

Impact of Corporate Governance Index on Total Factor Productivity of Indian Firms

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Abstract – The aim of this study is to measure the impact of corporate governance index (CGI) on performance of firms listed in India. We use total factor productivity as measure of firm performance. This study adopts a data set of 49 companies listed on BSE -500 index during the period of 2001 to 2012, using a panel regression model. To measure the governance performance relationship, we have taken corporate governance index as independent variable and total factor productivity as dependent variable. DEA based a non parametric Malmquist productivity index was used to calculate total factor productivity and its components- technical efficiency change and technological change. The result of this study leads to conclusion that there is no significant relationship between corporate governance index and total factor productivity. The result suggests that corporate governance does not improve the firm performance. Corporate governance improves only investor's perception about firm's governance.

Keywords: *Corporate Governance Index, Total Factor Productivity, Malmquist Index, Data Envelopment Analysis*

I. INTRODUCTION

Corporate governance need has been highlighted due to the various scams occurring frequently in the world. Corporate governance is a system of structuring, operating and controlling a company to attain long-term goals to assure various stakeholders such as shareholders, employees, creditors, suppliers and customers and fulfill the regulatory and legal requirements. Effective corporate governance helps firms to obtain the external finance and leading to more investment as well as high growth, employment, lower cost of capital by reducing risk and create higher firm valuation. This shows that there is a relationship between corporate governance and firm performance. This relationship has been measured in various countries like USA, UK, Germany, Hong Kong, Greece, Korea, India, Ukraine etc. But most of the researches related to corporate governance and financial performance have primarily focused on individual components such as board size, board independence, CEO duality, board committee, ownership concentration etc. Biswas and Bhuiyan (2008) [13] suggest that rather than examining the impact of a complete set of corporate governance practices on firm performance, most of the existing studies investigate impact of individual corporate governance characteristics on firm performance which fails to capture the total effect and thus brings misleading results. Therefore we decided to focus on the corporate governance index (CGI) rather than individual components. The CGI effectively summarizes the different aspects of corporate governance and make distinction between good and poor governed firms. On the basis of existing literature and provisions of Clause 49 we decide the attributes of the CGI. Therefore, we measured the impact of corporate governance through the CGI. We

measure the relationship of corporate governance index and firm performance with total factor productivity (TFP) as measure of firm performance.

We use total factor productivity as measure of firm performance. It is argued that productivity is more reliable measure of firm performance than financial measures as accounting profits can be manipulated and stock prices can be biased [9]. Technical efficiency is an indicator of how efficiently the inputs are being used by the firms to produce output. Technological change is adoption or availability of new and superior technology in an industry makes an industry better equipped and thus it is possible to become more productive and efficient. Productivity and efficiency of Decision Making Units (DMU) is assessed by two approaches – parametric approach and non- parametric approach. The various parametric approaches are distribution free approach, thick frontier approach and econometric frontier approach. The specification of functional form of production function and cost function are required in these approaches. TFP is considered by various approaches such as - stochastic frontier analysis (SFA), growth accounting approach and DEA based Malmquist productivity index. DEA is the non –parametric approach to make a production frontier was first proposed by [1]. The DEA is highly popular tool with the researchers [16, 15, 7, 21].

SFA and DEA based MPI have become more popular approaches for evaluation of TFP. DEA has significant advantages relatively to SFA such as; it does not need any functional form for the production function [20]. DEA based Malmquist productivity index has three advantages relative to Tornquist and Fischer indices and these were suggested by Grifell-Tatje and Lovell (1996) [5] – (1) It

does not need the assumption of cost minimization or profit maximization. (2) It does not want information regarding input and output prices. (3) it allows the decomposition of productivity changes into two components the indices of total factor productivity change, technology change and efficiency change, if the researcher have panel data.

The Malmquist productivity index is an index of geometric mean of TFP index from period (t) to (t+1). The Malmquist TFP index examines the TFP change among two data points by calculating the ratio of the distances of each data points relative to a general technology. Fare et al. (1994) [17] suggests that if panel data are available, the distance measures of Malmquist Total Factor Productivity Index (MTFPI) can be calculated using DEA. The MTFPI is the product of measure of efficiency change and technical change. We used DEA based MPI to identify the sources of total factor productivity growth which will help the policy makers to know the performance of industry and take steps to increase the efficiency and productivity in this study.

The present study is planned in such a way where section 2 presents the review of literature related with the present study. Section 3 deals with the objective and section 4 explains methodology, data and variables adopted for the study. Section 5 summarized the evaluation of results. And last section provides conclusion of the study.

II. REVIEW OF LITERATURE

Most of prior studies focus on the individual components of corporate governance such as CEO duality, board size, board meeting, board independence etc. And these studies found the relationship between corporate governance and firm's financial performance. But this study measures the impact of corporate governance on firm performance by constructing a corporate governance index. In this study, we used total factor productivity as firm performance measures. For measuring the corporate governance index and its relationship with total factor productivity, the researcher reviews the literature.

Corporate Governance Index (CGI)

The researcher reviews the literature for developing the corporate governance index. The following are some studies those have construct corporate governance index. These existing studies help us in identifying the methodology for construction of corporate governance index.

Mohanty (2003) [10] investigate the relationship of CGI and financial performance of firms. He developed a corporate governance index with the help of nineteen measures of corporate governance. The author considers all stakeholders not only the shareholders. When constructed the CGI, he assigns higher weightage to the shareholders measures as compared to other stakeholders and higher negative weightage to negative form measures.

Silva and Leal (2005) [2] constructed the CGI to investigate the relationship among quality of corporate governance practices and Brazilian listed company's performance. Their CGI is combination of fifteen items. Each item of CGI is based on 'Yes or No' answer to a specific question. If answer is 'yes', then value of one is assign to the question, otherwise the value is zero. CGI is the total of points for each question and maximum index value is fifteen.

Varshney et al. (2012) [14] constructed the CGI on the basis of both internal and external corporate governance mechanisms to measure the relationship between corporate governance and performance of Indian firms. They used value based and traditional measures to investigate the relationship. The researchers found positive relationship between CGI and firm performance.

Sarkar et al. (2012) [24] constructed a corporate governance index for 500 firms listed in India on the basis of information related to four important corporate governance mechanisms like board of directors, audit committee, auditor and ownership structure. The index has been created in two parts. A sub- index was made for each of corporate governance mechanism in first step. Second, sub- indices average is calculated to compute CGI of a firm. Their results show strong relationship between CGI and market performance of the firms. It means the firms with better corporate governance structure earn better rate of return in the market. So, Indian market rewards those firms that have strong corporate governance mechanisms.

Total Factor Productivity (TFP)

Total factor productivity is an index of output divided by an index of input combinations and shows the productivity changes. The following are some studies that have used Malmquist productivity index based on Data envelopment analysis (DEA) to measure the total factor productivity and its components.

Arnade (1998) [3] used non-parametric Malmquist index approach to estimate agricultural productivity indices during the years 1961-1993 for 70 countries. In case of developing countries, he found that thirty six out of forty seven countries in the sample show negative technical change.

Isik and Hassan (2003) [6] examined efficiency change, technical change and productivity growth in Turkish commercial banks. They found that both private and public Turkish banks recorded significant productivity gains. These results were driven by more effective management of resources rather than technical progress.

Jeanneney et al. (2006) [23] measured the productivity growth of Chinese banking system and decomposing the total factor productivity growth into efficiency change and technological change. They found that the Chinese banking system had improved its total factor productivity and

productivity growth was mainly achieved through the technical progress rather than to development in efficiency.

Mittal and Dhingra (2007) [19] used Data envelopment analysis on selected 27 Indian commercial banks over the years 2003-04 and 2004-05. They found that private-sector banks were more efficient in terms of the productivity and profitability than other banks under public ownership.

Relationship between CGI and TFP

The following studies are based on the corporate governance mechanisms and total factor productivity.

Pant and Pattanayak (2008) [8] analyzed the impact of corporate governance mechanisms and product market competition on productivity. They used total factor productivity as measure of corporate performance. They found that firms with high proportion of promoter’s stake are more productive provided competition in firm’s product market is intense.

Wahab et al. (2012) [11] analyzed the productivity changes of Zakat institutions of Malaysia. They used the output oriented Malmquist productivity index to measure the changes. They found that technical change is the main contributor in TFP growth. It also suggested that pure efficiency is the important source of efficiency change rather than scale efficiency.

III. OBJECTIVES OF THE STUDY

The aim of this study is to determine the relationship between corporate governance index (CGI) and total factor productivity of firms listed in India. To achieve the objective, following research hypothesis has been formulated:

H₀₁ : There is a no relationship between corporate governance index and total factor productivity.

IV. DATA AND METHODOLOGY

This study used data of BSE- 500 listed firms for the period of 2001 to 2012. The firm level data have been collected from “Prowess” a database of Indian companies, maintained by the Centre for Monitoring the Indian Economy (CMIE). Annual reports of the companies are taken from the company’s websites. This paper sample excludes all banking and financial services companies because they are regulated by Banking Regulation Act. The final sample set after removing outliers and companies with inadequate financial data consist of 49 companies over a period of 12 years.

Methodology of Corporate Governance Index Construction

This paper construct the corporate governance index on the basis of five corporate governance mechanisms such as Board of directors, Audit committee, Remuneration committee, Shareholders and investors grievances committee and Ownership structure. This paper takes the

attributes within a specified governance mechanism and use binary coding (1 or 0) to score each attribute. And then aggregate the score of all attributes. The simple aggregation of scores means the researcher construct unweighted index. The attributes used in the index were obtained from the standards specified in the Clause 49 regulations as well as from various academic studies.

Variables

To measure the governance performance relationship with total factor productivity, we have taken corporate governance index as independent variable and total factor productivity as dependent variable. Firm size, sales growth, beta and leverage are taken as control variables. Firm size is measured as logarithm of total assets. Leverage, has been considered as the ratio of total debt to the total assets. Beta has been used as a measure of risk. Sales growth has been measured as total sales of the current year less total sales in the previous year divided by total sales in the previous year.

Total Factor Productivity

We use total factor productivity as measure of firm performance. In this study, we use one output and two inputs variables to calculate total factor productivity. In terms of output we use net sale. In terms of capital we use gross fixed assets of a firm that includes both tangible assets such as land, building, plant and machinery and intangible assets such as goodwill, software etc. Labor, which is a freely moving variable in the estimation of the production function, is measured by compensation to employees that include all cash and payments in kind made by a company to its employees.

In this study we use output – oriented analysis because the majority of firms and industries have their objective to maximize the output in the type of revenue or profit. It is also assumed that there is constant return to scale (CRS) technology to estimate the distance functions for calculating Malmquist TFP index and if technology exhibits constant return to scale, the input based and output based Malmquist TFP index provide the same measure of productivity change. The Malmquist productivity index is an index of geometric mean of TFP index from period (t) to (t+1). The Malmquist TFP index measures the TFP change between two data points by calculating the ratio of the distances of each data points relative to a common technology.

In order to keep away from choosing the MPI of an arbitrary period Fare *et al.* (1994) [17] denote the output-oriented Malmquist productivity change index as:

Output- oriented Mamquist Productivity index as:
(Model 1)

$$M_o (X^{t+1}, Y^{t+1}, X^t, Y^t) = \sqrt{\frac{D_o^t(X^{t+1}, Y^{t+1})}{D_o^t(X^t, Y^t)} \frac{D_o^{t+1}(X^{t+1}, Y^{t+1})}{D_o^{t+1}(X^t, Y^t)}} \tag{1}$$

Färe *et al.* (1994) further states that the MPI formula in equation (1) can be equivalently rewritten as:

$$M_o(X^{t+1}, Y^{t+1}, X^t, Y^t) = \frac{D_o^{t+1}(X^{t+1}, Y^{t+1})}{D_o^t(X^t, Y^t)} \sqrt{\frac{D_o^t(X^{t+1}, Y^{t+1})}{D_o^{t+1}(X^{t+1}, Y^{t+1})} \frac{D_o^t(X^t, Y^t)}{D_o^{t+1}(X^t, Y^t)}} \quad (2)$$

The first ratio on the right hand side of equation (2) measures the changes in technical efficiency (EFFCH) between period t and $t+1$ as a catching-up to the frontier effect. The second term measures (TECHCH) the change in production technology generally referred to as a shift in production frontier.

$$\text{Technical Efficiency Change} = \text{EC} = \frac{D_o^{t+1}(X^{t+1}, Y^{t+1})}{D_o^t(X^t, Y^t)} \quad (3)$$

$$\text{Technological Change} = \text{TC} = \sqrt{\frac{D_o^t(X^{t+1}, Y^{t+1})}{D_o^{t+1}(X^{t+1}, Y^{t+1})} \frac{D_o^t(X^t, Y^t)}{D_o^{t+1}(X^t, Y^t)}} \quad (4)$$

The Malmquist Productivity Index (MPI) of total factor productivity change (TFPCH) is the product of technical efficiency change (EFFCH) and technological change (TECHCH).

$$\text{TFPCH} = \text{EFFCH} \times \text{TECHCH} \quad (5)$$

The Malmquist productivity change index hence can be written as:

$$M_o(X^{t+1}, Y^{t+1}, X^t, Y^t) = \text{EFFCH} \times \text{TECHCH} \quad (6)$$

Technical efficiency (TE) change examine the change in efficiency between current period (t) to next ($t+1$) periods, while the technological change (Frontier effect) measures the change in frontier technology. Technological change (TECHCH) is the improvement of new products or the progress of new technologies that provides methods of production to improve and outcome in the shifting upwards of the production frontier.

The Malmquist productivity index is an index of geometric mean of TFP index from period (t) to ($t+1$). When the value of MPI is greater than one it shows improvement in productivity and a value less than one shows a decline in productivity and when equal to one it means no change in productivity.

V. RESULTS

Descriptive Statistics of DEA

This section provides brief description of variables used in the study. The dataset consist of 49 firm's data for the period of 2001 to 2012. Table 1 represents the variables.

Table 1: Descriptive statistics of input and output variables

(Values in millions)

Variable	Range	Minimum	Maximum	Mean	Standard Deviation
Net Sale	540000	314.8	541614.2	44700	80006.18
Compensation to Employees	86385.. to 3	44.6	86429.9	4097.74	9735.01
Gross Fixed Assets	417086	196	417282	30884.4	53840
N = 637					

Net sale is used as output range between 314.8 and 541614.2 with standard deviation 80006.18. Compensation to employees is used as input in terms of labor has standard deviation 9735.01. And gross fixed assets are also used as input in terms of capital has range between 196 and 417282 with standard deviation 53840. The larger figure of standard deviation shows that the data dispersion in the series is quite large.

Table 2: Malmquist Index Summary of Annual Means

YEAR	EFFCH	TECHCH	TFPCH
2001	1.043	0.938	0.978
2002	0.955	1.001	0.955
2003	1.086	0.935	1.016
2004	0.777	1.331	1.034
2005	1.076	1.037	1.116
2006	1.189	0.918	1.091
2007	1.148	0.881	1.011
2008	0.955	1.057	1.01
2009	0.605	1.628	0.985
2010	1.482	0.656	0.972
2011	0.869	1.155	1.003
2012	0.964	1.068	1.03
Mean	0.99	1.026	1.016

Table 2 shows mean value of change in Malmquist total factor productivity index and its components (efficiency change and technical change) over the period of 2001 - 2012. A value more than one will show a positive TFP growth while, a value less than one will show a decrease in TFP growth. It shows that technological change has contributed more than efficiency change among Indian firms to the total factor productivity. The table shows eight

out of twelve years, Indian firms have experienced productivity gain.

Relationship between CGI and Total Factor Productivity

To measure the relationship between CGI and total factor productivity, we used panel data analysis in this study because panel data sets are able to identify and estimate effects that are not measurable in pure cross-sectional or pure time-series data. We have employed the model 1 to measuring the effect of corporate governance index on total factor productivity. This model is also used by [12].

$$D(TFP)_{it} =$$

$$\beta_0 + \beta_1 CGI_{it} + \beta_2 FIRM_SIZE_{it} + \beta_3 SALES_GROWTH_{it} + \beta_4 BETA_{it} + \beta_5 LEVERAGE_{it} + \epsilon_{it}$$

D stands for dependent variable taking value of TFP. CGI represents corporate governance index an independent variable. Some control variables are used to control the firm-specific characteristics that may affect firm performance. These control variables are firm size, sales growth, beta and leverage. It is generally believed that the firms with larger size perform better due to some advantages of economies of scale. So, it is important to control the impact of size on firm performance. Sales growth is related to future growth opportunities of the firm. Beta has been used as a measure of risk. And leverage is used to control for variations in capital structure. ϵ_{it} Denote error term respectively.

We have applied panel regression model to find out the relationship between corporate governance index and total factor productivity as a firm performance measure by controlling the heteroskedasticity. We have used redundant likelihood ratio test to check the appropriateness of fixed effect model. If p-value less than 0.05, null hypothesis that independently pooled panels are more efficient was rejected, implying that fixed effects model was preferred to independently pooled panel model. The results are controlled for hetroskedasticity by using white cross – section coefficient covariance method.

Table 3: Regression results of the TFP as dependent variable

Durbin – Watson Stat	2.357
Observation	588
Likelihood Ratio Test (Chi square)	111.329***

*: p < 0.10; **: p < 0.05; ***: p < 0.01

Table 3 represent CGI has a negative and insignificant relationship with TFP. The model explains 40 per cent variation in dependent variable (TFP). F statistics is significant at one per cent level. It denotes fitness of model. We have applied fixed effect model of panel regression as the redundant likelihood ratio test rejects the null hypothesis at one percent significance level. We could not found any significant relationship between corporate governance index and total factor productivity. TFP is found to be negatively affected by firm size at one per cent significance level. Beta and leverage has positive and insignificant relationship with TFP. Sales growth is positively affected TFP at one percent significance level. Durbin – Watson statistics score value is 2.357.

The regression analysis results indicate that corporate governance index and total factor productivity has not any significant relationship. Various researchers had used TFP as firm performance measure [22, 4, 8, 12].

VI. CONCLUSION

We determine the relationship of corporate governance index and firm performance with total factor productivity (TFP) as measure of firm performance for the period of 2001- 2012 in this study. This study used the Malmquist productivity index to analyze the total factor productivity growth and its components - technical change and efficiency change of Indian firms. The results show that technological change has contributed greater than efficiency change among Indian firms to the total factor productivity growth. The result of the study leads to conclusion that there is not any significant relationship between corporate governance index and total factor productivity. We use TFP as a measure of firm performance. The result suggests that corporate governance does not improve the firm performance. Corporate governance improves only investor’s perception about firm’s governance.

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