Moderating Influence of Efficiency on Variables of Hospital Financial Performance : Evidence from Indian Multi - Specialty Private Sector Hospitals

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Abstract

Globally, studies that situate financial and non-financial indicators as antecedents to hospital financial performance are a widely-researched domain. Similarly, studies that have investigated hospital efficiency using multiple operational inputs and outputs abound. In this study, however, there was an attempt to explore the intervening effects of hospital efficiency on the nature and magnitude of the relationship between financial & non-financial ratios and cash-flow from operations *(CFFO*) as a hospital financial performance indicator in India. In view of the afore-mentioned purpose, this study used multivariate panel-data regression technique on the data gathered from 28 standalone multi-specialty private sector hospitals in India for the time period between the years 2012-2013 to 2014-2015.Predictor variables were selected logically based on prior research findings and regressed against *CFFO* using a fixed effect model with hospital efficiency condition acting as a moderator. Relative hospital efficiencies were calculated using data-envelopment analysis (DEA) technique. The relative efficiency scores were then converted to binary moderator values. The findings from this study indicated towards a direct positive and significant relation between predictor variables, in particular, debt-equity ratio *(DER)*, capital-employed turnover *(CET)*, net-revenue per patient *(NRP)*, and occupancy rate *(OR)* with *CFFO*. Further, this study also found a negative and significant relationship between patient's average length of stay *(ALOS)* and *CFFO*. Furthermore, this study also found that hospital efficiency conditions significantly moderated the relationship between the above mentioned variables in their expected direction of relationship. This study also offered insights into the nature, significance, and managerial implications that emerged from the empirical findings of this study. Hospitals are viewed upon as an important link in the healthcare system that efficiently deliver services to the general public at large in India. Any better understanding of ways to sustain the financial health of such indispensable entities is of high-priority.

Key words : **hospital performance, efficiency, financial ratios, non-financial ratios, healthcare, private hospitals**

JEL Classification : C33, C58, C51, C52, I11

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Studies on the financial performance of hospitals, in the past, concentrated on the indicators of financial performance, that is, liquidity ratios, capital structure ratios, activity ratios, and profitability ratios (Bhat, 2006 ; Zeller, Stanko, & Cleverly, 1996). Experts, however, argue that though these financial indicators would, no doubt, offer valuable insights on the financial perspective of hospitals' performance, they do not provide the holistic view of hospitals' performance. This is because the performance of a hospital is also influenced by operational indicators of hospitals' performance, for example, number of beds, occupancy rate, and

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average length of patients' stay (Das, 2009 ; Watkins, 2000). It may be noted, in this connection, that these operational indicators are non-financial in nature. Therefore, studying the impact of financial indicators in conjunction with these operational indicators of hospitals' performance will provide a holistic perspective of how they influence together the hospitals' performance.

Further, though the financial and operational indicators are categories of characteristics of hospitals' performance, it is necessary to situate them against an appropriate benchmark of hospitals' performance. In this connection, there are three reasons to consider cash flow from operations as the consequent variable of these probable antecedents. First, cash flow from operations can be used to apply the time value of money by discounting them with an appropriate discount rate to calculate their present values. Second, the sufficiency or otherwise of the cash flows generated can be measured against an appropriate expected rate of return. Third, the magnitude of return can be measured through cash flows more appropriately than by using accounting profits (Fridson & Alvarez, 2011; Penman, 2014). Adopting cash flow from operations as the benchmark of firm performance enables us to get beyond three limitations of accrual accounting, that is, not considering a time value of money, not using an appropriate discount rate as a measure of risk, and not measuring the magnitude of cash flows to be earned to create value (ibid). Therefore, it becomes necessary to study the influence of financial and non-financial indicators on cash flow from operations so as to use it as a measure of hospitals' performance.

Furthermore, hospitals provide us a unique case of context, which needs to be explored further to understand the boundary conditions in the relationship between financial and non-financial indicators on hospitals' cash flow operations. In case of hospitals, the perceived efficacy of its intellectual capital consisting of doctors, medical, and non-medical staff, the perceived service quality of the hospital, and the degree of efficiency with which the number of efficient doctors and the number of beds can produce the number of patients and the number of surgeries will determine the degree of its performance (Kirigia & Asbu, 2013; Mogha, Yadav & Singh, 2015), which may be expressed in terms of cash flow from operations. This is because the constituents of activity ratios, leverage ratios, and the liquidity ratios depend upon the hospital efficiency defined as the ratio of the weighted sum of hospital outputs to weighted sum of hospital inputs (Charnes, Cooper, & Rhodes, 1978).

Unless one considers the moderating effect of hospital efficiency, the relationship between financial, non-financial indicators, and cash flow from operations may be nothing short of a spurious relationship. In this connection, an overview of the past literature in the area of hospital performance suggests that no study in the past, in India, has attempted to examine hospital performance by adopting both financial and non-financial indicators. Second, no study in the past has attempted to situate financial and non-financial indicators as antecedents of hospital performance indicators like cash flow from operations. At best, past studies, in a predominantly Western context, have considered the role of both financial and operational indicators in measuring the creditworthiness of hospitals (Watkins, 2000). Lastly, in the Indian context, though there are a few studies (Dash, Vaishnavi, & Muraleedharan, 2008, 2010 ; Mogha, Yadav, & Singh, 2012 ; Mogha et al., 2015) that measured hospital efficiency, but there are no studies that have considered the interactive effects of hospital efficiency, by situating it as a moderator, in the relationship between financial and non-financial indicators and cash flow from operations.

Therefore, this paper attempts to fill the above-mentioned gaps by examining the relationship between financial and non-financial and hospital performance dimensions in terms of cash flow from operations in Indian multi-specialty private sector hospitals and by measuring the moderation effect of hospital efficiency in the relationship between financial and non-financial indicators and cash flow from operations. It is important to fill this gap in the Indian context because empirical evidence that would emerge out of this study would offer valuable insights on the appropriate mix of financial and non-financial ratios that would lead to desirable levels of cash flow from operations under the conditions of high efficiency in hospitals.

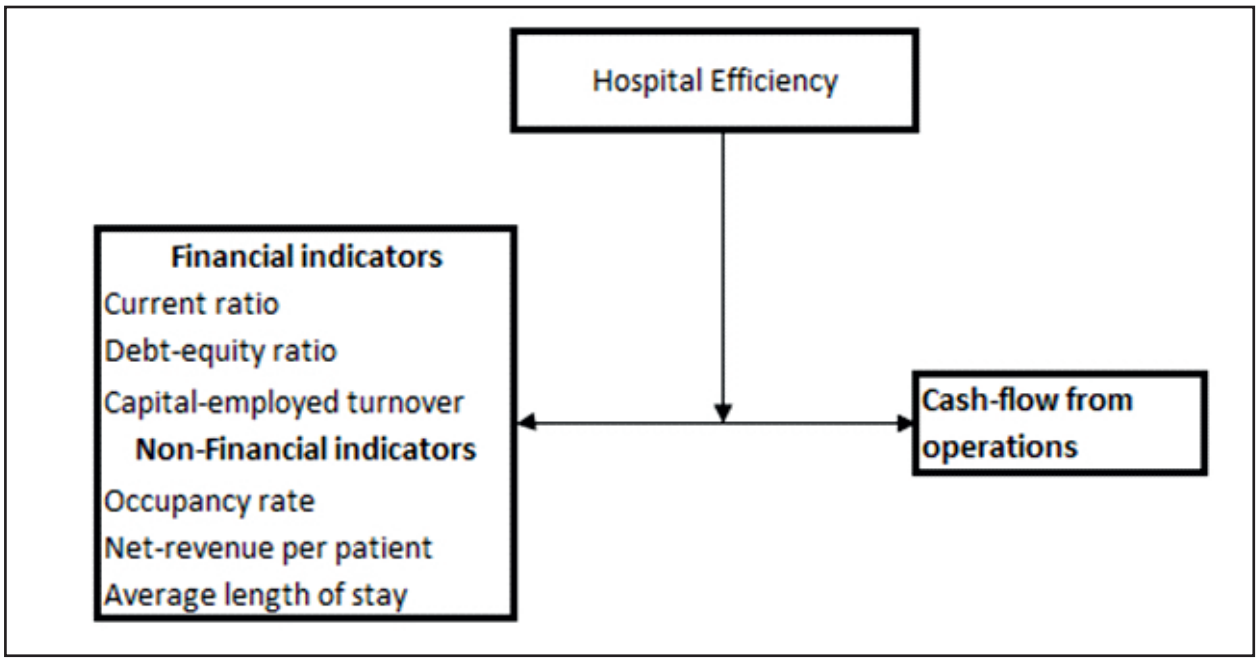
Theoretical Background and Hypotheses Development

A firm's value is measured in terms of present value of its free cash flows. The concept of present value of free cash flows takes into consideration the process of discounting the future expected free cash flows by the weighted average cost of capital of the firm. The concept of weighted average cost of capital represents the minimum expected rate of return on firm's investments. This implies that only if there are residual earnings in the future, which result from higher returns on net operating assets of a firm than the expected returns on them, it will result in positive present value of free cash flows. Therefore, all trading and transaction multiples should favor the generation of residual earnings (Michalski, 2010). However, accounting earnings are alone not considered in assessing value creation of a firm as earnings aren't important per se due to the fact that they are the result of the application of accrual principle and, therefore, they do not necessarily represent incremental cash flows. Therefore, analysis of value creation in firms should necessarily consider the time value of money, risk of cash flows, and magnitude of cash flows generated. Therefore, for an analyst, cash flows are important as he or she proceeds to evaluate the worth of a firm by gauzing the time value, risk, and sufficiency or otherwise of the magnitude of cash flows generated by the firm. Among the three types of cash flows, that is, cash flows from operations *(CFFO)*, cash flows from investing activities *(CFFIA)*, and cash flows from financing activities *(CFFFA)*, the financial health of a firm can be captured by analyzing the cash flow from operations. Therefore, analyzing the impact of a hospital's business operations on its cash flow from operations assumes crucial importance.

The extent to which trading and transaction multiples were favorable for the firm's creation of value is measured by capturing the past figures of liquidity ratios, activity ratios, leverage ratios, and profitability ratios. Among liquidity ratios, current ratio *(CR)* is important for the generation of cash flow from operations. This is because this ratio indicates what a hospital is due to receive, especially from health insurance companies, and the ability of a hospital to carry out its operations with the cash available on hand. This would thus contribute to additional *CFFO*. Among activity ratios, the ratios such as occupancy rate *(OR)* and average length of stay *(ALOS)* are important in their contribution to *CFFO*. Occupancy rate contributes to facilitating an increase in net revenue per patient and optimal utilization of existing resources. Average length of a patient's stay in a hospital is hypothesized to be beneficial only in the initial threshold period of patient stay as it is during this period that the contribution that results from medical interventions exceeds the fixed costs related to those medical interventions. Among profitability ratios, net revenue per patient *(NRP)* is expected to contribute significantly to *CFFO*. Among leverage ratios, the ratios such as debt-equity ratio *(DER)* and capital-employed turnover ratio *(CET)* contribute significantly to the generation of *CFFO*. This is because an increase in these ratios indicates the expansion of 'physical facilities' and related long term investments that are necessary to meet the increasing number of patients, facilitate prompt delivery of service, improve service quality, reduce patients' waiting time, enable technical efficiency, and achieve technological progress.

Funds raised by raising debt should be adequately employed to facilitate these outcomes in addition to hire the required 'intellectual capital' that is crucial to enable an increase in hospital efficiency. The effect of the above-discussed ratios on *CFFO* cannot be discussed in isolation. Hospital efficiency, which is defined as the interactive effect of 'inputs' consisting of a number of doctors, number of supporting staff, and the number of beds and the 'outputs' consisting of the total number of in-patients, total number of out-patients, and the number of major surgeries carried out in the hospital moderate the expected effects of the above-mentioned activity, profitability, leverage, and liquidity ratios. Accordingly, the role of *CFFO* in creating value for hospitals and the role played by the above-discussed ratios, and the moderating role of hospital efficiency are captured in the following conceptual framework (refer to Figure 1) :

Figure 1. Conceptual Framework



(1) Relationship Between *CR* and *CFFO* : Current assets in the hospitals constitute cash, cash equivalents, receivables, and inventory. Current liabilities constitute mainly sundry creditors, loans and advances, provisions, and bank overdraft (Kulkarni, Satyashankar, & Gomes, 2009). In the hospitals studied, receivables represent mainly the dues from health insurance companies. Also, it is to be noted, in this connection, that hospitals are likely to raise bank overdraft when their operations increase to meet their immediate cash needs. Accordingly, it can be anticipated that the increase in both current assets and current liabilities indicate increasing service operations of hospitals. Further, current assets and current liabilities are expected to mature in a short duration of time and, therefore, the increase in current ratio is expected to increase the cash flow from operations. Therefore, the following hypothesis is framed :

↳ **H1:** Increase in *CR* is positively related to increase in *CFFO*.

(2) Relationship Between *DER* and *CFFO* : Firms in general, and hospitals, in particular, can increase their debt component to support the increase in operations (Brealey, Myers, Allen, & Mohanty, 2014). Increased long-term debt would be generally invested by hospitals in fixed assets in order to support their increased operations. Increased investment in fixed assets is expected to increase the capacity of hospitals to meet the increasing requirements of increasing number of patients. Therefore, the resulting expansion of facilities that are enabled by increased long-term investments would naturally increase perceived service quality and reduction in waiting time of patients. Further, the investment in fixed assets that are required to increase hospital operations so as to increase the number of patients can also be facilitated by an increased debt-equity ratio. Therefore, the number of inflow of patients and the consequent revenue per patient are also expected to grow. Accordingly, the following hypothesis is framed :

↳ **H2 :** Increase in *DER* is positively related to increase in *CFFO*.

(3) Relationship Between *CET* and *CFFO* : The strength of a firm can be gauged by analyzing the extent to which the amount invested is giving rise to actual rates of return. However, the actual rate of return can be analyzed only in conjunction with the expected rate of return. Ideally speaking, it is only the residual earnings that result from the positive difference between actual rate of return and the expected rate of return that will add its value. As the 'accounting earnings' are the results of accrual accounting, the residual earnings will have meaning only if it is accompanied by an increase in cash flows too. The return on operating assets is represented by *CFFO* ; whereas, the return from non-operating assets is represented by cash flows from investing and financing activities (Penman & Zhang, 2017). Therefore, for all practical purposes, the degree of efficacy of increasing amounts of capital employed in its ability to add value can be gauzed by analyzing its impact on cash flow from operations. Keeping other things constant, a given increase in CET ratio indicates the increase in hospital revenue for every rupee contributed by capital employed. Increase in sales/revenue per patient will increase *CFFO* too. Therefore, the following hypothesis is framed :

↳ **H3 :** Increase in CET ratio is positively related to increase in *CFFO*.

(4) Relationship Between *OR* and *CFFO* : The higher the *OR* in hospitals, the greater would be the revenue per patient. This implies that the possibility of residual earnings will increase resulting from the corresponding increase in CET ratio and *NRP*. Further, the increase in *OR* implies the increase in the number of in-patients as also the possible increase in the number of surgeries and other high revenue-yielding medical services. A lower *OR* is usually associated with poor hospital performance (Liu, Jervis, Younis, & Forgione, 2011). Accordingly, the following hypothesis is framed :

↳ **H4 :** Occupancy rate is positively associated with *CFFO*.

(5) Relationship Between *NRP* and *CFFO* : Increase in *NRP* will increase earnings of hospitals before deducting interest and taxes that they pay on their long-term debt and on their income. As depreciation is further added back to earnings before interest and taxes, the net increase in *CFFO* from operations will be more than the proportionate increase in net revenue per patient. Therefore, increased patient inflow and the increased occupancy rate will lead to increased net revenue per patient and the consequent increase in cash flow from operations (Singh & Wheeler, 2012). Therefore, the following hypothesis is framed :

↳ **H5 :** Net revenue per patient is positively associated with *CFFO*.

(6) Relationship Between *ALOS* and *CFFO* : The interaction among fixed cost, variable cost, and contribution that results as a consequence of increased length of stay of patients presents an interesting array of effects. In the initial few days of patients' stay, hospitals earn maximum revenue because of surgeries that they undertake and the high-cost/high revenue-yielding medical interventions. Therefore, the contribution (revenue - variable cost) that results will cover the fixed cost involved in patients' stay of those days. However, if patients continue to remain in the hospital beyond the above-mentioned high-contribution period, the costs outweigh the contribution that results from continued patient stay. Especially, the fixed costs involved in meting out treatment to overstaying patients will be more than the contribution that their continued stay generates (Kalhor, Salehi, Keshavarz, Bastani, & Orojloo, 2014). Therefore, the following hypothesis is framed:

↳ **H6 :** There is negative relationship between *ALOS* of patients and *CFFO*.

(7) Moderating Effect of Hospital Efficiency in the Relationship Between *CR* and *CFFO* : The expected positive association between *CR* and *CFFO* of hospitals is likely to be moderated by hospital efficiency. The construct of hospital efficiency is the interactive effect of inputs in hospital operations, that is, the number of doctors that a hospital has, number of other medical staff that it has on its rolls, number of beds with which it operates, and the outputs of hospital operations that are defined in terms of total number of in-patients, total number of out-patients, and the number of major surgeries that are carried out in the hospital. If the 'inputs' of hospital operations increase, they are likely to increase the 'outputs' mentioned above. Further, it is only the increase in 'outputs' of hospital operations, that is, the number of in-patients, number of out-patients, and the number of surgeries that happen relative to the cost incurred on 'inputs' that will decide whether there will be increase in 'receivables' in hospitals that come into being in the form of unrealized/not encashed health insurance claims, though duly accrued (Michalski, 2012). Therefore, the hypothesized direct effect of increase in *CR* on *CFFO* is moderated by the degree of hospital efficiency with which a hospital is operating. Therefore, the following hypothesis is framed :

↳ **H7 :** The hospital efficiency will moderate the positive relationship between *CR* and *CFFO* such that the relationship will be stronger in efficient hospitals than in inefficient hospitals.

(8) Moderating Effect of Hospital Efficiency in the Relationship Between *DER* and *CFFO* : Increased debt content will lead to increased *CFFO* provided the following conditions are satisfied. First, increased debt may be used by hospitals to expand the fixed assets that are required to increase the number of patients and the probable consequent accompanying effect of increased number of surgeries. Despite this additional investment spending, it may not lead to increased *CFFO* unless hospitals are able to attract capable and highly qualified doctors and an efficient team of supporting staff who can inspire confidence and trust in their capability regarding delivery of a high degree of service quality. This can be further extended to argue that patients who have a high or moderate degree of financial affordability will be ready to be treated and operated, especially in case of highly critical surgeries, by a competent team of doctors and supporting staff. This becomes possible if hospitals are ready to invest in the 'intellectual capital' of doctors and other critical medical staff. Therefore, investment in 'inputs' can significantly increase the 'outputs' of hospital efficiency, which will increase the cash flow from operations. Therefore, the direct relationship between *DER* and *CFFO* is moderated by hospital efficiency (Chen, Hwang, & Shao, 2005). Accordingly, the following hypothesis is framed :

↳ **H8:** Hospital efficiency will moderate the relationship between *DER* and *CFFO* such that the relationship will be stronger in efficient hospitals than in inefficient hospitals.

(9) Moderating Effect of Hospital Efficiency in the Relationship Between *CET* and *CFFO* : Increase in capital employed should lead to several favorable outcomes. Prior research on service operations in the healthcare sector has argued that one of the key indicators of patient satisfaction and service quality in hospitals is the reduction in waiting time of patients (Prakash, 2010). This becomes possible provided the 'fixed facilities' created through investment in fixed assets will enable reduction in waiting time and prompt delivery of service. Increased amount of capital employed will lead to expansion of long-term investments to increase service quality. Further, this enables increase in the number of patients consequent upon increased service quality and reduced waiting time. Therefore, revenue per patient will also increase. However, the increase in revenues from hospital operations can increase, provided the increased revenues are not necessarily the result of expansion of physical facilities. This is because the increased number of patients may not lead to sustained level of patient satisfaction if the increased quality of physical facilities is not accompanied by the patient satisfaction that results from the service delivered by highly qualified and competent doctors and nursing staff. In this connection, the hospital should possess the

support of intellectual capital of those doctors who inspire confidence in their patients regarding their ability to handle complicated surgeries. Therefore, the investment in attracting and recruiting highly qualified doctors and support staff will enable an increase in the number of critical surgeries handled in the hospital (Hicks, 2014). This will enable an increase in not only the revenue per patient, but also the cash flow from operations. Therefore, the following hypothesis is framed :

↳ **H9:** Hospital efficiency will moderate the relationship between *CET* ratio and *CFFO* relationship such that the relationship will be stronger in efficient hospitals than in inefficient hospitals.

(10) Moderating Effect of Hospital Efficiency in the Relationship Between *NRP* and *CFFO* : Revenue per patient increases cash flow from operations only if the 'outputs' of hospital efficiency, that is, the number of patients and number of major surgeries increase. However, this becomes possible only in the presence of those doctors and supporting staff whose eminence and efficiency are beyond doubt. Therefore, the relationship between *NRP* and *CFFO* will have to be explained by the extent to which it is conditioned by the degree of hospital efficiency (Kaufman, 2013). Therefore, the following hypothesis is proposed :

↳ **H10 :** Hospital efficiency will moderate the relationship between *NRP* and *CFFO* such that the relationship will be stronger in efficient hospitals than in inefficient hospitals.

(11) Moderating Effect of Hospital Efficiency in the Relationship Between *OR* and *CFFO* : Occupancy rate increases revenue from hospital's service operations as also the revenue per patient. However, this is the result of increased numbers of in-patients and out-patients as also the number of major surgeries conducted in the hospital. These 'outputs' of hospital efficiency are facilitated by 'inputs' of hospital efficiency, that is, the number of efficient and reputed doctors, supporting staff, and the number of beds that can handle the increased patient inflow. Therefore, the positive association between *OR* and *CFFO* does not happen in isolation as this relationship is conditioned by the degree of hospital efficiency present in hospitals (Vélez-González, Pradhan, & Weech-Maldonado, 2011). Therefore, the following hypothesis is framed :

↳ **H11:** Hospital efficiency will moderate the relationship between *OR* and *CFFO* such that the relationship will be stronger in efficient hospitals than in inefficient hospitals.

(12) Moderating Effect of *ALOS* and *CFFO* : The direct relationship between *ALOS* of in-patients in a hospital and the *CFFO* is expected to be negative. This implies that the longer the duration of stay, the lesser would be the resulting *CFFO*. This is because a hospital would not gain incremental revenue over incremental costs if patients stay as in-patients beyond a threshold period. This threshold period of stay is that period during which the hospital would have gained major portion of its revenues resulting from critical treatment procedures administered on patients as, for example, major surgeries. If patients continue to stay in the hospital beyond this threshold period, incremental costs would outweigh incremental revenues as there would be no need to carry out high revenue-yielding surgeries and other medical interventions. However, if 'outputs' of hospital efficiency, that is, number of patients and number of surgeries can increase because of relatively lesser number of doctors, support staff, and beds, then it is indicative of the negative relationship between average length of stay and cash flow from operations which is conditioned by the degree of hospital efficiency. This implies that optimal utilization of doctors, support staff, and beds can lead to shorter patient's *ALOS* and subsequently higher *CFFO* (Karagiannis, 2015). Therefore, the following hypothesis is proposed:

↳ **H12 :** Hospital efficiency will moderate the relationship between *ALOS* and *CFFO* such that the relationship will be stronger in efficient hospitals than in inefficient hospitals.

Methods, Procedures, and Analysis

(1) Sampling Method and Sample Characteristics : In the first stage, we decided upon the criteria for selecting relevant hospitals for this study. The decision was based on the aspects such as the geographic location of the hospitals, type and nature of hospitals, and the number of beds. This study considered only those hospitals that were situated in urban areas of the country. Further, this study considered only standalone multi-specialty private sector hospitals with bed capacity of 100 to 250 beds. This implied that single specialty and corporate chain of hospitals were not considered for this study. Further, this study adopted a non-probability sampling technique. In-fact, 87 hospitals were approached for the survey between February - October 2016 to gather data on the variables of interest for three years (i.e. 2012-2013 to 2014-2015). Of all the hospitals approached, 28 hospitals agreed to participate in the survey on strict conditions of anonymity and confidentiality.

(2) Input and Output Variables : Drawing from the past empirical research on indicators of hospital performance (Watkins, 2000), financial indicators considered for this study include current ratio *(CR)*, debt-equity ratio *(DER)*, and capital-employed turnover *(CET)*. On the other hand, non-financial indicators of hospital performance include average length of patient stay *(ALOS)*, occupancy rate *(OR)*, and net revenue from patient *(NRP)*. For this study, *DER* is defined as the proportion of long term debt to equity of the hospital. Further, *CET* is considered as the ratio of hospital's total revenue to total capital employed (i.e. both debt and equity). With regard to non-financial indicators, *NRP* is defined as the ratio of difference between total revenue and total expenses against the total number of patients. Further, *OR* rate is defined as the ratio of total occupied beds against total available beds. Furthermore, *ALOS* is the ratio of yearly total inpatient days against the total number of discharges during the year. Cash-flow from operations is considered as a dependent variable for the study.

(3) Dummy Variable : Since this study aims at examining the moderating effect of hospital efficiency in the relationship between financial and non-financial indicators and cash flow from operations, it was necessary to include hospital efficiency as a dummy group in the panel-data regression model. To arrive at an efficiency dummy group (i.e. efficient hospitals or others), as a first step, this study estimates the relative technical efficiency scores of 28 standalone multi-specialty Indian private sector hospitals for all the three years (i.e. 2012-2013 to 2014-2015) by using output-oriented CCR based DEA model. In this regard, consistent with past empirical studies on hospital efficiency (Mogha et al., 2015), number of beds, physicians, and other medical staff are considered as input variables ; whereas, total number of outpatient visits, inpatient visits, and major surgeries are considered as output variables for estimating relative technical efficiency scores. Further, based on tertile calculations for each individual year under consideration, hospitals that were placed in the third group based on their relative technical efficiency score for the year (i.e. between 66.67th percentile and 100th percentile) were coded '0,' implying efficient frontiers. All other hospitals were coded '1,' implying inefficient frontiers. The dummy variable for this study is, therefore, categorical in nature.

(4) Control Variable : This study controls for characteristics like hospital size by using log of total assets *(LogTA)* as a proxy for hospital size effect.

(5) Tools Used for Data Analysis : Multivariate regression method was used to examine the panel data of the study variables available from 28 hospitals for the time-period between 2012-2013 and 2014-2015. Adoption of panel data analysis ensured that it accounted for both cross-sectional and time series effects (Sulong & Nor, 2010) in the sample of 28 hospitals considered for this study. Further, based on the results from the initial Breusch-Pagan test statistic and Hausman test statistic, this study adopted a fixed-effects model with robust (HAC) standard errors

option. Furthermore, the relationship between the study variables was established over four regression models (refer to Table 2). In Step 1, control variable *LogTA* (proxy for total assets) was loaded and regressed against the dependent variable - cash-flow from operations. In the subsequent models, independent variables representing financial and non-financial indicators, an efficiency group dummy (i.e. efficient hospitals) and interaction variables between financial & non-financial indicators and efficiency group dummy were loaded and regressed against the dependent variable - cash flow from operations. In this regard, a noteworthy point to remember is that all the independent variables were standardized for testing the research hypotheses.

Analysis, Results, and Discussion

The Table 1 exhibits the descriptive statistics, in particular the means, standard deviations, skewness, and kurtosis values of the variables considered for this study. Further, Table 2 evinces the panel-data regression results of the study. A cursory overview of the F-statistic values reported in Table 2 indicates that regression model 1 (i.e. with control variable), model 2 (i.e. with control variable and independent variables), model 3 (i.e. with control variable, independent variables, and efficiency group dummy), and model 4 (i.e. control variable, independent variables, efficiency group dummy, and interaction effects) are statistically significant at the 1% level. The adjusted R^2 for panel-data regression models 1 to 4 are 36.29, 59.95, 62.95, and 67.81 %, respectively.

As can be seen in the model 4 of Table 2, the direct effect results of CR ($\beta = -0.0847, p > 0.05$) do not support the hypothesis (i.e. H1) that states the direct relationship between current ratio and cash flow from operations. The possible implication of the absence of support for this relationship is that patients in the hospitals of this study may not have availed health insurance for their treatment in these hospitals. This is understandable in the Indian healthcare context where patients spend for their healthcare needs primarily through their 'out-of-pocket' sources

Table 1. Descriptive Statistics

Variable	*Mean*	*Stdev*	*Skewness*	*Kurtosis*
Log TA	9.016	9.259	1.694	2.349
Age	16.571	5.134	0.063	-0.919
No. of Beds	135.360	43.456	1.236	0.887
No. of Physicians	13.143	4.678	1.420	1.827
Other medical staff	87.345	36.296	1.008	0.253
Total inpatients	8380.800	4665.900	0.978	0.781
Total outpatients	12953.000	4950.200	0.718	0.756
Major surgeries	694.790	383.100	0.588	-0.168
Efficiency*	0.493	0.491	0.439	-1.808
CFFO	2477.890	1765.81	2.18	2.57
CR	0.939	0.695	0.790	-0.114
DER	2.302	1.998	1.392	0.503
CET	2.223	1.885	1.638	1.854
ALOS	4.620	1.430	0.530	-0.560
NRP	1429.780	753.690	-0.370	2.310
OR	0.682	0.135	-0.159	-0.425

Note : * Represents dummy variable (moderator)

Table 2. Moderation Model : Panel Data Results

	Model 1	Model 2	Model 3	Model 4	Results
Control Variables					
LOGTA	0.129536*** (0.00491)	0.0881735 (0.07080)	0.0885987 (0.06874)	0.0612744 (0.03681)	
Independent Variables					
CR (H1)		-0.14028 (0.08195)	-0.14170 (0.08332)	-0.06847 (0.19173)	Not supported
DER (H2)		0.45498** (0.20211)	0.45028** (0.21144)	0.14183** (0.57551)	Supported
CET (H3)		0.22955** (0.08676)	0.22980** (0.08664)	0.17093** (0.07265)	Supported
OR (H4)		0.49099*** (0.43732)	0.41712*** (0.42358)	0.29968*** (1.78883)	Supported
NRP (H5)		0.31664** (0.04969)	0.29845** (0.05428)	0.18713** (0.11935)	Supported
ALOS (H6)		-0.21005*** (0.03802)	-0.20943*** (0.03689)	-0.13073** (0.07651)	Supported
Moderator					
dE					
Moderator-Dummy			0.05902** (0.10577)	0.030145** (0.12582)	
Moderating effect (Interaction)					
*CR*dE* (H7)				-0.056735 (0.11546)	Not supported
DER dE* (H8)				0.103061** (0.37288)	Supported
CET dE* (H9)				0.173294** (0.10782)	Supported
OR dE* (H10)				0.345682*** (0.23939)	Supported
NRP dE* (H11)				0.214812** (0.12102)	Supported
ALOS dE* (H12)				-0.269222*** (0.16027)	Supported
dt_2	0.015480 (0.049341)	0.063227 (0.0483956)	0.063342 (0.0481960)	-0.060678 (0.0651856)	
dt_3	0.315400*** (0.102674)	0.171568** (0.0641329)	0.172439** (0.0656398)	0.0994184 (0.114096)	
R^2	0.362961	0.599541	0.629584	0.678103	
$\Delta\ R^2$		0.13658	0.030043	0.048519	
F-Statistic	46.72008***	16.25404***	15.93497***	10.38221***	
DW Statistic	1.845933	1.723361	1.725158	2.066117	
S.E.	0.260835	0.214450	0.216918	0.173220	

Note: Panel-data - Fixed-effect model with 84 observations from 28 cross-sectional units.

** $p < 0.05$, ***$p < 0.01$

(Balarajan, Selvaraj, & Subramanian, 2011; Shahrawat & Rao, 2012). A point to be noted, in this connection, is that the significance of the relationship between *CR* and *CFFO* cannot be summarily rejected in the absence of data on the amount of receivables arising out of health insurance schemes that the patients included in the study have availed for.

Debt-equity ratio ($\beta = 0.14183$, $p < 0.05$) is found to be positively and significantly related to *CFFO*. This relationship remains positive if hospitals use the debt raised to increase the quality of service operations (Brealey et al., 2014), which is what the significance of the relationship indicates. Therefore, hypothesis H2 is supported.

Capital-employed turnover ratio ($\beta = 0.17093$, $p < 0.05$) demonstrates significance in its positive relationship with *CFFO*. This points towards the possibility of 'residual earnings' in these hospitals without which there might not be increase in cash flow from operations (Michalski, 2010). Therefore, hypothesis H3 is supported. However,

this significant relationship has meaning in terms of value creation only when the magnitude of cash flows from operations are compared against the expected rate of return on investment.

Further, with regard to non-financial indicators, OR ($\beta = 0.29968$, $p < 0.01$) is found to be positively associated to *CFFO* at the 1% level of significance. Therefore, hypothesis H4 is supported. It is observed that higher occupancy rates lead to incremental cash flow from operations. This would naturally reduce the average length of stay of patients in such a manner that marginal cost of patients' cost of treatment will be less than the marginal revenue that results from the higher occupancy rate. This explains the significance in the relationship that this study has found between occupancy rate and cash flow from operations.

Furthermore, there is empirical support to articulate the positive and significant relationship between *NRP* ($\beta = 0.18713$, $p < 0.05$) and *CFFO* (Singh & Wheeler, 2012). Therefore, hypothesis H5 is supported. A key point to note is that as the transactions are essentially cash-based (Shahrawat & Rao, 2012) in the Indian healthcare scenario, this significant relationship is obvious. The relationship between patient's ALOS and CFFO, which was hypothesized to be negative (i.e. H6), has found empirical support ($\beta = - 0.13073$, $p < 0.05$). Therefore, this has vindicated the assertion that the marginal cost of stay exceeds the marginal revenue if the patients' average length of stay increases (Kalhor et al., 2014).

Model 4 of Table 2 also evinces the interaction effect of hospital efficiency with financial & non-financial indicators and *CFFO*. The results of moderated panel-data regression analysis suggest that, except for *CR* (i.e. H7), hospital efficiency significantly moderates the relationship between predictor and criterion variables. Non-support to hypothesis H7 can be attributed to a possible situation that characterizes insufficient technological change adopted in the hospitals considered for this study. The coefficient of interaction term between DER and hospital efficiency, that is, *DER*dE* shows a positive and significant interaction coefficient of $\beta = 0.103061$ at the 5% level of significance. Therefore, hypothesis H8 is supported. This implies that the relationship between *DER* and *CFFO* is relatively stronger for hospitals that are efficient when compared to non-efficient hospitals. The results from the interaction effect of CET with hospital efficiency, *CET*dE* also offers evidence of a positive and significant effect ($\beta = 0.173294$ at $p < 0.05$) on *CFFO* supporting hypothesis H9. This implies that the relationship between *CET* and *CFFO* is stronger for hospitals that are efficient when compared to non-efficient hospitals. Further, the results also offer evidence of positive and significant moderation effect of hospital efficiency on the relationship between *OR* ($\beta = 0.34568$, $p < 0.01$) & *NRP* ($\beta = 0.214812$, $p < 0.05$) and *CFFO*.

Therefore, the results support the hypotheses H10 and H11. Furthermore, results from the interaction effect of hospital efficiency with patient's *ALOS* and *CFFO*, that is, *ALOS*dE,* provides a negative and significant effect ($\beta = -0.269222$, $p < 0.01$) on *CFFO*, thereby supporting hypothesis H12. This implies that the inverse relationship between *ALOS* and *CFFO* is found to be stronger in hospitals that are efficient when compared to non-efficient hospitals (i.e. with an increase in hospital efficiency, average length of patient stay comes down).

Managerial Implications

This paper has many managerial implications. First, the key to increasing *CFFO* lies in increasing the strength of 'intellectual capital' of hospitals. Patients do not necessarily get attracted to physical ambience of hospitals, though the importance of physical facilities and technological progress cannot be denied. However, even the technological progress can be properly handled only by competent doctors and the support staff. Therefore, the 'external' facilities that a hospital possesses will have meaning only if the 'internal' strength of the hospital, as demonstrated by the competency of doctors and the support staff, is robust. For this purpose, the funds raised should be invested not just for creating physical ambience but also for increasing the strength of the hospital's 'intellectual capital' and the degree of technological progress that the hospital has attained.

Second, capital employed will increase turnover of the hospital in terms of *NRP*, provided the brand image of

the hospital (Priya & Jabarethina, 2016; Shiri, 2014) is strong in the minds of potential patients regarding the hospital's ability to handle surgeries and other sophisticated medical interventions for not only to diagnose, but also to offer the relevant treatments. The number of patients can increase if they believe in the ability of the hospital to 'deliver' in terms of patient expectations, especially with regard to handling critical illnesses and the complicated treatment procedures regarding the same. The intellectual/professional knowledge and competency of doctors and support staff will increase the degree of patient flow. This will increase the *NRP* as well as the *OR*. Consequently, the *ALOS* will reduce, and the *CET* will increase. These will lead to increase in *CFFO*. Therefore, the 'technical efficiency' of doctors and the support staff and the 'technological progress' that a hospital has attained stand out to be the two most important factors that increase the cash flow from operations and, therefore, these are the two areas on which hospitals should concentrate on directing the flow of their funds while they decide on their investment priorities. Lastly, most hospitals' pricing policy isn't guided by calculations relating to weighted average cost of capital of the hospital. As many hospitals aren't corporate hospitals, they aren't listed on the stock exchange. Therefore, they need to apply 'pure play' method of calculating the cost of capital. This method is invoked by treating a listed corporate hospital firm as the benchmark firm for calculating the hospital's cost of capital. After making due adjustments to the benchmark firm's cost of capital, the 'pure play' method enables the calculation of cost of capital of a hospital being studied.

Cost of capital of the firm is then used to calculate the expected returns on the investments made. This will, thus, enable the hospital to determine its pricing policy, including the differential pricing policy, in such a manner that there will be residual earnings. In this connection, it should be noted that the emergence of residual earnings will alone contribute to hospital efficiency and financial performance by enabling 'outputs' of hospital efficiency to be higher than its 'inputs.'

Conclusion

This study analyzes 28 private sector hospitals in India using their data on financial, non-financial, operational data for efficiency and *CFFO* covering three years. The study has offered insights on the presence of significant association between the predictor variables, for example - *DER, CET, NRP, ALOS, OR,* and *CFFO*. Of particular interest to the study is to understand the underlying conditions that strengthen the relationship between financial and non-financial indicators and *CFFO*. In this regard, it is found that hospital efficiency significantly moderates the relationship between predictor variables and *CFFO*. This suggests that the relationship between financial & non-financial indicators and *CFFO* is found to be stronger in hospitals that are efficient when compared to hospitals that are non-efficient. The results highlight the importance of efficiency as an underlying condition for hospital's financial performance. The managerial implications that have emerged from this study are, therefore, expected to assist hospital managers and policy makers in key-decisions that pertain to improving hospital efficiency and financial performance.

Limitations of the Study and Scope for Future Research

This study is not without limitations. First, the study has only focused on standalone multi-specialty private sector hospitals in India. A noteworthy point in this regard is that only 28 hospitals participated in this study. Future studies are, therefore, encouraged to consider a bigger sample of private and public hospitals across India to compare and validate their findings against the findings of this study. In-fact, future studies are encouraged to examine the influence of financial and non-financial indicators on hospital performance indicators like cash-flow from operations of single-specialty hospitals and community health centres. With regard to listed hospitals in

India, future studies are encouraged to examine the moderating effect of hospital efficiency in the relationship between financial & non-financial indicators and firm value.

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