

Impact of Merger and Acquisitions on Operating Performance: Evidence from Manufacturing Firms in India

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The present paper is carried out with the objective of studying what shift-in-structure is experienced especially in the operating performance (OP) after merger and acquisitions (M&As) by studying 39 selected acquiring manufacturing firms in India. The firms, which had gone in to the M&As process during the financial year 2006–2007 are only considered for the study. Factor analysis, correlation matrix, multiple regression, and chow test are applied to study the OP of these firms in the pre-and post-merger periods. The study reveals that the M&As process has significant (positive improvement) effect on OP of the acquiring manufacturing firms in India after M&As over the study period.

Key Words: acquisition; corporate restructuring; merger & acquisition; post-merger operating performance; operating performance of Indian industries; long-run operating performance

JEL Classification: G34; L25

Introduction

Largely, corporate restructuring has been a resounding success, which has led to remarkable improvement in corporate performance. Observers of corporate restructuring believe that the gains are attributable to synergetic benefits, sharper forces, better corporate governance, enhancement in managerial incentives and motivation, greater disciplining power of debt, and elimination of cross subsidies. The present study has analyzed operating performance (OP) of manufacturing firms in India in pre-and post-merger period under seven dimensions, i. e. *gross earnings* (GE), *liquidity* (L), *financial risk* (FR), *cost of utilization* (CU), *turnover* (T), *growth*

(G), and operating leverage (OL). The existing literature in the area of research prove differing results, for instance, a sick firm is taken over by a good performer and makes serious attempts to enhance the OP, it is possible to turn it around successfully (Sankar and Rao 1998). The acquiring firms performed better than the industry average in terms of profitability (Pawaskar 2001). The long-term OP following M&As in Japanese firms was positive but insignificant, and there was a high correlation between pre-and post-merger performance (Kruse et al. 2003). The merged firms reacted positively to the merger announcement, and only a few financial variables influenced the share price of the merged firms (Vanitha and Selvam 2007). There was a significant shift (*change*) in the output (*shareholders' wealth*) due to the merger during the post-merger period, which supports a good, significant positive impact of M&As on the shareholders' wealth of manufacturing firms of food industry in India (Azhagaiah and Sathishkumar 2012a). With this background, the present paper is carried out with the objective of analyzing what shift-in-structure is experienced in the OP of the acquiring manufacturing firms after M&As, in India.

Review of Literature

Levine and Aaronovitch (1981) concluded that there was no evidence of any significant difference between the acquiring and target firms for the profit related variables and their growth. Ikeda and Do (1983), who tested OP on parameters such as *profitability, efficiency, growth, and research and development* found that the financial performance in respect of profitability was higher in the post-merger period. Scherer (1988) revealed that most of the firms did not show significant improvement in long-term profitability after M&As. Healy, Palepu and Ruback (1992) found that the merged firms registered improvement in the post-merger OP in comparison to that of their industry peers, these increases from improvements in asset productivity. Lee, Pamela and Gayle (1996) revealed that the horizontal acquisitions showed the strongest predictive ability with the variables such as *long-term debt/total assets, long-term debt/market value, market value/book value, and asset growth and sales growth* showing significance in the post-merger period. Rau and Vermaelon (1998) found that the acquiring firms under-perform during the three years after M&As while tender offers earned a small but statistically significant positive abnormal return. However, the long-term performance of acquiring firms, due to M&As, is not uniform across the firms, which went

for M&As. Pawaskar (2001) elucidated that the acquiring firms were at the lower end in terms of growth, tax and liquidity of the industry, and the target firms performed better than that of the industry in terms of profitability.

Coontz (2004), in the study 'Economic Impact of Corporate Mergers and Acquisitions on Acquiring Firm Shareholder' stated that the companies failed to perform well after mergers and acquisitions in all parameters under study; the performance was different from different industry; and the performance of company depends on the type of industry in which mergers and acquisitions take place. Dubrovski (2005), in the study 'Restructuring and Business Reengineering in Integrative Process' stated that restructuring has a more significant role for preventing crisis and development, either as internal (organic) growth or growth by the helping hand from partners, in comparison to acute crisis solving itself, when measures having short-term positive effects take priority.

Martynova, Oosting and Renneboog (2006), in the paper 'The Long Term Operating Performance of European Mergers and Acquisitions' analyzed the extent of European companies improved their profitability following the completion of takeover transactions of 155 European M&As completed during 1997–2001 and found that the profitability of the combined firm decreased significantly following the takeover. Means of payment, geographical scope and industry relatedness did not have significant explanatory power on profitability. Companies with excessive cash holdings are negatively related to performance while acquisitions of relatively larger targets result in better profitability of the combined firm subsequent to the takeover.

Mantravadi and Reddy (2007), in the study 'Relative Size in Mergers and Operating Performance: Indian Experience' studied the impact of mergers on the operating performance of acquiring corporate by examining some financial ratios of pre and post-merger periods of firms of public limited and traded companies in India during 1991–2003. They had found that there were minor variations in terms of the impact on operating performance following mergers when the acquiring and acquired firms are of different relative sizes as measured by market value of equity.

Martynova, Oosting and Renneboog (2007) found that the acquiring and target firms significantly outperformed the median peers in the industry prior to the takeovers event, but the profitability of the combined firm decreased significantly following the takeover. Beena (2008) made a

study on 'Trends and Perspectives on Corporate Mergers in Contemporary India' and found that the performance of acquiring firms in 1990–2005 was relatively better as compared to that of the Indian private corporate manufacturing sector. However, the study did not find significant evidence of improvement in their performance in terms of various parameters during the post-merger phase as compared to the pre-merger period.

Sinha, Kaushik and Chaudhary (2010), in a study 'Measuring Post Merger and Acquisition Performance: An Investigation of Select Financial Sector Organizations in India' found that more than half of the merging firms showed improved financial performance in the post-merger period as compared to the pre-merger period; earnings available to equity shareholders and debt-equity ratio showed a significant change in the post-merger period. Srinivas (2010) revealed that the overall long-term repaying capacity of the banks has been improved after the M&As and, which is proved in the case of interest coverage ratio too.

Liargovas and Repousis (2011), in a study 'The Impact of M&As on the Performance of Greek Banking Sector: An Event Study Approach' examined the impact of Greek M&As on the performance of Greek Banking sector during 1996–2009 and rejected the 'semi-strong form' of Efficient Market Hypothesis of the Athens stock exchange; found that bank M&As have no impact and do not create wealth; the operating performance did not improve following M&As. Azhagaiah and Sathishkumar (2011) found that the M&As process has significant impact on the profitability of acquiring firms in India after merger. Verma, Maji and Nair (2013) concluded that the Indian banks, although small in number when compared to their global counterparts, are taking great strides not only within the continental shelf of India, but even beyond its borders too.

The previous studies, mostly, attempted to study the short-run impact, say three years prior to and after the M&As period. Moreover, most of the previous studies undertook almost similar research methods to evaluate OP in the pre-and post-merger periods. With these evidences and supports, the present study is an attempt to measure the impact of M&As on the OP in the long run, say five years prior to merger year and five years after the merger year. The present paper attempts to overcome the limitations of the previous studies by use of chow test. Hence, the present paper aims at to fulfil the research gap in the existing literature in terms of two dimensions, one – long-run impact, and the other – applying chow test to analyse the shift-in-structure (*impact*) in the OP due to M&As.

Statement of the Problem and Significance of the Study

When a firm is merged with another or is acquired by the profit-making firm, it benefits both the firms; hence, it is the order of the day that all firms are interested in resorting to corporate restructuring in the name of M&A. However, the question that often arises is whether all the firms those are merged/acquired end up with increase in OP? As some firms end up with a negative impact on OP (Pawaskar 2001; Coontz 2004) after M&A, the present paper is an attempt to seek answers to the stated question by analysing the impact of M&A on OP by studying 39 selected acquiring manufacturing firms in India, which are listed in one of the leading Indian stock exchanges in India namely the Bombay Stock Exchange which have undergone M&A in the same (related merger) industry during the financial year 2006–2007, and an attempt has been made to study the OP of the acquiring manufacturing firms in India in the long-run, that is, during the period of five years before merger and five years after the merger, that is from 2002 to 2006, and from 2008 to 2012, hence the period of the study is ten years (i. e., from 2002 to 2012; merger year 2006–2007 is not included).

Objectives and Hypotheses Developed for the Study

The motives behind the M&A are, naturally shareholders' wealth maximization, profit maximization, and financial and operating risk minimization. The present paper attempts to analyze the shift in structure in the OP of selected acquiring manufacturing firms of food industry in India, which have adopted the M&A strategy. More specifically, the present paper proposes

1. To analyze the effect of M&A on the attributes of operating performance vs. *gross earnings, liquidity, financial risk (financial leverage), cost of utilization, turnover, growth, and operating leverage* of acquiring manufacturing firms in India; and
2. To study the shift-in-structure (improvement) in the operating performance of acquiring manufacturing firms in India in the post-merger period.

The present paper is attempted to estimate the OP of acquiring manufacturing firms in India in the post-merger period. The study has further attempted to investigate and test if there is any significant change in the results achieved by the acquiring manufacturing firms due to M&A. Based on the objectives, the following hypotheses are developed:

TABLE 1 Number of Merger and Acquisitions in India, 2001–2012

Year	(1)	(2)	Year	(1)	(2)
2001–2002	164	138	2007–2008	202	176
2002–2003	133	114	2008–2009	131	108
2003–2004	141	110	2009–2010	201	147
2004–2005	147	113	2010–2011	170	109
2005–2006	211	176	2011–2012	73	24
2006–2007	228	179			

NOTES Column headings are as follows: (1) announced M&As deals, (2) completed M&As deals. Data compiled from PROWESS data-base provided by CMIE.

H_0^1 *There is no significant impact of attributes of operating performance vs. gross earnings, liquidity, financial risk (financial leverage), cost of utilization, turnover, growth, as well as operating leverage on operating performance of acquiring manufacturing firms in India in the post-merger period.*

H_0^2 *There is no significant shift-in-structure in the operating performance of acquiring manufacturing firms in India in the post-merger period.*

Research Methodology

DATA SOURCE AND PERIOD OF THE STUDY

The study used secondary sources of data, which were collected from the capital market database called Centre for Monitoring Indian Economy Private Limited (Prowess CMIE). Data on OP for a period of five years prior to the merger year and five years after the merger year for each acquiring manufacturing firm were collected. Table 1 reveals that the M&As is highest in number during 2006–2007 in terms of M&As deal announcement (228) as well as M&As deal completed (179), hence the sample units (firms) chosen are based on those firms that ventured in to the M&As process during 2006–2007 only, and are considered for the study for want of analysing the long-run impact of M&As on OP, hence the study period is restricted to 10 years ranging from 2002 to 2012 considering the year 2006–2007 as mid-year, i. e. the year of M&As.

Purposive multi-stage sampling technique is used and the different stages followed are shown in table 2. The number of M&As held in the manufacturing sector in India during 2006–2007 is shown in the table 3.

TABLE 2 Sampling Procedure

Stage 1	Total of 228 firms under the manufacturing and service industries had gone into the M&A deal during the financial year 2006–2007.
Stage 2	Out of 228 firms, 179 firms only have completed M&A deal during the financial year 2006–2007.
Stage 3	Out of 179 firms, 39 firms were eliminated because they did subsequent merger with another target firm in the same financial year, resulting in to the number of firms to 140 for further stage.
Stage 4	Out of 140 firms, 75 firms fall under the manufacturing sector and remaining 65 firms fall under the service sector, hence 75 firms of manufacturing sector only are taken into account for further stages.
Stage 5	Out of 75 firms, full-fledged data are available only for 39 firms of manufacturing sector.
Stage 6	Hence, the final sample comprises 39 acquiring manufacturing firms in India.

TABLE 3 Sector-Wise Number of Merger and Acquisitions Held in the Manufacturing Sector in India, 2006–2007

Industry	(1)	(2)	(3)
Food and Beverage	17	13	7
Machinery	16	12	6
Non-Metallic Mineral Products	10	9	5
Chemicals	24	18	12
Textiles	10	9	05
Metals and Metal Products	8	7	1
Transport Equipment	5	2	1
Miscellaneous Manufacturing	5	5	2
Total	95	75	39

NOTES Column headings are as follows: (1) no. of mergers (before elimination of subsequent M&As), (2) no. of mergers (after elimination of subsequent M&As), (3) full-fledged data available in the data source.

Research Methods for Analysis

The study used ‘factor analysis, correlation matrix, multiple regression analysis, and the chow test.’ Factor analysis is used to analyse underlying variables, or factors, that explain the pattern of correlations within a set of observed variables. Correlation co-efficient is used to analyze one-to-one relationship between the selected variables. Multiple regression analysis has been used for estimating as to which part of the increase the merger had impact, by use of various ratios for studying the OP of the acquiring

manufacturing firms in India. Further, chow test is used for studying the shift-in-structure (improvement) in OP due to M&As.

ANALYSIS OF OPERATING PERFORMANCE

The study used regression equation to estimate the determinants of operating performance, say return on equity (ROE) based on predictor (explanatory) variables.

Response Variable

Return on equity (ROE) is the response/criterion variable, which is expressed as a percentage. The ROE is an indicator of firm's profitability by measuring the extent to which the profit is generated by the firm with the money invested by common stock owners. The higher the ratio, the more is the management efficiency in utilizing its equity base and in turn, the better return is to the investors. The OP is measured through ROE (Cabanda and Pascual 2007), and the selected predictor variables to measure the ROE are *gross earnings, liquidity, financial risk (financial leverage), cost of utilization, turnover, growth, and operating leverage*.

Regression equation:

$$ROE = \alpha + \beta_1GE + \beta_2L + \beta_3FR + \beta_4CU + \beta_5T + \beta_6G + \beta_7OL + E, \quad (1)$$

where ROE is return on equity, GE gross earnings, L liquidity, FR financial risk, CU cost of utilization, T turnover, G growth, OL operating leverage, α regression constant, $\beta_1, \beta_2, \dots, \beta_7$ regression coefficients and E error term.

Predictor Variables

The selected predictor variables are gross earnings (GE), liquidity (L), financial risk (financial leverage) (FR), cost of utilization (CU), turnover (T), growth (G), and operating leverage (OL).

INDICATION OF CHOW TEST

The shift-in-structure in respect of OP has been studied with the help of Chow test. The chow test (Chow 1960) was designed to analyze the same variables obtained in two different data sets to determine if they were similar enough to be pooled together. The method, however, could be used to determine if two regression lines are different from one another (Lee 2008a; 2008b). The Chow test for parameter stability confirms that there was a structural change in the estimating equation, and the Chow

test models clearly indicate that for all series under examination, the null hypothesis of more than one structural break time can be rejected (Allaro, Kassa and Hundie 2011).

The impact of M&As on the OP of acquiring manufacturing firms in India is studied through its structural changes and its impact on the acquiring firms of manufacturing sector in India. For this purpose, the period of study has been divided in to two sub-periods – pre-merger period, from 2002–2006 and post-merger period, from 2008–2012. The firms, which had gone in to the M&As process during the financial year 2006–2007 only are considered for the study for want of analysing long-run impact of M&As on OP. The test statistic is as follows:

$$F = \frac{\frac{RSS_w - RSS_g + RSS_j}{k}}{\frac{RSS_g - RSS_j}{n_1 + n_2 - 2k}} \quad (2)$$

This is distributed as F with k and $n_1 + n_2 - 2k$ degrees of freedom, where F is the test statistic, RSS_w residual sum of squares for the whole sample (restricted model), RSS_g residual sum of squares for the pre-merger sub-sample, RSS_j residual sum of squares for the post-merger sub-sample, n number of observations, k number of regressors (including the intercept term) in each unrestricted sub-sample regression and $2k$ number of regressors in both unrestricted sub-sample regressions (whole sample).

Analysis and Discussion

The selected variables are rotated through Varimax with Kaiser Normalization method extracted using principal component analysis and seven major predictor factors are identified and they are interlinked, which are shown in table 4 that the first factor (GPR (0.875), CPR (0.861), EBIT_SR (0.842), NPR (0.835), OPR (0.821), and R_LTFR (0.680)) is gross earnings, which is denoted as GE. The second factor (QR (0.826), WC_SR (0.796), WC_TAR (0.743), and CR (0.657)) is liquidity, which is termed as L. The third factor (PR (0.870) and TD_TAR (-0.848)) is financial risk (financial leverage), which is denoted as FR. The fourth factor (RM_SR (-0.695), S&AC_SR (0.686), P&F_SR (0.671), and EC_SR (0.525)) is cost of utilization, which is termed as CU. The fifth factor (ITR (0.897) and STR (0.893)) is turnover, which is termed as T. The sixth factor (GOEBITR (0.826), GOPR (0.778), and GOFAR (0.488)) is growth, which is termed as G, and the seventh and the final factor (NFA_NWR (0.810) and TL_NWR (0.740)) is operating leverage, which is termed as OL.

The predictor variables in the first factor, viz., GPR (0.875), and CPR (0.861); in the third factor, viz., PR (0.870), and in the fifth factor, viz., ITR (0.897) and STR (0.893) are found to be highly significant dominating in the factor (Varimax with Kaiser Normalization method). The Eigen values 5.089, 2.847, 2.501, 1.865, 1.569, 1.464, and 1.219, respectively, for the factors 1 to 7 are > 1 hence, the study analyzed these seven predictor factors in the pre-and post-merger periods in respect of OP (ROE) and found that these factors are significant in the post-merger period.

Analysis of Determinants of Operating Performance in Pre-Merger Period

Correlation analysis is used to study one-to-one relationship between the selected predictor factors (GE, L, FR, CU, T, G, and OL) and the details are shown in table 5, which reveals that factors, viz., GE, FR, and G have significant positive relationship with ROE (0.5230.01, 0.1680.05, and 0.1460.05) at 1% and 5% level respectively, while factors, viz., L and CU have significant negative relationship with ROE ($-0.2070.01$ and $-0.2210.01$) at 1% level. However, factors vs. T and OL do not show any significant positive/negative relationship with ROE.

The results of regression analysis of M&As on pre-merger OP as well as post-merger OP are presented in table 6. The results reveal that the factors GE, FR, and G have significant positive beta coefficient (6.7380.01, 1.9900.05, and 4.8440.01) on ROE at 1% and 5% level respectively, while the factors viz. L and OL have significant negative beta coefficient ($-2.2020.05$ and $-1.5730.05$) on ROE at 5% level however, the factors vs. CU and T did not show any significant positive/negative beta coefficient. The R^2 and adjusted R^2 is 0.398 and 0.375 respectively, and the critical value of F (df , 7, 187) is 17.6470.01, which is significant at 1% level, reveals that the selected predictor variables affected the OP of acquiring manufacturing firms in India in the pre-merger period too.

Analysis of Determinants of Operating Performance in Post-merger Period

The correlation matrix of factors of OP (see table 7) for the post-merger period shows that factors, viz., GE, FR, and G have significant positive relationship with ROE (0.5110.01, 0.2500.01, and 0.2370.01) while factor OL has a significant negative relationship with ROE ($-0.2830.01$) at 1% level. However, factors viz., L, CU, and T do not show any significant positive/negative relationship with ROE.

TABLE 4 Results of Factor Analysis of Predictor Variables of the Impact of M&As on the Operating Performance (ROE) of Acquiring Manufacturing Firms in India, 2001–2012

(1)	(2)	(3)	Components						
			1	2	3	4	5	6	7
GE	5.089	GPR	0.875	-0.009	0.009	0.123	0.005	0.188	0.005
		CPR	0.861	0.052	0.044	0.059	0.145	-0.104	-0.029
		EBIT_SR	0.842	0.064	0.025	0.193	-0.033	0.273	0.027
		NPR	0.835	0.097	0.201	-0.066	0.094	0.001	0.015
		OPR	0.821	-0.079	-0.200	0.267	0.014	0.227	0.053
		R_LTFR	0.680	-0.108	0.204	-0.240	0.047	0.229	-0.032
L	2.847	QR	0.012	0.826	0.007	-0.083	0.101	0.009	-0.066
		WC_SR	0.034	0.796	-0.179	0.067	-0.058	-0.003	-0.059
		WC_TAR	-0.042	0.743	0.046	-0.145	-0.240	0.111	0.139
		CR	0.044	0.657	0.411	0.015	0.064	-0.015	0.090
FR	2.501	PR	0.216	0.085	0.870	0.034	0.070	0.039	0.051
		TD_TAR	0.007	0.051	-0.848	0.019	-0.127	0.012	0.289
CU	1.865	RM_SR	-0.291	0.176	0.075	-0.695	-0.072	0.047	0.242
		S&AC_SR	0.086	0.173	0.192	0.686	0.120	0.077	-0.016
		P&F_SR	0.034	-0.237	-0.351	0.671	0.099	-0.175	0.079
		EC_SR	-0.464	-0.026	0.169	0.525	-0.281	0.171	-0.257
T	1.569	ITR	0.088	-0.018	0.063	0.130	0.897	0.033	-0.069
		STR	0.092	-0.073	0.125	0.035	0.893	0.121	-0.061
G	1.464	GOEBITR	0.228	0.100	0.018	-0.001	0.083	0.826	0.018
		GOPR	0.242	0.050	-0.071	-0.095	0.047	0.778	-0.068
		GOFAR	-0.045	-0.138	0.293	0.381	0.044	0.488	0.155
OL	1.219	NFA_NWR	-0.062	0.004	0.071	-0.050	-0.098	-0.028	0.810
		TL_NWR	0.123	0.030	-0.287	-0.084	-0.016	0.046	0.740

NOTES Column headings are as follows: (1) factors, (2) eigen value, (3) variable convergence.

The results of regression analysis on the OP of (see table 6) post-merger period reveals that the factor GE has a significant positive beta coefficient (8.1240.01) on ROE at 1% level; which infers that the acquiring manufacturing firms gain more profit by optimum utilization of the available resources in the post-merger period. The factor L has a significant negative beta coefficient (-1.8630.01) on ROE at 1% level, which

TABLE 5 Correlation Matrix of Selected Predictor Factors with Operating Performance (ROE) for Pre-Merger Period (2001–2006) of Acquiring Manufacturing Firms in India

	ROE	GE	L	FR	CU	T	G	OL
ROE	1							
GE	0.523** (0.000)	1						
L	-0.207** (0.004)		1					
FR	0.168* (0.019)			1				
CU	-0.221** (0.002)	-0.179* (0.012)			1			
T				-0.155* (0.030)		1		
G	0.146* (0.042)	-0.143* (0.045)					1	
OL								1

NOTES Compiled and edited from the financial statements of selected firms listed-CMIE-prowess package. ** Significant at 1% level. * Significant at 5% level.

infers that the acquiring manufacturing firms are able to pay their debts as and when they are due after the merger period. The factor FR has a significant positive beta coefficient (4.3850.01) on ROE at 1% level; which implies that FR of the acquiring manufacturing firms, in relying on the borrowings, is significantly affected by their M&As activity; therefore, the acquiring manufacturing firms are able to repay their external liabilities in the post-merger period. The factor CU has a significant negative beta coefficient (-2.9190.01) on ROE at 1% level, which implies that the acquiring manufacturing firms are able to improve operating efficiency in respect of CU and are also able to control the expenses in the post-merger period.

The factor G has a significant positive beta coefficient (2.5640.01) on ROE at 1% level, which implies that the acquiring manufacturing firms are able to increase G after merger and it also infers that they are able to use their internal resources to the maximum extent to maximize profit. The factor OL has a significant negative beta coefficient (-4.5160.01) on ROE at 1% level, which implies that the acquiring manufacturing firms are able to reduce their OL after merger period by way of reducing the

TABLE 6 Results of Multiple Regression of Selected Predictor Factors on Operating Performance (ROE) of Acquiring Manufacturing Firms in India for Pre-Merger (2001–2006) and Post-Merger (2007–2012) Periods

Variable	Un-standardized coefficients beta value					
	Pre-merger			Post-merger		
	β	t-value	P-value	β	t-value	P-value
(Constant) ROE	12.661	12.970	0.000	12.115	15.184	0.000
Gross Earnings	6.738	8.677	0.000**	8.124	10.787	0.000**
Liquidity	-2.202	-2.591	0.010*	-1.863	-2.772	0.006**
Financial Risk (Leverage)	1.990	2.532	0.012*	4.385	6.005	0.000**
Cost of Utilization	-1.528	-1.951	0.053	-2.919	-3.936	0.000**
Turnover	1.417	1.342	0.181	-0.844	-1.360	0.176
Growth	4.844	3.755	0.000**	2.564	3.886	0.000**
Operating Leverage	-1.573	-2.211	0.028*	-4.516	-5.707	0.000**
R^2	.398			.525		
Adjusted R^2	.375			.507		
F	17.647**			29.473**		
Degrees of Freedom	7,187			7,187		
Number of Observations	195			195		

NOTES Compiled and edited from the financial statements of selected firms listed-CMIE-prowess package. ** Significant at 1% level. * Significant at 5% level

total liability relative to their net worth, while the factor T does not show any significant positive/negative beta coefficient on ROE; hence, H_0^1 is rejected in respect of factors vs. GE, FR, and G (+ve), L, CU, and OL (-ve).

The R^2 and adjusted R^2 of the regression analysis for the post-merger period is 0.525 and 0.507 respectively and the critical value of F (df, 7, 187) 29.4730.01 is significant at 1% level, which implies that the test statistic (29.4730.01) for post-merger period > 99% critical value (2.64) of F-test, F-value, being significant at 1% level, the analysis implies that there is a significant impact of most of the selected explanatory variables on the OP hence, it is possible to reject the (H_0^1) null hypothesis.

Impact of Merger and Acquisitions on Operating Performance – Application of Chow Test

The result of the chow test (see table 8) reveals that the F-value (2.790.01) is greater than the F limit (2.51) at 1% level for df. 8, 374, hence, H_0^2 is rejected, which implies that the acquiring manufacturing firms have a

TABLE 7 Correlation Matrix of Selected Predictor Factors with Operating Performance (ROE) for Post-Merger Period (2007–2012) of Acquiring Manufacturing Firms in India

	ROE	GE	L	FR	CU	T	G	OL
ROE	1							
GE	0.511** (0.000)	1						
L			1					
FR	0.250** (0.000)			1				
CU		0.173* (0.015)			1			
T						1		
G	0.237** (0.001)						1	
OL	-0.283** (0.000)							1

NOTES Compiled and edited from the financial statements of selected firms listed-CMIE-prowess package. ** Significant at 1% level. * Significant at 5% level.

TABLE 8 Results of Chow Test for Structural Shift in Operating Performance between Pre-and Post-Merger Periods of Acquiring Manufacturing Firms in India

Sum of square residuals			(4)	(5)	(6)	(7)	(8)
(1)	(2)	(3)					
42395.12	20620.93	19380.19	8	390	2.79**	8, 374	F0.01 2.51*

NOTES Column headings are as follows: (1) whole sample, (2) pre-merger period, (3) post-merger period, (4) number of parameters estimated, (5) number of observations, (6) *F*-value, (7) degrees of freedom, (8) *F*-limit. Computed results from the regression analysis. * For $V_1 = 8$, $V_2 = 374$). ** Significant at 1% level. * Significant at 5% level.

highly significant shift-in-structure (improvement positively) in respect of OP in the post-merger period at 1% level.

Conclusions and Policy Prescriptions

The study examined the OP of acquiring manufacturing firms in India using factor analysis, correlation coefficient, regression analysis, and Chow test to study if there is a significant shift in the OP of acquiring manufacturing firms in the post-merger period based on the annual financial data spanning the years from 2002–2012, for a period of five years prior to the merger (2002–2006) and five years after the merger (2008–

TABLE 9 Summary of the Status of Hypotheses Developed on Operating Performance

Hypotheses	Overall results
H ₀ ¹ There is no significant impact of gross earnings (GE) of acquiring manufacturing firms in India on ROE after M&As.	+ve** rejected
H ₀ ¹ There is no significant impact of liquidity (L) of acquiring manufacturing firms in India on ROE after M&As.	-ve** rejected
H ₀ ¹ There is no significant impact of financial risk (leverage) (FR) of acquiring manufacturing firms in India on ROE after M&As.	+ve** rejected
H ₀ ¹ There is no significant impact of cost of utilization (CU) of acquiring manufacturing firms in India on ROE after M&As.	-ve** rejected
H ₀ ¹ There is no significant impact of turnover (T) of acquiring manufacturing firms in India on ROE after M&As.	accepted
H ₀ ¹ There is no significant impact of growth (G) of acquiring manufacturing firms in India on ROE after M&As.	+ve** rejected
H ₀ ¹ There is no significant impact of operating leverage (OL) of acquiring manufacturing firms in India on ROE after M&As.	-ve** rejected
H ₀ ² There is no significant shift in structure in the operating performance (ROE) of acquiring manufacturing firms in India in the post-merger period.	+ve** rejected

NOTES Regression analysis and chow test analysis. ** Significant at 1% level.

2012) for each of the acquiring manufacturing firm in India. The study is carried out with a sample of 39 acquiring manufacturing firms, which had gone in to the M&As process during the financial year 2006–2007, only for the simple reason that the number of M&As was the highest in 2006–2007 in the recent past decade, and also for want of analysing the long-run impact of M&As on OP in the post-merger period.

The results of the overall analysis reveal that the impact of explanatory factors vs. GE, FR, and G on ROE is found to have highly significant positive beta coefficient, while that of the factors viz., L, CU, and OL on ROE is found to have significant negative beta coefficient at 1% level. However, the factor T on ROE does not show any significant impact. The Chow test *F*-value (2.79) > *F*-limit (2.51) at 1% level, which implies that the acquiring manufacturing firms have significant shift-in-structure (improvement positively) in respect of OP in the post-merger period. The status of hypotheses developed and results on operating performance (ROE) of acquiring manufacturing firms in India are shown in tables 9 and 10.

Hence, the study supports the findings of the existing research stud-

TABLE 10 Summary of Results of Regression and Chow Test for Selected Financial Predictor Factors on Operating Performance (ROE) of Acquiring Manufacturing Firms in India for Pre-Merger (2001–2006) and Post-Merger (2007–2012) Periods

Factors	Pre-merger	Post-merger
Gross earnings	**	**
Liquidity	*	**
Financial risk (financial leverage)	*	**
Cost of utilization	NS	**
Turnover	NS	NS
Growth	**	**
Operating leverage	*	**
F-value (regression)	**	**
Chow test	**	**

NOTES ** Significant at 1% level. * Significant at 5% level. NS – not significant. Computed from the regression analysis.

ies (Long and Young 2007; Vanitha and Selvam 2007; Azhagaiah and Sathishkumar 2011; Azhagaiah and Sathishkumar 2012b) that the M&A process has significant (shift) effect on OP of the acquiring manufacturing firms in India after M&A.

Based on the inference, the following suggestions are put forth, which may help policy prescriptions to improve the OP of acquiring manufacturing firms in the post-merger period.

The factor L has a significant negative beta coefficient with ROE, implying that the acquiring manufacturing firms have the capacity to pay their debts as and when they are due after M&A; however the negative L position will enable decrease the profit as well as the shareholders' wealth, hence the acquiring manufacturing firms should concentrate significantly more on to reduce their debt funds to increase the efficiency of the owners' fund say the equity holders.

The factor T did not show any significant impact on ROE. As T is concerned, it is an established fact that sales has a direct relationship with the performance of the firms i. e. higher sales means more production, which is undoubtedly the result of the best possible utilization of physical sources, i. e., material, machine, and active participation of human resource. Therefore, the acquiring manufacturing firms should use their physical sources to the maximum extent as well.

The study is mainly based on secondary data and is restricted to the acquiring manufacturing firms in India comprising food & beverage, machinery, non-metallic mineral product, chemical, textiles, metals & metal product, transport equipment, and miscellaneous categories. The firms, which originally went in for the M&As process during 2006–2007, and subsequently entered in to M&As process with some other firms are ignored in the study for the simple reason that it requires a further attempt to explore the impact of M&As on OP of firms in a series of M&As process over a series of period.

The study consists of OP of the acquiring manufacturing firms in India, leaving scope for further studies with the similar objectives with reference to other sectors like banking and financial and non-financial firms too. The present study has used ROE only as a measure to study the OP of acquiring manufacturing firms in India. Hence, further studies may be conducted using the responding variable, return on assets (ROA), return on sales (ROS), return on profit (ROP) etc. to measure the OP of acquiring firms in the post-merger period.

The present study has studied the impact of M&As on OP of acquiring manufacturing firms in India in the post-merger period. Hence, further studies may be conducted to analyse the impact of M&As on shareholders' wealth (SW) in the post-merger period of acquiring manufacturing firms in India.

The topic consists of OP of the acquiring manufacturing firms in India therefore, there is further scope to do similar research studies, but of course with other variables like *modes of payment, types of mergers, friendly or hostile*, etc. Further studies may also be conducted using data of other countries or to be more representative, cross country merger deals/worldwide merger deals data may as well be considered. Additionally, weekly data, monthly data or quarterly data may also be used against the use of the annual data that has been applied in this paper, especially to explore the longer-term impact of M&As on the operating performance (ROE).

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