

## Impact of Cash Deals and Related Industry Merger on Synergies Gains: A Case of Indian M&A

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### Abstract

A firm's financial attributes play an essential part in the merger decision. The present paper attempts to improve the existing literature on assessing M&A activity in Indian corporate. This research paper aims primarily to analyze the (a) Synergies realized when the mode of payment in the merger deal is cash, (b) impact on bidder liquidity when payment is made in cash (c) Synergies realized when both target and acquirer in the deal belong to related industry, i.e. the merger is horizontal and (d) assess the impact on bidder leverage when payment is made in equity. The paper has analyzed a panel of 120 major Indian M&A deals from 2005 to 2015, having three years of data pre and post-merger. Instrument Variable Probit Regression analysis has been employed in the study. The key results from the analysis show that in case of payment method in the deal being cash, M&A appears financially favorable for the bidder companies. The results of the empirical analysis of the study do support the generation of synergies in the case of horizontal mergers. The combined firm has also found to have lower liquidity for Indian Mergers & Acquisitions. Significant results have also been obtained for the leverage variables indicating fewer borrowings for the merged firm.

**Keywords:** M&A Activity, Synergies, Variable, Regression Analysis, Cash Deals, Industry Relatedness.

**JEL Classification Codes:** G34, C35, M41.

### I. Introduction

Corporate restructuring involves any change in the assets or capital structure of a company or its ownership through an inorganic route (Godbole, 2013). Such a change can be effected through either acquisition of a company, merger or demerger of/into two or more companies, delisting or selling off a company, or its important assets. Mergers & Acquisitions is the primary mean of corporate restructuring. A merger can be defined as the consolidation of the resources, liabilities, and operations of two or more firms into one, where payment is made in the form of the merger company's equity shares or debentures or cash or else a hybrid of the payment methods listed above (Beena, 2000). Some of the main objectives to undergo a merger are expanding into new markets, considerable cost savings, and knowledge sharing as well as risk-sharing. However, the prime objective of undertaking any form of restructuring is to gain synergies generated out of the combination. Synergy is the potential benefit that is achieved post the amalgamation. Apart from the lure of quantum growth associated with the mergers, there are many other motives for which companies resort to M&A, financial and operating synergies being the most important out of them, which add to the enterprise valuation (Sudarsanam, Holl, & Salami, 1996).

Synergies are of two types – revenue-generating and cost reduction with the former being more difficult to achieve (Cullinan, Le Roux, & Weddigen, 2004). Financial synergies involve combining both target and acquirer companies' balance sheets to achieve improved financial parameters (Godbole, 2013). Operating synergies are the ones that are generated due to improved operating efficiencies of merged entities, which is majorly due to improved tax benefits or investment cutbacks (Huyghebaert & Luypaert, 2013; Hamza, Sghaier, & Thraya, 2016; Loukianova, Nikulin, &

Vedernikov, 2017). The synergies generated are not always positive, and firms can even experience negative synergies, which create the exact opposite outcome to that of positive synergies. In the case of negative synergies, the sum is less than its parts due to value erosion. The theories of diseconomies of scale and scope are used to explain the adverse effects of negative synergies (Harding & Rovit, 2004).

The M&A deals have become common in India in the last two decades. In the post-liberalization period, though they had not been uncommon before, but the frequency was less (Bhoi, 2000). The liberal economic policy by the Government post-1990s incentivized companies to undergo expansion, diversification, up-gradation of technology, and entering into newer geographical areas. Several firms deemed it necessary to combine with related business units and subsidiaries to achieve cost efficiency and improved production. The quantum of deals in India has seen a steady increase since 2013 with a similar increase in the total value of deals undertaken. In 2015, companies announced over 1200 transactions with a total value over 51 billion USD. The number of transactions increased moderately by 15.6 percent compared to 2014, while the value has increased by 63 percent (M&A Statistics by Countries-Institute for Mergers, Acquisitions, and Alliances (IMAA), 2019).

The financial performance and also the assessment of mergers & acquisitions have dwelled well in the field of financial and industrial economics. Despite this, there is debate if mergers & acquisitions boost corporate efficiency. The present study explores the performance of the acquirer and whether synergies are achieved in the post-merger time period, when the mode of payment for the transaction is cash. Similar gains are analyzed for horizontal mergers as well. The present study analyses 120 deals of Mergers & Acquisitions which took place between 2005 and 2015 for the Indian Corporate. To estimate the relationship, the Instrument Variable Probit Regression model is applied in the study.

The paper is organized into six sections, which are as follows. Literature review of the different methodologies used in the existing studies and their findings have been discussed in Section 2. Section 3 gives the objective and hypothesis of the present study. Section 4 comprises the research design, variables, data source, and methodology employed in the research. Section 5 pertains to the results based on the econometric analysis. The paper ends with the conclusion and implications presented in Section 6.

## 2. Literature Review

Majority of studies to date in Mergers & Acquisitions relate to economic costs & benefits accrued to acquirers and targets in the post-merger scenario. Few studies deal with the stock market returns and misvaluations. Majorly, the methodology of event study has been used in the existing literature, which assesses the impact of the merger in the short-run  $([-1,+1],[-5,+5])$ , i.e. to investigate the implications of the announcement of M&As on the wealth of the shareholder. They have concluded either significantly negative abnormal returns or insignificant abnormal returns in the short-run (Andrade, Mitchell, & Stafford, 2001; Bruner & Mullins, 1987; Bradley, Desai, & Kim, 1988; Byrd & Hickman, 1992; Kaplan & Weisbach, 1992; Healy, Palepu, & Ruback, 1992; Lang, Stulz, & Walking, 1989; Mulherin & Boone, 2000; Servaes, 1991; Smith & Kim, 1994). Whereas the result of the long-run event studies studying post-merger returns after three years have pointed out that firms experience negative abnormal returns (Andrade, Mitchell, & Stafford 2001; Lahey & Conn, 1990; Limmack, 1991; Loughran & Vjih, 1997; Mitchell & Stafford, 2000; Rau & Vermaelen, 1998).

Despite the strength of the research in this area, there is a lack of consensus on the stimulus mergers and acquisitions have on the economies of the countries in which they occur, especially on the targeted corporations. In the past, several studies have sought to examine the costs and gains of mergers and acquisitions. However, the conclusions of these investigations are so varied that it is impossible to arrive at a clear consensus. Although some research supports the benefits accrued to the acquired firm, no consensus can be derived on the benefits obtained by acquiring companies' shareholders (Cummins & Weiss, 2004; Mohanty & Mishra, 2011).

There are studies, which assess the shareholder wealth by accounting performance through performance measures like operating cash flows to sales, operating cash flows to total assets, return on assets and operating income over total assets; and they come to a variety of conclusions. While some studies like Andrade, Mitchell, and Stafford (2001); Ramaswamy and Waagelein (2003) shows the gain in accounting performance post-acquisition; there are studies like Ravenscraft and Scherer (2011) which show retrogression of performance post-M&A.

Studies undertaking the assessment of synergies in terms of operating performance after undertaking Merger & Acquisition have shown mixed results. While studies like Linn and Switzer (2001); Moeller and Schlingemann (2004); Switzer (1996); Parrino and Harris (1999); Powell and Stark (2005) looking into pretax cash flows have shown an increase in post-acquisition cash flows; there are studies which shows an overall decline in cash flow (Kruse, Park, & Suzuki, 2003), lower profitability (Meeks, 1977), a significant decline in the ROA (Yeh & Hoshino, 2002; Dickerson, Gibson, & Tsakalotos, 1997) and insignificant improvement in operational efficiency following the acquisition by the acquirer (Ghosh, 2001; Herman & Lowenstein, 1988; Lev & Mandelker, 1972; Sharma & Ho, 2002).

Existing literature in financial synergies studying the existence and extent of financial synergies have suggested deterioration in post-M&A profitability measure in respect of EPS (Hogarty, 1970), Return on capital equity (Harris, Franks, & Mayer, 1987), ROE (Yeh & Hoshino, 2002), liquidity, profitability, and solvency ratios (Pazarskis, Vogiatzoglou, Christodoulou, & Drogalas, 2006). The results suggest that the result of the acquisition of the profitability of the firm is detrimental (Dickerson, Gibson, & Tsakalotos, 1997). However, an analysis of the financial efficiency of selected Indian financial institutions showed that long-term value was created and financial performance improved for the acquired firm post-acquisition; but not on all parameters (Sinha, Kaushik, & Chaudhary, 2010).

The mode of payment is also one of the determinants of the synergies gained in the post-acquisition. Linn and Switzer (2001) suggest that the operating efficiency of the combined firm in the US have a propensity to be greater in cases where cash was the key mode of payment. Acquisitions financed by stocks are associated with smaller synergy changes than when the payment method is in cash (Carline, Linn, & Yadav, 2005; Ghosh, 2001). Statistical findings have consistently shown that the target and the acquirer's share prices react more favorably to a cash proposition than to a stock purchase at the time of the initial announcement of the bid (Peterson & Peterson, 1991; Carnes, Black, & Jandik, 2001; Bouwman, Fuller, & Nain, 2009).

Another critical issue in the literature is how the horizontal acquisition affects the efficacy of the acquirer, by influencing synergies within the combined organization. It is believed that horizontal acquisitions provide substantial synergy opportunities, because of the similar institutional climate of the acquirer and the target (Farjoun, 1994; Barai & Mohanty, 2014). At the same time, vertical acquisitions are hypothesized to offer lesser potential for synergy (Chatterjee, 1986). It is increasingly being recognized that the complementary resources of varied industries may also provide the major potential for synergies (Barkema, Baum, & Mannix, 2002; Harrison, Hitt, Hoskisson, & Ireland, 2000; Tanriverdi & Venkatraman, 2005). Meta-analysis results, however, suggest no significant association between the performance of the acquirer and similarity of the industry of the acquired firm (King, Dalton, Daily, & Covin, 2004).

An overview of the prominent studies showing the reported variables and the methodology adopted is given in Table I.

Table I. Summary of Literature Review

Existing Literature	Methodology adopted	Key Variables Used in the study
Varaiya and Ferris (1987), Lang, Stulz and Walkling (1989), Bradley, Desai, and Kim (1988), Asquith, Bruner, and Mullins (1990), Healy, Palepu, and Ruback (1992), Byrd and Hickman (1992), Mulherin and Boone (2000), Kaplan and Weisbach (1992), Andrade, Mitchell, and Stafford (2001), Kuipers, Miller and Patel (2002), Chari, Oumet and Tesar (2004), Huyghebaert and Luybaert (2013), Barai and Mohanty (2014)	Event Study	Acquirer Return, Free Cash Flow, Premium, Leverage, Relative Size, Announcement Returns, Leverage, Return On Asset, Sales, Market Capitalisation, EBITDA To Sales, Cumulative Average Abnormal Returns
Hogarty (1970), Philippatos, Choi, and Dowling (1985), Ramaswamy and Salatka (1996), Ravenscraft and Scherer (2011)	Univariate Regression Analysis	Operating Cash Flow Return On Assets, Earning Per Share, Operating Expense Ratio, Operating Income Over Assets
Ghosh (2001), Morag (2011), Tanriverdi and Uysal(2011), Barai and Mohanty (2014)	Multivariate Regression Analysis	Integration Effectiveness, Relatedness, Organizational Culture, Synergy Potential, M&A Success, Cash Flows To Total Assets, Profitability, Return On Asset, Leverage, Growth Of Net Assets, Leverage, Free Cash Flow, Relative Size, Method Of Payment, Book Leverage, IT Capability Of Acquirer, Relative Acquisition Size
Cudd and Duggal (2000), Kumar and Rajib (2007), Basu, Dastidar, and Chawla, (2008), Ismail (2011), Bena and Li (2014), Ismail, Dbouk, and Azouri (2014), Fich Nguyen, and Officer (2018)	Logit Analysis	Liquidity Ratio, Growth Rate, Market To Book Ratio, Total Assets Ratio, Sales, Cash Flow, Price To Earnings Ratio, Leverage, Tobin Q, Cash Payment, Relative Size, Log Assets
Harris (1982), Pastena and Ruland (1986), Harford (1999), Bernile (2005), Mooney and Shim, (2015), Chira, García-Feijóo, & Madura (2017), Tremblay (2017), Bernile and Lyandres (2019)	Probit Analysis	Size, Liquidity, Leverage, Profitability, Growth, Price/Earnings ratio, Dividend policy

Source: Authors' representation based on the previous literature

### 3. Objective and Hypothesis

The present paper aims to assess if synergies are gained post the merger for the acquirer. The study examines 120 M&A deals for the Indian Corporate, which took place between 2005 and 2015. Certain parameters have been selected to effectively represent the synergies gained (Appendix B). The mergers have been selected from a broad period to ensure representation from different business cycles. The primary objective of the present study is to analyze (a) the Synergies realized when the mode of payment in the merger deal is cash, (b) impact on bidder liquidity when payment is made in cash,

- (c) Synergies realized when both target and acquirer in the deal belong to related industry, i.e. the merger is horizontal and  
 (d) impact on bidder leverage when payment is made in equity.

The models developed in the paper are listed in the table below.

Table 2. Models employed in the study

Objectives	Hypothesis	Dependent Variable (Binary Variable)	Equations for each model
<b>Model 1</b>	H <sub>1</sub> : When payment is made in cash, more synergies are generated.	Mode of Payment is Cash	$Payment\_Cash_{it} = \alpha + \sum_{j=1}^j \beta_j X_{it}^j + \gamma_{it}Z_{it} + \epsilon_{it}$
<b>Model 2</b>	H <sub>2</sub> : When bidder liquidity is high, payment is made in cash.	Mode of Payment is Cash	$Payment\_Cash_{it} = \alpha + \sum_{j=1}^j \beta_j X_{it}^j + \gamma_{it}Z_{it} + \epsilon_{it}$
<b>Model 3</b>	H <sub>3</sub> : When merger & acquisition take place in the related industry sectors, more synergies are generated.	Relatedness of Industry	$Industry\_Relatedness_{it} = \alpha + \sum_{j=1}^j \beta_j X_{it}^j + \gamma_{it}Z_{it} + \epsilon_{it}$
<b>Model 4</b>	H <sub>4</sub> : When bidder leverage is high, payment is made in equity.	Mode of Payment is Equity	$Payment\_Equity_{it} = \alpha + \sum_{j=1}^j \beta_j X_{it}^j + \gamma_{it}Z_{it} + \epsilon_{it}$

Where X is the independent variable and Z is our instrument variable.

## 4. Data and Methodology

### 4.1 Data Description

The study considers an unbalanced panel data of the 120 Mergers& Acquisition deals which took place in India from 2005 to 2015. Data of seven years (3 years post-Merger, year of Merger, 3 years pre-Merger) has been taken for each deal. Hence, the period of data used in the study is from 2002 to 2018. The study has excluded non-listed acquirer firms, and also financial and banking companies because they have distinct accounting, operational, and risk-based features. The highest representation for the acquirer in the deals under consideration is in the industrial sector with 30 deals. The basic Materials sector has been most represented for the target (Appendix A).

Accounting and financial data, which is used as regressors and dependent variables for the probit analysis, i.e. Mode of Payment (cash or equity) and Relatedness of Industry have been compiled from Bloomberg. Appendix B defines the variables that the study uses. For the present study, the combined entity's performance in the post-acquisition period has been equated with that of target and acquirer (A+T) entities. For an appropriate comparison, each variable is deflated by tangible assets of the considered firms and thus eliminating the size effect (Healy, Palepu, & Ruback, 1992). (Note 1)

The paper has also measured operating cash flow returns on assets to assess operational efficiency changes, as suggested by Healy, Palepu, and Ruback (1992). Conceptually, cash flows have been concentrated as they reflect the real economic gains that are generated by assets. Operating cash flows were defined as the addition of sales, goodwill expenses, and depreciation; followed by deduction of the selling and administrative expenses and cost of goods sold. As the amount of economic gains is influenced by the assets used, cash flows have been scaled by total assets to form a measure of return that can be measured over time and even across the firms.

### 4.2 Methodology

The present study uses the two-step Instrument Variable Probit regression for empirical analysis instead of conventional multivariable regression analysis. Binary data models that are of a dichotomous type assume a binomial distribution for the dependent variable which are well described by Awogemi and Oguntade (2012); Gujarati, (2004); Krzanowski (1998); Hollander and Wolfe (1973). The assumptions of normality such as disturbance terms and observations are normally distributed; homogeneity of variance; normality measures are null. The dichotomous quality of dependent variables collapses the assumptions of Ordinary Least Square (OLS).

Variables used in the study for the firms are correlated to each other. This can be observed from the fact that if we have included Net Income in the model, we cannot say that a firm's Net income is not impacted by the EBITDA or total assets of the firm which has not been considered in the equation employed. It suggests that in such a model EBITDA or total assets will be represented in the error term. And hence the error term shows a correlation with the model's independent

variables. This kind of problem is distinctive in such type of studies. Hence, instead of employing Probit Regression, we have used the Instrument Variable Probit Regression methodology in the study to tackle the issue of endogeneity.

IV-probit suits those probit models in which one or more of the regressors are determined endogenously. This is used when you consider that the error term is associated with one or more of the regressor. The estimator of minimum chi-squared is invoked with the option two-step (Newey, 1987). It relies on the assumption of the continuous endogenous regressors and unsuitable to use with endogenous regressors which are discrete. The model used in IV probit estimation is:

$$y_{1i}^* = y_{2i}\gamma + x_{1i}\delta + \mu_i \quad (1)$$

$$y_{2i} = x_{1i}\Phi_1 + x_{2i}\Phi_2 + v_i \quad (2)$$

Where  $i = 1, \dots, N$ ,  $y_{2i}$  is a  $1 \times n$  vector of endogenous variables,  $x_{1i}$  is a  $1 \times m_1$  vector of exogenous variables,  $x_{2i}$  is a  $1 \times m_2$  vector of additional instruments, and the  $y_{2i}$  is reduced form of the equation.

For a typical Probit model, it is presumed that the error term has one variance. However, we presume that  $(\mu_i, v_i)$  is multivariate normal with a matrix of covariance, in the case of a Probit model with an endogenous regressor. Consequently,  $\gamma$  and  $\delta$  results would not be yielded by the estimator of Newey and two-step estimators of probit. Instead,  $\gamma/\sigma$  and  $\delta/\sigma$  estimates are generated, where  $\sigma$  is defined as the square root of  $\text{Var}(\mu_i | v_i)$ . Therefore a direct comparison of the estimates obtained from estimator of Newey with those obtained from probit or maximum likelihood is not possible. However, the two-step estimator is still beneficial. The maximum likelihood estimator can struggle to converge, particularly with multiple endogenous variables; but the convergence of the two-step estimator is most definite. Furthermore, while the coefficients from the two models are not comparable precisely; it is still possible to use the two-step calculations to check for statistically significant relations. In two-step IV probit estimation, Wald test of the null hypothesis  $H_0$  (of no endogeneity) works as the exogeneity test.

#### 4.3 Robustness Test

Weak IV identification test has been conducted to check that the weak-IV concern is not present in the instruments. The weak IV test of STATA module is performed on the endogenous variable(s) in an instrumental variables (IV) model to verify the validity of the instrument used, and create confidence sets for these coefficients. These confidences and tests are robust to weak instruments, in the context that the coefficients are not believed to be known. Weak IV test can be used to estimate linear models (including fixed panel effects and dynamic panel data), probit, and Tobit IV (Finlay, Magnusson, & Schaffer, 2014). In the case of IV probit, the two-step estimator (Newey's, 1987) is required.

The weak IV test for IV probit in stata reports the Anderson-Rubin test (AR). AR test is a joint test of the structural parameter ( $\beta = b_0$ , which represents the coefficient of endogenous regressor) and the exogeneity of the instruments ( $E(Zu) = 0$ , where  $u$  indicate the disturbance in the structural equation and  $Z$  indicate the instruments).

### 5. Empirical Analysis and Results

#### 5.1 Stationary Test and Correlation Matrix

Fisher-type (Choi, 2001) for an unbalanced panel is applied to all variables used in the models to check for stationarity. The study found that a majority of the variables is commonly stationary at their first difference. Out of 41 variables, 39 variables were found stationary at their first difference.

Appendix C, D, E, and F exhibit of correlation among the significant variables of the models. There is a weak correlation reported between the majorities of variables.

#### 5.2 Results of IV Probit Regression and Interpretation

Table 3 reports the findings of IV-Probit model I results. The paper has estimated three equations for model I with Payment\_Cash as the dependent variable. The probit model estimates involve reverse causality and possible biases, which raises concerns of endogeneity. To mitigate this concern for endogeneity, two-step Instrumented Variable (IV) probit regressions (Newey, 1987; Rivers & Vuong, 1988) has been employed. Specifically, in the first stage, the paper has estimated the current market cap as the selected instrument. In the second stage, using the predicted values of relative current market cap and other variables as regressors, the study estimates the IV probit regression. The second stage results of the IV-probit model, provided in table 3 columns 2, 4, and 6, indicate that the current market cap is negative and significant at the level of  $< 1$  percent. As can be observed from table 3, net income has a positive and statistically significant relationship with payment dummy for all the three reported models, indicating that if payment for the deal is made in cash then synergy realized in the form of net income is more in the post-acquisition stage. Similar positive and statistically significant outcomes have also been observed for R&D expense to Net sales in our model, indicating spillover of technology in the post-merger period. Significant results have also been obtained for the leverage variables like Net debt (EQ 3) and Net Debt to Ffcf (EQ 1 & 2), indicating fewer borrowings for the merged firm. Thus, the results of the empirical analysis of the study support hypothesis 1, which states "When payment is made in cash, more synergies are generated".  $\text{Prob} > \chi^2$ -is the probability of achieving this chi-square statistic if collectively independent variables do not influence the dependent variable (UCLA: Statistical Consulting Group). This p-value is compared to a critical value, i.e. at 10 percent, 5 percent, and 1 percent to determine the statistical significance of the overall model. In this case, all the three models are

statistically significant at less than 1 percent level. A Wald test of the exogeneity of the instrumented variables is reported at the bottom of the results. On that basis, we refute the null hypothesis that there is no endogeneity.

Table 3. Results of Instrument Variable IV Probit estimation for Mode of Payment in Cash is the dependent variable. This table reports the coefficient estimates and p-statistics from Instrument Variable Probit MODEL I.

	EQ 1		EQ 2		EQ 3	
	First stage (1)	Two-step probit with endogenous regressors (2)	First stage (3)	Two-step probit with endogenous regressors (4)	First stage(5)	Two-step probit with endogenous regressors (6)
Cur_Mkt_Cap		-1.9114 (0.7866)***		-1.8289 (0.5748)***		-1.4760 (0.4863)***
Net_Income	6.4955 (0.570) ***	11.6607 (5.5305) **	6.6359 (0.627) ***	11.1299 (4.2499) ***	7.679 (0.62) ***	10.4152 (4.1947) **
Personnel_Expn_ Per_Employee			-1.68E-09 (3.69E-09)	-1.54E-08 (1.63E-08)		
Net_Debt_To_Fcf	-0.00003 (0.0001)	-0.0011 (0.0016)	-0.0002 (0.0003)	-0.0037 (0.00233)*		
Risk_Premium	-0.0208 (0.020)	-0.1561 (0.0499)***	-0.0165 (0.023)	-0.1383 (0.0499)***	-0.00565 (0.0198)	-0.1157 (0.03873)***
Opcfroa_Healy	-0.0028 (0.004)	-0.0708 (0.0304)**	-0.0028 (0.009)	-0.08294 (0.0364)**	-0.00372 (0.0083)	-0.0534 (0.0291)*
Rd_Expnd_To_ Net_Sales	0.1342 (0.037) ***	0.2185 (0.1277) *	0.1316 (0.039) ***	0.2012 (0.1040) *	0.1193 (0.03748)***	0.1801 (0.0876) **
Net_Debt					-1.2330 (0.16332)***	-1.2993 (0.6302) **
Goodwill_Assets -					0.016086 (0.0032)***	0.0276 (0.0098) ***
constant	0.4326 (0.127) ***	1.3274 (0.5524) **	0.3159 (0.148) **	1.3175 (0.445)		1.1969 (0.4517)
Wald test of exogeneity		16.78***		22.07***		14.60***
Anderson-Rubin test		17.82***		26.47***		18.11 ***
Wald chi2(9)		17.95		23.02		23.59
Prob> chi2	0	0.0064	0	0.0017	0	0.0027
Number of obs	660	660	529	529	577	577

Robust standard errors in parentheses. \*\*\*p<0.01, \*\*p<0.05, \* p<0.1

Source: Authors' estimation

Table 4 presents the findings of IV-Probit for model 2 "When payment is made in cash, bidder liquidity is high". Probit regression model has been run with Payment\_Cash as the dependent variable and liquidity variables such as free cash flow and operating cash flow return on assets along with other variables as part of the independent variables. This model estimate Net Assets as the selected instrument in all three reported equations. As per the results Operating cash flow return on asset, Working Capital, Cash and Cash Equivalent and Quick ratio are statistically significant but negative in all the three models when the payment is made in cash. This indicates that the combined firm has lower liquidity for Indian Mergers & Acquisitions, and it is more likely the company will struggle with paying debts when payment is made in cash, thereby negating the hypothesis 2. However, free cash flow was found to have an opposite effect in our estimation. Prob> chi2 indicates that the EQ 1 and 2 are statistically significant at less than 10 percent level and EQ 3 at less than 5 percent level. Based on Wald's test of the exogeneity of the instrumented variables, we refute the null hypothesis of no endogeneity.

Table 4. Results of Instrument Variable Probit estimation for Mode of Payment in Cash as the dependent variable. This table reports the estimates of coefficient and p-statistics from Instrument Variable Probit Model 2.

	EQ 1		EQ 2		EQ 3	
	First stage (1)	Two-step probit with endogenous regressors (2)	First stage (3)	Two-step probit with endogenous regressors (4)	First stage(5)	Two-step probit with endogenous regressors (6)
Net_Assets		22.553 (8.457) ***		19.506 (8.604) **		20.024 (8.849) **
Working_Capital	0.367 (0.046)***	-9.051 (3.435) ***	0.519 (0.061) ***	-10.739 (4.778) **	0.527 (0.062) ***	-10.876 (4.987) **
Cf_Free_Cash_Flow	-0.079 (0.090)	2.315 (2.395)	-0.289 (0.122) **	6.01 (3.505) *	-0.280 (0.122) **	6.338 (3.554) *
Opcfroa_Healy	0.001 (0.0004)	-0.060 (0.0269) **	-0.00005 (0.0007)	-0.052 (0.028) *	-0.00005 (0.001)	-0.0464 (0.0274) *
Invent_Turn	0.0001 (0.0001)	-0.018 (0.017)	0.0004 (0.0002) **	-0.019 (0.014)	0.0004 (0.00015) **	-0.02114 (0.01525)
Cce_And_Sti_Detailed	0.034 (0.0173)**	-1.347 (0.657) **	0.0254 (0.0235)	-1.002 (0.649) *	0.0262 (0.0235)	-0.953 (0.6674)
Quick_Ratio	0.0149 (0.0047) ***	-0.604 (0.232) ***	0.0191 (0.0064)**	-0.634 (0.262) **	0.0192 (0.0064) ***	-0.585 (0.2709) **
Ebitda	0.396 (0.1005) ***	-8.2799 (3.5739) **	0.7466 (0.1349)**	-13.72 (6.179) **	0.7493 (0.135) ****	-12.83 (6.377) **
Revenue_Sequential_Growth	1.17E-06 (3.83E-06)	-0.0013 (0.0017)	3.55E-07 (5.21E-06)	-0.0013 (0.0017)	0.0000004 (0.000005)	-0.0017 (0.0017)
Net_Fixed_Assets_5_Year_Growth	-0.00004 (0.00008)	-0.0014 (0.0023)	0.0001 (0.0011)	-0.0041 (0.0027)	0.000093 (0.00014)	-0.00423 (0.0028)
Cash_Flow_To_Net_Inc	0.0026 (0.0004) ***	-0.075 (0.025) ***	0.0058 (0.0005)**	-0.129 (0.0522) **	0.0058 (0.0005) ***	-0.132 (0.0536) **
Total_Debt_And_Preferred_Equity	-0.524 (0.0419)**	12.560 (4.517) ***	-0.169 (0.0525)**	4.343 (1.8002) **	-0.1725 (0.0527) ***	4.128 (1.877) **
Capitalization_Ratio	0.00075 (0.0003)**	-0.016 (0.0107)	-0.00107 (0.0004)**	0.0212 (0.0117) *	-0.0011 (0.0004) ***	0.0214 (0.0121) *
Cons		5.235 (2.3851)**		-6.994 (2.991)	0.3828 (0.034) ****	-7.148 (3.073) **
Wald test of exogeneity		36.08***		33.58***		34.16***
Anderson-Rubin test		32.21***		31.63***		32.28***
Wald chi2(9)		23.07		19.81		25.80
Prob> chi2	0	0.0591	0	0.0999	0	0.0275
Number of obs	577	577	577	577	577	577

Robust standard errors in parentheses.\*\*\*p&lt;0.01, \*\*p&lt;0.05, \* p&lt;0.1

Source: Authors' estimation

Table 5 reports the findings of IV probit regression model run for the Model 3 with Industry relatedness as the dependent variable. This model estimates the current market cap as the selected instrument. The second stage results of the IV-probit model, presented in columns 2 and 6 of Table 5, reflects that the instrumented current market cap is negative and significant at the less than 1 percent level and less than 10 percent level in EQ 3 (column 4). It has been highlighted by the results that significant variables like Return on capital, Net income growth, total operating expense as a percentage of sales, asset turnover, and free Cash flow yield have a positive and statistically significant relationship with the relatedness of the industry of the reported EQ 2 and 3, indicating that if acquirer undertakes a horizontal merger then synergy in the form of said variables are gained post the merger. Similar positive and statistically significant results have also been observed for Inventory turnover in all the reported models. Thus, the results of the study's empirical analysis do support hypothesis 3, which states "When mergers & acquisition take place in the related industry sector, more synergies are generated". However, Financial Leverage and Net debt of the combined firm were observed to have a positive and statistically significant relationship with the relatedness of the industry as depicted in EQ 1; indicating an increase in borrowing post-merger for the combined firm. The rise in financial leverage is the result of an increase in debt capacity (Ghosh & Jain, 2000). Prob> chi2 indicates that all the models are statistically significant at less than 1 percent level. We refute the null hypothesis of no endogeneity, based on Wald's test.

Table 5. Results of Instrument Variable Probit estimation for Relatedness of Industry as the dependent variable. This table reports the estimates of the coefficient and p-statistics from Instrument Variable Probit MODEL 3.

	EQ 1		EQ 2		EQ 3	
	First stage (1)	Two-step probit with endogenous regressors (2)	First stage (3)	Two-step probit with endogenous regressors (4)	First stage (5)	Two-step probit with endogenous regressors (6)
Cur_Mkt_Cap		0.2758 (0.106) ***		1.636 (0.905) *		0.368 (0.126) ***
Invent_Turn	0.0033 (0.0008) ***	0.0025 (0.0019) ***	0.001 (0.0006) *	0.006 (0.004) *	0.001 (0.001) ***	0.0069 (0.0032) **
Ebitda_To_Revenue	-0.0009 (0.0007)	0.0179 (0.004)			-0.0035 (0.0025)	0.0253 (0.0129) **
Oper_Margin	-0.0023 (0.0015)*	-0.0176 (0.0042) **				
Total_Opex_As_A_Percentage_Sales	-0.0043 (0.0014)** *	-0.0049 (0.0027) ***	-0.00304 (0.00098)***	-0.0115 (0.0045) ***	-0.0049 (0.0016) ***	-0.0196 (0.0078) **
Quick_Ratio	0.0447 (0.0306)	-0.125 (0.0459)	-0.0463 (0.02039) **	-0.0143 (0.0657)	0.0234 (0.0313)	-0.047 (0.0465)
Return_Com_Eqy	0.0007 (0.0012)	-0.0144 (0.0031)				
Asset_Turnover	0.0292 (0.0905)	0.2066 (0.125)	-0.1164 (0.0604) *	0.6911 (0.2234) ***	-0.205 (0.098)	0.3964 (0.154) ***
Free_Cash_Flow_Yield	-0.0014 (0.0005)** *	0.0052 (0.0015) ***	-0.00011 (0.00035)	0.002733 (0.00142) *	-0.0013 (0.00057)	0.00163 (0.00125)
Ebitda			-1.724 (1.2352)	-2.4798 (2.00431)		
FncL_Lvrg			-0.02543 (0.00967)***	0.0191 (0.0331)		
Capitalization_Ratio			-0.00595 (0.0012) ***	0.0143 (0.00665)**		
Bs_Long_Term_Investm			0.33778	-1.0551		

ents			(0.16034)**	(0.5077)		
				**		
Ebitda_To_Revenue			-0.000014	0.0489		
			(0.00060)	(0.01196)***		
Return_On_Cap			0.00473	-0.0211	0.0192	-0.0219
			(0.00240)**	(0.00780)***	(0.004)	(0.0066)
					***	***
Tobin_Q_Ratio			0.8315	-1.4132		
			(0.0288)	(0.7662)		
			***	*		
Normalized_Net_Income_Growth			-	0.00025	-0.00003	0.00022
			0.000038(0.00002)*	(8.27E-05)	(0.00004)	(0.00007)
				***		***
Oper_Margin			-0.00445	-0.043	-0.0005	-0.041
			(0.0011)	(0.01091)	(0.002)	(0.01186)
			***	***		***
Net_Debt					0.0453	0.9648
					(0.229)	(0.338)
						***
Net_Fixed_Assets_5_Year_Growth					-0.0001	0.00742
					(0.0005)	(0.0023)
						***
Mkt_Cap_To_Revenue					0.0098	-0.0232
					(0.007)	(0.0134)*
Constant	0.6927	0.758	0.263	1.275	0.659	1.4216
	(0.181)	(0.318)	(0.1303)	(0.466)	(0.212)	(0.8551)
	***	**	**	***	***	*
Wald test of exogeneity		8.43***		5.51**		11.00***
Anderson-Rubin test		7.10***		5.20 **		9.16***
Wald chi2(9)		44.50		40.97		51.77
Prob> chi2	0	0.0000	0	0.0003	0	0.0000
Number of obs	744	744	725	725	578	578

Robust standard errors in parentheses. \*\*\*p<0.01, \*\*p<0.05, \* p<0.1

Source: Authors' estimation

Lastly, IV Probit model has been estimated for model 4 "When payment is made in equity, bidder leverage is high", for which results are presented in table 6. Payment\_Equity is the dependent variable and leverage variables along with other variables form the part of the independent variables. The current market cap is the selected instrument in EQ 1 and 2, along with other variables in the outcome regression in the first stage. For the estimation of EQ 3, the total asset has been used as the selected instrument. As per the results, EQ 1 suggests long term borrowing to have a statistically significant relationship with payment equity. EQ 2 suggests short and long term debt and EQ 3 suggests net debt to have a negative and statistically significant relationship with the payment equity. This suggests lower borrowings post the merger when the payment is made in equity, thus not supporting our hypothesis 4. Prob>chi2 indicates that all the models are statistically significant at less than 1 percent level. We reject the null hypothesis of no endogeneity, based on Wald's test.

Table 6. Results of Instrument Variable Probit estimation for Mode of Payment in Equity as the dependent variable. This table reports the estimates of the coefficient and p-statistics from Instrument Variable Probit MODEL 4.

	EQ 1		EQ 2		EQ 3	
	First stage (I)	Two-step probit with endogenous regressors (2)	First stage (3)	Two-step probit with endogenous regressors (4)	First stage(5)	Two-step probit with endogenous regressors (6)
Cur_Mkt_Cap		1.33 (0.67) **		1.169 (0.467) **		
Bs_Lt_Borrow	0.318 (0.283)	-1.985 (0.51) ***				
Net_Debt_To_Ffcf	-0.00001	0.003				

	(0.00006)	(0.0021)				
Tot_Debt_To_Tot_Asset	-0.014 (0.0024) ***	0.02 (0.0104) *				
Free_Cash_Flow_Yield	-0.0014 (0.0006) **	0.004 (0.0014) ***				
Net_Income	6.667 (0.572) ***	-8.3663 (4.7636) *				
Quick_Ratio	-0.0733 (0.03099) **	0.347 (0.112) ***				
Short_And_Long_Term_Debt			2.284 (0.32442)***	-5.126 (1.628) ***		
Total_Debt_And_Preferred_Equity			-3.004 (0.354) ***	4.935 (1.838) ***		
Is_Oper_Inc			7.534 (1.653) ***	-12.648 (4.101) ***		
Ebitda			-1.652 (1.551)	5.391 (2.5356) **		
Rd_Expnd_To_Net_Sales			0.1308 (0.03553) ***	-0.15142 (0.08326) *		
Bs_Tot_Asset					3.2273 (0.976) ***	
Net_Debt					0.505 (0.033) ***	-2.166 (0.563) ***
Degree_Financial_Leverage					0.00014 (0.00025)	-0.004 (0.0025) ***
Totaldebttoequity					1.00E-06 (1.61E-06)	1.42E-05 (1.63E-05)
Gross_Fix_Asset_Turn					0.00052 (0.00216)	0.0702 (0.0309) **
Cf_Free_Cash_Flow					0.0939 (0.0652)	-0.818 (0.464) *
Pretax_Margin					0.00004 (0.00015)	0.0015 (0.00091) *
Constant	1.0775 (0.259) ***	-0.781 (0.9823)	0.5242 (0.1062) ***	-0.03086 (0.3362)	0.8347 (0.02295)***	-2.4354 (0.8841) ***
Wald test of exogeneity		7.76***		13.40***		13.74***
Anderson-Rubin test		8.09***		12.90***		13.94***
Wald chi2(9)		32.95		28.42		38.70
Prob> chi2	0	0.0001	0	0.0001	0	0.0000
Number of obs	712	712	732	732	795	795

Robust standard errors in parentheses. \*\*\*p<0.01, \*\*p<0.05, \* p<0.1

Source: Authors' estimation

Summary of result of hypothesis testing has been detailed below in the table.

Table 7. Summary results of hypothesis testing

Objectives	Hypothesis	Expected Sign	Test Result
Model 1	H <sub>1</sub> : When payment is made in cash, more synergies are generated.	+	Supported
Model 2	H <sub>2</sub> : When bidder liquidity is high, payment is made in cash.	+	Not Supported
Model 3	H <sub>3</sub> : When merger & acquisition take place in the related industry sectors, more synergies are generated.	+	Supported
Model 4	H <sub>4</sub> : When bidder leverage is high, payment is made in equity.	+	Not Supported

Thus, this study contributes to the literature in two ways. The main finding of the present study is the generation of synergies if the mode of payment for merger and acquisition is cash for Indian Corporate. Also, horizontal mergers generate greater value for the Indian corporate. The robustness of the results was checked further by estimating the weak IV instrument robustness test as has been discussed in the sub section 5.3 below.

### 5.3 Weak Instrument Robustness Test for the Instrument Variable (Weak IV Test)

The Anderson-Rubin statistics, as reported in Table 3,4,5,6 for each Model specified in the study, are significant at less than 1 percent significance level. It refutes the null hypothesis, which states that the coefficient is zero on the endogenous variable. To put it another way, the instruments developed are not weak. These findings indicate that the instrument is strongly related to the endogenous variable and does not suffer from the weak IV problem. The weak-instrument-robust inference tests are also significantly varied from zero, suggesting that the predicted effects are robust to weak IV problems if any.

## 6. Conclusion

A firm's financial assets play a significant part in the decision-making phase of a merger. The present paper aims to improve the existing literature on assessing M&A activity in Indian corporate. This research paper aims primarily to analyze the (a) Synergies realized when the mode of payment in the merger deal is cash, (b) impact on bidder liquidity when payment is made in cash (c) Synergies realized when both target and acquirer in the deal belong to related industry, i.e. the merger is horizontal and (d) assess the impact on bidder leverage when payment is made in equity. A panel of 120 major Indian M&A deals from 2005 to 2015, each having 3 years of data pre and post-merger (seven years of data in totality including the year of the merger), i.e. data from 2002 to 2018 has been used in the analysis for the considered firms. The study employs Instrument Variable Probit Regression analysis to tackle the issue of endogeneity.

Summary of results for the models employed in the present study has been detailed in the table below.

Table 8. Significant variables and their relationship with the dependent variable as per the present study

Objectives	Hypothesis	Significant variables as per the study conducted	Relationship with the dependent variable
Model 1	H <sub>1</sub> : When payment is made in cash, more synergies are generated.	Net Income	Positive
		R&D Expenditure To Net Sales	Positive
Model 2	H <sub>2</sub> : When bidder liquidity is high, payment is made in cash.	Operating Cash Flow Return On Asset	Negative
		Working Capital	Negative
		Cash And Cash Equivalent	Negative
		Quick Ratio	Negative
Model 3	H <sub>3</sub> : When merger & acquisition take place in the related industry sectors, more synergies are generated.	Return On Capital	Positive
		Net Income Growth	Positive
		Total Operating Expense As A Percentage Of Sales	Positive
		Asset Turnover	Positive
		Free Cash Flow Yield	Positive
Model 4	H <sub>4</sub> : When bidder leverage is high, payment is made in equity.	Long Term Borrowing	Negative
		Net Debt	Negative
		Short And Long Term Debt	Negative

From the above table 8, it is indicated that in the case payment method in the deal is cash; M&A appears to be financially profitable for the bidder companies and synergies are realized for the Indian corporate. The major contribution of the present research is in the identification of the sources of synergy creation for the India M&A deals. The study highlight that net income has a positive and statistically significant relationship with cash payment of deal. Significant results have also been obtained for the leverage variables like net debt and net debt to free cash flow, indicating fewer borrowing for the merged firm in the post-merger period. Similar positive and statistically significant results have also been observed for R&D expense to net sales in our model, indicating spillover of technology post the merger. These results align with existing research such as Ghosh (2001), Megginson, Morgan, and Nail (2005), Ismail (2011). Secondly, we show that there is a significant association between realization of synergies and similarities of industry of target and acquirer firm. It was found that net income growth, return on capital, total operating expense as a percentage of sales, asset turnover, and free Cash flow yield contributes to the value creation in case of relatedness of industry in the merger deal. Thus, the results of the empirical analysis of the study do support the generation of synergies in the case of horizontal mergers. These results are found to be in resonance with Barai and Mohanty (2014), Rozen-Bakher (2018) but in dissonance with Mooney and Shim (2015).

The results also suggested an increase in borrowing post-merger for the combined firm. The improvement in financial leverage is the result of the rise in debt capacity (Ghosh & Jain, 2000). Operating cash flow return on asset, working capital, cash and cash equivalent and quick ratio is statistically significant but negative when the payment is made in cash. This indicates that the combined firm has lower liquidity for Indian Mergers & Acquisitions, and it is more likely the company will struggle with paying debts when payment is made in cash. This is in contrast with Jensen's theory of free cash flow (Jensen, 1986). Our results also indicate that leverage has a negative relationship with equity mode of payment. It implies the lowering of borrowings post the merger when the payment is made in equity.

### 6.1 Implications for the Indian Market

From the results of this analysis can be extracted some significant implications. Firstly, it supports the results of previous research that adhere to the point of view that bidder firms in India have achieved better financial performance post the merger and acquisition. The nature and trend of the Indian companies' mergers & acquisitions strategies show more horizontal mergers. This lends support to the argument that Indian firms are concentrating on their core areas and growing further into similar strength areas that are helping to realize synergistic benefits. The major contribution of the study lies in determining various sources of value creation or destruction for Indian mergers and acquisitions. It supports the hypothesis that M&A generates synergy for Indian M&As when Indian corporate focus on undertaking merger & acquisitions in similar industries, to gain economies of scale and create value post the merger. Secondly, the decision to use stock or cash often sends signals about the acquirer's estimate of the risk of failing to achieve the synergies anticipated from the acquisition. Repeated empirical research shows that the market responds far more favorably to cash-deal announcements than to stock-deal announcements. Synergy has been shown to be created post the merger in case cash is the preferred mode of payment for the merger deal in Indian scenario. Managers in the merger deal should emphasize on cash payment for the deal to generate higher value creation.

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### Notes

**Note 1.** Tangible Asset is defined as a total fixed asset. (Source: Bloomberg Terminal)

**Note 2.** Due to the paucity of space, the result is not mentioned here. The Result of the stationary test is available on request.

**Appendix A.** Distribution of sample across sectors.

Sectors	Acquirer Industry Sector	Target Industry Sector
Industrial	30	23
Basic Materials	28	29
Consumer, Cyclical	24	27
Consumer, Non-cyclical	17	21
Technology	9	7
Energy	4	2
Utilities	4	4
Communications	2	6
Diversified	2	1

Source: Bloomberg Terminal

**Appendix B.** Definition of the Variables

S.No.	Variable	Symbol	Definition of the variable
1	Mode of Payment dummy	Payment_Cash (Dependent Variable)	Value 1 if cash is the method of payment for the deal and 0 otherwise.
2	Mode of Payment dummy	Payment_Equity (Dependent Variable)	Value 1 if the method of payment is equity and 0 otherwise.
3	Relatedness of industry dummy	Industry_Relatedness (Dependent Variable)	Value 1 if the acquisition is horizontal and 0 otherwise.
4	Free Cash Flow	Cf_Free_Cash_Flow	It is the cash that a firm may yield after outlining the capital necessary to sustain or extend its assets.
5	Earnings before interest, taxes, depreciation, and amortization	Ebitda	(Net income + taxes+ depreciation+ interest +amortization) It is used to evaluate and equate profitability among firms since the consequences of accounting and financing resolutions are excluded by it.
6	Current Market Cap	Cur_Mkt_Cap	The total current market value of all the outstanding shares of the firm.
7	Working Capital	Working_Capital	Current Assets minus Current Liabilities
8	Short and Long Term Debt	Short_And_Long_Term_Debt	Summation of Short and Long Term Debt.
9	Net Debt	Net_Debt	Indicates the company's overall debt. Net of liabilities and debts along with cash and other similar liquid assets.
10	Financial Leverage	Fncl_Lvrg	Average assets/Average equity
11	Degree of Financial Leverage	Degree_Financial_Leverage	The affect a given amount of financial leverage has on a firm's earnings.
12	Net Fixed Assets 5 Year Growth	Net_Fixed_Assets_5_Year_Growth	The geometric growth rate over five years in net fixed assets.
13	Gross Fixed Asset Turnover	Gross_Fix_Asset_Turn	Net sales / gross fixed assets.
14	Personnel Expenses per Employee	Personnel_Expn_Per_Employee	Personnel expenses/number of employees.
15	R & D Expenditure to Net Sales	Rd_Expnd_To_Net_Sales	Research and development (R&D) expenditures as a percentage of the net sales.
16	Goodwill to Assets %	Goodwill_Assets_	Goodwill / total assets.

17	EBITDA Margin	Ebitda_To_Revenue	The ratio of EBITDA to revenue.
18	Cash Flow to Net Income	Cash_Flow_To_Net_Inc	A firm's total net income that is accessible as cash for investing and financing the current business.
19	Operating Margin	Oper_Margin	Operating Income (Losses) / Total Revenue * 100
20	Total Operating Expenses as a Percentage of Sales	Total_Opex_As_A_Percentage_Sales	Measures the total operating expenses (including the cost of goods sold and selling, general, and administrative expenses) as a percent of sales.
21	INVENT_TURN	Invent_Turn	The ratio shows the number of times a firm's inventory is sold and gets replaced over a period.
22	NET INCOME	Net_Income	Amount of profit of the firm after settling all of its expenses.
23	Net Debt to FCF (Free Cash Flow to Firm)	Net_Debt_To_Ffcf	It is a leverage ratio indicating a firm's ability to pay off its debts after deducting the cash outlays necessary to maintain its current operation.
24	Risk Premium	Risk_Premium	An investor requires an average incremental return as compensation for investing in equities rather than as a risk-free instrument.
25	Quick ratio	Quick_Ratio	Cash and Near Cash + Account Receivables + Short Term Investments / Current Liabilities
26	Total Assets	Bs_Tot_Asset	Sum of short and long-term assets.
27	Operating Income or Losses	Is_Oper_Inc	(Net Sales + Other Operating Income) - (Cost of Goods Sold + Other Operating Expenses)
28	Free Cash Flow Yield	Free_Cash_Flow_Yield	Return expected per share.
29	Return on Common Equity	Return_Com_Eqy	Measure how much income a corporation earns, in percentage, with the money shareholders invested.
30	Asset Turnover	Asset_Turnover	Amount of sales or revenues generated per assets.
31	Capitalization Ratio	Capitalization_Ratio	Long-term debt as a percentage of total equity and long-term debt, including preferred equity and minority share.
32	Long Term Investments	Bs_Long_Term_Investments	Includes long-term investments.
33	Return on Capital	Return_On_Cap	Measures, in percentage, the return generated by an investment for capital contributors.
34	Tobin's Q Ratio	Tobin_Q_Ratio	The ratio of a firm's market value to the cost of replacement of its assets.
35	Normalized Net Income Growth	Normalized_Net_Income_Growth	Year over year growth in normalized net income.
36	Market Cap To Net Revenue	Mkt_Cap_To_Revenue	Market Value of Equity/Trailing 12 Month Net Revenue.
37	Long Term Debt	Bs_Lt_Borrow	All interest-bearing financial obligations which are not due within a year.
38	Total Debt to Total Assets	Tot_Debt_To_Tot_Asset	The total amount of debt relative to assets.
39	Total Debt and Preferred Equity	Total_Debt_And_Preferred_Equity	Sum of short term borrowing, long term borrowing, and preferred equity at the end of the period end date.
40	Total Debt to Total Equity	Totaldebttototalequity	Total debt/total shareholders' equity.
41	PRETAX MARGIN	Pretax_Margin	Earnings before tax for a firm as a proportion of overall income or profits.
42	Net Asset	Net_Assets	Total Assets - Current Liabilities - Long-term Borrowings - Other Long-term Liabilities
43	Cash and Cash Equivalents	Cce_And_Sti_Detailed	Cash in vault + Deposits in banks + short term investments having a maturity of less than 90 days.
44	Revenue Growth	Revenue_Sequential_Growth	Period to period sequential growth rate in revenue.

Source: Bloomberg terminal

## Appendix C. Correlation Matrix for Model 1

	Cur_Mkt_Cap	Net_Income	Net_Debt_To_Fcf	Risk_Premium	Opcfroa_Healy	Rd_Expend_To_Net_Sales	Net_Debt	Goodwill_Assets
Cur_Mkt_Cap	I							
Net_Income	0.182	I						
Net_Debt_To_Fcf	-0.053	-0.067	I					
Risk_Premium	-0.060	-0.078	0.009	I				
Opcfroa_Healy	0.016	0.025	-0.009	-0.021	I			
Rd_Expend_To_Net_Sales	0.135	0.024	-0.017	-0.081	-0.024	I		
Net_Debt	-0.120	0.034	0.037	0.025	-0.059	-0.098	I	
Goodwill_Assets	0.134	0.051	-0.034	-0.026	0.020	-0.044	0.122	I

Source: Authors' estimation

## Appendix D. Correlation Matrix for Model 2

	Net_Assets	Working_Capital	Cf_Free_Cash_Flow	Opcfroa_Healy	Invent_Turn	Cce_And_Sti_Detailed	Quick_Ratio	Ebitda	Cash_Flow_To_Net_Inc
Net_Assets	I								
Working_Capital	0.264	I							
Cf_Free_Cash_Flow	0.004	0.018	I						
Opcfroa_Healy	-0.021	0.017	0.093	I					
Invent_Turn	0.162	0.095	0.011	-0.008	I				
Cce_And_Sti_Detailed	0.178	0.164	0.004	-0.025	0.029	I			
Quick_Ratio	0.170	0.139	-0.039	-0.010	0.109	0.149	I		
Ebitda	0.144	0.080	0.140	0.002	0.088	-0.141	-0.025	I	
Cash_Flow_To_Net_Inc	0.154	0.006	-0.020	-0.016	0.005	0.057	0.048	-0.156	I

Source: Authors' estimation

## Appendix E. Correlation Matrix for Model 3

	Cur_Mkt_Cap	Invent_Turn	Total_Oper_A_Percentage_Sales	Free_Cash_Flow_Yield	Return_On_Cap	Normalized_Net_Income_Growth	Oper_Margin
Cur_Mkt_Cap	I						
Invent_Turn	0.197	I					

Total_Opex_As_A_Percentage_Sales	-0.054	-0.023	I				
Free_Cash_Flow_Yield	-0.158	-0.03	-0.134	I			
Return_On_Cap	0.230	0.166	-0.078	-0.0546	I		
Normalized_Net_Income_Growth	-0.070	0.097	0.114	-0.005	-0.005	I	
Oper_Margin	0.039	0.013	-0.273	0.144	0.080	-0.054	I

Source: Authors' estimation

**Appendix F.** Correlation Matrix for Model 4

	Cur_Mkt_Cap	Bs_Lt_Borrow	Free_Cash_Flow_Yield	Net_Income	Quick_Ratio	Short_And_Long_Term_Debt	Total_Debt_And_Preferred_Equity	Rd_Expended_To_Net_Sales	Bs_Tot_Asset	Degree_Financial_Leverage
Cur_Mkt_Cap	I									
Bs_Lt_Borrow	-0.19	I								
Free_Cash_Flow_Yield	-0.151	0.129	I							
Net_Income	0.172	-0.127	-0.091	I						
Quick_Ratio	0.006	-0.026	-0.058	0.074	I					
Short_And_Long_Term_Debt	-0.122	0.327	0.130	-0.091	-0.108	I				
Total_Debt_And_Preferred_Equity	-0.29	0.787	0.171	-0.19	-0.14	0.205	I			
Rd_Expended_To_Net_Sales	0.137	-0.149	-0.034	0.055	0.029	-0.124	-0.15	I		
Bs_Tot_Asset	0.162	0.130	-0.073	0.02	0.013	0.162	0.240	-0.028	I	
Degree_Financial_Leverage	-0.02	0.069	-0.001	-0.04	-0.02	0.060	0.069	0.021	0.05	I.0000

Source: Authors' estimation

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