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Sunk Cost Bias in Decision Making: Empirical Evidence on Capital Expenditure in Mergers and Acquisitions Deals

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Sunk cost bias, Mergers & Acquisitions, Capital Expenditures

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ABSTRACT

The aim of the study is to examine the sunk cost bias in underperforming mergers and acquisitions (M&A) deals characterized by capital spending in the post-M&A period.

For this study, the deal-specific data of 184 mergers and acquisitions transactions, from SAARC and ASEAN regions, were collected from Bursa Malaysia Library. However, Firm-specific data for acquirer and targets firms were gathered from annual reports and websites of the respective companies. Univariate and multivariate analysis were employed to capture the impact of firm performance on capital expenditures for 3 years period after M&A deals.

Research findings favor the sunk cost bias. The study further finds that underperforming M&As experienced more capital spending in the post-M&A period which implies that management is allocating more resources to failed mergers to prove them worthy.

There are number of studies on the topic based on hypothetical surveys and/or lab experiments. However, this study was conducted on frequently occurring phenomena of mergers and acquisitions. This study is quite unique/original considering the research methodology and generalizability of study findings at strategic level decisions.

INTRODUCTION

Sunk cost refers to time and expenses already invested and become irrecoverable which are not considered for any future course of action (Bazerman & Moore, 2013, p.102). Sunk cost bias is a behavioral tendency to continue the effort and spending after investment already has been made and even if such effort and spending are not feasible to do (Arkes & Blumer, 1985).

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Contrary to rational decisions of marginal cost and benefit analysis, individuals suffer from sunk cost bias and regret avoidance bias. Individuals consider already incurred costs in the decision-making process and continue investment to justify the initial decisions (Teger, 2013). Escalation of commitment arises due to sunk cost and negative feedback from prior decisions (Feldman & Wong, 2018) when managers throw good money after bad money to avoid regret of their initial decisions.

Mergers and Acquisitions (M&As) have an irreversible impact on firms and managers involved in it and they endeavor to prove their decisions in favorable outcomes. In the post-M&As period, managers will expend more to counter the losses that occurred due to merger decisions. Capital expenditures are incurred with the hope to control losses in the post-M&As period. Sunk cost bias does not only stop managers from rational decisions but also leads them to mitigate losses arising from already incurred expenditures. Mergers and acquisitions (M&A) deals are relevant and suitable for research on sunk cost bias in managers. Managers involved in M&As to achieve synergy but may expose to sunk cost bias and the tendency increased due to reputational reasons (Shefrin, 2007). In the context of M&A deals, sunk cost bias likely led managers to increase capital expenditures in the post-M&A period in case of underperforming M&A deals to cover post-M&A losses of acquirer's firms.

The sunk cost bias stems from managers' tendency to deploy resources to unsuccessful course of actions in a manner to validate their past decisions. To examine this, the study is designed to use post-M&A capital expenditures as a sign of sunk cost bias, and post-M&A performance of acquirer's firms is considered a determinant of it. Low performing acquirer firms are likely to experience high post-M&A capital expenditures because managers of underperforming firms are likely to spend more to avoid losses in the post-M&A period.

Evidence of the existence of sunk cost bias are based on the survey conducted in hypothetical situations (Arkes & Blumer, 1985; Arkes & Ayton, 1999; Molden & Hui, 2011) and the second stream is experimental studies to examine sunk cost bias (Phillips et al., 1991; Heath, 1995; Offerman & Potters, 2006; Friedman et al., 2007; Bogdanov et al., 2017; Schulreich et al., 2022; Su et al., 2022) and both streams provide inconsistent results.

The study is unique in its kind to use firm-level data to examine the sunk cost bias in managers of acquirer's firms. The study examined the sunk cost bias proxied through post-M&A capital expenditures after M&A deals incurred in SAARC and ASEAN regions.

LITERATURE REVIEW

Prospect theory is based on loss aversion and assumes that investors asymmetrically value gains and losses. It is part of behavioral economics which suggest that investors put more focus on perceived gains instead of perceived losses (Kahneman & Tversky, 1979). The relationship between loss aversion and sunk cost fallacy was established by Thaler (1980) and elucidated that investor become risk-seeking in the domain of losses is due to escalation of commitment to the initial investment.

Contrary to the rational decision of marginal cost and benefit analysis, individuals suffer from sunk cost bias and regret avoidance bias. Individuals consider already incurred costs in the decision-making process and continue to invest to justify initial decisions (Teger, 2013). Escalation of commitment arises from sunk cost fallacy and negative feedback from prior decisions (Feldman & Wong, 2018). Bazerman & Moore (2013, p.109) stated that the escalation of commitment is generated from regret avoidance bias when managers throw good money after bad money in order to avoid the regret of their initial decisions.

A sunk cost is a cost that has been already incurred and cannot be recovered (Mankiw, 2017). Sweis et al., (2018) find that humans, mice, and rats are subject to sunk cost fallacy under specific situations where parallel decision-making algorithms are working in neural circuits to evaluate different alternatives and such algorithms are exposed to suck cost. The sunk cost fallacy is aroused from the already invested value. Sunk cost fallacy is a robust judgment error in decision-making (Arkes & Blumer, 1985). Regret avoidance and loss aversion are psychological factors behind sunk cost fallacy. In the context of M&As regret avoidance, loss aversion, and sunk cost lead to the escalation of commitment and managers may start throwing good money after bad money.

Staw & Ross (1978) found that the escalation of commitment is more obvious when failure is explained in such a way that it relates to the managers' initial decision rather than attributed to external factors such as economic shift. The disposition effect leads to an escalation of commitment where individuals are reluctant to admit losses because it is tantamount to the loss of self-esteem (Stracca, 2002).

Sunk cost bias is examined in hypothetical created scenarios (Molden & Hui, 2011; Arkes & Ayton, 1999; Arkes & Blumer, 1985) and results are mixed. The alternative reasoning of the experimental method was suggested and criticized the hypothetical scenario for misperceiving

the information by participants in surveys. Responses from participants in a hypothetically created scenario are translated into sunk cost bias may be because of misunderstanding the fact described in the scenario but give a response on their real-life (Friedman et al., 2007). The choices exhibited by those subjects participating in a survey, who are confused with or indifferent toward hypothetical scenario, could be misunderstood as sunk cost bias (Weigel, 2018; Cason & Plott, 2015).

Incentivized laboratory experiments are used for examining sunk cost bias and seminal works on prices of lottery tickets were conducted by Phillips et al. (1991) and found that very few subjects exhibit sunk cost bias. A similar experiment on lottery prices with slight changes was conducted by Heath (1995) and found reverse of sunk cost bias. Friedman et al. (2007) used the computer game of treasure and found very small sunk cost bias. In a laboratory experiment by Hong et al. (2018) sunk cost bias is found to resist in exploiting new opportunities.

But laboratory experiments are underappreciated in management scholarship (Podsakoff & Podsakoff, 2019). Reason behind the lack of appreciation is research designs employed by researchers in management research over the years. Researchers criticize laboratory experiments for lack of realism, and validity in real-world (Colquitt, 2008; Greenberg & Tomlinson, 2016; Taylor et al., 2016).

Research on field data is another alternative to laboratory experiment and some recent studies provide evidence about the existence of sunk cost. Augenblick (2016) and Weigel (2018) conducted studies on people who participated in penny auctions and concluded that the higher the previous bid cost the higher the value of winning the goods. Similarly higher past property taxes (sunk cost) lead to a significant increase in sellers' chosen listing prices (Ratnadiwakara & Yerramilli, 2022). Examine sunk cost bias Ho et al. (2017) found that increase in the fee of government licenses (sunk cost) causes to increase in driving. The current study is based on field data of mergers and acquisitions (M&A) deals in SAARC and ASEAN regions and examined post-M&A capital expenditure relationship with the performance of M&A deals.

Since M&As have an irreversible impact on firms so managers, involved in M&As, endeavor to prove their decisions in favorable outcomes. In the post-M&As period managers may spend more to avoid losses that occurred due to underperforming mergers. So, the post-M&A period might experience high capital expenditure with a hope to prove the M&A deal worthy. In the

context of M&As, managers' sunk cost bias can be examined with the proxy of capital expenditures in the post-M&A period and its role in explaining post-M&A performance.

Based on the literature following hypothesis is postulated:

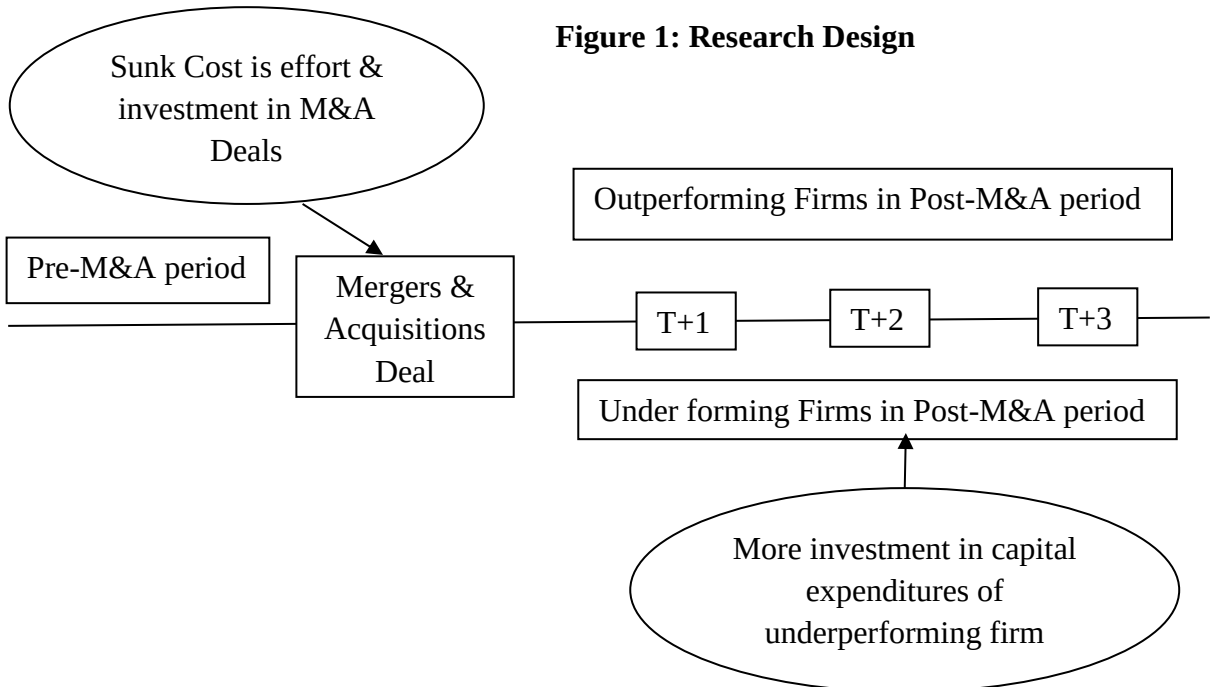
H: Underperforming acquirer firms experience more capital expenditure in post-M&A period as compared to outer performing acquirer firms.

RESEARCH DESIGN

The current study examined sunk cost bias in dealing with losses of underperforming mergers in the post-M&A period. Sunk cost is considered the effort and expenditures incurred on M&A deals and sunk cost bias is measured through growth in capital expenditures for covering losses in the post-M&A period. Sunk cost bias assumes that managers considered already invested effort and cost and ignore future costs and benefits of the transactions. In current study managers' investment in capital expenditures to mitigate the effect of losses in the post-M&A period is considered as an escalation of commitment to the initial decisions of the underperforming deal.

Figure 1 depicts the research design where mergers and acquisition (M&A) deals are shown as a sunk cost (initial decision) and post-M&A capital expenditures (CAPEX) for 3 years are observed in response to the post-M&A performance of acquirer firms. Higher capital expenditures (CAPEX) for underperforming firms is a sign of sunk cost bias because more capital spending implies that management endeavors to prove the M&A deal (initial decision) was a worthy decision.

Figure 1: Research Design



METHODOLOGY

Population of the study

Mergers and acquisition deals completed in SAARC and ASEAN regions and unit of analysis is acquirer's firm. Mergers and acquisitions (M&A) for the study includes deals in which target firms vanished after M&A deals.

Sampling

Probability sampling techniques and purposive sampling techniques were considered two extremes in the context of their use and purpose of research, but it turned into continuum when new typology of mixed-method sampling technique was introduced (Teddlie & Yu, 2007). This study also used multi-level mixed method of sampling (Teddlie & Reynolds, 2000) for selecting the acquirer's firms.

At first level emerging markets were selected from SAARC and ASEAN regions based on MCSI classification. The sample countries fulfill the criteria for emerging economies are India, Pakistan, Malaysia, Thailand, Indonesia, and the Philippines.

At second level a purposive sampling technique is used to select firms involved in M&As. So, selection criteria for sample firms as:

1. M&A deals completed during the period of 2000 to 2017.
2. Financial firms are excluded, and only non-financial firms are included in the sample.
3. Firms level data of the acquirers and targets firms are available for 3 years pre-M&A and 3 years post-M&A deals.
4. Both acquirer firms and target (acquired) firms must be listed on respective stock exchanges of Pakistan, India, Malaysia, Thailand, Indonesia, and the Philippines.

Data Collection

Deals specific data are gathered from Bursa Malaysia library and respective websites of acquirer and target firms. Firm's specific variables such as capital expenditure, operating profit return on assets, operating profit return on equity, free cash flow, acquirer's size, relative size of targets, are computed from annual reports of respective firms.

Gross domestic product (GDP) and ease of doing business (EDB) of sample countries are extracted form World Bank data.

Statistical Techniques

Univariate analysis

In univariate analysis, acquirer's firms are categorized into two groups (underperforming & overperforming) based on post-M&A performance. To test the hypothesis, mean difference of capital expenditure is compared for the underperforming and overperforming acquirer firms.

Regression Analysis

Univariate analysis reveals the existence of phenomena but unable to explain causes of changes or factors that affect the phenomena. To overcome the shortcoming, multivariate analysis is used to examine the impact of post-M&A performance, acquirer's size, relative target size, method of payment on post-M&A capital expenditures.

Below linear equation is used to estimate relationship that is based on the principle of least squares;

$$\textbf{(Capex)}_{i,\ post\ t} = \alpha + \beta_1\textbf{(Fin Performance)}_{i,\ post\ t} + \beta_2\ \textbf{(FCF)}_{i,\ post\ t} + \beta_3\ \textbf{(Firm Size)}_{i,\ post\ t} + \beta_4\ \textbf{(Stock|Cash|)}_{dummy} + \beta_5\textbf{(Rel.Target Size)}_{i,\ pre\ t} + \beta_6\textbf{(GDP)}_{j,\ post\ t} + \beta_7\textbf{(Ease of Biz)}_{j,\ post\ t} + \epsilon_{it}$$

Where i denote i^{th} firm, t denotes year of observation in range (-3, 3) and j denote respective country.

Measurement of Variables

Dependent variable in the study is sunk cost proxied through growth in capital expenditure in post-M&A period and Table 1 shows the measurement of variables.

Table 1: Measurement of Variables

Variable	Type	Proxy
Sunk Cost Bias	Dependent	Growth in capital expenditure -1 to +3 years of M&A deal
Firm financial performance	Independent	Operating profit Return on Assets (EBITRoA), Operating profit Return on Equity (EBITRoE)
Free Cash Flow	Control	Free Cash flow (FCF) as percentage (%) of sales
Size of Acquirer firms	Control	Natural Log of Assets
Method (stock vs Cash) of Payment	Control	Stock payment =0 and Cash payment =1 (To target shareholders)
Relative size of target	Control	Percentage of assets of target to the asset of acquirer
GDP	Control	Natural log of GDP of each country or growth in GDP
Ease of Doing Business	Control	Score of each country as reported by World Bank

ANALYSIS AND DISCUSSION

Descriptive Statistics

Average growth of capital expenditure in sample firms is 15.47% during post-M&A period of +3 years as shown in Table 2. Acquirer's firm's size increase as a result of mergers and acquisitions as revealed from increase in means of natural log of total asset of acquirers. Relative size of the target firms is 25% of the acquirer's size. Mean and standard deviation of operating profit return on asset (ROA) decrease as a result of M&A which reveals that performance in post-M&A decreases along with decrease in risk. Similarly, mean and standard of operating profit return on equity (ROE) in post-M&A period is 0.1597 and 0.1212 respectively and both (mean & SD) decreased from 0.1988 and 0.1433 of pre-M&A period. This indicate that profitability and related risk decreased due mergers and acquisition deals.

Table 2: Descriptive Statistics

Variables	Obs.	Mean	SD	Min	Max
Capital Expenditure after M&A (Capex-pre)	552	0.1547	0.2267	-0.0593	0.6757
Free Cash Flow before M&A (FCF-pre)	552	0.0301	0.1174	-0.1719	0.2227
Free Cash Flow after M&A (FCF-post)	552	0.0375	0.1032	-0.1435	0.2061
Acquirer's Firm size before M&A	552	10.6562	3.1508	6.7090	15.7742
Acquirer's Firm size after M&A	552	11.5054	3.1242	7.7097	16.5518
Operating profit returns on Assets (RoA-pre)	552	0.1056	0.0744	0.0055	0.2471
Operating profit returns on Assets (RoA-post)	552	0.0813	0.0605	-0.0058	0.1938
Operating profit returns on Equity (RoE-pre)	552	0.1988	0.1433	0.0141	0.4619
Operating profit returns on Equity (RoE-post)	552	0.1597	0.1212	0.0007	0.3790
Target firm relative size	552	0.2556	0.1849	0.0036	0.5819

Univariate Analysis

Univariate analysis involves analyzing a single variable on basis of categories or groups such as in the current study compare the mean difference of capital expenditures incurred in post-M&A period by the acquirer firms based on outperformers and under performers.

The two groups are made on the basis financial performance of sample firms and those firms having financial performance above mean are term as outperformers and firms having financial performance below the mean are under performers.

Capital expenditures growth is higher for outperforming firms (above average of EBITROA) as compared to underperforming firms (below average of EBITROA) as shown in Table 2 but the mean difference is statistically insignificant. Similarly, outperforming firms (above average of

EBITROE) experienced high expenditure as compared to underperforming firms (below average of EBITROE) as shown in panel B of Table 2 and result is statistically significant at 5 % level.

Table 3: Outperforming vs Underperforming firms and Post-M&A Capital Expenditures

Panel A: Operating Profit Return on Assets (EBITROA)	**Outperforming Firms**	**Underperforming Firms**	**Mean Difference**	**P-Value**
Capital Expenditures growth year -1 to +3	0.1562	0.1534	-0.0028	0.4427
Panel B: Operating Profit Return on Equity (EBITROE)	**Outperforming Firms**	**Underperforming Firms**	**Mean Difference**	**P-Value**
Capital Expenditures growth year -1 to +3	0.1805	0.1353	-0.0452**	0.0101

This table reports that results of the univariate analysis for 184 Mergers & Acquisitions deals from SAARC and ASEAN regions, where firms are categorize based on performance in post-M&A period. Mean difference of capital expenditures (Capex) of acquirer firms are estimated for two groups (outer/underperforming). Mean difference estimates are reported and symbols ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

Univariate analysis does not provide evidence of sunk cost bias as post-M&A expenditures growth do not have any relations with underperformance of post-acquisition period. However, univariate is unable to provide causal relationship of other variable such as free cash flow, performance and firm's size with capital expenditures and the deficiency is fulfilled by multivariate (regression) analysis.

Regression Analysis

Model Diagnostics

Model diagnostics shows that there is no multicollinearity as mean variance inflation factor VIF is 1.45 which less than threshold value of 10 and conditional number is 33.9951 which is less than the lower bound of the range for moderate multicollinearity (100 < conditional number<1000).

Breusch Pagan Test and White general test confirmed heteroscedasticity as p-values for both the test are less than 0.05 and the estimated model is robust for heteroscedasticity.

Analysis

Return on asset (ROA) has negative impact on growth rate of capital expenditures of acquirers in post-M&A performance. One unit increase in financial performance (RoA) causes to 0.5882 unit decrease in capital expenditures and result is statistically significant at 5% level as shown in Table 3. The results of the current study are inconsistent with earlier researchers who documented positive impact of corporate earnings on capital expenditures (Dalbor & Jiang, 2013; Jiang et al., 2006).

Results of the current study support the hypothesis and confirm the existence of sunk cost bias in post-M&A period. Underperforming acquirers attract higher amount investment in capital expenditures reveals that management throwing good money after bad money.

Free cash flow is cash basis financial performance of the firms and results of the study reveal that capital expenditures is negatively affected by acquirer's free cash flow. One unit increase in free cash flow causes to decrease 0.4210 unit in capital expenditures and the relationship is statistically significant at 1% level as shown in Table 3.

Results of the current study is against pecking order hypothesis which assumes that free cash flow (internal fund) is consumed on top priority to fulfill the investment need of firms.

Results are also inconsistent with findings of earlier researchers who reported positive impact of free cash flow on capital expenditures (Ali et al., 2018; Dalbor & Jiang, 2013; Richardson, 2006).

Findings of the study provide evidence on presence of sunk cost bias as the results of the study show that acquirers unable to generate enough operating cash flow are involved in capital expenditures after M&A deals to prove the deal worthy.

Similarly, post-M&A free cash flow (FCF_{post}) negatively influenced post-M&A capital expenditures growth for India, Pakistan and Malaysia and results are statistically significant at 5% level, but the impact is positive for Indonesia and result is statically significant at 10% level.

Firm's size of acquirers positively influenced post-M&A capital expenditures growth and the relationship is statistically significant at 5% level. Large firms need more to invest in capital assets as compare to small firms (Kadapakkam et al., 1998). Results of the study are consistent with earlier studies which repot that large firms are observed to invest more in capital spendings (Haller & Murphy, 2011; Dalbor & Jiang, 2013).

Table 4: Regression Analysis estimates for Capital Expenditure and Post-M&A performance for 184 Mergers & Acquisitions deals in SAARC & AEASN

Variables	Overall (Capex)	India (Capex)	Pakistan (Capex)	Malaysia (Capex)	Indonesia (Capex)	Thailand (Capex)	Philippines (Capex)
Intercept	0.1072	1.0142**	0.6445	-1.4580	-0.5621	-0.2731	3.9487
Post M&A EBIT RoA (Lag-1)	-0.5882**	-0.5327	0.7669	-2.3440**	-0.4373	-0.1720	-2.1099
Post M&A EBIT RoE (Lag-1)	0.3752	0.2485	0.4954	1.8428	0.0945	-0.9427	-0.2522
Post M&A Free Cash flow	-0.4210***	-1.0850**	-2.0252***	-0.7139**	0.3598*	0.5113	-0.3140
Post M&A Size of Acquirers	0.01188***	0.01531	0.0017	-0.0004	0.0073	0.0208	-0.0029
Stock Vs cash	-0.0256	-0.0648	NA	-0.0899	-0.0946	-0.1182	0.1723
Relative Target size	0.0223	0.2949	-0.2805	0.14306	0.0619	-0.1750	0.1013
GDP_{post}	0.5619	-7.0776*	-1.9698	0.8770	9.2224	0.6577	0.1101
Easy of Doing Business $(EDB)_{post}$	-0.2252	-0.8334	-0.8981	1.9698	0.2396	0.3342	-6.2009
Adjusted R-squared	0.0739	0.2219	.22187	0.2607	0.0853	0.0829	0.3844
Prob > F-Satatistics	0.0002	0.0000	0.0000	0.0014	0.2139	0.2310	0.0202
No of Observation	289	169	42	64	40	38	28
Conditional Number	33.9951	45.2653	37.2059	148.0767	49.8542	114.2413	529.9746
Variance Inflation Factor (VIF)	1.45	1.42	1.61	1.54	1.39	3.11	2.20
Breusch Pagan Test (p-value)	0.0001	0.0000	0.7187	0.0006	0.3072	0.0000	0.5520
White General Test p-value)	0.0000	0.0002	0.8343	0.2552	0.4256	0.4236	0.4110

This table reports that results of the panel regression where independent variable is post-M&A capital expenditures of acquirers (Capex) and dependent variables are return on assets (RoA), return on equity (ROE) and free cash Flow (FCF). Control variables are acquirer's size, method of payment for acquisitions, relative target size, gross domestic product (GDP) and ease of doing business (EDB). Mean coefficient estimates are reported and symbols ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

However, the impact of cash versus stock acquisition on post-M&A capital expenditures growth is statistically not significant. Similarly relative size of the target firms positively influenced post-M&A capital expenditures growth, but the results are statistically insignificant.

The causal relationship of GDP and Ease of Doing Business (EDB) with post-M&A capital expenditure growth is statistically insignificant.

CONCLUSIONS

This study investigates the impact of sunk cost on spending in capital expenditure in the post-M&A period of acquirer firms. The research design for the study characterized the capital spending for underperforming M&A deals in the post-M&A period as sunk cost bias and effort and investment in M&A deals are described as a sunk cost. The study takes the model to -1 to +3 years of data of 184 mergers and acquisitions from SAARC and ASEAN regions. Through pooled regression estimates, the findings of the study show compelling evidence of sunk cost. Management of the underperforming acquirer firms incurred large capital expenditures to prove the worthy and mitigate the losses of value-destroying mergers. Based on results it is concluded that underperforming firms experience higher capital expenditure in the post-M&A period. Post-M&A performance negatively affects post-M&A capital expenditure growth which reveals that managers allocate more resources in case of post-M&A losses. The study confirms evidence of sunk cost bias in managers to deal with post-M&A performance.

Policy Implication:

The study investigated sunk cost bias of managers which affect managerial decisions in post-M&A period of 3 years. Behavioral issue stem from subconscious where managers honestly endeavor to increase the wealth of shareholders yet make irrational decision. Contrary to agency related issues, behavioral bias may not be curb through corporate governance mechanism. So, findings of the study are helpful for managers to identify the bias affecting their decision and it is also helpful for them to avoid “throwing good money after bad money”. Findings of the study are helpful for shareholders to enquire about capital expenditure after M&A deals in annual general meeting. The study is helpful in enhancing discernment of board members about sunk cost and its irrelevancy in future managerial decision making.

Limitations and Future Research Directions

Limitations of the study are time horizon, the value of deals, and board diversification. Current study used data for 3 years of post-M&A deal and extension of the time span to 5 years after

M&A deal will provide insights on overcoming the sunk cost bias over time. Inclusion of M&A deals value (amount of sunk cost) will provide insights into the sensitivity of sunk cost bias to the cost of initial investment decision. The collective wisdom of board may reduce the sunk cost bias and inclusion of board diversification will give interesting results on debias of this heuristic.

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