NTC.

3. Research Methodology

3.1. Sample and data collection

Data for our study is obtained for firms listed at the Bombay Stock Exchange (BSE) for the period 2012 to 2021. Only listed firms are considered to ensure data reliability, as these firms are subjected to stringent audit norms and prudent disclosure obligations. ProwessIQ is used to query data from the Centre for Monitoring Indian Economy (CMIE) database. Data are retrieved for all firms forming part of the BSE ALLCAP index constituting 1084 firms. Following Le (2019), we have excluded 119 firms operating in the banking, financial, and insurance sectors as these firms are subject to separate regulation norms, differ in disclosure requirements, and have distinct business models. Firms with missing data points are removed. Following (Baños-Caballero et al., 2016; Akbar et al.,2020), only firms having consecutive data for five years are considered. Firms with extreme values (1% of the sample) are excluded from the sample. Following Wang (2019), firms having negative book values are also excluded from the sample. This has resulted in the final sample of 700 firms with data ranging for ten years from 2012 to 2021, constituting an unbalanced data of 6308 firm years.

3.2. Variable Selection

The variables are selected based on our research objectives and considering previous studies in the extant literature.

3.2.1. Dependent Variable

The earnings price(EP) ratio (EPR) is a widely used valuation metric that represents earnings generated per unit amount of equity investment (Umutlu et al., 2021). Following Kheradyar et al. (2011), the EPR is taken as earnings per share divided by market price per share. It is the reciprocal of the price-earnings (PE) ratio.

3.2.2. Independent variable

Following Sawarni et al. (2020), the net trade cycle (NTC) is taken as a proxy for efficient WCM, where NTC = (inventory + accounts receivable -accounts payable) •365/Sales. The components of NTC, i.e., inventory days (IND), accounts receivable days (ARD), and accounts payable days (APD), are taken as explanatory variables individually, where IND = inventory • 365/ Sales, ARD = accounts receivable • 365 /sales, and APD =account payable • 365 /sales)

3.2.3. Control Variables

Following Aktas et al. (2015), we have calculated book to market ratio (BMR) as the book value of equity divided by the market value of equity. It controls the stock return variation predictability (Kheradyar et al., 2011). Following Kieschnick et al. (2013), we have computed dividend yield (DIY) as dividend paid divided by the market value of equity. The larger firm has intense analytics, reduced information asymmetry, and enjoys easy access to the capital market, whereas the smaller firm has limited choice to get finance for their OWC requirement (Hill et al., 2010). To control the effect of capital market accessibility, size (SIZE) is computed as natural logarithm of the market value of equity (Hill et al., 2010). Leverage (LEV) accounts for the cost of capital and the effect of debt financing on WC (Baños-Caballero et al., 2016). Following Saravanan et al. (2017), we have measured LEV as (short-term debt + long-term debt) / equity. A firm with higher profitability can reduce its WC due to higher market power. ROE is taken to control for the differences in the market power of sample firms and computed as earning after-tax /equity (Sawarni et al., 2020). To control the degree of aggressiveness of WC investment policy, we have considered the ratio of current assets to total assets (CATA), where a lower ratio indicates a comparatively aggressive policy. CATA is measured as current assets divided by the total assets (Adam & Quansah, 2019).

3.3.1. Empirical Model to study the impact of efficient WCM on the market value of sample firms

A set of 700 firms and ten years provides a time dimension and cross-section of panel data. The estimated result could be seriously affected by the existence of endogeneity; hence we have used the two-step generalized method of moments (GMM) model to control for the endogeneity. The endogeneity can crop up due to an independent variable that may be correlated with the error term mainly produced by omitted variables, measurement errors, or simultaneity between dependent and independent variables (Mun & Jang, 2015).

To examine the impact of efficient WCM on EP ratio, the following GMM models are developed.

- EPRit = βo + β1•EPRit-1 + β2•NTCit +β3•BMRit+ β4•DIYit + β5•SIZEit+ β6•LEVit + β7•ROEit + β8•CATAit +ϭi+yt+ €it (1)

- EPRit = βo + β1•EPRit-1 + β2•INDit +β3•BMRit+ β4•DIYit + β5•SIZEit+ β6•LEVit + β7•ROEit + β8•CATAit +ϭi+yt+ €it (2)

- EPRit = βo + β1•EPRit-1 + β2•ARDit + β3•BMRit+ β4•DIYit + β5•SIZEit+ β6•LEVit + β7•ROEit + β8•CATAit +ϭi+yt+ €it (3)

- EPRit = βo + β1•EPRit-1 + β2•APDit + β3•BMRit+ β4•DIYit + β5•SIZEit+ β6•LEVit + β7•ROEit + β8•CATAit +ϭi+yt+ €it (4)

Where equations (1), (2), (3), and (4) are used to test the hypotheses H1.1, H1.2, H1.3, and H1.4, respectively. Where EPR, earnings price ratio; NTC, net trade cycle; IND, inventory days; ARD, receivable days; APD, account payable days; BMR, book to market ratio; DIY, dividend yield; SIZE, natural logarithm of the market value of equity; LEV, finance leverage; ROE, return on equity; CATA, current asset to total asset ratio. βi is a firm-specific intercept of an ith firm, ϭi represents firm unabsorbable individual effect, yt represents time dummy variable, €it is a random disturbance. For all variables, subscript t represents time dimension (t=1,2,3,…10 representing year from 2012 to 2021), and subscript i represent individual firms which are cross-section units (i=1,2,3,…….,700).

3.3.2. Empirical Model to study interactive effect of cash holdings on OWC-market value nexus

To analyze the interactive effect of cash holdings on the relationship between efficient WCM on EP ratio, we have formulated the following equation (5).

- EPRit = βo + β1•EPRit-1 + μ1•NTCit + μ2• (NTC •D) it + β3•BMRit+ β4•DIYit + β5•SIZEit+ β6•LEVit + β7•ROEit + β8•CATAit +ϭi+yt+ €it (5)

Where D=1 when cash holdings are positive (CASHH> 0) and D=0 when cash level is negative (CASHH<=0). CASHH represents a proxy of cash holdings, and following Mun and Jang (2015), it is worked as {(cash + marketable securities) – (short-term debt+ current maturing portion of long-term debt)}/ {total assets}. Where μ1 represents the influence of negative cash holdings and (μ1 + μ2) represents the influence of positive cash holdings on firm value. The description of other variables is the same as mentioned in section 3.3.1.

3.3. Estimation approach

Variation inflation factor (VIF) has been worked out for each independent variable to test whether multicollinearity exists. As VIF ranges from 1.03 to 1.65, and since all are less than five, it indicates that there is no issue of multicollinearity. Panel data allow us to control unabsorbable heterogeneity. GMM is used with the robust option to control inflated t statics and orthogonal option as we have unbalanced panel data. All right-hand side variables are used as instruments with lagged

up to 5 times, similar to Baños-Caballero et al. (2014). Hansen test is used to test the validity of the instrument, and AR2 is used to ensure that model does not suffer from 2nd order serial correlation.

4. Results and discussion

4.1. Descriptive statistics

4.1.1. Descriptive statistics for the aggregate sample

our composite sample comprises 700 firms covering data for ten years from 2012 to 2021, making unbalanced panel data of 6308 firm-year observations. EP ratio has a mean of 0.0735 with a standard deviation (SD) of 0.0746, and it varies in the range of 0.0003 to 0.7194. NTC varies from the lowest of -118.5620 to an extreme highest of 1486.9740 with a mean of 82.1669 and a SD of 119.2456. Table 1 presents the descriptive statistics of all variables used in the study for the aggregate sample.

4.1.2. Descriptive statistics for above-median and below-median OWC samples

Above and below-median OWC samples of firms are formulated based on the difference between the firm's NTC and the corresponding year median NTC for the aggregate sample. The composite data is divided into two samples, i.e., a sample of firms with above-median OWC (Where NTC> median NTC) and another sample of firms with below-median OWC (Where NTC<= median NTC). The descriptive statistic of all variables of the two samples is shown in table 2.

4.2. Pearson Correlation results

4.2.1. Pearson correlation results for the aggregate sample

The correlation coefficients are worked out to investigate the nature as well as the degree of association among the pairs of variables. The EP ratio of sample firms (aggregate) has a negative correlation with NTC. The negative sign is, as per our expectation, that a reduction in the length of the conversion cycle increases the market value of firms; however, the association of this bivariate coefficient is not statistically significant for the sample firms (aggregate). The relationship of EP ratio with each component of NTC, i.e., IND, ARD, and APD, is negative and significant, indicating that firms with efficient inventory management, efficient receivable management, and inefficient payable management have higher market value. All pairs of independent variables have coefficients within 0.60, indicating that the linear relationship is not very dominant among pairs of independent variables. Only in the case of one bivariate coefficient the linear relationship is dominant, i.e., NTC with IND has a coefficient of more than 0.91. This high correlation is consistent with the WC theory that firms with efficiency in managing the individual components of WCM also manage the aggregate WCM better (Boisjoly et al., 2020). The correlation coefficient of the composite sample is presented in table 3.

Table 1. Descriptive statistics for the aggregate sample

Variable	Observation	Mean	Median	Standard Deviation	Minimum	Maximum
EPR	6308	0.0735	0.0505	0.0746	0.0003	0.7194
NTC	6308	82.1669	60.8889	119.2456	-118.5620	1486.9740
IND	6308	64.9258	45.1869	111.7406	0.0000	1514.7680
ARD	6308	65.5395	55.7574	53.7491	0.0000	753.1786
APD	6308	48.2984	41.6447	34.9137	0.2333	746.5634
BMR	6308	0.7140	0.4534	0.7809	0.0104	9.7732
DIY	6308	0.0163	0.0096	0.0229	0.0000	0.3867
SIZE	6308	4.2423	4.1820	0.8259	1.5805	7.1318
LEV	6308	1.1053	0.8414	1.0890	0.0019	36.9145
ROE	6308	0.1490	0.1329	0.1180	-0.8391	1.4198
CATA	6308	0.4901	0.4903	0.1957	0.0025	0.9985

4.2.2. Pearson Correlation results for above-median and below-median OWC samples

Table 4 presents the correlation coefficients of above-median and below-median OWC samples. The figures in the upper triangles represent the coefficients of the below-median OWC sample group, whereas those in the lower triangles represent the coefficients of the above-median OWC sample. The coefficient of EP ratio is negative with NTC for the sample firms with above-median NTC, but it is positive for the sample firms with below-median NTC.

4.3.GMM results

4.3.1. Impact of efficient WCM on the market value of firms

The finding of the regression of the EP ratio on NTC and its components are presented in Table 5. When we have regressed the EP ratio against NTC by considering the impact of control variables (model 1), we have found that WCM efficiency (proxied by NTC) has a positive and significant influence (the coefficient of NTC is -0.0000419, significant at 5%) on the market value (proxied by EP ratio) of firms. This indicates that firms with WCM efficiency (lower NTC) have generated higher market value (higher EP ratio) in the Indian context. Further, the P-values of the Hansen test and AR2 are insignificant, which confirms that the instruments are valid, our model does not suffer from serial autocorrelation, and the results are robust. The findings confirm our hypothesis H1.1. This finding is supported by Boisjoly et al. (2020), who have found that efficient WCM enhances market value. Sawarni et al. (2020) document that the reduction of the OWC of a firm relates to an enhancement of market value. The positive relationship of efficient WCM with EP ratio may be explained by the reasoning that efficient WCM reduces the capital blocked into OWC components, which results in a reduction in an associated carrying cost of OWC resources, improving financial flexibilities, less dependence on external debt, and taking up value-enhancing growth projects with the released funds. The results of model 2 reveal that IND has a coefficient of -0.0000326, which is negative and significant at the 10% level. The negative sign indicates that a shorter holding time of inventories (efficient management of inventories) has a positive impact on the EP ratio of sample firms. This is

in confirmation of our hypothesis H1.2, and therefore, we accept this hypothesis. The regression coefficient of ARD is -0.0001317 as per the results of model 3. The coefficient is negative and significant at the 5% level. This reflects that firms with efficient receivables management produce higher market values. The results support our hypothesis H1.3. The results of model 4 show that APD has a coefficient of -0.0002533, which is negative and significant at the 1% level. The negative sign indicates that prompt payment to suppliers has a positive impact on the EP ratio of sample firms. The findings do not support our hypothesis H1.4. Further, the p-values of AR2 and Hansen test are insignificant in all models 2, 3, and 4, which discards the presence of autocorrelation or the issue of invalid instruments. The possible reasons for the results of models 2, 3, and 4 is that Indian listed firms with lower inventories levels, lesser receivable period, and prompt payment to suppliers enhance their competitive advantages, which in turn provide better negotiating power with the customers and suppliers, which enhances their market value. This outcome is supported by the findings of Nguyen et al. (2020), who have observed that shortening IND, reducing ARD, and lowering APD are positively connected to the market value of firms.

Table 2. Descriptive statistics for above-median and below-median OWC samples

Above median NTC sample												Below median NTC sample											
Variable	Observation	Mean	Median	Standard deviation	Minimum	Maximum						Variable	Observation	Mean	Median	Standard deviation	Minimum	Maximum					
EPR	3153	0.0767	0.0528	0.0750	0.0003	0.7194						EPR	3155	0.0702	0.0482	0.0741	0.0003	0.7194					
NTC	3153	140.0009	101.5336	144.9742	59.1007	1486.9740						NTC	3155	24.3695	28.4326	27.2948	-118.5620	64.3632					
IND	3153	97.9900	67.0107	149.1708	0.0000	1514.7680						IND	3155	31.8826	30.1299	23.3463	0.0000	140.0130					
ARD	3153	89.5176	77.8161	58.5067	0.0000	534.1223						ARD	3155	41.5766	36.4986	34.7418	0.0000	753.1786					
APD	3153	47.5066	40.7695	32.9536	0.4623	344.1886						APD	3155	49.0897	42.4200	36.7565	0.2333	746.5634					
BMR	3153	0.7746	0.5027	0.8031	0.0104	9.7732						BMR	3155	0.6534	0.4012	0.7534	0.0122	8.6126					
DIY	3153	0.0156	0.0091	0.0225	0.0000	0.3533						DIY	3155	0.0170	0.0099	0.0233	0.0000	0.3867					
SIZE	3153	4.0691	4.0446	0.7452	1.5805	6.5608						SIZE	3155	4.4154	4.3454	0.8656	1.8655	7.1318					
LEV	3153	1.1093	0.8371	1.2375	0.0019	36.9145						LEV	3155	1.1014	0.8450	0.9171	0.0033	8.0960					
ROE	3153	0.1349	0.1267	0.0904	-0.6143	1.0341						ROE	3155	0.1630	0.1383	-0.1389	0.8391	1.4198					
CATA	3153	0.5443	0.5377	0.1700	0.0060	0.9985						CATA	3155	0.4359	0.4216	0.2046	0.0025	0.9946					

Note: Where above-median OWC sample (NTC> median NTC); below-median OWC sample (NTC<= median NTC).

Table 3. Pearson's correlation coefficient for the aggregate sample

	EPR	NTC	IND	ARD	APD	BMR	DIY	SIZE	LEV	ROE	CATA
EPR	1										
NTC	-0.0180	1									
IND	-0.0234*	0.9103***	1								
ARD	-0.0633***	0.3716***	0.0537***	1							
APD	-0.1095***	0.0699***	0.1742***	0.4424***	1						
BMR	0.5789***	0.0865***	0.0729***	0.0597***	0.0298**	1					
DIY	0.3566***	-0.0401***	-0.0544***	-0.0350***	-0.0909***	0.2235***	1				
SIZE	-0.4190***	-0.0853***	-0.0220*	-0.1289***	0.0227*	-0.4883***	-0.0855***	1			
LEV	0.1400***	0.0555***	0.0840***	0.0969***	0.2285***	0.0646***	-0.0136	-0.1344***	1		
ROE	0.0674***	-0.1582***	-0.1324***	-0.1840***	-0.1670***	-0.3615***	0.1245***	0.2441***	0.0137	1	
CATA	-0.0229*	0.2351***	0.1759***	0.2837***	0.1969***	-0.1674***	-0.0019	-0.0896***	0.0755***	0.2126***	1

Note: P-values are in parentheses. ***, **, and * represent significance at 1%, 5% and 10% level respectively.

Table 4. Pearson's correlation coefficient for above-median and below-median OWC samples

	EPR	NTC	IND	ARD	APD	BMR	DIY	SIZE	LEV	ROE	CATA
EPR	1	0.1170***	0.0581***	-0.0389**	-0.0868***	0.5983***	0.3301***	-0.4119***	0.1513***	0.0287	-0.0663***
NTC	-0.0863***	1	0.3259***	0.2938***	-0.2579***	0.0750***	0.0018	-0.2325***	-0.0867***	-0.0357**	0.2312***
IND	-0.0630***	0.9358***	1	-0.1069***	0.2921***	0.0806***	-0.0750***	-0.0444**	0.1813***	-0.0731***	0.1576***
ARD	-0.1282***	0.2020***	-0.0977***	1	0.6591***	0.0524***	-0.0082	-0.1360***	0.0895***	-0.1409***	0.2829***
APD	-0.1333***	0.1952***	0.2363***	0.4445***	1	0.0450**	-0.0567***	0.0159	0.2641***	-0.1531***	0.1959***
BMR	0.5592***	0.0649***	0.0610***	0.0156	0.018	1	0.2148***	-0.4828***	0.0508***	-0.3501***	-0.2275***
DIY	0.3873***	-0.0444**	-0.0579***	-0.0367**	-0.1320***	0.2384***	1	-0.0548***	-0.013	0.1227***	0.0244
SIZE	-0.4315***	0.0807***	0.0746***	0.0217	0.0215	-0.4916***	-0.1405***	1	-0.1349***	0.2284***	-0.0118
LEV	0.1342***	0.0900***	0.0884***	0.1148***	0.2080***	0.0747***	-0.0143	-0.1445***	1	0.1049***	0.0830***
ROE	0.1451***	-0.2055***	-0.1727***	-0.1856***	-0.2071***	-0.3899***	0.1270***	0.2265***	-0.0870***	1	0.2952***
CATA	-0.0009	0.1387***	0.1326***	0.1367***	0.2329***	-0.1662***	-0.0164	-0.0641***	0.0769***	0.1923***	1

Note: Upper triangle, below median OWC sample; lower triangle, above-median OWC sample; P-values are in parentheses. ***, **, and * represent significance at 1%, 5% and 10% level respectively.

In table 6, we have reported regression results after incorporating industries dummies to consider the industries' effect. After the inclusion of industries dummies (table 6), the findings are similar to those explained in interpreting the results without the industries impact.

4.3.2. The interactive impact of cash holdings on the nexus between efficient WCM and market value of firms

In this section, we present the GMM results on the interactive impact of cash holdings on the nexus between efficient WCM and market value for two subsamples, a sample with firms having above-median OWC (NTC> median NTC) and another sample with firms having below-median OWC (NTC<= median NTC). The finding of the interactive impact of cash holdings is presented in table 7; the p-values of the Hansen test and AR2 are insignificant in all the models, the result is robust with valid instruments, and there is an absence of serial autocorrelation.

Table 5. GMM results on the impact of efficient WCM on the market value of firms (aggregate sample)

Dependent variable: EPR				
Model	1	2	3	4
$EPR_{(t-1)}$	0.0530718	0.0530038	0.0536517	0.0508913
	(0.137)	(0.139)	(0.133)	(0.157)
NTC	-0.0000419			
	(0.028) **			
IND		-0.0000326		
		(0.064) *		
ARD			-0.0001317	
			(0.021) **	
APD				-0.0002533
				(0.003) ***
BMR	0.0951016	0.0951325	0.0943923	0.0977955
	(0.000) ***	(0.000) ***	(0.000) ***	(0.000) ***
DIY	0.0878305	0.0975585	0.0978599	0.0312664
	(0.681)	(0.654)	(0.639)	(0.881)
SIZE	-0.0068229	-0.006372	-0.0076446	-0.0046375
	(0.004) ***	(0.008) ***	(0.001) ***	(0.070) *
LEV	0.0108803	0.0113881	0.0106583	0.0134779
	(0.000) ***	(0.000) ***	(0.000) ***	(0.000) ***
ROE	0.2560341	0.2573971	0.2506437	0.2555733
	(0.000) ***	(0.000) ***	(0.000) ***	(0.000) ***
CATA	0.0171015	0.0140991	0.0214818	0.0228109
	(0.148)	(0.199)	(0.092)*	(0.057) *
Constant	-0.0234422	-0.026152	-0.0155401	-0.0305618
	(0.193)	(0.152)	(0.378)	(0.093) *
Firm effect	yes	yes	yes	yes
Year effect	yes	yes	yes	yes
Industries effect	no	no	no	no
AR2				
(*p*-value)	0.669	0.680	0.633	0.750
Hansen test (*p*-value)	0.274	0.274	0.270	0.288

Note: P-values are in parentheses. ***, **, and * represent significance at 1%, 5% and 10% level respectively.

4.3.2.1. GMM results for above-median OWC firms

When we have regressed the EP ratio against NTC for the sample with above-median OWC in the absence of the moderating impact of cash holdings (table 7, model 1), considering the impact of control variables, we have found that WCM efficiency (proxied by NTC) has a positive and significant influence (the coefficient of NTC is -0.0000582, significant at 1%) on the market value (proxied by EP ratio). This result is in conformity with the findings of previous studies, which have established the positive influence of efficient WCM (lower NTC) on the market value of firms (proxied by Tobin's Q, MBR, excess stock returns) (De Almeida & Eid Jr, 2014; Le, 2019; Boisjoly et al., 2020). The plausible explanation for these results is that firms with above-median NTC do not operate at optimal OWC and therefore try to reduce their OWC to generate higher market value. However, if these firms increase their OWC further by investing more in WC resources, their market value diminishes (De Almeida & Eid Jr, 2014).

Table 6. GMM results on the impact of efficient WCM on the market value of firms (aggregate sample) (with industries effect)

Dependent variable: EPR				
Model	1	2	3	4
$EPR_{(t-1)}$	0.0568921	0.0566277	0.0560259	0.0537714
	(0.124)	(0.127)	(0.124)	(0.139)
NTC	-0.0000433			
	(0.015)**			
IND		-0.0000327		
		(0.057)*		
ARD			-0.0001248	
			(0.017)**	
APD				-0.0002068
				(0.009)***
BMR	0.0953348	0.095449	0.0946382	0.0969065
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
DIY	0.0699495	0.0638567	0.1352916	0.0548633
	(0.746)	(0.766)	(0.565)	(0.797)
SIZE	-0.0064114	-0.0059802	-0.0070254	-0.0049655
	(0.001)***	(0.002)***	(0.001)***	(0.015)**
LEV	0.0080558	0.0085568	0.0088348	0.0114414
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
ROE	0.252148	0.254411	0.240459	0.2433697
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
CATA	0.014743	0.0107515	0.0210199	0.0162417
	(0.106)	(0.191)	(0.058)*	(0.079)*
Constant	-0.0202174	-0.0225154	-0.0152166	-0.0235137
	(0.170)	(0.119)	(0.323)	(0.088)*
Firm effect	yes	yes	yes	yes
Year effect	yes	yes	yes	yes
Industries effect	yes	yes	yes	yes
AR2 (*p*-value)	0.651	0.662	0.650	0.650
Hansen test (*p*-value)	0.221	0.223	0.198	0.198

Note: P-values are in parentheses. ***, **, and * represent significance at 1%, 5% and 10% level respectively.

To investigate the interactive impact of cash holdings, we have considered a dummy variable, D, which assumes a value of "1" for positive cash holdings (CASHH>0) and "0" for negative cash holdings (CASHH <= 0). In the case of sample firms with above-median OWC as well as negative cash holdings (table 7, model 2), the value of μ1 (coefficient of NTC) is -0.0000437, which is negative and significant at 1%. This is perhaps because firms with negative cash holdings (debt > cash) generate higher market value by reducing their excess OWC, as debt funding is beneficial only when the firms have efficiency in WCM. For such firms, negative cash holdings are not a problem (Mun & Jang, 2015). This indicates that WCM inefficiency reduces the market value of firms with negative cash holdings. For such firms, debt funding becomes problematic.

In the case of sample firms with above-median OWC and positive cash holdings (table 7, model 2), the value of μ1 + μ2 (coefficient of NTC +coefficient of NTC•D), representing the influence of positive cash holdings is -0.0001224 (at 5% significance level), which is steeper than that of negative cash holdings (μ1 = -0.0000437). The plausible reason for this result is that firms with positive cash holdings and above-median OWC have cash in excess of debt. For such firms, mobilizing funds through the issuance of debt in case of contingent events is relatively easier compared to firms with negative cash holdings, even though they have above-median OWC. Therefore, an improvement in WCM efficiency for firms with positive cash holdings and above-median OWC may generate a relatively higher market value compared to firms with negative cash holdings and above-median OWC. This finding has confirmed hypothesis H2.1.

Table 7. GMM results on the interaction of cash holdings on WCM efficiency – market value nexus for above-median and below-median NTC samples

	Dependent variable: EPR			
	Above median NTC sample		Below median NTC sample	
	Without interaction term	With interaction term	Without interaction term	With interaction term
Model	1	2	3	4
$EPR_{(t-1)}$	0.0543525	0.0572221	0.003478	-0.0159642
	(0.331)	(0.295)	(0.962)	(0.846)
NTC	-0.0000582	-0.0000437	0.0002969	0.0001188
	(0.004) ***	(0.008) ***	(0.206)	(0.663)
NTC.D		-0.0000787		0.0005864
		(0.047) **		(0.275)
BMR	0.0869976	0.0851715	0.1072252	0.1123119
	(0.000) ***	(0.000) ***	(0.000) ***	(0.000) ***
DIY	0.0321961	0.0129075	-0.1757625	-0.2392185
	(0.938)	(0.975)	(0.476)	(0.473)
SIZE	-0.002572	-0.0016242	-0.005639	-0.0057586
	(0.447)	(0.634)	(0.170)	(0.190)
LEV	0.007127	0.0052669	0.0147812	0.0203336
	(0.010) **	(0.020) **	(0.044) **	(0.019) **
ROE	0.2679154	0.2525828	0.2557607	0.2540844
	(0.000) ***	(0.000) ***	(0.002) ***	(0.004) ***
CATA	0.0463258	0.0476721	0.0059752	-0.0049558
	(0.028) **	(0.014) **	(0.764)	(0.838)
Constant	-0.0454441	-0.0440648	-0.0317396	-0.0363565
	(0.060) *	(0.062)*	(0.323)	(0.285)
Firm effect	yes	yes	yes	yes
Year effect	yes	yes	yes	yes
AR2 (*p*-value)	0.052	0.058	0.346	0.292
Hansen test (*p*-value)	0.129	0.151	0.205	0.200

Note: D, dummy variable (D=1, if CASHH>0; D=0, if CASHH<=0); CASHH, cash holdings; NTC.D, interaction term; P-values are in parentheses. ***, **, and * represent significance at 1%, 5% and 10% level respectively.

Our study supports the findings of Mun and Jang (2015), which state that a reduction in WC improves profitability in the case of firms which have both positive WC level and positive cash holdings. However, our findings differ from them in the case of firms having positive WC levels but with negative cash holdings, where they do not find a significant influence of WCM efficiency on the

profitability of firms, but we have confirmed that efficient WCM significantly impacts the market value of firms though with lower steepness of the slope. The possible reasons for the difference in findings of both studies could be; first, the study of Mun and Jang (2015) is limited to the restaurant firms only, whereas our study covers all industries. The conversion of WC resources into cash is faster in the case of restaurant firms, in comparison to firms operating in other industries like manufacturing and retail (Mun & Jang, 2015); therefore, the nature of the business may impact efficient WCM-market value nexus. Second, the firms in the study of Mun and Jang (2015) belong to the US, a developed economy, whereas our sample firms pertain to India, an emerging economy. The developed economy has an established financial market and a developed legal framework that provides an easy excess to external funds at lower costs and faces less economic uncertainty. Therefore market settings do play a role in the impact of WCM efficiency on the market value of firms.

Table 8. GMM results of the impact of efficient WCM on Tobin's Q of firms

	Dependent variable: TQ			
Model	1	2	3	4
$TQ_{(t-1)}$	0.6336382	0.6361377	0.6381212	0.6515807
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
NTC	-0.0009705			
	(0.026)**			
IND		-0.0007047		
		(0.011)**		
ARD			-0.0031068	
			(0.082)*	
APD				-0.0047787
				(0.066)*
BMR	-0.681063	-0.672287	-0.7167078	-0.6824887
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
DIY	-3.140014	-3.24213	-2.479216	-2.632963
	(0.729)	(0.690)	(0.812)	(0.804)
SIZE	0.2545019	0.2591233	0.227458	0.2666441
	(0.037)**	(0.025)**	(0.092)*	(0.045)**
LEV	-0.09046	-0.0817729	-0.0927225	-0.0238177
	(0.416)	(0.417)	(0.451)	(0.883)
ROE	-1.325041	-1.122782	-1.675632	-1.841823
	(0.658)	(0.652)	(0.652)	(0.652)
CATA	0.5807538	0.4872245	0.6663976	0.6324498
	(0.034)**	(0.036)**	(0.050)*	(0.035)**
Constant	0.117288	0.0577119	0.3829325	0.1504162
	(0.806)	(0.899)	(0.505)	(0.784)
Firm effect	yes	yes	yes	yes
Year effect	yes	yes	yes	yes
AR2 (*p*-value)	0.300	0.305	0.302	0.299
Hansen test (*p*-value)	0.190	0.193	0.165	0.156

Note: P-values are in parentheses. ***, **, and * represent significance at 1%, 5% and 10% level respectively.

4.3.2.2. GMM results for below-median OWC firms

When we have regressed the EP ratio against NTC for the sample with below-median OWC in the absence of the moderating impact of cash holdings (table 7, model 3), considering the impact of control variables, we have found that WCM efficiency (proxied by NTC) has a positive and insignificant influence (the coefficient of NTC is +0.0002969) on the market value (proxied by EP ratio) of firms. This result is in contradiction to Aktas et al. (2015), who observed that for firms with negative excess OWC level, the increase in OWC level positively influences market value as such firms intend to maintain higher inventories to avoid the risk of stock out and build customer relationship with soft credit terms to influence sales. Our result also deviates from the findings of Mun and Jang (2015), they have observed that in the case of the negative WC group, firms increase WC in order to improve their profitability. The result of our study reveals that Indian markets do not respond to changes in the WCM efficiency of firms with below-median OWC.

In the case of sample firms with below-median OWC and negative cash holdings (table 7, model 4), the value of μ1 (coefficient of NTC) is + 0.0001188, which is positive and insignificant. In the case of sample firms with below-median OWC and positive cash holdings (table 7, model 4), the value of μ1 + μ2 (coefficient of NTC +coefficient of NTC•D) representing the influence of positive cash holdings is +0.0007052, which is positive and insignificant, but the influence is steeper than that of negative cash holdings (μ1 = + 0.0001188). Therefore, cash holdings do not influence WCM efficiency -market value nexus for below-median OWC firms in the Indian context. Thus, hypothesis H2.2 is accepted. Our finding is in line with the study of Mun and Jang (2015), where they have not found any significant cash-holdings interaction effect on the relationship between WC and profitability for firms with a negative WC group.

Table 9. GMM results on the interaction of cash holdings on WCM efficiency – market value nexus for upper and lower quartile samples based on NTC.

	Dependent variable: EPR			
	Upper quartile NTC sample (quartile 4)		Lower quartile NTC sample (quartile 1)	
	Without interaction term	with interaction term	Without interaction term	with interaction term
Model	1	2	3	4
$EPR_{(t-1)}$	0.0014773	0.0526728	0.1856111	0.1102943
	(0.987)	(0.565)	(0.138)	(0.411)
NTC	-0.0000433	-0.0000324	0.0001322	0.0001271
	(0.022)**	(0.036)**	(0.181)	(0.606)
NTC.D		-0.0000747		0.000303
		(0.015)**		(0.47)
BMR	0.0641455	0.0537321	0.0487257	0.0775128
	(0.000)***	(0.000)***	(0.000)***	(0.001)***
DIY	0.8711661	0.9704888	0.3929842	0.2789075
	(0.018)**	(0.017)**	(0.218)	(0.372)
SIZE	-0.0017299	-0.0003676	-0.003854	0.0028841
	(0.642)	(0.921)	(0.219)	(0.517)
LEV	0.0050368	0.0028882	0.0031108	0.0027098
	(0.035)**	(0.127)	(0.301)	(0.471)
ROE	0.2509559	0.1943701	0.125791	0.0909902
	(0.003)***	(0.017)**	(0.011)**	(0.167)
CATA	0.0626718	0.0547348	-0.0172166	-0.0122356
	(0.006)***	(0.010)**	(0.096)*	(0.646)
Constant	-0.0494021	-0.0363241	0.0101403	-0.0196504
	(0.071)*	(0.147)	(0.589)	(0.476)
Firm effect	yes	yes	yes	yes
Year effect	yes	yes	yes	yes
AR2 (*p*-value)	0.184	0.222	0.59	0.453
Hansen test (*p*-value)	0.179	0.108	0.197	0.181

Note: D, dummy variable (D=1, if CASHH>0; D=0 if CASHH<=0); CASHH, cash holdings; NTC.D, interaction term; P-values are in parentheses. ***, **, and * represent significance at 1%, 5% and 10% level respectively.

5. Robustness test

5.1 Robustness test of efficient WCM-market value nexus

We have tested the robustness of our findings by using Tobin's Q as a proxy for market value. Following Sawarni et al. (2020), Tobin's Q (TQ) is taken as (market value of equity+ book value of debt)/(book value of the total assets). We have replaced the dependent variable EP ratio in equations (1), (2), (3), and (4) with TQ as a dependent variable. The results are reported in Table 8. The coefficient of NTC is negative and significant at 5 % (table 8, model 1). At the same time coefficient of IND, ARD, and APD are also negative and significant at 5%, 10%, and 10%, respectively (table 8, models 2, 3, and 4). The result supports our earlier findings that efficient management of OWC, as well as its components, enhances the market value of the firms.

5.2 Robustness test on impact of cash holdings on efficient WCM-market value nexus

To strengthen our finding on the moderating effect of cash holdings on the WCM-market value nexus, we have divided the firms into four quartiles of OWC. To see whether our findings still hold in accordance with hypothesis H2.1 and H2.2 for quartile clustering of a sample, we have tested our model with reference to equation (1) for efficient WCM-market value nexus and equation (5) for the absence and presence of CASHH interaction, respectively, for the upper (quartile 4; higher NTC firms) and lower quartile (quartile 1; lower NTC firms) sample firms. We find in the case of the upper quartile, the coefficient of NTC is negative and significant at 5% (table 9, model 1) without cash holdings interaction. In the case of the upper quartile sample firms, where OWC is on the higher side as well as has negative cash holdings (table-9, model 2), the value of μ1 (coefficient of NTC) is -0.0000324, which is negative and significant at 5%. For cases of upper quartile sample firms with positive cash holdings (table-9, model 2), the value of μ1 + μ2 (coefficient of NTC +coefficient of NTC•D) representing the influence of positive cash holdings, which is -0.0001071 (at 5% significance level), this is steeper than that of negative cash holdings (μ1 = -0.0000324). We find that the efficient WCM has an influence on the market value of firms in case of excess OWC, and results are steeper if they have positive cash holdings instead of negative cash holdings. In the case of lower quartile sample firms, we find that coefficients of NTC with and without the interactive effect of cash holdings are not significant (table-9, models 3 and 4). We do not find any significant indication of the impact of efficient WCM in the case of firms with shorter NTC. This finding is aligned with our previous finding of the interactive impact of cash holdings on efficient WCM-market value nexus for above and below-median NTC sample firms. Table 9 shows the results of GMM.

6. Conclusion

This study makes an attempt to investigate the impact of WCM efficiency on the market value (proxied by EP ratio) of the Indian listed firms. Further, we have explored the influence of cash holdings on the nexus between WCM efficiency and the market value of firms in the Indian context.

We have found that NTC has a significant negative relationship with the EP ratio of the sample firms, indicating that the firms with efficient WCM generate higher market value. Efficient WCM reduces the conversion cycle (shorten NTC), resulting in the lower commitment of funds in OWC resources and channeling the released funds into productive usages; consequently, shareholders see a value premium attached with such firms, i.e., a higher value at a lower price (high EP ratio). IND, ARD, and APD have a negative impact on the EP ratio of firms. This indicates that firms with low inventory holding, prudent credit policies with lower receivables, and prompt payment cycles have higher market value. We have also found that WCM efficiency impacts the market value of firms only in the case of firms with above-median OWC.The cash holdings have an interactive impact on the nexus of efficient WCM and the market value of that firm, which falls in the above-median OWC sample. For firms with above-median OWC, the positive relationship between efficient WCM and market value is steeper in the presence of positive cash holdings as compared with firms having

negative cash holdings. But, there is no interactive effect of cash holdings on the nexus of WCM efficiency and market value in the case of firms having below-median OWC.

This study contributes in numerous ways, provides insight to managers for leveraging an efficient WCM in order to enhance market value, it provides investors a way to formulate a strategy for investment by focusing on value premium, i.e., fundamentally strong undervalued stock, for academician it enriches the knowledgebase on efficient WCM-market value nexus. The study highlights the imperative of the management of components of OWC for market value augmentation. The current research considers firm-specific factors but ignores external factors like gross domestic product growth, inflation, monetary policy, and other external business indicators for determining the relationship between efficient WCM and market value. Future research can be undertaken to gauge the influence of these external factors in the efficient WCM and market value relationship.

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