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Article

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FINANCIAL ECONOMICS | RESEARCH ARTICLE

Does halo effect of innovative firms moderate the impact of working capital efficiency on firm value? Evidence from India

Sayantana Kundu¹, Kamran Quddus^{2*} and Nistala Jagannath Sharma³

Abstract: The purpose of this study is to examine whether perceived innovativeness moderates the relationship between working capital management (WCM) and firm value. The study uses a sample of 200 listed Indian firms for 2015–2019. The firms are classified into innovative and non-innovative categories using the OECD and the EU Industrial R&D Investment Scoreboard 2018. Using OLS and GMM-DPD estimations, the study finds in accordance with the prior literature that a sample of firms exhibits a positive relationship between WCM efficiency and firm value. The original contribution of the paper is finding that low R&D and high R&D firms are treated differently when investors factor WCM into prices. The firms belonging to industries that are perceived to be innovative are not penalised in terms of valuation even if they follow inefficient WCM. However, firms that belong to industry sectors that are perceived to be non-innovative experience a drop in their valuation if their WCM is inefficient. The authors argue that this difference is due to the halo effect of innovative firms. The results imply that the halo effect obscures the true valuation. Hence,

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PUBLIC INTEREST STATEMENT

The paper studies how innovativeness, perceived either through industry affiliation or by higher Research and Development expenditure, changes the way investors value the efficiency of firms' working capital management (WCM). Data for 200 Indian firms over 2005–2009 were analysed using robust regression models. The study finds that as WCM becomes more efficient, it increases the firm value. However, when firms are classified into innovative and non-innovative industry categories or low R&D and high R&D categories, it is found that investors value the WCM efficiency differently based on perceived innovativeness. The firms that belong to the innovative industry sector do not exhibit a drop in firm valuation even if they follow inefficient WCM. On the contrary, firms that belong to non-innovative industry sectors experience a decline in their valuation if their WCM is inefficient. The study implies that the halo effect around *innovativeness* obscures the actual valuation. Hence, investors should be conscious of the bias while valuing innovative firms based on WCM efficiency.

investors should learn to avoid valuing innovative firms' WCM based merely on their classification into an innovative industry sector.

Subjects: Finance; Corporate Finance; Business Management and Accounting

Keywords: Halo effect; innovative; R&D; working capital; CCC; firm value

1. Introduction

Working Capital Management (WCM) is essential and often considered one of the most critical corporate finance decisions to manage its operations effectively (Abuzayed, 2012; Nyeadi et al., 2018). Working capital (WC) acts as a lubricant in the process of churning profits by asset turnover. Thus, it is a critical factor in shareholders' value maximisation (Deloof, 2003). Working capital management comprises retaining an ideal level of inventories, accounts receivables, and accounts payables (Lazaridis & Tryfonidis, 2006). It also includes effective cash management and current liabilities, properly negotiating a balance between firms' liquidity and profitability (Aktas et al., 2015; Jose et al., 1996).

It is always convenient (and less risky) to have the required inventory and enough liquidity in a firm. However, more capital tied up in working capital may lead to lesser capital expenditure (CAPEX), which may hamper the firm's growth. The PWC report on the working capital survey 2018–19¹ states that “converting cash is becoming harder, and capital expenditure is continuing to decline, and the cost of cash is increasing.” Similarly, Ernst and Young's 2019 report on WCM states that “US\$2.5 trillion is tied up in excess working capital, which is above the reasonable operating cash requirements, to run their business models.” Thus, it is widely accepted that investors penalise firms for inefficient WCM, resulting in longer working capital cycles in developed markets (Deloof, 2003; Wang, 2019) and developing countries like India (Saravanan et al., 2017).

The Cash Conversion Cycle (CCC) is one of the widely held measures of the efficiency of WCM (Richards & Laughlin, 1980). The Net Trading Cycle (NTC) is another popular measure of WCM (Shin & Soenen, 1998). Both measure the time interval for which cash is tied up in the working capital cycle, starting from buying raw materials on credit, keeping the inventory for production, selling the finished good on credit, finally getting the cash from the customer, and paying off the vendor. CCC and NTC though qualitatively similar apply different denominators to calculate Accounts Receivable Days (ARD), Inventory Holding Days (IHD), and Accounts Payable Days (APD), the components of the WC cycle. This paper uses CCC as a measure of the efficiency of WCM.

This paper questions whether innovativeness or perceived innovativeness moderate the way WCM affects firm value. Innovativeness represents how successfully firms react to and adapt to changes in the environment (Tajeddini, 2011). Since such changes are inevitable and mostly uncontrollable, how the firms generate new ideas and modify their existing processes, policies, or structure is key to being innovative. Efficiently done, it forms an organisational culture and adds to the firm value (Rubera & Kirca, 2012).

The *Halo effect* is a cognitive bias that plays a pivotal role in this study. *Halo effect* is generally defined as the positive “influence of a global evaluation on evaluations of individual attributes” (Nisbett & Wilson, 1977). The effect is strong for ambiguous attributes that are difficult to ascertain by individuals. However, Nisbett and Wilson (1977) point out that “Global evaluations may be capable of altering perceptions of even relatively unambiguous stimuli, about which the individual has sufficient information to render a confident judgment.” This paper argues that innovative firms have a *halo* around them, although studies like Kock et al. (2011) note that the net effect of technological innovativeness on commercial success may be close to zero.

The authors argue and present evidence in this paper that due to the *halo effect*, firms belonging to the innovative industries, irrespective of the actual research and development expenditure (R&D) made, are penalised less despite having higher CCC days (i.e., inefficient WCM), compared to non-innovative firms. To the best of the authors' knowledge, this study is novel in revealing that halo effect for firms belonging to the innovative industries moderates the relationship between WCM and firm value. Contrary to Aktas et al. (2015), industry-specific target CCCs are not significant for listed Indian firms (Banerjee et al., 2021). This study also finds that deviation from median CCC does not affect the firm value for the sample of innovative firms. However, for non-innovative firms, the positive deviation from the sample median decreases firm value significantly, while negative deviations have no significant impact. Thus, affiliation to industry type may be more indicative of how investors judge firm performance. Finally, there is scant research on WCM in the Indian context, and the paper adds valuable insights on Indian firms to the literature.

Most of the earlier studies on working capital management studied the issue from a traditional finance perspective. The originality and major contribution of the paper to the extant literature is that it examines the behavioural perspective by addressing two novel issues. First, whether R&D expenditure plays a role in the way WCM impacts firm value. Since better WCM frees up capital that may be used for R&D. Second, the Halo effect of innovativeness, just through having affiliation to innovative industry instead of actually having high R&D, creates a behavioural bias in investors psyche that impacts the firm value.

The results have value for the managers since they can tweak their working capital management and have a CCC to balance between profitability and liquidity by considering whether they belong to an innovative industry or not. However, investors may learn to avoid the *halo effect* and value innovative firms' WCM not merely on their classification into an innovative set of industries but also on actual freeing up of funds due to more efficient WCM and investing the same in R&D.

The study is organised as follows: Section 2 reviews the literature, followed by the theoretical background and development of the hypotheses. Next, section 3 discusses the data and the methodology, while Section 4 presents the results. Section 5 discusses the results and their implications. Finally, section 6 concludes the study and highlights the limitations and future scope of work.

2. Review of literature, theoretical background, and hypotheses

2.1. Review of literature

2.1.1. Working capital management and firm value

Working capital is a financial indicator that reflects a company's operating liquidity and is derived by deducting the current liabilities from current assets. WCM enables firms to monitor cash and working capital based on the movements in the inventory, accounts receivables and accounts payables over a period. Extant literature confirms that WCM acts as a balance between short-term liquidity and long-term profitability of firms (Deloof, 2003) and thus impacts the firms' market value (Banerjee et al., 2021).

There are two main threads in the WCM literature. The first thread focuses on how WCM impacts profitability (Abuzayed, 2012; Baños-Caballero et al., 2012; Deloof, 2003; Sharma & Kumar, 2011). Profitability has been typically measured by either or a combination of Gross Operating Profit (GP), Net Operating Profit (NP), Net Profit Margin (NPM), Return on Assets (ROA), and Return on Capital Employed (ROCE). The second thread measures the impact of WCM on firm value using Tobin's Q (Abuzayed, 2012), or other measures of Enterprise Value (EV), or related measure of firm value using excess stock return, or Alpha (Aktas et al., 2015; Banerjee et al., 2021; Wang, 2019).

Profitability, being a key to the firm value, is the basis of most studies. A majority of the studies find that higher WC days are negatively related to firm profitability, inferring higher WC days as a source of inefficiency. Soenen (1993) investigates whether NTC as a measure of WCM efficiency can explain the ROA of US firms. The study finds that although there is a variation across industries, overall, higher the NTC lower the ROA. Jose et al. (1996) test the long-run equilibrium relationship between the CCC and different profitability measures and find a negative relation between CCC and profitability. Further, Shin and Soenen (1998) analyse US firms from 1975 to 1994 and establish a negative relationship between working capital efficiency (proxied by NTC) and profitability (gross and net profit).

Deloof (2003) uses a sample of 1,009 large Belgian non-financial firms for 1992–96 to find a negative relationship between WCM (measured by CCC) and profitability. The study uses components of CCC: ARD, APD, and IHD as measures of trade credit and inventory policy, individually. Using a sample of Saudi Arabian firms, Eljelly (2004) finds a significant negative relationship between a firm's profitability and liquidity level measured by the current ratio. Moreover, when WCM efficiency (measured by CCC) is low, it accentuates the negative relationship further.

Padachi (2006) uses a sample of 58 small manufacturing companies in Mauritius to reveal that the short-term component of working capital financing is increasing over time. The study shows that higher investment in inventories and receivables results in lower profitability. Juan García-Teruel and Martínez-Solano (2007) find the same outcome for Spanish SMEs using panel data regression methodology. Enqvist et al. (2014) studied Finnish firms to conclude that the relationship between working capital and profitability becomes more pronounced during economic booms than during economic downturns. However, Soukhakian and Khodakarami (2019) use data from listed Iranian manufacturing firms and report that macroeconomic factors do not moderate the negative relationship between CCC and ROA.

On the contrary, a few studies point out that higher investment in working capital might increase a firm's profitability. For example, Abuzayed (2012) studies 8 years' data for 52 non-financial companies listed on the Amman Stock Exchange to conclude that an increase in CCC and its three components (ARD, IHD, APD) increased the profitability of the firms.

The firms often face the tradeoff in working capital investments, between profitability, on one hand, and risk on the other, which affects firm value. Overaggressive liquidity management by targeting a lower CCC may lead to stock-out problems and, thereby, loss of sales. Therefore, firms have to manage their working capital to ensure smooth operations and simultaneously maintain the liquidity to meet their obligations (Eljelly, 2004). Thus, WCM balances maintaining enough liquidity and freeing up cash for investment into positive Net Present Value (NPV) projects (Jose et al., 1996). Therefore, both managers and investors need to understand the optimal level of working capital that firms should maintain.

Lazaridis and Tryfonidis (2006) find the relationship of corporate profitability (measured by gross operating profit) and WCM efficiency (measured by CCC and its components) of 131 companies listed in the Athens Stock Exchange (ASE) for the period 2001–04. They report evidence in favour of an optimum level for the different components. The issue of the optimality of working capital has been further explored by Baños-Caballero et al. (2012). They establish a concave quadratic relationship between CCC and Profitability. Additionally, using instrument variables for CCC, they found an optimal value of CCC for their sample firms. Similarly, Pais and Gama (2015) find target-seeking behaviour and the presence of optimal WC for Portuguese firms.

In the Indian context, Saravanan et al. (2017) analyse 12 years of data from 261 non-financial Indian firms to conclude that working capital efficiency affects firm value. They use several concurring measures of firm value for robustness (Tobin's Q ratio, EV/Sales ratio, EBITDA margin, and ROA). They find the presence of optimal CCC for which Tobin's-Q is maximised. Prasad et al.

(2019) also find a deviation from optimal NTC to impact profitability negatively. On the contrary, Chauhan and Banerjee (2018) analysed a large sample of Indian firms from 1993 to 2015 to report the absence of an optimum level of working capital for Indian firms.

Some popular measures of firm value used in the literature are the ratio of enterprise value to operating income (EV/EBITDA), Tobin's Q, Return on Equity (ROE), Earnings per Share (EPS), and market-to-book value (Bianconi & Tan, 2019; Nurein & Din, 2017; Saravanan et al., 2017). However, few studies have investigated the impact of working capital efficiency on firm value based on the market performance of their stocks, such as excess return or Alpha (Aktas et al., 2015; Banerjee et al., 2021). Using firm-level data from 2013 to 2018, Hussain et al. (2021) show that firms' net operating cash flow impacts the relationship between CCC and financial performance. Arachchi et al. (2018) examine the value effect of WCM efficiency of firms in a high growth frontier market and note that efficient WCM positively impacts firm value. In contrast, Vijayakumaran (2019) finds that NTC and firm value are negatively related.

Aktas et al. (2015) analyse a sample of 15,541 US companies from 1982 to 2011 to find that lower NTC results in higher excess stock returns. They find evidence that the industry median NWC/Sales level is optimal, and firms should seek to achieve that target to maximise their operating and market performance. Wasiuzzaman (2015) concludes that working capital efficiency results in higher firm value only for financially constrained firms. Wang (2019) analyses the return of long-short portfolios based on CCC, effectively searching for and establishing the existence of a return premium for CCC. In the Indian context, Banerjee et al. (2021) applied GMM based dynamic panel data models to find that industry medians are not significant as they target optimal CCC for Indian firms. They further show that the negative relationship is a piecewise linear relation with a threshold CCC. If a firm's CCC is below the threshold, the firm value is not affected. In contrast, investors perceive the WCM as inefficient, resulting in lower excess return and firm value if the CCC is above the threshold.

2.1.2. Firm innovativeness and firm value

The literature suggests that firms that adopt innovation get the necessary boost to enhance their performance (Dos Santos & Peffers, 1995). The organisation's ability to succeed must adapt to the ever-changing and uncontrollable external environment by aligning its characteristics and processes as per the contingency theory (Lawrence & Lorsch, 1967; Tajeddini, 2011).

The innovative firms engage themselves in innovative capabilities, such as introducing new products, organisational practices, marketing practices, or new technological processes (Walker et al., 2015). Innovation by firms gives them a competitive advantage, especially in a dynamic environment (Damanpour, 1991; Damanpour & Aravind, 2012). Additionally, innovative firms prefer to employ a balanced approach in adopting technical and administrative innovations. They collectively support and enhance their performance compared to implementing innovativeness at the individual level (Damanpour & Gopalakrishnan, 2001). This practice forms an organisational culture and adds to the firm value (Rubera & Kirca, 2012). Investors see this culture of innovation as attractive as it increases firm value.

R&D expenses (Dambiski Gomes de Carvalho et al., 2017; Wrede & Dauth, 2020), along with the number of patents filed (Wen & Zheng, 2020) and the number of scientific publications (Simeth & Cincera, 2016), are prominent proxies to measure the innovativeness of a firm. Knott (2008) uses Research Quotient (RQ) (the firm-specific output elasticity of R&D) as another measure of the fruitfulness of R&D.

Although studies like Kock et al. (2011) note that the net effect of technological innovativeness on commercial success may be close to zero, the literature generally cites positive effects of innovation on firm value. Moreover, extant studies indicate a significant effect of R&D expense on innovation behaviour and culture that positively impact firm value (Chandler et al., 2000; Rubera & Kirca, 2012).

2.2. Theoretical Background and hypotheses

The cash conversion cycle (CCC) is the number of days a firm takes to recover the cash locked up in the working capital cycle. Hence, the shorter the number of days, the more beneficial it is for the firms as financing costs are reduced. Therefore, CCC is taken as one of the primary proxies of WCM efficiency in this paper.

As discussed in the literature review, higher CCC signifies more capital tied up in working capital. Hence, freeing up the fund for investment in positive NPV projects (or productive CAPEX) increases firm value. However, firms with more WC investments may find it easier to sail through uncertain times, supply chain shocks, and liquidity bottlenecks. It is widely found in the literature that overall, there is a negative impact of higher CCC on firm value for firms in both developed (Soenen, 1993) and emerging markets (Saravanan et al., 2017; Wasiuzzaman, 2015). Hence, the first hypothesis, which also forms the basis of later hypotheses of the paper, may be stated as:

H1: Cash conversion cycle days negatively impact firm value

The effects of accounts receivable days (ARD), inventory holding days (IHD), and accounts payable days (APD) have to be studied individually to understand the effect of CCC as a proxy of WCM efficiency (Cumbie & Donnellan, 2017). The ARD represents the seller company's credit period to the buyer's company; therefore, it serves as the short-term financing arrangement to the buyer company. It also serves as the capacity of the seller company to withstand the receivables in their books (García-Teruel & Martínez-Solano, 2010). Therefore, the fewer credit days extended by the firm, the less cash shortage it will experience. Consequently, higher ARD is expected to impact firm value negatively.

H1a: Accounts receivable days negatively impact firm value

Similarly, the literature suggests that inventory-level reduction is expected to increase firm value (Deloof, 2003). Firms need to maintain a minimum level of inventory of raw materials, work-in-progress and finished goods for smooth operations and minimum supply chain shocks (Eroglu & Hofer, 2011). The investment in inventory directly relates to the amount tied up in the form of inventory. If freed up, the cash can be invested in more profitable opportunities, increasing the firm value. Hence, the following hypothesis is formed.

H1b: Inventory holding days negatively impact firm value

Firms enjoy the time to settle the accounts payables as a source of short-term funding. Hence, the delay serves as a source of short-term funds and can help firms overcome the liquidity crunch (Bhattacharya, 2014). Therefore, the next hypothesis is as follows:

H1c: Accounts payable days positively impact firm value

2.2.1. Linkage between WCM Efficiency and R&D

The R&D for an organisation is crucial to stay competitive, both in terms of market share and cost, and most importantly, to remain in the present market and secure future growth. This trend has emerged due to the recognition that R&D is critical to the success of both businesses and economies. It attempts to achieve a competitive advantage by combining technology improvements with new products and services and developing new manufacturing processes to secure a more significant market share (Cohen & Levinthal, 1989). Firms try to gain a competitive advantage through R&D

initiatives for sustainable development as competition grows and technologies change rapidly, giving heterogeneous R&D behaviour varies across firms (Kang et al., 2017).

The investment in R&D and its persistence involve large-scale funds both on the capital account and revenue expenditure. In this regard, sources of capital play a crucial role in funding the R&D activities in a firm. The sources can be internally generated or through external borrowing. Extant literature focused on the internally generated funds for the R&D investments (Grabowski, 1968; Himmelberg & Petersen, 1994; Ughetto, 2008). Their studies have evidenced that R&D levels are connected to levels of internal cash flow. However, Switzer (1984) and Wang and Thornhill (2010) concluded that debt (considering the riskiness and intangibility of R&D) is not a good source of R&D financing. The study by Carpenter and Petersen (2002) and Martinsson (2010) suggest that equity is an ideal source of funding for R&D. The investment smoothing concept employing working capital in R&D expenses was developed by Fazzari and Petersen (1993). Further, studies on the elements of working capital were on cash holdings (in constrained firms) by Bigelli and Sánchez-Vidal (2012). Similarly, the merits of trade credit and account receivables were highlighted by Petersen and Rajan (1997). Thus, efficient WCM could be an important source of cash freed up. Hence, WCM efficiency may impact firm value through the route of more R&D expenses, resulting in higher future cash flows. Therefore, the study first checks whether R&D expense has any moderating effect on how CCC and its components impact firm value.

H2: Firm R&D expense moderates the relationship between cash conversion cycle days and firm value

H2a: Firm R&D expense moderates the relationship between accounts receivable days and firm value

H2b: Firm R&D expense moderates the relationship between inventory-holding days and firm value

H2c: Firm R&D expense moderates the relationship between accounts payable days and firm value

2.2.2. Halo effect of innovativeness on firm value

Ho et al. (2011) suggest through empirical analysis that business-model innovation can result in higher market value for firms in high-end technology industries than low-end ones. Seminal research points out that innovative organisations distinguish themselves from their counterparts, i.e., non-innovative organisations (Damanpour, 1991). The authors argue that innovativeness is an ideal candidate for the *halo effect* cognitive bias in investors' decision-making. This argument is further supported by findings that despite heterogeneity across industries, overall scientific publications by a firm positively impact firm value beyond the effects of R&D, patent stocks, and patent quality (Simeth & Cincera, 2016).

Due to the halo effect, a global evaluation like "*innovativeness is value-creating*," coupled with the stereotype that "*firms belonging to innovative industries are value-creating*," may lead investors to neglect other critical negative factors like inefficient WCM (proxied by higher CCC) while valuing a firm. The halo effect is especially strong for decisions based on ambiguous attributes that are difficult to ascertain by individuals. In those cases, it acts as a heuristic. However, positive global evaluation, at times, is capable of altering even relatively unambiguous attributes, on which individuals may have sufficient information to make a rational judgment (Nisbett & Wilson, 1977).

CCC is not directly reported in financial statements. Whereas the Current Ratio (Current Asset/Current liability) can be computed from the data provided in the financial statements in one step, CCC requires two-step calculation and is considerably complex and costly to compute. Since the cost of obtaining the variable is high, investors may consider relying on heuristics rather than acquiring the data (Grossman & Stiglitz, 1980). Thus, this paper hypothesises that innovative firms

have a halo around them, and it moderates the way CCC impacts the firm value. The following testable hypotheses are formed based on the above discussions and arguments.

H3: The effect of WCM efficiency (CCC, ARD, IHD, APD) on firm value is different for firms belonging to innovative industries than the same for firms belonging to non-innovative industries.

Finally, the target-seeking behaviour may differ across two sets of industries—innovative and non-innovative, due to investors treating them using different benchmarks based on the halo effect bias. Hence, the final hypothesis is as follows:

H4: The effect of departure from optimal/threshold CCC on firm value is different for firms belonging to innovative industries than the same for firms belonging to non-innovative industries.

3. Data and methodology

3.1. Data and variables

3.1.1. Data

The sample is constructed from the companies listed in the Bombay Stock Exchange (BSE) between 2015 and 2019. The data for this study is collected from the Capitaline Database² for Indian firms. All banks and financial institutions are removed. All public sector firms (PSUs), where the Government of India has a majority and controlling stake, are also removed since they may have distinct halo effects that might interfere with the stated objective. The final sample consists of 200 listed Indian firms across 23 industry sectors. They represent companies with the largest market capitalisation across two broad classifications of industry sectors—innovative industries and non-innovative industries.

The sectors are classified into *Innovative* and *Non-innovative* categories as per the definition of innovative firms as laid down by the Organization for Economic Co-operation and Development (OECD; Grupp, 1995) and the EU Industrial R&D Investment Scoreboard 2018. The method classifies industries into innovative and non-innovative industries based on their R&D intensity and technology intensity (Nurein & Din, 2017). The classification of industry sectors and the number of firms in each sector are listed in Table 1.

3.1.2. Variables

In this study, the ratio of Enterprise Value (EV) to EBITDA is used to measure the firm value of Indian companies (dependent variable). EV/EBITDA is a measure of firm value based on earnings multiples. A more frequent measure in the WCM literature is Tobin's-Q which measures the firm value based on growth opportunities (market to book value) of a firm. However, EV/EBITDA measures the price the firm demands per unit of operating profit (EBITDA). Since, through cost reduction and future sales maximisation, R&D ultimately enhances EBITDA, it is argued as a better measure, (than Tobin's-Q) in this context. Further, from an investor's point of view, the ratio can be easily calculated, as the number is disclosed prominently in the financial statements. The EV/EBITDA metric is distinctive as it supports an equity investor to assess the firm on tangible market value (Bhullar & Bhatnagar, 2013) and, therefore, a robust proxy of firms' market value (Lifland, 2011).

The primary explanatory variable, the CCC, is used as a proxy for the efficiency of WCM. It is a popular measure of working capital efficiency (Deloof, 2003; Juan García-Teruel & Martínez-Solano, 2007). CCC is calculated from its components: accounts receivable days (ARD), inventory-holding days (IHD), and accounts payable days (APD). The R&D Intensity (RD) is used to measure firm innovativeness (Dambiski Gomes de Carvalho et al., 2017; Wrede & Dauth, 2020). RD is

Table 1. Classification of industries into innovative and non-innovative categories

Innovative industries	No. of firms	Non—innovative industries	No. of firms
Automobiles & Parts	16	Construction Materials	15
Chemicals	12	FMCG	21
Electronic & Electrical Equipment	1	Mobile Telecom	5
Health Care	4	Beverages	3
Pharmaceuticals	16	Media	7
Software & Comp Services	11	Tobacco	3
Technology Hardware	1	Utilities	17
Oil & Gas	1	Personal Care	16
Household Goods	12	Real Estate	7
Mining & Metals	3	Transportation & Logistics	6
Industrial Engineering	1		
Paper Industries	1		
General Industrial	2		
Total	100	Total	100

Note: Based on OECD Classification (Grupp, 1995)

measured by the percentage of R&D expenditure on sales to capture the firms' focus on innovativeness.

Researchers widely use CCC to measure WCM efficiency (Deloof, 2003). NTC and CCC are related measures, and the results of the studies conducted by Deloof (2003) were comparable by using CCC or NTC. Similarly, Nurein and Din (2017) also use CCC as a measure of WCM to study the effect of WCM on the firm value of the innovative and non-innovative firms. Furthermore, in their review paper on working capital management, Prasad et al. (2019) report that 27 articles totalling 77% of the articles (under the review corpus of 35 articles) use CCC as a proxy for WCM, whereas NTC by two papers.

There has been evidence that optimal CCC (from the quadratic relationship) doesn't exist in India (Banerjee et al., 2021; Chauhan & Banerjee, 2018). Hence, optimal CCC and deviation from that are not used. However, deviation from median CCC is utilised to test the non-linear effect.

The control variables used in this study are firm size (SZ), financial leverage (LEV), working capital ratio (WCR), growth in sales (GRW), age of the firm (AGE), and net profit margin (NPM). These are taken as control variables in accordance with the past studies (Deloof, 2003; Juan García-Teruel & Martínez-Solano, 2007; Kieschnick et al., 2013; Prasad et al., 2019; Saravanan et al., 2017). The variables used in this study, their acronyms, type (whether dependent, independent, or control variable), and the formula for computation are presented in Table 2.

The study uses NPM (Profit after Tax/Sales) to control cost-efficiency. ROA, ROE, EBITDA/TA or EBITDA/EQ are other common profitability measures. However, since R&D impacts the firms in two major ways: cost reduction and future sales, authors argue that the NPM along with control for firm size proxied by the log of sales control for their effect well. As the effect of R&D undertaken by the firm cannot be directly measured, the NPM ratio captures the impact of R&D in operations, administration, and finance. R&D activities contribute to the improvement of revenue and reduction of costs, which converge in profits to the firm. The sales reflect the R&D efforts or activities undertaken in the previous years till the current year. However, total assets, or ROA, may be distorted due to capex

Table 2. Variable description

Sl. No.	Variables	Acronyms	Type of variable	Measurement
<i>Dependent variable</i>				
1	Firm Value	FV	Dependent	(Market Capitalization + Total Debt – Cash & Cash Equivalents)/EBITDA
<i>Independent explanatory variables</i>				
2	Cash Conversion Cycle-	CCC	Proxy for working capital management efficiency	Accounts Receivables Days+ Inventory Holding days—Accounts Payable Days. (ARD + IHD—APD)
3	Accounts Receivable Days	ARD	Proxy for receivables management efficiency	Accounts Receivables (amount) divided by sales, multiplied by 365 days. (AR/Sales) X 365
4	Inventory Holding Days	IHD	Proxy for inventory management efficiency	Inventory (amount) divided by Cost of Sales, multiplied by 365 days. (INV/COS) X 365
5	Accounts Payable Days	APD	Proxy for payables management efficiency	Accounts Payables (amount) divided by Cost of Sales, multiplied by 365 days. (AP/COS) × 365
6	R&D Intensity	RD	R&D expenditure proxy for firm innovativeness/ effectiveness	R & D Expenses/Sales × 100 (in %)
<i>Control variables</i>				
7	Firm Size	SZ	A measure of firm size	Natural logarithm of Sales
8	Leverage	LEV	A measure of the financial leverage of the firm	Total debt divided by total shareholder's equity
9	Working Capital Ratio	WCR	A measure of the liquidity of the firm	Current Assets/Current Liabilities
10	Growth in Sales	GRW	A proxy for the growth of the firm	(Current year sales—previous year sales)/previous year sales
11	Age of the Firm	AGE	A measure of the maturity of the firm in its lifecycle	Natural log transformed age of the firm in years since incorporation
12	Net Profit Margin	NPM	A measure of the profitability of the firm	Profit after Tax/Sales

that is funded mainly by debt instead of cash saved through efficient WCM. Similarly, RoE is not considered as there may be a capital infusion, leading to noise in the measure.

3.2. Methodology

The linear regression model has been used to examine the stated hypotheses in this study. Equation (1) tests for the first hypothesis, while Equation (2) tests hypothesis H2 employing an interaction term with CCC and RD.

$$FV_{it} = \alpha + \beta_1 CCC_{it} + \chi_{it} RD_{it} + \sum_j \kappa_j X_{it}^j + \mu_i + \tau_t + \varepsilon_{it} \quad (1)$$

$$FV_{it} = \alpha + \beta_1 CCC_{it} + \beta_2 (CCC_{it} \times RD_{it}) + \chi_{it} RD_{it} + \sum_j \kappa_j X_{it}^j + \mu_i + \tau_t + \varepsilon_{it} \quad (2)$$

Hypotheses H1a, H1b, and H1c are tested using Equation (3), while hypotheses H2a, H2b, and H2c are tested using Equation (4). Equation (4) has RD interacting with ARD, IHD, and APD separately.

$$FV_{it} = \alpha + \gamma_1 ARD_{it} + \delta_1 CCC_{it} + \lambda_1 CCC_{it} + \chi_{it} RD_{it} + \sum_j \kappa_j X_{it}^j + \mu_i + \tau_t + \varepsilon_{it} \quad (3)$$

$$FV_{it} = \alpha + \gamma_1 ARD_{it} + \delta_1 CCC_{it} + \lambda_1 CCC_{it} + \gamma_2 (ARD_{it} \times RD_{it}) + \delta_2 (ARD_{it} \times RD_{it}) + \lambda_2 (ARD_{it} \times RD_{it}) + \chi_{it} RD_{it} + \sum_j \kappa_j X_{it}^j + \mu_i + \tau_t + \varepsilon_{it} \quad (4)$$

In all the equations i is the index of firms, t is the index of years, α is the constant (intercept term), μ_i measures the firm (cross-section) fixed effects, τ_t measures the year (period) fixed effects, and ε_{it} is the random error term. X_{it}^j represents the six control variables ($j = 1$ to 6) with respective coefficients κ_j .

Further, equations (1), (2), (3), and (4) are reused to test hypothesis H3 for subsamples of innovative and non-innovative firms. Testing the hypothesis H4 involves testing the medians of the two subsamples of innovative and non-innovative firms as possible threshold points, above and below which the effect of CCC on firm value differs. Thus, the absolute deviation from median CCC ($MEDIANCCC_s$) of each firm is computed for two subsamples using Equation (5) and Equation (6)

$$MEDPOS_{its} = \max(CCC_{its} - MEDIANCCC_s, 0) \quad (5)$$

$$MEDNEG_{its} = \max(MEDIANCCC_s - CCC_{its}, 0) \quad (6)$$

Further, they are used in Equation (7) to test hypothesis H4.

$$FV_{its} = \alpha + \Phi_1 MEDPOS_{its} + \Phi_2 MEDNEG_{its} + \chi_{it} RD_{it} + \sum_j \kappa_j X_{it}^j + \mu_i + \tau_t + \varepsilon_{it} \quad (7)$$

Where i is the index of firms, t is the index of years, and s is the index of subsamples.

In the first step of regression analysis, the panel data OLS is fitted with fixed effect for each firm (cross-section) and each year (period or time) to estimate the equations. However, the Durbin-Watson statistic is high, and the cross-section dependence test (Breusch-Pagan LM Test, Baltagi et al., 2003; Breusch & Pagan, 1980) suggests that the cross-section dependence (correlation) in residuals. This significant first-order autocorrelation renders the OLS estimation inefficient. Thus, Dynamic Panel

Table 3. Descriptive statistics

Variable	Obs.	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis
FV	1000	21.5213	17.2000	382.7600	2.9800	21.1689	7.5985	104.5275
CCC	1000	80.8802	43.0000	5248.0000	-483.0000	274.4372	9.5756	144.1490
ARD	1000	51.8960	41.0000	446.0000	0.00	48.4589	2.5564	15.6402
IHD	1000	106.8220	62.0000	6085.0000	0.00	287.4548	11.7709	204.4345
APD	1000	77.8378	59.0000	901.0000	1.00	72.8131	4.1411	30.7853
RD	1000	0.9556	0.0800	22.1300	0.00	2.4146	4.3958	26.0978
SZ	1000	8.2365	8.1450	12.8300	3.8000	1.3303	0.1731	3.6218
LEV	1000	0.4600	0.2200	8.7800	0.0000	0.6997	3.7937	29.5156
WCR	1000	1.4614	1.2600	9.9800	0.0500	0.9795	3.0552	19.4968
GRW	1000	14.1377	9.9400	1929.4800	-70.3900	72.2406	21.4459	532.4795
AGE	1000	3.5414	3.5000	4.7600	1.1000	0.6418	-0.4616	3.2100
NPM	1000	10.1290	9.1800	80.3200	-340.0600	21.3267	8.4259	131.7767

Data Source: Capitaline Database, Computation by Authors.

Arellano-Bond n-step estimator (GMM-DPD) has been used to find robust estimates. In this GMM-DPD method, dummy variables are used to remove period fixed effects, differences are used to remove cross-sectional fixed effects, and past level values of all explanatory variables are used as instruments. The Sargan-Hansen J-statistic (H_0 : GMM Overidentifying restrictions are valid, i.e., instruments are valid) and its p-values are reported to support the validity of the GMM estimates (Hansen, 1982).

The classification of firms into innovative and non-innovative categories is exogenous. Hence, this could affect the results. Therefore, sample firms are categorised into high RD firms and low RD firms for a robustness check. If a firm's average RD over the sample period is above (or below) the median of average RD of all firms, then the firm is classified as high RD (or low RD). The regression equations (1), (2), (3), and (4) are estimated using OLS and Dynamic Panel Arellano-Bond n-step estimator on the two subsamples separately.

4. Results

4.1. Descriptive statistics and correlation matrix

The descriptive statistics and correlation matrix presented in Table 3 and Table 4 show that none of the variables except SZ and AGE is close to being normally distributed. The correlation matrix presents the Pearson correlation among the variables used in this study. None of the variables, except IHD and CCC, are highly correlated, suggesting no multicollinearity problems.

4.2. Regression results

Table 5 presents the results of Equations (1), (2), (3), and (4) fitted on the entire sample. In the OLS model, both the fixed effects are not redundant. Although the F-statistics is significant and the Equation could explain 37.44% variation in the firm value, the presence of first-order autocorrelation makes the estimation inefficient. Hence, GMM-DPD has been fitted. The Sargan-Hansen J-statistic for GMM-DPD suggests that the estimates are not over-identified by the instruments and are robust (Hansen, 1982). Results from both OLS and GMM-DPD indicate that the firms with higher CCC have significantly lower firm value (FV), *ceteris paribus* (H1 supported). RD is not significant in either of the cases.

Similarly, Equation 2, estimated using OLS and GMM-DPD, suggests that the interaction of RD does not impact the negative and significant relationship between CCC and FV. Thus, it can be inferred that the R&D intensity neither impacts FV nor has any moderating effect on the negative relationship of CCC with firm value. Thus, hypothesis H2 is not accepted.

The rest of the columns in Table 5 presents the results for Equations (3) and (4) that tests the effects of components of CCC (ARD, IHD, and APD) on firm value and the moderating effect of RD on their relationship with firm value. It is clear from the results presented in Table 5 that ARD does not affect firm value (H1b not accepted). In contrast, IHD has a significant negative effect on firm value (H1c supported by both OLS and GMM-DPD), while expectedly, APD positively affects firm value (H1d supported by only OLS). In all the cases, the interaction terms of RD with ARD, IHD, and APD assume insignificant coefficients. Thus, we conclude that R&D intensity does not have any significant moderating effect on the relationship of individual components of CCC on firm value (H2b, H2c, H2d not accepted).

Table 6 presents the results of Equations (1), (2), (3), and (4) fitted on the subsample of innovative firms. It is clear and consistent from all the estimations (both OLS and GMM-DPD) that neither CCC nor RD significantly impacts the FV for innovative firms. RD does not moderate the relationship between CCC and FV for innovative firms. Only in one case does APD have a weakly significant (at 10%) positive impact on firm value (OLS Equation-3).

In contrast, Equations (1), (2), (3), and (4) fitted on the subsample of non-innovative firms (results presented in Table 7) show that CCC has a significant negative impact on FV for both

Table 4. Correlation among variables

	FV	CCC	ARD	IHD	APD	RD	SZ	LEV	WCR	GRW	AGE	NPM
FV	1.0000											
CCC	0.0570*	1.0000										
ARD	-0.0077	0.1517***	1.0000									
IHD	0.0531*	0.9669***	0.0572*	1.0000								
APD	-0.0102	0.1490***	0.3194***	0.3417***	1.0000							
RD	-0.0060	0.0146	0.2332***	-0.0226	0.0110	1.0000						
SZ	-0.1997***	-0.1999***	-0.0648**	-0.1881***	-0.0325	0.1323***	1.0000					
LEV	-0.0942***	0.0228	0.0558*	0.0562*	0.1731***	-0.1184***	0.0477	1.0000				
WCR	-0.0108	0.1392***	0.1972***	0.0672**	-0.1283***	0.0818***	-0.1859***	-0.3270***	1.0000			
GRW	-0.0238	-0.0071	-0.0230	-0.0188	-0.0631**	-0.0299	-0.0420	0.0112	0.0156	1.0000		
AGE	0.0010	0.0226	-0.1344***	0.0352	-0.0354	0.0541*	0.1248***	-0.2146***	-0.0124	-0.1372***	1.0000	
NPM	0.0421	0.1990***	0.0311	0.1695***	-0.0600*	0.0858***	-0.0707**	-0.2155***	0.3218***	0.0314	0.0265	1.0000

Note: *, **, *** indicates significance at 10%, 5%, and 1% level, respectively.

Data Source: Capitaline Database, Computation by Authors.

Table 5. Impact of WCM efficiency and R&D intensity on firm value for sample of all firms
Dependent variable FV, sample of all firms, sample size 1000 firm-years

	Eq-1 (OLS)	Eq-1 (GMM-DPD)	Eq-2 (OLS)	Eq-2 (GMM-DPD)	Eq-3 (OLS)	Eq-3 (GMM-DPD)	Eq-4 (OLS)	Eq-4 (GMM-DPD)
Variable	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
FV _{t-1}		0.2189		0.2237		0.2553		0.2237
CCC	-0.0354***	-0.1191**	-0.0356***	-0.1253**				
ARD					0.0436	-0.1186	0.0443	-0.3425**
IHD					-0.0381***	-0.1105***	-0.0379***	-0.1428**
APD					0.0566***	0.0674	0.0556***	0.1839
RD	1.0440	-0.4494	0.7983	-2.1048	0.8641	0.5962	0.2230	20.0022
CCC × RD			0.0026	0.0085				
ARD × RD							-0.0033	0.0576
IHD × RD							0.0079	-0.0982
APD × RD							0.0003	-0.0099
GRW	-0.0231***	-0.0204	-0.0230***	-0.0430	-0.0208**	-0.0498	-0.0210**	-0.0949
LEV	-1.0924	-3.0146	-1.0951	-3.7889	-2.3963	-1.6328	-2.4317	13.0043
NPM	-0.0736*	0.1102	-0.0735*	0.1255	-0.0864**	0.1017	-0.0869**	0.0803
SZ	-2.4967	-20.2434	-2.4094	-19.3331	-2.7695	-10.0205	-2.5554	-8.9769
WCR	-1.9634	-2.5300	-1.9946	-1.2125	-1.8523	-5.4386	-1.8270	-36.6366
AGE	-5.8387	35.3939	-5.8628	35.8177	-2.4954	26.3125	-3.1964	-1.3907
C	69.0697		68.5047		54.7231		55.6171	
J-Statistics		4.1153		3.9910		6.0535		1.4773
Prob of J-stat		0.5329		0.5507		0.3010		0.9157
Adj R ²	0.3744		0.3739		0.380108		0.3781	
F-Statistics	3.8335***		3.8137***		3.8759***		3.8124***	
DW-Stat	2.4724		2.4698		2.4710		2.4722	

Note: Equations 1 to 4 are estimated using Panel OLS with fixed cross-section and period effects for the entire sample. Dynamic Panel Arellano-Bond n-step estimator (with dummy variables to remove period fixed effects, difference to remove cross-sectional fixed effects and using all explanatory variables as instruments) has been used to find robust estimates. Sargan-Hansen J-stat (H_0 : GMM Overidentifying restrictions are valid, i.e., instruments are valid) and its p-values are reported to support validity of the GMM estimates. *, **, *** indicates significance at 10%, 5%, and 1% level, respectively.

Data Source: Capitaline Database, Computation by Authors

OLS and GMM-DPD estimations. IHD also negatively impacts FV (both OLS and GMM-DPD), while APD has a positive effect only in OLS estimation. For non-innovative firms, RD neither affects FV nor has any moderating impact on the relationship of WCM efficiency variables on FV. Thus, it can be concluded by contrasting Table 6 and Table 7 that the effect of WCM efficiency on FV significantly differs for the two classifications of firms (H3 supported).

The classification of firms into innovative and non-innovative categories is exogenous, and the results may depend upon the particular method applied for such classification. Therefore, a robustness test is performed by segregating the sample of all firms into high and low RD firms by dividing them according to their average R&D intensity over the sample period. Table 8 presents the results of Equation (1) and (2) with OLS and GMM-DPD, fitted on the entire sample. Results for Equations (3) and (4) are qualitatively similar and not reported for brevity. Table 8 provides evidence that WCM efficiency (CCC) has no impact on FV, even for the high-RD firms. In contrast, CCC has a significant negative effect on FV for low-RD firms. In all the cases, RD has no individual or moderating effect on FV. Results presented in Table 8 support hypothesis H3.

Table 6. Impact of WCM efficiency and R&D intensity on firm value for sample of innovative firms
Dependent variable FV, sample of innovative firms, sample size 500 firm-years

	Eq-1 (OLS)	Eq-1 (GMM-DPD)	Eq-2 (OLS)	Eq-2 (GMM-DPD)	Eq-3 (OLS)	Eq-3 (GMM-DPD)	Eq-4 (OLS)	Eq-4 (GMM-DPD)
Variable	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
FV _{t-1}		0.5920		-0.8957*		-0.6852		-0.8214*
CCC	-0.0062	0.1355	-0.0104	0.1169				
ARD					0.0069	0.0481	0.0001	0.1105
IHD					0.0438	0.2034	0.0262	0.1769
APD					0.0402*	0.0753	0.0257	-0.1577
RD	0.6754	-2.4530	0.4353	7.4726	0.4223	0.1740	-1.0854	-0.3485
CCC × RD			0.0017	-0.0249				
ARD × RD							0.0021	-0.0299
IHD × RD							0.0069	-0.0030
APD × RD							0.0033	0.0334
GRW	-0.0061	-0.6120	-0.0059	0.7717*	-0.0046	0.5596	-0.0050	0.6080
LEV	0.0864	-31.9482	0.3656	-51.9594	-1.9449	-78.7498	-1.4873	-54.0310
NPM	0.0498**	0.0963	0.0499**	0.2894**	0.0403*	0.3676**	0.0450**	0.3085
SZ	-7.2114***	42.4547	-7.0365**	-70.5235*	-6.2599**	-59.1503	-5.6716**	-62.3977
WCR	-1.6686	18.8903	-1.6293	3.8039	-1.306	14.4704	-1.1737	3.7749
AGE	4.5978	-52.8754	4.7543	70.9106	8.6937	75.3032	7.3781	79.0241
C	65.5087		63.6457		36.3790		39.1536	
J-Statistics		3.4161		2.7024		3.2193		3.5567
Prob of J-stat		0.6361		0.7458		0.6662		0.6148
Adj R ²	0.4795		0.4785		0.4853		0.4848	
F-Statistics	5.1414***		5.0877***		5.1639***		5.0487***	
DW-Stat	2.0803		2.0858		2.1720		2.2030	

Note: Equations 1 to 4 are estimated using Panel OLS with fixed cross-section and period effects for the sample of innovative firms. Dynamic Panel Arellano-Bond n-step estimator (with dummy variables to remove period fixed effects, difference to remove cross-sectional fixed effects, and using all explanatory variables as instruments) has been used to find robust estimates. Sargan-Hansen J-stat (H_0 : GMM Overidentifying restrictions are valid, i.e., instruments are valid) and its p-values are reported to support validity of the GMM estimates. *, **, *** indicates significance at 10%, 5%, and 1% level, respectively.

Data Source: Capitaline Database, Computation by Authors.

Finally, Table 9 presents the results of equations (7) estimated through OLS and GMM-DPD models separately for the two subsamples of innovative and non-innovative firms. The results of OLS and GMM-DPD are consistent. They indicate no effect of either positive or negative deviation from median CCC for the sample of innovative firms. However, for non-innovative firms, while a positive deviation from median CCC lowers FV, negative deviations have no impact on FV. Thus, hypothesis H4, which postulates the target-seeking behaviour of innovative vs. non-innovative firms, measured by the different effects of CCC on FV on either side of a threshold/optimal CCC, is supported.

5. Discussions and implications

5.1. Discussions

The results suggest that the firm value (FV), of which the market value of the firm's equity is a significant component, is impacted negatively by WCM efficiency when both innovative and non-innovative firms are considered. The results corroborate previous findings (Saravanan et al., 2017; Soenen, 1993). The individual components IHD and APD have positive and negative impacts, respectively, on FV, which is similar to the findings of Afrifa (2013), Deloof (2003), and Bhattacharya (2014),

Table 7. Impact of WCM efficiency and R&D intensity on firm value for sample of non-innovative firms
Dependent variable FV, sample of innovative firms, sample size 500 firm-years

	Eq-1 (OLS)	Eq-1 (GMM-DPD)	Eq-2 (OLS)	Eq-2 (GMM-DPD)	Eq-3 (OLS)	Eq-3 (GMM-DPD)	Eq-4 (OLS)	Eq-4 (GMM-DPD)
Variable	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
FV _{t-1}		0.2432*		0.2459		0.2317		0.1962
CCC	-0.0303***	-0.1060**	-0.0304***	-0.1433**				
ARD					0.0309	-0.2750	0.0277	0.0672
IHD					-0.0321***	-0.1494**	-0.0328***	-0.1029*
APD					0.0501*	0.0339	0.0551*	0.1619
RD	1.0062	-4.0635	12.2317	296.4592	1.0527	-1.7779	17.3790	102.8427
CCC × RD			0.0727	1.7657				
ARD × RD							-0.0415	-0.0736
IHD × RD							0.0146	-0.3635
APD × RD							-0.0791	-0.4547
GRW	-0.0881***	0.0602	-0.0878***	0.3098	-0.0828***	-0.1626	-0.0825***	0.1211
LEV	-2.5770	-11.5726	-2.6300	-28.3444	-2.9901	-16.5127	-3.0831	-18.0074
NPM	-0.8626***	-0.5739	-0.8699***	-0.8436	-0.8601***	-0.2795	-0.8690***	-0.3341
SZ	7.7405	-37.9070	7.9656	-79.2124	7.0403	-17.9497	7.2150	-24.0185
WCR	-1.9917	-1.5258	-1.8887	23.1956	-1.7384	-7.7708	-1.6086	1.3664
AGE	-12.3439	74.3843	-15.4128	87.4547	-9.4658	17.7018	-13.0654	29.5713
C	21.7217		29.0127		13.2645		22.8714	
J-Statistics		4.4634		2.7323		5.0381		6.9633
Prob of J-stat		0.4848		0.7412		0.4112		0.2234
Adj R ²	0.4143		0.4158		0.4143		0.4133	
F-Statistics	4.1805***		4.1715***		4.1232***		4.0298***	
DW-Stat	2.4931		2.4869		2.48652		2.4866	

Note: Equations 1 to 4 are estimated using Panel OLS with fixed cross-section and period effects for the sample of innovative firms. Dynamic Panel Arellano-Bond n-step estimator (with dummy variables to remove period fixed effects, difference to remove cross-sectional fixed effects, and using all explanatory variables as instruments) has been used to find robust estimates. Sargan-Hansen J-stat (H_0 : GMM Overidentifying restrictions are valid, i.e., instruments are valid) and its p-values are reported to support validity of the GMM estimates. *, **, *** indicates significance at 10%, 5%, and 1% level, respectively.

Data Source: Capitaline Database, Computation by Authors.

etc. Since the increase in working capital days signifies inefficient working capital management, it results in cash being tied up in the working capital cycle for a more extended period. If freed up, the funds could have been used for investment in positive NPV projects, resulting in higher returns for the stakeholders. Thus, investors reprimand the firm with inefficient WCM by devaluing it.

However, a deeper investigation into the issue by segregating firms into innovative and non-innovative categories based on their industries shows that the values of firms belonging to innovative industries are not affected by an increase in working capital days. On the contrary, the firms belonging to non-innovative industries experience a significant reduction in their firm value with increasing working capital days. Further, it is found that the target-seeking behaviour is not present for the firms belonging to innovative industries. In contrast, for their non-innovative industry counterparts, if the WC days are more than the median (target), they are penalised more in terms of valuation.

In this paper, the authors argue that this difference in behaviour is due to the *halo effect* around firms that belong to the innovative industries, whether the OECD classification (Grupp, 1995) or the categorisation based on high (or low) R&D expenditure intensity is used. Since innovative firms are

Table 8. Robustness Test: Effect of WCM efficiency on firm value for samples of high R&D and low R&D firms

	Dependent variable FV, sample of high R&D firms, sample size 500 firm-years				Dependent Variable FV, sample of low R&D firms, sample size 500 firm-years			
	Eq-1 (OLS)	Eq-1 (GMM-DPD)	Eq-2 (OLS)	Eq-2 (GMM-DPD)	Eq-1 (OLS)	Eq-1 (GMM-DPD)	Eq-2 (OLS)	Eq-2 (GMM-DPD)
Variable	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
FV_{t-1}		−0.5408***		−0.6110***		0.0784		0.0177
CCC	0.0211	−0.0211	0.0298	0.0116	−0.0367***	−0.1214***	−0.0369***	−0.1176**
RD	0.7519	−4.6633	0.9248*	−0.4513	8.4980	−55.8704	−19.9184	−99.0069
CCC × RD			−0.0023	−0.0192			0.3736	0.6767
GRW	0.0100	0.5566	0.0072	0.4710	−0.0233*	0.2418	−0.0232*	0.2495
LEV	−0.7680	−42.0883	−0.8347	−28.3200	−1.4691	−16.4061	−1.5392	−13.2400
NPM	−0.4515***	−1.2932*	−0.4482***	−1.2312*	−0.0467	0.2750*	−0.0483	0.2383
SZ	−5.4526	−85.4287**	−5.7584*	−70.0114*	−2.5363	−47.9768	−2.7490	−47.3493
WCR	−2.1482*	−8.0683	−2.1760*	−6.5261	−1.4846	2.7388	−1.5331	1.9333
AGE	−7.6813	101.9133	−7.7182	63.6799	−4.2252	84.5008	−4.3385	79.2573
C	102.8464*		105.1935*		63.6471		65.9468	
J-Statistics		2.7256		3.3953		2.1389		2.6873
Prob of J-stat		0.7422		0.6393		0.8296		0.7481
Adj R ²	0.5967		0.5963		0.3134		0.3121	
F-Statistics	7.6523***		7.5820***		3.0517***		3.0218***	
DW-Stat	2.3298		2.3327		2.4811		2.4835	

Note: As check for robustness of the method and classification of firms into Innovative and Non-Innovative categories, equations 1 and 2 are estimated using Panel OLS (with fixed cross-section and period effects) and with Dynamic Panel Arellano-Bond n-step estimator (with dummy variables to remove period fixed effects, difference to remove cross-sectional fixed effects, and using all explanatory variables as instruments) for the samples of High R&D and Low R&D firms. Sargan-Hansen J-stat (H_0 : GMM Overidentifying restrictions are valid, i.e., instruments are valid) and its p-values are reported to support validity of the GMM estimates. *, **, *** indicates significance at 10%, 5%, and 1% level, respectively.

Data Source: Capitaline Database, Computation by Authors

expected to deliver higher returns to their investors over the long term (Rubera & Kirca, 2012), there is a universal positive sentiment around such firms. Therefore, due to the *halo effect*, a global evaluation like “*innovativeness is value-creating*,” coupled with the stereotype that “*firms belonging to innovative industries are value-creating*,” allows investors to neglect factors like inefficient WCM while valuing firms from innovative industries. Further, this paper provides evidence that while valuation, whether the firm invests in R&D substantially does not impact the relationship of WCM with firm value. However, the absence of such a *halo effect* allows investors to consider WCM efficiency as a crucial factor while valuing firms that do not belong to innovative industries.

5.2. Implications and original contributions

This study has multiple implications for both academicians and practitioners. First, it adds to the literature by exploring the presence of a behavioural bias in investors due to which they factor in WCM efficiency into firm value differently. Second, to the best of the authors’ knowledge, it is a novel study to elucidate how mere affiliation to the innovative industry can moderate the way investors perceive WCM efficiency. Third, the study finds that investors adjust their trading behaviour accordingly and do not exhibit any target-seeking behaviour for working capital days for firms belonging to innovative industries. However, for firms belonging to non-innovative industries, investors seek a target working capital days and penalise firms for having higher working capital days than the target.

Practitioners and investors may use the results of this study to update their valuation and trading strategies. The cognisance of the halo effect may prompt them to see their valuation of

Table 9. Test for optimal or threshold WCM efficiency in determining firm value for samples of innovative and non-innovative firms

Variable	Dependent variable FV, sample of innovative firms, sample size 500 firm-years		Dependent variable FV, sample of non-innovative firms, sample size 500 firm-years	
	Eq-7 (OLS)	Eq-7 (GMM-DPD)	Eq-7 (OLS)	Eq-7 (GMM-DPD)
	Coefficient	Coefficient	Coefficient	Coefficient
FV _{t-1}		0.4692		0.4484*
MEDPOS	0.0219	0.3124	−0.0325***	−0.1708**
MEDNEG	0.0328	−0.0224	−0.0333	0.5774
RD	0.6243	−5.0722	1.1228	−14.9732
GRW	−0.0054	−0.4206	−0.0882***	−0.2575
LEV	−1.4441	−44.7666	−2.4849	−13.6355
NPM	0.0428*	0.0598	−0.8332***	−0.4268
SZ	−7.5681***	21.6315	5.5476	−13.1438
WCR	−1.3883	17.4321	−2.2277	0.1535
AGE	5.7802	−24.4714	−11.0314	−13.9157
C	62.5698		35.9627	
J-Statistics		3.3640		2.3098
Prob of J-stat		0.6441		0.8048
Adj R ²	0.4825		0.4178	
F-Statistics	5.1547***		4.1978***	
DW-Stat	2.1043		2.4643	

Note: This table tests for the presence of optimal/threshold WCM efficiency that determines firm value for Innovative and Non-Innovative samples of firms. Equations 5 is estimated separately using Panel OLS (with fixed cross-section and period effects) and with Dynamic Panel Arellano-Bond n-step estimator (with dummy variables to remove period fixed effects, difference to remove cross-sectional fixed effects, and using all explanatory variables as instruments) for the samples of Innovative and Non-Innovative firms. Sargan-Hansen J-stat (H_0 : GMM Overidentifying restrictions are valid, i.e., instruments are valid) and its p-values are reported to support validity of the GMM estimates. *, **, *** indicates significance at 10%, 5%, and 1% level, respectively.

Data Source: Capitaline Database, Computation by Authors.

firms belonging to innovative industries more objectively. The exploitation of overvaluation may, over time, correct the bias and make the valuations more efficient.

6. Conclusions

This paper highlights the significance of working capital management efficiency for firm value. The paper has comprehensively studied the effect of the aggregate measure of working capital days (CCC) and its three components (ARD, IHD, APD) on firm value. The extant literature has suggested that higher “working capital days” impact firm value negatively. This paper starts with the premise and finds evidence favouring the same, strengthening the acceptability of the sample as a representative one. However, further investigations reveal that firms from innovative and non-innovative industry sectors are evaluated differently. The authors argue that this difference is due to a *halo effect* around firms from innovative industries. Due to the *halo effect*, their valuations are not impacted by higher working capital days, unlike the firms from non-innovative industries. The results obtained from the sample of Indian firms are expected to hold for other emerging markets.

Although it is a novel study in the field of the effect of WCM on firm value and the moderating effect of industry categorisation, it has some scope for improvement. First, further research with more firms in each type of industry sector may be studied. Second, the finding of this paper may be

evaluated in other countries to see whether the *halo effect* bias is universal or a distinctive characteristic of Indian investors.

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Notes

1. Please refer to the PwC report titled "Navigating uncertainty: PwC's annual global Working Capital Study" 2018–19
2. Capitaline Database for Indian companies by Capital Market Publishers India. See <https://www.capitaline.com/>

References

- Abuzayed, B. (2012). Working capital management and firms' performance in emerging markets: The case of Jordan. *International Journal of Managerial Finance*, 8 (2), 155–179. <https://doi.org/10.1108/17439131211216620>
- Afrifa, G. A. (2013). Working capital management practices of UK SMEs. *The Role of Education and Experience*, 3(4), 185–196. <https://doi.org/10.6007/IJARAFMS/v3-i4/390>
- Aktas, N., Croci, E., & Petmezas, D. (2015). Is working capital management value-enhancing? Evidence from firm performance and investments. *Journal of Corporate Finance*, 30(1), 98–113. <https://doi.org/10.1016/j.jcorpfin.2014.12.008>
- Arachchi, A. N. H., Perera, W., & Vijayakumaran, R. (2018). The impact of working capital management on firm value: evidence from a frontier market. *Asian Journal of Finance & Accounting*, 9(2), 399. <https://doi.org/10.5296/ajfa.v9i2.12449>
- Baltagi, B. H., Song, S. H., & Koh, W. (2003). Testing panel data regression models with spatial error correlation. *Journal of Econometrics*, 117(1), 123–150. [https://doi.org/10.1016/S0304-4076\(03\)00120-9](https://doi.org/10.1016/S0304-4076(03)00120-9)
- Banerjee, A., Kundu, S., & Sivasankaran, N. (2021). Asymmetric impact of working capital efficiency on market performance of Indian firms. *Global Business Review* doi:<https://doi.org/10.1177/0972150920988648>.
- Baños-Caballero, S., García-Teruel, P. J., & Martínez-Solano, P. (2012). How does working capital management affect the profitability of Spanish SMEs? *Small Business Economics*, 39(2), 517–529. <https://doi.org/10.1007/s11187-011-9317-8>
- Bhattacharya, M. (2014). Business growth, size and age: evidence from the business longitudinal survey (BLS) data in Australia. *Australian Economic Papers*, 53(3–4), 129–138. <https://doi.org/10.1111/1467-8454.12027>
- Bhullar, P. S., & Bhatnagar, D. (2013). Theoretical framework EV vs. Stock price—A better measurement of firm value. *International Journal of Commerce, Business and Management*, 2(6), 335–343.
- Bianconi, M., & Tan, C. M. (2019). Evaluating the instantaneous and medium-run impact of mergers and acquisitions on firm values. *International Review of Economics & Finance*, 59(Did), 71–87. <https://doi.org/10.1016/j.iref.2018.08.005>
- Bigelli, M., & Sánchez-Vidal, J. (2012). Cash holdings in private firms. *Journal of Banking & Finance*, 36(1), 26–35. <https://doi.org/10.1016/j.jbankfin.2011.06.004>
- Breusch, T., & Pagan, A. (1980). The lagrange multiplier test and its application to model specification in econometrics. *Review of Economic Studies*, 47(1), 239–254. <https://doi.org/10.2307/2297111>
- Carpenter, R. E., & Petersen, B. C. (2002). Capital market imperfections, high-tech investment, and new equity financing. *The Economic Journal*, 112(477), F54–F72. doi:<https://doi.org/10.1111/1468-0297.00683>.
- Chandler, G. N., Keller, C., & Lyon, D. W. (2000). Unraveling the determinants and consequences of an innovation-supportive organizational culture. *Entrepreneurship Theory and Practice*, 25(1), 59–76. <https://doi.org/10.1177/104225870002500106>
- Chauhan, G. S., & Banerjee, P. (2018). Financial constraints and optimal working capital – Evidence from an emerging market. *International Journal of Managerial Finance*, 14(1), 37–53. <https://doi.org/10.1108/IJMF-07-2016-0131>
- Cohen, W. M., & Levinthal, D. A. (1989). Innovation and learning: the two faces of R&D. *The Economic Journal*, 99(397), 569. doi:<https://doi.org/10.2307/2233763>.
- Cumby, J. B., & Donnellan, J. (2017). The impact of working capital components on firm value in US firms. *International Journal of Economics and Finance*, 9(8), 138. <https://doi.org/10.5539/ijef.v9n8p138>
- Damanpour, F. (1991). Organisational innovation: A meta-analysis of effects of determinants and moderators. *Academy of Management Journal*, 34(3), 555–590. <https://doi.org/10.5465/256406>
- Damanpour, F., & Aravind, D. (2012). Managerial innovation: conceptions, processes and antecedents. *Management and Organization Review*, 8(2), 423–454. <https://doi.org/10.1111/j.1740-8784.2011.00233.x>
- Damanpour, F., & Gopalakrishnan, S. (2001). The dynamics of the adoption of product and process innovations in organisations. *Journal of Management Studies*, 38(1), 45–65. doi:<https://doi.org/10.1111/j.1740-8784.2011.00233.x>.
- Dambiski Gomes de Carvalho, G., Alisson Westarb Cruz, J., Gomes de Carvalho, H., Carlos Duclós, L., & de Fátima Stankowitz, R. (2017). Innovativeness measures: A bibliometric review and a classification proposal. *International Journal of Innovation Science*, 9(1), 81–101. <https://doi.org/10.1108/IJIS-10-2016-0038>
- Deloof, M. (2003). Does working capital management affect profitability of Belgian firms? *Journal of*

- Business Finance & Accounting*, 30(3–4), 573–588. doi:<https://doi.org/10.1111/1468-5957.00008>.
- Dos Santos, B. L., & Peffers, K. (1995). Rewards to investors in innovative information technology applications: first movers and early followers in ATMs. *Organization Science*, 6(3), 241–259. <https://doi.org/10.1287/orsc.6.3.241>
- Eljelly, A. M. A. (2004). Liquidity – Profitability tradeoff: an empirical investigation in an emerging market. *International Journal of Commerce and Management*, 14(2), 48–61. doi:<https://doi.org/10.1108/10569210480000179>.
- Enqvist, J., Graham, M., & Nikkinen, J. (2014). The impact of working capital management on firm profitability in different business cycles: evidence from finland. *Research in International Business and Finance*, 32, 36–49. doi:<https://doi.org/10.1016/j.ribaf.2014.03.005>.
- Eroglu, C., & Hofer, C. (2011). Inventory types and firm performance: vector autoregressive and vector error correction models. *Journal of Business Logistics*, 32(3), 227–239. <https://doi.org/10.1111/j.2158-1592.2011.01019.x>
- Fazzari, S. M., & Petersen, B. C. (1993). Working capital and fixed investment: new evidence on financing constraints. *The RAND Journal of Economics*, 24(3), 328. <https://doi.org/10.2307/2555961>
- García-Teruel, P. J., & Martínez-Solano, P. (2010). A dynamic perspective on the determinants of accounts payable. *Review of Quantitative Finance and Accounting*, 34(4), 439–457. <https://doi.org/10.1007/s11156-009-0124-0>
- Grabowski, H. G. (1968). The determinants of industrial research and development: a study of the chemical, drug, and petroleum industries. *Journal of Political Economy*, 76(2), 292–306. <https://doi.org/10.1086/259401>
- Grossman, S. J., & Stiglitz, J. E. (1980). On the Impossibility of Informationally Efficient Markets. *The American Economic Review*, 70(3), 393–408. <https://doi.org/10.2307/1805228>
- Grupp, H. (1995). Science, high technology and the competitiveness of EU countries. *Cambridge Journal of Economics*, 19(1), 209–223. <https://doi.org/10.1093/oxfordjournals.cje.a035304>
- Hansen, L. P. (1982). Large sample properties of generalised method of moments estimators. *Econometrica*, 50(4), 1029. doi:<https://doi.org/10.2307/1912775>.
- Himmelberg, C. P., & Petersen, B. C. (1994). R&D and Internal Finance: A Panel Study of Small Firms in High-Tech Industries. *The Review of Economics and Statistics*, 76(1), 38. <https://doi.org/10.2307/2109824>
- Ho, Y. C., Fang, H. C., & Hsieh, M. J. (2011). The relationship between business-model innovation and firm value: a dynamic perspective. *International Journal of Business, Human and Social Sciences*, 4(5). <https://doi.org/10.5281/zenodo.1330299>
- Hussain, S., Nguyen, V. C., Nguyen, Q. M., Nguyen, H. T., & Nguyen, T. T. (2021). Macroeconomic factors, working capital management, and firm performance—A static and dynamic panel analysis. *Humanities and Social Sciences Communications*, 8(1), 123. <https://doi.org/10.1057/s41599-021-00778-x>
- Jose, M. L., Lancaster, C., & Stevens, J. L. (1996). Corporate returns and cash conversion cycles. *Journal of Economics and Finance*, 20(1), 33–46. <https://doi.org/10.1007/BF02920497>
- Juan García-Teruel, P., & Martínez-Solano, P. (2007). Effects of working capital management on SME profitability. *International Journal of Managerial Finance*, 3(2), 164–177. <https://doi.org/10.1108/17439130710738718>
- Kang, T., Baek, C., & Lee, J.-D. (2017). The persistency and volatility of the firm R&D investment: revisited from the perspective of technological capability. *Research Policy*, 46(9), 1570–1579. doi:<https://doi.org/10.1016/j.respol.2017.07.006>.
- Kieschnick, R., Laplante, M., & Moussawi, R. (2013). Working capital management and shareholders' wealth. *Review of Finance*, 17(5), 1827–1852. <https://doi.org/10.1093/rof/rfs043>
- Knott, A. M. (2008). R&D/returns causality: absorptive capacity or organizational IQ. *Management Science*, 54(12), 2054–2067. doi:<https://doi.org/10.1287/mnsc.1080.0933>.
- Kock, A., Gemünden, H. G., Salomo, S., & Schultz, C. (2011). The mixed blessings of technological innovativeness for the commercial success of new products. *Journal of Product Innovation Management*, 28(s1), 28–43. <https://doi.org/10.1111/j.1540-5885.2011.00859.x>
- Lawrence, P. R., & Lorsch, J. W. (1967). Differentiation and Integration in Complex Organisations. *Administrative Science Quarterly*, 12(1), 1. <https://doi.org/10.2307/2391211>
- Lazaridis, I., & Tryfonidis, D. (2006). Relationship between working capital management and profitability of listed companies in the Athens stock exchange. *Journal of Financial Management and Analysis*, 19(1), 26–35. <http://search.ebscohost.com/login.aspx?direct=true&db=eoh&AN=0884188&site=ehost-live>
- Lifland, S. (2011). The impact of working capital efficiencies on the enterprise value option: empirical analysis from the energy sector. *Advances in Business Research*, 2(1), 57–70.
- Martinsson, G. (2010). Equity financing and innovation: is Europe different from the United States? *Journal of Banking & Finance*, 34(6), 1215–1224. <https://doi.org/10.1016/j.jbankfin.2009.11.015>
- Nisbett, R. E., & Wilson, T. D. (1977). The halo effect: evidence for unconscious alteration of judgments. *Journal of Personality and Social Psychology*, 35(4), 250–256. doi:<https://doi.org/10.1037/0022-3514.35.4.250>.
- Nurein, S., & Din, S. (2017). Working capital management and firm value: The role of firm innovativeness. *Proceeding of the International Conference on Economic and Development*, 1(June), 7–24. <https://doi.org/10.17501/iced.2017.1102>
- Nyeadi, J. D., Sare, Y. A., & Aawaar, G. (2018). Determinants of working capital requirement in listed firms: empirical evidence using a dynamic system GMM. *Cogent Economics & Finance*, 6(1), 1558713. <https://doi.org/10.1080/23322039.2018.1558713>
- Padachi, K. (2006). Trends in working capital management and its impact on firms' performance: An analysis of Mauritian small manufacturing firms. *International Review of Business Research Papers*, 2(2), 45–58.
- Pais, M. A., & Gama, P. M. (2015). Working capital management and SMEs profitability: Portuguese evidence. *International Journal of Managerial Finance*, 11(3), 341–358. <https://doi.org/10.1108/IJMF-11-2014-0170>
- Petersen, M. A., & Rajan, R. G. (1997). Trade credit: theories and evidence. *Review of Financial Studies*, 10(3), 661–691. <https://doi.org/10.1093/rfs/10.3.661>
- Prasad, P., Narayanasamy, S., Paul, S., Chattopadhyay, S., & Saravanan, P. (2019). Review of literature on working capital management and future research

- agenda. *Journal of Economic Surveys*, 33(3), 827–861. <https://doi.org/10.1111/joes.12299>
- Richards, V. D., & Laughlin, E. J. (1980). A Cash Conversion Cycle Approach to Liquidity Analysis. *Financial Management*, 9(1), 32. <https://doi.org/10.2307/3665310>
- Rubera, G., & Kirca, A. H. (2012). Firm innovativeness and its performance outcomes: a meta-analytic review and theoretical integration. *Journal of Marketing*, 76(3), 130–147. <https://doi.org/10.1509/jm.10.0494>
- Saravanan, P., Narayanasamy, S., Srikanth, M., & Shankarshaw, T. (2017). Enhancing shareholder value through efficient working capital management: an empirical evidence from India. *Finance India*, 31(3), 851–871. <http://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=127350243&site=ehost-live>
- Sharma, A. K., & Kumar, S. (2011). Effect of working capital management on firm profitability. *Global Business Review*, 12(1), 159–173. <https://doi.org/10.1177/097215091001200110>
- Shin, -H.-H., & Soenen, L. (1998). Efficiency of working capital management and corporate profitability. *Financial Practice and Education*, 8(2), 37–45. <http://search.ebscohost.com/login.aspx?direct=true&db=eoh&AN=0491946&site=ehost-live>
- Simeth, M., & Cincera, M. (2016). Corporate science, innovation, and firm value. *Management Science*, 62(7), 1970–1981. <https://doi.org/10.1287/mnsc.2015.2220>
- Soenen, L. A. (1993). Cash conversion cycle and corporate profitability. *Journal of Cash Management*, 13, 53.
- Soukhakian, I., & Khodakarami, M. (2019). Working capital management, firm performance and macroeconomic factors: evidence from Iran. *Cogent Business & Management*, 6(1), 1684227. doi:<https://doi.org/10.1080/23311975.2019.1684227>.
- Switzer, L. (1984). The determinants of Industrial R&D: A funds flow simultaneous equation approach. *The Review of Economics and Statistics*, 66(1), 163. <https://doi.org/10.2307/1924710>
- Tajeddini, K. (2011). The effects of innovativeness on effectiveness and efficiency. *Education, Business and Society: Contemporary Middle Eastern Issues*, 4(1), 6–18. <https://doi.org/10.1108/17537981111111238>
- Ughetto, E. (2008). Does internal finance matter for R&D? New evidence from a panel of Italian firms. *Cambridge Journal of Economics*, 32(6), 907–925. doi: <https://doi.org/10.1093/cje/ben015>.
- Vijayakumaran, R. (2019). Efficiency of working capital management and firm value: evidence from Chinese listed firms. *International Journal of Financial Research*, 10(6), 133. <https://doi.org/10.5430/ijfr.v10n6p133>
- Walker, R. M., Chen, J., & Aravind, D. (2015). Management innovation and firm performance: an integration of research findings. *European Management Journal*, 33(5), 407–422. <https://doi.org/10.1016/j.emj.2015.07.001>
- Wang, B. (2019). The cash conversion cycle spread. *Journal of Financial Economics*, 133(2), 472–497. <https://doi.org/10.1016/j.jfineco.2019.02.008>
- Wang, T., & Thornhill, S. (2010). R&D investment and financing choices: A comprehensive perspective. *Research Policy*, 39(9), 1148–1159. doi:<https://doi.org/10.1016/j.respol.2010.07.004>.
- Wasiuzzaman, S. (2015). Working capital and firm value in an emerging market. *International Journal of Managerial Finance*, 11(1), 60–79. <https://doi.org/10.1108/IJMF-01-2013-0016>
- Wen, J., & Zheng, L. (2020). Geographic technological diversification and firm innovativeness. *Journal of Financial Stability*, 32, 100740. doi:<https://doi.org/10.1016/j.jfs.2020.100740>
- Wrede, M., & Dauth, T. (2020). A temporal perspective on the relationship between top management team internationalisation and firms' innovativeness. *Managerial and Decision Economics*, 41(4), 542–561. doi:<https://doi.org/10.1002/mde.3119>.



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