Influence of Firm Characteristics on Cash Holdings: Evidence from Indian Iron & Steel Industry

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Abstract: Cash holding is an important area of recent debate in corporate finance due to its growing significance in the changing corporate settings. Further, the varying significance of cash holdings across industries is also adding another dynamic to corporate finance literature. Under these backdrops, this paper investigates the influence of firm characteristics on cash holdings in Indian Iron & Steel industry over 2007 - 2019. To mitigate the potential endogeneity problem in the data, the study uses dynamic panel regression i.e., Generalized Method of Moments (GMM). The regression result documents that firm characteristics viz cash flow, dividend, assets tangibility, and profitability positively influence the cash holdings while firm size, leverage, net working capital, and R&D expenditure negatively influence cash holdings. However, the influence of growth opportunities is insignificant. Further, the study reveals that leverage, cash flow, and R&D expenditure are the prominent firm characteristics influencing cash holdings in the Iron & Steel industry. This paper adds to the present literature concerning cash holdings by tracing out the firm-level factors affecting cash holdings in the Iron & Steel industry.

1. Introduction

Cash management has received the growing attention of firms, investors, and analysts in present times due to its growing importance in the corporate world. Cash shows the ability of a firm to pay its obligations as and when they become due. It is the input and outcome of every business as cash is invested in the business in the form of acquisition of fixed assets and investment in operations like the purchase of raw materials, payment of wages, etc. which passes through subsequent phases of work-

in-progress, finished goods and sales to get converted into cash. Hence, cash is the basic input and also the ultimate outcome for the business. Though it is a crucial asset for the business in the time of need, it is unproductive and costly to hold. Keynes (1936) documented that firms' propensity to hold cash is induced by transaction need, precautionary need, and speculative need while Jensen (1986) pointed out the agency need for cash holdings.

Corporate financial theories viz. the Static Trade-off theory of Myer (1977), the Pecking Order Theory of Myers and Majluf (1984), and the Agency theory of Jensen (1986) have well documented the firms' behaviour to keep cash. Trade-off theory posits that the firm's cash balance is arrived at by having a trade-off between the costs of cash crunch and the opportunity cost of cash. Pecking Order Theory postulates that firms, first of all, choose to sponsor the investment from retained earnings succeeded by borrowings, and lastly from equity. In the situation of surplus funds from the operation after meeting firm's investment needs, the firms pay back the borrowed money first and then hold cash. Agency Theory states that the managers choose to hoard higher cash balances to gratify their self-interests that don't match with that of shareholders. Based on these theories, there are propositions about the response of different firm-level variables to the cash position and this study is an attempt to test those propositions in the context of the Indian Iron & Steel Industry.

This study is original in the sense that previous studies have identified the factors determining the firms' cash holdings in India as well as in the global context in general whereas this study seeks to identify the factors determining the firms' cash holdings in Indian Iron & Steel industry. The significance of analyzing cash holdings at the industry level is based on the fact that the cash requirement of firms differs owing to the nature of activities which dictates the working capital cycles as well as investment needs. The Iron & Steel industry is considered in the study as this industry occupies a prominent place on the global map and it has immense contribution in boosting all other industries more specifically automobile, transport, infrastructure, real estate, etc. which in turn ensures economic development (Ashton, 1951). Hence, the soundness and survival of this industry are basic to the development of other industries and the economy. Further, the significance of the Indian Iron & Steel industry to the world economy lies in the fact that it is the second-largest contributor of crude steel after China and the largest contributor of sponge iron in the world (World Steel Association, 2020). The heavy investments in physical assets as well as the presence of a long cash conversion cycle make the Iron & Steel industry more sensitive to cash holdings which is evident from the economic crisis of 2008 and the demonetization of 2016. The news of unprecedented variation in cash holdings across Iron & Steel firms made a lot of hue and cry in the corporate world (Mint, 4th October 2013). Further, the high exposure of banks to steel firms became a matter of worry for banks amid slower demand for steel leading to reduced cash flow and cash holdings as well (The Economic Times, 09th September 2015). All these developments require the attention of researchers. In the above backdrop, it is worth analyzing the cash holdings of the Iron & Steel industry.

2. Review of Literature

The analyses of cash holdings of firms, more specifically the factors determining the cash holdings, have garnered sound focus in the empirical financial literature. At the global level, prior works concerning

determinants of cash holdings have emphasized many facets like firms' financial constraints (Gautam *et al.*, 2014; Denis and Sibilkov, 2009; Almeida *et al.*, 2004),corporate governance (Chauhan *et al.*, 2018), financial crisis (Bliss *et al.*, 2015; Al-Najjar, 2013; Song and Lee, 2012; Campello *et al.*, 2011; Atif *et al.*, 2019; Cambrea *et al.*, 2021), ownership structure (Gupta and Bedi, 2020; Moin *et al.*, 2020; Locorotondo *et al.*, 2014; Matta *et al.*, 2022; Anand *et al.*, 2012; Paskelian and Nguyen, 2010; Bhat and Bachhawat, 2005; Deloof, 2001), firm diversification (Subramaniam *et al.*, 2011; Duchin, 2010; Tong, 2011), stock liquidity (Nyborg & Wang, 2021), capital structure (Guney *et al.*, 2007), macro-level factors (Wang *et al.*, 2014: Stone *et al.*, 2018; Chang and Tang, 2021), geopolitical risk (Wang *et al.*, 2021; Kotcharin and Maneenop, 2020; Demir *et al.*, 2019), etc from the viewpoint of the firm in general. In the Indian context, very few studies such as Maheshwari and Rao (2017), Chauhan *et al.* (2018), Paskelian and Nguyen (2010), Anand *et al.* (2012), Bhat and Bachhawat (2005), Saluja and Drolia (2015), Gautam *et al.* (2014), and Al-Najjar (2013) have studied the factors affecting corporate cash holdings in general. But Damodaran (1997) documented a laudable variation in cash & cash equivalents holdings as a portion of assets across industries and the difference in cash holdings across industries can be attributed to the transaction needs for cash & cash equivalents in different lines of business. This is for the reason that the span of the cash conversion cycle of firms varies across industry groups based upon the nature of the production process and sales pattern. This observation of Damodaran (1997) motivates to inquiry into the factors influencing cash holdings of industries. Hence, this study seeks to analyze the firm characteristics as factors affecting cash holdings in the Indian Iron &Steel industry. Further, as far as the firm-specific characteristics are concerned, brief reviews of prior studies are narrated as follows:

2.1. Firm Size

Trade-off theory posits that small firms encounter problems in arranging external capital as they are new, less known, subject to more information asymmetry, and show greater sensitivity to imperfection in the capital market (Almeida *et al.,* 2002; Sethi and Swain, 2019). So small firms keep higher cash holdings. As per pecking order theory, large firms hold large cash as large firms are considered to be successful and run with huge cash holdings after fulfilling investment requirements (Ferreira and Vilela, 2004). Agency theory also assumes large firms to hold large cash as such firms have wider shareholder distribution leading to enhanced flexibility of managers over investment and holding of cash.

2.2. Growth Opportunities

Trade-off theory assumes more cash holdings by growing firms. The reason can be attributed to the fact that relying on an internal source of finance mitigates the possibility of forgoing investment avenues and avoids costly external finance. Though the projection of pecking order theory commensurates with that of trade-off theory, there is a difference in their stand point. The former focuses on transaction cost where as the latter focuses on precautionary need (Chauhan *et al.,* 2018; Maheshwari and Rao, 2017; Hu *et al.*, 2019). However, from the agency theory perspective, managers having poor investment avenues keep higher cash for investment in value-destroying avenues (Ferreira and Vilela, 2004).

2.3. Leverage

Firms with higher debt keep higher cash balance as debt increases the possibility of financial distress. Besides, as per Trade-off theory, cash decreases the possibility of under-investment which is highly pronounced in the prevalence of riskier borrowings. Pecking order theory opines that leverage is inversely associated with cash balance on the ground that an increase in debt results from the exhaustion of all its internal resources of finance that decreases the cash holdings (Gill and Shah, 2012; Bashir, 2014). Agency theory postulates that highly debt-ridden firms are under stringent monitoring and debt covenants by lenders that impair the managerial flexibility to hoard large cash (Gao *et al.*, 2013; Subramaniam *et al.*, 2011).

2.4. Cash Flow

As cash flow is immediate liquidity for the business, an inverse association of cash flow with cash holdings is expected by the Trade-off theory (Kim *et al.*, 1998; Hardin *et al.*, 2009; Subramaniam *et al.*, 2011). But the Pecking order theory presumes firms having higher cash flow pile up higher cash than firms with lower cash flow (Chauhan *et al.*, 2018; Sethi and Swain, 2019; Hu *et al.*, 2019).

2.5. Dividend

Dividend-paying firms can raise external capital at a lesser cost than a non-paying firm and as a result, non-paying firms depend on internal sources of capital to avoid costlier external capital. So, a negative relationship of dividend payment with cash balance is projected as revealed by Hu *et al.* (2019) and Kim *et al.* (2011). Conversely, higher cash holdings induce dividend payments. Hence, a positive relationship of dividend payment with cash balance is presumed (Ozkan and Ozkan, 2004; Gogineni *et al.*, 2012; Maheshwari and Rao, 2017; Chauhan *et al.*, 2018).

2.6. Net Working Capital

Trade-off theory expects the cash holdings to get negatively influenced by net working capital because assets with ready market value work as a replacement for holding extra cash. Chauhan *et al.* (2018), Hu *et al.* (2019), Mesfin (2016) and Ozkan & Ozkan (2004) opine that the liquidation cost of current assets is negligible as compared to other assets. So firms having higher receivables and inventory are expected to maintain lesser cash holdings denoting an inverse association of net working capital with cash holdings.

2.7. Research and Development Expenditure

As R&D Expenditure requires large cash outflow, the firms making R&D expenditures are presumed to have less cash. The reason is R&D based innovations are financed by the internal source to get rid of the high cost of external funds stemming from the uncertain outcome, intangibility, and information asymmetry associated with R&D. So R&D is primarily sponsored through internal funds and equity issues which reduce the cash balance (Bates *et al.,* 2009; Maheshwari & Rao, 2017). Conversely, firms making R&D are supposed to garner large cash inflows resulting from increased sales revenue (Wang *et al.*, 2014; Chauhan *et al.*, 2018; Hu *et al.*, 2019).

2.8. Assets Tangibility

Tangible assets are regarded as the replacement for cash as, in the situation of cash shortfall, the firm can dispose of its tangible assets. Moreover, the firm having higher collateral as tangible assets faces lesser problems in raising funds through debt, and as a result, such firms have a lesser propensity to keep cash (Islam, 2012).

2.9. Profitability

Trade-off theory assumes a more profitable firm to keep small cash as profit is a ready form of liquidity. So, profitability and cash balance are inversely related (Pinkowitz and Williamson, 2001; Al-Najjar, 2013). In contrast, as per pecking order theory, firms with more profit keep more cash for future requirements (Ali and Yousaf, 2013; Mugumisi and Mawanza, 2014; Chauhan *et al.*, 2018).

So based on above literature review, the following hypotheses are developed:

H_0: Firm characteristics don't influence cash holdings of Indian Iron & Steel manufacturing firms.

H_1: Firm characteristics influence cash holdings of Indian Iron & Steel manufacturing firms.

3. Research Methodology

3.1. Data and Sample

We collected data on Indian Iron & Steel manufacturing firms listed on the Bombay Stock Exchange and National Stock Exchange from the PROWESS database of the Centre for Monitoring the Indian Economy. The dataset spans over 13 years from 2007 to 2019. Initially, a sample of 17,807 manufacturing companies was gathered of which 17,307 were found to be with missing data. Hence, out of the remaining 500 firms, 52 firms having the first two-digit National Industrial Classification (NIC)codes of 24 and 25 are classified as Iron & Steel industry. We used the NIC code published by the Central Statistical Organisation under the Ministry of Statistics and Programme Implementation, Government of India for categorising firms as this code specifies the nature of economic activity in which a company or an economic entity is engaged (Mishra and Akbar, 2015; Gill and Kaur, 2015; Bhatt and Bhattacharya, 2017; Komera *et al.,* 2018; Singh *et al*, 2018; Sethi and Swain, 2019).

3.2. Model Specification

To investigate the impact of firm characteristics on cash balance, we have specified Generalized Methods of Moments regression model. Dynamic panel estimation using GMM is capable of correcting heterogeneity, time-invariant effect, measurement error, omitted variable bias, persistence, and endogeneity issue (Caselli *et al.,* 1996). Particularly, System GMM is appropriate for data-sets having moderate periods where some variables are endogenous and there is a dynamic relationship between variables (Sheikh *et al.*, 2018). With 52 firms spanning over 13 years (means N>T), the sample is appropriate for System GMM. Cash holdings are considered a dynamic variable as it is influenced by its past observations. All explanatory variables are considered endogenous. This model needs selection

of lag length, so lag (0 1) is taken in all cases. Data estimation is done through Two-Step System GMM (xtdpdgmm command in Stata). The estimated autoregressive dynamic panel model is as follows:

$$\text{Cash Holdings}_{it} = \alpha_0 + \beta_1 \text{Cash Holdings}_{it-1} + \beta_2 \text{Cash Holdings}_{it-2} + \beta_3 \text{Firm Size}_{it} +$$
$$\beta_4 \text{Growth Opportunities}_{it} + \beta_5 \text{Leverage}_{it} + \beta_6 \text{Cash flow}_{it} + \beta_7 \text{Dividend}_{it} + \beta_8 \text{Net Working Capital}_{it} +$$
$$\beta_9 \text{R\&D Expenditure}_{it} + \beta_{10} \text{Assets Tangibility}_{it} + \beta_{11} \text{Profitability}_{it} + \varepsilon_{it}$$

Where,

Cash Holdings = Cash & Cash equivalents/Net assets (Net assets = Total assets - Cash & cash equivalents).

Firm Size = Natural logarithm of Net assets.

Growth Opportunities = Market-to-book value [(Book value of Net assets - Book value of Equity +Market value of Equity) / Book value of Net assets].

Leverage = Total debt /Net assets.

Cash Flow = Cash flow from operation /Net assets.

Dividend = A dummy variable that takes 1 for dividend-paying firms and 0 otherwise.

Net Working Capital = (Net working capital -Cash & cash equivalents) / Net assets.

R&D Expenditure = R&D expenditure /Net assets.

Assets Tangibility = Fixed assets /Net assets.

Profitability = EBIT /Net assets.

4. Results and Discussion

4.1. Descriptive Statistics

Table 1: Descriptive Statistics

Variables	Mean	Median	Minimum	Maximum	Std. Dev.	C.V.
Cash Holdings	0.053	0.018	0.000	0.631	0.093	1.747
Firm Size	9.669	9.275	5.446	14.412	1.860	0.192
Growth Opportunities	1.487	1.106	0.456	16.016	1.374	0.924
Leverage	0.671	0.660	0.085	5.374	0.327	0.488
Cash Flow	0.088	0.080	-0.375	0.533	0.097	1.103
Dividend	0.709	1.000	0.000	1.000	0.455	0.642
Net Working Capital	0.403	0.154	-2.235	10.425	0.855	2.119
R&D Expenditure	0.001	0.001	0.000	0.108	0.007	4.675
Assets Tangibility	0.634	0.606	0.070	2.042	0.290	0.457
Profitability	1.007	0.879	0.011	3.580	0.527	0.524

Source: Authors' Own Compilation

From table 1, it is observed that the mean cash holdings of the Iron & Steel industry stand at 5.3% of net assets and the median cash holdings stand at 1.8% of net assets denoting a huge variation

in cash holdings across firms. The standard deviation and coefficient of variance of cash holdings stand at 0.093 and 1.747 respectively. The mean size, growth opportunities, leverage, cash flows, dividend, net working capital, R&D expenditure, assets tangibility, and profitability of the Iron & Steel industry stand at 9.669, 1.487, 0.671, 0.088, 0.709, 0.403, 0.001, 0.634, and 1.007 respectively.

4.2. Correlation Matrix

Table 2: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Cash Holdings	1									
(2) Firm Size	0.079	1								
(3) Growth Opportunities	0.408	-0.026	1							
(4) Leverage	-0.049	-0.122	0.008	1						
(5) Cash Flow	0.226	-0.068	0.250	-0.287	1					
(6) Dividend	0.230	0.118	0.126	-0.388	0.200	1				
(7) Net Working Capital	0.118	-0.203	0.080	-0.188	0.137	0.238	1			
(8) R&D Expenditure	0.061	-0.007	0.031	-0.003	0.087	0.040	0.002	1		
(9) Assets Tangibility	0.040	-0.293	-0.077	0.115	0.238	-0.274	-0.100	0.157	1	
(10) Profitability	0.086	-0.607	0.177	-0.015	0.233	-0.010	0.181	0.075	0.215	1

Source: Authors' Own Compilation

Table 2 depicts Karl Pearson coefficient of correlation between the variables. The correlation coefficient ranges between 0.002 and 0.607 which implies the absence of collinearity problem. Besides, variance inflation factor (VIF) test is performed to examine multicollinearity among the variables. The highest VIF value of 2.088 implies no multicollinearity among the variables (Chatterjee and Hadi, 2015; O'Brien, 2007).

4.3. Regression Results

Table 3: Result of the Two-step System GMM Regression

	Dependent Variable		Cash Holdings
Independent Variables	Coefficient	Std. Err.	P-value
Intercept	2.385	1.949	0.221
Cash Holdings L1	0.441***	0.045	0.000
Cash Holdings L2	0.141***	0.032	0.000
Firm Size	-0.516***	0.183	0.005

contd. table 4

	Dependent Variable		Cash Holdings
Independent Variables	*Coefficient*	*Std. Err.*	*P-value*
Growth Opportunities	0.013	0.052	0.806
Leverage	-1.019**	0.507	0.044
Cash flow	1.626***	0.322	0.000
Dividend	0.433***	0.124	0.000
Net Working Capital	-0.471***	0.164	0.004
R&D Expenditure	-4.975**	2.425	0.040
Tangibility	0.546**	0.275	0.047
Profitability	0.871***	0.233	0.000
Firm-year observations	572		
No. of firms	52		
No. of Instruments	43		
AR (1) test p-value	0.000		
AR (2) test p-value	0.531		
Sargan-Hansen test p-value	0.432		

Source: Authors' Own Compilation

Note: ***, ** and * stand for statistical significance at 1%, 5% and 10% respectively.

4.4. Diagnostics Tests

The Hansen test examines the overall validity of the instruments taking the H_0 as 'instruments as a group is exogenous'. As the p-value of the Hansen Test fails to reject the H_0 (p>0.10), it is concluded that the instruments are valid. Another requisite criterion is that the number of instruments must be less than or equal to the number of groups to eliminate over-identification which gets satisfied for the model. Other diagnostics tests include AR1 and AR2 for examining the presence of autocorrelation. The AR1 depicts first-order serial autocorrelation (i.e. differenced error term is serially correlated at AR1) while AR2 detects autocorrelation at levels. The AR1 statistics show the presence of first-order serial autocorrelation. The H_0 for AR2 statistics is 'no autocorrelation in the error term' which is accepted indicating no serial autocorrelation in the model.

4.5. Analysis

Table 4 reports the influence of firm characteristics on cash balance in the Iron & Steel industry measured using GMM. The result shows that the current cash balance is positively affected by its two lags which confirm the dynamic nature of the cash holdings. The influence of firm characteristics is discussed in the succeeding section.

4.5.1. Firm Size

The negative influence of firm size on the cash balance means that in the Iron & Steel industry, cash holdings decline in response to an increase in firm size. It supports the finding of Bates *et al.* (2009),

Al-Najjar (2013), Sun *et al.* (2012), Kim *et al.* (2011), Chauhan *et al.* (2018), Gogineni *et al.* (2012), Sethi and Swain (2019), Kim *et al.* (1998), and Opler *et al.* (1999).

4.5.2. Growth Opportunities

Growth opportunities exert an insignificant influence on cash balance and this finding corroborates with the findings of Islam (2012) & Drobetz and Gruninger (2007). The reason for the insignificant impact can be attributed to the fact that very few companies that are already grown up are working in this industry. Hence, even though there is a growth opportunity, the companies don't accumulate cash for that purpose.

4.5.3. Leverage

Leverage is having a significantly negative association with cash holdings which aligns with the pecking order theory. It implies that firms having more debt, hold less cash because firms choose debt financing when all internal sources are exhausted. Further, higher interest payment on account of higher leverage reduces the cash reserve. This observation goes in consonance with the observation of Chauhan *et al.* (2018), Hu *et al.* (2019), Al-Najjar (2013), Gogineni *et al.* (2012), Bhat and Bachhawat (2005), Opler *et al.* (1999), Kim *et al.* (1998), & Ali and Yousaf (2013).

4.5.4. Cash Flow

There is a significantly positive association of cash flow with cash holdings. It goes in agreement with the pecking order theory that firms with higher cash flow from operation keep higher cash balances. This result agrees with prior results of Fereira and Vilela (2004), Chauhan *et al.* (2018), Hu *et al.* (2019), Ali and Yousaf (2013), Stone and Gup (2013), Sun *et al.* (2012), Sethi and Swain (2019), Ozkan and Ozkan (2004), Maheshwari and Rao (2017), Opler *et al.* (1999), Mesfin (2016), & Mugumisi and Mawanza (2014).

4.5.5. Dividend

Consistent with the findings of Chauhan *et al.* (2018), Maheshwari and Rao (2017), Ali and Yousaf (2013), & Gogineni *et al.* (2012), the effect of dividends on cash holdings is positive indicating a greater propensity of dividend-paying firms to hoard cash.

4.5.6. Net Working Capital

Net working capital is negatively linked to cash holdings which supports the trade-off theory. It is because assets with ready market value work as a replacement for holding extra cash and the cost of disposing of the current assets is lesser than other assets. Hence, firms having higher receivables and inventory keep lesser cash holdings. This finding supports the earlier evidence of Chauhan *et al.* (2018), Hu *et al.* (2019), Kim *et al.* (2011), Bates *et al.* (2009), Al-Najjar (2013), Maheshwari and Rao (2017), Sun *et al.* (2012), Stone and Gup (2013), & Opler *et al.* (1999).

4.5.7. Research and Develpement Expenditure

In agreement with the revelation of Bates *et al.* (2009), & Maheshwari and Rao (2017), R&D expenditure has a significantly negative impact on cash holdings as R&D-based innovations are financed from

internal sources which reduces the cash balance.

4.5.8. Assets Tangibility

Assets tangibility hasa significantly positive influence on cash balance which means that the firms with more fixed assets generate and hold more cash.

4.5.9. Profitability

Supporting the propositions of pecking order theory, profitability and cash holdings are positively associated. Chauhan *et al.* (2018), Mugumisi and Mawanza (2014), & Ali and Yousaf (2013) also obtained the same result.

5. Findings & Suggestions

5.1. Findings

The above discussion reveals that in the Iron & Steel manufacturing firm, cash flow, dividend, assets tangibility, and profitability exerta positive effect on cash balance while firm size, leverage, net working capital, and R&D expenditure exert a negative effect on the cash balance. However, the effect of growth opportunities is insignificant. Further, cash flow and R&D expenditure are the prominent firm characteristics influencing cash holdings in this industry.

5.2. Suggestions

Firms with higher leverage maintain less cash which may bring the possibility of financial distress and impede further investment due to the increased cost of capital. So the firm should keep more cash to mitigate these problems.

Firms with more R&D expenditure hold less cash but information asymmetry created by R&D owing to its uncertain outcome and intangible nature may put the firm in a disadvantageous position and affect operations and investment. So firms are required to keep more cash balance.

Tangibility is having a positive bearing on cash holdings but firms with more fixed assets may leverage the benefits of having flexibility in securing external finance by pledging the fixed assets as and when required. Hence, such a firm may keep less cash reserve.

6. Conclusion

This paper investigates the influence of firm characteristics on the cash balance of the Indian Iron & Steel industry. Firm characteristics namely firm size, growth opportunities, leverage, cash flow, dividend, net working capital, R&D expenditure, assets tangibility, and profitability are considered to investigate their influence on cash holdings. It is documented that except for growth opportunities, all other firm characteristics pose a significant influence on cash holdings of the Iron & Steel industry. This study is restricted to the Indian Iron & Steel industry only and a few firm characteristics have been analyzed. The outcomes of this paper are helpful for corporate boards, managers, investors, and rating agencies in designing economic decisions. This study can be widened to other

industries and consider other firm characteristics and macroeconomic variables affecting the cash holdings.

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