Corporate Governance and the Efficiency of Banks listed in Pakistan

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Dedication

First of all, I am dedicating this thesis to my paternal father Muhammad Sadiq, although he is no longer of this world, who loved me and taught me the value of life. May you find peace and happiness in paradise, I am also dedicating this thesis to my beloved family members and friends who have supported me throughout the process. Also, this thesis is dedicated to all the people who are the part of my life in good and bad times.

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M Khalil Ur Rehman.

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Table of Contents **Page NO.**

List of Tables **Page No.**

Abstract

Agency problems is main issues for the management and the shareholders. Agency theory deal the with manager and shareholders interest or agent and principal relationship. In the corporation, do not work properly and not work for the shareholder's interest. Under this assumption, this study examines the influence of corporate governance and the efficiency of banks listed in Pakistan. This study data envelopment analysis to measures the different efficiencies such as technical efficiency, pure technical efficiency and scale efficiency. This study depends on three outputs and five inputs that used for the efficiencies measures in data envelopment analysis. In this study used the technique panel data to find out the influence of corporate governance on the efficiencies of the banks. Collected the data from annual reports published by the State Bank of Pakistan and from the websites of each bank. This study depends on the 286 observations and 26 Banks. The time period started from the year 2005 to the year 2015. Corporate governance structure positively impact on firm efficiencies. Managerial, board independent, CEO duality, board size, audit committee independent and institutional shareholder also positively impact on banks efficiency.

Keywords: Corporate Governance, Agency theory, Efficiencies and techniques.

Chapter 1

Introduction

The corporate governance plays an important role in efficiency of the firms. The corporate governance is balancing the relationship between owners of the company and executives. The corporate governance term is broader and refer to the mechanism, relations, and the processes by which a company is controlled and directed. In governance structure the board of directors show the fairness of the all stakeholders of the firm, the managing role of the executives is an important factor of corporate governance (John & Senbet, 1998). The corporate governance structure is depending on these things. First, explicit and implicit contract between firm and its stakeholders and distribution among responsibility, rights and rewards. The stakeholders of the firm include the equity holder, creditors and other claimants such as employees, customers and suppliers. Second, sometime occur conflict between owners and employees, the practice merges the conflicts between employees and owners during the duties. John et al., (1998) proposed the corporate governance is separate from its ownership. Managers manage all activities effectively in the firm. Owners who start or run the firm but managers or director control the firm activities both separate from one another. Griffith (2001) reported that the separation of the ownership and manager perform inefficiently because the manager do not monitor the work properly in the firms. Nor owners properly monitor the manager's efforts. Thirdly, the good and proper check and balancing system in the firm. The owners and managers face different problems in the organization. The shareholders give the power or authority to managers check out the firm's affairs and makes about the decision to manage the problems. According to Rediker and Seth (1995) the conflict arises in the firms that time when managerial decisions are nonvalue and give negative consequences for the company.

Ownership interest create the agency problem or issues between brokers and principles (Berls and Means 1932). The agency problem main issue for the firms. Short, Keasey, Wright and Hall (1999) proposed that the high level managerial ownership actually may increase the agency problem in the firms. The previous study show that the company's management does not play best or essential role for shareholder's interest. The executive or top management react different ways in the firms such as different types of skill used in the firm to improve the efficiency. The best top management policy improves firm efficiency, better governance minimizes the agency problem in the organization (Johson, Boone, Breach and Friedman 2000). According to Wang, Jeng and Peng (2007) the corporate governance mechanism plays an essential role to minimize the conflicts from the firms. The lack of top management policies decrease the efficiency of the firms and also decrease the growth of the firms (Johson et al., 2000). If board of directors separately work from the owners, then weak performance show in the company and the company work not properly. Bhagat and Bolton (2008) find out the independent board reduce the operating performance and efficiency of the firm. When company governance is efficiently performed then the investors attract and they feel our amount or money also save then more investment in the firm. All company performance depends on governance of the firms. Krafft, Qu, Quatraro, and Ravix, (2013): Baner, Guenster, and Otten (2004) described that the international investors before investment check the corporate system fully than makes the investment decisions. In international level or broader cross countries laws much influence on investors behaviors, but efficient governance minimizes the challenges for investors (Love, 2010). Efficient board of directors and executives make efficient rules, policies and procedures for the governance. Klapper and love (2004) suggested that the good governance mechanism show best operational performance, higher market value and to make good acquisitions. The corporate governance is more effectively work in private firms rather than the public listed companies. The governance mechanism low performs where agency problems occur more (Klapper et al., 2004). Black, Jang and Kim (2006) reported that good corporate governance practices in the firm, then the firm reputation and market value of the shares or stocks also increase and less chances of conflicts, improve the annual return of the firms (Listokin, 2008). The previous studies show that the government cannot play an active role in the corporate governance but the privatization make efficient organizations. Top Management more influence on the efficiency of the firms. In internal governance mechanism, the board of directors more influence the firm performance and the firm efficiency (Lin, Ma and Su 2009). The employees and top management receive the compensation different ways from company. When company compensate the executives through packages such as (pension fund, bonuses, stock base compensation, and medical allowance etc) then increase company performance. The employee's compensation is positive impact and increase the shareholder worth and firm performance (Sonza and Kloeckner 2013). The bonuses and the stock base compensation is more important tool to measure the firm performance, productivity and maximize the corporate or firm values (Baker, Jensen and Murphy 1988; Jensen and Murphy 1990). According to Bebchuk and Fried (2003) showed that the compensation scheme reduces the agency issues. Sometime the company shareholders not compensate to employees during the conflicts but the shareholders change the executives or the top management of the firms when the change top management than firm performance and firm efficiency would increase. According to Berger, Clarke, Cull, Klapper and Udell (2005) change of corporate governance increase the performance and show the company work efficiently. The effective board or corporate governance mechanism reduces the moral hazard problems from the company. Bertrand and Mullaiathan (2003) suggested that the strong executive or top management reduce the moral hazard problems in the banks. Managerial behavior more impact on the corporate governance mechanism, firm behavior effects the managerial performance of the company (Bertrand et al., 2003). This study impact of corporate governance mechanism measurement on efficiency of the bank listed in Pakistan. This study is the employment of three different efficiency measurement as well as corporate governance structure on them. Study investigates the influence of aspect corporate governance on the various efficiencies in Pakistan such as the technical efficiency TE, pure technical efficiency PTE and scale efficiency SE.

1.1 Problem Statement

Study investigate the impact of top management or corporate governance mechanism of the corporations and efficiencies of listed banks in Pakistan. This issue can consider innovative because the corporate governance to verify the variables on the efficiency of Pakistani banks. This study, investigate the influence of corporate governance mechanism on efficiencies such as Technical Efficiency TE, Pure Technical Efficiency PTE and Scale Efficiency SE. These efficiencies employment in Pakistani banking system and what types of result outcome. How corporate governance improve the overall efficiency of the banking systems. Good corporate governance doesn’t lose the opportunities of the firms. But they are seeking the opportunities for the company and maximize the shareholder wealth. Porta, Silanes, Shleifer and Vishny (2000) proposed that the firm opportunities increase the firm growth and efficiency.

1.2 Research Questions

This study checked the corporate governance mechanism impact on three questions about various efficiencies such as Technical Efficiency, Pure Technical Efficiency and Scale Efficiency.

- Does corporate governance impacts on efficiency 1 (Technical Efficiency) of the banks listed in Pakistan?
- Does corporate governance mechanism impact on efficiency 2 (Pure Technical Efficiency) of the banks listed in Pakistan?
- Does corporate governance mechanism impact on efficiency 3 (Scale Efficiency) of the banks listed in Pakistan?

In this question, check the impact of top management policies on the TE (technical efficiency) in banking system. In manufacturing companies measured the technical efficiency through maximum outputs and minimum inputs. According to the Sathye (2001) TE efficiency help us to choose the productions inputs for the firms. But in banking systems we measured the technical efficiency through multiple resource such as CCR model and ratios. Banking system we measured through financial services how bank ability to work quickly perform or not (Bhattacharyya, Lovell and Sahay 1997). Corporate governance mechanism positively impacts on the manufacturing companies, turn out of the company is higher and positive impact on the technical efficiency (Destefanis et al., 2007). Study increase the technical efficiency in banking sectors through these technologies such as modern ATM machine, credit card and visa card. Obwana (2006) reported that the technology is improve the technical efficiency of the firms. Governance mechanism good impact on technical efficiency. Technical efficiency measure through resource of the firms, and how much resource used and what types of outputs earn how spend the inputs in the firms. The technical inefficient managers decrease the market value of the shares and reduce the efficiency of the organization. Study measured the pure technical efficiency through VRS. We measured the Scale Efficiency through ratio of TE and PTE.

1.3 Research Objectives

To investigate the impact of mechanism on TE efficiency of the financial organizations. Sound governance mechanism work efficiently in the firm. Main objective of corporate governance improves the technical efficiency in the banking sectors. study check the one-by-one three efficiencies in banking sector.

- To investigate the impact of CG on banks technical efficiency, pure technical efficiency and scale efficiency.
- To investigate the impact of agency problems on banks efficiency.

This thesis examines the impact of corporate governance CG mechanism on PTE efficiency of the banks. Agency problems also effects on the banks efficiency, governance mechanism removes the conflict and makes the efficient firms. When the shareholder delegates the power and authority to the board of directors to manage the firm's affairs and conflict incurred. The agency theory discusses the relationship between of executives and shareholder's conflicts. Furthermore, we check the influence of CG mechanism on SE efficiency of the banks.

1.4 Significance of the Study

The governance mechanism helpful for the national development and the international development of the businesses. This study examines the impact of corporate governance mechanism on the efficiency in Pakistan banking sectors. The corporate governance to literature on efficiency of the context to different institution Pakistani environment and the previous studies only output measure of efficiency. When the investors want the investment in any organization, before the investors investment thoroughly check the governance structure like the performance of managers, salary of mangers, how they react in the firm, good governance mechanism more protectable for the investors investment (Porta et al., 2000). This study helpful for the investors during the investment, if the firm governance mechanism is sound or healthy than the firm show increases the efficiency. The sound governance mechanism provides the good policies and rules for the regulators and removes the problems from organization. Corporate governance is most important for the primary business plans. Good Corporate governance mechanism makes the procedures, rules, and laws broadly internally and externally but operate the business efficiently. If the company all things manage properly than the company work efficiently. Sometime the conflicts are incurred between top management and the principles. Conflicts decrease the efficiency of the firm. But the sound governance mechanism improves the efficiency of the firm.

Chapter 2

Literature Review

2.1 Theoretical Background

The system of banks plays an essential role in the economy. If the banking system sound and efficient than the whole economy grows in the country. Kumar and Gulati (2008) suggested that the banking system directly effect to the country growth and the firm productions. Banks main pillar of country growth. If banks cannot work properly in the country then country growth also decrease, without effectiveness and efficient structure banks not work properly in the country. Without the effective and efficient banking system, cannot work properly in the country (Kumar et al., 2008). In previous studies the Hitt and Ireland (1986) and Belkaoui and Pavlik (1992) proposed that the banking system plays an essential role for the country growth. Frydam, Gray, Hessel and Repaczynski (1999) argued the profitability is the more important tool of efficiency measure by the firms. Firm efficiency measure through total revenue of the firm over the total number of employees work in the company, (Megginson, Nash and Randenborgh 1994). The researcher could not focus on the operational function but they show what input and output of companies (Sheu and Yang 2005).

2.2 Supporting Theory

study link theoretical base the corporate governance mechanism to the efficiency of the firms. The agency theory clearly shows the relationship between agents and principles. The shareholder does not link directly with the organizations but the managers acting for their interest. In managerial firm the owners and managers separate. All policies and laws makes by the manager but more chances to occur the conflicts. Fama (1980) reported that the problems arise that time the decisions make the executives. The top management or executives think that we are makes the profit of the firm and do control but not owned in the firm. Then decision power and voting right in the hand of shareholders that reason problems become creates. Corporate governance mechanism balances the relationship between managers and shareholders. Agency problem minimize the efficiency of the firms. Baysinger and Butler (1985) argued that the board of directors easily remove the conflicts from the organization. Bozec and Dia (2007), Sanchez (2010) proposed that the executives or board of directors is the backbone of corporate governance. If the executives work properly in the company and not exist conflicts among agent and shareholders than the company efficiency increase. If the conflicts incurred between executives and shareholders than the company efficiency decrease. The more complex for the shareholders to check and monitor the manager efforts. Bozec, Dia and Bozec (2010) argued that the difficult challenge for the shareholders to find out the internal and external agency problems in the firms. In the family, own business has less chance the agency problems incur rather than the other businesses. Family business all share held by the owner and he manage the all activities in the organization, this cause the less chances of agency issues. Previous literature demonstrated in family business zero percent chance of agency conflicts. Schulze, Lubatkin, Dino and Buchholtz (2001) reported that the owner manages or check the daily activity in private firms. It means the family firms works efficiently in the world. Hart (1983) proposed that the two types of firms first is entrepreneur firms and second is managerial firms. Entrepreneur firm the all activities manage by the owners but the managerial firm's owner and manager both are separate. Maximum agency problem incurs in the managerial firms. Chrisman, Chua and Litz (2004) argued that the family businesses cost is less than the non-family businesses. We used the Data Envelopment Analysis model for the measure of the various efficiencies. DEA is a nonparametric method used for measuring the operational and economies of the production firm. This help to measure the empirical productivity of the decision-making units DMU of the companies. Sometime the external forces effect the efficiency of the firms. External forces mean the suppliers does not provide the raw material with in time, it is main issue for the manufacturing companies. If raw material does not avail at the time the efficiency of the manufacturing companies is down. Resource dependent theory discussed that the external forces highly effects on the firm performance. But the good corporate governance is face external forces, makes good strategies policies and manage the external behavior and try to improve the firm's efficiency. Sound governance mechanism efficiently manage all these forces and does not hit the firm's growth and the firm's efficiency. In resource, dependent theory discussed the all organizations depend on the resources, these resources are the main power of the companies. The organization is not work independently but depend on the other organizations. Resource dependency also effect the companies' efficiency. The resource dependency and power directly effects on the firm efficiency. Board of directors or top management makes efficient procedure to control the internal and external forces for the companies and increases the efficiency of firm through makes are good decisions.

2.3 Aspect of Corporate Governance Overall on the Firm Efficiency

The corporate governance mechanism plays more essential role in the firms. Corporate governance is the system of rules, practice, and processes by which a company and banking systems is directed and controlled. Corporate governance mechanism is helpful for balance the relationship between agent and shareholders. Efficient governance reduces the firms conflicts between the top management and shareholders. The governance structures and the shareholders distribute the rights and responsibility among the different participant of corporations such as the creditors, lenders, suppliers, employees, shareholders and board of directors. Governance structure define the rules and procedures for the decision making of firm's affairs. Good governance efficiently monitor the all rules and procedures in the firms. External forces hit the corporate governance mechanism in the firms. The main external forces such as shareholders, lenders, suppliers, creditors, managers and customers more affected the firm activities. John et al., (1998) argued that the corporate governance structure is used to strengthen control and protection internal stakeholders and external stakeholder's responsibility to efficiently manages all activities of the firms. Organizations success or the fail depend on the managerial strategies. If the someone firm are bankruptcy it means the management are not effective or capable. When the managerial strategies not effective then incurred the agency problems. Daily and Dalton (1994) said that the lack of communications between top management and shareholders to create the agency problem. Hanbrick and Daveni (1992) reported that the dominant CEO were more likely to be associated the bankruptcy. The honest governance mechanism can easily remove the bankruptcy of the organizations improve the growth and efficiency of the firms. Most of the times manager of the company think that we have control and manage the business but the voting right hand of shareholders and effective or important decision held by the controlling shareholders. The main reason for the agency conflicts. Destefanis and Sena (2007) reported that the all decisions authority and voting right in the hand of controlling shareholders it is the main cause of agency issues. Managers of the firms makes policies to reduce the conflict among the employees. Efficient governance mechanism increases the efficiency of the firms. Market value of the share depend on the managerial strategies. If the strategies good than the market share price is increase of the firm shares and firms work efficiently, rather than if the managerial strategies not proper work than market value of the share decrease and firm inefficiently. According to the Wright and Ferris (1997) suggested that the bad managerial strategies or weak governance decrease the market value of the shares and direct effects on the firm's efficiency. Bozec et al., (2010) said that the managerial behavior also influences the owners' equity. The OECD (2004) described that more helpful for the firms to use resources more efficiently and increase the growth. The efficient corporate governance we examine through strengths and weaknesses in the country economy. Sometime economy of country is strong, it means the corporate governance properly do work in the firms. If economy of country is weak than show that the corporate governance does not work properly in the firms. Maher and Andersson (2000): Bebchuk and Roe (1999) reported that when corporate governance strengthen or weaken work in the firm then more effects on economic growth and firm efficiency. Corporate governance also impact on shareholder's equity. Healthy or efficient governance show the higher return on equity and weaker governance show the low return on equity. Compers, Ishii and Metrick (2001) showed that the weaker governance system much influence of the shareholder equity such as low profit, sale growth lower, higher capital expenditures in the company and higher amount of corporate acquisitions.

The purpose of this study is to investigates the influence of aspect corporate governance on the various efficiencies of Pakistani banks such as technical efficiency, pure technical efficiency and scale efficiency. The previous studies only output measure of efficiency. In previous studies the Hitt and Ireland (1986) and belkaoui and pavlik (1992) reported that corporate governance more helpful to improve the firm efficiency. Frydam, Gray, Hessel and Repaczynski (1999) argued the profitability is the more important tool of efficiency measure by the firms. Megginson, Nash, and Randenborgh (1994) proposed that the efficiency taking by firm revenue divided the number of employees. The researcher did not focus on the operational function but they show what input and output of companies (Sheu and Yang 2005). Sometime conflict arises among the shareholders and employees or executives in the firms. When the governance does weak work then the conflict arises in the firm. Separation of business from shareholders may arise the conflicts in the company, businesses affect and conflicts arises that time when separate from the ownership (John et al., 1998). Sometime shareholders delegate the power to their employees manage the firm's affairs and makes important decision relates the company. Good governance increases the efficiency of the firms, while also increase the market value of the firms and country economy. Weak governance decrease the efficiency of the firm and market value of the firms and also impact on the country economy. Conflict arises that time when the ownership separate from the management and shareholders does not monitor the exact efforts of the managers. It is strengthening challenges for the shareholders to measure the managers worth. Sometime managers think that the all effort we do in the organization and shareholders enjoys the lot of benefit own theirs interest. This is the basic reason for conflicts in the organization. If the owners of firm compensate to their employees, then less chances to create the issues in the firms. Compensation to their employees through the bonuses and stocks. Corporate governance structure does control the all problems in the firms such as internal problems and external problems. Internal problems included such as internal policies, rules, laws and procedures control by the governance makers. The external problems face by the governance such as shareholders, creditors, lenders, suppliers, and customers etc. corporate governance structure is a way to monitoring the all businesses activities. Internal and external all forces handle the governance of the firms. Efficient governance or management the makes good policies to run the firm, low cost through effective skills and efficiently perform the operating activities of the firms. Sound governance full attention on the internal problems and check why problems create and what reason behind. Problems and issues do weak the governance structure of the firms. Vafeas and Theodorou (1998) said that the efforts of governance and board of directors increase the firm growth, performance and efficiency of the firms. Horvath and Spirollari (2012) argued that the inside ownership work efficiently in the firm. Corporate governance must influence the initial public offering (IPO) performance. Better governance increase the IPO performance and weaker governance reduce the IPO performance. Experience person can easily diverse the IPO but the non-experience person face complexity for IPO. Filatotchev and Bishop (2002) reported that the board of director's activity also impact on external investors behaviors.

2.4 Board Size and Firm Efficiency

The board of the firm makes the efficient policies, rules and procedures to extend the shareholders wealth. Board of directors used sound policies to increase the market value of the shares and country economy. Company governance depend on the board compositions and responsibility. Good governance manages responsibility and makes decisions with in time, makes the strategy with in time and increase the efficiency and reputation of the firms. The board is responsible for the shareholder wealth and govern the firm management. The board is the servant of top management or executives such as (CEO) who is the chairman of boards. Efficient board do work efficiently in the organization. The role of the board of directors has increasingly come under scrutiny in light of corporate scandal such as Enron, world come and health south in which the board of directors failed to act investors interest. Shareholders still pay attention on the board of directors and how to run the firms efficiently. There is no universal agreement on the optimum size of a board of directors. Each board of member work effectively in the organization. But most analyst think that the ideal size of board is seven, 7. Jensen (1993) reported that the seven or eight members are more effective for the firms. Two critical board committees are independent such as first compensation committee second is audit committee. The minimum number of each committee is three. Three members of compensation committee and three members of audit then total six member's committee and seventh number member is chairperson in the board. The chairperson is the responsible to makes the effective policies, rules and procedures to increase the efficiency of the organization. The conflict created of interest if the CEO is also the chairperson of the board. Board strategies also effect the firm activities and firm efficiency. Companies strategies depends on the board. If the board makes strategies strengthen than firm efficiency increase otherwise efficiency of the firm decrease if strategies is weakened. Johnson, Hoskisson and Hitt (1993) proposed that lack of board make more ineffective the managerial strategies and control of the firm. Sometime board restructuring the company strategies. Managers when restructure the firm strategies then firm efficiency is increase and the reputation of the firm also increase. Johnson et al., (1993) said that when the company performance and efficiency decrease the management and board restructure the company strategies. If the board failed to proper act and makes ineffective decisions than the share value of firm decrease, and efficiency also reduce of the firm. Board is the responsible to that provide all information about firm to their stakeholders. All investors that used this information for the investment. If the information is wrong than investors doesn't investment in the firm. The good corporate governance system attracts the foreign investors. When foreign investors want to investment in other country than first of all check the country laws, and policies after this thoroughly check the governance system. Oxelhim and Randoy (2003) said that the corporate governance easily remove the barriers for foreign investors and cross boarder investment. Two main sorts of firms, firstly entrepreneurship firms, secondly managerial firms. Firms entrepreneurship basically we can say family businesses. In family businesses, less chances of agency problems and operate more efficiently works. When efficiently works than market values of the share are increase and family business reputation also increase. But the managerial firms high level of chance of agency problems. In managerial firms the board of directors or top management is separate from the ownership, all information shareholders take from board of the directors. This information effect the shareholder's decisions. McConaughy, Walker, Henderson and Mishra (1998) reported that family businesses board work effectively and efficiently rather than the managerial firms. Singh and Davidson (2003) showed that the managerial agency cost and small businesses cost is different. Anderson and Reeb (2003) proposed that the family business is most profitable rather than the managerial firms because that the separation of ownership is show the fraud in the business, and maximum chances of conflicts occur. Denis and Denis (1994) documents that the separation of the firm from shareholders more chance issues and conflicts occur. In family firms, more stronger control against the nonfamily firms. The four-corporate system work in the world. It is necessary for the organization or firms chose any one and works through this. Corporate system is following work in the world such as German system, Japanese system, Latin system or the Anglo-American system. Oxelhim et al., (2003) argued that the Anglo-American system is much demanding for the firms and using more effectively in the firms rather than other systems. Managerial ownership is performing the all activities efficiently in the firms. Managerial ownership effectively utilizes the firm's assets and operating efficiency extend the firms. Managerial ownership can easily reduce the agency cost in the firms (Vafeas et al., 1998). But the outsiders cannot operate the firm asset affectively and nor reduce the agency cost of the firms. Managerial board wants to the increase the shares values of the firm and wants the makes efficient policies, rules, and procedures for the corporate governance structure. Singh et al., (2003) reported that the managerial ownership positively impact on the firm's activities rather than the outsiders. The board of directors can easily remove the conflicts from the organization. Conflict arises that time when the shareholder give the all power to manager for making the decisions of the firms. Or that time managers thinks all efforts we are doing and maximum portion of profit we are gives to the shareholders and they are enjoying and we are only work on small part of salary, it is more important point for the conflict arises. If the firm's shareholders compensate the all employees, then agency problems cannot arise in firm surly. Sometime firm's shareholders give the stock or bonuses to their board of directors or top management because to minimize the agency problems from the firms. When managerial ownership exists then less chances of conflicts occur. In previous studies discussed that the board structure also impact on the firm values and firm efficiency. But the change of board structure also impact on the firm values. Alern and Dittmar (2009) proposed that the change of board must increase the firm values and efficiency. They argued that the women work efficiently in the organization, rather than the men. Terjesen, Couto and Francisco (2015) argued that the female directors higher the firm performance and firm efficiency. But the new or younger woman also impact on firm value. Ramly, Chan, Mustapha and Sapiei (2015) showed that the female board of directors monitors the all aspect of firm efficiently. We cannot compare the experience man directors and new woman directors. Experience person makes efficient decision against the low experience person. But the female directors experienced act differently in the organization and increase the value of firm, reputation, and efficiency of the firms.

Board size is more effect on the firm performance and firm efficiency. Large number of members in the board are more issues arise in the firms such as lack of communication, decisions making power weak in the firms and doesn't makes decisions with in times. Large board poor communication among the employee more ineffective for the firm efficiency. Andres et al., (2005) documents that the large number of board reduce the equity value of the firms. Cheng (2008) proposed that the large number of board more impact on the firm performance. Rao and Lee-Sing (1995) argued that the large board related with less research and development and reduce the firm growth and firm productive efficiency. But the small board is more helpful for the firm making quick decisions, strong communication between each other and makes or take decisions within time. Yermack (1996) reported that the small board of the firm, increase the market value of the firms and efficiently manage all activities. Basically, more analysts think that the seven members of board is better than the more employees. Three members are audit committee, three members are compensation committee and one members are chairperson of the board. Capable board play important role in the organization such as change the firm profitability, firm growth, economy of country, market value of the shares of firms etc. the board meeting does introduce the new strategies in the firms. And described the different rules and procedure among employees, to achieve the organizational effective goals and find the solution to solve the agency problems. The board annual meeting call and check our governance do fulfilled the all requirement or not, and employees meet all responsibility honestly in the firm. Vafeas (1999) documents that the board annual meeting positively impact on the firm efficiency and firm performance. All information of the firms hold by the directors and check the all issues of the firms. High level of information absorbs the board of directors and they are known that the what our organization perform. Good board of directors clean the conflict among shareholders and managers. Governance can change the ownership structure of the firm. Barnhart and Rosenstein (1998) argued that the board of director’s compensation and managerial ownership is positively impact on firm efficiency and the firm performance. A durable governance take the risk and try to makes high level of return. Sometime governance use target zone strategies for the company. Targeted zone strategy mean company set the criteria 35 % or 40 % we cannot have used the debt. Efficient governance take the loan from bank high level and the company prefer the pay quickly loan amount with interest to the bank and enjoy the target zone or enter the target zone area. Governance take risk to maximize the shareholders interest. CEO manages all activities for organization and he is responsible for all resources of the firms. Zahra and Pearce (1989) showed that the CEO is play essential role for the designing and leading the board of the firm. Inefficient board of directors cannot manage properly responsibility of the firms. During the inefficient board makes weaken strategies for the firm. Andres, Azofra and Lopez (2005) reported that the inefficient board of the firms high costly for the company. The board of directors properly plan the firm's activities and monitors, reduce the uncertainty of the firms and try to makes effectiveness better return. But some researcher said that the large board of organization efficiently manages the firm's activities, large board of firms effectively work in the businesses (Pfeffer, 1972). The replacement of board is more effective for the company. Sometime permanent board full know the behavior of the firm's shareholders and they are knowing that the what type of check and balance in the company. This reason creates the agency problems for the company. Bhagat and Black (1999) documents that the replacement of the board more helpful for the company. Board of directors is more helpful the investors for the investment. Board of directors provide the accurate information to the investors and after makes the investment decisions. The investors face difficult to make decision for investment but the efficient board help the investors for making decisions of investment. Bhagat et al., (1999): and Haleblian and Finkelstein (1993) showed that the board of directors provide the information and helpful for the investors decision making. The board of directors promoting the company efficiency and the company profitability. Callen, Klein and Tinkelman (2003) documents that the board of directors more helpful to manages all activities of the firm and minimizing the contracting cost of the firm. The board of directors or top management of firm easily remove the conflicts and problems. The top management or the board of directors is the head of information.

All information hold by the board of directors and they are knowing that the what type of performance of the organization.

Hypothesis 1: Board size positively impact on the efficiency of banks.

2.5 Board Independent and Firm Efficiency

The concept of independent directors is an essential term within the board concept of the corporate governance. Independent board play important role to extend the firms efficiency. Bulan, Sanyal and Yan (2009) proposed that the independent board is more beneficial for the all firms. Firms measure the performance of independent board of directors. Identify the firm's strength, weakness, threats and opportunities. The independent board of directors manages efficiently all activities of the organization. The firm board of director's evaluation or measurement of the positively impact on the firm efficiency and the firm performance. The researchers shown that some organizations show the independent board performance, but most firms don't evaluate the performance of independent board of directors. The evaluation of firm performance is most beneficial for the company and significant impact on three levels such as organizational, board and individual member level. Independent directors monitoring the all aspect of firm efficiently. Firm bear the low cost on the independent board rather than the large board. Raheja (2005) documents that the independent board low costly for the company and well manages the interest of the shareholders. Independent board work effectively and unfriendly in the organization and everything monitors strictly. Adams and Ferreira (2007) argued that the independent directors work toughly and more effectiveness for the company. Independent board much helpful for the company performance and company efficiency. Independent board is means outside board of directors. Vafeas (1999) showed that the outsider board of directors increase the firm values. The independent board of directors monitoring and quickly used power to make the decision for the firms more efficiently and within the time. Baysinger and Butler (1985) said that the independent directors makes quickly decision and more efficiently for the firms. Some researcher said that the independent board play dominants role in the firm and used more strict behavior with the other employees. But it is more ineffective for the firm. They argued that these are beneficial for the small businesses but not for the managerial firms. The board structure is work collectively in the organization and more powerful for the firm. Firm high growth, R&D, high stock return, operating efficiency increase in the organization not support for the independent board. Linck, Netter and Yang (2008) argued that the determinants of board structure differ between small businesses and the large businesses. Board independent directors much effective for the organizations. Mak and Kusnadi (2005) said that the independent board more impact on firm values. Kallamu (2016) reported that the independent directors positively impact on the firm performance and firm efficiency. Independent board of directors easily chose the hard work employees. Independent board of directors hold all information and makes decisions on the bases of this information. Egwuonwu (2010) proposed that the majority independent board of directors help to the board member for chose the active employees. Independent directors make decision effectiveness in the contribute the independent views, and actively participate in board discussion. Fuzi, Halim and M.K (2016) showed that the independent directors minimize the agency problems from the organization. If the females independent board of director in the firm, she manages and monitor the all activity in the firm effectively. Females work hard in the organization during the female's board of directors less chance of agency problems face by the corporate governance mechanism. Females more intelligent rather than the males. Wang (2014) documents that the independent directors increase the equity holders return and firm efficiency. Outside directors of board used strictly rules in the firm and try to makes good efficiency of the banks. Outside directors makes the strength strategies for the organization. Kouki and Guizani (2015) reported that the outside directors minimize the agency problems and improve the firm share values.

Hypothesis 2: Board independence positively impact on the efficiency of banks.

2.6 Audit Committee Independent and Firm Efficiency

Audit committee is an operational committee take the financial information and check and disclose for the investors. Chairperson of the board chose the audit committee members. The purpose of audit committee is check the resources or strategies of the company properly used in the organization. Watts and Zimmerman (1983) reported that the audit committee reduce the agency problem from the organization. The audit committee helpful for the minimize the firm risk and management. Dionne and Triki (2005) argued that the audit committee helpful for the internal auditors to minimize the risk of the firms. Audit committee is responsible for the all process in the firm, and selection the internal and external auditors. Audit committee define the results of internal and external auditors. The committee force the board of directors to check the all responsibility of the employees meet honestly in the organization. Audit committee check the all activities of firm such as financial reporting, internal control of the firm, employee’s behaviors in the firm and accounting policies of the firm etc. committee help and give advice to manage the all activities of the firms. The terms and conditions of audit committee vary country to country and company to company. The financial decision makes by investors on information. But some organization manipulate the data and show the wrong picture to investors for investment. The audit committee try to promote the shareholder’s wealth. Bansal and sharma (2016) reported that the audit committee independent responsible for the promoting the shareholder’s wealth. Corplaw and

Blog (2014); Leungetal et al., (2014) represented that the audit committee wants that the we go to for long shareholder's interest. The audit committee helpful for the firms the control internal structure and improve the firm efficiency. The internal audit committee independent is the responsible for the surviving and the monitoring the all activities of firm. Internal audit committee remove the deficiency of the firm and try to makes good strategies improve the shareholders interest or the firm profitability. Independent committee person makes efficiently decision for the firms. Wang and Huynh (2013) proposed that the independent audit committee person make strong decision for the organization and reduce the firm's deficiency. Many studies show that the independent audit committee more influence the firm efficiency and firm performance (Chang and Li 2008); Aldamen et al., (2012); Al- Matari et al., (2012). The independent audit committee strong impact on the firm's efficiency. Hutchinson and Zain (2009) represented that the audit committee positively impact on firm efficiency and firm growth. Audit committee provide the road map to board of directors about the organization.

Hypothesis 3: Audit committee independence positively impact on the efficiency of banks.

2.7 CEO Duality and Firm Efficiency

The CEO duality is referring the situation when the CEO hold the position of the chairman of the firm board. The board of directors select the CEO on the behalf of the shareholders. The shareholders and the board of directors designing the compensation agreements and leasing and passion CEOs. A double CEOs work close with the board and make firm values. Rechner and Dalton (1991) proposed that the dual CEOs work in the organization more efficiently. The CEOs establishing the unity in the firms and makes essential decisions for the firms. The CEOs duality reduce the shareholder's responsibility in the organization. Without CEOs duality, the shareholders face difficult to monitor and manage the discipline in the organization. In duality, the firm have dual leadership structure. In duality business competition exist between both CEOs. Yang and Zhao (2012) documents that the more competition exist in duality business rather than the non-duality businesses. In duality businesses, the two CEOs work and large number of information holds the dual leadership structure the higher information cost in the firms. Some firms used the duality system and some firms used the nonduality system of the board. In duality business, the CEOs work with unity in the organization, efficiently monitors the all aspect of the firms. But agency theory gives arguments about this the duality dropped the bad impact on the firm performance and the firm efficiency. The duality firms relinquish the dual structure and used the non-duality structure. When the company used the dual system in the organization the expenses of the firm increases. In duality, the board of director’s responsibility divide, both CEOs work gather and try to improve the efficiency of the firms. Moscu (2013) argued that the duality board more effectively work in the company. Dahya and Travlosn (2000) reported that the positive relationship between CEOs duality and the firm performance or firm efficiency. Some researcher gives argument the agency theory indicate the CEOs duality is drop the bad impact on the firm performance and the firm efficiency (Chen, 2014). The CEOs duality system company start after the governance scandal in USA (Enron, world come etc). All company shareholders known that the board of directors makes all decisions for the organization. The board of director not take efficient decision for the company. Then the company’s shareholder decides the CEOs duality in the firm is better. The main responsibility of the CEOs is the implement the board of director’s strategies in the firm and check in firm what type of result outcome. The board of directors provide the road map to the CEOs. Some previous studies show the duality negative effect on the firm efficiency and performance (Chen et al., 2005; and Ujunwa (2012). But some researcher argued that the duality system is positive impact on the company efficiency and performance (Peng et al., 2007; Baptista et al., 2016; Lam and Lee 2008). But other researcher said that the duality of board has no impact on the firm efficiency and performance (Faleye, 2007; Yu 2008). The firms cannot work proper then select the right person for the board and leads in the organizations. If the firms chose the right person for the board then the firm efficiency increase. The separation of the business more effect on the firm efficiency (Brickley, Coles and Jarrell 1997). Baliga, Moyer and Rao (1996) reported that the duality of board leads the firm performance.

Hypothesis 4: CEOs duality positively impact on the efficiency of banks.

2.8 Institution Shareholder Ownership and Firm Efficiency

Institutional shareholder ownership mean institutional investors spend money for purchase the firms securities, real property or the any assets of the firms. Institutional investors include the banks, insurance companies, pensions and the mutual fund, etc. operating firm also investment in the capital in these assets. The institutional investors are the main source of capital in the financial market. Sometime the firms face the financial problems. The institutional investors provide the finance to achieve the firm's opportunity. Institutional investors reduce the agency problems and promote the corporate governance mechanism. The institutional investors investment procedure is different other investors. The institutional investors make the portfolio for the investments. The institutional investors need high level of liquidity hold in the firms and reduce their investment opportunities. When the institutional investors pay finance to other company or firm. They used the policies for protection of finance the better protection is insurance for the business etc. the institutional investors investment the finance on the behalf of their members. If the firm corporate governance is strong then no issues for taking the finance in crucial situation. If the weak governance corporate structure the institutional investors doesn't give the finance without securities. After firm governance scandals the shareholders doesn't believe the board of director's strategies and policies. Then the firm ownership more hit and those scandals affect the several countries ownership. Institutional investors help to the shareholders and manage the firm all activities. Najjar (2015) proposed that the institutional investors dropped positively impact on the firm performance or efficiency. Institutional investors improve the firm efficiency and firm growth. The institutional investors help makes good corporate governance for the firms. Institutional investors reduce the inefficiency of the firm and bad performance of the firms. The institutional investors help the firm to survives the long time in the markets. Institutional investors select the good and more efficient person for governance. Chung, Fung and Hung (2012) represented that the institutional investors reduce the agency problem in the organization. The institutional investors not directly participate in the governance decision of the firm. Charfeddine and Elmarzougui (2011) documents that the institutional investors not directly effect on the organization decision makes by the board of directors. Institutional investors improve the organization equity and growth. The institutional ownership is the improve the firm efficiency and the firm performance. The institutional investors behavior and market behavior are different react between the developing countries and developed countries. Tahir, Saleem, Arshad (2015) Reported that the institutional investors not same react both in developing and developed countries. Moghaddam, Reihanzadeh, Gharjagh, Ahmadi, Foroghi and Akbari (2014) argued that the institutional investors or ownership increase the return of firm and growth of firms. Institutional investors also help reduce the conflicts or problems from the organizations. Sauha and Anis (2016) proposed that the may help reduce the agency issues from companies.

Hypothesis 5: Institutional shareholder ownership positively impact on the efficiency of banks.

2.9 Managerial Ownership and Efficiency

Managerial ownership is play important role in the organization. Managerial ownership reduces the agency problems and improve the firm efficiency. Sometime the shareholders give the few part of shares to the board of directors or the top management. Short and Keasey (1999) reported that the managerial ownership help to minimize the agency issues. The moral hazard problems create that time when the businesses separation from ownership of the shares. Effectiveness corporate governance easily remove the all conflicts from the organization. Li, Moshirian, Nguyen and Tan (2007) documents that the managerial ownership increase the firm performance and efficiency but decrease the company problems. If the corporate governance is work do well in the organization, then the lack chances to occur the problems in the company but the corporate governance is work inefficiently in the company the more chances occur the problems in the firms. Some the shareholder offer to top management or board of directors to purchase the company share for own self. When top management purchases the shares then more less chances the managers works not only for own interest. Conflicts creates that time when managers or top management think the all efforts ours and interest enjoys other peoples. Li and Sun (2014) argued that the shareholders offer some part of share for the board of directors. Ruan, Tian and Ma (2011) showed that the managerial ownership more effect the firms value. Hubbard and Palia (1995) proposed that the managerial ownership reduce the agency cost of the firms. If the large numbers of share give to the manager or the top management, then opposite effect on the firm performance and efficiency of the firm. Mueller and Spitz (2002) represented that the large number of share of managerial ownership then negative impact the firm efficiency and the firm performance. When the shareholders offer the few part of shares to managers then they work more efficiently in the organization. Zhou (2001); and Hu, and Zhou (2006) showed that the firm managerial ownership positively impact on the firm's efficiency and firm performance. DeAngelo and DeAngelo (1985) justified that the managerial ownership promoting the shareholder's wealth. In the corporate governance index over all corporate governance elements discuss such as board size, board independent, audit committee independent, CEO duality, institutional shareholder's ownership and managerial ownership. Corporate governance help for the investments and high level of return (Muniamba, 2009).

Hypothesis 6: Managerial ownership positively impact on the efficiency of banks.

Corporate governance more influence on the efficiency of the firm, research on the technical efficiency (TE) of companies over data envelopment analysis (DEA) supports entire to the problem of corporate governance in a change scenario. If the positive or significant relationship occur between corporate governance and technical efficiency, then company's incentives develop their governance. Zheka (2005) technical efficiency we can measure single collective of using input factors to produce and preferred output relative to efficiency. The data envelopment analysis (DEA) enable an inspect of the root of the corporate governance problem and specifically, of the inefficient use of resources. The use technical efficiency to measure the company performance and efficiency of the firm in different ways. Destefanis and sena (2007) represented that the many way for technical efficiency. (i) the technical efficiency batter implication for the firm's performance and firm efficiency measure in developing capital market, because the diminishes the importance measures base on share price the information not full reflect or hit in the market. (ii) the separation of ownership control and board of directors works the reduce the technical efficiency of the firm. The many studies represented that the separation of ownership create the conflicts for the organization and efficiency reduce of the firms, (Jensen and Meckling 1976; Belkaoui and pavlik 1992). The compensation of the board of director's fund improve the efficiency of the firm. Ghosh (2007) proposed that the compensation and the firm performance positive relationship exist.

Babenko (2009) indicated that the share buyback is positively relate the employee's compensation and the employee buy share when company face the financing problem, it is more positive edge for the top management and receive the higher compensation from organizations. This is not better full for the employees always. Some researchers argued that the if firm share sell outsider from company then better full for the company and company efficiency or growth improves (Bennett, 2010). Slovin and Sushka (1993); Ghosh and Ruland (1998); Hall and Liebman (1998); Fahlenbrach and Stulz (2009) documents that the positive relationship among firm performance, firm efficiency and employee's compensation. Bulan, Sanyal and Yan (2010) proposed that the non-monotonic positive relationship between productive efficiency and executive ownership. Guedri and Hollandts (2008) reported that this relationship provides by the French companies.

Good corporate governance more impact on the pure technical efficiency (PTE). We used the BCC model was to assess the efficiency of decision making units DMUs characterized by variable return to scale (VRS). The VRS assumption provide the measurement of pure technical efficiency (PTE), which is the measurement of technical efficiency lacking of the scale efficiency effect. The PTE measure is obtained by estimating the efficiency frontier under the assumption of variable returns to scale. It is a measure of technical efficiency without scale efficiency and purely reflect the managerial performance to organize the inputs in the production process. PTE measure has been used as an index to capture managerial performance. The corporate governance more positively impact on the pure technical efficiency (Kumar and Gulati 2008). And we used the scale efficiency (SE) measurement is ratio of OTE to PTE provide SE measure.

Chapter 3

Methodology

To analyses the influence of aspect of the corporate governance on efficiency of banks listed in the Pakistan. study have conducted descriptive research based on quantitative methods.

3.1 Equations

TE = f (ACI, BI, BOARD, CEO, ISO, MANAG, ROA, SZ)

PTE = f (ACI, BI, BOARD, CEO, ISO, MANAG, ROA, SZ)

SE = f (ACI, BI, BOARD, CEO, ISO, MANAG, ROA, SZ)

This study depends on three efficiencies (TE 1, PTE 2 and SE 3) for dependent variables and check the impact on different variables specifically impact on corporate governance mechanism.

3.2 Liner equations

$$TE_{i,t} = \beta_0 + \beta_1 ACI_{i,t} + \beta_2 BI_{i,t} + \beta_3 BOARD_{i,t} + \beta_4 CEO_{i,t} + \beta_5 ISO_{i,t} + \beta_6 MO_{i,t} + \beta_7 ROA_{i,t} + \beta_8 SZ_{i,t} + \varepsilon_{i,t}. \qquad (1).$$

$$PTE_{i,t} = \beta_0 + \beta_1 ACI_{i,t} + \beta_2 BI_{i,t} + \beta_3 BOARD_{i,t} + \beta_4 CEO_{i,t} + \beta_5 ISO_{i,t} + \beta_6 MO_{i,t} + \beta_7 ROA_{i,t} + \beta_8 SZ_{i,t} + \varepsilon_{i,t}. \qquad (2).$$

$$SE_{i,t} = \beta_0 + \beta_1 ACI_{i,t} + \beta_2 BI_{i,t} + \beta_3 BOARD_{i,t} + \beta_4 CEO_{i,t} + \beta_5 ISO_{i,t} + \beta_6 MO_{i,t} + \beta_7 ROA_{i,t} + \beta_8 SZ_{i,t} + \varepsilon_{i,t}. \qquad (3).$$

Where,

TE = Technical Efficiency

PTE = Pure Technical Efficiency

SE = Scale Efficiency

ACI = Audit Committee Independence

BI = Board Independence

BOARD = Board Size

CEO = CEO Duality

ISO = Institutional Shareholder Ownership

MO = Managerial Ownership

ROA = Return on assets

SZ = Firm Size

3.3 Variables Descriptions

3.3.1 Audit Committee independence

An audit committee is a selected number of members of a company's board of directors whose responsibilities include helping auditors remain independent of management. the audit committee's obligation to choose and manage the issuer's independent accountant, procedures for treatment protests about the issuer's accounting practices, the authority of the audit committee to involve consultants, and funding for the independent auditor and any outside advisors engaged by the audit committee. Proxy number of independent or non-executive's members on audit committee over total number of board members (Bulan, Sanyal & Yan, 2009).

3.3.2 Board Independence

An independent board is a corporate board that has a majority of outside directors who are not affiliated with the top executives of the firm and have minimal or no business dealings with the company to avoid potential conflicts of interests. Mean the how number of members or directors in the board independent. Proxy board independent members or nonexecutive directors divided by the total no. of board members (Bulan, Sanyal & Yan, 2009; Sonza & Kloeckner, 2013).

3.3.3 Board Size

A group of people constituted as the decision-making body of an organization. Total number of board members in the bank (Bulan, Sanyal & Yan, 2009).

3.3.4 CEO duality

CEO duality denotes to the situation when the CEO also holds the position of the chairman of the board. "1" if CEO and chairman of board is a same person otherwise "0" (Bulan, Sanyal & Yan, 2009).

3.3.5 Institutional Shareholder Ownership

Institutional investor is a term for entities which pool money to purchase securities, real property, and other investment assets or originate loans. Institutional investors may also influence corporate governance by exercising voting rights in their investments. Number of share held institutions over total number of shares or outstanding shares (Bulan, Sanyal & Yan, 2009).

3.3.6 Management Ownership

Management is a term for entities which pool money to purchase securities or share from the firms is called the management ownership. Number of shares held by managers or directors divided by total number of shares or outstanding shares (Bulan, Sanyal & Yan, 2009).

Control is an alternative term for independent variable. The control variable (or scientific constant) in scientific experimentation is the experimental element which is constant and unchanged throughout the course of the investigation. The control variable strongly influences experimental results, and it is held constant during the experiment in order to test the relative relationship of the dependent and independent variables.

3.3.7 ROA

Return on assets (ROA) is an indicator of how profitable a company is relative to its total assets. ROA gives an idea as to how efficient management is at using its assets to generate earnings. Calculated by dividing a company's annual earnings by its total assets, ROA is displayed as a percentage. Sometimes this is referred to as "return on investment”. Formula use for profitability measure net income divided by the total assets. “Profitability of firm calculated as return on assets” as proposed by Tan & Florose (2013).

3.3.8 Size of Firm

Size of the firm is more strongest control variable. Different types of firm size such as large, medium and small. In this study, Bank size of the firm estimated through proxy “logarithm of total assets” showed by the Tan & Florose (2013).

3.4 Efficiency

In pervious literature efficiency measure through two approaches such as (1) Production approach and (2) Intermediation approach used for the choose of input and output. Benston (1965) and Bell and Marphy (1968) first time introduced by the production approach. Under this approach, the banks specific factors used for the inputs like labor and capital as can create various kinds of the advances and investments. The intermediation approach introduced by Sealy and Lindley (1997). Under this approach, the banks used the deposit fund or physical assets to create the advances and investments. The large numbers of studies depend on the Data Envelopment Analysis and used the intermediation approach (Sathye 2003). Inputs and outputs selection through previous studies for this study depend on intermediation approach used for efficiency measure by Tsionas et al., (2003), Canhoto and Dermine (2003), Burki and Niazi (2003), Ketkar et al., (2003) and Usman et al., (2010).

This study depended various inputs and outputs following.

Out puts

Gross loan

Financial institutional lending

Investments

Inputs

Operating fixed asset

Deposits

Financial institutional borrowing

Number of employees

3.4.1 Technical Efficiency (TE)

Leong et al., (2003) Burki and Niazi (2006) Akmal and Saleem (2008) and Usman et al., (2010) reported that the technical efficiency measure through the DEA, CCR model. Akmal and Saleem (2008) documented that different methods to measure the technical efficiency and precisely variable identify and research design. But this proposed the constant return to scale is better for us. Previous literature suggested technical efficiency opt is non-parametric methods approach used DEA for CCR model, (1978). CCR model which is calculated as ratio weighted inputs to outputs. Technical efficiency rage between 0 and 1, closer to “zero” is inefficiency and closer to “one” is efficiency.

3.4.2 Pure Technical Efficiency (PTE)

The Data Envelopment Analysis is best tool for measuring the efficiency of the firms. First time introduced by the Charners, Cooper and Rhodes (1978). We can say CCR model, this is the linear programing technique. The CCR help us the measurement the efficiency of each decision-making units (DMU) that is obtained as a maximum outputs and minimum inputs weights. If less inputs invested in producing the more outputs then high efficient of the production of firm. In CCR we take the assumption CRS (constant return to scale). CRS assumption is better for, when all DMUs are operating at an optimal scale. If the no significant relationship between the scale of operation and efficiency, then we relinquish the CRS assumption and used the Banker et al., (1984). In this model, we take the assumption VRS (variable return to scale). This model assumption was used to assess the efficiency of decision making units characterized by variable return to scale. Akmal and Saleem (2008) and Usman et al., (2010) using the scale efficiency and pure technical efficiency in Pakistani banking sectors and Tan & Floros (2013) used the BCC model in banking sectors the country of china.

3.4.3 Scale Efficiency (SE)

The scale efficiency measured by using the BCC model proposed by the banker et al. (1984). Input oriented Data Envelopment Analysis approach applied under the assumption of variable return to scale as incorporated by Akmal and Saleem (2008), Usman et al. (2010) and Tan & Florose (2013) in their studies. This model assumes that all DMUs are operating at their best level means scale of operations have no noteworthy association with efficiency which is not true in dynamic microstructure market as suggested by Bankers et al. (1984). Bankers et al. (1984) soothing the constant return to scale assumption modified the model into "BCC" model. Variable return to scale assumed by "BCC" model assesses the pure technical efficiency of each decision-making unit. Purely technical efficiency measured by this model is free of effect of scale efficiency. The representation of the CCR model is as follows:

$\text{Min}_{\Theta,\lambda}\,\Theta$

Subject to

$-y_i + Y\lambda \geq 0,$

$\Theta x_i - X\lambda \geq 0,$

$\lambda \geq 0$

Where constants are represented by λ a vector of $N \times 1$ and scalar is reported as Θ, all data of inputs and outputs stated as Y for N firms, outputs individually reported as y_i and individual inputs as x_i for ith firm. Efficiency scores are reported as Θ ranges from 0 to 1 for each decision-making unit denotes the level of efficiency. $N1'\lambda=1$ is convexity restriction added in CRS model to remove the linear programming problem which will provide "BCC" model characterized with variable return to scale. The "BCC" model can be written as;

$\text{Min}_{\Theta,\lambda}\,\Theta$

Subject to

$-y_i + Y\lambda \geq 0,$

$\Theta x_i - X\lambda \geq 0,$

$N1'\lambda=1$

$\lambda \geq 0$

Where $N1$ is a $N\times 1$ vector of ones. The "CCR" model provides conical hull of intersecting planes which envelops data points loosely. To envelope the data points more tightly for producing convex hull of intersecting planes VRS approach is used. Efficiency score obtained from CRS model can be equal or less than "pure technical efficiency" scores. If the scores of "technical efficiency" and "pure technical efficiency" are different then scale inefficiency exist in DMU. The scale inefficiency can be computed by calculating the divergence of scores of technical efficiency and pure technical efficiency form the following expression; $TE_{CRS} = TE_{VRS} \times SE$

3.5 Data collection

We have collected data from annual reports of banks and other bank sites. The basic data related to banks return on assets, size, and corporate governance related such as (board size, audit committee independence, board independence, institutional shareholder ownership, managerial ownership and CEOs duality).

3.6 Sample size

this study depended on 26 banks listed in Pakistan. study was started data obtain from the year 2005 to 2015. In this research used probability technique for select the sample size and check the different efficiencies such as TE, PTE and SE. In this study, used the method of DEA for efficiencies measures and used the technique penal balance methods.

Chapter 4

Results and Discussion

4.1 Descriptive statistics

The descriptive statistical analysis for all variables of this study for the period of 2005 – 2015. The mean value represents the average value of variables and stander deviation measure of the dispersion from the mean. The maximum value identifies the highest value and minimum shows the lower value of data.

Table 4.1

Descriptive statistics

Variables	Mean	Std. Dev.	Minimum	Maximum
Board	8.343	0.094	4	13
ACI	0.298	0.006	0.143	0.571
ISO	0.084	0.003	0.010	0.224
M.O	0.048	0.006	0	0.674
CEO **(**duality)	0.150	0.021	0	1
B.I	0.698	0.011	0.182	0.923
ROA	0.003	0.001	- 0.092	0.037
SZ	18.753	0.082	15.208	21.56
SE	0.965	0.004	0.688	1
TE	0.937	0.005	0.674	1
PTE	0.969	0.004	0.674	1

Table 4.1 shows the mean value of board size is 8.343 which means that the average company has 8 directors and stander deviations is 0.094, and minimum level is 4 and maximum number of board of directors is 13. The mean value of audit independent committee is 0.298 it shows the average number of outsider member of the audit committee is 29 percent by having a deviation from the mean is 0.006. the maximum level of the audit independent committee member is 0.571 and minimum level is 0.143 observe during the sample period. ISO is (institutional shareholding ownership) mean is 0.084 represents the 8 percent of share held in average by the institution and maximum level of institutional ownership is 0.224 represent is 22 percent and minimum value is 0.011 represent is 1 percent and stander deviation is 0.003. The managerial ownership mean is 0.048 represent the 4 percent average, but the stander deviations is 0.006. the maximum value is 0.674 represent 67 percent average shares held by the banks directors, minimum value is 0. CEO duality the average value is 0.150 the value of the mean is near to zero, it means that most banks haven’t CEO duality, and stander deviation is 0.021, and the maximum value is the 1 but the minimum value is 0. The average value of board independency is 0.698 it means the 69 percent outsider member in the executive board. The stander deviation is 0.011, the maximum level is 0.923 and minimum level is 0.182 of board independent in overall period. Return on asset (ROA) average mean is 0.003 it means the 2 percent average return on asset. The stander deviation is 0.001 the maximum level is 0.037 and minimum level is - 0.093 overall the period. The size average is 18.753, stander deviation is 0.082, maximum level is 21.562 and minimum level is 15.208. SE (Scale efficiency) average during the period is 0.966 stander deviation SE is 0.004 maximum level is 1 and minimum level 0.688. TE (Technical Efficiency) average is 0.937, stander deviation is 0.005, maximum level of technical efficiency is 1 and minimum level is 0.674. PTE (pure technical efficiency) average is 0.969, and stander deviation is 0.004, maximum level of pure technical efficiency is 1 and minimum level is 0.674.

Correlation Matrix

Table 4.2

	Board Size	ACI	ISO	M.Owner	CEO	B.I	ROA	SZ
Board size	1							
ACI	-0.546	1						
ISO	-0.101	0.162	1					
M.O	0.069	-0.016	0.143	1				
CEO	-0.073	0.105	0.0960	-0.62	1			
B.I	0.089	0.082	0.075	-0.132	0.042	1		
ROA	0.281	-0.702	0.068	0.519	0.101	0.296	1	
SZ	0.328	-0.068	-0.083	0.200	0.087	0.185	0.492	1

Table 4.2 presents that the audit committee negatively correlated with no. of board members we used the proxy of audit independent directors divided by total no. of board directors. ISO mean the institutional ownership in the firms, here ISO negatively correlated with no. of board and positively correlated with audit committee. We used the proxy measurement for ISO is total numbers of institutional shares divided by the total numbers of shares or total outstanding shares. M.

Ownership means managerial ownership in the firm, M.O is positively correlated with no. of board director, negatively correlated with the audit committee but positively related with ISO. We used the proxy of total managerial share divided by total number of shares or outstanding shares. CEO duality is negatively correlated with the no. of board, positively correlated with the audit committee and ISO, but the negatively correlated with M. ownership. B. I mean the board independence in the firms, no. of board, audit committee, ISO and CEO (duality) is positively correlated with the B.I but the M. Ownership is negative correlated with the B.I. we used the proxy for measure the B.I through the number of independent directors divided by the total numbers of board members. ROA mean the (return on assets) of the firms, ROA positively correlated with the all variables without the audit committee independence. Here study used the proxy is net income divided by total assets. SZ mean the firm size, firm SZ is positively correlated with the all variable without the audit committee independence and ISO. Study used the proxy measure for firm size through taking the natural log.

4.3 Regression Model 1 (dependent variable is TE-CRS)

Here Table 4.3.1 we applying the fixed effect model for the TE-CRS efficiency. The TE-CRS efficiency means is (technical efficiency). the R square value is 0.388. It means the 38% variation in technical efficiency is occurring due to all independents variables. C show the intercept in results coefficient is 0.564, stander error is 0.188, t-statistic is 2.999 and prob. During the period is 0.013.

Table 4.3.1

Fixed effect model (dependent variable is TE-CRS mean technical efficiency)

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	0.564	0.188	2.999	0.013
ACI	0.205	0.087	2.366	0.019
BI	-0.122	0.045	-2.739	0.007
BOARD	0.007	0.006	1.136	0.257
CEO	0.055	0.041	1.318	0.189
ISO	-0.275	0.172	-1.597	0.111
MO	0.300	0.130	2.309	0.021
ROA	0.494	0.303	1.631	0.104
SZ	0.018	0.009	1.948	0.052

$R^2 = 0.388$	F-statistic = 4.836
Adjusted R-squared = 0.311	Prob(F-statistic) = 0.000
N = 286 (panel balance)	Durbin Watson state = 1.404

ACI means the audit committee independence is positively and significant relationship between the TE-CRS efficiency. It means the if we increase the audit committee in the firm than the firm TE-CRS efficiency is increases during the period. The coefficient value is 0.205 and prob. Value is 0.019. B.I means the board independence is negatively and significant relationship between the TE-CRS efficiency. It means the if we independence board increase the firm TE-CRS efficiency is decreases and relationship is significant. The coefficient value is -0.122 and prob. Value is 0.006. Board means the no. of board of directors the positively and insignificant relationship between the

TE-CRS efficiency. If the board of directors increases in the firm than the TE-CRS (technical efficiency) is also increase but the relationship is insignificant. The coefficient value is 0.007 and prob. Value is 0.257. CEOs duality is positively and insignificant relationship exist between the TE-CRS efficiency. It means if company CEOs duality do increase then the firm TE-CRS efficiency is also increase but the relationship is insignificant. The coefficient value is 0.055 and prob. Value is 0.188. ISO means the institutional ownership is negatively and insignificant relationship between the TE-CRS (technical efficiency). If the institutional ownership is increases the firms than the firm's technical efficiency is decreases. The coefficient is -0.275 and prob. Value is 0.111. manage means the managerial ownership is positively and significant relationship exist between TE-CRS efficiency. If the managerial ownership is increases than the firm technical efficiency is also increases. The coefficient is 0.300 and prob. Value is 0.022. ROA means the return on assets is positively and insignificant relationship exist between the TE-CRS efficiency. If the company assets increase than firm technical efficiency also increases but the relationship is insignificant. Coefficient is 0.494 and prob. Value is 0.104. SZ means the firm size is positively and significant relationship exist between the TE-CRS efficiency. If the firm size increase than the firm efficiency is also increases. The firm size coefficient value is 0.018 and prob. Value is 0.053.

Regression model 2 (dependent variable is scale efficiency)

Table 4.3.2 we used the fixed effect model for the scale efficiency (SE). the hausman test prob. Result is 0.000. we decided on this which model is suitable. Fixed effect model is suitable for this efficiency. the value of R square is 0.363. It means that 36% of variation in scale efficiency (dependent variable) is occurring due to all independent variables. C show the intercept coefficient value is 0.499, stad.error value is 0.142 t.state value is 3.511 and the prob. Value is 0.002.

Table 4.3.2

Fixed effect model and dependent variable is scale efficiency

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	0.499	0.142	3.511	0.002
ACI	0.179	0.065	2.748	0.006
BI	-0.081	0.034	-2.408	0.016
BOARD	0.002	0.005	0.416	0.677
CEO	0.011	0.031	0.351	0.726
ISO	-0.037	0.130	-0.285	0.776
MO	0.285	0.098	2.899	0.004
ROA	0.284	0.229	1.239	0.216
SZ	0.023	0.007	3.365	0.001

R^2 = 0.363	F-statistic = 4.354
Adjusted R-squared = 0.279	Prob(F-statistic) = 0.000
N = 286 (panel balance)	Durbin Watson state = 1.353

ACI mean the audit committee independence positively and significant relationship between the Scale efficiency. If the audit committee members increase than the firm efficiency also increases. The coefficient value is 0.179 and prob. Value is 0.006. B.I means the board independence is negatively and significant relationship between the scale efficiency. If the board independence members are increase the firm efficiency is decreases. The coefficient value -0.081 and prob. Value is 0.017. Board means the number of board of directors is positively and insignificant relationship between the scale efficiency. If board members are increases than the firm efficiency is also increase but the relationship is insignificant. The coefficient value is 0.002 and prob. Value is 0.677. CEOs duality is positively and insignificant relationship between the scale efficiency. If the CEOs take responsible board and chairman or president, then increase the firm efficiency. The coefficient value is 0.011 and prob. Value is 0.726. ISO means the institutional ownership is negatively and insignificant relationship exist between scale efficiency. If the institutional ownership increase than the firm efficiency is decrease. The coefficient value is -0.037 and the prob. Value is 0.775. Manage means the managerial ownership is positively and significant relationship exist between scale efficiency. It means if the managerial ownership is increase than the firm efficiency is also increases. The coefficient value is 0.285 and the prob. Value is 0.004. ROA means the return on asset is positively and insignificant relationship exist between scale efficiency. If the assets increase in the firms the scale efficiency also increases but the relationship is insignificant. Coefficient value is 0.284 and prob. Value is 0.217. SZ means the firm size is positively and significant relationship exist between scale efficiency. If the firm size is increase than the scale efficiency is also increases. Coefficient value is 0.023 and prob. Value is 0.001.

Regression model 3 (dependent variable is pure technical efficiency)

Table 4.3.3 is the random effect model applying for the TE-VRS efficiency. TE-VRS efficiency means the (pure technical efficiency). C is show the intercept in the table, Coefficient is 0.938 stander error is 0.089, t. stat is 10.549, and prob. during the period is 0.000**.**

Table 4.3.3

Random effect model (table) applying for dependent variable is TE-VRS

Variables	Coefficient	Stander Error	t.stat	Prob.
C	0.938	0.089	10.549	0.000
ACI	0.025	0.054	0.459	0.646
BI	-0.010	0.026	-0.393	0.694
BOARD	0.006	0.004	1.743	0.082
CEO	0.036	0.018	2.017	0.045
ISO	-0.159	0.102	-1.571	0.117
MO	0.033	0.059	0.553	0.580
ROA	0.316	0.199	1.586	0.114
SZ	-0.001	0.005	-0.196	0.845
R^2 = 0.048		F-statistic = 1.729		
Adjusted R-squared = 0.020		Prob(F-statistic) = 0.091		
N = 286 (panel balance)		Durbin Watson state = 1.155		

first ACI (audit committee independence) is positively and insignificant relationship between TE-VRS. The ACI coefficient is 0.025 and prob. Value is 0.646 it means if audit committee independence improves the TE-VRS efficiency also improve but relation is insignificant between both. B.I (board independence) is second variable and negatively and insignificant relationship between TE-VRS. The B.I coefficient is -0.010 and prob. Value is 0.695 it means if board independence is increases then the TE-VRS efficiency is decreases of the firm. Board means the no. of directors in the board, no. of board positively and insignificant relationship between TE-

VRS. Board coefficient is 0.006 and prob. Value is 0.082. if the board members increase in the firm then TE-VRS efficiency is increase but the relationship is insignificant between both of theirs. CEOs duality is positively and significant relationship between TE-VRS. If the CEO duality is increase than the TE-VRS efficiency is also increases of the firm. CEOs duality coefficient value is 0.036 and prob. Value is 0.045. ISO means the institutional shareholding negatively and insignificant relationship between the TE-VRS efficiency. If institutional shareholding increases in the firms than the TE-VRS efficiency of the firm is decreases. The coefficient value is -0.159 and the prob. Value is 0.117. Manage means the managerial ownership positively and insignificant relationship between the TE-VRS. If the managerial ownership is increases than the TE-VRS efficiency also increases. The coefficient value is 0.033 and prob. Value is 0.581. Two control variables in over study such as ROA, SZ. ROA means is return on asset positively and insignificant relationship between TE-VRS. If the return on assets increases than the TE-VRS efficiency is also increase but the relationship is insignificant. The coefficient value is 0.316 and the prob. Value is 0.114. SZ means is firm size negatively and insignificant relationship between TE-VRS efficiency of firm. If the firm size increases than the TE-VRS efficiency is also decreases of the firms. Coefficient value is -0.001 and the prob. Value is 0.845.

Chapter 5

Conclusion and Recommendation

In this research work, empirical investigation conducted to find out corporate governance mechanism impact on efficiency of banking sector in Pakistan, a deeply investigation made by including the corporate governance mechanism structure and three dependent efficiencies such as (TE, PTE, SE). This study examined the data of Pakistani banks over the period of 2005 to 2015. During this period, main concern the banking firms was to improve the efficiency level and making the environment more competitive. When the corporate governance not properly work in the firms then occur the issues between executives and shareholders. According to Rediker and Seth, (1995) the conflict arises in the firms that time when managerial decisions are nonvalue and give negative consequences for the company. Ownership interest create the agency problem or issues between brokers and principles, (Berls & Means, 1932). The agency problem is main issue for the corporate governance, finance and administrative incentives, (Tirole, 2006). Short, Keasey, Wright and Hall (1999) proposed that the high level managerial ownership actually may increase the agency problem in the firms. The previous study show that the company's management does not play best or essential role for shareholder's interest. The executive or top management act different ways and inconsistent effect on the shareholder interest. The best top management policy improves firm efficiency, better governance minimizes the agency problem in the organization, (Johson, Boone, Breach & Friedman, 2000). According to Wang, Jeng and Peng (2007) the corporate governance mechanism plays an essential role in the impact of efficiency for property dues insurers in Taiwan. The lack of top management policies decrease the efficiency of the firms and also decrease the growth of the firms, (Johson et al., 2000). If the board is independently work, then weak performance become in the company and the company work with the shareholders efficiently perform more less chance of agency problems. Bhagat and Bolton (2008) find out the Independent board reduce the operating performance and efficiency of the firm. When company governance is strong then the investors are more investment in the firm and all situation depend on governance of the firms. Krafft, Qu, Quatraro, and Ravix (2013): Baner, Guenster and Otten (2004). The system of banks is plays essential role in the country. If the banking system sound and efficient than the whole economy grows in the country. Kumar and Gulati (2008) suggested that the banking system directly effect to the country growth and the firm productions. We were used the DEA (data envelopment analysis) for measured the efficiencies. In DEA, we used the two models first CCR model and second BCC model. CCR model provided the measurement of technical efficiency. And BCC model used for the pure technical efficiency. we were taken the outputs such as (Gross loan, Financial institutional lending, Investments) and inputs such as (Operating fixed asset, Deposits, Financial institutional borrowing, Number of employees) for efficiencies measured. Audit committee independent positively impact on firm's efficiency. But some researcher given arguments that the B.I (board independent) we could not give evidence the positively impact on the firm efficiency. but some research given arguments that the B.I is positively impact on the firm efficiency. In our results the B.I is negative and significant impact on firm efficiency. It means the if Pakistani banking sectors we improve the board independent directors than the firm efficiency is also decreases. Our study is depended on 286 observations and used the panel balance technique for this research work.

In this study, due to time and data limitations Islamic banks and Microfinance banks are not taken into consideration. An empirical investigation is required to investigate the same relationship as elaborated in this study, further a comprehensive comparative empirical study on Islamic, corporate governance mechanism of the Pakistani banks relation with efficiency of the banking firms is required to fill the gap. It is believed that current study might be helpful for regulatory authority of Pakistani banking system, investors, and policy makers of banks. As well as, it will provide the base contextually for further studies and a contribution to empirical literature.

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Appendix

Tables for model selection which model is best for this study.

1 Common effect model (dependent variable is TE-CRS means technical efficiency)

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	1.034963	0.093914	11.02031	0.0000
ACI	0.083027	0.070402	1.179341	0.2393
BI	-0.013988	0.031475	-0.444416	0.6571
BOARD	0.003515	0.004431	0.793259	0.4283
CEO	0.003951	0.015519	0.254593	0.7992
ISO	-0.127754	0.117418	-1.088033	0.2775
MO	-0.079587	0.056053	-1.419858	0.1568
ROA	0.813873	0.308335	2.639577	0.0088
SZ	-0.006937	0.004778	-1.451673	0.1477
R^2 = 0.039986		F-statistic = 1.442170		
Adjusted R-squared = 0.012260		Prob(F-statistic) = 0.178751		
N = 286 (penal balance)		Durbin Watson state = 0.879989		

2 Fixed effect model (dependent variable is TE-CRS means technical efficiency)

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	0.563933	0.188016	2.999392	0.0130
ACI	0.204898	0.086608	2.365803	0.0187

BI	-0.122231	0.044618	-2.739490	0.0066
BOARD	0.007117	0.006264	1.136168	0.2570
CEO	0.054646	0.041459	1.318090	0.1887
ISO	-0.275026	0.172166	-1.597444	0.1114
MO	0.300427	0.130056	2.309983	0.0217
ROA	0.494490	0.303109	1.631396	0.1041
SZ	0.017995	0.009235	1.948578	0.0525

R^2 = 0.387776	F-statistic = 4.836788
Adjusted R-squared = 0.310604	Prob(F-statistic) = 0.000000
N = 286 (penal balance)	Durbin Watson state = 1.404001

3 likelihood test (dependent variable is TE-CRS means technical efficiency)

Effects Test	**Statistic**	**d.f.**	**Prob.**
Cross-section F	5.726213	(25,252)	0.0000
Cross-section Chi-square	128.657057	25	0.0000

We used the likelihood test for the selection purpose that either common effect model or fixed effect model will be better. The selection criteria are the P-value of this test. If the P-value is significant than we will reject common effect model. Our results show the P-value is significant (0.0000) therefore we reject the common effect model.

4 Random effect model dependent variable is TE-CRS means technical efficiency

Variable	Coefficient	Std.Error	t. Statistic	Prob.
C	0.847544	0.130177	6.510703	0.0000
ACI	0.161241	0.078620	2.050882	0.0412
BI	-0.089669	0.037690	-2.379105	0.0180
BOARD	0.004275	0.005357	0.798056	0.4255
CEO	0.017093	0.025959	0.658464	0.5108
ISO	-0.220631	0.148058	-1.490166	0.1373
MO	0.042797	0.087713	0.487914	0.6260
ROA	0.590169	0.288157	2.048078	0.0415
SZ	0.004321	0.006695	0.645420	0.5192
R^2 = 0.060603			F-statistic = 2.233737	
Adjusted R-squared = 0.033472			Prob(F-statistic) = 0.025276	
N = 286 (penal balance)			Durbin Watson state = 1.124609	

5 Hausman test dependent variable is TE-CRS means technical efficiency.

Test Summary	Chi-sq. Statistic	Chi-sq.d.f.	Prob.
Cross-section random	17.986697	8	0.0213

Here we check the all table data through different test such as common effect, fixed effect model, likelihood test, random effect model and hausman test. The hausman test prob. Result is (0.0213). it means the less than the 5% or 0.05, if the hausman test prob. Result is less than 5% or 0.05 then we apply the fixed effect model. Here we applying the fixed effect model for the TE-CRS means technical efficiency.

7 common effect model and dependent variable is SE means Scale efficiency

Variables	Coefficient	Std.Error	t. state	Prob.
C	0.499029	0.142132	3.511030	0.0005
ACI	0.179922	0.065472	2.748080	0.0064
BI	-0.081221	0.033729	-2.408016	0.0168
BOARD	0.001974	0.004736	0.416843	0.6771
CEO	0.010995	0.031341	0.350824	0.7260
ISO	-0.037135	0.130150	-0.285328	0.7756
MO	0.285057	0.098317	2.899372	0.0041
ROA	0.283873	0.229137	1.238879	0.2165
SZ	0.023490	0.006981	3.364900	0.0009

R^2 = 0.363148	F-Statistic = 4.354433
Adjested R squared = 0.279751	Prob(F-Statistic) = 0.00000
N = 286 (penal balance)	Durbin Watson State = 1.352974

8 Fixed effect model and dependent variable is scale efficiency

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	0.499029	0.142132	3.511030	0.0015
ACI	0.179922	0.065472	2.748080	0.0064
BI	-0.081221	0.033729	-2.408016	0.0168
BOARD	0.001974	0.004736	0.416843	0.6771
CEO	0.010995	0.031341	0.350824	0.7260

ISO	-0.037135	0.130150	-0.285328	0.7756
MO	0.285057	0.098317	2.899372	0.0041
ROA	0.283873	0.229137	1.238879	0.2165
SZ	0.023490	0.006981	3.364900	0.0009

R^2 = 0.363148	F-statistic = 4.354433
Adjusted R-squared = 0.279751	Prob(F-statistic) = 0.000000
N = 286 (penal balance)	Durbin Watson state = 1.352974

9 Likelihood test and dependent variable is scale efficiency

Effects Test	**Statistic**	**d.f.**	**Prob.**
Cross-section F	4.245152	(25,252)	0.0000
Cross-section Chi-square	100.518595	25	0.0000

We used the likelihood test for the selection purpose that either common effect model or fixed effect model will be better. The selection criteria are the P-value of this test. If the P-value is significant than we will reject common effect model. Our results show the P-value is significant (0.0000) therefore we reject the common effect model.

10 Radom model effect and dependent variable is SE means scale efficiency

Variables	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	1.025529	0.080887	12.67860	0.0000

ACI	0.119854	0.054647	2.193228	0.0291
BI	-0.064167	0.025321	-2.534147	0.0118
BOARD	-0.002395	0.003601	-0.665099	0.5065
CEO	-0.021435	0.015122	-1.417472	0.1575
ISO	-0.053127	0.098435	-0.539713	0.5898
MO	-0.054856	0.052577	-1.043346	0.2977
ROA	0.316126	0.210421	1.502349	0.1341
SZ	-0.001125	0.004199	-0.267907	0.7890

R^2 = 0.051798	F-statistic = 1.891475
Adjusted R-squared = 0.024413	Prob(F-statistic) = 0.061293
N = 286 (penal balance)	Durbin Watson state = 1.067237

11 huasman test and dependent variable is scale efficiency

Test summary	**chi-sq. statistic**	**chi-sq.d.f.**	**prob.**
Cross-section random	42.655359	8	0.0000

Here we check the all table data through different test such as common effect, fixed effect model, likelihood test, random effect model and hausman test. The hausman test prob. Result is (0.0000). it means the less than the 5% or 0.05, if the hausman test prob. Result is less than 5% or 0.05 then we apply the fixed effect model. Here we applying the fixed effect model for the SE means scale efficiency.

13 Common effect model (table) Dependent variable is TE-VRS

Variables	Coefficient	Stander Error	t.stat	Prob.
C	0.870612	0.062458	13.93920	0.0000
ACI	0.005324	0.046821	0.113707	0.9096
BI	0.025230	0.020933	1.205316	0.2291
BOARD	0.006478	0.002947	2.198412	0.0287
CEO	0.026131	0.010321	2.531861	0.0119
ISO	-0.060149	0.078089	-0.770265	0.4418
MO	0.026317	0.037278	0.705955	0.4808
ROA	0.395124	0.205059	1.926883	0.0550
SZ	0.001323	0.003178	0.416269	0.6775
R^2 = 0.104521		F-statistic = 4.041446		
Adjusted R-squared = 0.078659		Prob(F-statistic) = 0.000146		
N = 286 (penal balance)		Durbin Watson state = 0.931415		

14 Fixed effect model (table) Dependent variable is TE-VRS

Variables	Coefficient	Stander Error	t.stat	Prob.
C	1.062577	0.130187	8.161952	0.0000
ACI	0.038969	0.059970	0.649809	0.5164
BI	-0.042128	0.030895	-1.363597	0.1739
BOARD	0.005480	0.004338	1.263282	0.2077

CEO	0.045843	0.028707	1.596914	0.1115
ISO	-0.228594	0.119212	-1.917541	0.0563
MO	0.023464	0.090054	0.260552	0.7947
ROA	0.205185	0.209880	0.977632	0.3292
SZ	-0.005869	0.006394	-0.917787	0.3596

R^2 = 0.380958	F-statistic = 4.699410
Adjusted R-squared = 0.299893	Prob(F-statistic) = 0.000000
N = 286 (penal balance)	Durbin Watson state = 01.234067

15 Likelihood test (table) dependent variable is TE-VRS

Effects Test	**Statistic**	**d.f.**	**Prob.**
Cross-section F	4.501287	(25,252)	0.0000
Cross-section Chi-square	105.587110	25	0.0000

We used the likelihood test for the selection purpose that either common effect model or fixed effect model will be better. The selection criteria are the P-value of this test. If the P-value is significant than we will reject common effect model. Our results show the P-value is significant (0.0000) therefore we reject the common effect model.

16 Random effect model (table) dependent variable is TE-VRS

Variables	**Coefficient**	**Stander Error**	**t.stat**	**Prob.**
C	0.938447	0.088959	10.54919	0.0000
ACI	0.024894	0.054182	0.459451	0.6463

BI	-0.010186	0.025912	-0.393098	0.6945
BOARD	0.006420	0.003683	1.743137	0.0824
CEO	0.035637	0.017670	2.016881	0.0447
ISO	-0.159883	0.101761	-1.571151	0.1173
MO	0.033083	0.059827	0.552981	0.5807
ROA	0.315897	0.199108	1.586562	0.1138
SZ	-0.000899	0.004580	-0.196188	0.8446

R^2 = 0.047578	F-statistic = 1.729681
Adjusted R-squared = 0.020071	Prob(F-statistic) = 0.091410
N = 286 (penal balance)	Durbin Watson state = 1.155055

17 Hasman test (table) dependent variable is TE-VRS

Test summary	**chi-sq. statistic**	**chi-sq.d.f.**	**prob.**
Cross-section random	6.046624	8	0.6420

Here we check the all table data through different test such as common effect, fixed effect model, likely hood test, random effect model and hausman test. The hausman test prob. Result is (0.6420). it means the more than the 5% or 0.05, if the hausman test prob. Result is less than 5% or 0.05 then we apply the fixed effect model. But here more than 0.05 it means we shall apply the random effect model for TE-VRS (pure technical efficiency).