CHAPTER ONE

INTRODUCTION TO THE STUDY

1. Introduction

This chapter gives an introduction to the study. The remainder of this chapter is organized as follows: The next sub section (1.1) starts with the background to the study and then in sub section 1.2 presents the motivation of the study. While sub section 1.3 indicates a statement of the problem, section 1.4 designates objectives and research questions. The data and methodology are summarised in sub section 1.5. Then sub section 1.6 points out the significance of the study. Finally, sub section 1.7 indicates the organization of the study.

1.1 Background

In the last three decades thousands of SOEs have been repositioned to the private sector in Africa, Asia, Latin America, Eastern and Western Europe, USA, Australia and New Zealand. Privatization can be considered in broad terms as the transfer of ownership and/or control of state owned organizations to private investors (Advani & Borins, 2001; Gruening, 2001; Heracleous, 2001; Hood, 1991; Stewart & Walsh, 1992). Whether ownership influences organizational performance is hotly debated in the privatization literature (Heracleous, 2001; Kay & Thompson, 1986; Nellis, 1994,; Wortzel & Wortzel, 1989). However, empirical evidence on the impact of ownership on firm performance remains inconclusive (Aharoni, 1986; Bozec, Dia, & Breton, 2006; Domberger & Piggott, 1994; Knight-John & Wasantha Athukorala, 2005; Loh, Kam, & Jackson, 2003; Lopez-de-Silanes & Chong, 2003; W Megginson & Netter, 2001; Tittenbrun, 1996; Vining & Boardman, 1992).

Another important factor determining corporate performance is corporate governance. Because of the separation of ownership from control in modern enterprises, the issue of corporate governance arises. According to the definition given by the Cadbury Committee (1992) of UK, corporate governance is the system by which companies are directed and controlled. In determining performance in an organization, board governance is a sub-set of corporate governance (Siriwardane, 2008).

Being an introductory chapter is organized as follows: The next sub section (1.2) starts with the motivation of the study. While sub section 1.3 indicates a statement of the problem, section 1.4 designates objectives and research questions. The data and methodology are summarised in sub section 1.5. Then sub section 1.6 points out the significance of the study and finally, sub section 1.7 indicates the organization of the study.

1.2 Motivation

Most of the studies that are published on ownership and corporate governance, in addition to ownership and performance have devoted their attention to developed countries, particularly USA, Canada and UK, and to a lesser extent, Australia and New Zeeland. There has been a considerable difference between the developed and developing countries, related to institutional, legal conditions and legal environments with respect to markets and organizations. Incomplete markets and various types of market failures have been the major and typical issues faced a developing country (Farooque, Zigil, Dunstan, & Karm, 2007; Sarkar, Sarkar, & Bkaumic, 1998; Sarker & Sarker, 2000).

The major motivation of this study is to contribute empirical evidence to the debate on the mixed results of the effect of ownership on firm performance and to expand the existing literature on the ownership performance relationship, especially in a developing country, such as Sri Lanka. The researcher could not find any research that compared profitability, technical efficiency and Tobin's Q with ownership type to date, and on the other hand, in many empirical studies researchers have selected only either ownership type or corporate governance. But in this study both aspects would be selected. Therefore this study will help to enrich and enhance literature on ownership, corporate governance and performance.

The empirical evidence on the impact of ownership on firm performance in developing countries enterprises remains inconclusive in the few existing studies and researchers suspect whether ownership would affect the performance of enterprises in developing countries. In this background, superiority of private enterprises argument of property right would be considered to be tested under the institutional condition of a developing country.

There are only two studies regarding ownership performance relationship in Sri Lanka till to date. Using partial productivity indicators, Loh, Kam & Jackson (2003) concluded that although

the efficiency of the plantation sector has improved since privatization, it is suspect whether private ownership has itself brought these gains. Knight-John & Wasantha Athukorala (2005) suggest rethinking and reorienting of transferring ownership from state to private hands in Sri Lanka. Nevertheless, the government of Sri Lanka has decided to implement non privatization policy and hope to maximise performance of State Owned Enterprises (from here on referred as SOEs) through capacity building (Government news, 2007). Although corporate governance practices are very important to any country, studies incorporating corporate governance are very thin in Sri Lanka (Siriwardane, 2008). With this background the outcome of this study should be useful for policy making to the government and other regulators in Sri Lanka specially and other developing countries with similar settings as Sri Lanka generally. Sri Lanka has a unique economic landscape as follows, making it suitable for a study of this nature.

1.3 Statement of the problem

The literature on developing and eastern European countries has provided evidence that private ownership has not necessarily lead to higher performance (Linz, 1997; McDonald, 1993; Whitley & Czaban, 1998). Consequently, the institutional conditions of a developing country question the basic foundation of the property right theory argument of private enterprise superiority (Coffee & John, 1986; Sarkar, et al., 1998). Nevertheless, a large body of empirical work in developed country economies indicates that private ownership is generally correlated with superior performance when compared with SOEs and mixed ownership type (Bozec, et al., 2006; Galal, L, & Vogelsang, 1994; William Megginson, Robert, & Van, 1994; Vining & Boardman, 1992).

While there has been a wide significant difference between the developing and developed countries, most of the studies that are published on ownership performance have devoted their attention to developed countries. Hence, managerial finance issues such as ownership and performance have not been well researched in developing countries or emerging economy perspectives (Farooque, et al., 2007; Siriwardane, 2008).

The corporate governance practices in developing countries become gradually more important domestically as well as internationally with closer integration of markets around the world (Farooque, et al., 2007). On the other hand, whether good structure and effectiveness of corporate governance practices contribute to improved corporate performance has been

extensively discussed in many empirical studies, mainly in developed nations. However, effective governance is very important to all economic transactions, especially in transition and emerging economies (Judge, Naoumova, & Koutzevol, 2003; Siriwardane, 2008). However, very few empirical researches have been done regarding the relationship between corporate governance and corporate performance, especially regarding board governance and performance in Sri Lanka as an emerging economy.

Another aspect of organizational performance studies are some potentially important biases related to the selection of the performance measures used in studies on organizational performance. Many researchers have chosen only one or two measurement techniques out of accounting/financial (profitability), market based (market value) and productivity (efficiency) measurement techniques to measure corporate performance. Different conclusions can be achieved using one or the other measures of empirical evidence. Consequently, the validity of results of many studies on corporate performance literature is questioned (Bozec, et al., 2006). To overcome this problem, multi-dimensional measures will be required (Carton & Hofer, 2006). Accordingly, three dimensions of performance measures (accounting/financial, market based and productivity) will be used in this study.

The purpose of this study is to empirically analyse the ownership, corporate governance, corporate performance relationship from the perspective of an emerging and developing country economy The sample is made up of Sri Lankan SOEs (not listed), Private Enterprises (from here on referred as PEs) which are listed on the Colombo Stock Exchange (from here on referred as CSE) and Mixed Enterprises (from here on referred as MEs) which are listed on the CSE. It also aims to explore whether different measurement techniques show different performance.

Apart from being within the institutional setting of an emerging economy, Sri Lanka provides a suitable testing ground for several reasons. The existence of state, mixed and private enterprises in a largely deregulated and an increasingly competitive environment make Sri Lanka a noteworthy case for a study of this nature. The existence of a sufficient number of enterprises to represent the three ownership types to choose a matched sample is a key consideration. The compilation of a unique and reliable data set through the corporation of the stock exchange and government sources is also a principal advantage of this study. In addition to those, the existing

comparable accounting system in government and private sectors means that the data is analogous. Lastly, privatization has become an important policy issue that has vet to be studied applying this methodology in Sri Lanka.

1.4 Objectives and research questions of the study

The main objective of this study is to empirically investigate the ownership type and corporate performance, the corporate governance and corporate performance relationship from the perspective of an emerging and developing economy. It will empirically investigate whether there are differences in performance of the SOEs mixed and privately owned enterprises in Sri Lanka, due to their ownership type (SOEs, PEs and MEs), corporate governance practices (board governance; board size, board composition and CEO duality), and to test whether the performance on selected performance measurement technique.

For the purpose of achieving this objective, four major research questions have been formulated as follows: (1) 'Do various efficiency measurement approaches generate consistent efficiency assessments for selected enterprises of Sri Lanka?' (2) 'What is the nature of board size and composition? Does the board size and composition explain the differences in enterprises' accounting, market performance levels and/or production efficiency of enterprises in Sri Lanka?' (3) 'Does type of ownership explain the differences in SOEs PEs and MEs in Sri Lanka's levels of accounting, market and/or production efficiency performance?' (4) 'Do the firm's specific factors affect performance?'

1.5 Data and methodology

The data for this study are drawn from Sri Lanka's 38 SOEs, 123 PEs and 36 MEs covering the period 2003-2007. Their choice was governed by the data availability, accuracy of data, and the suitability to match PEs and MEs (whether the firm has the same category of inputs and outputs which exist in SOEs of same industry) with SOEs. The main reason is to choose the study period 2003-2007 because there was no privatization of SOEs in between 2003-2007. Data were obtained from the Accounting and Auditing Standards Board of Sri Lanka, Colombo Stock Exchange (CSE) and the Department of Public Enterprises of the Ministry of Finance in Sri Lanka.

With regard to the methodology, research questions one and two are addressed using an accounting/finance performance model (accounting ratios are being used), market–based

performance model (Tobin's Q method is being used) and the total factor productivity performance model (DEA Malmquist Productivity Index method is being used). Here Pearson's correlation coefficient, Spearman's correlation coefficient, percentage analysis and multiple regression analysis are used to test both hypotheses in accordance with the said two research questions. Research question three is addressed by using Tobit regression analysis and the Bootstrap analysis based on DEA Malmquist Productivity Index analysis results. Finally, research question four is dealt with Spearman's rank order correlation analysis and Chi–Squared test, based on accounting/finance performance results, market–based performance results and the productivity performance results.

1.6 Significance of the study

This study aims at extending the accounting and financial performance measures traditionally applied to assess corporate and industry performance to more accurate and theory-based measures, consistent with broader measurement of performance, so far not applied to studying firm level performance.

According to the literature, SOEs broadly experienced poor efficiency performance, compared with private sector firms. Thus privatisation has been shown to have led to efficiency improvement in several countries (Boubakri & Cosset, 1998; Boyco, Schleifer, & Vishny, 1996; Lo, 1999; W Megginson & Netter, 2001; William Megginson, et al., 1994). Evidence about inefficiency and lower profitability relative to the private firms can be found in the studies of Boardman & Vining (1989) and Dewenter & Malatesta (2001). These researchers used mainly financial indicators as their performance measures, leaving out more critical efficiency measures such as Data Envelopment Analysis (from here on referred as DEA) or Total Factor Productivity (from here on referred as TFP) which is simply a ratio of output to input values. These studies also evidenced that efficiency and performance were examined separately and not at the same time, therefore leaving the issue of linkages between production efficiency and performance largely unanswered.

This study aims to provide new findings on a comparative basis, about the production efficiency and financial performance of the public, private and mixed sector firms and industries. It is expected to contribute significantly to the existing knowledge by developing a newer and broader approach for measuring a firm's performance by extending the accounting/finance

models to include measures of production efficiency. This is done by a matched sample method to reveal robust results. It makes four significant contributions to the study of the performance of public, private and mixed enterprises in Sri Lanka, especially via multiple approaches to address the research issue of corporate performance. Firstly, it fills the gap in un-researched areas among the state, private and mixed enterprises performance evaluation. Findings from this study will provide not only a comparative literature, but also will assist in ranking the large number of SOEs on efficiency factors by providing quantitative evidence on relative performance at industry and firm levels.

Secondly, this study employs two production efficiency measures: DEA-Malmquist and Bootstrap/Tobit method for the first time to augment the value of findings from this study using the more traditional accounting cum financial and Tobin's Q performance measures. The Malmquist DEA method is applied for the first time in the calculation of productivity change and its decompositions into two efficiency measures, using matched sample of public and private sector firms over a four year study period. Such decomposition makes it possible to examine if one sector has improved its productivity simply through a more efficient use of existing technology or through technological progress. That will also provide a useful benchmark for an evaluation of a firm's performance correcting for local differences.

In addition, the application of the Bootstrap and the Tobit regression methods, enterprises allow us to investigate firm specific factors, if any, that may be contributing to the efficiency performance. Finally this study observes for the first time the linkage between the firms' performance using the traditional accounting/financial ratios with their production efficiency performance measures from employing the DEA- Malmquist methodology. The combination of three performance measures: Malmquist index, accounting/finance and Tobin's Q- all based on sound theories, will provide detailed inside information of a firm's level of quantitative performance for the first time in Sri Lanka.

Using ratio analysis, factors that explain a firm's accounting and financial performance are usually identified and this is the most common approach. By comparing the accounting/financial performance, market based performance (Tobin's Q) and the economic efficiency performance, this research aims to identify whether a firm's total factor productivity measures and the accounting/financial performance are related. If these are related, the nature of the relationship can be identified, and this has important implication for studies of comparative efficiency.

1.7 Organization of the study

This study is divided into seven chapters. Chapter two provides a brief review of corporate governance and its emergence, Different models and dimensions of corporate governance are discussed broadly. Also it presents theories of market competition and monopoly as well as production efficiency theories. It also provides literature regarding the performance of SOEs, PEs and MEs.

Chapter three provides the general research framework for analysis, including the conceptualization of the research design, formulation of test models and methods, hypotheses and the identification of data used.

Chapter four provides important findings on the linkages among firms' financial performance and productivity performance, firms' financial performance and market performance and market performance and productivity performance of SOEs, PEs and MEs. The results are obtained by using seven financial ratios, one market based ratio and Malmquist productivity index using Spearman's correlation coefficients. For the robustness of results, best performing and worst performing firms are compared based on different measurement techniques by using Pearson's Chi-Square test for relatedness.

Chapter five discuses the comparative accounting/finance performance and market based performance of SOEs, PEs and MEs and industries as well. Following, chapter six includes a description of SOEs PEs and MEs and industries' productivity performance.

Chapter seven contains the findings on firms' technical efficiency and identifies the factors which influence technical inefficiency of matched public, private and mixed firms over 2004-2008. A Bootstrap method and Tobit regression methods are applied using an unbalanced panel of 197 firms with the total of 788 observations relating to seven industries, in which the non-negative technical efficiency effects are assumed to be a function of a firm's specific variables, thus excluding efficiency change. This chapter provides answers to the question of whether some firm's specific factors will have similar contributions to a firm's technical efficiency and/or labour contributions to technical efficiency rather than other factors. Each industry is estimated individually in order to investigate whether the technical efficiency and/or labour contribution to technical efficiency are systematically related to the factors such as size, leverage, growth, firm risk and competition. Chapter eight is the concluding chapter with some suggestions for further research.

CHAPTER TWO

CORPORATE GOVERNANCE, FINANCIAL PERFORMANCE, MARKET-PERFORMANCE AND PRODUCTION EFFICIENCY: THEORIES AND EVIDENCE

2.1 Introduction

This chapter contains a brief review of the literature relevant for this study on corporate governance, corporate financial performance and market-performance and production efficiency. At the beginning of section 2.2 is Sri Lanka, its economy and the corporate sector, privatization in Sri Lanka. Then corporate performance studies in Sri Lanka which are the subject matter of this study are discussed briefly. Next section 2.3 presents the concepts of corporate governance, its emergence, different models and dimensions of corporate governance and these are discussed broadly. Section 2.4 provides a summary of the relevant theories along with a summary of evidence of those theories. Section 2.4.1 relates to the relevant theories, namely microeconomics theories of firm performances and as well as performance theories commonly used in finance and production economics.

The evidence from prior studies is summarized in section 2.4.2: the next section profiles the corporate sector by describing the private, mixed and public sector firms and their structures. Section 2.4.3 provides a summery review of production efficiency theory, followed by a description of the linkage between financial and production efficiency as well as the evidence for theories in section 2.4.4 and section 2.4.5 respectively. The following sections provide some critiques of the theories applied to the study of Sri Lankan corporate performance, and then the corporate performance and its relationship between corporate governance practices are discussed briefly, followed by an examination of boards of directors. In the section 2.5, the literature review on the relationships between elements of corporate governance and corporate performance are broadly stated. Finally, a few research works carried out by different study groups are presented briefly. However, apart from one conference paper no other study was found in relation to corporate governance in Sri Lanka. The chapter summery is presented in section 2.6.

2.2 Sri Lanka, its economy and the corporate sector

Sri Lanka, officially the 'Democratic Socialist Republic of Sri Lanka', is an island nation of 65,610 square kilometres. It is located at the south-eastern tip of the Indian sub-continent, about 31 kilometres off the southern coast of India. It uses Colombo as the commercial capital and Sri Jayewardenepura as the administrative capital. The population of Sri Lanka is around twenty one million. It is the 53rd most populated nation of the world (Lanka, 2008). Sri Lanka is a multi-ethnic and multi religious country. Since it has one of the most literate populations among the developing countries, the literacy rate of the people has been calculated at 92%. 83% of the total population have received secondary education (Gunawardene, 2009).

Following over two thousand years of rule by local kingdoms, beginning in the 16th century, parts of Sri Lanka were colonized by Portugal and the Netherlands. Subsequently the entire country was surrendered to the British Empire in 1815. However, independence was given by the British Empire in 1948 (De Silva, 1997).

After gaining independence, the constitution of Sri Lanka established a democratic socialist republic of Sri Lanka as a unitary state. The government formed as a mixture of presidential and parliamentary system. The president of Sri Lanka is the head of the state, the commander in chief and head of the government as well.

There was a civil war in the country from 1983 against the government by a separatist militant organization who fought to create an independent state in the north and east in the country. Finally, ending the civil war, the president of Sri Lanka announced the victory followed by the deaths of all senior leaders of that militant group in May 2009 (Government of Sri Lanka, 2009).

As a result of colonization Sri Lanka became a plantation economy in the 19th and 20th centuries. It is famous for its production and export of cinnamon, rubber and Ceylon tea. Sri Lanka is the number one tea exporter in the world (De Silva, 1997).

When Sri Lanka was winning independence from Britain in 1948, it was a strong prosperous economy with a large active private sector and linkages to the international economy through its major exports. Developed infrastructure of roads, railways, ports, airports and a communication network had been left by the British Empire. Therefore, Sri Lanka was in a better position for

economic development in 1948 than most of the other Asian countries, such as South Korea, Taiwan or Singapore.

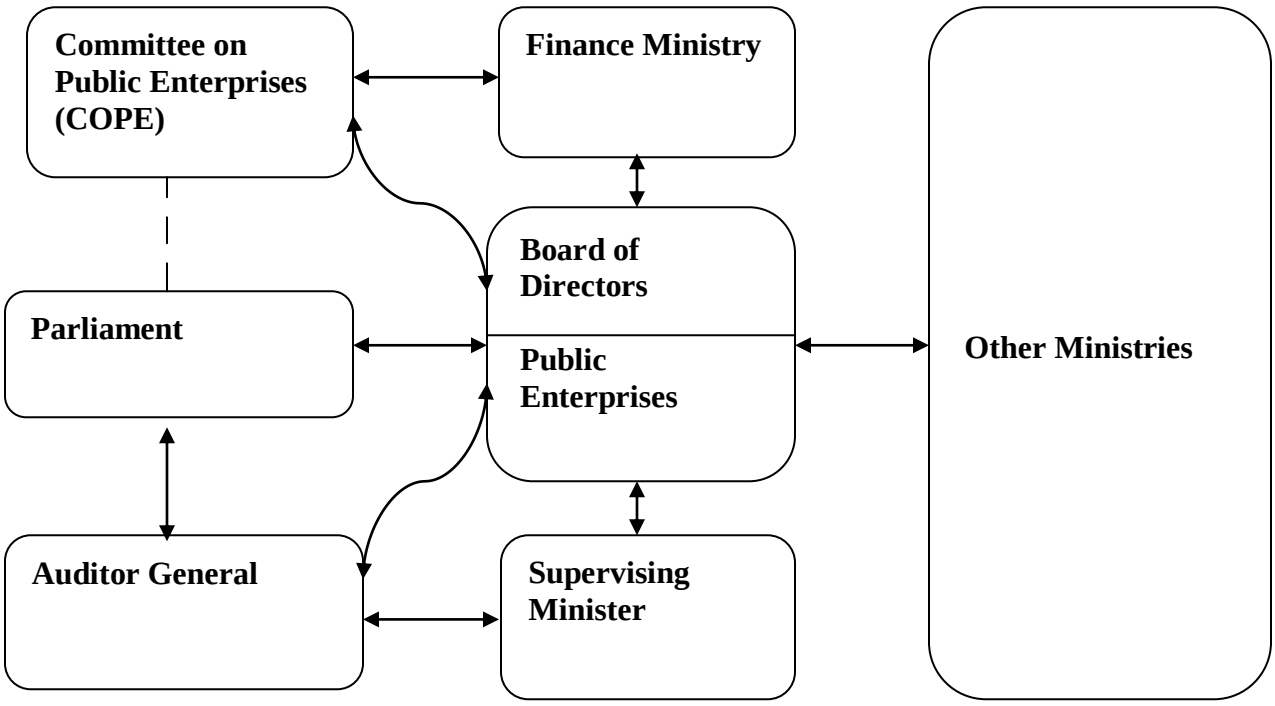
In the 1950s and 1960s the size of Sri Lanka's state sector rapidly increased as a result of nationalization of buses, ports, insurance, petroleum and the establishment of state owned industries with the aid of the Soviet Russia. Private ownership of lands was limited and the remaining lands, plantation companies, excess houses and many private industries, ranging from restaurants to factories, were nationalized by the government in early 1970s.

Sri Lanka has around 200 public enterprises. Out of those, while 75 of them are commercial, 125 are non-commercial enterprises. Due to excessive staff, weak management, heavy losses, are suffered by most of them. Meanwhile the non-commercial enterprises operate on government funds, the commercial enterprises are expected to be self-financing (Commonwealth advanced seminar, 2005).

The ministry of finance has the responsibility of managing public enterprises. They have been given the authority by the government-sponsored corporation act (No. 19) of 1955 and its revision and the state industrial corporation act (No. 49) of 1957, to provide the board of directors with adequate autonomy to run the corporations outside the bureaucracy of the government. The finance ministry's monitoring and control is included for matters such as: remuneration of board members; conditions of employment of managing directors; borrowing limits of the corporation; reserves and dividends; accounts of the corporation; payments to auditors; and sale of government shares to the public (Weerakoon, 1995).

Figure 2.1

Monitoring and control mechanisms of public enterprises in Sri Lanka



Source: Public Enterprise Pathology: Sri Lanka's Experience in Perspective (Weerakoon, T.S, 1995, P.308)

2.2.1 Privatization in Sri Lanka

As a result of the continuous increase since independence (1948) of the size and the scope of the government and SOEs, they became a major part of the Sri Lankan economy. Therefore, government had to allocate almost 1/3 of their budget expenditure; equal to 10- 12% of gross domestic product (GDP), and this in turn increased the budget deficit to 14 % of GDP annually in early to mid-1980s. Also 17 % of total employment was by the government (Balasooriya, Quamrul, & Ken, 2007; Kelegama, 1995). On the other hand, governments took out take more and more loans from donor agencies like IMF and the World Bank. When they are providing money they showed the governments that SOEs are unprofitable and a burden to the economy and therefore, donor agencies proposed and pressurized the government to privatize and reform SOEs (Balasooriya, et al., 2007).

In this environment, trimming the public sector and enhancing the private sector began by the newly elected democratic capitalist government in 1977. Some of the SOEs were closed or sold and the remaining SOEs were forced to compete with PEs in the market economy. Foreign ownership of enterprises was allowed. Most of the essential service industries like passenger transportation, insurance, telecommunication, power and electricity, banking, health and education industries were opened to the private enterprises (Weerakoon, 1995).

Privatization in Sri Lanka was implemented under three typical phases. The first phase started in mid 1980s and the main objective of this phase was to reduce fiscal burden due to financing of inefficient SOEs. However, the government implemented this phase neither with a mechanism to manage, monitor and evaluate the fiscal aspects of SOEs nor did the government have a plan or the required skill for reforms other than some technical assistance provided by USAID for the enhancement of the private sector. Due to various reasons, instead of changing the ownership on a large scale, mainly in the form of partial divestiture, liquidation, franchising and management, contract methods were implemented. Especially, the government could not form a relevant institute or necessary institutional support for privatization to succeed (Kelegama, 2002).

The second phase basically implemented domestic plans in late 1980s. Here the government used the word 'peopleization', meaning 'given to the people', to overcome social anger instead of privatization. As an essential step of privatization, all targeted SOEs and public corporations were converted into public companies (Kelegama, 1995). Implementing this 2nd phase of privatization, partial or full divestiture of 43 SOEs was done. However, the government strategically kept the SOEs out of privatization which supplies nationally important public utilities (Knight-John & Wasantha Athukorala, 2005).

The third phase started in the mid-1990s and the government formed the Public Enterprise Reform Commission (from here on referred as PERC) to implement the entire public enterprise reform program. Under the recommendation of PERC, by using the strategies such as open tenders, competitive bidding, management contracts and employee buyouts, the majority of shares of SOEs were sold to corporate investors. Even though public utilities had not been privatized under the previous two phases, the government decided to run with the recommendation of PERC to privatize public utilities such as gas and telecommunication

(Balasooriya, et al., 2007). However, most of the mixed enterprises were established in the second and third phases of privatization.

The privatization of SOEs became a major policy of every government which came into power until 2005. However, the newly elected president decided in 2005 to dissolve the main authority related with privatization of SOEs and PERC. He announced that privatization will no longer be a policy of his government. However he still continues with the reforms of SOEs.

2.2.2 Corporate performance studies in Sri Lanka

Except two small studies, to date no significant study has been undertaken of Sri Lankan SOEs economic, financial or productivity performance, and nothing in relation to private sector firms. Considering that studies have seldom been done, even in developed countries (with the possible exception of the UK) lack of attention to production efficiency is not surprising. Most studies covered public sector reforms which were, at best, poor attempts to model performance using financial models, and these seldom applied more refined models. As far as the author is aware two small studies have been conducted in Sri Lanka. An example is a study of just eight privatised SOEs by Knight-John and Athukorala (2005) which suggests rethinking and reorienting of transferring ownership from state to private hands in Sri Lanka. Using partial productivity indicators, Loh et al. (2003) concluded that although the efficiency of the plantation sector has improved since privatization, it is uncertain whether private ownership has itself brought these gains.

2.3 Corporate governance

Corporate governance or its aspects of corporate control are complex concepts. In the context of a firm, corporate governance refers to the totality of the institutional and organizational mechanisms and the corresponding decision making intervention and control rights which serve to resolve conflicts of interest between the various groups which have a stake in the firm. The term covers not only the company's charter and the legal framework, including, for example, the disclosures and laws on insider trading, but also the actual distribution of ownership rights to the company, as well as the rights of the creditors, including banks, to intervene and exercise control. It covers also the extent to which the company's employees, as well as its suppliers and

the customers who buy its products, can influence its actions within the relevant legal frame work (Schmidt & Tyrell, 1997).

Governance is different from management. After all, when we say that the function of the government is to govern, what it indicates is government should maintain the basic function of the law and order, so that a peaceful society can exist. In the context of commercial enterprise, this would mean ensuring the framework of values, principles and the organizational culture so that while the enterprise runs efficiently, it does not dabble in any unethical or illegal activities. When we talk about corporate governance, we are talking about the fundamental value framework which decides the organizational culture and which ensures that an efficiently run enterprise does not indulge in unethical or illegal practices (Vittal, 1998).

Corporate governance describes all the influences affecting the institutional processes, including those for appointing the controllers and/or regulators, involved in organizing the production and sale of goods and services. Described in this way corporate governance includes all types of firms, whether or not they are incorporated under civil law (Turnbull, 1997). A firm is the nexus of contracts, written and unwritten, among owners of factors of production and customers (Fama & Jensen, 1983). Blair (1995) as quoted by Turnbull (1997) says firms may be publicly traded, privately held, for profit or not for profit. Much of the corporate governance implicitly assumes that only publicly traded firms are the subject of analysis. With firms defined in this way, the scope of corporate governance includes nearly all the economic activities of a nation.

Thereby, corporate governance includes many disciplines such as microeconomics, organizational economics, organizational theory, information theory, law, accounting, finance, management, psychology, sociology and politics. Each may view corporate governance in a different way (Turnbull, 1997). Following are some of the definitions given by researches on corporate governance.

Lex Donaldson (1990, p. 376) defined corporate governance as the "structure whereby managers at the organizational apex are controlled through the board of directors, its associated structures, executives incentive, and other schemes of monitoring and bonding" as cited by Turnbull (1997, p. 184). "Corporate governance is the process by which corporations are made responsive to the rights and wishes of stakeholders" (Demb & Neubauer (1992) as cited by Turnbull (1997, p. 184). The Cadbury committee is the key committee that undertook an investigation of UK listed companies in 1992 and they say, "Corporate governance is the system by which companies are

directed and controlled". Also Tricker (1994, p. xi) states "Corporate governance addresses the issues facing boards of directors, such as the interaction with top management, and relationships with the owners and others interested in the affairs of the company, including creditors, debt financiers, analysts, auditors and corporate regulators." While Monks & Minow (2008, p. 144) marked that: "It is the relationship among various participants in determining the direction and performance of corporations."

Hawley & Williams (1997, p. 208) undertook a literature review of corporate governance in the US as a background paper for the Organization for Economic Cooperation and Development (OECD) and according to them corporate governance is "a set of relationship, between a company's management, its board, its shareholders, and other stake holders through enhanced performance." Turnbull (1997, p. 194) in his paper which provided an orientation of corporate governance states that "Governance will be used to describe a system of control or regulation which includes the process of appointing the controllers or regulators".

There has been much discussion recently about whether corporate governance makes a difference to the bottom line, that is, does good corporate governance improve corporate performance? But before discussing corporate performance, it is wise to look at why corporate governance exists in the first place.

2.3.1 Emergence of corporate governance

According to the various definitions given above, it is apparent that recent studies investigating corporate governance have raised several important theoretical and practical issues and hence it is important to look at why corporate governance exists.

The issue of corporate governance arises because of the separation of ownership from control in modern corporations. The separation of ownership and control has had profound consequences for the nature of corporate governance. Salaried managers are hired to run the company on behalf of its owners, the shareholders. The positive theory of agency argues that the managers may behave opportunistically to maximize their own welfare (Fama & Jensen, 1983). Further Fama & Jensen (1983) state that the central issue in the growing body of theoretical and empirical literature on corporate governance is whether the actions of the managers (the agents) are consistent with the realization of the interests of the shareholders (the principals), the "agency problem".

Mangers have different objective functions from the shareholders. They may favour strategies for the firm that enhance career prospects and remuneration rather than maximize share value. In a world of bounded rationality and asymmetric information, managers have the opportunity and incentive to pursue their own goals at a cost to the shareholders (Fama & Jensen, 1983). This agency problem could exist not just between shareholders and managers, but also between controlling and minority shareholders, between shareholders and creditors and between controlling shareholders and other stakeholders, including suppliers and workers. So when ownership is separated from management, a basic question for shareholders is how they can effectively monitor managers and exercise control so that the managers will act in the shareholder's best interest. A number of mechanisms exist for shareholder monitoring and control, which were described as corporate governance systems or practices. A sound corporate governance system should provide effective protection for shareholders and creditors, such that they are not denied the return on their investment (Claessens, Djankov, & Pohl, 1997).

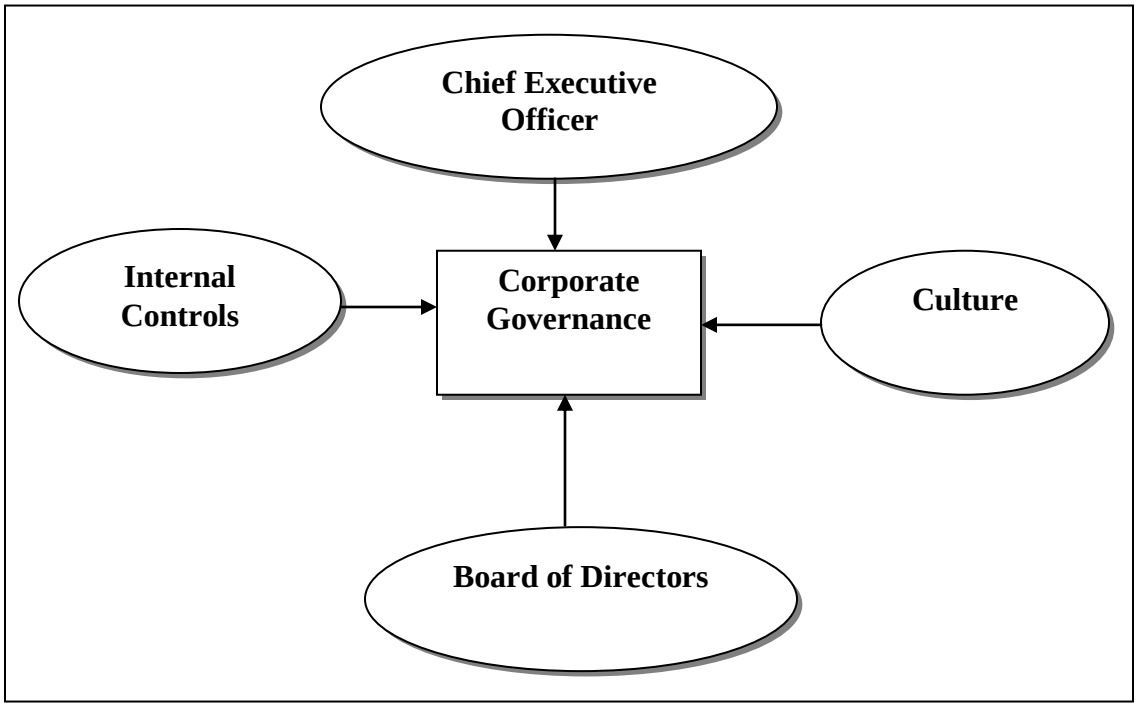
Throughout the twentieth century the pattern of the ownership continued to change and, in the US and UK in particular, individual share ownership has declined and institutional share ownership has increased. With the internationalization of the cross boarder portfolios, and the financial crises that have occurred in many parts of the world, it is perhaps not surprising that institutional investors increasingly look more carefully at the corporate governance of the companies. After all, corporate governance goes hand in hand with increased transparency and accountability and many scholars have identified various models, dimensions and characteristics of corporate governance.

2.3.2 Dimensions of corporate governance

Apart from the above-discussed models many researchers have identified many dimensions of corporate governance. Among these the Cadbury Report has gained significant attention from all others concerned with corporate governance.

Figure 2.2

Dimension of corporate governance



Source: Culture, corporate governance and disclosure in Malaysian corporations (Haniffa & Cooke, 2002, p. 321)

According to the above, good corporate governance practice prevail in a company, if a combination of all the above four elements exists. But in this particular research the researcher studies only two of the above four corporate governance elements, namely board of directors and chief executive officer and the impact of the same on the performance of enterprises in Sri Lanka. Hence, these two corporate governance elements are broadly analysed empirically from this point onwards.

2.3.2.1 Cadbury Committee Report

Among the corporate governance literature Sir Adrian Cadbury who chaired the Cadbury Committee in 1992 in the UK, investigating the governance of UK quoted companies, drafted significant and debatable proposals. The Cadbury Committee was charged with improving the accountability and transparency of a number of areas. First the role of chairman and chief executive officer should be separated; second non-executive directors should be independent;

third non-executive should have a sufficient representation to carry weight at board meetings; and fourth board monitoring committees should be established to deal with specific areas such as the setting of director remuneration. In addition, Cadbury proposed that these committees should consist primarily of non-executive directors who would act as monitors and independent judges of management. Quoted companies have to include in their annual report a statement about the extent of their compliance, or non-compliance, with the code. Such a public statement may bring pressure to bear on firms to comply, simply to be seen to have adopted the code. If companies adopt the Cadbury recommendations, it is expected that they would be more likely to pursue shareholder interests than companies that have alternative, less effective, governance structures (Cadbury, 1992).

Adrian Cadbury (2000, p. 8) who became synonymous with the development of corporate governance says "….I have always made it clear in international discussions that, in my view, there is no single right corporate governance model and that the best approach is to start from whatever system is in place and to seek ways of improving it… in this search for improvement, every country can learn from the experience of others."

2.3.2.2 Other literature

The findings of the Cadbury Report had a bearing on the literature for some time and the corporate governance areas that Adrian Cadbury raised were recognised as codes of best practices under a number of jurisdictions and influenced research in the field. Based on these researchers carried out their own studies and came out with many conceptual and cultural findings.

Many of these important findings concluded that success or failure hinged on four corporate governance issues. These were the culture and tone at the top of the organization; the chief executive; the board; and internal controls. Figure 2.1 above shows such governance issues.

2.3.3 Models of corporate governance

Hawley & Williams (1996) undertook a literature review of corporate governance in the US as a background paper for the OECD. They identified four models of corporate control. Those are mentioned briefly as follows.

2.3.3.1 Financial model

In the pure 'finance view' of corporate governance, corporations exist only to serve their shareholder's desires and therefore they have only one goal: to maximize their owner's wealth. In the ‘finance view’ the central problem in corporate governance is to construct rules and incentives, that is, implicit or explicit 'contracts' to effectively align the behaviour of managers (agents) with the desires of principals (owners). The ‘finance view’ of what is wrong with the governance system holds that shareholders do not have enough control or influence over management and those companies therefore too often get away with lacklustre performance, while executives enjoy lavish perks (Haniffa & Cooke, 2002).

2.3.3.2 The stewardship model

The stewardship model "argues that managers are good stewards of the corporation and diligently work to attain high levels of corporate profit and shareholder returns. Managers are principally motivated by achievement and responsibility needs” (Haniffa & Cooke, 2002, p. 321). As per Hawley & Williams (1997) argument, corporate financial performance and shareholder wealth will be maximized by empowering managers to exercise unencumbered authority and responsibility.

2.3.3.3 The stakeholder model

While the stewardship model shares with the finance model a goal of maximizing shareholder wealth, a broad version of the stakeholder model asks that firms be 'socially responsible' and often subordinates profit maximization to others. From this perspective the corporation is responsible to a wide range of individuals and groups in addition to those having a direct financial interest in the company. Stakeholders may, among others, be members of the community in which plants are located, consumers of the product, and, sometimes, the environment at large, society, and even future generations. According to this point of view the corporation - through the board of directors - mediates these potentially competing interests in some fashion that is typically difficult to describe.

2.3.3.4 The political model

The political model recognizes that the allocation of corporate power, privileges and profits between owners, managers and other stakeholders is determined by how governments favors their various constituencies. The ability of corporate stakeholders to influence allocations between themselves at the micro level is subject to the macro framework which is interactively subjected to the influence of the corporate sector. The political model of corporate governance places severe limits on the traditional economic analysis of the governance problem, and locates the performance-governance issue squarely in a broader political context (Hawley & Williams, 1996).

2.4 Corporate performance

Performance of a firm can be identified by three criteria according to Kakabadse, Kakabadse, & Kouzmin (2001). One of these is a 'financial criterion', which measures a firm's profitability, liquidity, leverage, low operating cost etc. 'Systematic' survival is another criterion which measures growth in resources, goal achievement and relative market position. According to Kakabadse, et al. (2001) 'Social' is the third criterion, which measures ethical behavior of the firm and its responsiveness to the society. Financial performance is limited to measures of how well a firm is using its financial resources, such as shareholder equity and debt. A few examples are Return on Assets (ROA), Return on Equity (ROE), Earnings per Share (EPS), Stock Price, and Return on Investment (ROI), Profit Margins; Net Income and Profit Margins on Sales, Income/Sales and Income/Equity Risk Adjusted Market Returns and Tobin's Q. As these examples show performance is often measured from the owners' point of view. This is not a coincidence. The reason is that these principals normally are the residual claimants of the firm's profits and therefore stand to lose (or gain) the most from the firm's activities. The owners therefore normally have the strongest needs and incentives to be informed about financial performance. Therefore, most of the studies over-focus on the financial dimensions of corporate performance. However, some attention was being paid to systematic performance and very little attention being given to social dimensions of corporate performance.

2.4.1 Economics of firm performance

- *2.4.1.1 Theory of competition*

In an efficient production environment in an economy, received knowledge suggests that competition or rivalry among firms to produce a given product or service, leads to the most desirable economic condition of perfect or near-perfect competition. Perfect competition occurs in a market place of many firms, each selling an identical or close enough substitute to a given product and there exist many buyers, any of whom could have no impact on the price or the quantity supplied. In such as market place there would be no restriction on entry into the industry. The industry does not possess an advantage over potential entrants. The firms and their customers are completely informed about the prices of the products of each firm in the industry (McTaggart, Findlay, & Parkin, 2010).

It presumes (assuming that state firms are intrinsically not competitive) that a private sector firm in a competitive market is a place capable of resource allocation; that it has the ability to combine the input factors efficiently to produce a good or service. Received knowledge suggests that efficiency may be measured by a number of means, two of which being the accounting/finance process and the other the total factor production process. The three decisions to be made by the firm are: how much to produce, whether to produce or temporally close down production, and whether to stop production and leave the industry (McTaggart, et al., 2010). Under a perfect competition, a firm is a price taker, meaning the firm can alter its rate of production and sales without significantly affecting the market price for its product. The firm has no power to influence the market price, determined by the presence of a multitude of producers, through its own individual actions (Lipsey, 1999).

The demand curve of such a firm is perfectly elastic or horizontal, since demand is perfectly elastic when the elasticity is equal to infinity. Lipsey (1999, p. 212) describe: "… the demand that each firm in perfect competition face is horizontal, because variations in the firm's output have no noticeable effect on price". This means that firms may produce a quantity, such that marginal cost equals the average price, which is the lowest possible efficiency, given demand and cost condition (McTaggart, et al., 2010). Observably, the freedom to enter pushes the firm to produce at the lowest cost.

In real life industries do not conform to the model of perfect competition, albeit some firms might appear to behave in a manner that is very close to that condition. A firm in such a market

price is a price taker, because it is only producing a tiny fraction of the total outputs in the market. The farmer faces a perfectly elastic demand curve, which is equal to infinity (McTaggart, et al., 2010). Allocative efficiency cannot be obtained by the firm, due to the existence of external coast, external benefits and monopoly. A perfectly competitive firm does not only earn economic profits in the short run, but may also make losses. In the short-run the market supply curve shows totally quantity supplied by all the firms in the industry and it varies as the market price varies (McTaggart, et al., 2010). Furthermore, the economics of scale would suggest that the marginal cost curve is likely to be below the average cost curve. Therefore, the profit maximising rule of setting price equals to marginal costs may lead to financial losses under perfect competition (Burke, 1991).

- *2.4.1.2 Theory of monopoly*

The other extreme market structure is monopoly, a condition which leads to different outcomes, when the producer's conditions are opposite to those of a perfect competition. State firms are theorised to be operating as monopolies, since they are licensed to produce in markets with little or no competition. In a monopolistic market there is only one supplier or seller of goods and services and many buyers. There are no close substitutes for the products or services produced by monopolists, therefore a seller can price a good or service higher than would be the situation in a competitive market. There is restriction to entry into the industry, thus preventing the entry of a new firm (McTaggart, et al., 2010) and (Pindyck & Rubinfeld, 2000) resulting in the monopolistic firm making no effort to make the production at the lowest costs to face the competition. For example, an oil producer may be organised as monopolist in a market with a good deal of competition: the failure of the monopoly producer would mean that the cost of production is not at the lowest, hence a state oil firm may produce at higher costs and thus lose profits, whereas the prices charged are at the market prices, which often leads to the monopoly producer operating with losses. The monopolistic firms are often the ones with a protected market because there is natural monopoly or that the state authorises a firm to produce a good or service without subjecting this firm to the competition from other services. The question of production efficiency in such firms must be addressed from a different perspective in the case of firms operating as monopolies.

SOEs are most often found in situations of natural monopolies. Governments set up these firms to provide goods and services needed by the public, often mandated by a country's law and

economic philosophy, as for example in the socialist countries. SOEs are naturally protected from competition by preventing new entrants from providing competition. Such firms are often also mandated to produce a large amount of outputs in areas where the private sector is unable to provide the capital and organization needed for large-scale production. The fixed investments would be too large for the private sector to rise (McTaggart, et al., 2010). There are other sources of monopoly power which include parents and the control of resources made available by the governments.

- *2.4.1.3 The Role of Competition*

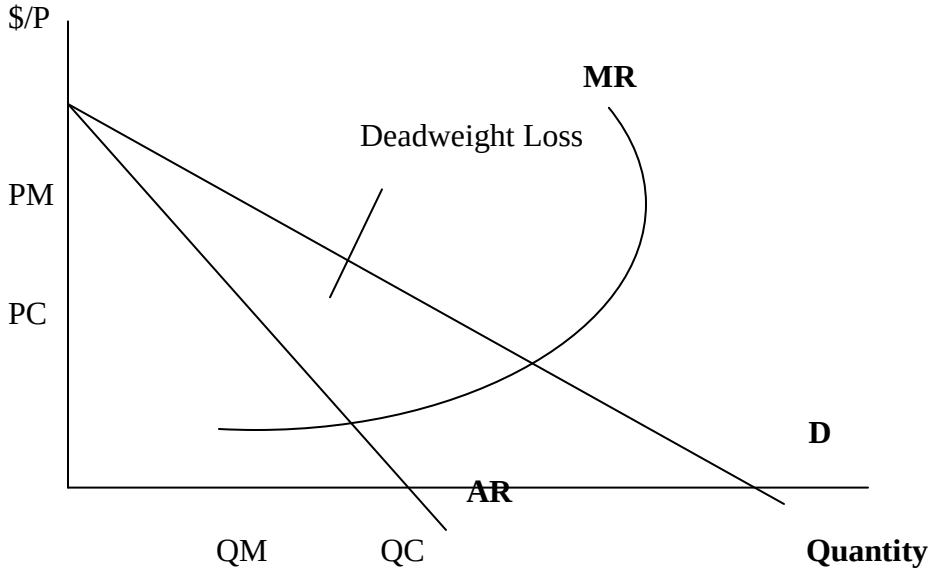
Typically, monopolistic firm uses too much input to produce a given output – thus it tends to operate at the stage of inefficient production curve–and it may pass the more expensively produced output to the public and yet show a higher performance in financial terms, an argument against the use of accounting/finance measure of performance. The firm may be said to be allocative inefficient, because of the monopolist's ability to price at levels exceeding the marginal cost, SOEs that are monopolist are therefore likely to be less efficient than the private sector firms which normally operate under non-monopolistic conditions, where these firms are unable to pass the higher costs to the buyer, since these firms operate under some degree of competition. Therefore, competition is the most important mechanism for maximising consumer benefits and for limiting a monopolist's power to shore up performance by increasing the price of the final outputs (Bishop, Kay, & Mayer, 1994).

Competition in product markets is widely viewed as contributing to improved efficiency. In the presence of competing suppliers, prices will tend towards marginal cost, thus enabling allocation of input resources to obtain their highest value. Empirical evidence suggests that in the absence of competition, SOEs will produce allocationally inefficiently (Jones, 1985). Therefore, introducing a privatisation scheme to a monopoly-type SOE means: firstly imposing profit motive on the firm's management: secondly, removing the state ownership, by which the capital support provided by the state to the firm is stopped and lastly, letting competition come from new entrants to the market via competition reforms. An SOE, once returned to private sector, is likely to be taken over by shareholders. When there are other producers entering the product market to complete the structure of the market place of the erstwhile SOE will convert gradually to that of competitive conditions via competition policies.

Bringing in competition, such as what is likely to happen after privatisation, for example in telecommunication firms all over the world, enables such firms to allocate resources efficiency once competition reduces the monopolistic behaviour. The new structure of the market will force SOEs to compete in the market on equal basis with private sector firms.

Consequently, under the competitive market condition, SOEs will face the same or similar prices for their products as those of the private sector firms. Even the technology adopted would ensure identical or lower marginal costs for products. The loss of consumer surplus under the SOE structure, under monopolistic pricing may be illustrated in Figure 2.1 below, which shows how the consumers lose their surplus in the monopolist market. The monopolists restrict production quantities at QM, and the firm prices at a higher price (PM) than at the price set by competitive firms.

Figure 2.3: Deadweight loss from monopoly power



Hence, creating a reduction in consumer surplus, the competitive firm produces higher outputs to meet all consumers' demands, thus enabling greater consumer surplus by pricing at lower price (PC). There is no loss of consumer's surplus (McTaggart, et al., 2010).

Other types of market structures are monopsony and monopolistically competitive. A monopsony exists when there is a single buyer. A buyer of a monopsony market is able to purchase a good or service at lower prices and lower quantities than one that would prevail in a competitive market (McTaggart, et al., 2010). With only one or a few buyers, a buyer has a monopsony power (Pindyck & Rubinfeld, 2000). For example, if only one firm buys such a product, then that firm is able to purchase at a lower price. A monopolistically competitive market has similar characteristics to that of a perfectly competitive market, as there are also many firms and no restriction to entry to the market. The only difference is that a monopolistically competitive firm sells not only one type of product, but also a broad range of products that differs in quality and appearance. In addition each firm is the sole producer of its brand (Pindyck & Rubinfeld, 2000).

2.4.2 Financial Performance Theory

Financial measures are commonly used very widely – as discussed in evaluation literature - to evaluate firms' financial performance, which is not the same as production efficiency. In general there are three main reasons for performance measurements: a concern for value of money in all evaluation processes; a concentration upon economy, efficiency and effectiveness and a focus on management rather than administration staff (Sharma, 2001).

A commonly used tool to assess the firm's financial performance is financial ratio analysis. Ratios provide tools for managing information in order to analyse a firm's financial condition and performance (Shapiro, 2006). These can provide a profile of a firm's economic characteristics, competitive strategies, operating, financial and investment decisions relating to other firms or industry (White, Ashwinpaul, & Fried, 2002). Necessarily, there must be a relationship between the production efficiency and the financial performance of the firm. This aspect of a possible connection between the two approaches to performance has still not been sufficiently studied; hence this study is a modest effort to start looking at this connection.

Ratios are categorised based upon different concerns of users. However, in general, financial ratios are divided into four categories as follows (Bishop & Thompson, 1992; Brigham & Gapenski, 1990; Keown, 1996; Ross, Westerfield, Jaffe, & Jordan, 2008; Shapiro, 2006; White, et al., 2002);

1) Liquidity ratios
2) Activity ratios
3) Financial leverage ratios
4) Profitability ratios

Liquidity ratios are used to measure a firm's quality and adequacy of short-term financial obligations as these obligations come to due. In fact, it is a measure of short term performance.

Interestingly, a system of relation can be established by decomposing a ratio into parts. This decomposition for example of ROE below is widely adopted (Whitley & Czaban, 1998).

$$\mathbf{ROE} = \left[\frac{\mathbf{NI}}{\mathbf{EBT}}\right] \times \left[\frac{\mathbf{EBT}}{\mathbf{EBIT}}\right] \times \left[\frac{\mathbf{EBIT}}{\mathbf{Sales}}\right] \times \left[\frac{\mathbf{Sales}}{\mathbf{Assets}}\right] \times \left[\frac{\mathbf{Assets}}{\mathbf{Equity}}\right]$$

As to which specific financial ratios are to be used, depends on the assessment purposes. For example, a study that aims to measure the quality of management in terms of efficiency use of working capital may use turnover ratios such as sales efficiency, and inventory turnover (Harper, 2002; Parker & Hartley, 1991).

Financial ratio measures are also commonly used for the evaluation of SOEs performance, even though one has to be aware that an SOE may not be set up to produce profits. Some scholars used a variation of return on assets (ROA), return on equity (ROE) and return on investment (ROI) as measures of the firm's profitability (Boubakri & Cosset, 1998; Dewenter & Malatesta, 2001; Harper, 2002; William Megginson, et al., 1994; Shirley, 1999; Sun, Tong, & Tong, 2001). In addition, a firm's profitability performance can also be measured using the return on sales, which is a ratio of net income to sales (Ricard Bozec & Breton, 2003; Harper, 2002). A firm's operating efficiency usually may be measured using the ratio of sales to the number of employees (Harper, 2002; William Megginson, et al., 1994).

2.4.3 Production efficiency theory

Production is the process of transferring inputs such as labour, land and capital into goods and services. Labour represents both the endeavour and brainpower of human beings. Capital is all goods that have been produced and are used in the next phase in production of other goods and services. Human capital is a particular type of capital, which is the accumulated knowledge and skill of human beings. Thus, the underlying research issue of the efficiency of combining inputs to produce some outputs can be measured by efficiency measures. It addresses the important issue of the production performance (Maddala, 1992). To some extent, this aspect of production is largely untested in corporate performance literature, and there is increasing concern that there is a need to use this method in parallel with financial performance measures.

Efficiency is a summary of the functional relationship between the maximum quantities of output produced from a given combination of inputs. Total product (TP) is a term usually used for the total output. Marginal product (MP) is the increase in total product due to an increase in labour or $\Delta TP/\Delta L$. The average product (AP) is an output per unit of labour or TP/L.

There are three stages of production as a firm learns to combine inputs to produce outputs more efficiently over time. Hence the issue in efficiency is the distance a firm has travelled on the continuous in the production efficiency over time. This determines three different behaviours of MP and AP: (1) If MP>0, AP is said to be rising and therefore MP>AP; (2). If MP>0 but AP is falling and MP<AP although TP is increasing; (3). If MP<0 where TP is falling. In two of these stages, a profit-maximising producer would not produce any outputs. In one of these three stages, a producer can increase the average efficiency of all units by adding one more until of labour to obtain a marginal product of labour higher than the cost of employing that labour. This is the stage two, which is an economically meaningful range. Stage three is a stage with no profit, because a producer can increase total output while saving the cost of a unit of labour by reducing the labour input. Thus stage two is the economically meaningful range. Hence, profit can be maximised if the value of the Marginal Product (MP) equals the price of a firm's inputs.

Our review of the production theory will include Cobb-Douglas production functions as a basic theory for measuring a firm's production efficiency, followed by DEA-Malmquist productivity index.

- *2.4.3.1 Cobb-Douglas production function and production efficiency*

A commonly used production function, as a measure of efficiency, is the Cobb-Douglas equation (or production function). This dates back to 1928. In its simplest form, it related to an output Q with two inputs, labour L and capital K. It can be written as:

$$\mathbb{Q} = \boldsymbol{AL^{\alpha}K^{\beta}}$$

A is a constant that depends on the units of measurement of output Q. Labour indicated by L and capital by K. The coefficient α and β are the elasticities of outputs with respect to labour and capital inputs respectively. Furthermore, α and β can measure returns to scale. If $\alpha + \beta = 1$, then output is not increased, hence such an efficiency indicates constant returns to scale. If $\alpha + \beta < 1$, output is less than input values, indicative of decreasing returns to scale. If $\alpha + \beta > 1$, output is higher than inputs resulting in increasing returns to scale (McTaggart, et al., 2010). Firms operating in stage (2) are able to achieve increasing returns to scale, and such a measure enables one to identify production efficiency.

- *2.4.3.2 DEA-Malmquist productivity index and production efficiency*

The measure of microeconomic efficiency measurement began from early works of Farrel (1957) and is increasingly applied in the 1990s to study performance. He defined a simple measure of a firm's production efficiency that could deal with multiple inputs, not at a time, but over a period of time. One most recent approach in measuring a firm's production efficiency is the DEA.

DEA is a non-parametric "…linear programming method used for evaluating the efficiency of decision-making units (DMUs or firms), where the presence of incommensurate inputs and outputs makes the measurement of overall efficiency difficult" (Azis Boussofiane, Martin, & Parker, 1997). It uses data as inputs and output quantities of a group of firms to construct a piece-wise frontier over the data points. This frontier is constructed by the solution of a sequence of linear programming problems, one of each firm in the sample. Efficiency measures are then calculated relative to this frontier, which represents an efficient technology. Hence this method is an ideal measure for broad measurement efficiency. Moreover it "…allows efficiency to be measured without having to specify either the form of production function or the weights for inputs and outputs used". Charnes, et al., (1978) first used the DEA constant returns to scale model (from here on referred as CRS model) to measure the efficiency of not-for-profit entities in the US public programmes.

However, where constant returns to scale do not prevail, it can be argued that these units should be compared, given their scale of operations. At least it would be useful to know the extent to which any inefficiency of a unit can be decomposed into its pure, technical and its scale efficiency (Charnes, et al., 1978). These methods are now widely used for measuring performance of firms.

DEA does not require any assumptions regarding the production technology or a firm's behaviour such as cost minimisation or profit maximisation. Therefore, DEA can deal either with input-orientated or output-orientated efficiency measure for an entity (Coelli, Rao, & Battese, 1998). In the input-orientated case, DEA frontier seeks the maximum possible proportional reduction in input used while maintaining the number of outputs produced from each other firm. Whilst in the output-orientated case, this method seeks the maximum proportional increase in output produced, with a certain level of input used.

Productivity measurement consists of measuring the change in ratio of outputs used in production process over time. Since many inputs are used, and shared outputs may be produced, a number of procedures have been developed to combine inputs and outputs and then measure changes. DEA method allows us to decompose productivity growth into two components: the technical efficiency change and technology change (Malmquist, 1953). Caves, et al. (1982) introduced the Malmquist index for the first time in productivity analysis. This method defined the index as a ratio of two distance functions, which are representing of multiple inputs and multiple outputs technology without need to specify a firm's behavioural objective such as profit maximisation or cost minimisation.

Fare et al. (1994) stated that an output distance function can be defined at a time t as follows:

$$D_0^1(x,^t y^t) = \min \{\emptyset: (x,^t y^t 1\emptyset) \in S^t$$

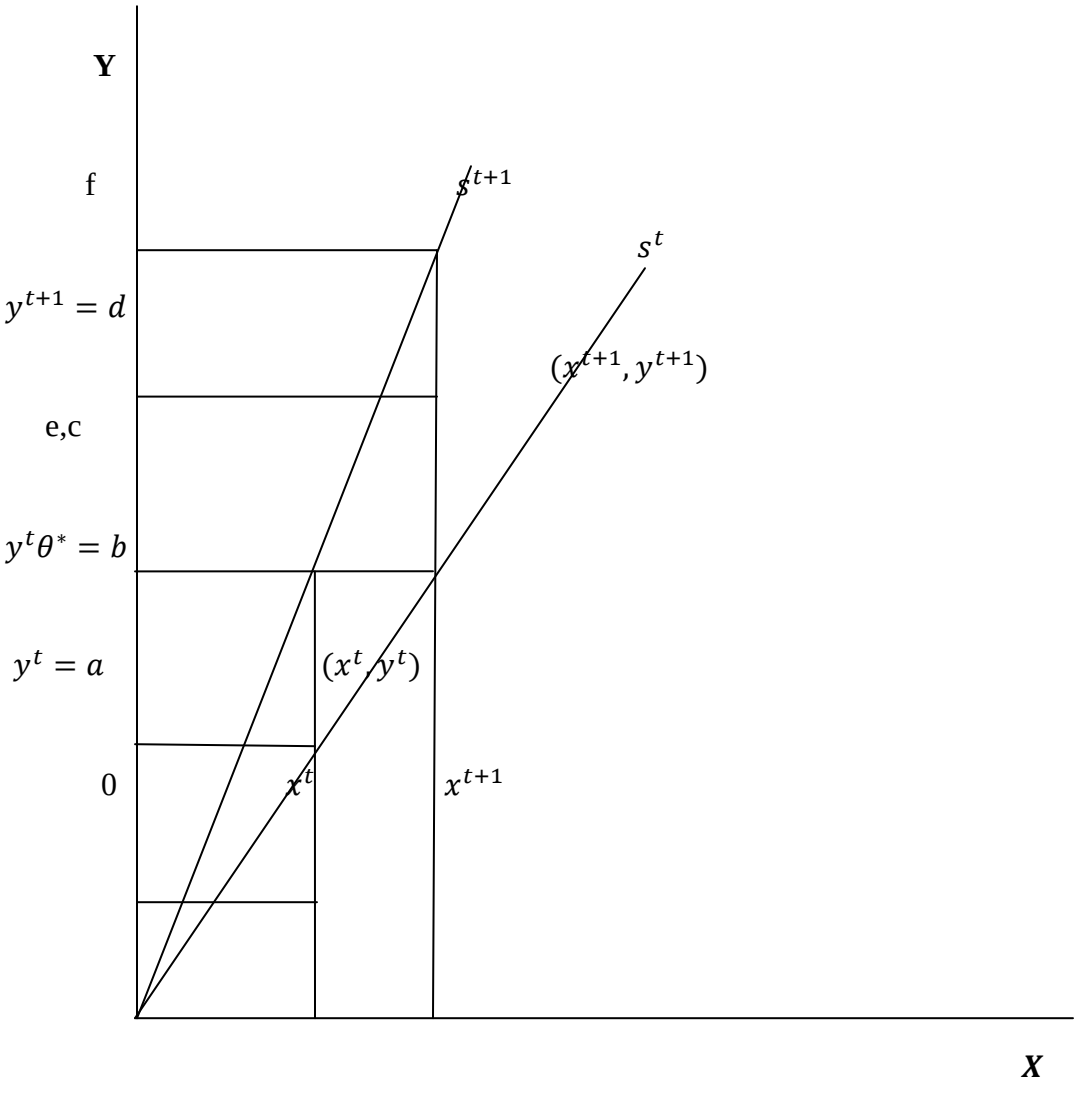
$$\min \{\emptyset: (x,^t \emptyset y^t) \in S^t\}$$

This shows how much outputs (y) can be increased, given a quantity of inputs (x) used, such that x and θy remain the production set over time -1 and 1. An input distance function can similarly be defined under constant returns to scale: the value would be equal to the earlier distance function. In particular the distance function $D^t\, 0\, (x^t, x^t) \leq 1$ if and only if the output vector, y, is an element of the feasible set, S (x). In addition the distance functions $D_0^1\, (x^t, x^t)$=1 if and only if y is located on the frontier technology of the feasible production set. This is likely to

occur when production is technically efficient (Farrell, 1957) (, i.e., the production efficiency arises from employing technology that enables efficiency change over a -1 to 1 period. This can be illustrated as shown in Figure 2.4 below. The observed production at t is interior to the frontier technology at t: that is the production at (x^t, x^t) is not technically efficient. The distance function tries to find the reciprocal of the greatest proportional increase in outputs given the inputs. The maximum feasible production, givenx^t, is at $(y^t/\ \theta *)$. Moreover the value of the distance functions for the observation in terms of distances on the y-axis $(o_a/o_{b)})$, is less than one.

Figure 2.4

The Malmquist output-based index of total factor productivity and output distance functions



The observed production at t is inferior to the frontier technology at t: that is the production at (x^t, y^t) is not technically efficient. The distance function tries to find the reciprocal of the greatest proportional increase in outputs given the inputs. The maximum feasible production, givenx^t, is at $(y^t/\theta *)$. Moreover the value of the distance functions for the observation in terms of distances on the y-axis$(o_a/o_{b)})$, which is less than one. The Malmquist index measures the Total Factor Productivity Change (from here on referred as TFPCH) between two data points over time, (financial performance also establishes the change over time, but does not separate the change due to technology adoption and management efficiency) by calculating the ratio of distances of each data point relative to a common technology. Fare et.al. (1994) determined the components of distance function of the Malmquist index using a non-parametric programming method. The technical change or innovation is defined as how much the world frontier shifts at each country's (or firm's) observed input mix. The output-orientated Malmquist productivity change index between period t and t+1 is illustrated following Fare et.al. (1994), as follows:

$$\mathrm{m_o}\left(y_{t+1}, x_{t+1,} y_{t,x_t}\right)^n = [\,\frac{d_0^t\left(x_{t+1,} y_{t+1}\right)}{\mathrm{d_o^t\,(x_{t..}\ y_t\,)}}\, x\ \frac{d_0^t\left(x_{t+1,} y_{t+1}\right)}{\mathrm{d_o^t\,(x_{t..}\ y_t\,)}}]\, t/2$$

This productivity index (m_0) measures the TFP change over the production point (x_{t+1}, y_{t+1}) and the production point (x_t, y_t) as a ratio of the distance of each point relative to a common technology. A value of m_0 greater than one indicates an improvement in total factor productivity (TFP) growth from period t to period t+1, while a value less than one indicates TFP decline (Coelli, et al., 1998). This equation is in fact, the geometric, mean of two TFP indices. The first is estimated with respect to period t technology and the second with respect to period t+1 technology.

By breaking down the TFP measures into (a) technical efficiency change (EFFCH) and (b) technological change (TECHCH), three ratios would be available for SOEs, PEs and MEs productivity performance to determine where the sources of efficiency are coming from. Most studies around the world show that productivity gains come from technological change (TECHCH). These three ratios are likely to be directly related to accounting performance, such

as ROA, ROE, asset turnover, and the like. For example, a firm with high asset turnover therefore achieves greater efficiency in the use of capital and is more likely to be achieving a higher TFP.

$$Y_j = y_0 + y_1 (TFP)_j + \varepsilon_j$$

Where Y_j is a selected accounting factor of firm j; y_0 is the slope coefficient; y_1 is the measure of the effect of TFP on accounting performance of firm j; and ε is the error term. Using the following equation that incorporates all productivity measures, one could find the association between individual productivity measure and the accounting factors:

$$Y_{j=\theta_0} + \theta_1(X_{1j}) + \theta_2(X_{2j}) + \varepsilon$$

θ_1 Is the coefficient of productivity factor EFFCH; θ_2 is the coefficient of the productivity factor TECHCH.

Whilst the model is not commonly applied as in this study researchers are increasingly employing the DEA method to measure efficiency performance with a number of studies focusing on efficiency of banking firms, see Berger et al.,(1993) Fukuyama (1995) Miller & Noulas (1996) Chu & Guan (1998) Mercan, Reisman, Yolalan, & Emel (2003), Ashmild, Paradi, Aggarwal, & Schaffnit (2004) Bonin, Hasan, & Wachtel (2005) Perera (2006) Seelanatha (2006). Also the method was broadly used for both public and private sector firms, see Bozec & Breton (2003) Viverita (2004) (Bozec, et al., (2006) Delios, Zhou, & Xu (2008) (Perrigot & Barros (2008) such as educational entities (see Charnes, et al.,(1978) Banker, Charnes, & Cooper (1984) and Boussofiane (1991)). In addition, this approach is also used to investigate the efficiency of enterprises in China (Chen (2003) Zheng, Liu, & Bigsten (2003), Delios, et al., (2008)). The methodology is used to examine the impact of ownership types on production efficiency (see Bozec, et al., (2006) Viverita (2004) Perera (2006)).

The purposes of this study are to measure the total factor productivity changes of Sri Lanka's SOEs and also those of private and mixed sector firms during the period 2003-2007. Its aim is to

determine the dynamics of (a) financial performance (b) market performance and (c) production efficiency (d) as well as the linkages of (a) and (c) and also (b) and (c) if any. The usefulness of employing DEA as the operational version of the Production Theory is to examine the TFP as the best measure of a firm's ability to perform under different market structure in the public and private sector. Since productivity consists of technical improvement, as well as gains in management efficiency within a given technology set, identifying which of the two is contributing to the performance would provide for the first time the dynamics of performance over time and across different market structures.

2.4.4 The linkage between financial performance and productivity efficiency

Accounting and financial data are commonly used to model corporate financial performance, and financial ratios have been used as proxies for overall performance, be it financial or production relationships. By relating the performance measure from the accounting/financial ratios to the production efficiency (see Feroz et al., (2003) Bozec et al., (2006) Perera (2006)), it is possible to examine if there exists some relation between two classes of measure. Unlike the work of Feroz et al., (2003) Bozec et al., (2006), Perera (2006), this study proposes to first measure the DEA-Malmquist then based on the obtained results, the observations are divided into (a) increasing returns to scale and (b) decreasing returns to scale. The firms with increasing returns to scale will create value in excess of expenses, thus show positive relationship with financial measures of performance. If otherwise the firm is likely to make losses and thus predicts either no relationship or negative relationship between the two variables.

If the financial analysis finds that firm's ROE increased over the observation period, then we can expect that the economic efficiency performance should also have increased. Since a firm's profitability is gained from its ability to generate revenue in excess of expenses, the same related factors must be changing, as for example expenses such as material used, labour cost and capital cost known as input variables in measuring a firm's production efficiency. Since this is still an un-researched topic, the results from such an approach could help to link the two approaches in a systematic manner. Besides the two approaches can help to identify policy-relevant conclusions on how to evaluate performance of SOEs and private sector firms, if one is to conclude that the accounting monopolists operate in a profit-increasing situation when in fact they are inefficient

in production. It is an extreme possibility that the relationship between the two approaches may in fact have unstable linkages. That would suggest the more rigorously derived production efficiency measures are perhaps more reliable as measures of corporate and industry performance.

2.4.5 Critiques of studies

Despite the advantages of the theories reviewed above, there are also some limitations and problems in their implementation. Firstly, some problems may occur in implementing the ratios in analysing a firm's financial performance. For example, sometimes it is not easy to recognise meaningful industry averages to which firms belong. Therefore, the firm must decide on its own peer firm and create a standard with no reference to the industry norms. In addition, inflation had badly disturbed a firm's balance sheet, thus financial statement analysis from these numbers as ratios must be interpreted with concern and judgement. Seasonal factors can also distort the ratio analysis, therefore balance sheet entry and their corresponding ratios will vary with the time of year when the statements are prepared (Brigham & Gapenski, 1990; Keown, 1996).

Secondly, despite the significant advantage of the DEA, it does not apply to a particular functional form. This approach requires a specification of the nature of returns to scale. Therefore one has to identify what technology they rely on, based on prior knowledge. Furthermore, it assumes that data is free of measurement error (Mester, 1996). Unreliable data therefore could give unreliable results. The efficiency scores are only relative to the best firm in the frontier, thus the addition of an extra firm may change the score (Coelli, et al., 1998).

Thirdly some predicaments in implementing the stochastic frontier approach have been explored (Coelli, et al., 1998) :

1. The selection of a distributional form of the inefficiency effects may be arbitrary, but general distributions, such as truncated-normal are considered the best.
2. The production technology must be specified by a particular functional form, for which flexible functional forms are recommended.
3. The stochastic frontier approach is only well developed for single output technologies, unless one is willing to assume a cost-minimising objective.

Since the stochastic frontier approach is based on the parametric linear regression methods, the results may become biased in the presence of common econometric problems such as heteroskedasticity, autocorrelation, and multicollinearity. How to overcome these problems will be discussed in the next chapter on methodological issues.

2.5 Corporate governance and corporate performance

Governance structure and corporate performance research has relied on accounting based indicators, market based indicators or combinations of both .In the financial literature differential influences of these indicator types on financial and market performance variables are ROA, ROE, SPE, NIE and Tobin's Q. The indicators based on market returns are, like Jensen's alpha, the Treynor measure, or the Sharpe measure. The relationship between the elements of corporate governance and corporate performance are varied significantly from research to research, country to country and time to time.

Narrative reviews describe board composition and performance links as 'vexing', 'contradictory', 'mixed' and 'inconsistent' (Finkelestin & Hambrick, 1996; Johnson, Daily, and Ellstrand, 1996; Zahara and Pearce, 1989 as cited by Dalton, Johnson, & Ellstrand, (1999) Bhagat & Bolton (2008) and Coles, Daniel, & Naveen (2008). Dalton & Dalton (2011) articulate more recently regarding Meta-analysis that they have found no evidence of substantive relationships between board composition and financial performance.

Yermack (1996); Lin, (1996) as cited by Dalton, et al.(1999), Coles, et al. (2008) demonstrate that board smallness was associated with higher market evaluations as well as higher market valuations as well as higher returns on assets and returns on sales.

A survey carried out by MCKinsey and Company, in conjunction with Institutional Investor Inc., found that investors pursuing a growth strategy did not worry about corporate governance, while investors who pursued a value strategy and invested in undervalued or stable companies were willing to pay for good governance (Agrawal & Knoeber, 1996; Kakabadse, et al., 2001; Wruck & Wu, 2009). According to them, these investors hold the belief that a company with good governance will perform better over time and/or that good governance can reduce risk and attract further investment. Also they insist that good corporate governance can apparently serve as a

tool for attracting certain types of investors as well as influencing what will be paid for stock; the average premium which investors are willing to pay for good governance being between 11 and 16 per cent.

Although there is a growing area in the literature linking corporate governance to corporate performance, there is, equally, a growing diversity of results. The diversity of results can be partly explained by differences in the theoretical perspective applied, selected research methodologies, measurement of performance and conflicting views on board involvement in decision making and, in part, to the contextual nature of the individual firm (Kakabadse, et al., 2001). Many studies that demonstrate positive relationships between variables of interest from the four sets of board attributes and a firm's performance, when meta analytically reviewed show negative relationships and no statistically significant relationship at all (D.R Dalton, Daily, Ellestrand, & Johnson, 1998; Kakabadse, et al., 2001). Dalton & Dalton (2011) have suggested, "Conflicting results in the literature may be entirely artificial". According to Kakabadse, et al. (2001), there is no actual population of relationships at all. For example a meta-analysis of 54 empirical studies of board composition and 31 empirical studies of board leadership structure and their relationship to financial performance by Dalton, et al.(1998) concluded by saying,

"Relying on firm size, the nature of the financial performance indicators and various operationalisations of board composition, provide little evidence of a systematic governance structure and financial performance relationships".

Similarly, the analysis of 40 years of data from 159 studies, carried out by Dalton, et al. (1999), concluded that there is no clear evidence of a substantive relationship between board composition and financial performance, irrespective of the type of performance indicators, the size of the firm or the manner in which board composition is measured. Hence, reliance on any one dimension of board roles and attributes will not ensure high levels of corporate financial performance, especially if it is at the expense of other director roles (Coles, et al., 2008; D.R Dalton, et al., 1999). Large-scale surveys of UK and US corporations suggest that a majority of respondents feel that the heightened focus on corporate governance has had no positive impact on financial performance. Hence, the feeling that sound financial performance excuses poor governance practice is widely spread (Claessens & Fan, 2002). Research reveals that institutional investors identify a key investment criterion to be financial performance and growth potential.

There has been much discussion recently about whether corporate governance makes a difference to the bottom line, that is, does good corporate governance improve shareholder value?

One can conceive of linkages between corporate governance and corporate performance that might affect a wide range of social, political and economic issues. From a broad perspective corporate performance might be about more than enhancing shareholder wealth. For example it could be evaluated for its impact on the cost of funds (efficiency in the financial markets), the role of labour in management (up to and including labour-owned firms), the role of corporations in education and training (efficiency in the labour market), and the contribution of corporations to research and development (efficiency in the knowledge market). Corporate performance could also be judged by its contribution to a country's ability to compete successfully in international markets. Some commentators have even put forward a broad agenda for corporations and their institutional owners.

The next part of this chapter discusses the relationships between the corporate performance and elements of corporate governance: The Board and the CEO.

2.5.1 The board of directors

Who is responsible for corporate governance? The primary responsibility is that of the board of directors, which is at the apex of an organization. It is the board of directors which lays down the strategic direction boundary and the value framework for the enterprise.

"It is the board of directors which has to determine where a company stands within that frame work. The board is the bridge between the providers of capital and the executives who put that capital to work, just as the board is the link between the enterprise and the community of which it is a part. It is the directors who have to frame the direction and purpose of the company and agree to the strategy by which that purpose will be met. Equally they have to balance the demands of the various interests, which their company seeks to serve. Corporate governance therefore focuses on the role of the board" (Cadbury, 2000).

Company directors occupy a dual position in the principal agent relationship, being both the principals of the managers and the agents of the shareholders (Raheja, 2005). Berle and Means (1932) as quoted in the Editorial Corporate Governance, (2001) highlighted the separation of the owners (shareholders) from the control of the business; 'control' being in the hands of the

directors. The board at the apex of the internal control system has the final responsibility for the functioning of the firm. Most importantly it sets the rules of the game for the CEO. The job of the board is to hire, fire and compensate the CEO and to provide high-level counsel (Jensen, 1993). Fields and Keys (2003); Raheja (2005); Coles (2008) also say one of the main duties of a corporate director is to monitor managers, a duty that includes selecting top managers, implementing incentives to motivate managers to take actions consistent with shareholder wealth maximization and evaluating manager performance to determine the size of the bonuses or whether managers should be fired.

The corporate board with its mix of expertise, independence, and legal power, is a potentially powerful governance mechanism (Bhagat & Bolton, 2008; Farooque, et al., 2007; Gillan, 2006; Kathuria & Dash, 1999). There does not seem to be conformity among financial economists on the importance of the structure and the size of the board of directors. The corporate governance literature identifies a variety of different roles which boards of directors may assume in decision making. Firstly, the 'service role' of the director is one of these, which is based on the stewardship theory. It includes control of corporation, reputation of corporation and formulating and implementing of decisions.

Secondly, the 'control roles' which are based on agency theory are concerned with safeguarding the interest of the shareholders, selecting and monitoring the performance of the CEO and separating the decision management from decision control. And the third role is the 'strategic role' which is based on stakeholder theory which concerns guiding the corporate mission, developing and implementing firm's strategy and resource allocation and so forth (Zahara and Pearce, 1989; Massen 1999 as quoted by Singh & Davidson (2003).

Apart from the board roles, the corporate governance literature identifies four sets of board attributes, namely; composition, characteristics, structure and process. Board composition is comprised of the board size, outsider representation (non-executive) and minority representation (male/female, foreign/local). Board characteristics are concerned with the director's background, experience, beliefs, attributes and his orientation. The board structure is concerned with board organization, board leadership.

Subsidiary boards in holding companies are concerned with efficiency of board committees and flow of information among directors. Finally, the board process is about intensity and quality of director's interaction (frequency and length of board meetings), interface between the

CEO/chairperson and the board, levels of director consensus, process of board evaluation, board culture.

From the different board attributes the researcher will concern the board size and outside representation, which are included in board composition and hence those are further elaborated in the study with their relationships between company performances.

2.5.2 Relationship between board size and corporate performances

The empirical research on the importance of board size was not too skinny. Most of the recent studies have largely overlooked the importance of board size (see), Hartarska (2005), Jensen (1993), Kathuria & Dash (1999), Lipton & Lorsch (1992), Mayers, Shivadasani, & Smith (1997), Mersland & Strom (2009), Pombo & Gutierrez (2011), Walker (2007), Yermack (1996).

According to Jensen (1993) "…. As groups increase in size, they become less effective because the coordination and the process problem overwhelm the advantage from having more people to draw on."

In Yermack's analysis (1996) of 452 large US corporations for the period 1984 to 1994 finds that the negative relation between board size and corporation value increases as the board becomes large. Mintzberg (1983) as cited by Dalton et al., (1999) suggests that board members' assessments of top management are more easily manipulated when boards are large and diverse and it might be reasonably expected, then, that large boards would tend to be more diverse, more contentious, and more fragmented than small boards.

Board size may be a measure of an organization's ability to form environmental links to secure critical resources (Goodstein et al. 1994 as quoted by Dalton, et al. (1999). Proven (1980) as cited by Dalton, et al. (1999) demonstrate that board size was associated with a firm's ability to extract critical resources such as amount of budget, external funding and leverage from an environment. Resource dependence theory has been the primary foundation for the perspective that larger boards will be associated with higher levels of firm performance (Alexender, Fennell & Halpern (1993) as cited by Dalton et al., (1999).

Keeping boards small can help improve their performance (Hartarska, 2005; Walker, 2007). When boards get beyond seven or eight people they are less likely to function effectively and are more difficult for the CEO to control (Jensen, 1993). In contrast, Singh & Davidson (2003) Coles (2008); Mersland & Strom (2009) suggest that as groups increase in size, they become less

effective because of coordination and process problems outweighing the advantages gained from having people of diverse backgrounds. Lipton and Lorsch (1992) quoted by Jensen (1993) states that "the norms of behaviour in most boardrooms are dysfunctional, because the directors rarely criticize the policies of top managers or hold candid discussions about corporate performance." Believing that these problems increase with the number of directors, Lipton and Lorsch (1992) recommend limiting the membership of boards to ten people, with a preferred size of eight or nine. The Cadbury committee (1992) also recommends that the ideal size of the board should be between eight and ten members.

2.5.3 Relationship between non-executive directors and corporate performance

Non-executive directors are defined as directors other than executive directors, affiliated directors are family-related, former executive, inter-corporate directors' and grey directors are bankers who make loans or have other interests in the firm, firm lawyers, firm consultants or auditors, officers or directors of firm's suppliers and customers, civil servants in the case of government-linked companies. These directors are part time employees and are not subordinates under the CEO (Mak & Li, 2001).

Only recently the empirical studies seem to have been able to resolve the debate about the importance of corporate boards, particularly non-executive directors, in protecting and promoting the shareholders' interest. The recent empirical work indicates that outside directors are important.

According to Weir and Laing (2001) boards consist of two different types of directors, executive (inside) and non-executive (outside). Executive directors are responsible for the day-to-day management of the company. They have direct responsibility for aspects of the business such as finance and marketing. They also help to formulate and implement corporate strategy. Their key strengths are that they bring specialized expertise and a wealth of knowledge to the business. They are full time employees of the company and should have clearly defined roles and responsibilities.

Daily and Dalton (1993) and Weir and Laing (2001) describe executive directors as subordinates of the CEO, and thus are not in a strong position either to monitor or discipline the CEO. It is therefore important that there is a mechanism to monitor the actions of the CEO and executive directors and to ensure that they pursue shareholder interests. Cadbury (1992) identifies this

monitoring role of non-executive directors as their key responsibility. Dare (1993) and Weir & Laing (2001) argues that non-executive directors are effective monitors when they question company strategy and ask awkward questions and in addition they are able to provide independent judgment when dealing with the executive directors in areas such as pay awards, executive director appointments and dismissals.

Board composition is defined as "the proportion of outside directors to the total number of directors" by Shamser and Annuar (1993) and Hanifa and Cooke (2002), thereby making a distinction between executive and non-executive (outside) directors. There are two views on this issue: those who argue for more non-executive directors on boards and those who favour more executive directors. Those who are in favour of more non-executive directors on the board base their arguments on two theories: agency and resource dependency. The premise of agency theory is that non-executive directors are needed on the boards to monitor and control the actions of executive directors owing to their opportunistic behaviour. Jensen and Meckling (1976) define the agency relationship as a contract under which one party (the principal) engages another party (the agent) to perform some service on their behalf. As part of this, the principal will delegate some decision-making authority to the agent. Mangel and Singh (1993) and Hanifa and Cooke (2002), believe that non-executive have more opportunity for control and face a complex web of incentives, stemming directly from their responsibilities as directors and augmented by any equity position that they hold. Thus, non-executive directors are seen as the check and balance mechanism in enhancing board effectiveness. Fama and Jensen (1983) also state that outside directors might be considered to be 'decision experts'.

Fama (1980), Fama & Jensen (1983), Kathuria & Dash (1999), Dahya, McConnell (2005) and Chen, et al. (2006) consider the board to be an important element of corporate governance and acknowledge the role of outside directors as monitors of management and providers of relevant complementary knowledge. According to this view the 'inside directors', i.e. the top managers of the corporation, provide valuable information about the corporation's activities, while 'outside directors' contribute both expertise and objectivity in evaluating the managers' decisions, thereby protecting the shareholders' wealth.

Even if boards do not merely duplicate other governance mechanisms, the authors argue that managers inherently dominate the board by choosing the outside directors they want to work

with. The argument thus implies that board and its composition does not play a very influential role in corporate governance (Demsetz (1983), Hart (1983) and Kathuria and Dash (1999)).

If non-executive directors were effective monitors, their effectiveness would increase in line with their board representation. This should result in improved corporate performance. However, Yermack (1996); Weir and Laing (2001); Chen (2006) find a negative relationship between the proportion of outside directors and corporate performance. Further Dalton et al., (1998) in their meta-analysis failed to find any relationship between corporate performance and outside director representation.

A moderating effect of board composition would suggest "… that a larger board with high proportion of outside directors would be associated with higher levels of financial performance than a larger board with fewer outside directors (Fazlzadeh et al.2011; Dalton et al. 1999).

The Cadbury Committee (Cadbury 1992) also recommends that the ideal size of the board should be between eight and ten members and that there had to be one executive director for every non-executive director.

In Australia the Bosch committee has recommended that boards be comprised of a majority of independent, non-executive directors (Cotter & Silvester, 2003) which is consistent with other research. Fama (1980), Fama and Jensen (1983) and Cotter and Silvester (2003) stress the importance of both inside (executive) and outside (non-executive) directors for effective boards, with the appropriate mix determining the board's effectiveness in monitoring management. Also outside board members may act as arbiters in disagreements among internal managers and if serious problems are between internal managers and shareholders. Firms with boards of directors that are dominated by top management can suffer problems associated with collusion between them and the consequent transfer of stockholder wealth. Therefore, corporate boards generally include outside members who ratify decisions that involve serious agency problems and act as arbiters in disagreements among internal managers (Cotter & Silvester, 2003).

Brickley and James (1987) and Kathuria and Dash (1999) say that the presence of outside directors tends to reduce managerial consumption of prerequisites. Chen et al. (2006) also find that the higher the proportion of outside directors on a board, the more likely the board will replace the corporation's CEO after a period of poor corporate performance. Outsiders are more likely to be inducted on the board after a corporation performs poorly or leaves an industry. In contrast a high proportion of non-executive directors on boards, as proposed by agency and

resource dependence theories, also have drawbacks. Arguments against boards dominated by non-executive directors include stifling strategic actions (Goodstein et al. 1994), excessive monitoring (Baysinger and Butler 1985), and lack of business knowledge required to be effective (Patton an Baker 1987; Chen 2006) and lack of real independence Hanifa and Cooke (2002).

Brickley et al. (1994) and Kathuria and Dash (1999) provide direct evidence that shareholder wealth is affected by board composition, as they document a positive stock price reaction at the announcement of the appointment of an additional outside director. These outside directors are generally retired decision-makers from other organizations. They find that the relationship between the stock market reaction and board composition is not monotonic, and argue that the estimated empirical relationship is consistent with the view that outside directors serve the interest of shareholders. Baysinger and Butler (1985); Brickley et al. (1994); Mayers et al. (1997)); Coles et al.(2008) and Fazlzadeh et al. (2011) also find some evidence that companies perform better if boards include more outsiders. On the other hand, Hermalin and Weisbach (1988); Kathuria and Dash (1999); Walker (2007); Bhagat et al. (2008) and Darlton et al. (2011) find no relation between the corporation's performance and the fraction of outside directors.

The market expects outside directors to add value to the firm. Rosenstein and Wyatt (1990) and Fields and Keys (2003), find that the addition of an outside director to the firm, produces a positive, significant stock price reaction. The stock market reaction at the appointment of inside directors is close to zero. Other studies show that outside directors are more effective than insiders when it comes to hiring, firing, and compensating top executives. Outside directors may receive cash compensation or stock awards for their presence on the board. However, outside directors are expected to receive their greatest benefit from serving on corporate board in the form of reputation effects.

Table 2.1

Outside director ratio by selected countries

Country	Mean/ outside Director Ratio	Study	Period
Australia	64.6%	Kang et al. (2007)	2003
Canada	68.0%	Park and Shin (2004)	1991-1997
Denmark	44.2%	Dahya et al. (2008)	2002
Finland	66.3%	Dahya et al. (2008)	2002
France	57.4%	Dahya et al. (2008)	2002
Germany	57.5%	Dahya et al. (2008)	2002
United States	60.1%	Barnhart, Marr, and Rosentein (1994)	1991
United States	75.0%	Dahya et al. (2008)	2002
India	45.8%	Berkman, Cole, Lee, and Veeraraghavan (2003)	2001-2003
Malaysia	47.5%	Dahya et al. (2008)	2002
Brazil	57.1%	Dahya et al. (2008)	2002
Chile	34.0%	Lefort and Urzua (2007)	2000-2003
Mexico	54.1%	Dahya et al. (2008)	2002
Venezuela	54.0%	Garay and González (2007)	2002
Colombia	33.7%	Pombo and Gutierrez (2011)	1996-2006

Source: Outside directors, board interlock and firm performance: Empirical evidence from Colombian Business Groups, Pombo and Gutierrez (2011).

2.5.4 Relationship between CEO duality and company performance

One key monitoring mechanism advocated by the agency perspective is the separation of the roles of CEO from chairman. When there is no separation the CEO also serves as the chairman. This situation known as CEO duality is problematic from an agency perspective where the CEO chairs the group of people in charge of monitoring and evaluating the CEO's performance (Judge, et al., 2003).

According to Weir and Lang (2001), the CEO is a full time post and has responsibility for the day-to-day running of the company as well as setting, and implementing corporate strategy. The CEO is also ultimately responsible for the performance of the company. In contrast, the post of chairman is normally part-time and the main responsibility is to ensure that the board works

effectively. The role therefore involves monitoring and evaluating the performance of the executive directors, including the CEO.

According to the Cadbury Report, the chairman has a responsibility to look after board room affairs by ensuring that non-executive directors have the relevant information for board meetings and other pertinent company information. Cadbury also argued that the chairman should be distanced from day to day activities and the posts of CEO and chairman should be separate (Dahya, McConnell, & Travlos, 2002). Further, Cadbury says,

"…. for recommending that the chief executive should not also be the chairman is that the effectiveness of boards turns to a great extent on the skill of their chairman and on their capacity to give time to turning a group of competent directors into an effective team. It is hard for chief executives to give the necessary time to acquire the skills of chairmanship and to act as counsellor to individual board members in the face of the demands of running the business" (Cadbury, 2000).

CEOs have the power to control the board, which in turn ultimately reduces the CEO's and the company's performance (Jensen, 1993). It is common in U.S. corporations for the CEO to also hold the position of chairman of the board. The function of the chairman is to run board meetings and oversee the process of hiring, firing, evaluating and compensating the CEO. Clearly the CEO cannot perform the function of the chair independent of his or her personal interest. Without the direction of an independent leader, it is much more difficult for the board to perform its critical function. Therefore for the board to be effective, it is important to separate the CEO and chairman positions. The independent chairman should, at a minimum, be given the rights to initiate board appointments, board committee assignments, and (jointly with the CEO) the setting of the board's agenda. All these recommendations, of course, will be made conditional on the ratification of the board (Jensen, 1993).

Daily and Dalton (1993); Weir and Lang (2001) and Chen, et al. (2006) state that duality is often a sign of strong CEO power which, combined with a lack of monitoring of board decisions, may have negative consequences for corporate performance. Also they state that duality is more common in failed firms than in non-failed firms. However, the matter is not precise.

There is some evidence that companies that have duality perform better than those with separate leadership (Amaral-Baptista, Klotzle, & Melo, 2011; Boyd, 1995; Donaldson & Davis, 1991; Fazlzadeh, et al., 2011). In addition, Dalton, et al. (1998) concludes that duality has no effect on

a firm's performance. Therefore, the US evidence in relation to duality is mixed. There is also conflicting evidence from the UK. Dahaya, et al. (1996) finds positive evidence for splitting the roles of chairman and chief executive. They find that the announcement that the roles are to be separated has a positive effect on share prices.

An aspect of corporate governance that has given rise to concern is the 'dominant personality' phenomenon, which includes role duality, when the CEO is also chair of the board. There are two views regarding this issue. Proponents of agency theory argue for separation of the two roles to provide essential checks and balances over management's performance. Furthermore when the CEO is also the chair, the board effectiveness in performing its governing function may be compromised because the CEO will be able to control board meetings, select agenda items, as well as select board members (Haniffa & Cooke, 2002).

An alternative argument is that the separation of roles is not crucial since many companies are well run with combined roles and have strong boards fully capable of providing adequate checks. Furthermore, when the role is combined, the CEO may be able to shape the company to achieve stated objectives, as there will be less interference. Most of the researchers' arguments are based on stewardship theory in which managers' act in the best interest of the firm and shareholders, and role duality enhances the effectiveness of the boards (Haniffa & Cooke, 2002).

In summary, those who favour role duality argue on the basis of stewardship theory in contrast to agency theory, which views executive managers as opportunistic shirkers. Stewardship theory adopts a more positive perspective, viewing directors as guardians, as corporate assets and wishing to do their best for the company. As such there is no problem if the two roles are combined (Haniffa & Cooke, 2002).

Nevertheless, separation of the roles of chair and chief executive will help enhance monitoring quality, controlling frauds (G. Chen, et al., 2006), increasing the turnover of executive directors (Renneboog, 2000) and reduce the advantages gained by withholding information, thereby improving the quality of reporting (Forker (1992) and Haniffa & Cooke (2002).

If the separation of the CEO from the chairman is symbolic of a culture of 'good' corporate governance, then companies with this characteristic should exhibit good performance.

However, according to some of the recent studies, Faleye (2007), Dey (2008), Iyengar (2009) and Dalton & Dalton (2011), there is no systematic relationship between board leadership and corporate financial performance.

2.6 Chapter summary

This chapter provides a foundation for model development for this study. It contains a literature review relevant for this study, specifically microeconomics theories of firm performance, financial performance as well as production economics. In addition, the evidence in the literature for each theory is explored as well, providing a brief review of the corporate sector of Sri Lanka. Microeconomics theories are used as a fundamental theory for the production economics used in this study. Since this study examines SOEs as well as private sector firms, the theory of market structure, namely monopoly and competition, are suitable to evaluate economic performance. Moreover, financial ratios provide a conceptual framework for a firm's financial condition and performance measures. It provides tools for evaluating a firm's liquidity, operating efficiency, leverage and profitability. The usefulness of ratio depends on the ingenuity and experience of the financial analysis. The ratio must be applied on a comparative basis. It means that comparing one firm to similar firms and similar industry standards over time is crucial. Such comparisons may provide clues for evaluating changes and trends in the firm's financial condition and profitability.

Production efficiency measures (DEA-MPI and the Tobit regression approaches) are planned to be used to circumvent the inadequacy of measuring financial performance, particularly in the SOEs, which rarely make any profits. The approaches developed are easily adapted to this study, because they do not need any assumption of a firm's specific behaviour, i.e. profit maximisation or cost minimisation. In addition, these approaches can also be applied to take into account the more realistic multiple inputs in the production to produce outputs. The Sri Lanka corporate sector is also reviewed in this chapter. It includes the history and development of SOEs as well as the recent reforms of the private and public sector firms.

Therefore this study contributes greatly to the existing literature in that the previous studies conducted in Sri Lanka applied very small data sets or focused on only one industry. Furthermore, this approach is noteworthy in that the research methodology is an innovative approach to studying this area. In addition the data used in this study is unique to this study being compiled from sources within Sri Lanka. Taken as a whole, this is the first research published in Sri Lanka using the DEA- Malmquist index, accounting ratios and Tobin's Q as well. Consequently, the findings of this study will be helpful to policy makers of the government of Sri Lanka particularly and policy makers of other emerging nations generally. Furthermore

decision makers regarding privatization and board governance, analysts, and investors will be aided in determining the divers of the value of firms and important corporate governance aspects in Sri Lanka.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter describes research design, and the methodology developed to investigate the firm's corporate governance, financial performance, market performance and production efficiency performance and production efficiency links with financial and market performance. Section 3.2 shows the conceptual framework of this study. Section 3.3 focuses on research method which consists of the research questions and hypothesis developed in this thesis. Data sources and statistics on the sample used as well as the variables derived are described and defined in section 3.4. Section 3.5 explains the models developed for this study, while section 3.6 reveals some methodology problems. This chapter ends in section 3.7 with the chapter summary.

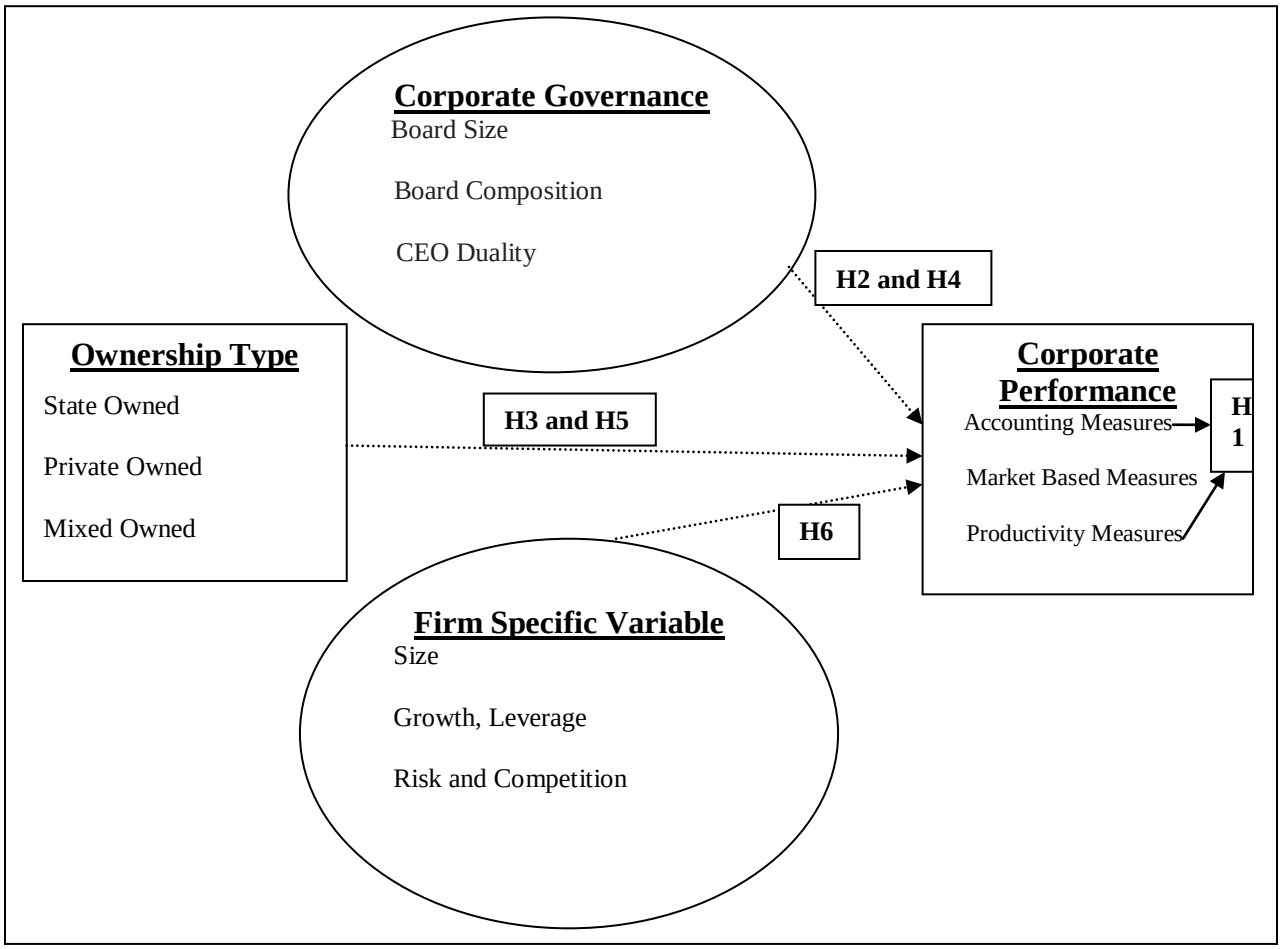
3.2. Conceptual frame work

The conceptual framework for the study (figure 3.1 below) is made up of ownership types, corporate governance and firm specific variables on corporate performance. While ownership types, corporate governance, firm specific variables are independent variables; Performance will be the dependent variable.

For the purpose of finding answers to research questions, hypothesis H1 is used to test whether there is a relationship between three different measurement approaches. While the relationship between corporate governance and performance will be tested using hypotheses H2 and H4; the relationship between ownership type and performance will be tested by hypotheses H3 and H5. Then finally, hypothesis H6 is used to test the relationship between firm specific variables and performance.

Figure 3.1

Conceptual model



3.2.1 Corporate performance

Three aspects of performance measures (accounting, market and productivity) will be used.

(a) Accounting performance (profitability)

(b) Market – based performance (market value)

(c) Productivity performance (efficiency)

Accounting performance is measured using conventional accounting ratios, Return on Equity (ROE) and DuPont equation decomposition of ROE (Margin (Net Income/Sales), Assets Turnover (Sales/Total Assets), equity multiplier (Total Assets /Equity), Return on Assets (ROA), Sales Per Employee (SPE), and Net Income Efficiency (NIE) (Boardman & Vining, 1989; Bozec, et al., 2006; Dewenter & Malatesta, 2001).

Market Performance is measured by Tobin's Q for the firms that have market data (listed firms). In its simplified form, it is defined as the market value of equity + book value of total debt divided by the book value of assets (Chung & Pruitt, 1994; Coles, et al., 2008; Faria & Mollick, 2010; Hovey, Li, & Naughton, 2003; Shepherd, 1986).

Productivity performance is evaluated through DEA Malmquist Productivity Index. Here the Total Factor Productivity, in addition to its decompositions (technological change and the technical efficiency change) is also assessed. The contribution of labour to the total factor productivity of a firm is also calculated. Labour productivity growth is measured, based on the change in the volume of labour input. Employment is a politically sensitive objective, and it is the reason to calculate labour contributions (Bozec, et al., 2006; Dewenter & Malatesta, 2001).]]

3.3 Research method

The aim of this study is to identify the financial performance (profitability) of the firm, the, market performance (market value) of the firm and production performance (efficiency) of the firm, based on three ownership types (SOEs, PEs and MEs) and corporate governance board size, board composition and CEO duality) by comparing a matched sample of private sector enterprises (PEs) state owned enterprises (SOEs) and mixed enterprises (MEs) from selected industries in Sri Lanka. Four major research questions need to be answered for this purpose: (1) 'Do various efficiency measurement approaches generate consistent efficiency assessments for selected enterprises of Sri Lanka?' (2) 'What is the nature of board size and composition? Does the board size and composition explain the differences in enterprises' accounting, market and/or production efficiency performance levels of enterprises in Sri Lanka?' (3) 'Does type of ownership explain the differences in SOEs PEs and MEs in Sri Lanka's levels of accounting, market and/or production efficiency performance?' (4) 'Do the firm's specific factors affect performance?' Especially this study intends to expand the widespread usage of accounting/financial and market performance measures to comprise to be more accurate measures of net productivity (total factor productivity, hereafter: TFP). Simultaneous applications of the two approaches (non-frontier performance measures and standard frontier performance measures) may reveal both unity and respect in the two approaches (non-frontier performance measures and standard frontier performance measures) while providing alternative measures of performance of firms. Particularly corporate performance using accounting or

financial measures has become suspect given the large number of accounting malpractices which has come to the public's attention in recent years. Therefore the fourth chapter of this study is devoted to showing the bias of those performance measurement methods.

Findings in the relevant literature appear to have focused only on one type of performance measure. (for example see, Megginson et al., (1994), Boyco et al., (1996), Claessens & Djankov (1999), Estrin & Rosevear (1999), Villalonga (2000), Heracleous (2001), Megginson & Netter (2001), Bozec and Breton (2003), Comstok et al., (2003), Chen et al., (2006), Bhagat and Bolton (2008), Coles et al., (2008), Siriwardene (2008), Wruck & Yilin (2009), Mersland & Storm (2009), and Amaral-Baptista (2011)). These researchers used mainly financial indicators or market indicators as their performance measures, leaving out a more critical efficiency measure, namely: the frontier approaches, to examine the impact of ownership types on technical efficiency (see, Liu and Zhuang (1998), Huang & Kalirajan (1998), Li et al., (2004) and Margaritis & Psillaki (2007)). These studies also provide evidence that efficiency and performance were examined separately and not at the same time, therefore leaving the significant issue of linkages between production efficiency and other performance measures largely unanswered.

This study is designed to evaluate the performance based on both ownership type (SOEs, PEs and MEs) and corporate governance (board governance consisting of board size and board composition) over the time period, 2003 to 2007, using a privately developed database relating to a large number of firms. This has been an intimidating task. Seven industry categories, namely constructions & engineering, hotel & travel, land & property, manufacturing, plantations, and the services and trading industry were included in the study. To date very limited attention has been given only to studying Sri Lankan firms. Furthermore the role of SOEs is yet to be studied empirically, though their descriptions are largely available. A few publications appear to have dealt with only specific industries. For example, Siriwardane (2008) examined the corporate governance and company performance in Sri Lanka taking just 86 private firms as a sample, using accounting and market based performance measures. Seelanatha (2006) examined the productivity efficiency and market structure of the banking industry in Sri Lanka, using only production efficiency measures. Although in Perera (2006) accounting and production efficiency measures have been used, the sample contained only the banking industry of Sri Lanka in the

study on the competitive conduct and efficiency of South Asian banking 1990 - 2004. Loh et al., (2003) investigated Sri Lanka's plantation Sector: a before and after privatization comparison just using partial productivity measures.

Most of the previous studies on Sri Lanka's SOEs or PEs used only one performance measure at a time, namely, financial measures or production efficiency measure. Especially most researchers used only one industry or few industries and also those studies did not consider mixed enterprises at all. Thus, another difference of this study examines the relationship between non-frontier performance measures and standard frontier performance measures.

A firm's performance is measured using the accounting/finance models; market based model and the Malmquist Productivity Index Model. Furthermore factors that influence the firm's productivity are evaluated using the Tobit regression model and the Bootstrap regression model which is as a second stage of the DEA approach. Therefore three relevant models are applied in this study. The financial ratios are used for the analysis of the firm's profitability, operating efficiency and gearing ratios. This study predicts that private firms would have higher gearing than SOEs. Furthermore the Malmquist Productivity Index method examines the firm's efficiency. The Tobit regression model and the bootstrap regression model examine the efforts of some explanatory variables such as size, growth, firm risk and leverage on the efficiency. In addition, the major aim of the design is in relating the results of financial performance and market performance to the results of the production efficiency. This would assist to extend the narrow concerns with the measure of accounting/financial performance and market performance towards a more inclusive approach of also using the very established production efficiency measures for corporate performance assessment.

3.3.1 Research questions and hypotheses

- *3.3.1.1 Research questions*

The purpose of this study is to address four major problems relating to the current efforts to study the performance of PEs, SOEs and MEs. The research questions are: (1) Do various efficiency measurement approaches generate consistent efficiency assessments for selected enterprises of Sri Lanka? (2) What is the nature of board size and composition? Does the board size and composition explain the differences in enterprises' accounting, market and/or production efficiency performance levels of enterprises in Sri Lanka? (3) Does type of ownership

explain the differences in SOEs PEs and MEs in Sri Lanka's levels of accounting, market and/or production efficiency performance? (4) Do the firm specific factors affect performance? (To address these research questions, six main hypotheses were developed leading to some subsidiary hypotheses.

- 3.3.1.2 Hypothesis generation

Based on those research questions, six main hypotheses are developed for this study:

1. *Ho: Various efficiency measurement approaches do not generate consistent efficiency assessments for selected enterprises of Sri Lanka.*
2. *Ho: The board size and board composition does not explain the differences in enterprises' accounting and/or market performance levels of enterprises in Sri Lanka.*
3. *Ho: Type of ownership does not explain the differences in SOEs PEs and MEs in Sri Lanka' levels of accounting and/or market performance.*
4. *Ho: The board size and board composition does not explain the differences in enterprises' production efficiency performance levels of enterprises in Sri Lanka*.
5. *Ho: There is no significant difference of production efficiency levels among private, mixed, and state owned enterprises.*
6. *Ho: The firm specific factors do not affect performance.*

The alternative hypotheses are: , if the first null hypothesis were rejected, it would mean that whether there is a link between a firm's financial performance and production efficiency performance; and also whether there is a link between a firm's market performance and production efficiency performance either or both in each sector. if the second null hypothesis were rejected, it would mean that whether the board size and board composition of SOEs is different from that of PEs and MEs; and whether there is a significant link between board size and board composition with financial performance and market performance, either or both with SOEs, MEs and PEs. In the case of hypothesis three, whether the performance of SOEs is different from that of PEs and MEs; and whether there is a significant link between financial performance and market performance, either or both with SOEs, MEs and PEs. In relation to hypothesis four, whether the board size and board composition of SOEs is different from that of PEs and MEs; and whether there is a significant link between board size and board composition with production efficiency performance, either with SOEs, MEs or PEs. Whether the

performance of SOEs is different from that of PEs and MEs is the hypothesis five. In addition, a rejection of the sixth null hypothesis would mean that firm-specific factors do affect performance. Finally, if the null hypotheses were rejected in each case, it would mean that the alternative hypotheses are accepted.

Also major hypotheses tests were done at the firm and industry levels as well as on data aggregated for SOEs, PEs and MEs. Hence the subsidiary hypotheses were developed and tested to support or reject the major hypotheses.

The subsidiary hypotheses which were developed to test the major hypothesis number one are as follows:

> *1a: H0: efficiency scores produced by different measurement methods (non-frontier performance measures and standard frontier performance measures) rank the enterprises in approximately the same order.*

The alternative hypothesis is that the accounting/financial measures and market based measures (non-frontier performance measures) are not showing similar trends as the production efficiency measures (standard frontier performance measures). If the null hypotheses were rejected, it would mean that the alternative hypothesis is accepted.

> *1b: H0: efficiency scores produced by different measurement methods (non-frontier performance measures and standard frontier performance measures) identify broadly the same order as "best practice" and as "worst practice"*

The alternative hypothesis is that either the accounting/financial or market based performance of best performing firms and worst performing firms (non-frontier performance measures) are not showing similar trends as the production efficiency performance of best performing firms and worst performing firms (standard frontier performance measures). If the null hypotheses were rejected, it would mean that the alternative hypothesis is accepted.

The subsidiary hypotheses which were developed to test the major hypothesis number two are as follows:

> 2a. *H0: Accounting performance of enterprises and the size of the board of the directors has no significant relationship.*

The alternative hypothesis is that the accounting cum financial performance of enterprises shows a significant positive or negative relationship with the size of the board of the directors. If the null were rejected, it would mean that the alternative hypothesis is accepted.

2b. *H0: Market performance of enterprises and the size of the board of the directors have no significant positive relationship.*

The alternative hypothesis is that the market performance of enterprises shows a significant positive or negative relationship with the size of the board of the directors. If the null is rejected, then the alternative hypothesis is accepted.

2c. *H0: Enterprises that have a lower proportion of non-executive directors to total number of directors are likely to have higher accounting performance.*

The alternative hypothesis is that the enterprises that have a higher proportion of non-executive directors to the total number of directors are likely to have higher accounting performance. If the null were rejected, it would mean that the alternative hypothesis is accepted.

2d. *H0: Enterprises that have a proportion of non-executive directors to the total number of directors are likely to have higher market performance.*

The alternative hypothesis is that the enterprises that have a higher proportion of non-executive directors to the total number of directors are likely to have higher market performance. If the null is rejected, then the alternative hypothesis is accepted.

2e. *H0: Enterprises that have an existence of CEO duality ((one person holds both chairman and the chief executive officer positions) are likely to have a higher accounting performance.*

The alternative hypothesis is that the enterprises that have a non-existence of CEO duality (having a separate chairman and a chief executive officer) are likely to have a higher accounting performance.

2f. *H0: Enterprises that have an existence of CEO duality (one person holds both chairman and the chief executive officer positions) are likely to have a higher market performance.*

The alternative hypothesis is that the enterprises that have a non-existence of CEO duality (having a separate chairman and a chief executive officer) are likely to have a higher market performance.

The subsidiary hypotheses which were developed to test the major hypothesis number three are as follows:

3a. H0: Enterprise accounting performance is the same for private enterprises as mixed and state owned enterprises.

The alternative hypothesis is that the accounting and financial performance of SOEs show a significant difference from that of PEs and MEs. If the null were rejected, it would mean that the alternative hypothesis is accepted.

3b. *H0: Enterprise market value measured by Tobin's Q is the same for private enterprises as for state and mixed enterprises*.

The alternative hypothesis is the production efficiency performance of SOEs shows a significant difference to that of PEs and MEs. If the null is rejected, then the alternative hypothesis is accepted.

The subsidiary hypotheses which were developed to test the major hypothesis number four are as follows:

4a: H0: There is no relationship between the size of a board of directors and production efficiency performance.

The alternative hypothesis is that the Production efficiency performance of enterprises shows a significant positive or negative relationship with the size of the board of the directors. If the null were rejected, it would mean that the alternative hypothesis is accepted.

4b: H0: Enterprises by means of lower proportion of non-executive directors to total number of directors are likely to have higher production efficiency.

The alternative hypothesis is that the enterprises by means of higher proportion of non-executive directors to the total number of directors are likely to have higher production efficiency performance. If the null is rejected, then the alternative hypothesis is accepted.

4c: H0: Enterprises by means of existence of CEO duality (one person holds both chairman and the chief executive officer positions)) are likely to have a higher production efficiency.

The alternative hypothesis is that the enterprises by means of nonexistence of CEO duality (having a separate chairman and a chief executive officer) are likely to have a higher accounting performance.

Since no sub hypotheses for the major hypothesis number five were developed, the subsidiary hypotheses which were developed to test the major hypothesis number six are as follows:

6a: H0: There is no relationship between selected firm related factors with production efficiency in the corporate governance model

The alternative hypothesis is that some selected firm/related factors (including board governance factors) are correlated with economic efficiency performance. A rejection of the null hypotheses would provide evidence that there is a significant correlation between selected firm-specific factors with economic efficiency performance.

6b: H0: There is no relationship between selected firm related factors with production efficiency performance in the ownership model

The alternative hypothesis is that some selected firm-related factors (including ownership type) are correlated with economic efficiency performance. A rejection of the null hypotheses would provide evidence that there is a significant correlation between selected firm-specific factors with economic efficiency performance.

The alternative hypotheses are expected to be accepted (as per literature), which would show that performance of SOEs, PEs and MEs are different: also there are some linkages between the two classes of measures.

3.4 Data and variables

- *3.4.1 Data*

The data for this study are drawn from three main sources. We used panel data from Sri Lanka's SOEs, PEs and MEs covering the period 2003-2007. The main reason to choose the study period 2003-2007 was that no privatization of SOEs took place between 2003 and 2007. While all SOEs remained as SOEs, PEs and MEs remained as PEs and MEs in the study period. Selected items of data from financial statements of balance sheets and profit and loss of firms operating during 2003-2007 were obtained from the Accounting and Auditing Standards Board of Sri Lanka, whilst data for SOEs were drawn from the Department of Public Enterprises of the Ministry of

Finance. In addition selected items of data from balance sheets and profit and loss statements for the respective period 2003-2007 are drawn from the firm's annual reports obtained from the Colombo Stock Exchange (CSE) handbooks. While financial year of some firms end from 31st of December, other firms' financial year ends from 31st of March. Therefore, necessary data are collected to represent each year very carefully.

Table 3.1

Sample profile

Industry Code	**Industry Name**	**Sample Size**			
		Private	**State**	**Mixed**	**Total**
ID 1	Constructions & Engineering	12	8	0	20
ID 2	Hotels & Travel	25	2	4	31
ID 3	Land & Property	13	6	1	20
ID 4	Manufacturing	32	9	10	51
ID 5	Plantations	6	1	17	24
ID 6	Services	11	7	0	18
ID 7	Trading	24	5	4	33
Total		123	38	36	197

Although there are approximately 40,000 private enterprises 242 mixed enterprises and 65 SOEs in Sri Lanka, only 49 mixed enterprises and 188 private enterprises are listed on the CSE of Sri Lanka. None of those 65 SOEs are listed on the CSE of Sri Lanka. Firms have included as shown in the table 3.1 above. In the sample, only if the data series are continuously available and have complete annual reports during the observation periods are the firms included. However, only 38 out of the 65 SOEs were included in the analysis owing to insufficiency of data. All these SOEs are required to be audited by the Department of the Auditor General of Sri Lanka, and hence the data have a higher degree of accuracy.

Although there are non-listed mixed and private enterprises in Sri Lanka, only listed enterprises were selected for the study. Their choice was governed by the data availability, accuracy of data, and the suitability to match (whether the firm has same category of inputs and outputs which

occur in SOEs of same industry) with SOEs. Especially for the calculation of Tobin's Q, the market value is needed. Therefore, listed companies were selected to fulfil that requirement too. Accordingly, only 123 out of the 188 PEs and 36 out of the 49 MEs were included in the sample. Data relating to 123 private sector firms, 49 mixed sector firms on the CSE were accessed using the company annual reports, which are reported in the annual stock exchange company handbooks. The handbook is the source for the official audited annual balance sheets and profit and loss statements. It is produced each year. The specific data items used in this study are: net income, total operating revenues, operating expenses, total assets, total debts, capital investments, total shareholders' equity, and data on production factors, such as material used and labour costs. These data are expressed in nominal monetary values in a country with high inflation. Thus data were adjusted for inflation as per Ma et al., (2002) Bozec et al., (2006), using the Gross Domestic Product Deflator (GDP deflator) and the Wage Index which is calculated by the Central Bank of Sri Lanka yearly, to obtain the real values. Besides, the total number of directors, number of executive and non-executive directors, CEO duality data were collected from particular annual reports.

- ***3.4.2 Variable definition***

This study computed the MPI to examine firm's net efficiency using multiple outputs and multiple inputs. There is no systematic agreement in the literature concerning the relevant inputs and outputs. However given the moderate sized sample, the proper method applied is the DEA methodology (Evanoff & Israilevich, 1991). To apply that, firms are defined as producing three outputs using three inputs. The output chosen is the net sales, since the objective of SOEs is not focused on profit, thus net profit is deemed inappropriate. The theory of firms suggests that firms aim to create value, which in the long run are the total assets; To this end maximised sales; create an annual value, which is Earnings Before Income and Taxation (from here on referred as EBIT), If profit is not the motive then net income is replaced by net sales. This is an important distinction. Since SOEs do not necessarily have a profitability objective, a practical alternative variable is to consider operating income EBIT as another output. EBIT is used to replace net income, considering SOEs are not always set up to make profit from their operations, nor are they mandated to. Since all firms irrespective of ownership by state, private or mixed sectors have to have the single output of sales, naturally sales will be a good output variable since that

variable is unaffected by the cost structures of SOE , PEs or MEs. The three inputs used are consistent with the efficiency literature: these are material costs, labour costs and capital costs. The GDP deflator and the wage index are used to deflate all the monetary variables. Using these data inputs, all of the parameters in the linear programs needed to quantify the MPI and its decomposition can be obtained.

The second models applied are the Tobit regression analysis and the Bootstrap analysis method. These methods are used to examine the effect of some firm-specific variables on a firm's technical efficiency (TE), or labour contribution to technical efficiency (LCTE). The dependent variable for this model is the TE or LCTE, while the independent variables are firm size, firm risk, growth, competition and leverage, five commonly used factors. To date there has been no such study investigating the effect of a firm's specific variables such as size, firm risk, growth, competition and leverage on the total factor productivity, using the Tobit regression analysis and the Bootstrap analysis methodology. Some studies have used size, firm risk, growth, competition and leverage variables as the independent variables that affect a firm's technical efficiency, with variation in results. For example, Fazlzadeh, Hendi, & Mahboubi (2011), Brada, King, & C.Ying, (1997) Mengistae (Mengistae, 1996) and Pitt & Lee (1981) found that firm size has a positive relationship with technical efficiency. On the other hand, studies by Chen and Tang (1987), Hill & Kalijaran (1993) found no relationship between size and technical efficiency. Moreover, Anderson, Lewis, & Zumpano, (2000) found that small firms experience the most gains in efficiency in the residential real estate market. Pitt & Lee (1981) and Hill & Kalijaran (1993) have found negative association in their studies.

3.4.2.1 Explanatory variables

Type

The model contains dummy variables for each type of enterprise (SOEs, PEs and MEs) to measure the performance of the different types of enterprises. The classification of each type of enterprise is applied by the Ministry of Finance in Sri Lanka.

Size, leverage and growth

The literature generally recognises three additional independent variables, size, growth and leverage that have an explanatory power when examining a firm's performance and ownership (Hovey, et al., 2003).

Size: While there are many ways of measuring size, this study will utilise a firm's sales, because the dependent variable Q already incorporates market and asset values. To account for the distribution, the net sales are transformed into natural logs. When the firm size becomes larger, management and operational inefficiencies can be experienced and it often adversely affects performance (Boardman & Vining, 1989; Bozec, et al., 2006; Dewenter & Malatesta, 2001).

Leverage: The debt/asset ratio of each firm can be measured by the book value of debt divided by the book value of assets. Government firms cannot issue stock except as a part of privatization. Thus capital, that is not internally generated or equity contributed by the government, must be borrowed, and moreover, government firms are able to borrow at favourable rates. Therefore government firms are often more leveraged than private firms. Hence leverage will very likely affect performance (Bhagat & Bolton, 2008; Dewenter & Malatesta, 2001; Hoskisson, Hitt, Johnson, & Moesel, 1993; Lubatkin & Chatergee, 1991).

Growth: The current growth rate of the firm can be measured by change in labour expenses to revenue for each year of the study. Here growth rate is expected to positively correlate with firm performance (Brush & Vanderwerf, 1992; Cameron, 1986; Drucker, 1954; Murphy, Trailer, & Hill, 1996; Tsai, MacMillan, & Low, 1991; Venkataraman & Ramanujam, 1987).

Firm Risk

Risk is measured by the standard deviation of annual earnings before taxes. A negative relationship between risk and performance will be expected. Poorly organized enterprises tend to be riskier enterprises (Castanias, 1983; Mackie-Mason, 1990; Margaritis & Psillaki, 2007).

Competition

Competition is an indicator variable. A control over for competition is made necessary because some of the sample firms are in a monopolistic position. Therefore with a dichotomous variable, this study distinguishes firms in a situation of monopoly from firms facing a higher level of competition (Bozec, et al., 2006; Dewenter & Malatesta, 2001).

Industry

Here seven types of industries are being considered and dummy variables distinguish each industry type (Boardman & Vining, 1989; Bozec, et al., 2006; Dewenter & Malatesta, 2001).

Following three board governance variables are being used as independent variables when assessing corporate governance and corporate performance relationship.

Board Size

Applies to the total number of directors on the board of directors (Coles, et al., 2008; Mayers, et al., 1997; Mersland & Strom, 2009)

Non-Executive Ratio

It is the ratio of non-executive directors to the total number of directors in a board of directors and this represents board independence (G. Chen, et al., 2006; Mayers, et al., 1997). Please note that the requirements for non-executive directors are the same for SOEs as they are for PEs and MEs.

CEO Duality

It is a binary variable and is equal to '0' if an individual holds both of the positions of chairman and CEO and '1' if each position is occupied by a different person (Chen, et al., 2006; Mersland & Strom, 2009).

- **3.4.3 Descriptive statistics**

3.4.3.2 Summary statistics of the entire sample

Table 3.2 below includes summary statistics on the entire sample. The sample consists of 788 firm-years of data on the sample made up of SOEs, PEs and MEs. This table describes the numerical descriptive statistics of the data set, such as the skewness**,** mean, median and standard deviation of the data. It shows that mean values of the data set are almost the same as the median values, which means the data have a normal distribution. In addition the value of the standard deviations has a relatively small dispersion, which together means that the data are normally distributed. Therefore the mean may be a reliable measure of the data (see Gujarati (2003) Berenson, Levine, & Krebbiel (2004) and Lind, et al. (2005)). Therefore the mean may represent the data set used in this study well.

As table 3.2 below shows the average and median Tobin's Q is a low value. Chung & Pruitt (1994), Hovey, et al. (2003) explain that a low Tobin's Q (between 0 and 1) means that the cost

to replace a firm's assets is greater than the value of its stock. This implies that the stocks in the CSE are undervalued.

Table 3.2

Summery statistics of the entire sample

Variables	Skewness	Mean	Median	Standard Dev.
Board Size	.402	7.52	7.00	2.203
Ex Dir Ratio	.654	0.2330	0.2000	0.1177
Non Ex Ratio	-.654	0.7670	0.8000	0.1177
Risk	.850	777955	666672	503383
Leverage	-1.046	.219161	.142318	.2288214
Growth	.031	0.0094	0.0053	0.0287
Size	-.239	13.4817	13.6440	1.9072
ROA	.465	.075940	.062524	.1486109
ROE	.323	.128011	.105674	.2846833
ROS	.903	.103543	.072665	.2645528
NIE	-.205	.921377	.646700	1.4095239
Tobin's Q	-.568	.952274	.790326	.5986959
Equity Multiplier	-.978	.850254	.883550	.1390267
SPE	-.131	1.0276	.9958	.45659
Assets Use Efficiency	-.852	-.1860	-.0765	.50213

Table 3.3 below shows variables related for the DEA-MPI calculation for all samples, including SOEs and SPEs. The data set includes three output indicators: total assets, sales and EBIT, three input indicators: material, labour cost, and capital investment, as well as the number of permanent staff for all samples. All data correspond to the year ending 31 March for each observation year, from 2003 to 2007. This data set consists for seven industries for SOEs, PEs and MEs: constructions & engineering, hotel & travel, land & property, manufacturing,

plantation, services and trading. These industries are chosen for comparing SOEs, PEs and MEs, based on a matched industry and observation periods, with the total of 788 firm-years.

Table 3.3

Summery statistics of the entire sample based on ownership types

Variables	SOEs		PEs		MEs	
	Mean	SD	Mean	SD	Mean	SD
Board Size	7.16	1.636	7.76	2.44	7.11	1.718
Ex Directors	NA	NA	1.72	0.872	1.56	0.645
Non Ex Directors	NA	NA	5.99	2.437	5.56	1.793
ROA	.060455	.1414054	.076454	.1553325	.090530	.1308276
ROE	.173681	.3788213	.116251	.2065812	.119983	.3810599
ROS	.093320	.2323070	.111983	.2852485	.085494	.2193895
NIE	.392336	.7588492	.666443	1.0354436	.447995	.7978929
Tobin's Q	NA	NA	.962480	.6028370	.917403	.5850435
Technical Efficiency(CRS)	393.96	-	410.05	-	339.31	-
Technical Efficiency(VRS)	419.38	-	384.93	-	400.92	-
Labour Productivity Change	270.31	-	292.28	-	300.18	-
Labour Contribution to TE	277.85		435.28	-	356.94	-

Table 3.4

Variables related for the DEA-Malmquist index

Variables	Skewness	Mean	Median	Standard Dev.
TE-CRS	-.526	.650101	.699000	.2613100
TE-VRS	-1.029	.742358	.800000	.2611685
Lbr Con TE	.180	-1.6115	-1.6778	.74406
Lbr Prod Ch	.143	1.040524	1.008500	.2861703

3.5 Test Models

- ***3.5.1 Accounting-finance model***

Accounting measures are commonly used to evaluate a firm's performance, which are also described as financial variables. However, not all of the accounting measures can be used, for example, profitability measures have to be omitted in order to take into account the fact that SOEs generally do not have profit motives. Most often they make losses. Also they do not pay taxes. Hence the operating measure such as margin (EBIT/Sales) is considered appropriate and can be used for this purpose. Parts of the following widely adopted ROE decomposition can be applied (white et al. (1998).

$$ROE = \left[\frac{NI}{EBT}\right] \times \left[\frac{EBT}{EBIT}\right] \times \left[\frac{EBIT}{Sales}\right] \times \left[\frac{Sales}{Asset}\right] \times \left[\frac{Assets}{Equity}\right] \quad (3.1)$$

Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	(3.2)
⟷	⟷	⟷	⟷	⟷	
Profit	Pre-tax profit	Margin	Turnover	Debt use	

Factors 1 and 2 requiring profits are thus sometimes not relevant for our models. This leaves the remaining factors as potential measures of (a) gross margin (Factor 3), which is a measure of profitability; (b) asset turnover, a measure of capital usage, and (c) debt usage, a measure of financial leverage. Multiplying factors 5 and 2 will give a new factor, which is the compound leverage: this can only be used for PEs and MEs.

The widely used ratio of ROE is the product of margin and turnover. For the management of SOEs to achieve satisfactory margin, maintain good asset turnover and also control leverage.

The research issue in this study is to extend the accounting measures and market-based measures to include productivity measures. To date only few studies examined the relationship between accounting ratios and DEA efficiency scores see (Bozec, et al., 2006; Feroz, et al., 2003; Perera, 2006; Viverita, 2004). Unlike these studies, this study uses DEA-Malmquist total factor productivity change to measure a firm's net efficiency, and also aims to expand the financial performance measures to include the measurement of a firm's labour efficiency which we consider is an innovative measure. In addition, this study investigates the link between accounting performance, market-based measures and total factor productivity change (TFPCH),

technical efficiency change (EFFCH), labour contribution to technical efficiency (LCTE) and technology change (TECHCH). Such a comprehensive framework, we believe, is needed to analyse findings to be robust on the important question of how to assess a firm's performance. We also believe, given the developments in the past 200 years in accounting, it is time to experiment with a more comprehensive approach to obtain reliable results on this important subject of corporate performance assessment. A key to understanding may well be revealed as to whether the accounting performance measures, market based measures and productivity measures in combination are the way forward.

In addition, by breaking down the TFP measures into (a) technical efficiency change (EFFCH) and (b) technological change (TECHCH), three ratios would be available on SOEs, PEs and MEs productivity performance to determine where the sources of efficiency are coming from. Most studies around the world show that productivity gains come from TECHCH. These three ratios are likely to be directly related to accounting performance, such as ROA, ROE, asset turnover, etc. For example, a firm with high asset turnover therefore achieves greater efficiency in the use of capital and is more likely to be achieving higher TFP.

$$Y_j = y_0 + y_1 (TFP)_j + \varepsilon_j \quad (3.3)$$

Where Y_j is a selected accounting factor of firm j; y_0 is the slope coefficient; y_1 is the measure of the effect of TFP on accounting performance of firm j; and ε is the error term. Using the following equation that incorporates all productivity measures, one could find the association between individual productivity measure and the accounting factors:

$$Y_{j=\theta_0} + \theta_1(X_{1j}) + \theta_2(X_{2j}) + \varepsilon \quad (3.4)$$

θ_1 Is the coefficient of productivity factor EFFCH; θ_2 is the coefficient of the productivity factor TECHCH. There is no published work about this hypothesised link between accounting and productivity measures. It is hypothesised that there is significant linkage between accounting measures, such as ROE, and efficiency change.

3.5.2 Market- based performance model

Although there are various market based measures such as stock returns, the most widely used market based measure in the corporate governance literature is Tobin's Q (Chung & Pruitt, 1994; Coles, et al., 2008; Hovey, et al., 2003). The first significant study to use this measure was Mørck et al. (1988). Other studies have followed, including Hermalin and Weisbach (1988), McConnell & Servaes (1990), Loderer & Martin (1997), Cho (1998), Himmelberg, Habbard, & Palia, (1999), Hovey et al., (2003) and, Gugler & Yurtoglu (2003). In its original formulation, Tobin's Q captures the ratio of market value to the replacement cost of production assets at the margin (Tobin, 1969, 1978). Typically average Q is used as a proxy for marginal Q (Hayashi, 1982) as quoted by Hovey et al.,(2003). Due to the difficulty of determining the replacement cost of assets, a widely used proxy for Tobin's Q is the book value of assets, although this remains controversial (see for example Chung & Pruitt, (1994)). Following most of the past researchers, market values of enterprises in this study are measured through Tobin's Q.

The primary measure of firms market based performance which this study focuses on, is Tobin's Q. Typically, in the finance and accounting literature average Q is taken as a proxy for marginal Q as it is shown by Hayashi (1982), as quoted by Hovey et al., (2003) to be a sound substitute. The various Q ratios are employed and compared in the study. The following Tobin's Q ratio is used:

Q_CP (Chung & Pruitt): MV + BV Long-term Liabilities + BV Inventories + Total Current Liabilities - Total Current Assets/BV Total Assets, annually for each firm. Chung & Pruitt (1994) find that their approximation of Tobin's Q explained 96.6% of the variability in the widely used Landenberg and Ross (1981), (as quoted by Hovey et al., (2003)) algorithm, but for which data is not available in Sri Lanka. Hovey et al., (2003) also found the Chung and Pruitt model to be an accurate measure in their comparison of it against other models. Book values are used for debt and other liabilities in the absence of any secondary market for such claims in Sri Lanka. Book value of assets is also used rather than replacement cost. This is an expedient approach as any attempt to capture replacement costs opens up considerable measurement problems. This measure reflects the firm as a whole and not just the equity capital. As it is the most robust (Hovey et al., (2003), Faria and Mollick (2010)) and given the available data in Sri Lanka, the Chung and Pruitt model of Tobin's Q is used as the primary model used to measure market based performance in the study.

The calculation of this variable requires a market valuation for the enterprise and in general is made available for publicly trading companies (Carton & Hofer, 2006; Faria & Mollick, 2010; Hovey, et al., 2003). Hence, the researcher intends to use the Chung & Pruitt model of Tobin's Q only for the listed companies. Thus the primary aspect of this study shall be measuring the influence of state, mixed and private ownership types on performance and also measuring the influence of corporate governance on performance.

3.5.3 DEA, panel data and Malmquist Productivity Index

Productivity is usually defined as an index of outputs divided by an index of inputs as explained in chapter two. Farell (1957) introduced the productivity measurement and defined efficient production units as those operating in production frontier. Thus inefficient production units are those operating below the production frontier. How much closer a production unit gets to the frontier refers to efficiency change (or catching-up). Additionally, how much the frontier shifts at each production unit's observed input mix is termed 'technical change' (technological progress), since the management secures new technology or new ways of doing things to achieve greater productivity gains. DEA method assists us to construct a non-parametric envelopment frontier over the data points of all observations that lie on or below the production frontier. Fare et al., (1994) constructed a world frontier, based on the data from the samples countries and compared each of them to that of each frontier, using the MPI.

Thus DEA provides a tool for measuring and evaluating a firm's performance beyond those available from accounting ratio measure. It is used to measure a firm's total factor productivity. This ratio is thought to be superior to the use of common productivity measures from financial ratios (such as labour contribution to sales), which is often partial productivity without controlling the effect of capital productivity. Financial measures are based on single input factor to a firm's output, and do not have partial effect of other input(s) removed. For example, labour productivity is measured as sales per employee. Though partial productivity measurement has the advantage of being easy to compute, they can often be misleading when looking at the changes in productivity of an organization. DEA takes into account multiple inputs that are used in the production process to produce outputs, to calculate TFP. TFP index is the ratio of the weighted aggregate output to a weighted aggregate input quantity index. This study is intended to apply DEA-MPI to measure a firm's TFP and its components.

The DEA-Malmquist approach uses panel data to estimate changes in total factor productivity, and then break this down into technical efficiency and technological progress. Scholars have used this method in a range of circumstances, such as for studying financial institutions (see Berg et al., (1992), Fukuyama (1995), Miller & Noulas (1996), Chu & Guan (1998), Sathye (2002), Seelanatha (2006) and Perera (2006)) manufacturing see, Arcellus & Arozena (1999) ; Fare et al., (2001), Sena (2001), Illuca & Lafuente (2003) and Bozec (2006)); electric and gas utilities see, Fare et al., (1994)). This method is also applied in service sectors such as hospitals, universities, vehicle inspections and even football teams see Fare et al., (1994), Linna (2000), Maniadakis (2000), Sola & Prior (2001), Moreno & Tadepalli (2002), Haas (2003), Coelli et al., (2005).

Fare et al., (1994) identify the MPI change as:

$$m_0\,(y_{t+1}, x_{t+1}, y_t, x_t) = \left[\frac{d_0^t\,(x_{t+1}, y_{t+1})}{d_0^t\,(x_t, y_t)}\right] \text{ x } \left[\frac{d_0^{t+1}\,(x_{t+1}, y_{t+1})}{d_0^{t+1}\,(x_t, y_t)}\right] \quad (3.5)$$

The Malmquist Performance Index (m_0) measures change over time of input output (x_{t+1}, y_{t+1}) relative to input-output at a starting point(x_t, y_t). It is a ratio of the distance of each point to serve as a benchmark to compare a certain bundle of input (x) and output (y). A value of m_0 greater than one indicates an improvement in efficiency growth from period t to period t+1, while a value less than one indicates a TFP decline (Coelli, et al., 2005). The Malmquist productivity index is an index of the geometric mean of two outputs based TFP indices, where one index uses period t technology and the other uses the period t+1 technology (Coelli, et al., 2005).

The calculation of Malmquist indices decomposed total factor productivity into technical efficiency change (catching-up) and technical change (technological progress), as below:

$$\text{Technical Efficiency Change} = \left[\frac{d_0^{t+1}\,(y_{t+1}, x_{t+1},)}{d_0^t\,(y_t, x_t)}\right] \quad (3.6)$$

$$\text{Technological Change} = \left[\frac{d_0^t\,(x_{t+1}, y_{t+1}}{d_0^{t+1}\,(x_{t+1}, y_{t+1}} \text{ x } \frac{d_0^t\,(x_t, y_t}{d_0^{t+1}\,(x_t, y_t)}\right] \quad (3.7)$$

The technical efficiency change measures the change in efficiency between period t and t+1, while the technical change capturing the shift in the frontier technology available to the firm over time. A value greater than one, in both cases indicates the growth in productivity. If we had used the cost minimisation approach, which is deal with as well for a similar study, a value less than 1 would indicate securing cost reduction. Both are predicted by the theory.

This study uses an output-orientated model, which focuses on the amount by which output quantity can be expanded using a given amount of inputs. Malmquist indices are derived, using the computer program called DEAP version 2.1 designed by Coelli (2005). This measures the net gain, therefore the overall efficiency of a firm. This method is ideally suitable to apply to both state and private sector firms without having to look at profit variables See, Lovell (1993)). Many critiques of privatisation studies had pointed out that using a profit-based measure, biases the SOEs to be inefficient. By applying a neutral method of DEA Malmquist, we aim to produce a set of results devoid of this criticism.

3.5.3.1 Using DEA estimated data and the Tobit regression model

When using DEA estimated data in a regression analysis, two main problems could arise. One problem is the interdependency of DEA estimated efficiency scores and therefore the normal procedures which are used in normal regression might not be valid. The Bootstrap approach could be used to overcome this problem (Xue & Harker, 1999). The nature of the variable is the second problem. The dependent variables are estimated by non-parametric DEA MPI and those parameters are bounded by one and zero. Therefore the least squares regression analysis method is not appropriate (Saxonhouse, 1976). Consequently, the Tobit multiple regression analysis method is being used to overcome this limited dependent variable problem (Tobin, 1958). It is assumed that the estimated efficiency distribution 'θ' is a truncated, normal and exponential distribution. A method of maximum likelihood is employed to estimate the relevant variables in the Tobit model (Gujarati, 2003). The relationship between the estimated efficiency scores (dependent variable) and the other independent variables are explained by the following Tobit model.

Let Z1….Zi be the determinants of enterprise's efficiency (where I is the number of determinants) which are explained in equation 3.8. If the distribution of inefficiency in enterprise's (θi) is explained by an exponential distribution function, it can be explained as

$$\theta nj^{*} = \sum_{k=0}^{I} Zkj \quad \delta\, k^{+uj} \qquad \text{if} \quad \theta j \geq 0 \qquad 3.8$$

$$0 \qquad \text{if} \quad \theta j \leq$$

Where uj of the normal N (0, σ2)

Zkj is a vector of observed variables explaining the enterprise's efficiency. 'n' denotes the number of observations used in the analysis. The likelihood function for estimating the unknown variables (δ) in the Tobit model with censoring point 'a=0 and 'a=1' can be identified as indicated below (Maddala, 1992).

$$L = \pi \frac{1}{\sigma} f\left(\frac{yi-\delta zi}{\sigma}\right) \pi f\left(-\frac{\delta zi}{\sigma}\right) \qquad 3.9$$

$yi \geq a \qquad yi \leq a$

In Tobit models, by maximizing this likelihood function (L) with respect to δ *and* σ, the estimation for the parameters can be derived. The use of a Tobit model allows estimation of parameters by coping with the heteroskedastic problems in estimated limited variables. It tenders insight to the feasible influence of those characteristics.

3.6 Bootstrap method

Bootstrapping is a computer-based method for assigning measures of accuracy to sample estimates (Efron & Tibshirani, 1994). This technique allows estimation of the sample distribution of almost any statistic using only very simple methods. It could also be used for constructing hypothesis tests. It is often used as an alternative to inference based on parametric assumptions when those assumptions are in doubt, or where parametric inference is impossible or requires very complicated formulas for the calculation of standard errors (Varian, 2005).

The Bootstrapping procedures are useful when the theoretical distribution of a statistic of interest is complicated or unknown. Its simplicity is a great advantage of bootstrap. Since the bootstrapping procedure is distribution independent, it provides an indirect method to assess the properties of the distribution, underlying the sample, and the parameters of interest that are derived from this distribution (Varian, 2005).

This study used both the bootstrap method and the Tobit regression analysis method. However, it was found that in both methods the results were almost similar and therefore only the Tobit regression results are presented in this chapter. Two separate Tobit regression models are estimated, based on technical efficiency scores, estimated to test the relation with board governance and to test the relationship with ownership type. The estimation process is performed using 'STATA 9.1' statistical software.

3.7 Statistical tests

3.7.1 Kruskal-Wallis test and the Mann-Whitney U test

The numbers of firms of SOEs, PEs and MEs in this study are different, owing to the data availability problem, hence leading to unbalanced sample sizes. Therefore, to test the significant differences in their performances, this study uses the Kruskal-Wallis test for three independent samples. It should be noted that prior researches had failed to test for significance, and we address this deficiency by using this test, which is appropriate given the fact that the DEA measures are non-parametric in nature. This statistical test enables a test as to whether three independent unmatched samples represent three populations with different mean values. This is a non-parametric statistical method, which assumes that: (1) samples are selected randomly from their particular population. (2) There is a mutual independence among the three samples and (3) the measurement scale is at least ordinal (measures are intervals and ratios in this study). Since this study has three independence samples from three independent populations, namely: SOEs, PEs and MEs, this statistical test is considered suitable for this study as advocated in Coakes (2005).

For the purpose of comparing productivity performance of SOEs, PEs and MEs and to identify the differences, a nonparametric test, the Kruskal-Wallis test is applied. The Kruskal-Wallis test allows possible differences between two or more groups to be examined (Coakes, 2005).

In addition, due to the data unavailability problem of SOEs in some cases, comparisons were done only between PEs and MEs. In such circumstances, the Mann-Whitney U test is used to test the null hypotheses as follows: whether the mean of the PEs is equal to the mean of the MEs. Thus the null and alternative hypotheses can be written as:

$H_0: \theta_t = \theta_1$

$H_1: \theta_1 \neq \theta_2$

Where θ_t represents the median of the population of private sector firms, and θ_2 represents the mean of the population of mixed firms

The statistical test is written as:

$$Z = \frac{U - \frac{n1n2}{2}}{\sqrt{\frac{n1n2(n1 + n2 + 1)}{12}}}$$

Where n_1 = sample size from the private sector firms;

n_2 = sample size from mixed firms

The Z values therefore are tested based on the 0.05 level of significance, using a two-tailed test. The test is chosen over the non-parametric tests because the DEA-MPI is a non-parametric method; hence parametric tests would be inapplicable**.**

3.7.2 Correlation and Chi-Squared analysis

Correlation analysis is employed to find whether there is a relationship between board governance factors and performance of enterprises. Correlation looks at the relationship between two variables in a linier fashion. A Pearson–product–movement correlation coefficient describes the relationship between two continuous variables (Coakes, 2005). The Pearson correlation is used to test the relationship between either accounting or market based performance and board governance factors. However the correlation between productivity efficiency performance and board governance is analysed by utilizing the Spearman's correlation because productivity efficiency performance data is non- parametric in nature. These correlation coefficients can have a range of possible values from +1 to -1. While the value indicates the strength of the relationship, the sign indicates the direction (Coakes, 2005).

Since a non- parametric test, the Chi-Square test for independence or relatedness applies to the analysis of the relationship between two categorical variables (Coakes, 2005), Frontier (DEA-

MPI) and non-frontier (accounting and market-based) performance results are compared using Chi-Square test to check whether there is any relationship between them.

3.8 Methodological problems

The first method used in this study is the DEA-MPI method. This method is extremely sensitive to outliers, as outliers may influence the optimal frontier quite seriously. Thus it is possible that one firm's deviation from a benchmark potentially may results from a variable not included in the productivity analysis. This shortcoming can be mitigated by careful consideration of what variable should be included. Secondly, DEA is not stochastic in nature, which means it does not allow for measurement error.

3.9 Chapter summary

This chapter provides a discussion of the framework for the analysis of a firm's financial performance, market performance and production efficiency performance. It provides a detailed research design for the analysis of Sri Lanka's ownership types (SOEs, PEs and MEs), and also the corporate governance of those enterprises. The accounting/finance, market/based and the Malmquist productivity models are the three models used to analyse the firm's performance, while the Tobit regression model is used to evaluate the effect of some firm's specific variables on technical efficiency and the labour contribution to technical efficiency. A nonparametric statistical test, Kruskal-Wallis test and Mann-Whitney U test, is used to determine the significant difference of SOEs, PEs and MEs performance.

A number of new ideas adopted in this research design have been highlighted: this thesis fills the gap in an un-researched area on SOEs, PEs and MEs performance evaluation. This study also involves a large number of firms over a reasonably long-run period; provides more accurate efficiency results in the form of DEA-MPI. In addition this study examines the corporate governance impacts on performance for policy formulation, and helps establish for the first time if there is a link between accounting/finance performance and production efficiency performance.

CHAPTER FOUR

TESTING THE LINK BETWEEN PERFORMANCE MEASURES

4.1 Introduction

This chapter makes an effort to find an answer to research question one, 'Do various efficiency measurement approaches generate consistent efficiency assessments for selected enterprises of Sri Lanka?' The hypothesis: (H1) 'various efficiency measurement approaches do not generate consistent efficiency assessments for selected enterprises of Sri Lanka,' will be tested. Accordingly this chapter provides a summary of findings to check whether there is a link between; (1.) the financial performance measures and the productivity performance measures, (2.) The market based measures and productivity performance measures and (3.) the market based performance measures and the financial performance measures. Sections two, three and four provide findings on this question by employing Spearman's rank order correlation coefficients to check the above three possible links. In section five of this chapter, a cross examination is done by using a Chi-Scared test to determine whether different measurement methods identify mostly the same enterprise as 'best practice' or 'worst practice'. The results are obtained by using seven financial ratios, one market based ratio and six Malmquist productivity index values to test the hypotheses. The chapter summary is presented in section six.

4.2 Results for hypotheses H1a and H1b

Findings from the cross examination of efficiency scores produced by various parametric and non-parametric measurements are presented in this section to test three hypotheses which are related to research question one. Hence, whether efficiency scores produced by different measurement methods (1) rank the enterprises in approximately the same order (H1a) and (2) identify broadly the same instructions as 'best practice' and as 'worst practice' (H1b), were the objective of this assessment. These tests were done based on the universal practice that both financial and productivity measurements have the same objective, that is, examining the firm's efficiency using the same data sources (firm's financial statements). Therefore, there should be a link between the results. To observe whether there is a linkage between the firm's production efficiency performance and the financial performance, null hypothesis H1a, that 'the efficiency

scores produced by the financial performance methods do not rank the enterprises in approximately the same order as the efficiency scores produced by the Malmquist productivity index,' against the alternative hypothesis, that 'the efficiency scores produced by the financial performance methods rank the enterprises in approximately the same order as the efficiency scores produced by the Malmquist Productivity Index.' In contrast, although market based measures (Tobin's Q) also use for the same objective as financial and productivity measures that is examining the firm's efficiency but using both financial and market data, it does not have a significant relationship with either financial ratios or Malmquist Productivity Index. Hence, cross examination results on Tobin's Q with financial and productivity measures are not reported.

4.2.1 The link between the financial performance measures and the productivity performance measures

4.2.1.1 Rank order correlations of different performance techniques

As clarified previously in chapter three, one cross examination technique is to check whether different performance measurement methods usually rank the enterprises in Sri Lanka in the same order (Hypothesis H1a). This hypothesis is associated with the research question one: 'Do various efficiency measurement approaches generate consistent efficiency assessments for all types of enterprises in Sri Lanka?'

Generally the efficiencies derived from different approaches should be significantly associated with standard non-frontier performance measures. If this is so, then it signifies that the computed efficiency scores are consistent with actual performance of enterprises, and "not just artefacts of the assumptions of the efficiency approaches" (Bauer, Berger, Ferrier, & Humphrey, 1998, p. 88).

According to Bauer et al. (1998), if average performance scores may differ significantly across accounting (non-frontier) and production efficiency performance (frontier) methods, it is still possible that different methods rank the sample enterprises in Sri Lanka in approximately the same order. Therefore, this exercise is important and wide comparisons can be carried out and policy implications obtained to the extent this occurs.

The table 4.1 displays the Spearmen's rank order correlations among all types of enterprises in Sri Lanka's performance scores generated by the frontier DEA model and non-frontier accounting ratios. On the average performance scores for each enterprise over the entire sample period from 2004 to 2007 following Bauer, et al., (1998) , Perera (2006), rankings were obtained. This approach could be helped to minimize the effect of noise that might distort comparisons.

(See the chapter six for the detail information about the determination of productivity performance measures).

The specific frontier performance measures are; efficiency change; technical change; productivity change; labour productivity change; technical efficiency (removing after change effect); labour contribution to technical efficiency (removed after change effect). The specific non-frontier performance measures are: ROS = profit before tax to total sales; ROA = profit before tax to total assets; ROE = profit before tax to total equity; NIE=net income to number of employees; AUE=sales to total assets, EM= total assets to equity, SPE=total sales to number of employees. Using averaged efficiency scores and averaged non-frontier performance measures to calculate correlation helps to reduce the effects of noise contained in the data. The correlations of efficiency scores and non-frontier performance measures from separate years (not reported) are broadly in line with the reported correlation figures. The 'p' values are given within parentheses and statistically significant values are highlighted in bold letters. Three, two or one asterisk indicates that correlation is statistically significant at 99%, 95% and 90% levels, respectively (2 tailed).

Table 4.1 Spearman's correlation coefficients between the financial performance measures and the productivity performance measures

Variable	ROS	ROA	ROE	NIE	AUE	EM	SPE
Efficiency change	.028 .498	**.134***** **(.001)**	**.128***** **(.002)**	.015 .716	**.205***** **(.000)**	.022 .596	**.084**** **(.041)**
Technical change	.052 .203	-.061 .138	-.062 .131	**.145***** **(.000)**	**-.167***** **.000**	.054 .194	.026 .524
Productivity change	-.014 .740	-.046 .264	-.039 .341	.013 .756	-.048 .246	.018 .657	-.019 .652
Labour prod. change	**.068*** **(.099)**	**.131***** **(.001)**	**.155***** **(.000)**	**.170***** **(.000)**	**.135***** **(.001)**	.027 .516	**.175***** **(.000)**
Technical efficiency	**.316***** **(.000)**	**.398***** **(.000)**	**.329***** **(.000)**	**.311***** **(.000)**	**.191***** **(.000)**	**.209***** **(.000)**	**.438***** **(.000)**
Labour con. to TE	.052 .211	.060 .144	**.071*** **(.086)**	.013 .751	.030 .470	.005 .899	.067 .102

Two tailed probabilities are given within parentheses

*** Correlation is significant at 0.01 levels (2- tailed); ** Correlation is significant at the 0.05 level (2-tailed); * Correlation is significant at the 0.1 level (2-tailed)

Examining the association between efficiency changes results with firms' financial performance in table 4.1, our findings point out that there are four financial ratios which have significant positive correlation with efficiency change as discussed below. While technical change has a significant positive relationship with NIE, it has a negative correlation with AUE. Meanwhile, productivity change does not have a significant relationship with any accounting ratio. Labour productivity change has a significant positive relationship with all accounting ratios except with the equity multiplier. Even though EM is a component of ROE, EM does not directly include a labour component. This might be the reason for the insignificance. However, technical efficiency has a highly significant correlation with all accounting ratios. Nevertheless, labour contribution to technical efficiency only has a significant relationship with ROE.

In summary, table 4.1 reveals that most of efficiency scores generated by frontier methods are consistent with non-frontier performance measures. For example, 19 out of 20 reported correlations are positive and 17 are statistically significant at 99% level.

Overall these figures provide mixed results for hypothesis H1a: Efficiency scores generated by different methods for enterprises in Sri Lanka are consistent with standard non-frontier performance measures. On the one hand, even though the correlation coefficient is not too strong, consistently positive and statistically significant correlation coefficients between two non-parametric efficiency scores (labour productivity change and technical efficiency) and non-frontier performance measures exist. On the other hand, no (or little) support is presented by relatively small and statistically insignificant (22 out of 42 coefficients) correlation coefficients between nonparametric efficiency scores and non-frontier performance measures.

These findings follow those of Bauer, et al. (1998). For example, they report that the DEA based efficiencies were much less so. These results broadly suggest that DEA methods used have unintentionally considered a substantial part of random error as differences in efficiency (Bauer, et al., 1998). Even though labour productivity change and technical efficiency have significant correlations with most non-frontier performance measures, when considering all, there is enough evidence to parity with their conclusion.

4.2.1.2 Association of 'Best Practice' and 'Worst Practice'

Determining whether different measurement methods identify mostly the same enterprises as 'best practice' and as 'worst practice' (hypothesis H1b associated with research question one) is another important aspect in the cross examination of performance scores. This approach helps to shed light on the mutual consistency of different methods in identifying best and worst performers (Bauer, et al., 1998). Especially, as Leong, Dollery & Coelli (2003) argue, if different methods consistently identify "best practice" and "worst practice" in a given market, then such analysis be supposed to prove useful to policy makers, even though the rank orders are not consistent.

Consequently, this sub section presents the empirical results for hypothesis H1b 'Different performance measurement methods identify mostly the same enterprises in Sri Lanka's as 'best practice' and as 'worst practice,' related to the research question one: 'Do various efficiency measurement approaches generate consistent performance assessments for sampled enterprises in Sri Lanka?' As pursued by Berg, et al., (1992) Bauer, et al., (1998), Leong, et al., (2003) and Perera (2006), the classifications mentioned below are being used to determine the 'best practice' and 'worst practice' enterprises. 'Best practice' enterprises are those which constitute the top 25%, when enterprises performance scores are calculated, using this method for each year and are arranged in a descending order. 'Worst practice' enterprises are those which constitute the lowest 25%.

Table 4.2

Test results of Pearson's Chi-Square test for relatedness–"Best Practice" enterprises

Variable	ROS	ROA	ROE	NIE	AUE	EM	SPE
Efficiency change	26616.342 .012	**27363.30 (.059)**	**27478.21 (.000)**	24359.050 .001	**28811.2 (.027)**	20233.542 .078	**28532. (.021)**
Technical change	22014.750 .002	22113.250 .549	22064.000 .081	**20017.3 (.002)**	**195758. (0.011)**	19158.250 .000	22797.825 .828
Productivity change	23789.939 .000	22860.208 .953	**23656.41 (.000)**	21087.756 .000	24690.667 .081	18140.417 .000	24099.667 .541
Labour productivity change	**235704.3 (.000)**	**232519 (.000)**	**29205.25 (.058)**	**26906.9 (.000)**	**31634.9 (.036)**	21765.974 .803	31076.750 .186
Technical efficiency	**14839.37 (.000)**	**14725.75 (.066)**	**15300.33 (.000)**	**13750.3 (.000)**	15021.250 .951	14775.000 .000	15267.500 .244
Labor contribution to TE	28663.500 .296	29517.167 .504	**15300.33 (.000)**	26151.750 .146	31027.500 .449	21673.283 .746	**31240. (.011)**

Two tailed probabilities are given within parentheses

*** Correlation is significant at 0.05 levels (2- tailed)

** Correlation is significant at the 0.1 level (2-tailed)

* Correlation is significant at the 0.1 level (2-tailed)

Tables 4.2 and 4.3 respectively present the association of 'best practice' and 'worst practice' enterprises using the performance scores obtained from frontier DEA Malmquest Productivity Index and non-frontier accounting ratios. 'Best practice' enterprises are those enterprises which constitute the top 25% when enterprises performance scores were calculated, using each method for each year and were arranged in a descending order. 'Worst practice' enterprises are those which constitute the lowest 25%. The standard Chi-Square test was used to assess whether association is statistically different from 0.25 at the 90% level. The value 0.25 is chosen since the random chance alone would give an expected value of 25%. Statistically significant values given

in bold letters three, two or one asterisk indicate statistical significance at 99%, 95% and 90% (two tailed) levels respectively.

Table 4.3

Test results of Pearson's Chi-Square test for relatedness – "Worst Practice" enterprises

Variable	ROS	ROA	ROE	NIE	AUE	EM	SPE
Efficiency change	27959.929 .042	**227647.7 (0.025)**	**221100 (0.09)**	29500.750 .101	**226948. (0.003)**	28647.083 .817	**31076. (.050)**
Technical change	21390.917 .139	20903.889 .008	20463.375 .189	**22934.0 (.009)**	**23656.4 (.055)**	22359.500 .192	23837.000 .103
Productivity change	24772.750 .031	24466.306 .000	24050.417 .001	25935.597 .290	27038.250 .178	25807.000 .102	27621.042 .015
Labour productivity Change	**26482.81 (.000)**	**25585.3 (.000)**	**25634.62 (.000)**	**210270. (0.087)**	**236203. (.000)**	26824.833 .375	28466.500 .428
Technical efficiency	**26373.375 (.002)**	**25730.38 (.000)**	**25133.91 (.012)**	**27815.3 (.007)**	28663.500 .066	27013.625 .355	28835.875 .174
Labour contribution to TE	25076.458 .170	25226.944 .000	**24490.93 (.000)**	26972.583 .003	27530.750 .259	26250.250 .188	**239302 (.000)**

Two tailed probabilities are given within parentheses

*** Correlation is significant at 0.05 levels (2- tailed)

** Correlation is significant at the 0.1 level (2-tailed)

* Correlation is significant at the 0.1 level (2-tailed)

Above table 4.2 and 4.3 correspondingly show the association of "best practice" and "worst practice" enterprises, using the performance scores obtained from frontier DEA Malmquest Index (efficiency change; technical change; productivity change; labour productivity change; technical efficiency; labour contribution to technical efficiency model and non-frontier accounting ratios (ROS; ROA; ROE; NIE; AUE; EM and SPE). These results were based on the

average efficiency scores for each enterprise over the entire sample period. This approach minimizes the effect of noise in comparison.

Test results of Pearson's Chi-square test for relatedness in table 4.2 and 4.3 show that efficiency change performance measure has a significant relationship with ROA, ROE, AUE and SPE. In the meantime, technical change only has a relationship with NIE and AUE. The productivity change does not have a significant relationship with any accounting ratio. However, labour productivity has significant relationships with five accounting ratios namely: ROS, ROA, ROE, NIE and AUE. While the technical efficiency has relationships with four accounting ratios: ROS, ROA, ROE and NIE, labour contribution to technical efficiency has relationships with ROE and SPE.

4.3 Chapter Summary

The interesting empirical results from the cross examination of efficiency scores for enterprises of Sri Lanka was presented in this chapter. Testing hypotheses H1a, H1b and H1c in relation to the research question one; 'Do various efficiency measurement approaches generate consistent efficiency assessments for selected enterprises of Sri Lanka?' was the aim of the above cross examination.

The results of the Malmquist Productivity Index and its decomposition and financial performance show that overall six financial performance measures (ROS, ROA, ROE, NIE, SPE and AUE) designate linkages with five production efficiency performance measures. The production performance measures are: efficiency change; technical change; labour productivity change; technical efficiency; labour contribution to technical efficiency. Three of these production efficiency performance measures: efficiency change and labour productivity change; technical efficiency, have a strong and positive association with non-frontier (financial) performance measures. Nevertheless, while an accounting ratio such as equity multiplier does not have any relationship with production efficiency performance, production efficiency performance measure: productivity change does not have any relationship with any accounting ratio. In the meantime, market based performance measure Tobin's Q does not have significant relationships either with accounting or production efficiency performance measures.

At the end, although most of the accounting/financial performance measures are correlated with production efficiency performance measures, there were very low correlation coefficients (less

than 0.5) among them. In summary, it appears that the two approaches for measuring performance (frontier and non-frontier) are not equivalent.

Hence, the results appear to suggest that both measures are broadly independent of each other. To suggest by using financial performance or market based performance that a firm is efficient are not an accurate description. If there is an absence of total factor productivity–indicative of value extraction by firms in the process of managing the inputs and outputs–a firm is simply inefficient. That is a known economic fact. Since it appears in this study that a correlation exists between any measures of efficiency change, labour productivity change and technical efficiency, with a majority of variables from the financial/accounting measure, the conclusion is that the use of one method to assign performance is not appropriate. Therefore it could be promoted that the use of all those three sets of measures are needed in order to draw a conclusion on corporate performance.

CHAPTER FIVE

ACCOUNTING AND MARKET BASED PERFORMANCE OF SOES, PES AND MES IN SRI LANKA

5.1 Introduction

This chapter presents the empirical results of performance for part two of the research question two: 'What is the nature of board size and composition? Does the board size and composition explain the differences in enterprises' accounting and/or market performance levels of SOE's, PE's and ME's in Sri Lanka?' Board governance is a subset of corporate governance in performance studies of an enterprise. Fama & Jensen (1983) argued that a board of directors is important in the corporate governance system. Companies with better corporate governance have better performance than companies with poor corporate governance (Fama & Jensen, 1983; Jensen & Meckling, 1976). However, there is no clear-cut agreement among researchers about the board size, composition of the board in terms of the ratio of outside directors (non- executive directors) to inside directors (executive directors) and the CEO duality on firm performance. Therefore, it is important to understand the relationship between board governance and firm performance using two different measurements in an emerging economy like Sri Lanka.

'Does type of ownership explain the differences in SOEs PEs and MEs in Sri Lanka' levels of accounting and/or market performance?' is the second research question discussed in this chapter. The literature presents mixed results on the relative performance of SOEs, mixed and privately owned firms. While some researchers argue that ownership influences SOEs performance the others argue that ownership change from state to private hands does not necessarily lead to higher performance. In ownership performance literature most of the researchers have paid their attention to developed countries. Nevertheless, there have been major differences between the developed and developing countries, related to institutional conditions with respect to markets and organizations. Therefore, it is worthwhile to determine ownership performance relationship in an emerging economy perspective in Sri Lanka.

Accordingly, this chapter consists of two sections, as section one (5.2), (5.3) and section two (5.4), (5.5), following the introduction.

Firstly, section one (5.2) presents descriptive statistics of performance and other variables to answer part (a) of research question two. The section begins with a description of the sample. The data collected from the annual reports and other sources are grouped, categorized and presented, relevant to all the variables related to the study. This was done especially to examine whether the factors concerned with corporate governance are actually adopted by the SOEs, PEs and MEs in different industries. Then the descriptive statistics are presented in relation to all the variables concerned.

The later stage of the section will begin with results of hypotheses tests relevant to the relationships between accounting performance (ROE, ROA, SPE and NIE) being the dependent variables and corporate governance practices (board size, number of non-executive directors and CEO duality) as the independent variables and secondly market based performance (Tobin's Q) being the dependent variable and corporate governance practices (board size, number of non-executive directors and CEO duality) as the independent variables.

The variables are tested for their correlations. Finally, variables are run under a multiple regression model introducing three control variables, which are then followed by a discussion to find an answer to part (a) of research question two.

Section two (5.4) presents and analyses the data of the study on ownership types by testing hypotheses H3 to answer part (a) of research question two. Section two (5.4) is structured as follow. The introduction for section one is 5.4.1 and then the performance statistics of PEs, SOEs and MEs are presented in section 5.4.2 for all firms. Respective results on profitability and labour performance under accounting performance measures and market performance for different industries are presented in section 5.4.3. Section 5.4.4 presents the multiple regression analysis results to test hypotheses and find an answer for part (a) of research question two followed by the chapter summary which is presented in section 5.5.

5.2 Descriptive statistics of performance and other variables

The three independent variables, which represent the practices of corporate governance, namely the board size, number of non-executive directors and the CEO duality of SOEs, PEs and MEs of Sri Lanka, are presented separately under the seven different industries in a frequency distribution. The five dependent variables used under two performance measurement techniques, specifically accounting/financial (ROA, ROE, SPE and NIE) and market based (Tobin's Q)

ratios, are presented as a frequency distribution. Finally average efficiencies, correlations between independent and dependent variable and multivariate analysis results are discussed.

5.2.1 Sample profile

As mentioned in chapter two, the sample consists of 197 enterprises which include 123 PEs and 36 MEs, which are listed, in the CSE, and 38 SOEs as well. The data are collected for the year 2004 to 2007 periods. Primarily the practices of corporate governance (board size, number of non-executive directors and the CEO duality), types of ownership (private, mixed and state) and the performance data were obtained from the annual reports and the Handbook of Listed Companies 2006 of CSE. The data on the number of non-executives directors and CEO duality could not be collected for SOEs. However, the sample represents 19 trading sectors (except banking and the finance trading sector) of the 20 trading sectors in the CSE and five industries (except banking and finance industry) of the six industries in the Department of Public Enterprise in Sri Lanka. However, carefully considering their similarities of inputs and outputs and the representation of each type of ownership, 19 trading sectors were amalgamated into seven industries.

5.1.1 Sample profile

Industry Code	**Industry Name**	**Sample Size**			
		Private	**State**	**Mixed**	**Total**
ID 1	**Constructions & Engineering**	12	8	0	20
ID 2	**Hotels & Travel**	25	2	4	31
ID 3	**Land & Property**	13	6	1	20
ID 4	**Manufacturing**	32	9	10	51
ID 5	**Plantations**	6	1	17	24
ID 6	**Services**	11	7	0	18
ID 7	**Trading**	24	5	4	33
Total		123	38	36	197

5.2.2 Board Size

Table 5.1.2 below shows that 103 firms (52%) of the sample hold a board size of seven to nine members. However the second largest category of percentages consists of four to six directors. While the board size of firms in Sri Lanka ranges from one to 15, the minimum board size of 71.6% of firms are seven members.

Table 5.1.2

Board Size

Board Size	No: of Firms	% of Firms	Cumulative %
0 - 3	5	2.5	100
4 – 6	51	25.9	97.5
7 - 9	103	52	71.6
10 – 12	33	17.1	19.6
13 - 15	05	2.5	2.5
Total	197	100	0

5.2.2.1 Board Size under different industries

Sizes of the board in the sample under different industries are given in table 5.1.3. It shows that the board sizes of all seven industries are within the range of two to 15. Although it ranges from seven to nine, there is only a slight difference of average board sizes among industries. Five industries out of eight industries present eight members on their board as the highest average board size. The table shows that the lowest average board size has seven directors being equally represented by the land & property, plantation and services industries.

Table 5.1.3

Average size and minimum and maximum ranges of a board under each industry for the period of 2003-2007

Industry Code	Industry Name	Board Size	
		Average	Range
ID 1	**Constructions & Engineering**	8	5-11
ID 2	**Hotels & Travel**	8	3-13
ID 3	**Land & Property**	7	4-11
ID 4	**Manufacturing**	8	7-13
ID 5	**Plantations**	7	2-10
ID 6	**Services**	8	4-15
ID 7	**Trading**	7	3-13
Total		8	2-15

Table 5.1.4

Average size and minimum and maximum ranges of a board under each industry and each ownership type for the period of 2003-2007

Industry Code	SOEs		PEs		MEs		All firms	
	Average	Range	Average	Range	Average	Range	Average	Range
ID 1	7	7-7	8	5-11	-	-	8	5-11
ID 2	7	7-7	8	3-13	9	5-12	8	3-13
ID 3	7	4-9	7	3-11	7	7-7	7	4-11
ID 4	7	7-11	8	4-13	8	7-9	8	7-13
ID 5	2	2-2	8	5-10	6	5-8	7	2-10
ID 6	7	7-8	9	4-15	-	-	8	4-15
ID 7	8	4-11	7	3-13	6	3-10	7	3-13
Total	7	2-11	8	3-15	7	3-12	8	2-15

5.2.3 Non-executive directors

As shown by Table 5.1.5, the highest percentage of firms represents four to five numbers of non-executive directors. However, almost half (49%) of all firms have six to nine non-executive

directors. While 54.7% of firms' boards represent six minimum non-executive directors, 86.8% of all firms have at least four non-executive directors.

Table 5.1.5

Non-executive Directors

Non-executive Directors	No: of Firms	% of Firms	Cumulative %
0-1	2	1.2	100
2-3	19	12	98.8
4-5	51	32.1	86.8
6-7	49	30.8	54.7
8-9	29	18.2	23.9
10-11	07	4.4	5.7
12-13	02	1.3	1.3
14-15	0	0	0
Total	159	100	0

5.2.3.1 Non-executive directors and non-executive directors' ratio under different industries.

Numbers of non-executive directors in the sample under different industries are given in table 5.1.6. It shows that the average non-executive directors of all seven industries are within the range of zero to twelve. While the highest numbers of non- executive directors are represented with an average of seven members by the hotel & travel (ID 2) and the lowest number is represented by the trading sector (ID 7) with five members. All the other five industries equally represent six members each. However PEs and MEs have equal numbers (six each) on average non-executive directors.

5.2.3.2 Average non-executive directors and non-executive directors' ratio

All industries consist of more than 70% of non-executive directors of the total board size. Although the highest number of non-executive director ratio is represented by the hotels and travel industry, the lowest non-executive directors of the total board size are represented by the service industry.

Table 5.1.6

Average numbers of non-executive directors and non-executive ratio under different industries

Industry Code	Industry Name	Average Non-executive	Range of the Non-executives	Non-executive Ratio
ID 1	Constructions & Engineering	6	4-9	0.77
ID 2	Hotels & Travel	7	2-12	0.85
ID 3	Land & Property	6	1-10	0.80
ID 4	Manufacturing	6	2-10	0.74
ID 5	Plantations	6	4-9	0.83
ID 6	Services	6	0-11	0.70
ID 7	Trading	5	2-10	0.77
Total		6	0-12	0.79

Table 5.1.7

Average numbers of non-executive directors under different industries and different ownership types

Industry Code	SOEs		PEs		MEs		All firms	
	Average	Range	Average	Range	Average	Range	Average	Range
ID 1	NA	NA	6	4-9	-	-	6	4-9
ID 2	NA	NA	7	2-12	7	4-11	7	2-12
ID 3	NA	NA	5	1-10	6	6-6	6	1-10
ID 4	NA	NA	6	2-10	6	4-8	6	2-10
ID 5	NA	NA	7	4-9	5	5-7	6	4-9
ID 6	NA	NA	6	0-11	-	-	6	0-11
ID 7	NA	NA	6	2-10	5	2-9	5	2-10
Total	NA	NA	6	0-12	6	2-11	6	0-12

Table 5.1.8

Non-executive directors' ratio under different industries and different ownership types

Industry Code	Industry Name	Non executive Ratio			
		SOEs	PEs	MEs	All firms
ID 1	Constructions & Engineering	NA	0.77	-	0.77
ID 2	Hotels & Travels	NA	0.84	0.85	0.85
ID 3	Land & Property	NA	0.73	0.86	0.80
ID 4	Manufacturing	NA	0.73	0.75	0.74
ID 5	Plantations	NA	0.87	0.78	0.83
ID 6	Services	NA	0.70	-	0.70
ID 7	Trading	NA	0.77	0.77	0.77
Total		-	NA	0.78	0.79

5.2.4 CEO duality

Table 5.1.9 below shows that out of sample selected for the study, 105 firms out of 159 firms have CEO duality. Accordingly 66% of firms of the sample have the CEO duality and 34% of the firms have a separate chairman and a separate CEO.

Table 5.1.9

CEO duality

	No: of Firms	%
CEO Duality	105	66
No CEO Duality	54	34
Total	159	100

5.2.4.1 CEO duality under different industries

Table 5.1.10 shows that in four industries out of seven industries, CEO duality exists in over 70% of companies. 86% of firms have CEO duality in the hotels and travel industry. Private enterprises have higher CEO duality when compared to mixed enterprises. While highest CEO duality in the private sector records of hotels & travel and plantation industries show 88% and 83% consecutively. The second largest CEO duality records of constructions & engineering and trading industries display 75% each. However, the lowest CEO duality records show 46% by the land & property industry under the private enterprise category. When considering the MEs, the largest number of firms with CEO duality is represented by land & property, trading and hotels & travel and plantation industries with 100%, 75% and 65% successively. In contrast, the land & property industry under MEs shows a 100% existence of CEO duality. Then again this particular industry represents just one of the sample firms.

Table 5.1.10

CEO duality under different industries

Industry Code	**Industry Name**	**CEO duality**	**Not having CEO duality**	**CEO duality %**	**Not having CEO duality %**
ID 1	Constructions & Engineering	9	3	.75	.25
ID 2	Hotels & Travel	25	4	.86	.14
ID 3	Land & Property	7	7	.50	.50
ID 4	Manufacturing	21	21	.50	.50
ID 5	Plantations	16	7	.70	.30
ID 6	Services	6	5	.55	.45
ID 7	Trading	21	7	.75	.25
Total		105	54	.66	.34

Table 5.1.11

CEO duality under different industries and different ownership types

Industry Code	Industry Name	Firms having CEO duality							
		PEs	%	SOEs	%	MEs	%	All firms	%
ID 1	Constructions & Engineering	9	.75	NA	-	0	0	9	.75
ID 2	Hotels & Travels	22	.88	NA	-	3	.75	25	.86
ID 3	Land & Property	6	.46	NA	-	1	100	7	.50
ID 4	Manufacturing	17	.53	NA	-	4	.40	21	.50
ID 5	Plantations	5	.83	NA	-	11	.65	16	.70
ID 6	Services	6	.55	NA	-	0	0	6	.55
ID 7	Trading	18	.75	NA	-	3	.75	21	.75
Total		83	.67	NA	-	22	.61	105	.66

5.2.5 Dependent variables used under two performance measurement techniques

As mentioned earlier, there are five dependent variables in the study, specifically ROA, ROE, SPE and NIE (under accounting/financial performance measurement technique) and Tobin's Q (market-based performance measurement technique)**.**

Table 5.1.12 shows the different average ROA, ROE, SPE, NIE percentages and Tobin's Q percentages. The trading industry provides the highest ROA and ROE both, while the manufacturing industry follows it. It is important to note that among the industries in the sample, the lowest ROA, ROE and NIE is shown by the hotels & travel industry, while the highest SPE is represented by the trading industry, the constructions & engineering industry records the highest NIE. In the meantime, constructions & engineering and land & property industries represent the second highest SPE and NIE respectively. When considering Tobin's Q it is again the trading industry which gives the highest Tobin Q followed by the constructions & engineering industry.

Table 5.1.12

Average performances under accounting/financial and market based measurement techniques

Industry Code	Industry Name	Average ROA %	Average ROE %	Average SPE %	Average NIE %	Average Tobin's Q %
ID 1	Constructions & Engineering	8.99	14.25	121	153	95.23
ID 2	Hotels & Travel	2.58	-0.88	87	21	93.99
ID 3	Land & Property	10.19	11.97	116	126	93.99
ID 4	Manufacturing	11.65	16.55	114	115	93.99
ID 5	Plantations	6.00	9.98	59	79	93.99
ID 6	Services	9.49	13.65	95	120	93.13
ID 7	Trading	16.01	21.82	127	112	99.32

Table 5.1.13

Control variables under different industries

Industry Code	Industry Name	Leverage %	Risk	Size	Growth %	Monopoly Power %	Privatized Firms %
ID 1	Constructions & Engineering	16.54	1,482,881	14.84	1.16	25.00	0.00
ID 2	Hotels & Travel	17.63	208,863	7.21	1.09	0.00	19.35
ID 3	Land & Property	15.91	632,983	7.08	0.66	0.00	5.00
ID 4	Manufacturing	21.00	381,153	7.83	0.55	9.52	23.53
ID 5	Plantations	23.58	428,912	8.21	0.68	0.00	70.83
ID 6	Services	12.92	238,423	13.59	0.82	0.00	0.00
ID 7	Trading	15.82	923,434	8.55	0.53	3.57	18.18
Total		-92.17	736,136	13.77	1.00	5.03	21.32

5.2.6 Control variables under different industries

Four additional variables are introduced under the corporate governance and performance model. These have explanatory power when examining firm performance and corporate governance and they are leverage, risk, size and growth while the following are dummy variables described as competition (degree of monopoly power) and privatized firms.

5.2.6.1 Leverage and risk

As per the data in table 5.1.13 for the period 2003-2007, two of the six control variables are leverage and risk. The leverage which was measured by the book value of debt divided by the book value of assets is higher in the plantation industry, followed by manufacturing and hotels & travel industry. However, the lowest leverage is represented by the services industry.

While the firm risk is measured by the standard deviation of annual earnings before taxes, the highest risk firms are in the constructions & engineering industry. The second and third highest risks are reported from trading and land & property industries respectively. Low risk firms are in the services industry.

5.2.6.2 Average size and average growth

The other **t**wo variables are average size (average turnover of the firm) and average growth (average growth rate of the turnover) and Table 5.1.13 displays it. The constructions & engineering industry shows the highest turnover, followed by the services industry. The highest average growth rate is given by the constructions & engineering industry, which is followed by the hotels & travel industry and table 5.1.13, displays it.

5.2.6.3 Competition (degree of monopoly power) and privatized firms

Two indicator variables, competition and privatized firms, are taken into account some of the sample firms have more monopoly power or competitive ability than their other counterparts. Out of all PEs and MEs, 25% of constructions & engineering firms have the highest monopoly power. Also 9.52% of manufacturing firms and 3.57% of trading firms enjoy monopoly power. Yet hotels & travel, land & property, plantations and services industry firms could not act as a monopolist.

Some of the sample firms were SOEs in historically and now they are recognized as privatized firms. Out of all firms in plantation industry, 70.83% of firms are privatized firms. The second,

third and fourth highest numbers of privatized firms are included in manufacturing, hotels & travel and trading industries.

5.2.7 Descriptive statistics for independent and dependent variables of the sample

Table 5.1.14 below summarizes the descriptive statistics for the variables employed in the study of corporate governance and accounting/market performance.

Table 5.1.14

Descriptive statistics for independent and dependent variables

Variables / Statistics	Board Size	Non Ex Directors	CEO duality	Leverage	Risk	Size	Growth	ROA	ROE	SPE	NIE	Tobin's Q
Mean	7.52	5.775	0.64	.1856	758752	13.576	.0079	0.0835	0.1181	1.027	0.9739	0.9399
Std. Deviation	2.203	2.115	0.479	.2088	494621	1.9145	.02554	0.1431	0.2938	0.4566	1.4595	0.5939
Skewness	.402	-.654	-.679	1.057	.960	-.212	.081	.465	.323	-0.131	-.372	-.568
Minimum	2	0	0	-.1887	102209	7.7509	-.0953	-.9081	-3.043	0.4655	-0.504	.0000
Maximum	15	12	1	1.695	2086641	18.646	.0962	.8873	1.5615	1.8051	3.0614	2.8614

5.2.7.1 Board size

The above table shows the number of directors on the board (board size) displays a wide range from two to fifteen. The mean board size is 7.52, with a standard deviation of 2.2. This is on a par with many studies undertaken by previous researches. The Cadbury committee report (1992) also recommends the size of the board to be between eight and ten members. Kathuria & Dash (1999) in their study found that the size of the board was about 9.83. Mayers et al., (1997) found a board size of seven for the stock companies and of twelve for mutual companies. Mak and Li (2001) in their research on 'Determinants of Corporate Ownership and Board Structure: Evidence from Singapore', found the mean of the board size to be 8.04 and the board size ranging from four to fourteen. Carter,& Simpson (2003) in their research on board diversity and firm value (sample is drawn from Fortune 1000) found a mean of 10.986 in the number of

directors with a standard deviation of 3.105. An empirical study on corporate governance and firm performance carried out in Russia by Judge, et al., (2003) found a 9.6 mean in the size of the board with a standard deviation of 4.2 (range is five to 17). Taking evidence from China, Chen et al., (2006) indicate that the average board size of firms in China is nine. In a study regarding simple and complex firms, Coles et al., (2008) found that the board size was 12.5 to 13 for simple firms and 16.5 to 17 for complex firms. Using empirical evidence on performance and governance in micro finance institution in the world Mersland & Strom (2009) showed the average board size of global micro finance institutions as seven.

5.2.7.2 Non-executive directors

When looking at the number of non-executive directors in the board, the table shows a mean of 5.78 with a standard deviation of 2.12 and it ranges between 0 to 12 non-executive members. This indicates that of the board size 75% are non-executive directors. The Cadbury Committee Report (1992) suggests for the board to become effective, the non-executive directors should have a sufficient representation. Mayers et al., (1997) found the non-executive ratio to be 44% for the stock companies and 72% for mutual companies. However, in contrast Eng & Mak (2003) who carried out a research on corporate governance and voluntary disclosure, found a mean of 57% of non-executive directors where the range is 0.10 to 1.00. Judge, et al., (2003) gives a mean proportion of 49.3% of outside directors or non-executive directors whereas Xie, et al., (2002) in their study of earnings management and corporate governance found 67% of the total board were non-executive directors. Weir Laing, et al., (2001) found that 47% of the board was comprised of non-executive directors. Thus, they state that UK quoted companies has an almost equal representation of executive and non-executive directors, and it can justifiably be claimed that the presence of non-executive directors is sufficient for them to influence decisions of UK boards.

In contrast, non-executive directors dominate US boards. For example, a 1999 study found that US companies had an average of 76% of non-executive directors (S Bhagat & Black, 1999). However, Chen, et al., (2006) find from China that the outside director ratio for his sample firms is 13%.

5.2.7.3 CEO duality

When considering CEO Duality, the Cadbury Committee Report (Cadbury, 1992) suggests the roles of the chairman and chief executive directors should be independent. According to the above table 5.1.10, CEO Duality gives a mean of 64%, indicating most of the companies in the sample show that one individual holds the most powerful posts on the board of directors, namely those of CEO and chairman and thereby CEO non duality exists in fewer companies in the sample. Judge et al., (2003) found that in 84% of the firms' CEO did not function as the board chairman. In contrast, Xie et al., (2002) found that the mean for firms with CEO duality as 85%. This is par with the research carried out by Carter, et al., (2003) where they determined 77.7% of CEO duality in the sample they selected.

Weir & Laing (2001) in their research with a sample of 320 UK quoted companies found the incidence of CEO duality is low with only 17% of companies combining the posts of chairman and CEO. This is similar to the figure found by another UK study, Conyon & Mallin, (Conyon & Mallin, 1997) who found 14% of companies had duality. Chen et al., (2006) found that the CEO duality in China was 8% to 9%. Using empirical evidence on "Performance and Governance in Micro Finance Institutions in the World", Mersland & Stom (2009) showed the percentage of CEO duality of global micro finance institutions as 15%. Thus, CEO duality is much higher in Sri Lanka than in the above mentioned studies.

5.3 Determinants of company performance: OLS Analysis

The hypotheses based on the research question two in chapter three are,

H2: **The board size and board composition does not explain the differences in enterprises' accounting and/or market performance levels of enterprises in Sri Lanka,**

H2a 'Accounting performance of enterprises and the size of the board of the directors has a significant positive relationship.'

H2b 'Market performance of enterprises and the size of the board of the directors has a significant positive relationship'.

H2c 'Enterprises that have a higher proportion of non-executive directors to the total number of directors are likely to have higher accounting performance'

H2d 'Enterprises that have a higher proportion of non-executive directors to the total number of directors are likely to have higher market performance'

H2e ‘Enterprises that have a non-existence of CEO duality (having a separate chairman and a chief executive officer) are likely to have a higher accounting performance’

H2f ‘Enterprises that have a non-existence of CEO duality (having a separate chairman and a chief executive officer) are likely to have a higher market performance’.

These hypotheses were tested using the Pearson correlation coefficient, which gives the measure of association between two variables.

Then the hypotheses are tested under the multiple regression models by introducing six control variables for all three hypotheses on entry method. (Three independent variables are regressed separately, accompanying the six control variables). Finally, the overall results are given with detailed discussion.

5.3.1 Correlation analysis

Table 5.1.15 below present the Pearson correlation coefficients between dependent variables and independent variables separately. There is no significant relationship between board size with ROA, ROE, NIE or SPE. Thus the null hypothesis H2a has been rejected. In addition to that the table shows no significant correlation between Tobin’s Q and the board size. Therefore the null hypothesis H2b has been rejected.

Correlation between the number of non-executive directors and the dependent variables shows that there is a positive relationship between non-executive directors and NIE, which is significant at 0.5 levels. And there is no significant relationship between non-executive directors and ROA, ROE or SPE. Accordingly null hypothesis H2c has been rejected except for NIE. In the case of Tobin’s Q, the hypothesis H2d has been rejected by considering the correlation between non-executive directors and Tobin’s Q which is statistically not significant.

There are statistically significant negative relationships between all accounting measures (ROA, ROE, SPE and NIE) and the governance variable CEO duality. At this point, the two tail significant levels of CEO duality are .01. Therefore the null hypothesis H2e is accepted. However, the null hypothesis H2f is not accepted due to the statistically insignificant correlation between governance variable CEO duality and dependent variable Tobin’s Q. Nevertheless there is a negative correlation between CEO duality and Tobin’s Q. Therefore both accounting and market-based performance measures have a negative relationship with CEO duality. In other words it indicates that CEO duality causes to show negative corporate performance.

Table 5.1.15

Pearson correlation coefficients among independent and dependent variables

Variables	Board Size	Non Ex Directors Ratio	CEO duality
ROA	-.046 (.245)	.052 (.192)	**-.202**^{**} **(.000)**
ROE	-.007 (.869)	.011 (.789)	**-.181**^{**} **(.000)**
SPE	.054 (.176)	.009 (.828)	**-.174**[*] **(.000)**
NIE	.057 (.152)	**.083**[*] **(.037)**	**-.176**^{**} **(.000)**
TOBIN'S Q	.034 (.395)	-.012 (.758)	-.030 (.452)

Two tailed probabilities are given within parentheses

** Correlation is significant at 0.05 levels (2- tailed)

* Correlation is significant at the 0.1 level (2-tailed)

The Table 5.1.15 shows the relationships between all the independent variables and the five dependent variables. There is a significant positive correlation between the board size and the non-executive directors' ratio. Also the non-executive directors' ratio is positively correlated with CEO duality at .05 significant levels.

When considering the control variables, while size of the firm positively correlates with the board size, firm risk is negatively correlated with the board size. Further the results show that the non-executive directors' ratio is positively correlated with size of the firm and negatively correlated with privatized firms. However, in contrast firm size is negatively and leverage positively correlated with the CEO duality at 0.1 and .01 levels of significance respectively.

Table 5.1.16

Pearson correlation coefficients among independent variables

Variable	Board Size	Non Ex Ratio	CEO duality	Leverage	Risk	Size	Growth	Competition	Privatized Firms
Board Size	1.000								
Non Ex. Dir Ratio	-661** (.000)	1.000							
CEO duality	-.069 (.081)	.082* (.039)	1.000						
Leverage	.049 (.223)	.010 (.805)	.118** (.003)	1.000					
Risk	-.109** (.006)	.073 (.065)	.017 (.666)	.072 (.071)	1.000				
Size	.165** (.000)	.114** (.004)	-.144** (.000)	.164** (.000)	.270** (.000)	1.000			
Growth	-.005 (.896)	-.037 (.347)	-.013 (.737)	.087* (.030)	.031 (.428)	.061 (.126)	1.000		
Competition	.000 (.984)	.015 (.707)	-.023 (.563)	.090* (.024)	.004 (.925)	.205** (.000)	-.022 (.572)	1.000	
Privatized Firms	-140** (.000)	-.086* (.030)	-.022 (.577)	.284** (.000)	-.068 (.089)	.125** (.002)	.084* (.034)	.219** (.000)	1.000

Two tailed probabilities are given within parentheses

** Correlation is significant at 0.05 levels (2- tailed)

* Correlation is significant at the 0.1 level (2-tailed)

NB: Although all the results are reported in one table, due to statistical problems, at the time of analysing, some of the variables had to be removed from the model and they were analysed separately.

5.3.2 Factors influencing performance

The variables studied under corporate governance and accounting/market performance were regressed under the multiple regression model (entry method), introducing seven control variables. Table 5.1.17 reports the regression results with respect to all the dependent variables.

Table 5.1.17

Multiple regression analyses

Variables	ROA	ROE	SPE	NIE	TOBIN'S Q
Constant	-6.040*** (.000)	-5.079*** (.000)	0.563 (.574)	-3.541*** (.000)	2.477*** (.014)
Board Size	-.820 (.412)	-1.270 (.205)	1.166 (.244)	-.620 (.535)	2.298** (.022)
Non-Ex Directors Ratio	1.190 (.234)	.620 (.535)	-1.511 (.131)	2.058** (.040)	-1.290 (.197)
CEO duality	-3.993*** (.000)	-3.560*** (.000)	-3.545*** (.000)	-3.893*** (.000)	-.140 (.888)
Leverage	-4.764*** (.000)	-2.530*** (.012)	-6.123*** (.000)	-6.375*** (.000)	.550 (.583)
Risk	.704 (.482)	1.318 (.188)	5.440*** (.000)	3.911*** (.000)	.756 (.450)
Size	7.574*** (.000)	7.128*** (.000)	6.153*** (.000)	4.285*** (.000)	-4.421*** (.000)
Growth	1.393 (.164)	.485 (.628)	-5.159*** (.000)	1.405 (.160)	-.027 (.978)
Competition	2.797*** (.005)	3.107*** (.002)	.1363 (.173)	1.989** (.047)	1.731* (.084)
Privatized Firms	-.192 (.848)	-.995 (.320)	-.5.494*** (.000)	-2.633*** (.009)	-.093 (.926)

Industry	1.629* (.104)	1.260 (.208)	0.293 (.770)	.861 (.390)	-1.359 (.175)
Included observations after ad	620	620	620	620	612
Adjusted R-squared	.178	.150	.269	.170	.031
Probability(F-statistic)	14.677	12.128	24.137	13.887	2.998
Durbin-Watson Statistic	1.916	2.061	2.032	1.753	2.103

Two tailed probabilities are given within parentheses

* Correlation is significant at 0.10 levels (2- tailed)

** Correlation is significant at 0.05 levels (2- tailed)

*** Correlation is significant at the 0.1 level (2-tailed)

The above table 5.1.17 presents the multiple regression results when it runs under the multiple regression models where ROA, ROE, SPE, NIE and Tobin's Q are the dependent variables.

The above multiple regression analysis reports that the dependent variable ROA, ROE, SPE, NIE (accounting measures) and the board size are not related significantly, either positively or negatively. Therefore, the null hypothesis (H2a) 'Accounting performance of enterprises and the size of the board of the directors has a significant positive relationship.' is not accepted.

However, considering the results of the multiple regression analysis, board size is significantly related with Tobin's Q positively (t=2.298, p<0.05). This supports the acceptance of H2b 'Market performance of enterprises and the size of the board of the directors has a significant positive relationship'.

In the regression analysis, there exists a positive relationship between all accounting variables and non-executive directors' ratio. With the multiple regression results, NIE is positively significant (t=2.058, p<0.05) with non-executive ratio. Based on these results related to NIE, hypothesis H2c 'Enterprises by means of higher proportion of non-executive directors to total number of directors are probable to have higher accounting performance,' is accepted.

The multiple regressions present a negative relationship between Tobin's Q and non-executive directors' ratio but it is not significant. Therefore, hypothesis H2d **'**Enterprises by means of

higher proportion of non-executive directors to total number of directors are probable to have higher market performance, cannot be accepted.

The results of the multiple regressions present a significant negative relationship among CEO duality with ROA (t=-3.993, p<0.01), ROE (t=-3.590, p<0.01), SPE (t=--3.545, p<0.01) and NIE (t=-4.488, p<0.01) in that order. Resulting, hypothesis H2e 'Enterprises by means of non-existence of CEO duality (having a separate chairman and a chief executive officer) are probable to have a higher accounting performance', is accepted.

Nevertheless, multiple regression results for the variables between Tobin's Q and CEO duality is not significant either negatively or positively. Nonetheless, there is a negative relationship between Tobin's Q and CEO duality. Consequently, there is no basis to accept the hypothesis H2f 'Enterprises by means of non-existence of CEO duality (having a separate chairman and a chief executive officer) are probable to have a higher market performance'.

Table 5.1.17 shows the regression results for control variables, when run with all the accounting variables. With respect to ROA, ROE, SPE and NIE, the table indicates the most important variable is leverage. By means of all four accounting variables, leverage is negatively related at 99% (.01) level of significance. Then it is size (sales turnover) and competition (degree of monopoly power) which are the most significant control variables followed by risk, growth and industry. The other variable which contributes negatively but not significantly, is privatized firms.

Then with respect to Tobin's Q the most contributing control variable is the size (sales turnover) followed by competition. The other entire controllable variables are not significant.

5.3.3 Discussion about corporate governance and corporate performance

5.3.3.1 Board size and corporate performance

From all the above analysis it shows the board size always has a positive significant relationship under the correlation analysis and also under multiple regressions. Especially, board size and Tobin's Q are positively related and they are significant. Therefore Hypothesis H2b can be accepted. Studying the relationship between board size and firm performance, taking 86 private enterprises as a sample from Sri Lanka, Siriwardane (2008) has come to a similar conclusion. Also there results match with a meta-analysis which has provided systematic evidence of

nonzero, positive true population estimates of board size and firm performance relationships according to Dalton, et al. (1999).

In contrast, some prior researchers found that smaller boards are more effective monitors than larger boards (Hartarska, 2005; Walker, 2007). Xie, et al., (2002) found that the coefficient for board size is negative and significant at 0.005. And also, Sing & Davidson (2003) use accounting measures, Yermack (1996), as cited by Carter, et al., (2003) using Tobin's Q, find a negative relationship between board size and performance. Although the results are not significant under accounting performance in this study, there is a negative relationship between board size and accounting performance. This finding is supported by recent studies by Coles et al., (2008) and Mersland & Strom (2009).

Also it is found in relation to ROA and ROE that the contribution of an additional director is decreased, when the board size and corporate performance increases. Kathuria (1999), Hartarska (2005), Walker (2007) also suggested that the size of the board has a significant impact on the corporate performance. Although the results in this study are weaker than their results, this study also suggests that a corporation's performance improves by increasing the board size and contribution of an additional board member decreases as the size of the board decreases.

Answering for a part of part (a) of research question one, it should be said that the board size explains the differences in enterprises' accounting and/or market performance.

5.3.3.2 Non-executive directors ratio and the corporate performance

From all the above analysis it shows that the non-executive directors and corporate performance have a positive significant relationship with NIE. However ROA and ROE analysis shows a positive but insignificant relationship with non-executive directors' ratio. These results are par with Mayers et al.,(1997), Coles et al.,(2008) and Fazlzadeh et al.,(2011). However, the result in this study is not fully consistent with what is expected from the study. Therefore, H2c is accepted in relation to NIE.

The relationship between Tobin's Q and non-executive directors' ratio is totally opposite to the above. In addition, it is found that the contribution of an additional non-executive director decreases when the market performance gets increased. However, this relationship is not significant. Therefore H2d is rejected.

Supporting the above rejection, two US Studies found a negative relationship between the proportion of outside directors and corporate performance (S Bhagat & Black, 1999). Eng and Mak (2003) found an insignificant negative relationship (-0.007) between the percentage of non-executive directors and ROE. Examining 59 empirical studies about firm performance in large American firms by Rhoades et al., (2001) found that board composition explains less than 1% of the variance in firm performance and further they found only a small, but significant negative relationship between proportion of non-executive directors on the board and firm performance. Two UK studies (Vafeas & Theodorou (1998), Weir & Laing (2001) concluded that there is no relationship between the proportion of non-executive directors and corporate performance. Studying failed and non-failed companies, Changati et al., (1985) decided that there is no difference in the proportion of non-executive directors on the boards of failed and none failed companies. Reviewing 54 empirical studies of large US firms in a meta-analysis, Dalton, et al., (2011) found that no systematic relationship exists between non-executive directors and the board size. Weir & Laing (2001) emphasize that if non-executive directors were effective monitors, it would result in improved corporate performance in line with their board representation.

5.3.3.3 CEO duality and corporate performance

CEO duality and corporate performance under all the above analyses gives a negative relationship with both accounting and market performance measures. Further, the contribution is highly significant with all the accounting measures. Therefore, Hypothesis H2e is accepted. Although CEO duality has a negative relationship with Tobin's Q in all the above analyses, it is not significant. Therefore, hypothesis H2f cannot be accepted with respect to Tobin's Q. This result strongly supports the findings of Judge, et al., (2003), Dhaya, et al., (1996) and Weir & Laing (2003) suggesting that CEO duality was negatively related to the firm performance. In addition, Siriwardane (2008) found a negative but insignificant relationship between CEO duality and corporate performances in her limited sample regarding enterprises in Sri Lanka.

However, the substance is not precise. According to Donaldson & Davis (1991), Boyd (1995), Amaral-Baptissa (2011) and Fazlzadeh et al., (2011) firms which have duality perform better than having non duality. Also Dalton & Dalton, (2011) Dey et al.,(2008), Iyengar & Zampelli

(2009) and Faleye, (2007) concluded that there is no relationship between duality and firm performance.

Answering for the latter part of part (a) of research question two, it could be said that the board composition explain the differences in enterprises' accounting and/or market performance levels of enterprises in Sri Lanka.

5.4 Factors Driving Accounting and Market Performance of SOEs, PEs and MEs

5.4.1 Introduction

This section contains a summary of findings from test results on accounting performance measures (Accounting Ratios) and a market performance measure (Tobin's Q) used to determine the non-production difference of private, state and mixed enterprises over 2004-2007. This provides evidence of all sectors first, that is for the whole sample and then on each of seven industries. The results are obtained from applying accounting ratios: Profitability and labour performance. In addition, using the DuPont equation decomposition of ROE, the factors that could be contributing to the overall accounting performance are being examined. Also the results are obtained from applying Tobin's Q for market performance.

The performance statistics of PEs, SOEs and MEs are presented in section 5.4.2 for all firms. Respective results on profitability and labour performance under accounting performance measures and market performance for each and every industry are presented in section 5.4.3. Section 5.4.4 present the multiple regression analysis results to test hypotheses and to find an answer for part (a) of research question two, followed by the chapter summary as presented in section 5.5.

5.4.2 Accounting and Market Performance of SOEs, PEs and MEs

The comparative ratios and test results on these ratios are presented in table 5.2.1 below. In panel one are to be found summery measures: ROE (equation 1 is termed 1A), ROA (1B), Net Income Efficiency (1C) and Sales per Employees (1D). Those measures indicate overall accounting performance. The analysis begins with the evaluation of firms return and efficiency as presented in panel one. In panel two are examined the components of DuPont equation decomposition of ROE, followed by the studying of market performance using the indicator Tobin's Q in panel

three. 2A is the profit margin, which indicates gross profit upon sales; this is an important indicator of operating performance. 2B shows sales turnover performance, which indicates the generated from using each unit of assets. This is an indicator of capital usage effectiveness. Thus examining the components that lead to the overall performance, ROE will provide clues regarding sources of performance differences among SOEs, PEs and MEs. Equation 2C is financial leverage performance, which indicates the firm's ability to leverage equity with more debt.

5.4.3 Results for Hypothesis H3

H3: Type of ownership does not explain the differences in SOEs PEs and MEs in Sri Lanka' levels of accounting and/or market performance,

H3a: 'Enterprise accounting performance is greater for private enterprises than mixed and state owned enterprises'

H3b: 'Enterprise market value measured by Tobin's Q is greater for private enterprises than state and mixed enterprises'.

In this section the above two sub hypotheses are tested to find the answer to part (a) of research question two.

5.4.3.1 Accounting and market performance: All type of firms

5.4.3.1.1 Result: All SOEs, PEs and MEs

Although it is statistically not significant, the average ROE of MEs have recorded the highest performance followed by PEs and SOEs second and third respectively. Since no one has previously done a study related to MEs in Sri Lanka, this is a new finding. In contrast, the average ROA of MEs is the lowest. While PEs has the highest ROA, they are followed by SOEs, though it is statistically insignificant. This indicates that private enterprises are able to earn greater profit by using greater financial leverage than is the case with state and mixed enterprises. This result is consistent with reported empirical evidence that SOEs are said to be less efficient than that of PEs in securing and using debt. Also private enterprises' greater usage of debt could be explained as the reason to obtain higher ROA. In terms of return on equity,

though it appears as a new result in favour of MEs,' there could be several reasons. One reason could be that the sample represents over 90% of plantation companies as mixed enterprises and almost all of them are appearing as highest profit earning firms on the Colombo Stock Exchange. Another reason could be that most of these mixed enterprises acted as monopolies before privatizing them and still most of them enjoy monopoly power.

Net income efficiency (1C) and sales per employees (1D) ratios are used to measure labour performance of PEs, SOEs and MEs in Sri Lanka. This is because governments always give employment opportunities for their political supporters and justifying it by giving more and more employment is one of the main objectives of a government. At the same time it is argued that the main objective of SOEs is not profit maximization. However, as per table 5.2.1 below it shows that the highest performance of labour based on net income (NIE) represents SOEs level of significance at 0.10. This would be a new and doubtful result for some researchers and this idea is opposed to most findings in the literature. However, there could be many justifiable reasons for this. In the huge privatization program implemented in Sri Lanka since 2005, all governments have privatized hundreds of government enterprises, and present SOEs are mostly filtered through the privatization process and as such are recognized as key institutions for the country. On the other hand most of SOEs enjoy monopoly power and are naturally protected from competition owing to the fixed investment which would be too large for the private sector to lift up. Therefore, they can earn more profit than private sector firms. Another reason could be the close supervision given by the PERC and the treasury of Sri Lanka. Also in the privatization program, the government offered huge compensation for workers to resign from their institutions and resigning excess workers might be a reason. Before privatizing, present mixed enterprises too faced the same situation and they benefited. Being the second highest performer, MEs also demonstrate the above argument. One of the popular arguments that the SOEs have the availability of low cost government funds is also support for the highest NIE performance of SOEs.

When considering the sales per employees' ratio, the statics shows that SOEs have the lower labour performance than that of MEs and PEs with a statistically significant difference at 0.01 probabilities. This result is consistent with the empirical literature on performance, which provides consistent evidence of a superior performance of private sector firms, which may have more capable employees to attract customers by using a better marketing philosophy. The table

shows that on average, while each employee in PEs contributes Rupees 107 (US$ 1) value of sales, SOEs and MEs contribute Rupees 70 (US$ 0.72) and 63 (US$ 0.64) values of sales respectively. Nevertheless, while SOEs delivering fewer sales compared to private firms, apparently utilizing their rent free land, buildings, natural resources and low cost loans, they enjoy greater profits. On the other hand one can argue that SOEs do not have enough capital resources to buy new machines or technology to expand their capacity and increase their sales. Another argument would be to give permission to SOEs to access capital under certain regulations to the Colombo Stock Exchange, to raise some money to increase their resources. The results for the DuPont equation decomposition of ROE indicates that average operating performance of Profit Margin, Asset Turnover and Equity Multiplier ratios are recorded in favour of PEs with a statistical significance of 0.01 probability.

Vickers & Yarrow (1998), and Boycko, et al., (1996) argue even though the SOEs main objective is rarely considered as profitability, it is expected that they generate profit to survive as a business enterprise. Therefore, profit margin performance is especially calculated to accommodate that idea. Whereas profit margin ratio indicates highest performance for MEs, SOEs and MEs report second and third places. That indicates that PEs can earn more profit margin than SOEs and MEs. However, whilst profit margins of SOEs and MEs are almost the same, there is a huge difference with PEs.

In contrast, the lowest asset turnover is shown by SOEs and highest by PEs. These points out those private enterprises are able to manage their sales more appropriately than state sector firms. This result provides consistent evidence of the superior performance of private enterprises which is driven by motivated and capable employees, in contrast to other enterprises, and it matches with the empirical literature on performance.

Financial leverage performance measured by the equity multiplier shows that the average leverage of PEs is greater than that of SOEs and MEs with a statistical significance of 0.01 probabilities. This means that PEs make use of more debt compared to their assets than SOEs and MEs. In contrast, SOEs utilize lower debt compared to their assets than the other two types of enterprises. This is a reliable proof to accept the limited capabilities of state sector firms to leverage their equity with more debt.

Market performance, as measured by Tobin's Q, requires market value of equity in addition to information which is given in the financial statement as explained in chapter three, Since SOEs

are not operating in the CSE, it is impossible to calculate Tobin's Q value for SOEs and therefore the Tobin's Q values are available only for MEs and PEs. Therefore here the Tobin's Q of MEs is compared with PEs value. As per table 5.2.1, below Tobin's Q is higher in PEs than in MEs, though it is not statistically significant. It means that both kinds of enterprises are almost the same with their market performance. In other words, it can be argued that the investors on the Colombo Stock Exchange do not care about the type of ownership. However, since the Tobin's Q ratio of both PEs and MEs is just below 1, it can be determined that the market valuation of capital is just below its replacement cost. As Brainard & Tobin, 1968, cited by Faria & Mollick (2010), point out, the investments are not stimulated. This is justified by the volatile situation in the Sri Lankan economy and the share market during the research period, owing to the terrorist problems in Sri Lanka.

Table 5.2.1

Relative accounting and market performance of PEs, SOEs and MEs in Sri Lanka over 2004 – 2007

Performance Indicator	**PEs**	**SOEs**	**MEs**	**ANOVA Test**	**Remarks**
Panel 1 - Return and efficiency					
1A – ROE (NI/Equity)					
Mean	0.0765	0.0605	0.0905	1.5241	MEs
Standard deviation	0.1553	0.1414	0.1308	(0.2185)	Highest
1B - ROA (NI/TA)					
Mean	0.1120	0.0933	0.0855	0.6985	
Standard deviation	0.2852	0.2323	0.2194	(0.4977)	PEs Highest
1C – NIE (NI/Employees)					
Mean	0.1163	0.1737	0.1200	2.4419*	
Standard deviation	0.2066	0.3788	0.3811	(0.0877)	SOEs Highest

1D – SPE (Sales/ Employees) Mean Standard deviation	1.0746 1.5319	0.7015 1.1560	0.6298 1.1171	7.9773** (0.0004)	PEs Highest
Panel 2 – DuPont Equation Decomposition of ROE **2A–**Profit Margin (NI/Sales) Mean Standard deviation	1.1160 0.4380	0.7504 0.5006	0.7254 0.3847	67.674*** (0.000)	PEs Highest
2B-Assets Turnover (Sales/TA) Mean Standard deviation	1.1693 1.0624	0.8025 0.8233	1.0195 0.6857	8.7298*** (0.000)	PEs Highest
2C-Equty Multiplier (TA/Equity) Mean Standard deviation	0.8921 0.1128	0.7607 0.1604	0.8018 0.1363	74.2008*** (0.0000)	PEs Highest
Panel 3–Market Performance **3A-** Tobin's Q(MVE+BVD/BVA) Mean Standard deviation	0.9625 0.6028	- -	0.9174 0.5850	2.381 (.123)	PEs Highest

Two tailed probabilities are given within parentheses

* Correlation is significant at 0.10 levels (2- tailed)

** Correlation is significant at 0.05 levels (2- tailed)

*** Correlation is significant at the 0.1 level (2-tailed)

5.4.3.2 Accounting and market performance: Construction & Engineering industry

In table 5.2.2 below are given test results for PEs, SOEs and MEs of construction & engineering industry in Sri Lanka for the period of 2003 to 2007. Panel one summarizes overall accounting performance; panel two summarizes DuPont equation decomposition, followed by market performance in panel three.

5.4.3.2.1 Results for Construction & Engineering industry

Since there are no mixed enterprises belonging to the construction and engineering industry, table 5.2.2 presents test results only for MEs and SOEs. In case of ROEs, there is no significant difference between average performance of PEs and SOEs. However, though it is statistically insignificant, ROE is slightly higher in SOEs than PEs. One reason for that must be having state owned firms with high monopoly power, and with the competition controlled by the government. Another reason might be that most SOEs in this industry invested with large scale capital and in addition to competition being controlled by the government. This phenomenon can be justified by the role of public firms in this industry, which play an important role for the economy. They receive special consent and financial support from the government as subsidies.

In contrast, average ROA of PEs is higher with respect to SOEs at 0.01 levels of significance. This result is consistent with empirical results of the literature. As is the nature of this industry, it needs huge amounts of money from time to time. Comparatively SOEs have only limited access to debt. This might be a reason for having the higher results for ROA of PEs. It seems apparent, based on reported empirical evidence, that PEs are said to be more profitable than SOEs. Superior efficiency in the use of assets of PEs could easily explain why they are higher for ROA than SOEs.

Both employee based performance measures have been determined in favour of PEs. When considering the NIE measurement, it appears that over five times' higher average value of PEs compares to SOEs at 0.01 levels of significance. In other words, when one SOE's employee contributes to their profit by one rupee, one PE's employee contributes by five Rupees. One major reason could be that these SOEs have large numbers of employees and pay large amounts of money for their employees as salaries and other employee benefits. Especially, since this industry represents most of large scale SOEs and SOEs with a branch network, politicians give employment to their supporters. Resulting in the NIE of SOEs is being well below to PEs.

The other ratio based on employees is SPE. Average SPE of PEs is well ahead of SOEs at 0.01 levels of significance. It is understandable that the number of employees could influence the increase or decrease of the SPE ratio. In the case of SOEs, having a large number of employees causes a decrease of SPE. On the other hand, empirical evidence supports the idea of PEs employees being more capable to increase sales than SOEs employees.

In the case of the profit margin performance (2A) of the construction and engineering industry which shows that the average performance of PEs is higher than that of SOEs with a statistically significant value of 0.01 probabilities. That specifies that PEs can earn a six times higher profit margin on sales than SOEs.

Asset turnover ratio also shows the highest average for PEs with 0.10 levels of significance. However, it has only a slight difference with SOEs. Even though there is a huge difference between PEs and SOEs profit margin ratio, only a little difference is shown between PEs and SOEs in the asset turnover ratio. Here it is clearly seen that one reason could be the large amount of employee expenses of SOEs.

Leverage performance measured by the equity multiplier indicates that the average leverage of SOEs is lower than that of PEs with statistically significance at .01 probabilities. This means that the SOEs use less debt compared to their total assets compared to PEs debt in relation to their total assets. Less leverage potentiality of PEs is furtherproven with this evidence. It gives consistent evidence about the limited capabilities of SOEs to leverage their equity with more debt compared to PEs.

There are not any MEs in this construction & engineering industry and thus there are no comparative figures to compare with Tobin's Q ratio of MEs. However, Tobin's Q ratio value for PEs is close to one. Hence it can be determined that they do not have a strong situation of market performance. Since the't' value is not significant, it indicates that the situation in every firm is almost the same. However, it can be argued, that although market performance is not too bad, it is not too good either.

Table 5.2.2

Relative accounting and market performance of constructions & engineering industry in Sri Lanka over 2004-2007

Performance Indicator	PEs	SOEs	MEs	ANOVA Test	Remarks
Panel 1 - Returns or Sales on Assets, Equity and Employees					
1A – ROE (NI/Equity)					
Mean	0.1425	0.2302		2.303	
Standard deviation	0.1031	0.3809		(.133)	SOEs Highest
1B - ROA (NI/TA)			-		
Mean	0.0899	0.0218		14.669***	
Standard deviation	0.0895	0.0559	-	(.000)	PEs Highest
1C – NIE (NI/Employees)					
Mean	1.5326	0.2856		37.059***	
Standard deviation	0.9112	0.8765	-	(.000)	PEs Highest
1D – SPE (Sales/ Employees)					
Mean	1.2074	0.7630		16.916***	
Standard deviation	0.4052	0.5613	-	(.000)	PEs Highest
Panel 2 – DuPont Equation Decomposition of ROE					
2A–Profit Margin (NI/Revenue)					
Mean	0.1868	0.0302	-	14.232***	PEs Highest
Standard deviation	0.1895	0.1697		(.000)	
2B-Assets Turnover (Sales/TA)			-		
Mean	0.9807	0.7074		3.319*	PEs Highest
Standard deviation	0.5584	0.7840		(.094)	
2C-Equty Multiplier (TA/Equity)			-		
Mean	0.8744	0.6557		64.656***	PEs Highest
Standard deviation	0.0866	0.1561		(.000)	

Panel 3–Market Performance					
3A–Tobin's Q(MVE+BVD/BVA)					
Mean	0.9523	-	-	.268	-
Standard deviation	0.5987	-	-	(.790)	-

Two tailed probabilities are given within parentheses

* Correlation is significant at 0.10 levels (2- tailed)

** Correlation is significant at 0.05 levels (2- tailed)

*** Correlation is significant at the 0.1 level (2-tailed)

5.4.3.3 Accounting and market performance: Hotels and travel industry

In table 5.2.3 below are the test results for PEs, SOEs and MEs of hotels and travel industry in Sri Lanka for the period of 2003 to 2007. Since panel one summarizes overall accounting performance, panel two summarizes DuPont equation decomposition followed by market performance in panel three.

5.4.3.3.1 Results for hotels and travel industry

There those are some new findings reported for the first time for this hotels and travel industry. They present the average ROE performance of SOEs is higher than that of PEs and MEs with a statistical significance of 0.01 probability. Not only ROE of SOEs but also ROA of SOEs are higher than PEs and MEs with a statistical significance of 0.01 probabilities. Part of the reason for being higher ROE and ROA might be that the data set the researcher is using comes from the period when the central government had already put in rehabilitation and reconstruction to rebuild the hotel industry which was badly affected by the Tsunami devastation in 2004. On the other hand, although most of the state owned hotels are situated in Colombo city and other inland cities, most of these state owned hotels were not affected by the tsunami, while the majority of PEs and MEs were badly affected. Also the other related problems created by the tsunami and also due to increasing terrorist activities during the research period could, have badly affected the hotels and travels industry. Even though these problems affected all firms, owing to government subsidies and continuous support, SOEs suffered least compared to the other two types of enterprises.

Although it is not statistically significant, the NIE ratio as reported seems to favour SOEs. In contrast, a sale per employees' ratio is highest in PEs and in SOEs it is the lowest and is

statistically significant at 0.10 level of probability. That clearly shows that the largest numbers of employees of SOEs are working in the hotels and travel industry.

Findings on profit margin performance indicate that, on average, SOEs have higher performance than that of MEs and PEs with a significant 0.01 probability. That means, while SOEs are earning higher profits in hotels and travels industry, PEs are earning very little profit and at the same time MEs are losing their money.

Asset turnover ratio is also highest in SOEs and lowest in PEs. When compared with PEs it is double in SOEs. However, it is almost similar between PEs and MEs. On the contrary, even though all the other ratios are highest in SOEs, average equity multiplier of PEs is highest and of SOEs it is lowest with the statistically significant probability of 0.01. This evidence is enhancing the argument that state sector firms have only limited ability to leverage their equity with more debt.

Panel three in table 5.2.3 shows market performance. However, with the circumstances of unavailability of market data for SOEs, average Tobin's Q of mixed enterprises is higher than private enterprises and it is statistically significant. Since Tobin's Q of MEs is 1.6 in the hotels and travel industry, this means an investment in MEs is encouraged, and since Tobin's Q is less than one in PEs, an investment in PEs is discouraged.

Table 5.2.3

Relative accounting and market performance of hotels & travel industry in Sri Lanka over 2003 – 2007

Performance Indicator	**PEs**	**SOEs**	**MEs**	**ANOVA Test**	**Remarks**
Panel 1 - Returns or Sales on Assets, Equity and Employees					
1A – ROE (NI/Equity)					
Mean	0.0020	0.3655	-0.0195	13.814***	SOEs
Standard deviation	0.1517	0.3043	0.3168	(.000)	Highest

1B - ROA (NI/TA)	0.0049	0.2160	0.0466	9.297***	SOEs
Mean	0.1330	0.1668	0.1326	(.000)	Highest
Standard deviation					
1C – NIE (NI/Employees)	0.1821	0.9569	0.4051	.956	SOEs
Mean	1.6077	0.9319	1.7046	(.387)	Highest
Standard deviation					
1D – SPE (Sales/ Employees)	0.8849	0.6009	0.7996	2.448*	PEs Highest
Mean	0.3872	0.2857	0.2268	(.091)	
Standard deviation					
Panel 2 – DuPont Equation Decomposition of ROE					
2A–Profit Margin (NI/Revenue)					
Mean	0.0461	0.2535	-0.0136	1.419	SOEs
Standard deviation	0.3851	0.1921	0.3636	(.246)	Highest
2B-Assets Turnover (Sales/TA)					
Mean	0.3946	0.8035	0.4744	4.218 **	SOEs
Standard deviation	0.4104	0.1919	0.4744	(.017)	Highest
2C-Equty Multiplier (TA/Equity)					
Mean	0.9268	0.7781	0.8333	13.724***	PEs Highest
Standard deviation	0.0797	0.1026	0.1709	(.000)	
Panel 3–Market Performance					
3A–Tobin's Q(MVE+BVD/BVA)					
Mean	0.9630	-	1.6306	-4.268 ***	MEs Highest
Standard deviation	0.5422		0.7899	(.000)	

Two tailed probabilities are given within parentheses

* Correlation is significant at 0.10 levels (2- tailed)

** Correlation is significant at 0.05 levels (2- tailed)

*** Correlation is significant at the 0.1 level (2-tailed)

5.4.3.4 Accounting and market performance: Land and property industry

Table 5.2.4 below is presenting the summary of findings on comparative ratios and test results for PEs, SOEs and MEs of the land and property industry in Sri Lanka for the period of 2003 to 2007. Since panel one summarizes overall accounting performance, panel two summarizes DuPont equation decomposition of ROE, followed by market performance as measured using Tobin's Q in panel three.

5.4.3.4.1 Results for land and property industry

Panel one of table 5.2.4 indicates comparative overall accounting performance of PEs, SOEs and MEs of enterprises in Sri Lanka. Except for 1D, other three performance measures of panel one shows that MEs have the highest performance. Table indicates that ROE of MEs is higher in this industry than that of PEs and SOEs though statistically insignificant.

In case of ROA, the exceptional performance of MEs is statistically significant at 0.01 probability level. However SOEs are recording the lowest performance among all types of enterprises. These results point out that MEs and PEs in the land and property industry are able to earn greater profit by using greater financial leverage than in the case of MEs and PEs.

Average performance measured by profit per employee (1C) is insignificant and there are only slight differences among industries. Anyway, the highest performance was recorded by MEs and lowest performance was recorded by SOEs. However, the other employee performance measure SPE (1D) shows highest average performance for PEs and lowest average performance with a 0.01 level of significance.

DuPont equation decomposition of ROE in panel two shows the highest profit margin for MEs followed by SOEs and PEs, having almost equal averages with a 0.10 probability of significance. The asset turnover ratio is greater in PEs, even though it is not statistically significant. The equity multiplier is largest in MEs and the second largest value is in PEs. It is statistically significant at 0.05 level of probability. This result is consistent with the literature.

Following most of the accounting ratios in this industry, market performance as measured by the average Tobin's Q ratio, are also highest in MEs and it is significant at 0.05. Also Tobin's Q ratio of MEs is higher than one and of PEs is less than one. Therefore, in these circumstances it could be argued that the capital of MEs is valued more highly in the market than it costs to

produce it. Thus it follows that, while investment of MEs is encouraged, investment of PEs could be discouraged.

Nevertheless, although most of the ratios in this industry are recorded by MEs, the sample for the land and property industry represents only one MEs firm.

Table 5.2.4

Relative accounting and market performance of land and property industry in Sri Lanka over 2003 – 2007

Performance Indicator	**PEs**	**SOEs**	**MEs**	**ANOVA Test**	**Remarks**
Panel 1 - Returns or Sales on Assets, Equity and Employees					
1A – ROE (NI/Equity)					
Mean	0.0538	0.0757	0.1856	1.563	MEs Highest
Standard deviation	0.1697	0.0896	0.0211	(.216)	
1B - ROA (NI/TA)					
Mean	0.0451	0.0340	0.1586	6.033***	MEs Highest
Standard deviation	0.0794	0.0317	0.0117	(.004)	
1C – NIE (NI/Employees)					
Mean	1.1668	1.4074	2.5077	1.635	
Standard deviation	1.5753	1.3003	0.1867	(.202)	MEs Highest
1D – SPE (Sales/ Employees)					
Mean	1.1779	0.7016	0.9220	10.629***	
Standard deviation	0.3985	0.4909	0.0544	(.000)	PEs Highest
Panel 2 – DuPont Equation Decomposition of ROE					

2A–Profit Margin (NI/Revenue)					
Mean	0.2468	0.2702	0.8152	3.011*	MEs Highest
Standard deviation	0.5222	0.2500	0.1398	(.055)	
2B-Assets Turnover (Sales/TA)					
Mean	0.5421	0.2171	0.1974	2.093	PEs Highest
Standard deviation	0.8278	0.2151	0.0229	(.130)	
2C-Equty Multiplier (TA/Equity)					
Mean	0.8714	0.7826	0.8925	3.186**	MEs Highest
Standard deviation	0.1280	0.1911	0.0178	(.047)	
Panel 3–Market Performance					
3A–Tobin's Q(MVE+BVD/BVA)					
Mean	0.7981	-	1.2914	-3.400**	MEs Highest
Standard deviation	0.5322	-	0.2498	(.017)	

Two tailed probabilities are given within parentheses

* Correlation is significant at 0.10 levels (2- tailed)

** Correlation is significant at 0.05 levels (2- tailed)

*** Correlation is significant at the 0.1 level (2-tailed)

5.4.3.5 Accounting and market performance: Manufacturing industry

Table 5.2.5 below is presenting the summary of findings on comparative ratios and test results for PEs, SOEs and MEs of the manufacturing industry in Sri Lanka for the period of 2003 to 2007. Since panel one summarizes overall accounting performance, panel two summarizes DuPont equation decomposition of ROE followed by market performance, as measured using Tobin's Q in panel three.

5.4.3.5.1 Results for manufacturing industry

The manufacturing industry is one of the most important industries for any economy. After getting independence from the British Empire in 1948, large manufacturing plants were either

donated by Russia or built with the help of foreign aids. However, after introducing the open economy policy in 1977, those state owned manufacturing firms were not able to compete with imported products. As a result the government had to privatize some of them or sold part of the shares to the private sector and they are represented in this sample while the remaining firms are still operating as SOEs. However, most of the SOEs are not operating to their full capacity.

As per panel one of table 5.2.5 indicates, all of the overall accounting ratios show that PEs are giving the highest performance among all types of enterprises. Since there is no big difference among the three types of enterprises, the average ROE is not statistically significant. Nevertheless, while lowest ROA are reported by SOEs, the highest are reported by PEs with 0.10 statistically significant values.

Findings on employees based performance measures (1C and 1D) show that average performance of PEs is higher in this industry than that of SOEs and MEs, statistically significant at 0.01 probability levels. Here in both cases the lowest average performance is by the SOEs. The reason could be both low sales and the large number of employees.

When considering the DuPont equation decomposition of ROE, the equation termed 2A indicates that the average profit margin of PEs is higher than that of SOEs and MEs, though it is not statistically significant. However the assets turnover ratio of SOEs is well below PEs and slightly below MEs significance at 0.01. It means SOEs have fewer sales to their assets compared to other types of enterprises. Part of the problem may have occurred due to having an excess capacity of SOEs. The equity multiplier ratio is higher in PEs than any other type with a level of significance at 0.01. However, having the lowest leverage in SOEs is not strange because the limited ability of SOEs to leverage their equity with more debt is already proved by research literature.

When considering market performance of PEs and MEs listed in the CSE, average Tobin's Q of private enterprises is higher than mixed enterprises despite the fact that it is not statistically significant. Nevertheless, values of Tobin's Q of both types of enterprises are less than one and it articulates that the market value of assets is less than the replacement cost of assets and it discourages investors in this industry.

Table 5.2.5

Relative accounting and market performance of manufacturing industry in Sri Lanka over 2003 – 2007

Performance Indicator	PEs	SOEs	MEs	ANOVA Test	Remarks
Panel 1 - Returns or Sales on Assets, Equity and Employees					
1A – ROE (NI/Equity)					
Mean	0.2056	0.1815	0.1255	.928	PEs Highest
Standard deviation	0.2705	0.5187	0.2558	(.397)	
1B - ROA (NI/TA)					
Mean	0.1296	0.0442	0.1034	2.648*	PEs Highest
Standard deviation	0.2249	0.1401	0.1381	(.073)	
1C – NIE (NI/Employees)					
Mean	1.3277	0.3996	0.5999	9.832***	PEs Highest
Standard deviation	1.4234	0.9484	1.1193	(.000)	
1D – SPE (Sales/ Employees)					
Mean	1.2087	0.6072	0.9101	48.704***	PEs Highest
Standard deviation	0.3546	0.3722	0.2269	(.000)	
Panel 2 – DuPont Equation Decomposition of ROE					
2A–Profit Margin (NI/Revenue)					
Mean	0.0563	0.0566	0.0610	.012	MEs Highest
Standard deviation	0.0923	0.3306	0.1825	(.989)	
2B-Assets Turnover (Sales/TA)					
Mean	1.9219	0.8394	1.0572	28.768***	PEs Highest
Standard deviation	1.0263	0.5844	1.0043	(.000)	
2C-Equty Multiplier (TA/Equity)					
Mean	0.9020	0.8082	0.8209	14.803***	PEs Highest
Standard deviation	0.0888	0.1339	0.1475	(.000)	

Panel 3–Market Performance					
3A–Tobin's Q(MVE+BVD/BVA)					
Mean	0.9542		0.9211	.274	PEs Highest
Standard deviation	0.6242		0.6795	(.785)	

Two tailed probabilities are given within parentheses

* Correlation is significant at 0.10 levels (2- tailed)

** Correlation is significant at 0.05 levels (2- tailed)

*** Correlation is significant at the 0.1 level (2-tailed)

5.4.3.6 Accounting and market performance: Plantation industry

In table 5.2.6 below test results are listed for PEs, SOEs and MEs of the plantation industry in Sri Lanka for the period of 2003 to 2007. Since panel one summarizes overall accounting performance, panel two summarizes DuPont equation decomposition, followed by market performance in panel three.

5.4.3.6.1 Results for plantation industry

Since the British introduced tea plantations to Sri Lanka in the early 18th century, the plantation industry is acting as a vital part of the Sri Lankan economy. The plantation industry provides the second highest income source to GDP at present. However, before initiating a garment industry in 1980 in Sri Lanka, the plantation industry was the largest contributor to the GDP. Before the early 1970s all plantation firms were owned by the private sector, but in the 1970 s they were placed under government ownership and in the 1990s, except for one firm, all the others were privatized.

As per panel one of table 5.2.6 below both the average ROE and ROA of SOEs are, whilst slightly higher than that of PEs and MEs, are not statistically significant at 0.01. That indicates that SOEs can earn return to shareholders and generate profits from the asset usage similar to those of PEs and MEs. Part of the reason for ROA and ROE being similar might be that the data set here used, comes from the period less than 10 years after privatization. Although they have been privatized, it seems that their returns have not been changed as much.

Profits and sales based on employees are also determined almost similar to the above situation, by having highest performance for SOEs, but it is statistically significant at 0.01 level of probability. While in both 1C and 1D ratios are showing highest performance of SOEs, MEs are showing the lowest performance. As the only SOE in the plantation industry they may be getting subsidies and all the other benefits from the government, this might be part of a reason. At the same time the reason for MEs indicating lowest performance from NIE and SPE ratios could be due to having the strongest labour unions preventing the removal of employees as a government condition for the privatization of the management of these plantation firms at the time of privatization.

The profit margin ratio in panel two shows that PEs is earning very high profit on revenue in contrast to SOEs and MEs. While almost all state and mixed firms in this industry are producing tea, almost all of the private plantation companies are producing other crops, and the labour cost and required number of workers is different in both cases. Especially, tea plantations needed larger numbers of labourers than for other crops. Labour unions in plantation sectors other than the tea plantation sector are also not strong. Owing to those reasons PEs could be earning higher profit margins compared to other types of enterprises.

The asset turnover ratio is highest in SOEs and lowest in PEs. It is obviously because Sri Lanka, as the number one tea producer in the world, has larger sales. This is because SOE and MEs have higher sales and the assets sales ratio is higher than for PEs.

The equity multiplier is higher in PEs as usual in all the other industries as proved by most empirical results in the literature and also it is significant at 0.01 probability levels. However, having said all the above, it should be mentioned that there is only one state owned enterprise available in this industry.

Market performance as measured by Tobin's Q in the plantation industry has been determined for the favour of PEs at 0.01 level of significant. Tobin's Q of PEs is 1.2736 and 0.6844 of MEs. Those figures clearly show that investments in PEs are encouraged and discouraged in MEs.

Table 5.2.6

Relative accounting and market performance of plantation industry in Sri Lanka over 2003 – 2007

Performance Indicator	PEs	SOEs	MEs	ANOVA Test	Remarks
Panel 1 - Returns or Sales on Assets, Equity and Employees					
1A – ROE (NI/Equity)	0.0972	0.1529	0.1024	.033	
Mean	0.0984	0.0396	0.4753	(.968)	SOEs Highest
Standard deviation	0.0648	0.1197	0.0552	1.912	
1B - ROA (NI/TA)	0.0681	0.0258	0.0657	(.153)	
Mean					SOEs Highest
Standard deviation	2.3759	3.0744	0.2269	122.245	
1C – NIE (NI/Employees)	1.1573	0.0000	0.3452	(.000)***	
Mean					SOEs Highest
Standard deviation	1.0323	1.7908	0.4305	128.876	
1D – SPE (Sales/ Employees)	0.3687	0.0496	0.1331	(.000)***	
Mean					SOEs Highest
Standard deviation					
Panel 2 – DuPont Equation Decomposition of ROE					
2A–Profit Margin (NI/Revenue)					
Mean	0.4347	0.0758	0.0767	37.898	PEs Highest
Standard deviation	0.2685	0.0171	0.1324	(.000)***	
2B-Assets Turnover (Sales/TA)	0.2561	1.5825	0.9276	86.651	
Mean	0.3298	0.0291	0.4148	(.000)***	SOEs Highest
Standard deviation	0.9380	0.8561	0.7417	38.402	
2C-Equity Multiplier (TA/Equity)	0.0987	0.0775	0.0949	(.000)***	PEs Highest
Mean					
Standard deviation					

Panel 3–Market Performance					
3A–Tobin's Q(MVE+BVD/BVA)					
Mean	1.2736	-	0.6844	5.779	PEs Highest
Standard deviation	0.7473		0.2367	(.000)***	

Two tailed probabilities are given within parentheses

* Correlation is significant at 0.10 levels (2- tailed)

** Correlation is significant at 0.05 levels (2- tailed)

*** Correlation is significant at the 0.1 level (2-tailed)

5.4.3.7 Accounting and market performance: Services industry

Table 5.2.7 below is presenting the summary of findings of comparative ratios and test results for PEs, SOEs and MEs of services industries in Sri Lanka for the period of 2003 to 2007. Since panel one summarizes overall accounting performance, panel two summarizes DuPont equation decomposition of ROE, followed by market performance as measured using Tobin's Q in panel three.

5.4.3.7.1 Results for services industry

In panel one and panel two the comparative ratios and test results of PEs along with SOEs are presented in table 5.2.7, in addition to that panel three is presenting only comparative ratios and test results of PEs, due to unavailability of mixed enterprises within these sample firms. Therefore the accounting performance of PEs is going to be compared only with SOEs; furthermore there is no comparison for market performance due to the above reason.

Average ROE and ROA of PEs is higher with respect to SOEs at 0.01 level of significant. This result is consistent with empirical results of literature. As shown in panel one in table 5.2.7 both ROE and ROA of PEs are double their SOEs counterparts. Part of a reason might be, comparatively SOEs have less access to debt than PEs. This might be a reason for having higher ROA of PEs. It appears that according to reported empirical evidence PEs are said to be more profitable than that of SOEs. Superior efficient use of assets of PEs could easily explain why they are able to get higher ROA than SOEs.

Net income efficiency of PEs is three times greater than that of SOEs with 0.01 statistically significant level of probability. This clearly indicates that PEs is earning higher profits and is employing a smaller number of employees. Sales per employees' ratio of PEs are also higher than SOEs with 0.01 statistically significant level of probability. As is the nature of the services industry, it needs to have committed employees. It is generally accepted that private sector employees are more capable to do marketing activities than state sector employees. This could be a reason to have higher NIE and SPE in MEs than SOEs.

Panel two of table 5.2.7 shows DuPont equation decomposition of ROE for PEs and SOEs of the service industry. Even though the profit margin is statistically insignificant, even at 0.10 level of probability, PEs are earning a higher profit margin than their SOEs counterparts. When PEs is earning 10% before tax SOEs are earning only 7% before tax from every Rupee of sales. Findings on leverage performance measured by asset turnover ratio also specify that the average leverage of PEs is higher than of SOEs with a level of statistically significant at 0.01. It means that PEs use debt of 91 cents in every Rupee of assets, SOEs uses 78 cents. This evidence is consistent with the inability of SOEs and ability of PEs to leverage their equity with more debt.

Given that MEs are not listed in the CSE for transactions, market performance information is available only for PEs. As per panel three in table 5.2.7, it shows that even though average Tobin's Q is less than one, it indicates that investments in this industry are discouraged as an industry; there are some firms with a value of Tobin's Q over one.

Table 5.2.7

Relative accounting and market performance of services industry in Sri Lanka over 2003 – 2007

Performance Indicator	**PEs**	**SOEs**	**MEs**	**ANOVA Test**	**Remarks**
Panel A - Returns or Sales on Assets, Equity and Employees					
A1 – ROE (NI/Equity)					
Mean	0.1365	0.0662	-	4.272**	PEs
Standard deviation	0.1406	0.1407		(.042)	Highest
A2 - ROA (NI/TA)					

Mean	0.0949	0.0459		4.265**	PEs
Standard deviation	0.1114	0.0718	-	(.043)	Highest
A3 – NIE (NI/Employees)					
Mean	1.2017	0.4197	-	7.403***	PEs
Standard deviation	1.4281	0.6457		(.008)	Highest
A4 – SPE (Sales/ Employees)			-		
Mean	0.9499	0.6220		22.908***	PEs
Standard deviation	0.3080	0.2390		(.000)	Highest
Panel B – DuPont Equation Decomposition of ROE					
B1–Profit Margin (NI/Revenue)					PEs
Mean	0.1043	0.0688	-	1.008	Highest
Standard deviation	0.1698	0.0982		(.319)	
B2-Assets Turnover (Sales/TA)					
Mean	1.007	0.5789	-	8.221***	PEs
Standard deviation	0.7635	0.2438		(.005)	Highest
B3-Equty Multiplier (TA/Equity)					
Mean	0.9118	0.7782	-	20.190***	PEs
Standard deviation	0.0936	.1588		(.000)	Highest
Panel C–Market Performance					
C1–Tobin's Q(MVE+BVD/BVA)					
Mean	0.9313	-	-	10.254	–
Standard deviation	.6024	-	-	(0.000)	

Two tailed probabilities are given within parentheses

* Correlation is significant at 0.10 levels (2- tailed)

** Correlation is significant at 0.05 levels (2- tailed)

*** Correlation is significant at the 0.1 level (2-tailed)

5.4.3.8 Accounting and market performance: Trading industry

Table 5.2.8 below is providing test results for PEs, SOEs and MEs, in the trading industry in Sri Lanka for the period of 2003 to 2007. Since panel one summarizes overall accounting performance, panel two summarizes DuPont equation decomposition followed by market performance in panel three.

5.4.3.8.1 Results for trading industry

Since there are no mixed enterprises belonging to the trading industry, table 5.2.8 below presents test results for PEs, MEs and SOEs. There are also some new findings in this research in relation to MEs, based on trading industry. In case of ROEs, there is a significant difference among average performance of MEs, PEs and SOEs. ROE is highest in MEs and in PEs it is the lowest. One reason for that might be that those MEs were SOEs before they were becoming mixed enterprises in the 1980s and 1990s. Most of them held monopolies in their life. Even after they became mixed enterprises, they still enjoyed monopoly power to some extent. Another reason might be that most SOEs in this industry invested with large scale capital and in addition their locations were well suited for marketing purposes. Even after those enterprises became MEs, they were getting all those advantages. And this phenomenon can be justified by the role of the government in this industry which plays an important role for the economy. Since trading activities highly affected peoples' cost of living, it affected the popularity of the ruling party, still the government uses these enterprises to maximize the welfare of people. Therefore, MEs receive special consents and financial support from the government as a subsidy. SOEs being second highest with regard to ROE and ROA further prove the above arguments.

Average net income efficiency of MEs is also higher than of SOEs and PEs at 0.01 level of significant. However, in the meantime SOEs are making the lowest profit per employee. One reason could be, having a large number of employees and poor management. In contrast, though SOEs records the lowest SPE and MEs record the highest ROEs among all three types, sales per employee ratio is almost similar in all three types of enterprises. This further proves the ability of private sector enterprises to perform sales in contrast to the state sector firms.

When considering DuPont equation decomposition of ROE in panel two, it shoes that the profit margin of MEs is higher than the other two types at 0.05 probability levels. However, the lowest profit margin is reported by SOEs. Although it is not significant, asset turnover ratio is also

higher in MEs. However, following the other entire six industries the lowest equity multiplier ratio is reported by SOEs. It further supports the empirical studies which agree about the inability of SOEs and ability of PEs to leverage their equity with more debt.

Whilst deeming market performance of PEs and MEs listed in the CSE, it seems that the average Tobin's Q of mixed enterprises is higher than of private enterprises, despite the fact that it is not statistically significant. However, value of Tobin's Q of private enterprises is less than one and it articulates that the market value of assets is less than the replacement cost of assets and it discourages investors in this industry. At the same time investors are encouraged to buy shares of mixed enterprises.

Table 5.2.8

Relative accounting and market performance of trading industry in Sri Lanka over 2003 – 2007

Performance Indicator	**PEs**	**SOEs**	**MEs**	**ANOVA Test**	**Remarks**
Panel 1 - Returns or Sales on Assets, Equity and Employees					
1A – ROE (NI/Equity)					
Mean	0.1323	0.2647	0.3042	4.017**	MEs Highest
Standard deviation	0.1980	0.5263	0.2124	(.020)	
1B - ROA (NI/TA)					
Mean	0.0848	0.1296	0.2354	5.828***	MEs Highest
Standard deviation	0.1203	0.2804	0.2119	(.004)	
1C – NIE (NI/Employees)					
Mean	1.0045	0.8813	2.1722	4.770***	MEs Highest
Standard deviation	1.5033	1.5147	0.9619	(.010)	
1D – SPE (Sales/ Employees)					
Mean	0.5640	1.0782	1.3938	1.458	MEs Highest
Standard deviation	0.0673	0.6344	0.4100	(.237)	

Panel 2 – DuPont Equation Decomposition of ROE					
2A–Profit Margin (NI/Revenue)					
Mean	0.1001	0.0219	0.1009	3.079**	MEs Highest
Standard deviation	1.7097	0.1078	0.0559	(.049)	
2B-Assets Turnover (Sales/TA)					
Mean	1.6351	1.8451	2.1670	0.807	MEs Highest
Standard deviation	0.3968	0.6425	0.3329	(.448)	
2C-Equty Multiplier (TA/Equity)					
Mean	0.8423	0.7663	0.9557	7.313***	MEs Highest
Standard deviation	0.1575	0.1444	0.0711	(.001)	
Panel 3–Market Performance					
3A–Tobin's Q(MVE+BVD/BVA)					
Mean	0.8948	-	1.0916	-1.285	MEs Highest
Standard deviation	0.5885	-	0.5634	(.213)	

Two tailed probabilities are given within parentheses

* Correlation is significant at 0.10 levels (2- tailed)

** Correlation is significant at 0.05 levels (2- tailed)

*** Correlation is significant at the 0.1 level (2-tailed)

Correlation coefficients for the independent and dependent variables and descriptive statistics used in the regression analysis are presented in tables 5.1.13 above and 5.2.9 below. The mean values and the standard deviations of each variable show that there are no outliers among the explanatory variables that could be affected to the estimated regression coefficients. However,

leverage sales per employee ratio and Tobin's Q ratio had to be converted using log 10 due to their normality problems and converted values, are shown in table 5.2.9.

Estimated Pearson correlation coefficients between explanatory variables are also presented in table 5.1.13 above. The table shows very little correlation between variables. According to Gujarati (2003) the low correlation between the variables indicates that there is no risk in multi-co-linearity in the regression analysis.

Table 5.2.9

Descriptive statistics for independent and dependent variables

Variables / Statistics	Leverage	Risk	Size	Growth	ROA	ROE	SPE	NIE	TOBINQ
Mean	-0.9770	777,955	13.47	0.0093	.07594	.1280	.9741	.5736	0.9399
Std. Deviation	0.6588	503,383	1.92	0.0288	0.1486	0.2847	.47778	0.9538	0.5939
Skewness	-1.046	.850	-.239	.031	.465	.323	.048	-.205	0-.568
Minimum	-3.44	102209	7.7509	-.1042	-0.9081	-3.0436	-1.63	-3.9328	0.000
Maximum	0.00	2086641	18.6469	.1001	0.8873	3.1299	2.04	3.9724	2.8614

5.4.4 Multiple regression analyses

The variables study under types of ownership and accounting/market performance were regressed under the multiple regression model (entry method), introducing seven control variables. Table 5.2.10 below reports the regression results with respect to all the dependent variables.

Table 5.2.10

Multiple regression analyses

Variables	ROA	ROE	SPE	NIE	TOBIN'S Q
Constant	-8.289*** (.000)	-5.102*** (.000)	-2.886*** (.004)	-6.641*** (.000)	2.927*** (.004)
Private	-.077 (.938)	-1.455 (.146)	8.148*** (.000)	.988 (.324)	-1.154 (.249)
State	-.220 (.826)	2.279** (.023)	-5.910*** (.000)	-.853 (.394)	NA
Mixed	.445 (.656)	-.852 (.395)	-6.609*** (.000)	-.581 (.561)	1.154 (.249)
Leverage	-5.145*** (.000)	-1.997** (.046)	5.195*** (.000)	3.365*** (.001)	.416 (.678)
Risk	-.258 (.796)	1.471 (.142)	-3.966*** (.000)	1.052 (.293)	.873 (.383)
Size	9.407*** (.000)	6.890*** (.000)	-.441 (.660)	-1.882* (.060)	-4.502*** (.000)
Growth	1.517 (.130)	-.006 (.995)	7.614*** (.000)	6.322*** (.000)	-.056 (.955)
Competition	3.022*** (.003)	2.200** (.028)	1.504 (.133)	1.467 (.143)	1.556 .(120)
Privatized Firms	-.318 (.751)	-.673 (.501)	-.946 (.344)	1.117 (.264)	-.895 (.371)
Industry	2.344*** (.019)	.775 (.439)	-5.362*** (.000)	-7.561*** (.000)	-1.492 (.136)
Included observations after ad	774	774 .	774	774	613

Adjusted R-squared	.159	090	.281	.148	.032
Probability(F-statistic)	17.418	9.573	39.210	17.971	3.281
Durbin-Watson Statistic	1.918	2.094	1.953	1.996	1.851

Two tailed probabilities are given within parentheses

* Correlation is significant at 0.10 levels (2- tailed)

** Correlation is significant at 0.05 levels (2- tailed)

*** Correlation is significant at the 0.1 level (2-tailed)

NB: Although private, state and mixed dummies and privatized firm dummy variable results are reported together in one table as above, at the time of analysis they were analysed separately.

The above table 5.2.10 presents the multiple regression results when it runs under the multiple regression models where ROA, ROE, SPE, NIE and Tobin's Q are the dependent variables.

In the above, the multiple regression analysis shows that the dependent variable ROA, ROE or NIE (accounting measures) and the private ownership are not related significantly either positively or negatively. However, in contrast, sales per employee ratio of performance have a statistically significant positive relationship with private enterprises at 0.01 level of probability (t=8.148, p<0.01). Therefore, the null hypothesis (H3a) 'Enterprise accounting performance is greater for private enterprises than mixed and state owned enterprises,' is only accepted with regard to SPE ratio.

When considering the results of the multiple regression analysis, SOE is positively related with ROE at 0.05 level of significant (t=2.279, p<0.05). In addition SPE is negatively related with SOEs at 0.01 level of significant. However, ROA and NIE are not significantly related with SOEs. With this evidence, in relation to ROE ratio, the null hypothesis (H3a) 'Enterprise

accounting performance is greater for private enterprises than mixed and state owned enterprises,' is not accepted.

The results of the multiple regressions present a significant negative relationship between mixed enterprises with SPE ratio (t=-6.609, p<0.01). Mixed enterprises do not have a statistically significant relationship with ROE, ROA and NIE. Resulting, the null hypothesis (H3a) 'Enterprise accounting performance is greater for private enterprises than mixed and state owned enterprises,' is only accepted with regard to SPE ratio.

However, considering the results of the multiple regression analysis, neither PEs nor MEs significantly related to Tobin's Q statistically. Therefore, there is no reasonable evidence to accept or reject the null hypothesis H3b 'Enterprise market value measured by Tobin's Q is greater for private enterprises than state and mixed enterprises'.

Table 5.2.10 above shows the regression results also for the control variables when run with all the accounting variables. With respect to ROA, ROE, SPE and NIE, the table indicates one of the most important variables is leverage. By means of variables ROA and ROE, Leverage is negatively related at 99% (.01) and 95% (.05) level of significance respectively. With two other accounting variables, based on sales or profit to number of employees (NIE and SPE), leverage is positively related at 99% (.01) level of significance. Then the size, measured by the natural logarithm of sales turnover, is the other control variable mostly related with accounting variables. Size has a significant positive relationship at .01 probabilities with ROE and ROA. In contrast, NIA and SPE have an insignificant negative relationship at .05 probabilities with size. Competition (degree of monopoly power) is also positively related to ROE and ROA at 0.01 and 0.05 levels of significant respectively. Growth is also positively related with NIE and SPE at 0.01 levels of significant. Industry also has a significant relationship with all accounting ratios except with ROA. The only control variable which is not significantly contributing any accounting ratio is privatized firms.

Then with respect to Tobin's Q the most contributing control variable is the size (sales turnover). But the other entire control variables are not significant.

5.4.5 Answers to research questions

5.4.5.1 Type of ownership and performance.

Table 5.2.11

Performance rankings based on ownership types (Panel 1 and 3 results)

Indicator	ROE			ROA			NIE			SPE			Tobin's Q		
Type / Industry	PEs	SOEs	MEs	PEs	SOEs	MEs	PEs	SOEs	MEs	PEs	SOEs	MEs	PEs	SOEs	MEs
ID1	2	**1**	-	**1**	2	-	**1**	2	-	**1**	2	-	**1**	-	-
ID2	2	**1**	3	3	**1**	2	3	**1**	2	**1**	3	2	2	-	**1**
ID3	3	2	**1**	2	3	**1**	2	3	**1**	**1**	3	2	2	-	**1**
ID4	**1**	2	3	**1**	3	2	**1**	3	2	**1**	3	2	**1**	-	2
ID5	3	**1**	2	2	**1**	3	2	**1**	3	2	**1**	3	**1**	-	2
ID6	**1**	-	2	**1**	-	2	**1**	-	2	**1**	-	2	**1**	-	-
ID7	3	2	**1**	3	2	**1**	2	3	**1**	2	3	**1**	**1**	-	2
All	2	3	**1**	**1**	2	3	3	**1**	2	**1**	2	3	**1**	-	2

Table 5.2.12

Performance rankings based on ownership types (Panel 2 results)

Indicator	Profit Margin			Asset Turnover			Equity Multiplier		
Type / Industry	PEs	SOEs	MEs	PEs	SOEs	MEs	PEs	SOEs	MEs
ID1	**1**	2	-	**1**	2	-	**1**	2	-
ID2	2	**1**	3	3	**1**	2	**1**	3	2
ID3	3	2	**1**	**1**	2	3	2	3	**1**
ID4	3	2	**1**	**1**	3	2	**1**	3	2
ID5	3	2	**1**	3	**1**	2	1	2	3
ID6	**1**	-	2	**1**	-	2	**1**	-	2
ID7	3	2	**1**	3	2	**1**	3	2	**1**
All	**1**	2	3	**1**	3	2	**1**	3	2

Rankings of accounting and market performance based on their ownership type under different industries and all firms are categorized in the above table 5.2.11.

When considering accounting performance, as indicated by ROE as shown in table 5.2.11 rankings of each industry, two industries record the highest ROE of PEs, three industries record the highest ROE of SOEs and two industries record the highest ROE of MEs. In addition the highest ROE out of all enterprises are reported by MEs.

With respect to ROA, while PEs in three industries indicates the highest performance, SOEs in two industries indicate the highest performance and the remaining two industries show the highest performance in MEs. Meanwhile PEs out of all types of enterprises designates the highest performance.

Whilst PEs in three industries, SOEs and MEs in two industries, show highest performance of NIE, SOEs out of all types of firms show the highest performance.

Five out of seven industries have the highest sales per employee by the private sector firms and the other two industries show highest SPE by SOEs and MEs correspondingly. In addition PEs holds the highest average performance out of all firms. This means the labour productivity in the private sector is higher than in SOEs and MEs. This evidence is consistent with the literature.

However, except for SPE, all the other accounting ratios are not statistically significant with private enterprises under the multiple regression analysis. Therefore, above evidence further proves to accept H3a 'Enterprise accounting performance is greater for private enterprises than mixed and state owned enterprises,' only with sales per employee ratio.

Even though five industries out of seven industries have determined market performance neither based on Tobin's Q for the favour of PEs, neither private nor mixed enterprises significantly related with Tobin's Q. Therefore, there is no strong basis to accept hypothesis H3b 'Enterprise market value measured by Tobin's Q is greater for private enterprises than for state and mixed enterprises.'

Finally, we could conclude that, although this sample does not give a clear cut answer to the research question, 'Does type of ownership explain the differences in SOEs PEs and MEs in Sri Lanka' levels of accounting and/or market performance?', we could see that private enterprises are the best performing firms when we use sales as a ratio of labour or number of employees. At the same time state owned enterprises are the best performing enterprises when we use the return

as a ratio of equity. However, when we consider DuPont equation analysis rankings as shown in table 5.2.12 above, it shows that though the profit margin ratio is higher in MEs, the asset turnover ratio and the equity multiplier ratio is higher in private sector enterprises. Therefore, we can conclude that the type of ownership explains the differences in SOEs PEs and MEs in Sri Lanka' levels of accounting and/or market performance to some extent.

5.5 Chapter summary

The first part (5.2) of this chapter presented the performance assessment empirical results to find answers to part (a) of research question two 'What is the nature of board size and composition? Does the board size and composition explain the differences in enterprises' accounting and/or market performance levels of SOE's PE's and ME's in Sri Lanka?'

Board size always has a positive significant relationship under the correlation analysis and also under multiple regressions. Especially, under all two analyses, board size and Tobin's Q are positively related and they are significant. Also it is found in relation to ROA and ROE that if the contribution of an additional director is decreased, company performance increases.

Results of the empirical analysis show that the non-executive directors and corporate performance have a positive significant relationship with ROS and ROE. However, with ROA and ROE the analysis shows a positive but insignificant relationship with non-executive directors' ratio. This is not fully consistent with what is expected from the study. Therefore, H2b is accepted in relation to ROS and NIE but not accepted in relation to ROA and ROE.

However, the relationship between Tobin's Q and non-executive directors' ratio is totally opposite to the above. In addition it is found that the contribution of an additional non-executive director decreases when the market performance increases. However, this relationship is not significant.

The CEO duality (CEO) and company performance under each and every analysis gives a negative relationship with both accounting and market performance measures. And the contribution is highly significant with all the accounting measures. Therefore, hypothesis H2e is accepted. Although CEO Duality has a negative relationship with Tobin's Q in all the above analysis it is not significant. Therefore, hypothesis H1f cannot accept with respect to Tobin's Q.

The second part of this chapter (5.3) presented evidence on the comparative accounting and market performance of private, state and mixed sector enterprises, followed by the multiple regression analysis. In general, the overall performance of private sector enterprises is better in terms of accounting and market performance measures in comparison with those of SOEs and MEs. This result provides consistent evidence of a higher performance of private sector firms and it is consistent with the empirical literature on performance.

The DuPont equation of ROE clearly shows that even though mixed enterprises are earning the highest profit margin, asset turnover and the equity multiplier are highest in private enterprises.

Examining the comparative financial performance among PEs, SOEs and MEs in each industry reveals that SOEs in the two industries (hotels & travel and plantation) show better performance than PEs and MEs. This evidence also could be pinpointed to the fact that SOEs in this industry have been financially supported by the government and are also getting special treatment from the government. Therefore, they can earn more profit than PEs and MEs. In case of MEs, they are performing better than the other two types of enterprises in two industries (land & property industry and trading industry). Having only one mixed enterprise in land & property industry and getting special treatment for mixed enterprises in the trading industry could be reasons for high performance.

CHAPTER SIX

OWNERSHIP TYPE, CORPORATE GOVERNANCE AND PRODUCTION EFFICIENCY PERFORMANCE OF ENTERPRISES IN SRI LANKA

6.1 Introduction

This chapter presents the performance assessment empirical results for the research questions 'Does type of ownership explain the differences in SOEs PEs and MEs in Sri Lanka's levels of production efficiency performance?' and 'What is the nature of board size and composition? Does the board size and composition explain the differences in enterprises' production efficiency performance levels of enterprises in Sri Lanka?' Accordingly following an introduction this chapter consists of two major sections as 6.2 and 6.3.

Firstly, section 6.2 is structured to find answers to the first research question as follows: the introduction for this section is 6.2.1 and then the performance statistics of PEs, SOEs and MEs are presented in section 6.2.2 for all firms. Respective results on production efficiency performance under productivity performance measures for different industries are presented in section 6.2.3. Section 6.2.4 presents a discussion relevant to finding an answer for the second research question.

Secondly, the section 6.3 analyses the data of the study on corporate governance by testing hypotheses H4a and H4b to answer research question three. The section begins with the results of Spearman's correlation relevant to the relationships between technical efficiency (TE) being the dependent variable and corporate governance practices (board size, number of non-executive directors and CEO duality) as the independent variables in relation to all sample firms. Further the results of Spearman's correlation results relevant to the relationships between technical efficiency and corporate governance of sample industries will be considered, to test hypotheses. Finally there will be a discussion to find answers to research question three followed by the summery of this section. The chapter summary is then presented in section 6.4.

6.2 Ownership and production efficiency performance

6.2.1 Introduction

This section summarizes findings on the production efficiency performance of 197 matched private, state owned and mixed enterprises of Sri Lanka over the 2003 to 2007 periods. Applying the data envelopment analysis (DEA) for the first time and comparing the production efficiency performance of Sri Lankan private, state owned and mixed enterprises, the results have been achieved. As explained in chapter two and three, the production efficiency of each enterprise has been measured by the total factor productivity change and its decompositions, which are technical efficiency change (arises due to managerial efficiency) and technological change (arising due to adopting superior techniques by firms over time). The production efficiency of each enterprise, owing to labour contribution, also has been measured by the labour productivity change, and considering its decomposition, labour contribution to technical efficiency also has been measured. Taking material, capital and labour as inputs the total factor productivity has been measured using "DEAP" software. On the other hand taking labour alone as an input its contribution to technical efficiency has been calculated using "DEAP" software as well.

After this introduction, sub section 6.2.2 shows findings on the performance of all sectors. Sub section 6.2.3 then presents results for each of seven industries. After that, in sub section 6.2.4 are provided the results of the analysis to test hypotheses with regard to production efficiency performance of Sri Lankan private, state owned and mixed enterprises. Finally the chapter summary is presented in sub section 6.4.

6.2.2 Analysis of production efficiency performance of all enterprises

To find an answer to the research question (3)(b) 'Does type of ownership explain the differences in SOEs PEs and MEs in Sri Lanka's, levels of production efficiency performance', the null hypothesis-(H5) 'Type of ownership does not explain the differences in SOEs PEs and MEs in Sri Lanka' levels of production efficiency performance,' will be tested.

As we have discussed in detail in chapter 2 and 3, Malmquist Productivity Index (MPI) has been extensively used to measure productivity improvements in previous research (Berg, et al., 1992; Casu & C, 2005; Seelanatha, 2006; Sturm & Williams, 2004; Viverita, 2004). There are two alternative methods which are the base period method and the adjacent period method to estimate

MPI. While the base period method estimates productivity, using a pre-specified base period, the adjacent period method estimate productivity changes on a yearly basis. However, this study applies the adjacent period method of MPI to investigate productivity improvements because of its suitability for unbalanced panel data.

The MPI uses a distance function approach to measure productivity improvements. The idea of using a distance function approach to analyse changes in productivity, based on a general production function, was first introduced by Caves, Chirstensen & Diewert (1982). However, based on the idea introduced by Caves, et al. (1982) and the conceptual basis provided by Farrell, (1957), Fare, et al., (1994), first introduced the DEA based MPI. Accordingly the input oriented MPI was expressed using input distance functions with respect to two periods as follows. The equation represents the productivity change of a production unit over the time span of 't' and 't+1'.

M1(x1+1, y1+1, x1, y1) = [Equation 6.1

Where: 'D (0)' is the distant function and M (…….) is the MPI which shows the change in productivity of the DMU under review on the constant returns to scale (c) …… are shown outputs (y) and inputs (x) of the year't' and the year't+1' respectively.

The productivity change in the given two consecutive periods contains two components, namely change in technical efficiency (catching up effect) and change in production technology (frontier shift effect). Fare et al., (1994) showed that MPI can be decomposed into two elements to find the catching up effect and frontier shift by reproducing the above equation as follows:

M1(x1+1, y1+1, x1, y1) = Equation 6.2

Total productivity change= efficiency change x technological change

If productivity of a decision making unit (DMU) has improved between two periods, the MPI discloses a value greater than one. On the contrary, an MPI less than one points out declining

productivity between two periods (Coelli, et al., 1998). In previous studies both parametric and non-parametric approaches have been applied to estimate MPI. This study takes a non-parametric DEA approach. Respective MPIs were estimated using DEAP software developed by Tim Coelli. Although both CRS and VRS approaches have been used to estimate MPI, this study used CRS based MPI. As pointed out by Coelli (2005) though, CRS or VRS options have no influence on MPI values; CRS approach ignores the differences in size among DMUs in the sample. This was the reason to choose CRS based MPI for this study. Therefore results of this study do not suffer from bias.

As mentioned earlier in this chapter, if MPI or any component were less than one, theory suggests that it would indicate a decline in performance or decreasing returns to scale. If values are higher than one, it indicates that improvement in performance or increasing returns to scale. Reviewing the performance of all firms in terms of TFP growth, labour productivity growth and their decompositions achieved over the study period, are the focal point of this sub section. Those indicators capture performance relative to the best practices, followed by the firms in the sample, where the best practices refer to the grand production frontier achieved by PEs, SOEs and MEs.

For the estimation of values of MPI in this study**,** three inputs and three outputs were used as explained in chapter three. The researcher uses only secondary data which was extracted from firms' annual reports and deflated by GDP deflator and the wage index. Three outputs were the net sales, total assets and EBIT. Three inputs were restricted to employee expenses (as a proxy for labour input) and operational expenses excluding depreciation and labour expenses (as a proxy for material input) and depreciation expenses (as a proxy for capital input). To identify the correlations between input and output variables, Pearson correlation coefficients were calculated for the purpose of showing the appropriateness between input and output variables as explained by Avikiran (1990). These recorded significantly high correlation coefficients between net sales and operational expenses (0.941) as well as net sales and employee expenses (0.542), verify that selected input and output variables for production efficiency performance evaluation is suitable.

6.2.3 Production efficiency performance of all enterprises

The average values of the MPI and its components for 197 firms over the 2003-2007 period are presented in table 6.2.1 below in panel one, two, three and four respectively.

As panel one of the table shows, the average Malmquist total factor productivity for all sample firms is 1.023. It means TFP has improved by 2.3% in the period of study. This 2.3% TFP improvement was driven by the huge technological advancement which accounted for 51.4% of all firms. However at the same time it can be seen that the efficiency (managerial efficiency) of all firms has deteriorated by 32.4%. Average labour productivity of all Sri Lankan firms' is 1.039. This indicates a 3.9% improvement of labour productivity. Average labour contribution to efficiency change is 0.894. It points out that the labour factor has contributed to the decline of efficiency by 10.6%. All those results provide enough evidence to prove that the main reason for weakening efficiency is the inefficiency of management rather than labour. Also the main contributor for the productivity improvement of Sri Lankan enterprises is the technological improvement. It is usual, as reported in the literature, to find the productivity is largely driven by technological change and less by efficiency change. Consequently the results in this study are consistent with the literature.

Average performances of private enterprises, presented in panel two of table 6.2.1, are also similar to the results of all firms. While TFP has been improved by 2.2%, technology of private enterprises has been improved by 63.2%. However, managerial efficiency has been declined by 37.4%. On the other hand, when labour productivity change is 1.036 labour contributions to efficiency change is 0.892. It means that while labour productivity increases by 3.6%, labour contribution to efficiency change decreases by 10.8%. It further means that both total factor productivity and labour productivity have advanced in private enterprises during the study period mainly due to technological progress.

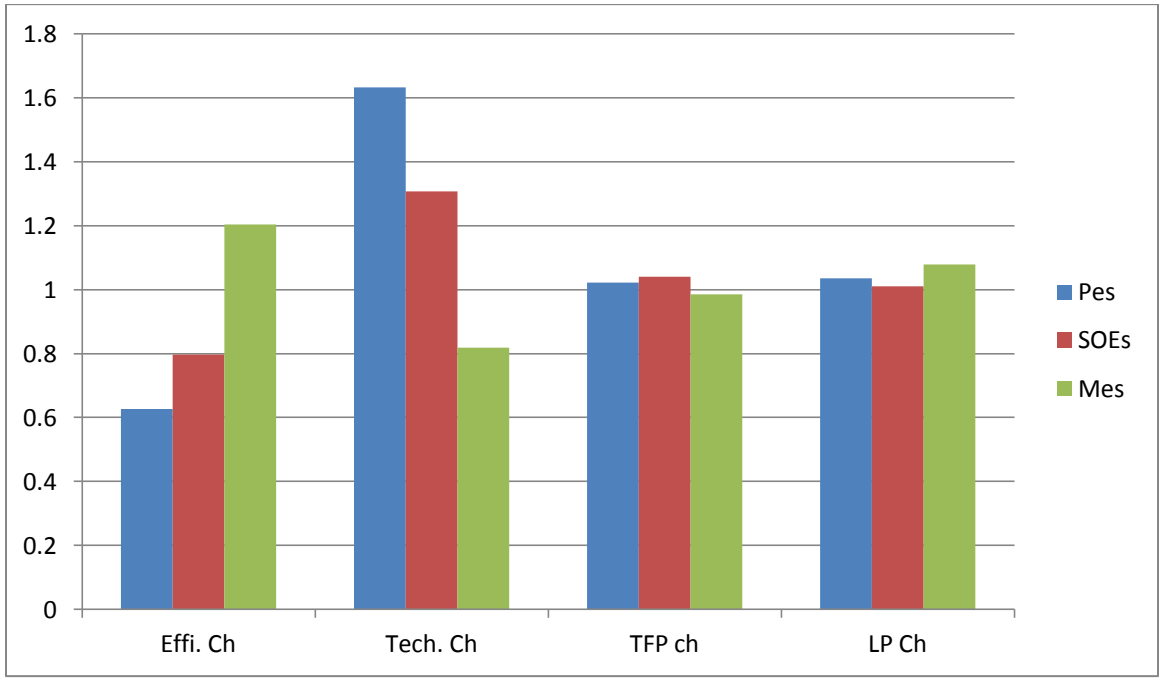
Average MPI performance scores of state owned enterprises in panel three shows somewhat interesting results when compared to the other two types of enterprises. TFP change and LP change has experienced 8.7% improvement, and 1.1% of the improvement applies to PEs. In contrast LC to efficiency has improved by 8.7%. However, as in PEs the main contributor for TFP growth in SOEs also has become technological growth, even though there was 20.4% of managerial inefficiency. There is a new and very important finding here. One of the major criticisms against SOEs is that they hire more labour due to political influences. Yet the results in this research show that LC to efficiency change has improved and is higher than in private enterprises with improved labour and total productivity. On the other hand, even though the technological improvement of SOEs is lower than in PEs, inefficiency of management is lower

in SOEs than PEs mainly due to labour commitment of SOEs. This needs an interpretation and it will be given after analysing results of MEs in panel four.

As shown in panel four in table 6.2.1, production efficiency performance of mixed enterprises is somehow different from PEs and SOEs. TFP has slightly deteriorated by 1.4 in the study period. However, LP has grown by 10.79%. While technology and labour contribution have declined by 18.1% and 24.1% respectively, managerial efficiency has improved by 20.4%. This will be a new and progressive finding and will influence policy decisions regarding the improvement of managerial efficiency of mixed enterprises.

Figure 6.1

Comparison of MPI of PEs, SOEs and MEs in Sri Lanka during 2004 - 2007



These results, put together, indicate that, while both PEs and SOEs experience TFP growth, mixed enterprises suffered from a slight decline of TFP. As mentioned earlier, the main reason for the productivity change of private and state sector is the technological change. One major reason could be taking advantage of the tsunami tragedy which was experienced in 2004. After destroying building, plant, equipment, and other resources, the government supported the rehabilitation and reconstruction activities of all enterprises with the help of foreign organizations and governments. Taking this golden opportunity, most of the organizations made

an effort to modernize their enterprises. However, since more than half of mixed enterprises are tea estates, and because they were established in the central part of the country, they were neither affected by the tsunami nor did they benefit as a result of it.

On the other hand, when PEs and SOEs were experiencing managerial inefficiency, owing to non-technological reasons, MEs experienced a managerial efficiency, despite a technological deterioration. This is a new and interesting result. The combination of marketing and governance philosophies and controls of both government and private sectors might be a reason. However, with the limited research in the literature, there is neither support nor opposition for this argument.

Out of all three sectors, only labour in SOEs has positively contributed to improve the managerial efficiency. And also TFP of SOEs has improved mostly similar to PES. Before the government decided to implement a non-privatization policy in 2005, there was large scale privatization in Sri Lanka (PERC, 2005). As a result government became very lean and present SOEs were filtered several times throughout the privatization process. Therefore the government gives more consideration and special treatment to them. Also the government implemented restructuring programs to uplift corporate governance and other aspects of SOEs with the help of donor agencies such as ADB, World Bank and IMF (Finance ministry, 2009). Especially, when considering the labour factor of SOEs, recruiting large numbers of graduates to the government sector and giving employment opportunities for graduates in SOEs also could have been a reason for improvement of labour contribution to efficiency change of SOEs. Receiving benefits of government restructuring programs and undergoing local and overseas training programs for employees could also be a reason to improve the labour factor.

In the meantime labour productivity has been improved in all three sectors during the study period and is the only similar factor among all three sectors. Resulting from free education, including universities in Sri Lanka, and due to the development of information technology and the communication sectors, the labour force has been developed and is providing more and more facilities locally and overseas with the help of government and international organizations, could be a reason for improved labour productivity.

Table 6.2.1

Annual means and panel means of production efficiency performance measures

Year	Efficiency Change	Technological Change	TFP Change	LP Change
Panel 1 - All Ent.				
2004	-	-	-	-
2005	1.473	0.723	1.065	1.037
2006	0.255	3.754	0.956	0.952
2007	0.824	1.278	1.053	1.136
Geometric Mean of Panel 1	0.676	1.514	1.023	1.039
Panel 2 – PE's				
2004	-	-	-	-
2005	1.087	0.942	1.024	1.003
2006	0.267	3.754	0.975	0.964
2007	0.846	1.278	1.069	1.151
Geometric Mean of Panel 2	0.626	1.632	1.022	1.036
Panel 3 – SOE's				
2004	-	-	-	-
2005	1.252	0.898	1.124	1.084
2006	0.836	1.096	0.916	0.884
2007	0.482	2.274	1.095	1.079
Geometric Mean of Panel 3	0.796	1.308	1.041	1.011
Panel 4 – ME's				
2004	-	-	-	-
2005	1.631	0.637	1.04	1.110
2006	1.075	0.856	0.92	0.987
2007	0.995	1.236	1.002	1.147
Geometric Mean of Panel 4	1.204	0.819	0.986	1.079

Table 6.2.2 below shows descriptive statistics for each of the production efficiency performance measures based on estimates from MPI and its decompositions of PEs, SOEs and MEs in Sri Lanka for the research period.

Table 6.2.2

Descriptive statistics for production efficiency performance measures

Descriptions	**Efficiency change**	**Technical change**	**TFP change**	**Labour prod. change**
Panel 1 – PEs				
Mean	1.0044	1.2672	1.0243	1.1127
Median	1.0000	1.0040	1.0000	1.0230
SD	.4618430	.7854955	.3088370	.6413858
Minimum Value	.0010	.3180	.0010	.0000
Maximum Value	2.9980	3.9970	2.4070	9.5790
Panel 2 – SOEs				
Mean	1.050737	1.320096	1.047956	1.041289
Median	0.9940	1.0285	1.0000	1.0000
SD	5956079	.9379991	.2781010	.3313358
Minimum Value	.1120	.2450	.4900	.287
Maximum Value	2.9980	3.9970	2.1190	2.2710
Panel 3 – MEs				
Mean	1.063593	1.038324	1.044667	1.045139
Median	0.9970	0.9645	1.0055	1.0085
SD	.4054279	.4646336	.2643228	.2407487
Minimum Value	.2900	.3470	.0900	.1280
Maximum Value	2.9950	3.9970	2.0210	1.6750

Since DEA efficiency scores are non-parametric, calculations were shown in table 6.2.3 below, using the non-parametric testing method Kruskal-Wallis test. When examining the table it can be seen that the total factor productivity is higher than SOEs or MEs. But efficiency is second highest in SOEs and lowest in PEs. However, neither TFP change nor efficiency change is statistically significantly different among PEs, SOEs or MEs. Nevertheless, average technological change is significantly different at 0.1 levels of significance and PEs is the highest. Even though PEs has a managerial inefficiency, they show high productivity because of this highest technological development. In other words, PEs covers their managerial inefficiency from the technological cover. This is a new and interesting result related to Sri Lanka. Also this result is consistent with the literature. Anyway, this needs an interpretation. The private sector has better access to capital than state or mixed sectors. Therefore, they spend much capital to buy new technology. The government sector has only a limited access to capital. However, just after the tsunami tragedy in 2004, SOEs received money from the government as subsidies and they used that money for the restructuring purpose. As mentioned earlier, the majority in the samples of mixed enterprises are these enterprises that have privatized their management. Although the properties (in most cases they are tea or rubber estates) are owned by the government, these properties are managed by private sector firms. This combination has been worthwhile and results in table 6.2.3 show that only mixed enterprises have an improvement of managerial efficiency. This is a new result and it is consistent with the literature. Thus, this finding will assist policy makers to develop policy decisions regarding privatization. Although it is not statistically significant, labour contribution to technical efficiency is higher in SOEs than in the other two sectors and at the same time, labour productivity is similar in each type of enterprise. Consequently, the generally assumed poor performance of SOEs is not seen in these results. Nevertheless, there could be industry differences in particular industries. This can be observed in the next sections in the detail under each and every industry.

Table 6.2.3

Productivity performance of PEs, SOEs and MEs in Sri Lanka from 2003 to 2007

Performance measures	Mean			Test of significance	Comments
	PEs	SOEs	MEs	Kruskal-wallis test	
1.Efficiency change	0.626	0.796	1.204	0.928 (0.629)	No Sig. Difference
2.Technical change	1.632	1.308	0.819	8.809 (0.012)	PEs the Highest
3.TFP change	1.023	1.041	0.986	2.648 (0.266)	No Sig. Difference
5. Labour prod. change	1.036	1.011	1.079	1.996 (0.369)	No Sig. Difference

6.2.4 Production efficiency performance: All industries

6.2.4.1 Production efficiency performance: Constructions & Engineering industry

To sketch aggregate multifactor productivity growth and its decomposition as probable sources for the efficiency of twenty firms in the construction & engineering industry is shown in table 6.2.4 below. Whilst panel 1 of that table presents the comparative annual total factor productivity change and labour productivity change for all enterprises, panel two presents private enterprises, followed by SOEs in panel three over the test period. As panel one indicates there is a 6.7% and 1.9% decline of TFP change and LP change of all firms, managerial efficiency and labour contribution to efficiency change has declined by 45.8% and 15.6% correspondingly. In the meantime, it records a 72.3% of an enormous level of technological improvement and it has contributed to maintain a reasonable TFP level in a situation where there exists a huge amount of managerial inefficiency.

Panel two indicates that PEs average productivity declined during the 2003– 2007 period by 13.2 percent. However, the efficiency turn down of PEs is 49.9 percent. Meanwhile, the technological growth of PEs in the construction & engineering industry is 73.2% and this contributes to cover up the managerial inefficiency to a certain degree and produces a lower but reasonable TFP level. This result reveals that private enterprises in the construction & engineering industry adopted new technology rapidly to boost their productivity during that period. It could have been achieved with capital participation of private sector enterprises. On the other hand, inherently this industry needs a huge amount of capital and innovations. At the same time, since most of the firms are large enterprises, they experience diseconomies of scale and managerial inefficiency is also an essential part of it

The productivity indices for the average unit of the SOEs are presented in panel three. The results show an increase of 3.6 percent of TFP growth throughout the period. However, though there is a growth of TFP, LP, and LC to efficiency and managerial efficiency, technology has declined by 3.2%. However technological development of the private sector is much less and there is a huge difference between private and state sectors when compared with the private sector. This could be due to the capital inadequacy of SOEs.

Table 6.2.4

Annual means and panel means of production efficiency performance measures: Construction & Engineering industry

Year	Efficiency change	Technological change	TFP change	Labor prod. change
Panel 1 - All Ent's				
2004	-	-	-	-
2005	1.064	0.936	0.996	1.055
2006	0.155	4.335	0.670	0.683
2007	0.966	1.260	1.218	1.309
Geometric Mean of Panel 1	0.542	1.723	0.933	0.981
Panel 2 – PEs				
2004	-	-	-	-
2005	1.048	0.963	1.009	0.935
2006	0.136	4.135	0.562	0.535
2007	0.882	1.304	1.151	1.202
Geometric Mean of Panel 2	0.501	1.732	0.868	0.844
Panel 3 – SOEs				
2004	-	-	-	-
2005	1.041	1.021	1.063	1.266
2006	1.046	0.89	0.931	0.984
2007	1.124	1	1.123	1.489
Geometric Mean of Panel 3	1.07	0.968	1.036	1.229
Panel 4 – MEs				
2004	-	-	-	-
2005				
2006				
2007				
Geometric Mean of Panel 4	-	-	-	-

Test statistics for the null hypotheses of equal efficiencies are reported in table 6.2.5 below and the Kruskal-Wallis test is used to test the null hypothesis that efficiencies are equal between MEs and SOEs in the constructions & engineering industry. Assessment of test statistics illustrates that even though the differences are not statistically significant; the technical change of SOEs is lower than that of PEs. In addition, the fact shows that the insignificance of efficiency change, TFP change, LC to efficiency change and LP change are higher in SOEs than in their private sector counter parts. It means that there is only weak evidence of differences in overall efficiency between PEs and SOEs during the study period. Finally, the productivity of PEs and SOEs in Sri Lanka in the constructions & engineering industry is not only different but also not dissimilar from the overall result and this result is also consistent with the literature.

Figure 6.2

Comparison of MPI of PEs, SOEs and MEs in Constructions & Engineering industry during 2003 - 2007

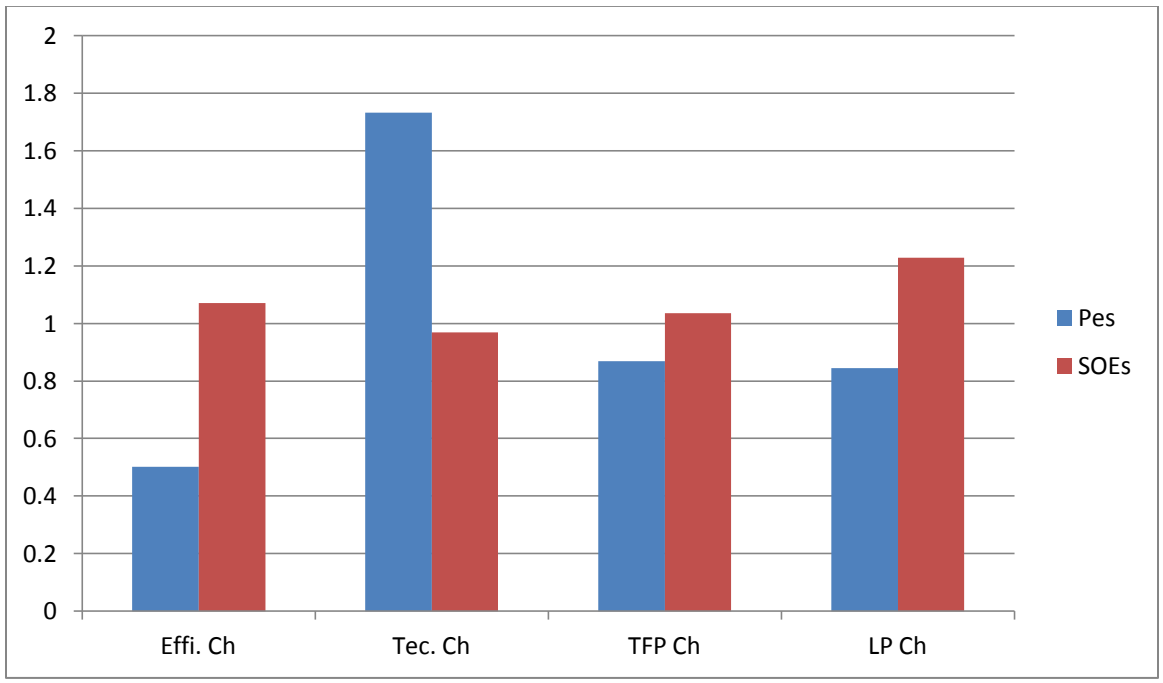


Table 6.2.5

Productivity performance of PEs, SOEs and MEs in Sri Lanka from 2003 to 2007: Constructions & Engineering industry

Performance Measures	Mean			Test of significance	comments
	PEs	SOEs	MEs	Kruskal wallis test	
1.Efficiency change	0.501	1.07	-	0.039 (0.844)	No Sig. Difference
2.Technical change	1.732	0.968	-	0.463 (0.496)	No Sig. Difference
3.TFP change	0.868	1.036	-	0.249 (0.618)	No Sig. Difference
5. Labour prod. change	0.844	1.229	-	0.628 (0.428)	No Sig. Difference

6.2.4.2 Production efficiency performance: Hotels and Travel industry

The average values of TFP, LP and their constituents of 31 enterprises in the hotels and travel industry are presented below in table 6.2.6. Results in panel one of the table indicate that the change in the TFP and LP in PEs is 1.022. It means that there is little improvement in both total and labour productivity during the study period. These productivity improvements are mainly due to the technological improvements (innovations) of this industry. However, the managerial efficiency has declined by 19.1%. It follows that the overall inefficiency which was mentioned in the previous section, related to all private enterprises in Sri Lanka. However, this managerial inefficiency has been obscured in total factor productivity by technological improvements (innovations). In addition it can be seen that the labour productivity and the labour contribution to efficiency change in PEs has been advanced by 4.5 and 20.4 percent respectively.

Results in panel three shows that average TFP growth, LP growth, efficiency change, technological change and labour contribution to efficiency of SOEs have increased almost equally. However, 4.6 percent of technological change has fully contributed to improve TFP by

6.6 percent. Labour in SOEs is a most sensitive factor and labour productivity has improved by 5% in the study period.

As panel four indicates, TFP in the mixed sector has deteriorated by 5%. However, when the efficiency change was deteriorating by 0.06%, technology has declined by 4.4%. Therefore, compared to the changing efficiency, the change in the adoption of technology was small and was a major cause for productivity decline in the study period. Nevertheless, labour productivity and the labour contribution to technical efficiency have grown by 0.09% and 12.9% respectively. This situation is quite similar to the situation of MEs in all enterprises.

Table 6.2.6

Annual means and panel means of production efficiency performance measures: Hotels and Travel industry

Year	**Efficiency change**	**Technological change**	**TFP change**	**Labour pro. change**
Panel 1 - All Ent's				
2004	-	-	-	-
2005	0.726	1.297	0.941	1.005
2006	1.346	0.754	1.014	0.973
2007	0.526	2.104	1.106	1.168
Geometric Mean of Panel 1	0.801	1.272	1.018	1.045
Panel 2 – PEs				
2004	-	-	-	-
2005	0.867	1.028	0.891	0.968
2006	1.14	0.939	1.071	1.015
2007	0.536	2.087	1.119	1.180
Geometric Mean of Panel 2	0.809	1.263	1.022	1.051

Panel 3 – SOEs	-	-	-	-
2004	1	0.9	0.9	1.007
2005	1	1.171	1.171	1.151
2006	1	1.084	1.084	1.000
2007				
Geometric Mean of Panel 3	1	1.046	1.046	1.050
Panel 4 – MEs				
2004	-	-	-	-
2005	0.891	1.509	1.344	1.264
2006	1.064	0.583	0.621	0.688
2007	1.035	0.993	1.027	1.183
Geometric Mean of Panel 4	0.994	0.956	0.950	1.009

Figure 6.3

Comparison of MPI of PEs, SOEs and MEs in Hotels and Travel industry during 2003 - 2007

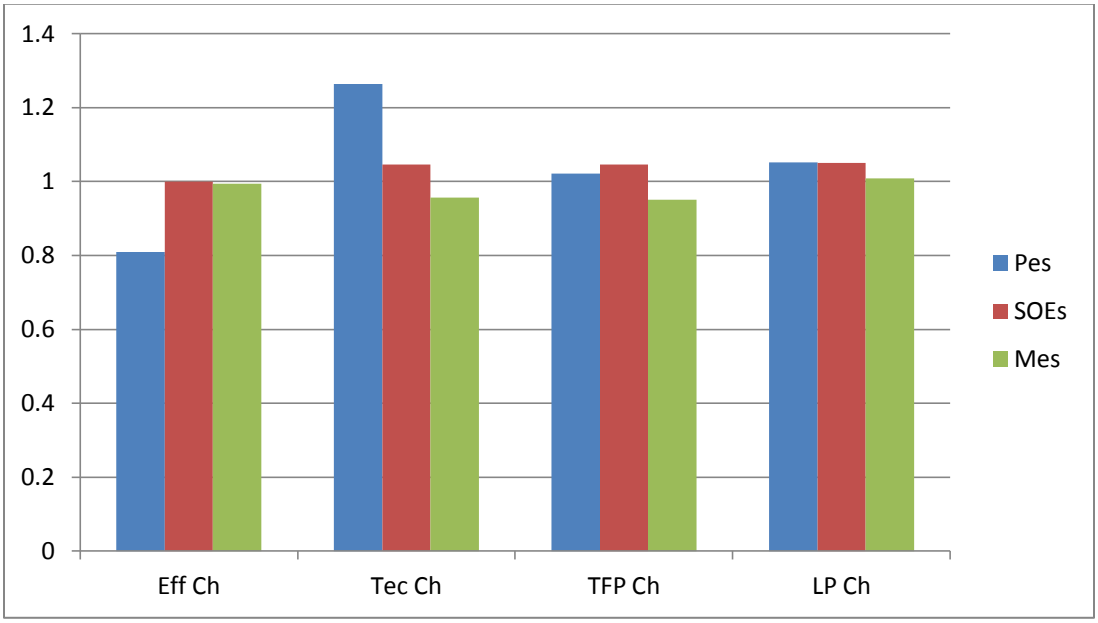


Figure 6.3 above illustrates the comparison of total factor productivity, labour productivity and their components for the study period.

Table 6.2.7

Productivity performance of PEs, SOEs and MEs in Sri Lanka from 2003 to 2007: Hotels and Travel industry

Performance Measures	Mean			Test of significance	Comments
	PEs	SOEs	MEs	Kruskal-wallis test	
1.Efficiency change	0.809	1	0.994	0.593 (0.743)	No Sig. Difference
2.Technical change	1.263	1.046	0.956	0.077 (0.962)	No Sig. Difference
3.TFP change	1.022	1.046	0.95	0.879 (0.644)	No Sig. Difference
5. Labour prod. change	1.051	1.050	1.009	0.420 (0.811)	No Sig. Difference

Test statistics for the null hypotheses of equal efficiencies are reported in table 6.2.7 and the Kruskal-Wallis tests were applied to test the null hypotheses that efficiencies are equal among PEs, SOEs and MEs in these hotel and travel industry. That table shows that the efficiency growth and the TFP of SOEs are higher than that of MEs and PEs. On the other hand PEs experienced higher technological progress than SOEs and MEs. In the meantime higher labour productivity and the highest labour contribution to efficiency change is recorded by PEs. This is an interesting result that casts doubt on the widely held view that private sector firms are intrinsically more productive than state and mixed firms. However, considered overall, there is no statistically different outstanding productivity growth among PEs, SOEs and MEs during the study period.

6.2.4.3 Production efficiency performance: Land and Property industry

Table 6.2.8 below presents the comparative annual means of the aggregate total factor productivity growth and its components of 20 firms in the land and property industry. Panel one presents the annual means of TFP, LP and its decomposition of PEs whilst panel two presents SOEs followed by MEs in panel three. Panel one reports the annual average of productivity indices of PEs and the results show a 2.2% of TFP improvement during the study period. It is also evident that this TFP progression is mainly due to 3.9% improvement of efficiency change. On the other hand there is a technological deterioration of 1.6% during the study period. While labour productivity has a 2.8% decline, labour contribution to efficiency change has deteriorated by 10.9%.

The results under panel two show a productivity improvement of 9.1% by SOEs and it was mainly contributed by the 54.9% of technological progression. The technological component grew sharply at the end of the study period and it was the reason for a huge increase of technology by SOEs. At the same time managerial efficiency also has declined sharply at the end of the study period. Hence there is a 29.5% decline of managerial inefficiency. This could be due to diseconomies of scale of SOEs in this industry. Similar to private enterprises, while labour productivity has 8.7% deterioration, labour contribution to efficiency change has deteriorated by 1%.

The average productivity indices for mixed enterprises are presented in panel four of table 6.2.8 and it indicates an 8.3% deterioration of average TFP during the study period. Also an 8.3% change of technological deterioration has been reported. Therefore, it can be seen clearly that the technological deterioration has been totally responsible for the decline of total factor productivity. Following PEs and SOEs, mixed enterprises also experienced a decline in labour productivity.

Table 6.2.8

Annual means and panel means of production efficiency performance measures: Land and Property industry

Year	Efficiency change	Technological change	TFP change	Labor prod. change
Panel 1 - All Ent's				
2004	-	-	-	-
2005	0.887	1.344	1.193	0.998
2006	0.984	0.783	0.771	0.899
2007	0.201	6.539	1.314	0.960
Geometric Mean of Panel 1	0.560	1.902	1.065	0.951
Panel 2 – PEs				
2004	-	-	-	-
2005	1.099	1.055	1.16	1.110
2006	0.998	0.886	0.884	0.856
2007	1.022	1.019	1.041	0.966
Geometric Mean of Panel 2	1.039	0.984	1.022	0.972
Panel 3 – SOEs				
2004	-	-	-	-
2005	1.068	1.116	1.192	0.815
2006	0.831	0.918	0.763	1.000
2007	0.394	3.626	1.43	0.934
Geometric Mean of Panel 3	0.705	1.549	1.091	0.913
Panel 4 –MEs				
2004	-	-	-	-
2005	1	0.88	0.88	0.842
2006	1	0.45	0.45	0.892
2007	1	1.945	1.945	1.047
Geometric Mean of Panel 4	1	0.917	0.917	0.923

Figure 6.4

Comparison of MPI of PEs, SOEs and MEs in Land and Property industry during 2003 - 2007

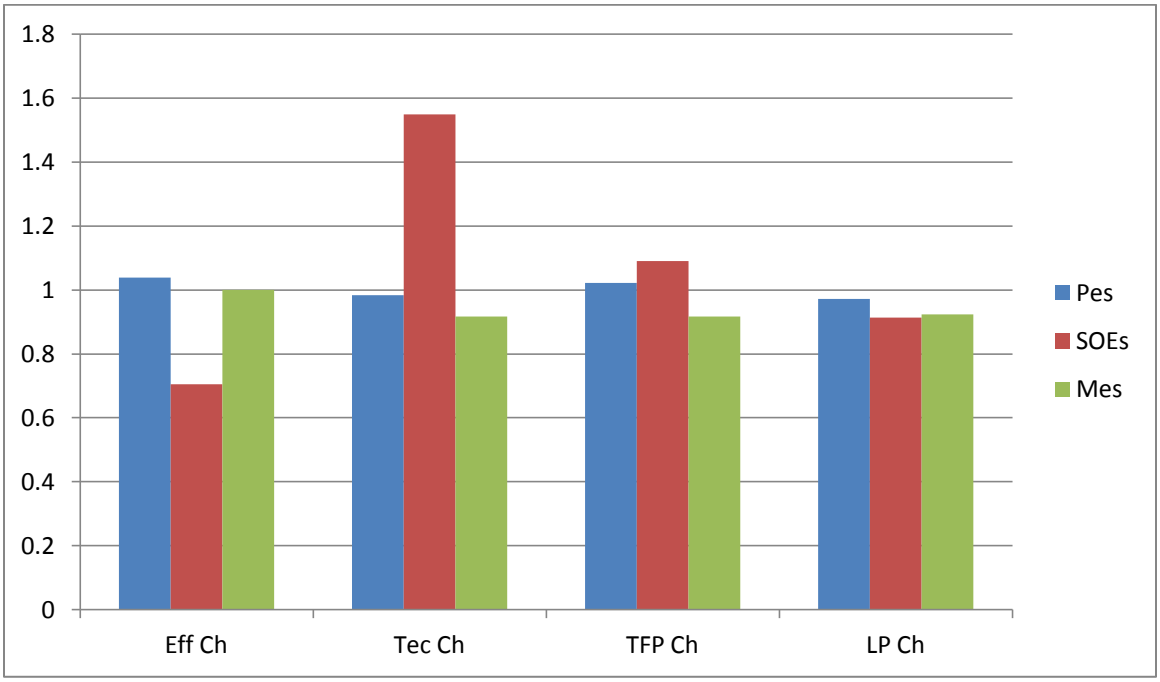


Figure 6.4 presents the trends in efficiency change, technological change, TFP change, LP change and LC to efficiency change of property and investment industry for the period 2003 to 2007. Bars in the figure indicate that TFP change had a similar pattern to LP change. In addition, technological and efficiency changes have similar patterns except SOEs.

Table 6.2.9

Productivity performance of PEs, SOEs and MEs in Sri Lanka from 2003 to 2007: Land and Property industry

Performance measures	Mean			Test of significance	Comments
	PEs	SOEs	MEs	Kruskal wallis test	
1.Efficiency change	1.039	0.705	1	1.419 (0.492)	No Sig. Difference
2.Technical change	0.984	1.549	0.917	0.000 (1.000)	No Sig. Difference
3.TFP change	1.022	1.091	0.917	5.199 (0.074)	No Sig. Difference
5. Labor prod. change	0.972	0.913	0.923	4.298 (0.117)	No Sig. Difference

Test statistics for the null hypotheses of equal efficiencies are reported in table 6.2.9 above and the Kruskal Wallis test is used to test the null hypothesis that efficiencies are equal among PEs, MEs and SOEs in the property and investment industry. Assessment of test statistics illustrates that even though the differences are not statistically significant; the technical change of PEs and MEs is lower than that of SOEs. In addition, despite the fact that the insignificance of TFP change and technological change are higher in SOEs than their private sector counter parts. It means that there is only weak evidence of differences in overall efficiency between PEs and SOEs during the study period.

6.2.4.4 Production efficiency performance: Manufacturing industry

This section reports the total factor productivity, labour productivity and their components of PEs, SOEs and MEs in the manufacturing industry. The average values of the index and its components for 51 firms in the manufacturing industry are presented in table 5.2.10 below.

Results in panel two indicate that on average, the TFP growth of PEs stood at minus 0.09%. This productivity decline was entirely driven by 0.09% deterioration in managerial efficiency as the

key contributor to the productivity. In contrast, there is no technological deterioration or improvement of PEs during the study period. Perhaps as a result of increasing demand for imported products, local manufacturing firms may not increase their capacity much. However, labour productivity and labour contribution to technical efficiency have been increased by 8.5% and 2.8% in that order.

The result in panel three of table 6.2.10 indicates that the change in TFP in SOEs was negative (0.991). It means that there was a small decline in productivity in the manufacturing industry during the study period. This productivity decline was mainly due to the technological deterioration. Yet SOEs experienced a technical efficiency enhancement of 8.1%. However, there is a down turn in labour productivity and in labour contribution to technical efficiency.

Panel four shows that there was no increase in TFP of mixed enterprises during the test period in the manufacturing industry. This productivity decline is mainly due to the technological decline. Average technology has declined by 13.4%. In contrast, there was an efficiency improvement of 15.1% during the study period. Labour productivity has been improved by 18.3% in the study period. However, labour contribution to technical efficiency has deteriorated during the study period.

Table 6.2.10

Annual means and panel means of production efficiency performance measures: Manufacturing industry

Year	Efficiency change	Technological change	TFP change	Labour prod.change
Panel 1 - All Ent's				
2004	-	-	-	-
2005	1.574	0.719	1.131	1.076
2006	1.105	0.854	0.945	1.051
2007	0.948	1.026	0.972	1.122
Geometric Mean of Panel 1	0.948	0.857	1.013	1.083
Panel 2 – PEs				
2004	-	-	-	-
2005	0.978	1.081	1.057	1.071
2006	1.014	0.917	0.93	1.024
2007	0.982	1.01	0.991	1.165
Geometric Mean of Panel 2	0.991	1	0.991	1.085
Panel 3 – SOEs				
2004	-	-	-	-
2005	1.248	0.896	1.118	1.093
2006	1.248	0.774	0.966	0.876
2007	0.81	1.112	0.901	0.963
Geometric Mean of Panel 3	1.081	0.917	0.991	0.973
Panel 4 – MEs				
2004	-	-	-	-
2005	1.541	0.652	1.005	1.078
2006	1.038	1.003	1.041	1.346
2007	0.953	0.993	0.947	1.141
Geometric Mean of Panel 4	1.151	0.866	0.997	1.183

Figure 6.5

Comparison of MPI of PEs, SOEs and MEs in the Manufacturing industry during 2003 - 2007

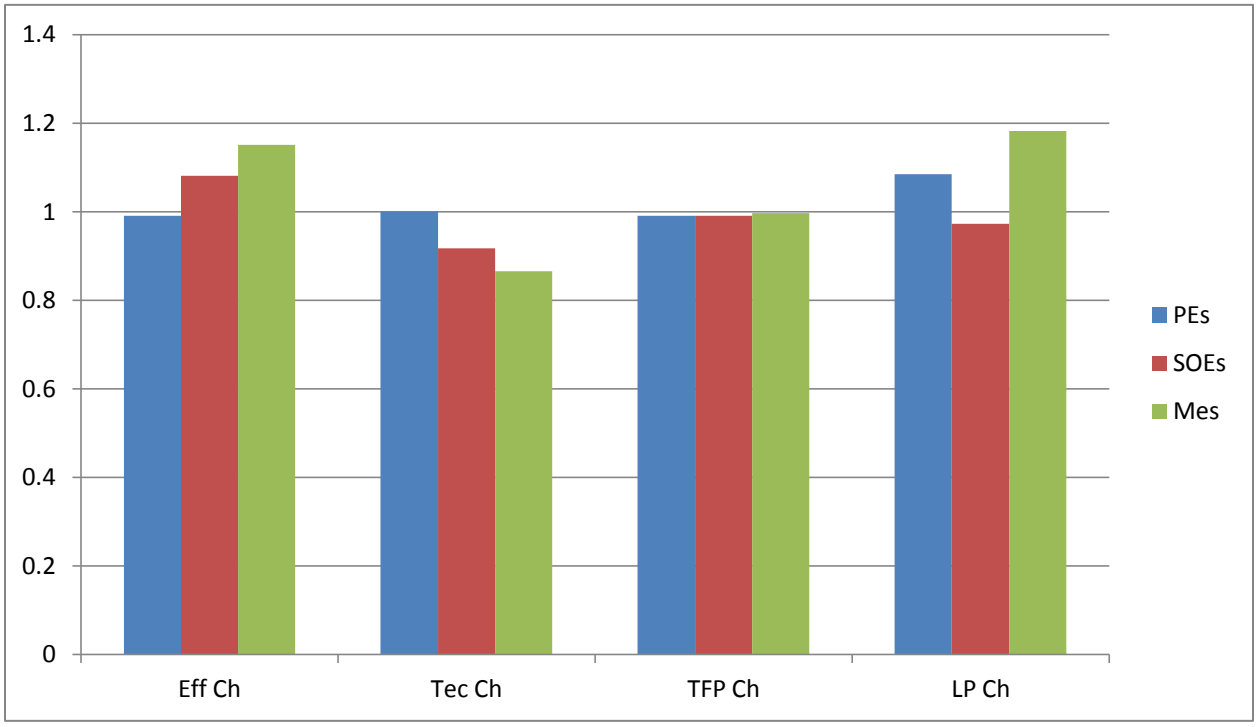


Figure 6.5 above illustrates the trend in efficiency change, technological change, TFP change, labour contribution to efficiency change and labour productivity change. It can be seen that the TFP growth is similar among private, state and mixed firms. But the technological growth is highest in PEs, followed by SOEs, and the lowest is recorded by MEs. In contrast, efficiency change was totally opposite to technological change. Labour contribution to efficiency change is very low in mixed enterprises. It is also a special feature in this graph.

Table 6.2.11

Productivity performance of PEs, SOEs and MEs in Sri Lanka from 2003 to 2007: Manufacturing industry

Performance Measures	Mean			Test of significance	Comments
	PEs	SOEs	MEs	Kruskal wallis test	
1.Efficiency change	0.991	1.081	1.151	2.546 (0.280)	No Sig. Difference
2.Technical change	1	0.917	0.866	7.614 (0.022)	PEs Highest
3.TFP change	0.991	0.991	0.997	0.106 (0.949)	No Sig. Difference
5. Labor prod. change	1.085	0.973	1.183	0.398 (0.819)	No Sig. Difference

The Kruskal Wallis test is done on the differences in the measures among PEs, SOEs and MEs. Test statistics for the null hypotheses of equal efficiencies are reported in table 5.2.12 below. MEs have the highest TFP performance compared to PEs and SOEs during the study period. This is mainly due to the progress of managerial efficiency securing 15.1% change. In addition, labour productivity is also highest in MEs. But the labour contribution to efficiency change is higher in PEs. In contrast, PEs report the highest technical change compared to SOEs and MEs and it is significant at 0.05 level of probability. Except for the technological change, the differences among other measures are not statistically significant. Consequently, there is no strong evidence of private firms TFP growth during the study period.

6.2.4.5 Production efficiency performance: Plantation industry

Table 6.2.12 below presents the comparative annual means of the aggregate total factor productivity growth, labour productivity growth and its components in the plantation industry. Panel two reports the annual average of productivity indices of PEs. The results show a TFP improvement in private sector firms during the study period, which is driven by both

technological and efficiency changes. In addition, both labour productivity and labour contribution to technical efficiency have progressed during the study period by 35.8% and 38.8% respectively.

The results in panel three shows instead of productivity growth, there was a productivity decline in SOEs during the study period. It is also evident that this TFP deterioration is mainly due to a decline in the technological change. Labour productivity also indicates a decline during the study period.

Panel four shows that there was no increase in TFP during the test period of MEs in the plantation industry. The productivity declined by 20.9%. Since the technological deterioration is as small as 0.02%, this productivity decline was mainly due to the deterioration of managerial efficiency. However, the LP changes also declined by 32.4%.

Table 6.2.12

Annual means and panel means of production efficiency performance measures: Plantation industry

Year	Efficiency change	Technological change	TFP change	Labour prod change
Panel 1 - All Ent's				
2004	-	-	-	-
2005	1.338	0.938	1.255	1.133
2006	1.010	1.008	1.018	0.951
2007	0.935	1.112	1.040	1.268
Geometric Mean of Panel 1	1.081	1.017	1.099	1.110
Panel 2 – PEs				
2004	-	-	-	-
2005	2.184	0.931	2.032	1.190
2006	1.077	0.973	1.048	1.214
2007	0.862	1.608	1.386	1.214
Geometric Mean of Panel 2	1.266	1.133	1.435	1.358
Panel 3 – SOEs				
2004	-	-	-	-
2005	1.000	0.643	0.643	1.412
2006	1.000	0.423	0.423	0.249
2007	1.000	0.658	0.658	0.428
Geometric Mean of Panel 3	1.000	0.602	0.602	0.578
Panel 4 – MEs				
2004	-	-	-	-
2005	0.806	1.513	1.219	0.896
2006	1.030	0.802	0.826	0.640
2007	0.600	0.819	0.492	0.563
Geometric Mean of Panel 4	0.793	0.998	0.791	0.686

Figure 6.6 below illustrates the trend in efficiency change, technological change, TFP change, labour contribution to efficiency change and labour productivity change.

Figure 6.6

Comparison of MPI of PEs, SOEs and MEs in Plantation industry during 2003-2007

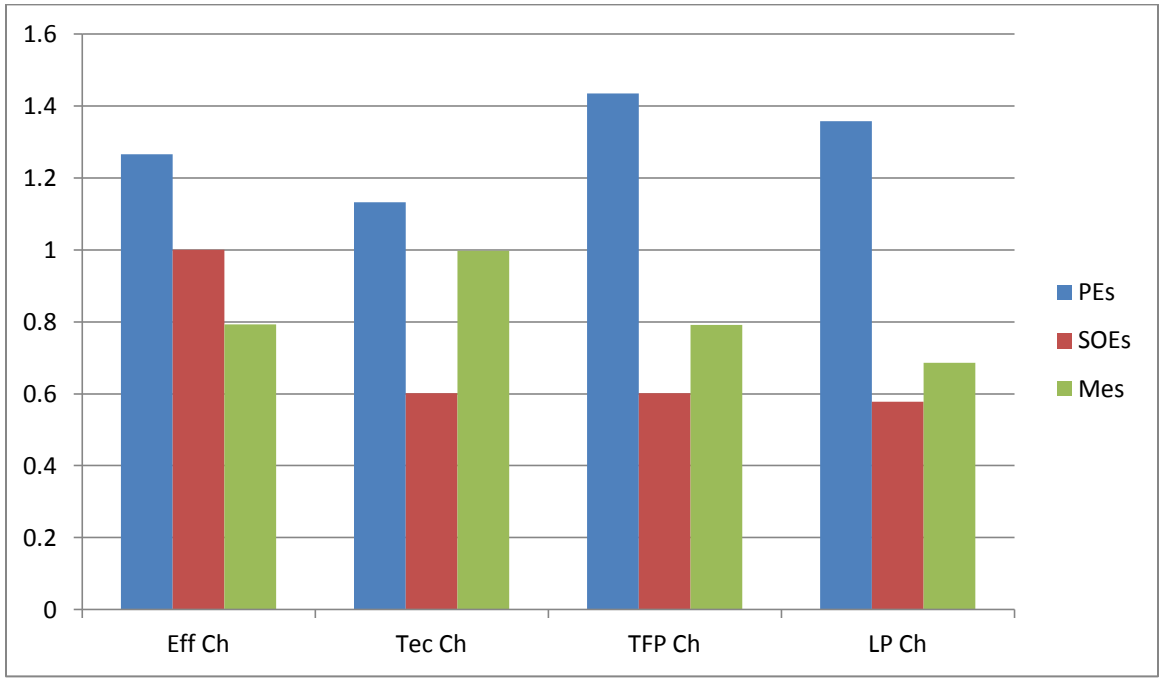


Table 6.2.13

Productivity performance of PEs, SOEs and MEs in Sri Lanka from 2003 to 2007: Plantation industry

Performance measures	Mean			Test of Significance	comments
	PEs	SOEs	MEs	Kruskal wallis test	
1.Efficiency change	1.266	1	0.793	1.287 (0.525)	No Sig. Difference
2.Technical change	1.133	0.602	0.998	5.694 (0.158)	No Sig. Difference
3.TFP change	1.435	0.602	0.791	0.597 (0.742)	No Sig. Difference
5. Labour prod. change	1.358	0.578	0.686	6.791 (0.056)	No Sig. Difference

Test statistics for the null hypotheses of equal efficiencies are reported in table 6.2.13 and the Kruskal-Wallis tests were applied to test the null hypotheses, that efficiencies are equal among PEs, SOEs and MEs in the plantation industry. This table shows that the efficiency growth, TFP growth, technological growth, labour contribution to efficiency growth and the labour productivity of private enterprises are higher than those of MEs and SOEs. This is an interesting result which casts doubt on the widely held view that private sector firms are intrinsically more productive than state and mixed firms. However, considered overall, there is no statistically different exceptional productivity growth among PEs, SOEs and MEs during the study period.

6.2.4.6 Production efficiency performance: Services industry

Table 6.2.14 below shows the comparative average efficiency change, technological change, total factor productivity change, labour contribution to efficiency change and the labour productivity change of PEs and SOEs in the services industry from 2004 to 2007. Panel two presents the annual means of the TFP, LP and their components of PEs, whereas panel three presents the TFP, LP and their components of SOEs. However, there were no mixed enterprises in the services industry.

Panel two shows that there was an increase in TFP by 2.9% during the test period in the service industry. This productivity progress was due to the efficiency improvement of 2.3% and the technological progress of 0.05%. Here can be seen a balanced contribution from both technology and efficiency. Nevertheless not only the productivity improvement but also the technological and efficiency improvement are also slightly better. Labour productivity is also improved by 0.09%. At the same time labour contribution to technical efficiency has grown by 6.9%.

The productivity indices for the average unit of the SOEs are presented in panel three. The results indicate there was no productivity improvement throughout the period, which is due to 3.2% of efficiency decline and the 1.4% of technological decline. In contrast, even though the labour productivity has deteriorated by 1.6%, labour contribution to efficiency has improved by 2.5%.

Table 6.2.14

Annual means and panel means of production efficiency performance measures: Services industry

Year	Efficiency change	Technological change	TFP change	Labor prod. change
Panel 1 - All Ent's				
2004	-	-	-	-
2005	0.986	1.084	1.069	1.069
2006	1.031	0.991	1.022	0.912
2007	0.928	0.979	0.908	1.023
Geometric Mean of Panel 1	0.981	1.017	0.997	0.999
Panel 2 – PEs				
2004	-	-	-	-
2005	1.033	1.093	1.129	1.089
2006	1.06	1.002	1.063	0.963
2007	0.978	0.926	0.906	0.980
Geometric Mean of Panel 2	1.023	1.005	1.029	1.009
Panel 3 – SOEs				
2004	-	-	-	-
2005	0.951	1.032	0.981	1.039
2006	1.013	0.925	0.937	0.837
2007	0.942	1.003	0.945	1.094
Geometric Mean of Panel 3	0.968	0.986	0.954	0.984
Panel 4 – MEs				
2004	-	-	-	-
2005	-	-	-	-
2006	-	-	-	-
2007	-	-	-	-
Geometric Mean of Panel 4	-	-	-	-

Figure 6.7 below presents the efficiency change, technological change, and TFP change, labour contribution to efficiency change and labour productivity change of private enterprises and state enterprises in the service industry in Sri Lanka during 2003 to 2007.

Figure 6.7

Comparison of MPI of PEs and SOEs in services industry during 2003-2007

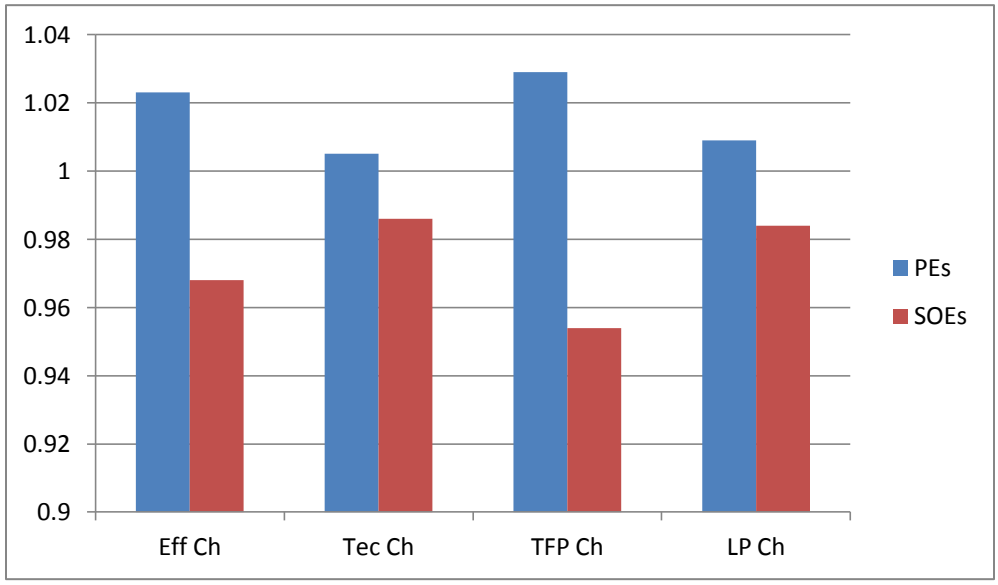


Table 6.2.15

Productivity performance of PEs and SOEs in Sri Lanka from 2003 to 2007: Services industry

Performance measures	Mean			Test of sig.	Comments
	PEs	SOEs	MEs	Kruskal wallis test	
1.Efficiency change	1.023	0.968	-	2.620 (0.082)	No Sig. Difference
2.Technical change	1.005	0.986	-	1.795 (0.180)	No Sig. Difference
3.TFP change	1.029	0.954	-	0.643 (0.423)	No Sig. Difference
5. Labour prod. change	1.009	0.984	-	0.711 (0.399)	No Sig. Difference

Test statistics for the null hypotheses of equal efficiencies were reported in table 6.2.15 above and the Kruskal Wallis tests were applied to test the null hypotheses that efficiencies are equal among PEs and SOEs in these services industry. That table shows that the efficiency growth and the TFP of PEs are higher than that of SOEs. On the other hand PEs experienced higher technological progress than SOEs. In the meantime higher labour productivity and the highest labour contribution to efficiency change is also recorded by PEs. Here it recorded amazing results showing private sector firms are more productive than state firms. However, overall, there is no statistically different remarkable productivity growth between PEs and SOEs during the study period.

6.2.4.7 Production efficiency performance: Trading industry

The average values of TFP, LP and their components of 33 enterprises in the trading industry are presented in table 6.2.16 below. Results in panel two of the table indicate that the change in the TFP and LP in PEs are shown as 0.998 and 1.043. It means that there is a small decline of TFP and a small improvement of labour productivity during the study period. This productivity deterioration is mainly due to the technological deterioration in this industry. However, managerial efficiency has improved by 1.9%. However, this technological decline has caused the deterioration of the total factor productivity. In addition, it can be seen that labour productivity and labour contribution to efficiency change in PEs has advanced by 4.3 and 7.8 percent respectively.

The result in panel three of table 6.2.16 below indicates that the change in TFP in SOEs was negative (0.954). It means that there was a 4.6% decline in productivity in the trading industry during the study period. This productivity decline was mainly due to technological deterioration. But at the same time SOEs experienced a technical efficiency decline of 4%. In addition, it shows an 8% turn down of labour productivity as well.

As panel four indicates, TFP in the mixed sector has improved by 2.9%. However, as efficiency was improving by 0.06%, technology was deteriorating by 0.01%. It can be seen that both the improvement of efficiency and the decline of technology are small. It seems to be a static situation, thus the total productivity also shows only little improvement in the study period. Nevertheless, labour productivity has grown by 11.8%. This situation is almost the same as the situation of MEs in all enterprises.

Table 6.2.16

Annual means and panel means of Production efficiency performance measures: Trading industry

Year	Efficiency change	Technological change	TFP change	Labour prod. change
Panel 1 - All Enterprises				
2004	-	-	-	-
2005	0.793	1.076	0.853	0.942
2006	1.285	0.921	1.184	1.038
2007	1.062	0.935	0.993	1.123
Geometric Mean of Panel 1	1.027	0.975	1.001	1.032
Panel 2 – PEs				
2004	-	-	-	-
2005	0.722	1.062	0.766	0.861
2006	1.376	0.941	1.295	1.139
2007	1.064	0.941	1.001	1.156
Geometric Mean of Panel 2	1.019	0.980	0.998	1.043
Panel 3 – SOEs				
2004	-	-	-	-
2005	0.995	1.062	1.057	1.262
2006	1.091	0.811	0.885	0.609
2007	0.96	0.967	0.928	1.011
Geometric Mean of Panel 3	0.960	0.941	0.954	0.920
Panel 4 – MEs				
2004	-	-	-	-
2005	0.871	1.362	1.186	1.121
2006	1.142	0.817	0.932	1.159
2007	1.004	0.981	0.984	1.076
Geometric Mean of Panel 4	0.999	1.03	1.029	1.118

Figure 6.8 illustrates the comparison of total factor productivity, its components and the labour productivity of the trading industry for the study period.

Figure 6.8

Comparison of MPI of PEs, SOEs and MEs in trading industry during 2003-2007

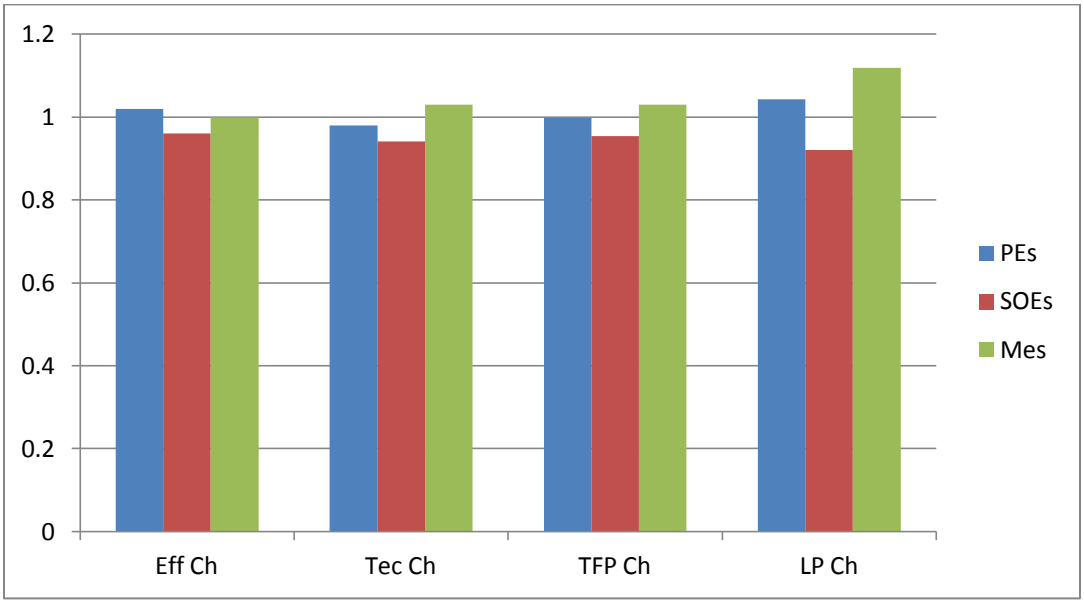


Table 6.2.17

Productivity performance of PEs, SOEs and MEs in Sri Lanka from 2003 to 2007: Trading industry

Performance measures	Mean			Test of significance	Comments
	PEs	SOEs	MEs	Kruskal wallis test	
1.Technical efficiency change	1.019	0.960	0.999	1.254 (0.534)	No Sig. Difference
2.Technical change	0.980	0.941	1.030	0.031 (0.985)	No Sig. Difference
3.TFP change	0.998	0.954	1.029	1.899 (0.387)	No Sig. Difference
5. Labour prod. change	1.043	0.920	1.118	1.814 (0.404)	No Sig. Difference

Test statistics for the null hypotheses of equal efficiencies are reported in table 6.2.17 above and the Kruskal-Wallis tests were applied to test the null hypotheses that efficiencies are equal among PEs, SOEs and MEs in these trading industry. That table shows that the technological progress, labour productivity and the TFP of MEs are higher than that of SOEs and PEs. On the other hand PEs experienced higher efficiency growth than SOEs and MEs. This is an interesting result and a good opportunity to posit that the mixed sector is more productive than either state or private firms. However, unfortunately, considered overall, there is no statistically different outstanding productivity growth among PEs, SOEs and MEs during the study period.

6.2.5 Answers to the research question

Based on the DEA Malmquist productivity index, the above average production efficiency performance results relevant to all sample firms and respective seven industries were obtained on behalf of private, state and mixed enterprises in Sri Lanka for the period of 2003 to 2007. The Kruskal-Wallis test was then performed to test hypothesis (H4) whether there are differences among average production efficiency performance of each type of ownership.

According to Kruskal-Wallis test results; there is no significant difference between private, state and mixed enterprises either because of technical efficiency change, total factor productivity change or labour productivity change. Therefore, according to hypothesis H4 'There is no significant difference of production efficiency levels among private, mixed, and state owned enterprises,' is strongly accepted with respect to the above three production efficiency performance measurement techniques. This is in accordance with the evidence provided by the literature.

However, there is a significant difference of technological change among private, state and mixed enterprises in relation to all sample firms generally and the manufacturing industries especially. On all those occasions while private enterprises recorded the highest technological improvement, mixed enterprises have recorded the lowest technological improvement. With this evidence, hypothesis H4 is rejected with respect to technological change. This is also consistent with the literature.

Answering research question four, it could be said that the type of ownership explains the differences in production efficiency levels of SOEs PEs and MEs in Sri Lanka only with regard

to technology. There are no significant differences among ownership types of either managerial efficiency or labour efficiency.

6.3 Corporate governance and production efficiency performance

This section summarizes findings on the relationship of board governance and production efficiency performance of 197 matched enterprises of seven industries in Sri Lanka during the 2003 to 2007 period. Applying the data envelopment analysis (DEA) for the first time and comparing the production efficiency performance (technical efficiency) with board governance (board size, non-executive directors' ratio and CEO duality) of Sri Lankan enterprises, the results have been achieved.

The hypotheses based on the research problem two (b) which was presented in chapter three and the main hypothesis (H4) 'The board size and board composition does not explain the differences in enterprises' production efficiency performance levels of enterprises in Sri Lanka,' and sub hypotheses are being tested using the Spearman's correlation coefficient, which provides the measure of association between two variables. The results of Spearman's correlation of three independent variables, which represent the practices of corporate governance, namely the board size, number of non-executive directors and the CEO duality of enterprises in Sri Lanka, are presented separately for all firms and under the seven different industries as well. Finally, the overall results are presented with a discussion.

6.3.1 Correlation analysis

6.3.1.1 Spearmen's correlation coefficient between board governance and production efficiency performance variable: All firms

Table 6.3.1 below presents Spearmen's correlation coefficients between dependent variable (technical efficiency) and independent variables (board size, number of non-executive directors, CEO duality) separately. There is no significant positive relationship between board size and technical efficiency of all sample firms in Sri Lanka. It means, when board size increases performance also increases. In other words, large boards gain production efficiency. As mentioned earlier in the last chapter, the technical efficiency contains two components such as technological change and managerial efficiency change. Therefore, technical efficiency change

would rise due to either technological change or managerial efficiency change or both. Nevertheless, there is no significant relationship between board size and technical efficiency.

Correlation between the number of non-executive directors and the dependent variables show that there is a positive relationship between non-executive directors and technical efficiency, which is insignificant. Although the correlation is not significant, the positive relationship indicates that an increase of non-executive directors increases technical efficiency of enterprises in Sri Lanka.

There is a statistically significant negative relationship between technical efficiency and the governance variable CEO duality. At this point, the two tail significant level of CEO duality is .01 with TE. As this result indicates, when there is only one person to hold the chairman and CEO posts, it causes to deteriorate the technical efficiency of enterprises in Sri Lanka.

Table 6.3.1

Spearmen's correlation coefficient between board governance and production efficiency performance variable: All firms

Board governance variable	Technical efficiency	Remarks
Board size	.034 (.340)	No Significance
Non-executive directors ratio	.003 (.948)	No Significance
CEO duality	-.107*** (.007)	Significance

Two tailed probabilities are given within parentheses

*** Correlation is significant at 0.05 levels (2- tailed)

** Correlation is significant at the 0.1 level (2-tailed)

* Correlation is significant at the 0.1 level (2-tailed)

6.3.1.2 Spearmen's correlation coefficient between board governance and production efficiency performance variable: All industries

6.3.1.2.1 Spearmen's correlation coefficient between board governance and production efficiency performance variable: Constructions & Engineering industry

Table 6.3.2 below shows Spearmen's correlation coefficients of firms between dependent variables and board governance variables of the constructions & engineering industry.

Between board size and technical efficiency there is a positive but insignificant relationship. The relationship is insignificant, since this industry is having a range of 5 to 11 and the average of eight members in a board. When increasing the number of directors, firm performance increases.

Technical efficiency has a positive but insignificant relationship with the number of non-executive directors. Out of all members of the board of directors, 77% members are non-executive directors in this industry. Even though the results are not significant, they indicate that an increase of non-executive directors cause to improve production efficiency performance.

As mentioned earlier in the previous chapter, 75% of firms in this industry have a CEO duality. Statistics in table 6.1.2 below indicate that, though the results are not significant, when there are two people to hold CEO and chairman posts separately, technical efficiency is improved.

Table 6.3.2

Spearmen's correlation coefficient between board governance and production efficiency performance variable: Constructions & Engineering industry

Board Governance Variable	Technical efficiency	Remarks
Board size	.125 (.271)	No Significance
Non-executive directors ratio	.117 (.427)	No Significance
CEO duality	-.115 (.436)	No Significance

Two tailed probabilities are given within parentheses

*** Correlation is significant at 0.05 levels (2- tailed)

** Correlation is significant at the 0.1 level (2-tailed)

* Correlation is significant at the 0.1 level (2-tailed)

6.3.1.2.2 Spearmen's correlation coefficient between board governance and production efficiency performance variable: Hotel and Travel industry

Table 6.3.3 below presents Spearmen's correlation coefficients of firms in the hotel and travel industry between the dependent variable (technical efficiency) and board governance variables (board size, non-executive directors and Tobin's Q) separately.

There is no significant relationship between board size and technical efficiency in the hotel and travel industry at 0.05 levels. However, there is a positive relationship between them. It means, when the board size increases, technical efficiency increases.

Correlation between the number of non-executive directors and technical efficiency shows that there is a positive relationship between them, which is insignificant at 0.05 levels. Although the correlation is not significant, it indicates while the number of non-executive directors increases, the technical efficiency increases.

There are statistically significant negative relationships between production efficiency measure, technical efficiency and the governance variable CEO duality. This indicates that when there is a CEO duality, the production efficiency performance, as measured by technical efficiency, decreases. In other words, when there is one person to hold these two important positions, technical efficiency decreases.

Table 6.3.3

Spearmen's Correlation coefficient between board governance and production efficiency performance variable: Hotels and Travel industry

Board Governance Variable	Technical efficiency	Remarks
Board size	.042 (.646)	No Significance
Non-executive directors ratio	.043 (.651)	No Significance
CEO duality	-.239*** (.010)	Significance

Two tailed probabilities are given within parentheses

*** Correlation is significant at 0.05 levels (2- tailed)

6.3.1.2.3 Spearmen's correlation coefficient between board governance and production efficiency performance variable: Land and Property industry

Table 6.3.4 below shows the spearmen's correlation coefficients of firms between dependent variables and board governance variables of the land and property industry.

Between board size and technical efficiency there exists a positive insignificant relationship. As long as this industry is having a range of 4 to 11 total number of directors and average of seven members in a board, whilst increasing the number of directors, firm performance as measured by technical efficiency, increases.

Technical efficiency has a positive but insignificant relationship with the number of non-executive directors. Even though the results are not significant, the results indicate that an increase of non-executive directors results in further improved production efficiency performance.

As mentioned earlier, 50% of firms in this industry have a CEO duality. Statistics in table 6.3.4 show that, there is a negative significant correlation (at the 0.10 level) between technical efficiency and CEO duality. This result signifies that, when there are two people to hold CEO and the chairman posts, production efficiency performance also increases.

Table 6.3.4

Spearmen's Correlation coefficient between board governance and production efficiency performance variable: Land and Property industry

Board governance variable	Technical efficiency	Remarks
Board size	.103 (.362)	No Significance
Non-executive directors ratio	.029 (.834)	No Significance
CEO duality	-.231 (.087)*	Significance

Two tailed probabilities are given within parentheses

*** Correlation is significant at 0.05 levels (2- tailed)

** Correlation is significant at the 0.1 level (2-tailed)

* Correlation is significant at the 0.1 level (2-tailed)

6.3.1.2.4 Spearmen's correlation coefficient between board governance and production efficiency performance variable: Manufacturing industry

Table 6.3.1.5 below presents the Spearmen's correlation coefficients of the firms of the manufacturing industry between dependent variable (technical efficiency) and board governance variables (board size, non-executive directors and Tobin's Q) separately.

There is no significant relationship between board size and technical efficiency in the manufacturing industry at 0.05 levels. However, there is a positive relationship between them. It means, when the board size increases, production efficiency performance increases in the manufacturing industry in Sri Lanka.

Correlation between the number of non-executive directors and the ROE shows that there is a negative relationship between non-executive directors' ratio and technical efficiency, which is insignificant at 0.05 levels. Although the correlation is not significant, it indicates while the number of non-executive directors increases, the production efficiency performance increases.

There are statistically significant negative relationships between the technical efficiency and the governance variable CEO duality. In this case the two tail significant level of CEO duality is .01 with technical efficiency. This indicates that when there is CEO duality, the accounting performance decreases. In other words, when there is one person to hold these two important positions, technical efficiency decreases.

Table 6.3.5

Spearmen's correlation coefficient between board governance and production efficiency performance variable: Manufacturing industry

Board Governance Variable	Technical efficiency	Remarks
Board size	.116 (.099)	No Significance
Non-executive directors ratio	.093 (.232)	No Significance
CEO duality	-.213*** (.006)	Significance

Two tailed probabilities are given within parentheses

*** Correlation is significant at 0.05 levels (2- tailed)

6.3.1.2.5 Spearmen's Correlation coefficient between board governance and production efficiency performance variable: Plantation industry

Table 6.3.6 below presents spearmen's correlation coefficients of firms between dependent variable (technical efficiency) and board governance variables (board size, non-executive directors and CEO duality) in the plantation industry.

Although the relationship is not significant, there is a positive correlation between board size and technical efficiency in the plantation industry of Sri Lanka. This production efficiency performance measure indicates that increasing the size of the board will in effect improve the performance. Since this industry consists of the least average number of board members (seven), increasing is possible.

The correlation between the number of non-executive directors and technical efficiency shows that there is a positive relationship between non-executive directors and technical efficiency, which is insignificant at 0.05 levels. Although the correlation is not significant, it indicates, while the number of non-executive directors increases, the accounting performance also increases.

There is a statistically significant positive relationship between accounting measure technical efficiency and the governance variable CEO duality. This is an interesting result related to CEO duality. Since 70% of companies in the plantation industry have CEO duality it demonstrates the success of having CEO duality by the statistically significant positive correlation between the governance variable CEO duality and technical efficiency. Since the British Empire initiated this plantation industry in the 18^{th} century in Sri Lanka, they followed an autocratic leadership style and plantation companies still follow it. Interestingly, this result provides evidence of the success of that autocratic leadership style and continues to have only one person to hold both CEO and the chairman posts.

Table 6.3.6

Spearmen's correlation coefficient between board governance and production efficiency performance variable: Plantation industry

Board Governance Variable	Technical efficiency	Remarks
Board size	.033 (.752)	No Significance
Non-executive directors ratio	.217** (.037)	No Significance
CEO duality	.216** (.039)	Significance

Two tailed probabilities are given within parentheses

*** Correlation is significant at 0.05 levels (2- tailed)

** Correlation is significant at the 0.1 level (2-tailed)

* Correlation is significant at the 0.1 level (2-tailed)

6.3.1.2.6 Spearmen's Correlation coefficient between board governance and production efficiency performance variable: Services industry

Table 6.3.7 below shows Spearmen's correlation coefficients of the firms in the services industry between technical efficiency vs. board size, non-executive directors and CEO duality.

There is no significant relationship between board size and technical efficiency in the services industry at 0.05 levels. However, there is a negative relationship between them. It means, when the board size decreases, production efficiency performance increases.

Correlation between the number of non-executive directors and technical efficiency show that there is a positive relationship between non-executive directors and technical efficiency, which is significant at 0.01 levels. As shown in the previous chapter, while the services industry consists of the lowest non-executive ratio among all other industries, it points out that any increases in the number of non-executive directors leads to increases in production efficiency performance.

There is a statistically insignificant positive relationship between accounting measure technical efficiency and the governance variable CEO duality. This indicates that although it is not

significant, when there is a CEO duality, the production efficiency performance increases. In other words, when there is one person holding these two important positions, technical efficiency increases.

Table 6.3.7

Spearmen's correlation coefficient between board governance and production efficiency performance variable: Services industry

Board governance variable	Technical efficiency	Remarks
Board size	-.172 (.148)	No Significance
Non-executive directors ratio	.386*** (.010)	Significance
CEO duality	.171 (.266)	No Significance

Two tailed probabilities are given within parentheses

*** Correlation is significant at 0.05 levels (2- tailed)

** Correlation is significant at the 0.1 level (2-tailed)

* Correlation is significant at the 0.1 level (2-tailed)

6.3.1.2.7 Spearmen's Correlation coefficient between board governance and production efficiency performance variable: Trading industry

Table 6.3.8 below presents Spearmen's correlation coefficients of the firms in the trading industry between dependent variable (technical efficiency) and (board governance) independent variable.

The table shows that there is a significant negative correlation between technical efficiency and the board size at 0.1 levels of probability in the trading industry in Sri Lanka. This production efficiency performance measure indicates that decreasing the size of the board will cause to improve the performance.

Correlation between the number of non-executive directors and the technical efficiency shows that there is a negative relationship between non-executive directors and technical efficiency, which is insignificant at 0.05 levels. The board of directors of the firms in this industry represents the highest number as 77% of non-executive directors. Although the correlation is not significant, it indicates, while the number of non-executive directors decreases, the production efficiency performance increases.

There is a statistically insignificant positive relationship between technical efficiency and the governance variable CEO duality. This indicates that when there is a CEO duality, the production efficiency performance increases.

Table 6.3.8

Spearmen's correlation coefficient between board governance and production efficiency performance variable: Trading industry

Board Governance Variable	Technical efficiency	Remarks
Board size	-.147***** (.093)	Significance
Non-executive directors ratio	-.085 (.371)	No Significance
CEO duality	.151 (.113)	No Significance

Two tailed probabilities are given within parentheses

*** Correlation is significant at 0.05 levels (2- tailed)

** Correlation is significant at the 0.1 level (2-tailed)

* Correlation is significant at the 0.1 level (2-tailed)

6.3.2 Answers to research questions

6.3.2.1 Board size and corporate performance

The above Spearmen's correlation analysis results which are related to seven industries show that broad size and technical efficiency (production efficiency performance) is negatively related and they are significant only in the trading industry, out of all seven industries. In addition, there is a negative but insignificant relationship in the services industry out of all seven industries. Consequently, hypothesis H4a, 'Enterprises by means of larger boards of directors are likely to have a higher Production efficiency', will be rejected in relation to the trading industry and the alternative hypothesis of H4a1 'Enterprises by means of smaller boards of directors are likely to have a higher Production efficiency' will be accepted. Some prior researchers have found that smaller boards are more effective monitors than larger boards (Coles, et al., 2008; Hartarska, 2005; Mersland & Strom, 2009; Singh & Davidson, 2003; Walker, 2007). Xie, et al., (2002) found that the coefficient for board size is negative and significant at 0.005. And also, Yermack (1996), as cited by Carter et al., (2003) found a negative relationship between board size and performance. Kathuria & Dash (1999) also suggested that the size of the board has a significant impact on the corporate performance. Nevertheless, all of the above studies have been performed, using either accounting or market performance measures. For the first time, using production efficiency measures in this study suggests that a firm's performance improves by reducing the board size and the contribution of an additional board member decreases as the firm's performance increases.

At the same time, when taking all sample firms together, it can be seen that there is an insignificant positive correlation between board size and technical efficiency. Also technical efficiency has a positive insignificant relationship in five out of seven industries. Therefore, hypothesis H4a, 'Enterprises by means of larger boards of directors are likely to have higher production efficiency,' cannot be accepted, in relation to five out of seven industries. However, this result proves that there is no relationship between board size and company performance.

6.3.2.2 Number of non-executive directors ratio and the corporate performance

Spearmen's correlation analysis results show that non-executive directors and corporate performance have a positive significant relationship with technical efficiency in relation to plantation and service industries. Therefore, the hypothesis H4b: 'Enterprises by means of higher proportion of non-executive directors to the total number of directors are likely to have higher production efficiency,' is accepted with regard to plantation and service industries.

In addition, technical efficiency shows a positive but insignificant relationship with non-executive directors' ratio in four out of seven industries in Sri Lanka. This result is enough to accept hypothesis H4b. Supporting these results which were obtained for the first time using production efficiency performance measures on this study, Baysinger & Butler (1985); Brickley et al.,(1994); Mayers et al.,(1997); Coles et al., (2008) Fazlzadeh et al., (2011), while also using accounting or market based measures, found some evidence that companies perform better if boards include more outsiders.

In contrast, it is found that technical efficiency is negatively correlated with non-executive directors in the trading industry in Sri Lanka. However, that relationship is also not significant. Therefore, there is not enough evidence to reject hypothesis H4b.

6.3.2.3 CEO duality and corporate performance

The CEO duality and company production efficiency performance analyses under four industries out of seven industries give a negative relationship with technical efficiency. The contribution is highly significant with technical efficiency in three out of seven industries. Therefore, hypothesis H4c: 'Enterprises by means of non-existence of CEO duality (having a separate chairman and a chief executive officer) are probable to have higher production efficiency,' is accepted regarding those four industries. This result, which was obtained for the first time using production efficiency performance measures, strongly supports the findings of Dhaya et al. (1996) Judge et al., (2003), and Weir & Laing (2003) Chen et al., (2006), suggesting that CEO duality was negatively related to the firm performance. In addition, Siriwardane (2008) found a negative but insignificant relationship between CEO duality and corporate performances in her limited sample regarding enterprises in Sri Lanka.

In contrast, CEO duality has a positive relationship with technical efficiency in three out of seven industries. In addition, it has a positive and significant relationship with technical

efficiency in the plantation industry. Therefore, hypothesis H4c is rejected with respect to the plantation industry which shows a significant correlation. This positive significant correlation between CEO duality and technical efficiency, which was obtained for the first time using production efficiency performance measures, support the finding of Donaldson & Davis (1991); Boyd (1995); Amaral-Baptissa (2011); Fazlzadeh et al., (2011) who argue that the firms that have duality perform better than those that do not have duality using accounting and market performance measures.

Answering for the latter part of research question three, it could be said that board composition explains the differences in enterprises' production efficiency performance levels to some extent in Sri Lanka. However, it depends on the measurement technique and the industry.

6.4 Chapter summary

The first part of this chapter (6.2) presented evidence on the comparative production efficiency performance of private, state and mixed sector enterprises. In general, the performance of private sector enterprises is better in terms of technological change than their SOEs and MEs counterparts. However, there is no significant difference of production efficiency levels among private, mixed, and state owned enterprises in relation to managerial efficiency, total factor productivity or labour productivity.

The second part (6.3) of this chapter presented the performance assessment empirical results to find answers to part (b) of research question two 'What is the nature of board size and composition? Does the board size and composition explain the differences in enterprises' production efficiency performance level of SOE's PE's and ME's in Sri Lanka?'

Especially, under the Spearmen's correlation analyses board size and technical efficiency are positively related and they are significant in the trading industry. Also it is found in relation to technical efficiency that the contribution of an additional director decreased company performance increases in relation to the trading industry. In addition, board size has no relationship with technical efficiency under the correlation analysis in the remaining industries.

Results of the empirical analysis show that the non-executive directors and company performance have a positive significant relationship with technical efficiency in relation to the plantation and service industries. In other words, it is found that the contribution of an additional non-executive director increases when the market performance is increased in relation to the

plantation and service industries. However, there is no relationship between non-executive directors and company performance with regard to the remaining industries in Sri Lanka.

While CEO duality has a significantly negative relationship with technical efficiency in four out of seven industries, it has a significantly positive relationship with technical efficiency in the plantation industry. In addition, CEO duality has no relationship with technical efficiency under the correlation analysis in the remaining industries.

CHAPTER SEVEN

FIRM SPECIFIC ISSUES AND TECHNICAL EFFICIENCIES OF ENTERPRISES IN SRI LANKA

7.1 Introduction

In this chapter the researcher makes an effort to find an answer to the research question four, 'Do the firm specific factors affect performance'. For the purpose of finding answers, hypothesis: (H6) 'the firm specific factors do not affect performance,' is being tested. This chapter consists of two sections as section one (7.2) and section two (7.3). Just after the introduction, the empirical models and potential determinant variables related to both sections have been presented. Section one (7.2) in this chapter reviews new findings on firms' board governance and identifies the factors which could influence technical efficiency of matched enterprises in Sri Lanka during the period 2004 to 2007. The Tobit regression analysis and the Bootstrap method (Appendix 15) were used for an unbalanced panel of 197 firms with 788 observations in seven industries. Furthermore, each industry is estimated individually in order to investigate whether the technical inefficiency is related to the factors, such as size, growth, leverage and risk. Later the evidence for the factors affecting firms' technical efficiency in all sectors has been provided. After that all seven industries are illustrated and finally, the chapter summary is presented.

Section two (7.3), recapitulate new findings on firms' technical efficiency and the labour contribution to technical efficiency and it also identifies the factors that influence performance of matched private, state and mixed enterprises in Sri Lanka from 2003 to 2007. As in section one, the Tobit regression analysis and the Bootstrap method (but results are presented in appendix 15) were used to estimate for an unbalanced panel of 197 firms with 788 observations in seven industries. All sample firms first and then each industry are estimated individually in order to investigate whether the technical inefficiency is related to the factors, such as size, growth, leverage, risk, competition, privatized and industry. Finally, the chapter summary is presented.

7.1.1 The empirical model and potential determinant variables of technical efficiency

In this study, the multivariate regression analysis is used to examine the characteristics and their influences after considering previous studies. As mentioned in chapter three, the empirical model which investigates the explanatory variables of the production efficiency of decision making units and is being used in this study, has been taken from the literature. This model is equally congruent with those, used in cross sectional studies, comparing the performance between SOEs and privately owned firms by Boardman & Vining (1989), Vining & Boardman (1992), Dewenter & Malatesta (2001), Bozec, et al. (2006).

As explained in chapter three, this study used both Bootstrap method and Tobit regression analysis method. However, it was found that in both methods the results were almost identical and therefore only the Tobit regression results are presented in this chapter (Bootstrap results are presented in appendix 15). Two separate Tobit regression models are estimated, based on technical efficiency scores estimated to test the relation with board governance and to test the relationship with ownership type. In addition, while model one (corporate governance model) analysis was limited to technical efficiency scores, model two (ownership type model) has used both technical efficiency and labour contribution to technical efficiency scores. As mentioned earlier, since CRS-DEA has more discriminatory power than VRS-DEA, CRS-DEA scores have been used. Furthermore, Table 7.1 below presents the characteristics incorporated in the regression model, proxy variables and expected relationships. The estimation process was performed using 'STATA 9.1' statistical software.

Table 7.1

Variables and definitions

Characteristics	Proxy Variable	Hypothesized Relationship
Dependent variables		
TE (G)	Technical efficiency in board governance	
TE (O)	Technical efficiency in ownership type	
TEL(O)	Labour contribution to Technical efficiency in ownership type	
Independent variables		
Board Size	Total no. of directors in a board	positive
Non-executive ratio	No. of non-executive directors to total no. of directors	positive
CEO Duality	Dummy-equals 1, if both CEO and chairman posts hold by one person.	Negative
Private	Dummy-equals 1, if the firm is privately owned	positive
State	Dummy-equals 2, if the firm is state owned	positive
Mixed	Dummy-equals 3, if the firm is owned by both private and state sector	positive
Size	the net sales are transformed into natural logs	Negative
Leverage	the book value of debt divided by the book value of assets	positive or Negative
Growth	change in labour expenses to revenue	positive
Risk	standard deviation of annual earnings before taxes	Negative
Competition	Dummy- equals 1, if the firm in a situation of monopoly ever in history	positive
Privatized firm	Dummy- equals 1, if the firm is a privatized firm	positive
industry	Dummy-equals 1 to 7, to distinguish each industry type	positive

7.1.2 Descriptive statistics and correlation coefficients for the independent and dependent variables related to both corporate governance and ownership model

Descriptive statistics and correlation coefficients for the independent and dependent variables are presented in table 7.2 and 7.3. There are no outliers among the independent variables of the mean values and standard deviations of each variable that could be affected by estimated regression analysis. And also the skewness of each variable shows that all the variables are distributed normally.

Table 7.2 below presents correlation coefficients between independent variables. The table shows a very small correlation between variables. Therefore, according to Gujarati (2003) such a correlation provides evidence for non-existence of multi-co linearity in the Tobit regression analysis.

Table 7.2

Descriptive statistics for independent and dependent variables

Variables / Statistics (N=630)	Board size	Non-ex directors	CEO duality	Leverage	Risk	Size	Growth
Mean	7.52	5.775	0.64	.18569	758752	13.576	.0079
Std. Deviation	2.203	2.115	0.479	.20888	494621	1.9145	.02554
Skewness	.402	-.654	-.679	1.057	.960	-.212	.081
Minimum	2	0	0	-.1887	102209	7.7509	-.0953
Maximum	15	12	1	1.6953	2086641	18.6469	.0962

Table 7.3

Spearmen's correlation coefficients among independent variables

Variable	Non ex ratio	Board size	CEO duality	Size	Growth	Risk	Leverage	Competition	Privatized firms
Non ex ratio	1.000								
Board size	.376*** (.000)	1.000 1.000 .							
CEO duality	.568*** (.000)	-.046 (.316)	1.000						
Size	-.159 **(.001)	.164*** (.000)	-.138*** (.002)	1.000					
Growth	.006 (.894)	-.028 (.546)	.007 (.874)	.012 (.796)	1.000				
Risk	-.244*** (.000)	-.104** (.023)	-.042 (.355)	.298*** (.000)	-.049 (.289)	1.000			
Leverage	.055 (.230)	-.010 (.824)	.113** (.014)	.193*** (.000)	.093** (.042)	.099** (.031)	1.000		
Competition	-.101** (.028)	.009 (.849)	-.023 (.617)	.172*** (.000)	-.016 (.722)	.044 (.341)	.084* (.068)	1.000	
Privatized firms	.013 (.782)	-.141** (.002)	-.022 (.629)	.13*** (.003)	.059 (.200)	-.080 (.081)	.342*** (.000)	.219*** (.000)	1.000

Two tailed probabilities are given within parentheses

***Correlation is significant at 0.01 levels (2- tailed)

** Correlation is significant at 0.05 levels (2- tailed)

* Correlation is significant at the 0.1 level (2-tailed)

7.2 Determinants of technical efficiency and board governance: All firms

The variables which are studied under corporate governance and production efficiency performance were regressed under the Tobit Regression Model introducing ten control variables. Table 7.4 reports the regression results with respect to technical efficiency (the dependent variable) with regard to all firms.

The relatively high values of the estimated R^2 of Tobit regression indicates that the corporate governance model was able to explain the influence of the variables on technical efficiency. Also the ability to explain the model provides the evidence by high log likelihood value.

Further, to examine the robustness of the estimated coefficients, Bootstrap analysis has been performed. But those results are not dissimilar to the results derived from the Tobit regression analysis. Therefore, Bootstrap analysis results are not being reported here.

Tobit regression analysis reports that the dependent variable technical efficiency and the board size are negatively related. It means when the number of directors increases the performance increases. However, this relationship is statistically not significant. Therefore, the results do not show that there is any relationship between board size and technical efficiency of enterprises in Sri Lanka.

In the regression analysis there exist a positive relationship between technical efficiency and non-executive directors' ratio. However, the relationship between technical efficiency and non executive ratio is also not significant. Consequently, the results indicate that there is no statistically significant relationship between executive directors' ratio and technical efficiency of enterprises in Sri Lanka.

The results of the Tobit regression show a significant negative relationship between CEO duality and technical efficiency. This result indicates that the non-existence of CEO duality (having a separate chairman and a chief executive officer) may lead to higher production efficiency performance in enterprises of Sri Lanka.

Table 7.4 shows the Tobit regression results for control variables when run with technical efficiency. With respect to technical efficiency, the table indicates that leverage, risk, size (sales turnover), competition (degree of monopoly power), for privatized firms and industry have significant relationships.

The leverage of each firm is measured by the book value of debt divided by the book value of assets. Leverage increases if one Rupee the technical efficiency would be decreased by 8 cents in

enterprises of Sri Lanka. In other words, when the firms borrow more and more money the production efficiency performance decreases accordingly.

Risk is measured by the standard deviation of annual earnings before tax. A negative relationship between risk and performance was expected. Poorly organized enterprises tend to be riskier enterprises. As per the empirical results, there is a negative relationship between TE and risk. When firms take 1% of a risk, it leads to decrease TE by 10%. However, the risk could be different from one industry to another and it will be further examined in the next section, in an industry by industry analysis.

While there are many ways of measuring size, this study will utilize a firm's sales, because the dependent variable already incorporates market and asset values. To account for the distribution, the net sales were transformed into natural logs. When the firm size becomes larger, management and operational inefficiencies can be experienced, and it often adversely affects performance. However, the empirical results on enterprises as a whole show a positive relationship between size and TE. That means firms are experiencing increasing returns to scale and they can further increase their capacity. In the research period there raged a civil war in the northern and eastern provinces in Sri Lanka for a 25 years period. Therefore, firms could not do their day to day business in those provinces. This could be one reason to have an excess capacity. Nevertheless, the relationship between size and TE will be further examined in detail in the next sub section under different industries.

Competition is an indicator variable. A control over competition was made necessary because some of the sample firms were in a monopolistic position. Therefore, with a dichotomous variable, this study distinguishes firms in a situation of monopoly from firms facing a higher level of competition. As per the empirical results, there is a positive relationship between TE and competition. When firms have a monopoly power, its technical efficiency is 15% higher than other competitive firms.

Privatized firms are also an indicator variable. A control over privatized firms is made necessary because some of the sample firms were privatized SOEs and they may still be enjoying some special treatment given by the government or they may still be suffering due to their historical problems. The empirical results show a negative relationship between privatized firms and technical efficiency. Table 7.4 indicates that a privatized firm's technical efficiency is 6 % lower than other firms.

Here seven types of industries are being considered and dummy variables distinguish each industry type. As per the empirical results, the industry has a significant correlation with technical efficiency. Therefore, the next sub section is devoted to identify performance differences made by each industry in detail.

Table 7.4

Tobit regression analysis: All firms

Variables	**Technical efficiency**
Constant	0.101059 1.26 (0.209)
Board size	-0.00716 -0.57 (0.572)
Non-ex directors	0.008385 0.67 (0.506)
CEO duality	-0.04072* -1.73 (0.084)
Leverage	-0.08375*** -5.7 (0.000)
Risk	-9.6008*** -4.81 (0.000)
Size	0.029102*** 5.44 (0.000)

Growth	0.202144 0.57 (0.57)
Competition	0.146796*** 2.72 (0.007)
Privatized firms	-6.3702*** -2.78 (0.006)
Industry	0.04465*** 8.63 (0.000)
Included observations after adjustments **LR Chi** **Probability> Chi** **Pseudo R-squared** **Log likelihood**	630 152.83 (0.000) 2.0541 39.2139

Two tailed probabilities are given within parentheses

* Correlation is significant at 0.10 levels (2- tailed)

** Correlation is significant at 0.05 levels (2- tailed)

*** Correlation is significant at the 0.1 level (2-tailed)

7.2.1 Determinants of technical efficiency and board governance: All industries

The variables studied under corporate governance and production efficiency performance (technical efficiency) were regressed under the Tobit Regression Model introducing ten control variables. Table 7.5 reports the regression results of technical efficiency (the dependent variable) with regard to all industries.

Tobit regression analysis reports that the dependent variable technical efficiency and the board size are negatively related in construction and engineering, land and property, manufacturing and plantation industries. This means, when the number of directors increases, the performance decreases. But this negative relationship is statistically significant only in the plantation industry. It shows that the decrease of one director resulted to increase performance by 19%. In contrast, the board size is not significant but negatively related with technical efficiency in hotels and travel, services and trading industries. Therefore, the results do not show that there is any relationship between board size and technical efficiency in industries except in the plantation industry out of all industries in Sri Lanka.

In the regression analysis there exist a positive relationship between technical efficiency and non-executive directors' ratio in construction and engineering, land and property, manufacturing and plantation industries. In contrast, hotel and travel, services and trading industries record a negative relationship between technical efficiency and non-executive directors' ratio. However, while technical efficiency and non ex ratio is positively significant in the construction and engineering and plantation industries, it is negatively significant in services and trading industries. Consequently, the results prove that although production based industries (construction and engineering and plantation industries) insist more non-executive directors, services based industries (services and trading industries) persist on more executive directors to improve production efficiency of enterprises in Sri Lanka. This is a new and interesting result.

The results of the Tobit regression show a negative relationship between CEO duality and technical efficiency in five out of seven industries whereas services and trading industries designate a positive relationship. However, there is a significant negative relationship between CEO duality and technical efficiency in land and property and manufacturing industries. This result proves that non-existence of CEO duality (having a separate chairman and a chief executive officer) is probable to have a higher production efficiency performance in only two (land and property and manufacturing industries) out of seven industries in Sri Lanka. Nevertheless, there is no significant relationship between CEO duality and technical efficiency in five out of seven industries.

Table 7.5 shows the Tobit regression results for control variables in each industry when it runs with technical efficiency. With respect to technical efficiency, the table indicates that leverage has a negative relationship in each and every industry. But the hotel and travel and plantation

industries have a significant relationship with technical efficiency. And if leverage increases by one Rupee, the technical efficiency would be decreased by eight cents in enterprises of Sri Lanka. In other words, when the firms borrow more and more money, the production efficiency performance goes further down.

Risk is measured by the standard deviation of annual earnings before taxes. A negative relationship between risk and performance was expected. Poorly organized enterprises tend to be riskier enterprises. As per the empirical results, there is a significant negative relationship between TE and risk in hotels and travels and land and property industries. In contrast, there is a significant positive relationship between TE and risk in construction and engineering and manufacturing industries. One reason could be the taking of high risk in these two high risk industries and getting a high return as well. Existence of both large and small firms particularly in the sample firms in those two industries could be another reason.

The empirical results for enterprises in hotel and travel, manufacturing, plantation, services and trading industries show a significant positive relationship between size and TE. That means, firms in those five industries are experiencing increasing returns to scale and they can further increase their capacity. As mentioned in earlier section as well, in the research period, there happened a civil war in the northern and eastern provinces in Sri Lanka for a 25 years period. Therefore firms could not do their day to day business in those provinces. This could be one reason to have an excess capacity. Also one other reason could be that all those industries have only medium scale firms.

The current growth rate of the firm is measured by change in labour expenses to revenue for each year of the study. Here growth rate was expected to be positively correlated with firm performance. There is a significant positive relationship between growth rates of firms in the hotel and travel industry and services industries and technical efficiency. In contrast, there is a significant negative correlation between growth rate and technical efficiency in the trading industry. Paying higher labour expenditure, compared to revenue by firms in this industry, could be a reason to have a negative relationship.

Since competition is an indicator variable, there is a significant negative relationship between TE and competition in the trading industry. When firms have monopoly power, their production efficiency is higher than that of other competitive firms in this industry. However, this variable was not estimated in five industries due to multi-co linearity problems.

Privatized firms are also an indicator variable. The empirical results show a significant positive relationship between privatized firms and technical efficiency only in the trading industry. In contrast, there is a negative relationship between privatized firms and technical efficiency in the plantation industry. However, this variable was not estimated in two industries due to multi-co linearity problems.

Table 7.5

Tobit regression analysis: All industries

Variables	**Ind 1 (TE)**	**Ind 2 (TE)**	**Ind 3 (TE)**	**Ind 4 (TE)**	**Ind 5 (TE)**	**Ind 6 (TE)**	**Ind 7 (TE)**
Constant	-1.7674 -2.26 (0.029)	0.0710 0.2 (0.842)	1.0517 3.72 (0.001)	-0.0785 -0.59 (0.558)	0.6386 1.79 (0.078)	0.3748 1.58 (0.122)	-0.0004 0.000 (0.997)
Board size	-0.1818 -1.53 (0.133)	0.0191 0.29 (0.772)	-0.1082 -1.52 (0.136)	-0.0202 -1.27 (0.205)	-0.1856 -2.62 (0.01)	0.0142 0.64 (0.524)	0.0248 1.6 (0.113)
Non-ex directors	0.2176 1.72 (0.094)	-0.0123 -0.19 (0.848)	0.1083 1.62 (0.111)	0.0247 1.62 (0.108)	0.1602 2.17 (0.033)	-0.0361 -1.91 (0.064)	-0.0528 -3.11 (0.002)
CEO duality	-0.1643 -1.22 (0.229)	-0.0910 -0.78 (0.439)	-0.1809 -1.88 (0.067)	-0.0544 -2.01 (0.046)	-0.1130 -1.66 (0.1)	0.0817 1.46 (0.153)	0.0313 0.85 (0.398)
Leverage	-0.0487 -0.51 (0.616)	-0.0967 -2.75 (0.007)	-0.0011 -0.02 (0.984)	-0.0314 -1.48 (0.142)	-0.1416 -2.02 (0.046)	-0.0508 -1.22 (0.231)	-0.0277 -1.2 (0.232)
Risk	1.3706 3.59 (0.001)	-4.2207 -3.12 (0.002)	-2.5407 -2.9 (0.006)	5.4307 7.31 (0.000)	-1.3907 -1.52 (0.132)	-6.6708 -0.24 (0.81)	2.59080 0.84 (0.404)
Size	0.0243 0.6 (0.554)	0.0394 2.23 (0.028)	-0.0019 -0.07 (0.945)	0.0350 4.77 (0.000)	0.0395 1.86 (0.067)	0.0331 2.71 (0.01)	0.0544 6.12 (0.000)

Growth	-0.0601 -0.02 (0.984)	2.4235 3.18 (0.002)	-0.4494 -0.55 (0.587)	0.0541 0.09 (0.928)	0.5803 1.05 (0.296)	1.94881 .92 (0.062)	-3.9775 -4.17 (0.000)
Competition	_	_		0.0334 0.84 (0.405)		_	-0.1642 -1.75 (0.083)
Privatized firms	_	0.0620 1.14 (0.258)	-0.1629 -1.2 (0.236)	0.0106 0.41 (0.685)	-0.2469 -2.96 (0.004)	_	0.1063 2.57 (0.012)
Included observations after adjustments	47	114	55	167	92	44	111
LR Chi	14.52	51.14	14.02	80.72	66.38	20.19	61.17
Probability> Chi	0.0427	0.000	0.0813	0.000	0.000	0.005	0.000
Pseudo R-squared	0.3183	2.1976	2.6386	-0.7476	-6.5378	-0.7051	-1.4746
Log likelihood	-15.547	13.935	4.3529	94.344	38.266	24.410	51.323

Two tailed probabilities are given within parentheses

* Correlation is significant at 0.10 levels (2- tailed)

** Correlation is significant at 0.05 levels (2- tailed)

*** Correlation is significant at the 0.1 level (2-tailed)

7.3 Determinants of production efficiency performance and ownership type: All firms

This section presents new findings on firms' technical efficiency, labour contribution to technical efficiency and the relationship between firms' specific variables and technical efficiency, labour

contribution to technical efficiency of the matched public and private sector firms. The Tobit regression analysis and the Bootstrap analysis method were used to obtain results. The statistical software package STATA 9.1 was used. Further, Bootstrap analysis has been performed to examine the robustness of the estimated coefficients and Bootstrap analysis results were not dissimilar to the results derived from the Tobit regression analysis. Therefore, Bootstrap analysis results are not being presented here as well.

Descriptive statistics for the independent't' variables are presented in table 7.6 below. There are no outliers among the independent variables of the mean values and standard deviations of each variable that could be affected to estimate regression analysis. Also the skewness of each variable shows that all the variables are distributed normally.

Table 7.6

Descriptive statistics for independent and dependent variables

Variables / Statistics	Leverage	Risk	Size	Growth
Mean	-0.9770	777,955	13.47	0.0093
Std. Deviation	0.6588	503,383	1.92	0.0288
Skewness	-1.046	0.850	-0.239	0.031
Minimum	-3.44	102209	7.7509	-0.1042
Maximum	0.000	2086641	18.6469	0.1001

Thus the variables studied under types of ownership and production efficiency performances were regressed under the Tobit regression model introducing eight control variables. Table 7.7 below reports the Tobit regression results with respect to two dependent variables (technical efficiency and labour contribution to technical efficiency).

Table 7.7 reports the estimation of the parameters for unbalanced panel of 197 firms with a total of 788 observations of private, state and mixed sector firms, in which the non-negative technical inefficiency and labour contribution to technical efficiency effects are assumed to be a function of leverage, risk, size and growth and seven indicative variables (private, state, mixed,

competition, privatized firms and industry). The observation includes 123 private enterprises, 38 state owned enterprises and 36 mixed enterprises during the research period of 2003-2007, in seven industry groupings namely the constructions and engineering, hotel and travel, land and property, manufacturing, plantation, services and trading industries.

The results show a negative sign on the estimated coefficient for all inputs (material, labour and capital) in private sector enterprises. The negative sign implies that the private sector firms' efficiency decreased because firms used more inputs, which is consistent with theory. However, this association is not significant. In addition, the estimated labour contribution to technical efficiency of private enterprises show a positive sign which is significantly associated with labour contribution to technical efficiency. This finding means that the greater use of labour leads to increased efficiency. Thus, these empirical results proved that the private enterprises in Sri Lanka are using more material and capital inputs instead of labour. Also it is suggested that the private enterprises will be able to further increase their efficiency if they replace labour with material or capital.

The estimated coefficient for all inputs in SOEs has a positive relationship with technical efficiency. Although this relationship is not significant, it indicates that SOEs' productivity increases as they use more inputs, a result which is consistent with theory. In the meantime, SOEs have a negative but significant relationship with labour contribution to technical efficiency. This finding denotes that the greater use of labour leads to decreased productivity in state owned enterprises. As a whole the results show the material and capital scarcity and excess labour of SOEs. Especially, this proves the capital scarcity of state owned firms. This finding is consistent with property right theory.

A circumstance of the results of mixed enterprises is also similar to private enterprises. The results in Table 7.7 show a significant negative relationship in the estimated coefficient for all inputs in mixed enterprises. The negative sign shows that the mixed firms' efficiency decreased because firms used more inputs. In addition, the estimated labour contribution to technical efficiency of private enterprises has a positive sign which is associated with labour contribution to technical efficiency. This finding means that the greater use of labour leads to increased efficiency. Thus, these empirical results proved that the mixed enterprises in Sri Lanka are using more material and capital inputs instead of labour. Also it is suggested that the private enterprises

will be able to further increase their efficiency if they replace labour with material or capital. However, this association is not significant.

The estimated coefficients of explanatory variables in the model for technical efficiency and labour contribution to technical efficiency have important implications. Firms' leverage has a significant negative relationship with technical efficiency and labour contribution to technical efficiency as well. This negative association implies that firms with greater use of debt tended to be more technically inefficient. Firm risk also has a significant negative correlation with production efficiency. This relationship indicates that high risk firms (poorly organized firms) experience technical inefficiencies. This is also consistent with theory. Size of the firm has a positive significant relationship with technical efficiency and labour contribution to technical efficiency as well. This implies that, when the size increases, both the overall production efficiency and the labour efficiency will be increased. Thus it could be argued that the enterprises in Sri Lanka are experiencing increasing returns to scale and those firms have an excess capacity. Therefore firms can increase their performance by employing more capital and labour inputs. In the meantime, while growth has a positive significant relationship with technical efficiency, it has a negative relationship with labour contribution to technical efficiency. This means, the growth of production efficiency could be boosted by utilizing more material and capital rather than employing more labour. In other words, there is a negative growth of the firms which are utilizing more labour (SOEs). The indicator variable competition indicates a positive significant relationship with technical efficiency. However, there is a significant negative relationship between competition and labour contribution to technical efficiency. This negative relationship points out that even if there has been a monopoly power in the firms' history or even at present, when they have excess labour; they keep on getting poor performance. This is a new and interesting result which is more applicable to SOEs. The indicator variable, privatized firms have a positive but an insignificant relationship with both overall technical efficiency and labour contribution to technical efficiency performance. This means, production efficiency performance of privatized firms are better than private and mixed firms. The indicator variable industry is having strong positive relationships with both performance measures. Therefore, it is worth to deeply consider industry by industry results, whether there are significant differences among study variables. As a consequence, the next sub section is devoted to analyse the situation of each of the seven industries.

Table 7.7

Tobit Regression Analyses: All Firms

Variables	Technical efficiency	Labour contribution to technical efficiency
Constant	0.0747 1.23 (0.22)	-3.1650*** -4.46 (0.000)
Private	-0.0084 -0.36 (0.719)	0.3950*** 5.68 (0.000)
State	0.0157 0.67 (0.502)	-0.3734*** -5.36 (0.000)
Mixed	-0.1129*** -2.88 (0.004)	0.0891 0.78 (0.436)
Leverage	-0.0826*** -6.22 (0.000)	-0.1916*** -4.89 (0.000)
Risk	-1.040*** -6.17 (0.000)	-3.0107*** -6.03 (0.000)
Size	0.0284*** 6.2 (0.000)	0.0576**** 4.25 (0.000)
Growth	0.5265* 1.85 (0.064)	-2.4165*** -2.84 (0.005)
Competition	0.1597*** 4.39 (0.000)	-0.2988*** -2.75 (0.006)

Privatized firms	0.0091 0.29 (0.774)	0.0511 0.55 (0.58)
Industry	0.0495*** 11.26 (0.000)	0.1394*** 10.74 (0.000)
Observations after adjustment	784	784
LR Chi	235.09	252.87
Probability> Chi	0.000	0.000
Pseudo R-squared	1.7417	0.1392
Log likelihood	50.0543	-781.864

Two tailed probabilities are given within parentheses

* Correlation is significant at 0.10 levels (2- tailed)

** Correlation is significant at 0.05 levels (2- tailed)

*** Correlation is significant at the 0.1 level (2-tailed)

7.3.1 Determinants of production efficiency performance and ownership type: All industries

Tobit regression analysis results for production efficiency performance on ownership type for seven industry groupings namely the construction and engineering (Ind 1), hotel and travel (Ind 2), land and property (Ind 3), manufacturing (Ind 4), plantation (Ind 5), services (Ind 6) and trading (Ind 7) industries are presented in table 7.8 and 7.9 below. While Table 7.8 presents performance based in all inputs (technical efficiency), Table 6.9 presents performance based in labour input (labour contribution to technical efficiency).

As per Table 7.8 the results show a negative sign on the estimated coefficient for all inputs (material, labour and capital) of private sector enterprises in land and property (Ind 3), plantation (Ind 5) trading (Ind 7) industries. The negative sign implies that the private sector firms' efficiency decreased because firms used more inputs, which is consistent with theory. However, this association is significant only in the trading industry. In addition Table 7.9 shows the

estimated labour contribution to technical efficiency of private enterprises has a positive sign, which is significantly associated with labour contribution to technical efficiency in constructions and engineering (Ind 1), hotel and travel (Ind 2), land and property and manufacturing (Ind 4) industries. Although the relationship is positive in Land and property (Ind 3) it was not significant. This finding means that the greater use of labour leads to increase inefficiency. Thus, these empirical results prove that the private enterprises in Sri Lanka are using more material and capital inputs instead of labour. Also it is suggested that the private enterprises will be able to further increase their efficiency if they replace labour with material or capital. However, this replacement might be possible in the hotel and travel industry rather than other industries. Because Ind 1, Ind 3 and Ind 4 are predominant capital intensive industries, there could be inabilities for 100% replacement but they might have a possibility to increase up to a sustainable level.

The estimated coefficient for all inputs in SOEs has a positive relationship with technical efficiency in the hotel and travel (Ind 2), plantation (Ind 5) and trading (Ind 7) industries as shown by table 7.8. Although this relationship is not significant in the hotel and travel (Ind 2) and plantation industries, it is significant in the trading industry. It indicates that SOEs productivity increases as they use more inputs, a result which is consistent with theory. In the meantime, according to table 7.9, SOEs have a negative but a significant relationship with labour contribution to technical efficiency in the constructions and engineering (Ind 1) and manufacturing (Ind 4) industries and non-significant relationship with the land and property (Ind 3) industry. This finding denotes that the greater use of labour leads to decreased productivity in state owned enterprises, especially in those two industries. As a whole the results show the material and capital scarcity and excess labour of SOEs. Especially, this proves the capital scarcity of state owned firms. This finding is consistent with the property right theory. However, there is a significant positive relationship with SOEs and labour contribution to technical efficiency in the plantation (Ind 5) industry. This implies that SOEs are able to increase labour in order to increase production furthermore.

The results in table 7.8 show a significant negative relationship on the estimated coefficient for all inputs in mixed enterprises in the hotels and travel (Ind 2), manufacturing (Ind 4), plantation (Ind 5) and trading (Ind 7) industries. The negative sign entails that the mixed firms' efficiency decreased because firms used more inputs. When examining reasons, one argument would be

that these mixed enterprises in these industries are experiencing either decreasing returns or diseconomies of scale. In addition, the estimated labour contribution to technical efficiency of private enterprises has a negative sign, which is associated with labour contribution to technical efficiency. Also this association is significant in the hotel and travel (Ind 2) and plantation (Ind 5) industries. This finding means that the greater use of labour leads to decreased efficiency. Thus these empirical results proved that the mixed enterprises in Sri Lanka are using more material and capital inputs instead of labour in the manufacturing (Ind 4) and trading (Ind 7) industries. Also it is suggested that these mixed enterprises will be able to further increase their efficiency if they replace labour with material or capital. In contrast, it seems to be the hotels and travel (Ind 2) and plantation (Ind 5) industries which of use more inputs (both capital and labour) than they required and consequently performances have deteriorated. Further it is proved that especially these two industries are experiencing diseconomies of scale. In the situation which is receiving limited empirical studies in the literature, these results are new and interesting about the mixed enterprises.

Table 7.8

Tobit regression analyses: Technical Efficiencies of all industries

Variables	**Ind 1**	**Ind 2**	**Ind 3**	**Ind 4**	**Ind 5**	**Ind 6**	**Ind 7**
Constant	-1.7977*** -3.8 (0.000)	-0.3521 -1.6 (0.112)	0.7929*** 3.64 (0.001)	-0.1906* -1.75 (0.082)	0.6215* 1.85 (0.067)	0.333* 1.97 (0.05)	0.2537** 2.16 (0.033)
Private	0.1499 1.57 (0.121)	0.2273** 2.44 (0.016)	-0.1193 -1.06 (0.291)	0.0145 0.39 (0.697)	-0.0216 -0.21 (0.83)	0.048 1.21 (0.23)	-0.137*** -3.33 (0.001)
State	-0.1499 -1.57 (0.121)	0.2189 1.56 (0.122)	-0.0365 -0.31 (0.755)	-0.0314 -0.69 (0.493)	0.0216 0.21 (0.83)	-0.048 -1.21 (0.23)	0.140*** 3.4 (0.001)
Mixed	_	-0.2269** -2.44 (0.016)	0.0924 0.82 (0.414)	-0.0050 -0.14 (0.89)	-0.353*** -5.08 (0.000)	_	-0.169*** -2.67 (0.009)
Leverage	-0.0209 -0.39	-0.0780** -2.5	-0.126*** -3.55	-0.0398* -1.86	-0.0290 -0.43	-0.075** -2.47	-0.061*** -2.86

	(0.701)	(0.014)	(0.001)	(0.064)	(0.671)	(0.02)	(0.005)
Risk	1.350*** 5.27 (0.000)	-4.790*** -3.76 (0.000)	-3.170*** -4.63 (0.000)	6.870*** 9.18 (0.000)	-1.5307 -1.56 (0.122)	-1.600 -0.68 (0.50)	3.2308 1.08 (0.28)
Size	0.0060 0.33 (0.744)	0.058*** 3.9 (0.000)	-0.000 -0.03 (0.978)	0.031*** 4.71 (0.000)	0.0213.9 5 (0.343)	0.025** 2.65 (0.01)	0.036*** 4.64 (0.000)
Growth	-0.6981 -0.77 (0.445)	2.343** 3.44 (0.001)	0.2809 0.41 (0.682)	1.077** 2.14 (0.033)	0.6281 1.05 (0.299)	1.52** 2.51 (0.01)	-2.313*** -3.17 (0.002)
Competition	0.216** 2.05 (0.044)	0.2868* 1.91 (0.059)	_	0.0584 1.56 (0.12)	_	_	0.0471 0.71 (0.477)
Privatized firms	_	0.1944** 2.53 (0.013)	-0.192* -1.69 (0.096)	0.0237 0.7 (0.486)	-0.375*** -4.1 (0.000)	_	0.0804* 1.84 (0.068)
Included observations after adjustments	79	122	80	203	96	72	131
LR Chi	28.31	65.07	31.52	107.85	57.58	15.93	55.14
Probability> Chi	0.0001	0.000	0.000	0.000	0.000	0.007	0.000
Pseudo R-squared	0.4778	2.1737	2.1291	-1.399	-3.0973	0.277	-0.979
Log likelihood	-15.4677	17.568	8.3591	92.468	30.988	36.69	55.736

Two tailed probabilities are given within parentheses

* Correlation is significant at 0.10 levels (2- tailed)

** Correlation is significant at 0.05 levels (2- tailed)

*** Correlation is significant at the 0.1 level (2-tailed)

Table 7.9

Tobit regression analyses: Labour Contribution to Technical Efficiencies of all industries

Variables	Ind 1	Ind 2	Ind 3	Ind 4	Ind 5	Ind 6	Ind 7
Constant	-2.4185** -2.27 (0.026)	-1.829*** -5.96 (0.000)	-3.06*** -4.91 (0.000)	-3.828*** -12.78 (0.000)	-1.899*** -4.18 (0.000)	-2.14*** -4.01 (0.00)	-2.298*** -6.53 (0.000)
Private	0.732** 2.66 (0.01)	0.371** 2.36 (0.02)	0.4375 1.3 (0.198)	0.1794* 1.77 (0.078)	-0.559*** -4.09 (0.000)	-0.020 -0.16 (0.87)	-0.0978 -0.82 (0.415)
State	-0.7322** -2.66 (0.01)	0.3790 1.59 (0.114)	-0.2418 -0.68 (0.499)	-0.2273* -1.81 (0.072)	0.559*** 4.09 (0.000)	0.020 0.16 (0.87)	0.0933 0.78 (0.435)
Mixed	_	-0.372** -2.37 (0.019)	-0.2351 -0.65 (0.516)	-0.0966 -0.94 (0.349)	-1.019** -10.79 (0.000)	_	-0.0393 0.78 (0.435)
Leverage	-0.0477 -0.29 (0.771)	-0.0218 -0.42 (0.672)	-0.0253 -0.39 (0.699)	-0.165*** -2.83 (0.005)	0.1160 1.25 (0.214)	-0.205** -2.13 (0.03)	-0.218*** -3.54 (0.001)
Risk	1.5007 0.2 (0.84)	6.81*** 3.19 (0.002)	-2.1507 -1.17 (0.246)	-2.5200 -0.12 (0.902)	5.7500 0.43 (0.666)	-1.36* -1.82 (0.07)	1.540* 1.8 (0.075)
Size	0.0087 0.16 (0.87)	0.045* 1.83 (0.069)	0.082* 1.75 (0.085)	0.114*** 6.17 (0.000)	0.124*** 4.09 (0.000)	0.1*** 3.07 (0.00)	0.065*** 2.8 (0.006)
Growth	-0.90372 -0.31 (0.755)	-0.99193 -0.87 (0.387)	-2.0315 -0.9 (0.373)	-4.021*** -2.86 (0.005)	-0.6431 -0.79 (0.432)	-8.11*** -4.23 (0.00)	-7.989*** -3.79 (0.000)
Competition	0.04731 0.14 (0.886)	-0.6261** -2.48 (0.014)	_	-0.1054 -1.03 (0.303)	_	_	-0.869*** -4.54 (0.000)

Privatized firms	_	0.283* 2.18 (0.031)	-0.2328 -1.28 (0.204)	0.0022 0.02 (0.981)	-1.578*** -12.7 (0.000)	_	0.1395 1.1 (0.272)
Included observation after adjustments	75	123	78	203	96	72	130
LR Chi	14.79	26.66	20.03	106.62	136.7	37.38	57.34
Probability> Chi	0.0219	0.0008	0.0055	0.000	0.000	0.000	0.000
Pseudo R-squared	0.0805	0.2222	0.1176	0.321	1.0484	0.295	0.2606
Log likelihood	-84.44	-46.6481	-75.157	-112.76	3.1529	-44.55	-81.365

Two tailed probabilities are given within parentheses

* Correlation is significant at 0.10 levels (2- tailed)

** Correlation is significant at 0.05 levels (2- tailed)

*** Correlation is significant at the 0.1 level (2-tailed)

As presented in table 7.8 and 7.9 above the estimated coefficients of explanatory variables in the model for technical efficiency and labour contribution to technical efficiency have important implications. Firms' leverage has a significant negative relationship with technical efficiency in Ind2, Ind3, and Ind4, Ind6 and Ind7 and labour contribution to technical efficiency in Ind4, Ind6 and Ind7 as well. This negative association implies that firms with greater use of debt tended to be more technically inefficient. High leverage has been contributed for inefficiencies in Ind3 and Ind7 of private enterprises, Ind3, Ind4 and Ind6 of SOEs and Ind2, Ind4 and Ind7 of mixed enterprises. Firm risk is also has a significant negative correlation with technical efficiency in Ind2, Ind3, and Ind6 and labour contribution to technical efficiency in Ind6. In contrast, while firm risk has a significant positive correlation with technical efficiency in Ind1 and Ind4, labour contribution to technical efficiency has a significant positive correlation in Ind 2 and Ind7. This

relationship indicates that even though firms in these industries are high risk firms, they experience high technical efficiencies because they might have organized things well. This is also consistent with theory.

Technical efficiency and labour contribution to technical efficiency has a positive significant relationship with the size of the firm in almost all industries. This implies that when the size increases, both the overall production efficiency and the labour efficiency will be increased. Thus, it could be argued that the enterprises in each and every industry of Sri Lanka are experiencing increasing returns to scale and those firms have an excess capacity. Therefore, firms can increase their performance by employing more capital and more labour input.

While growth has a positive relationship with technical efficiency in all industries, except Ind1 and Ind7, in the meantime it has a negative relationship with labour contribution to technical efficiency in all industries. This means the growth of production efficiency could be boosted by utilizing more material and capital rather than employing more labour. In other words, there is a negative growth of the firms which are utilizing more labour (e.g. SOEs).

The indicator variable competition indicates a positive relationship with technical efficiency in all industries and the relationship is significant in Ind1 and Ind2. However, there is a significant negative relationship between competition and labour contribution to technical efficiency in Ind2, Ind4 and Ind7. This negative relationship points out, that even if there has been a monopoly power in the firm history or even in the present, when they have excess labour; they keep on getting poor performance. This is a new and interesting result which is more applicable to SOEs and it is further valid to industry results as well.

The indicator variable, privatized firms have a positive and significant relationship with both overall technical efficiency and labour contribution to technical efficiency performance in Ind2 and Ind7 whereas there is a negative relationship between those two variables in Ind3 and Ind5. This means, production efficiency performance of privatized firms are better with the firms in Ind2 and Ind7 but it is worse in Ind3 and Ind5. This implies that even though the firms have been privatized, their success or failure would be determined by the industry circumstances as well.

7.4 Chapter summary

In this chapter an effort was made to find an answer to research question four, whether the firm specific factors affect performance. Section one (7.2) in this chapter provided new findings on board governance or the factors influencing firms' production efficiencies with special reference to board governance of firms in Sri Lanka using four years of firm level data.

The null hypothesis (H6a) that 'there is no relationship between selected firm related factors with technical efficiency in the corporate governance model,' is rejected.

Although board size has a negative association with technical efficiency in a majority of industries, it was significant only in the plantation industry. When increasing non-executive directors, performance increased in the construction and engineering industry and in the plantation industry, whereas increasing the number of directors, decreased performance in services and trading industries. The existence of CEO duality leads to decreased performance of enterprises in Sri Lanka as a whole and especially in the land and property and manufacturing industries.

While the leverage is significant and negatively associated with technical efficiency, both size and competition are significant and positively associated with technical efficiency in all firms. However, the risk is negatively significant in Ind2 and Ind3 but positively significant in Ind1 and Ind4. Although growth has a positive significant relation in Ind2 and Ind6, it has a negative significant relationship in Ind7.

Section two (7.3) in this chapter provided new findings on the factors influencing firms' production efficiencies in the private , public and the mixed sector firms in Sri Lanka, using four years of firm level data.

The null hypothesis (H6b) that 'there is no relationship between selected firm related factors with production efficiency performance in the ownership model,' is rejected in all three sectors. Therefore, these results are consistent with studies in the literature in relation to other economies. In addition overall technical efficiency and mixed ownership have a negative relationship. It means, when mixed firms increase their inputs (capital and material), production efficiency decreases. In the meantime, labour contribution to technical efficiency has a positive relationship with private enterprises, while it has a negative relationship with state enterprises. It means, when firms increase their labour input, it causes an increase in production efficiency of private firms, while it causes a decrease in production efficiency of state firms. These results are

consistent with the property right theory. However, these results slightly differ among various industries. For example, a key factor to be considered is that the plantation industry has extremely strong union influences within the firms. Furthermore, they have very strong political connections which also result in deep-seated political influences.

The results show a strong negative association with firm specific variable leverage and production efficiency of all types of enterprises and in all industries. Firm risk also has a strong negative relationship with production efficiency performance of all types of enterprises. In contrast, a firm which utilizes more capital and material rather than labour, has a strong positive relationship between risk and production efficiency performance of firms in the construction and engineering industry and in the manufacturing industry. In the meantime, a firm which utilizes more labour rather than capital and material, has a strong positive relationship between risk and production efficiency performance of firms in the hotel and travel industries as well as in the trading industry.

The size effect is strongly positive with production efficiency of enterprises in Sri Lanka as a whole and almost in all industries. This implies that firms in all industries in Sri Lanka are experiencing increasing returns. Growth and production efficiency has a negative association when firms use more labour than capital and material, but when firms use more capital and material, there is a positive association between growth and production efficiency. The firms which were enjoying monopoly power in their firm history perform better when they use more material or capital than labour. Production efficiency performance of privatized firms is higher in most industries, except for the land and property and plantation industries.

The next chapter, chapter eight, concludes this thesis. It briefly revisits the research questions, hypotheses and methodology, followed by a summary of the results. Then, it discusses implications of the findings, highlights the contributions and limitations of the study. Finally, it ends with suggestions for future research and extensions.

CHAPTER EIGHT

CONCLUSIONS, LIMITATIONS AND FURTHER RESEARCHS

8.1 Introduction

This research examined trends in the corporate governance and performance, and also in ownership and performance of all listed enterprises of the CSE and all SOEs of Sri Lanka during a four year period from 2003 to 2007. Here three performance measurement techniques were used to measure corporate performance. They are namely accounting/financial performance measures, market based performance measures and production efficiency performance measures.

This research covered four main research questions namely:

(1) 'Do various efficiency measurement approaches generate consistent efficiency assessments for selected enterprises of Sri Lanka?'

(2) 'What is the nature of board size and composition? Does the board size and composition explain the differences in, (a) Enterprises' accounting and/or market performance levels of enterprises in Sri Lanka?' (b) Enterprises' production efficiency performance levels of enterprises in Sri Lanka?'

(3) 'Does type of ownership explain the differences in SOEs PEs and MEs in Sri Lanka', (a) Levels of accounting and/or market performance?' (b) Levels of production efficiency performance?'

(4) 'Do the firm specific factors affect performance?'

All the way through dealing with these four research issues, this study provides empirical evidence about the relationship of corporate governance and ownership with all three types (private, state, mixed) of enterprises in Sri Lanka, to supplement the existing body of knowledge in accounting/financial, market-based and production efficiency performance measures from a developing country's perspective.

As mentioned in chapter three, six main hypotheses and several sub hypotheses were developed for the purpose of answering the above four research questions.

The six main hypotheses are:

(H1) 'Various efficiency measurement approaches do not generate consistent efficiency assessments for selected enterprises of Sri Lanka.

(H2) 'The board size and board composition does not explain the differences in enterprises' accounting and/or market performance levels in Sri Lanka.'

(H3) 'The type of ownership does not explain the differences in SOEs PEs and MEs in Sri Lanka's levels of accounting and/or market performance.'

(H4) 'The board size and board composition does not explain the differences in enterprises' production efficiency performance levels of enterprises in Sri Lanka.

(H5) 'The type of ownership does not explain the differences in SOEs PEs and MEs in Sri Lanka's levels of production efficiency performance.'

(H6) 'The firm specific factors do not affect performance.''

8.2 Findings

For the purpose of answering the first research question, a cross examination was done to determine whether various efficiency measurement approaches generate consistent efficiency assessments for selected enterprises of Sri Lanka.

Three production efficiency performance measures (efficiency change and labour productivity change, technical efficiency) have an association with non-frontier (financial) performance measures. Nevertheless, while accounting ratio, equity multiplier, does not have a relationship with production efficiency performance: Productivity change does not have a relationship with any accounting ratio. The market based performance measure, Tobin's Q, does not have significant relationships either with accounting or production efficiency performance measures. Although most of the accounting/financial performance measures are associated with production efficiency performance measures, they have very low correlation coefficients (less than 0.5) among them. In brief, it appears that the two approaches for measuring performance (frontier and non-frontier) are not equivalent. Hence, the results appear to suggest that both measures are broadly independent of each other.

Considering the second research question is as follows. 'What is the nature of board size and composition? Does the board size and composition explain the differences in enterprises' accounting, market and production efficiency performance levels in Sri Lanka?'

Broad size has a positive relationship with market performance levels of enterprises in Sri Lanka. It means that the contribution of an additional director causes the company's market performance to increase. Also it is found that there is no relationship to accounting performance levels of enterprises in Sri Lanka (not supported to the hypothesis). However, when taking all sample firms together, it can be seen that there is no relationship between board size and production efficiency performance (not supported to the hypothesis). Nevertheless, industry analysis shows a negative relationship only in the trading industry. However, other industries do not show a relationship between board size and production efficiency performance (not supported to the hypothesis).

The non-executive directors' ratio and company performance has a positive significant relationship with accounting performance levels of enterprises in Sri Lanka. However, there is no relationship between market performance and non-executive directors' ratio (not supported by the hypothesis). Also the non-executive directors' ratio and company performance have a positive relationship with production efficiency and it is particularly strong in relation to plantation and service industries.

There could be many reasons for it not to be supported. It is worthwhile to note the governance environment that adopted these elements. For instance, how are meetings actually run? Who is in attendance? Although the results show that there is a positive relationship between board size and the number of non-executive directors, it may be that the composition has little influence on firm performance when the company is stable or growing (Judge, et al., 2003; Siriwardane, 2008). Is it possible to improve the quality of the non-executive directors? Good non-executive directors will be in demand to sit on the boards but would this mean that their talents are too finely spread? Secondly, although prices of ordinary shares have a direct impact on the Tobin's Q since Sri Lanka is a developing country and this is common for most of the developing countries, CSE is also a small and a less matured securities exchange. A third possible explanation is that another variable that somewhat approximates the executive/ non-executive distinction has yet to be identified in the governance literature. One possibility might be leadership expertise, another might be organizational commitment. Obviously field research

would be helpful in terms of understanding the role and impact of governance structures in Sri Lankan companies. It is also essential to identify that an appropriate structure for one firm may not be suitable for another. If shareholder interests are to be promoted, greater flexibility in acceptable governance structures may therefore be essential.

CEO duality and company performance have a negative relationship with both accounting and market performance measures. The relationship is strong with accounting measures. Further, CEO duality and company production efficiency performance have a strong negative relationship with all the other industries except with the plantation industry. However, the plantation industry has a positive relationship between CEO duality and company production efficiency performance. It means, the existence of CEO duality (holding chairman and a chief executive officer posts by one person) is probable to produce a higher production efficiency in the plantation industry.

Answering the research question two, it could be concluded that the board size and the board composition explain the differences in performance levels of enterprises in Sri Lanka up to a certain extent. However, it depends on the measurement technique and the industry.

The third research question addresses the performance evaluation of SOEs PEs and MEs in Sri Lanka, using accounting, market and production efficiency with an unbalanced match sample. As indicated in chapter two, SOEs are known to generally experience lower financial as well as lower productivity performance than PEs and MEs. However, SOEs in two industries (hotels & travel and plantation industries) are indicating higher financial and higher market performance than their PE and ME counterparts. This evidence could be identified by the fact that SOEs in these industries have been financially supported by the government and also are receiving special treatment from the government. Especially, in the hotel industry almost all the state owned hotels are historically located in ideal places for tourist attraction and their goodwill and experience could be the reason for this.

In general, the overall performance of private sector enterprises PEs is better in terms of accounting and market performance measures compared with SOEs and MEs. DuPont equation of ROE clearly shows that the asset turnover and the equity multiplier are highest in private enterprises. This result provides consistent evidence of a higher performance of private sector firms and it is consistent with the empirical literature on performance.

In the case of MEs, even though private enterprises are showing highest ROE, mixed enterprises are earning the highest profit margin. This fact can be indicative that mixed firms have been specially treated by the government and, as recently privatized firms', they are operated in more protected monopoly markets. In two industries (the land and property industry and trading industry) MEs are performing better than the other two types of enterprises. Nevertheless, only having one mixed enterprise in the land and property industry and it receiving special treatment from the government like other mixed enterprises, could be reasons for high performance. Also the partly monopoly situation in the trading industry could be a reason for high performance.

Production efficiency performance results concluded that there is no difference among private, state and mixed enterprises, either because of technical efficiency change, total factor productivity change or labour productivity change. However, there is a significant difference of technological change among private, state and mixed enterprises in relation to all sample firms generally and the manufacturing industry especially. Therefore, it could be concluded that the type of ownership explained the differences in production efficiency levels of SOEs PEs and MEs in Sri Lanka only with regard to technology. Nevertheless, there are no significant differences in production efficiency levels among ownership types either with managerial efficiency or labour efficiency. This is in accordance with the evidence provided by the literature. In all those occasions, while private enterprises recorded the highest technological improvement, mixed enterprises have recorded the lowest technological improvement.

Answering research question three, it could be concluded that the type of ownership explains the differences in accounting, market and production efficiency levels of performance of SOEs PEs and MEs in Sri Lanka. However, the levels of performance could depend either on the measurement technique or industry or some other reason.

To answer research question four, Tobit regression analysis and the Bootstrap method (but Bootstrap results are not presented) were applied for an unbalanced panel of 197 firms with 788 observations in seven industries to identify whether the firm specific factors affect performance. The results show that high leverage firms have a negative association with production efficiency of all types of enterprises and in all industries in Sri Lanka. In general, firms with high firm risk have a negative association with production efficiency. Those facts are clearly in accordance

with the literature. Especially, capital intensive firms (a firm which utilizes more capital rather than labour) have a strong positive relationship between risk and production efficiency performance of firms in the construction and engineering and manufacturing industries. In contrast, labour intensive firms (a firm which utilizes more labour rather than capital) have a strong positive relationship between risk and production efficiency performance of firms in the hotel & travel and trading industries.

The size effect is strongly positive with production efficiency of enterprises in Sri Lanka as a whole and in almost all industries. This implies that the firms in all industries in Sri Lanka are experiencing increasing returns. Because of the ongoing civil war in the northern part in Sri Lanka, firms are not using their full capacity of production. Also another reason could be that almost all firms are either small or medium scale firms. Growth and production efficiency has a negative association when they are labour intensive firms and also there is a positive association between growth and production efficiency when the firms are capital intensive. The firms which were enjoying monopoly power in their firm history, show better performance when they are capital intensive. Production efficiency performance of privatized firms is higher, except for land & property and plantation industries. This gives evidence of high political intervention and the strongest intervention of labour unions in the plantation industry. High competition among real estate companies is the reason for low performance of the land & property industry. On considering the research question, it could be concluded that the firm specific factors have a relationship with production efficiency performance. Except for leverage and size, the other factors, such as growth, firm risk, industry and competition determine their relationship with production efficiency performance, based on their usage of capital and labour.

To suggest that using financial performance or market based performance to determine that a firm is efficient is not an accurate description. If there is an absence of total factor productivity, indicative of value extraction by firms in the process of managing the inputs and outputs, a firm is simply inefficient. That is a known economic fact. Since there appears, at least in this study, the indication of a correlation between any measures of efficiency change, labour productivity change and technical efficiency, with a majority of variables from financial/accounting measure, the conclusion is that the use of one method to assign performance is not appropriate. Therefore,

it could be suggested that the use of all those three sets of measures are needed in order to pass judgment on corporate performance.

8.3 Limitations

This study focuses only on comparing the matched PEs and MEs to SOEs based on industries and therefore 197 firms and 788 observations are included in this study to represent seven industries throughout a four year period of time: 123 PEs, 36 MEs and 38 SOEs. However, there exists a larger number of PEs, MEs and SOEs, than these selected for this study. Owing to data unavailability, the small number of SOEs was selected as a sample. Anyway, other previous studies had used much smaller samples of SOEs than this study. Although there are thousands of unlisted MEs and PEs in addition to listed MEs and PEs, those were not considered due to the unreliability of their financial statements and considering the difficulty in including them in a matched sample.

Especially, data could not be collected regarding non-executive directors and CEO duality of SOEs due to unavailability of data. Therefore, the compositions of boards were compared only between MEs and PEs. That means SOEs were not compared with MEs or PEs. This is one of the major limitations regarding corporate governance comparisons in this study.

The use of accounting data is the other limitation. Whilst, almost all corporate studies use financial statement data and almost all studies use similar data sets. It is stated that the accounting data are not reliable performance indicators. Because, accounting data tend to be biased and subjectively determine by the management of the firms. One defence against this claim is that these numbers may have both positive and negative errors. Therefore, on average it would have cancelled any effect from the errors created by interventions in the reporting process. On the other hand, the literature indicates that there is some debate regarding the use of accounting data. However, in the case of SOEs in Sri Lanka, as recently advised by the Ministry of Finance of Sri Lanka, the Department of the Auditor General audits all the financial statements against the SLAS (Sri Lanka Accounting Standards) which was created by the Institute of Chartered Accountants of Sri Lanka. In addition, listed firms of the Colombo Stock Exchange which were selected as matched sample normally also prepared their financial statements according to SLAS.

Even though the DEA technique needs quantified data i.e. number of employees, number of units of material, number of units produced and the like. We had to use financial data that was extracted from their financial statements and deflated them using a GDP deflator and the wage index due to unavailability of relevant quantities. Although almost all instances researchers have used a similar approach, this is not the real expectation of DEA approach. However, collecting quantity data for a large number of years from a large number of firms is practically impossible. Thus, this is a major limitation of DEA approach.

8.4 Future research

Findings of this research present only a small beginning of the study of corporate governance, accounting, finance and economics applying this approach. Further research concerning firms for corporate governance, financial/accounting and production efficiency performance should be investigated. In order to generalize the findings of this research in the economy, further research should be undertaken, perhaps considering the total population in the CSE as the sample, while research could be carried out even among the non-quoted companies as well. Also when selecting the sample, the banks, finance and insurance sector were omitted due to the fact that the said sector has to comply with different rules and regulations issued by the central bank and other regulatory bodies. However, the banks, finance and insurance sector also need to be considered separately to enhance the findings.

With regard to corporate governance, this research only examined the impact of three elements in the corporate governance namely; board size, number of non-executive directors and the nonexistence of CEO duality to company performance. Yet, there are many other governance variables that affect the company performance such as, the existence of different board committees, independence of the board, board composition, CEO compensation, board culture, ownership structure, and etc. These variables could be dealt together in further studies gain a more complete understanding of the elements of corporate governance which influence company performance.

In relation to ownership types, this study explains three different ownership types and their performance in detail, based on the results and especially considering privatized and mixed enterprises, the remaining issues to be solved with SOEs by the policy makers would be to

further verify whether SOEs should be privatized, or mixed with the private sector, or should be managed more efficiently.

The input and output variables for examining enterprises productivity performance might be extended in future research to employ the quantity and price data that will provide a more useful comparable analysis of the performance of SOEs, PEs and MEs. Also based on the results of this research it could be suggested that considering the lack of evidence of the linkage between financial and production measures, future studies of corporate performance need to be applied to both approaches to asses performance.

Even though the performance of a company can be examined by different performance measures, in this study only accounting, production efficiency and Tobin's Q performance measures were used. However, there are some other company performance measures. These measures could be used for further research, not only as dependent variables but as independent variables as well, since these are cross-sectional in nature.

This study disclosed that SOEs are more efficient than other types of enterprises in some industries. It also revealed that the type of ownership explained the differences in production efficiency levels of SOEs PEs and MEs in Sri Lanka only with regard to technology, but not with either managerial efficiency or labour efficiency. At the same time this study revealed that there is only a small relationship between financial and production efficiency performance measures. Therefore, this fact suggested that the assessment of corporate performance could only be determined at a balanced judgment, if both financial and production efficiency measures were applied to evaluate performance. Since the main objective of SOEs is not maximizing profit, this study especially questioned the long established practice of assessing financial performance of SOEs in preparing privatizing and restructuring programs for SOEs.

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APPENDICES

Appendix 1

Enterprises observed and their ranks based on Total Factor Productivity (TFP) in the Constructions & Engineering Industry of Sri Lanka (2004-2007)

Private Enterprises (PEs)	Rank	TFP
Richard Pieris & Company Limited 246	1	1.766
Ceylon Theatres Limited 230	2	1.11
Vallibel Power Erathna Limited 588	3	1.108
Aitken Spence & Company Limited 224	4	1.101
Carson Cumberbatch & Company Limited 226	5	1.094
Hemas Holdings Limited 238	6	1.063
Hayleys Limited 234	7	1.02
James Finlay & Company (Colombo) Limited	8	0.989
240	9	0.898
Lankem Developments Limited 216	10	0.777
Vidullanka Limited 590	11	0.677
Sunshine Holdings Limited 248	12	0.137
John Keells Holdings Limited 242		
State Owned Enterprises (SOEs)	**Rank**	**TFP**
Central Engineering Consultancy Bureau	1	1.14
Ceylon Electricity Board	2	1.139
Ceylon Petroleum Corporation	3	1.089
Sri Lanka Land Land Reclamation & Development	4	1.023
Corporation	5	1.019
Sri Lanka Ports Authority	6	1.01
State Development & Construction Corporation	7	1.006
State Engineering Corporation	8	0.884
Urban Development Authority		
Mixed Enterprises (MEs)	**Rank**	**TFP**
-	-	-

Appendix 2

Enterprises observed and their ranks based on Labor Productivity (LP) in the Constructions & Engineering Industry of Sri Lanka (2004-2007)

Private Enterprises(PEs)	Rank	LP
Aitken Spence & Company Limited 224	1	1.371
Richard Pieris & Company Limited 246	2	1.263
Carson Cumberbatch & Company Limited 226	3	1.162
Ceylon Theatres Limited 230	4	1.133
Vallibel Power Erathna Limited 588	5	1.129
Sunshine Holdings Limited 248	6	1.105

Hayleys Limited 234	7	1.066
Hemas Holdings Limited 238	8	1.063
James Finlay & Company (Colombo) Limited	9	0.985
240	10	0.779
Vidullanka Limited 590	11	0.686
Lankem Developments Limited 216	12	0.077
John Keells Holdings Limited 242		
State Owned Enterprises (SOEs)	**Rank**	**LP**
Sri Lanka Land Land Reclamation & Development	1	2.785
Corporation	2	1.371
State Development & Construction Corporation	3	1.198
State Engineering Corporation	4	1.108
Urban Development Authority	5	1.094
Ceylon Electricity Board	6	1.056
Ceylon Petroleum Corporation	7	1.011
Central Engineering Consultancy Bureau	8	0.877
Sri Lanka Ports Authority		
Mixed Enterprises (MEs)	**Rank**	**LP**
-	-	-

Appendix 3

Enterprises observed and their ranks based on TFP in the Hotels and Travels Industry of Sri Lanka (2004-2007)

Private Enterprises(PEs)	**Rank**	**TFP**
Fortress Resorts Limited, The 302	1	1.637
Royal Palm Beach Hotels Limited 336	2	1.498
Ceylon Hotels Corporation 294	3	1.271
Riverina Hotels Limited 334	4	1.251
Hotel Reefcomber Limited 308	5	1.202
Pegasus Hotels of Ceylon Limited 330	6	1.114
Eden Hotel Lanka Limited 300	7	1.105
Stafford Hotels Limited 342	8	1.101
Browns Beach Hotels Limited 292	9	1.067
Mercantile Shipping Company Limited 604	10	1.027
Confifi Hotel Holdings Limited 296	11	1.014
Serendib Hotels Limited 338	12	0.988
Renuka City Hotels Limited 332	13	0.98
Associated Hotels Company Limited 288	14	0.923
Trans Asia Hotels Limited 348	15	0.916
Taj Lanka Hotels Limited 344	16	0.915
Tangerine Beach Hotels Limited 346	17	0.91
Paragon Ceylon Limited 606	18	0.908
Nuwara Eliya Hotels Company Limited 328	19	0.9

Connaissance Holdings Limited 298	20	0.888
Sigiriya Village Hotels Limited 340	21	0.888
Lighthouse Hotel Limited The 320	22	0.887
Aitken Spence Hotel Holdings Limited 284	23	0.885
Miramar Beach Hotel Limited 326	24	0.862
Hotel Sigiriya Limited 312	25	0.825
State Owned Enterprises (SOEs)	**Rank**	**TFP**
Airport & Aviation Servises (SL) Ltd	1	1.186
Ceylon Shipping Corporation	2	0.922
Mixed Enterprises (MEs)	**Rank**	**TFP**
Asian Hotels & Properties Limited	1	1.02
286	2	1.02
Hunas Falls Hotels Limited 314	3	0.936
Galadari Hotels (Lanka) Limited 304	4	0.835
Hotel Services (Ceylon) Limited 310		

Appendix 4

Enterprises observed and their ranks based on LP in the Hotels and Travels Industry of Sri Lanka (2004-2007)

Private Enterprises(PEs)	**Rank**	**LP**
Fortress Resorts Limited, The 302	1	1.855
Royal Palm Beach Hotels Limited 336	2	1.526
Riverina Hotels Limited 334	3	1.522
Hotel Reefcomber Limited 308	4	1.357
Eden Hotel Lanka Limited 300	5	1.181
Ceylon Hotels Corporation 294	6	1.178
Pegasus Hotels of Ceylon Limited 330	7	1.169
Stafford Hotels Limited 342	8	1.114
Browns Beach Hotels Limited 292	9	1.064
Mercantile Shipping Company Limited 604	10	1.041
Confifi Hotel Holdings Limited 296	11	1.031
Connaissance Holdings Limited 298	12	1.006
Miramar Beach Hotel Limited 326	13	1.002
Serendib Hotels Limited 338	14	0.967
Renuka City Hotels Limited 332	15	0.964
Paragon Ceylon Limited 606	16	0.953
Trans Asia Hotels Limited 348	17	0.942
Nuwara Eliya Hotels Company Limited 328	18	0.916
Associated Hotels Company Limited 288	19	0.911
Sigiriya Village Hotels Limited 340	20	0.894
Taj Lanka Hotels Limited 344	21	0.888
Tangerine Beach Hotels Limited 346	22	0.868

Aitken Spence Hotel Holdings Limited 284	23	0.863
Hotel Sigiriya Limited 312	24	0.841
Lighthouse Hotel Limited The 320	25	0.806
State Owned Enterprises (SOEs)	**Rank**	**LP**
Airport & Aviation Servises (SL) Ltd	1.138	1
Ceylon Shipping Corporation	0.969	2
Mixed Enterprises (MEs)	**Rank**	**LP**
Hunas Falls Hotels Limited 314	1	1.153
Asian Hotels & Properties Limited 286	2	1.137
Galadari Hotels (Lanka) Limited 304	3	0.951
Hotel Services (Ceylon) Limited 310	4	0.831

Appendix 5

Enterprises observed and their ranks based on TFP in the Land and Property Industry of Sri Lanka (2004-2007)

Private Enterprises(PEs)	**Rank**	**TFP**
Land & Building Ltd 408	1	1.416
Equity Two Limited 400	2	1.118
Three Acre Farms Limited 178	3	1.111
Huejay International Investments Limited 402	4	1.033
Commercial Development Company Limited	5	1.025
394	6	1.019
C T Land Development Limited 380	7	1.01
Bairaha Farms Limited 140	8	1.007
Overseas Realty (Ceylon) Limited 414	9	0.998
Ceylinco Housing & Real Estate Company	10	0.968
Limited 384	11	0.951
Kelsey Developments Limited 406	12	0.87
Colombo Land & Development Company	13	0.86
Limited 390		
Ceylinco Seylan Developments Limited 386		
Equity One Limited 398		
State Owned Enterprises (SOEs)	**Rank**	**TFP**
Employee Trust Fund	1	1.454
Skills Development Fund Ltd	2	1.306
National Livestock Development Board	3	1.113
Lady Lochore Loan Fund	4	0.979
Sri Lanka Cashew Corporation	5	0.934
Local Loans & Development Fund	6	0.874
Mixed Enterprises (MEs)	**Rank**	**TFP**
Property Development Limited 418	1	0.917

Appendix 6

Enterprises observed and their ranks based on LP in the Land and Property Industry of Sri Lanka (2004-2007)

Private Enterprises(PEs)	Rank	LP
Ceylinco Housing & Real Estate Company	1	1.39
Limited 384	2	1.141
Land & Building Ltd 408	3	1.095
Kelsey Developments Limited 406	4	1.09
Commercial Development Company Limited	5	1.087
394	6	1.061
Bairaha Farms Limited 140	7	1.044
Three Acre Farms Limited 178	8	1.029
Ceylinco Seylan Developments Limited 386	9	1.029
Colombo Land & Development Company	10	0.949
Limited 390	11	0.897
Equity Two Limited 400	12	0.844
C T Land Development Limited 380	13	0.397
Equity One Limited 398		
Huejay International Investments Limited 402		
Overseas Realty (Ceylon) Limited 414		
State Owned Enterprises (SOEs)	**Rank**	**LP**
National Livestock Development Board	1	0.99
Lady Lochore Loan Fund	2	0.988
Employee Trust Fund	3	0.977
Local Loans & Development Fund	4	0.865
Sri Lanka Cashew Corporation	5	0.848
Skills Development Fund Ltd	6	0.825
Mixed Enterprises (MEs)	**Rank**	**LP**
Property Development Limited 418	1	0.923

Appendix 7

Enterprises observed and their ranks based on TFP in the Manufacturing Industry of Sri Lanka (2004-2007)

Private Enterprises(PEs)	Rank	TFP
Lake House Printers & Publishers Limited 602	1	1.081
Singer Industries (Ceylon) Limited 496	2	1.05
Ceylon Grain Elevators Limited 454	3	1.043
Ceylon Printers Limited 596	4	1.034
Regnis Lanka Limited 486	5	1.026
ACL Cables Limited 432	6	1.02

Associated Electrical Corporation Limited 440	7	1.014
Blue Diamonds Jewellery Worldwide Limited	8	1.013
442	9	1.012
Nestle Lanka Limited 168	10	1.012
Caltex Lubricants Lanka Limited 446	11	1.011
Kuruwita Textile Mills Limited 260	12	1.008
Ceylon Tobacco Company Limited 152	13	1.002
Lion Brewery Ceylon Limited, The 176	14	1
Lanka Aluminium Industries Limited 468	15	0.999
Ceylon Cold Stores Limited 148	16	0.998
Keells Food Products Limited 162	17	0.998
Soy Foods Lanka Limited 172	18	0.998
Royal Ceramics Lanka Limited 488	19	0.997
Sierra Cables Limited 494	20	0.994
Harischandra Mills Limited 160	21	0.993
Swadeshi Industrial Works Limited 498	22	0.99
Abans Electricals Limited 430	23	0.989
Central Industries Limited 448	24	0.987
Samson International Limited 492	25	0.982
Acme Printing & Packaging Limited 436	26	0.982
Printcare (Ceylon) Limited 484	27	0.976
Kelani Cables Limited 464	28	0.97
Ceylon Brewery Limited, The 146	29	0.969
Dipped Products Limited 462	30	0.953
ACL Plastics Limited 434	31	0.904
Lanka Tiles Limited 474	32	0.768
Asian Cotton Mills Limited 254		
State Owned Enterprises (SOEs)	**Rank**	**TFP**
Manthai Salt Ltd	1	1.195
Thamankaduwa Agro Fertillizer Ltd	2	1.157
Lanka Fabrics Ltd	3	1.099
Ceylon Fertillizer Co. Ltd	4	1.051
State Timber Corporation	5	1.03
Associated Newspapers of Ceylon Ltd	6	0.978
MILCO Pvt Ltd	7	0.974
Lanka Mineral Sands Ltd	8	0.825
Northsea Ltd	9	0.712
Mixed Enterprises (MEs)	**Rank**	**TFP**
Lanka Walltile Limited 478	1	1.738
Bogala Graphite Lanka Limited 444	2	1.211
Ceylon Oxygen Limited 456	3	1.157
Lanka Cement Limited 470	4	1.058
Kelani Tyres Limited 466	5	0.994

Lanka Ceramic Limited 472	6	0.978
Ceylon Leather Products Limited 256	7	0.953
Distilleries Company of Sri Lanka	8	0.898
Limited 156	9	0.734
Dankotuwa Porcelain Limited 458	10	0.615
Ceylon Glass Company Limited 450		

Appendix 8

Enterprises observed and their ranks based on LP in the Manufacturing Industry of Sri Lanka (2004-2007)

Private Enterprises(PEs)	Rank	LP
Lion Brewery Ceylon Limited, The 176	1	2.238
Kelani Cables Limited 464	2	1.276
Abans Electricals Limited 430	3	1.258
ACL Cables Limited 432	4	1.243
Lanka Aluminium Industries Limited 468	5	1.222
Blue Diamonds Jewellery Worldwide Limited	6	1.214
442	7	1.211
Ceylon Printers Limited 596	8	1.144
Ceylon Brewery Limited, The 146	9	1.142
Ceylon Cold Stores Limited 148	10	1.133
Caltex Lubricants Lanka Limited 446	11	1.127
Lanka Tiles Limited 474	12	1.113
Ceylon Grain Elevators Limited 454	13	1.094
Regnis Lanka Limited 486	14	1.093
Sierra Cables Limited 494	15	1.091
Ceylon Tobacco Company Limited 152	16	1.089
Harischandra Mills Limited 160	17	1.082
Acme Printing & Packaging Limited 436	18	1.066
Nestle Lanka Limited 168	19	1.061
Dipped Products Limited 462	20	1.056
Kuruwita Textile Mills Limited 260	21	1.055
Associated Electrical Corporation Limited 440	22	1.052
Keells Food Products Limited 162	23	1.044
ACL Plastics Limited 434	24	1.025
Printcare (Ceylon) Limited 484	25	1.019
Royal Ceramics Lanka Limited 488	26	1.007
Singer Industries (Ceylon) Limited 496	27	0.969
Swadeshi Industrial Works Limited 498	28	0.945
Lake House Printers & Publishers Limited 602	29	0.935
Central Industries Limited 448	30	0.921
Soy Foods Lanka Limited 172	31	0.745

Samson International Limited 492 Asian Cotton Mills Limited 254	32	0.697
State Owned Enterprises (SOEs)	**Rank**	**LP**
State Timber Corporation	1	1.115
Thamankaduwa Agro Fertillizer Ltd	2	1.112
Manthai Salt Ltd	3	1.072
Lanka Fabrics Ltd	4	1.045
MILCO Pvt Ltd	5	0.964
Associated Newspapers of Ceylon Ltd	6	0.952
Ceylon Fertillizer Co. Ltd	7	0.892
Northsea Ltd	8	0.865
Lanka Mineral Sands Ltd	9	0.796
Mixed Enterprises (MEs)	**Rank**	**LP**
Lanka Walltile Limited 478	1	3.665
Bogala Graphite Lanka Limited 444	2	1.236
Ceylon Glass Company Limited 450	3	1.149
Lanka Ceramic Limited 472	4	1.081
Ceylon Oxygen Limited 456	5	1.08
Kelani Tyres Limited 466	6	1.077
Dankotuwa Porcelain Limited 458	7	1.071
Distilleries Company of Sri Lanka Limited 156	8	0.947
Ceylon Leather Products Limited 256	9	0.938
Lanka Cement Limited 470	10	0.861

Appendix 9

Enterprises observed and their ranks based on TFP in the Plantation Industry of Sri Lanka (2004-2007)

Private Enterprises(PEs)	**Rank**	**TFP**
Good Hope Company Limited, The 530	1	4.24
Bukit Darah Company Limited, The 528	2	1.606
Indo-Malay Estates Limited, The 532	3	1.389
Selinsing Company Limited, The 534	4	1.092
Metropolitan Resource Holdings Limited 568	5	0.973
Shalimar (Malay) Estate Company Limited, The 536	6	0.868
State Owned Enterprises (SOEs)	**Rank**	**TFP**
Kalubowitiyana Tea Factory Ltd	0.302	1
Mixed Enterprises (MEs)	**Rank**	**TFP**
Bogawantalawa Tea Estates Limited	1	2.024

546	2	1.877
Maskeliya Plantations Limited 566	3	1.39
Hapugastenne Plantations Limited	4	1.293
550	5	1.272
Balangoda Plantations Limited 544	6	1.218
Talawakelle Tea Estates Limited 572	7	1.062
Kahawatte Plantations Limited 554	8	0.955
Watawala Plantations Limited 576	9	0.886
Udapussellawa Plantations Limited	10	0.866
574	11	0.795
Kelani Valley Plantations Limited 558	12	0.738
Namunukula Plantations Limited 570	13	0.712
Kotagala Plantations Limited 560	14	0.684
Malwatte Valley Plantations Limited	15	0.382
564	16	0.159
Kegalle Plantations Limited 556	17	0.13
Agalawatte Plantations Limited 542		
Elpitiya Plantations Limited 548		
Madulsima Plantations Limited 562		
Horana Plantations Limited 552		

Appendix 10

Enterprises observed and their ranks based on LP in the Plantation Industry of Sri Lanka (2004-2007)

Private Enterprises(PEs)	**Rank**	**LP**
Good Hope Company Limited, The 530	1	1.766
Selinsing Company Limited, The 534	2	1.748
Indo-Malay Estates Limited, The 532	3	1.638
Shalimar (Malay) Estate Company Limited, The	4	1.201
536	5	1.055
Bukit Darah Company Limited, The 528	6	0.978
Metropolitan Resource Holdings Limited 568		
State Owned Enterprises (SOEs)	**Rank**	**LP**
Kalubowitiyana Tea Factory Ltd	1	0.478
Mixed Enterprises (MEs)	**Rank**	**LP**
Maskeliya Plantations Limited 566	1	1.825
Kelani Valley Plantations Limited 558	2	1.352
Hapugastenne Plantations Limited 550	3	1.279
Watawala Plantations Limited 576	4	0.985
Udapussellawa Plantations Limited 574	5	0.957
Namunukula Plantations Limited 570	6	0.921
Balangoda Plantations Limited 544	7	0.852
Kotagala Plantations Limited 560	8	0.769

Talawakelle Tea Estates Limited 572	9	0.735
Bogawantalawa Tea Estates Limited 546	10	0.698
Kegalle Plantations Limited 556	11	0.682
Kahawatte Plantations Limited 554	12	0.616
Malwatte Valley Plantations Limited 564	13	0.607
Elpitiya Plantations Limited 548	14	0.563
Agalawatte Plantations Limited 542	15	0.545
Madulsima Plantations Limited 562	16	0.184
Horana Plantations Limited 552	17	0.124

Appendix 11

Enterprises observed and their ranks based on TFP in the Services Industry of Sri Lanka (2004-2007)

Private Enterprises(PEs)	**Rank**	**TFP**
E-Channelling Limited 356	1	1.473
John Keells Limited 598	2	1.062
Haycarb Limited 190	3	1.028
Union Chemicals Lanka Limited 204	4	1.028
Chemanex Limited 184	5	1.014
Lankem Ceylon Limited 196	6	1.011
Colombo Pharmacy Company Limited 612	7	0.985
Chemical Industries (Colombo) Limited 188	8	0.98
Nawaloka Hospitals Limited 274	9	0.967
Asha Central Hospitals Limited 266	10	0.935
Asiri Hospitals Limited 268	11	0.921
State Owned Enterprises (SOEs)	**Rank**	**TFP**
State Pharmaceutical Manufacturing Corporation	1	1.019
National Institute of Business Management	2	0.983
State Pharmaceutical Corporation of Sri Lanka	3	0.975
Sri Lanka Bureau of Forign Employment	4	0.954
Sri Lanka Rupavahini Corporation	5	0.951
Independent Television Network	6	0.94
Sri Lanka Ayurvedic Drugs Corporation	7	0.865
Mixed Enterprises (MEs)	**Rank**	**TFP**
_	_	_

Appendix 12

Enterprises observed and their ranks based on LP in the Services Industry of Sri Lanka (2004-2007)

Private Enterprises(PEs)	**Rank**	**LP**
Union Chemicals Lanka Limited 204	1	1.184
Haycarb Limited 190	2	1.161

Lankem Ceylon Limited 196	3	1.13
Chemanex Limited 184	4	1.099
Colombo Pharmacy Company Limited 612	5	1.059
Asiri Hospitals Limited 268	6	1.013
Asha Central Hospitals Limited 266	7	1.008
Nawaloka Hospitals Limited 274	8	0.985
Chemical Industries (Colombo) Limited 188	9	0.944
John Keells Limited 598	10	0.867
E-Channelling Limited 356	11	0.743
State Owned Enterprises (SOEs)	**Rank**	**LP**
National Institute of Business Management	1	1.03
Sri Lanka Ayurvedic Drugs Corporation	2	1.009
State Pharmaceutical Manufacturing Corporation	3	1.009
Sri Lanka Rupavahini Corporation	4	0.996
Sri Lanka Bureau of Forign Employment	5	0.974
State Pharmaceutical Corporation of Sri Lanka	6	0.96
Independent Television Network	7	0.913
Mixed Enterprises (MEs)	**Rank**	**LP**
_	_	_

Appendix 13

Enterprises observed and their ranks based on TFP in the Trading Industry of Sri Lanka (2004-2007)

Private Enterprises(PEs)	**Rank**	**TFP**
Hayleys Exports Limited 650	1	1.144
Radiant Gems International Limited 654	2	1.1
Coco Lanka Limited 154	3	1.064
Autodrome Limited, The 510	4	1.061
Eastern Merchants Limited 648	5	1.058
United Motors Lanka Limited 522	6	1.045
Office Equipment Limited 652	7	1.028
Gestetner of Ceylon Limited 616	8	1.021
Brown & Company Limited 642	9	1.015
C.W. Mackie & Company Limited 644	10	1.013
Ceylon Tea Services Limited 150	11	1
Diesel & Motor Engineering Company Limited	12	0.993
514	13	0.99
Singer (Sri Lanka) Limited 658	14	0.983
Hunter & Company Limited 618	15	0.98
Cargills (Ceylon) Limited 142	16	0.98
Colonial Motors Limited 512	17	0.969
E. B. Creasy & Company Limited 614	18	0.968

Associated Motorways Limited 506	19	0.967
Dialog Telekom Limited 628	20	0.959
Suntel Limited 634	21	0.946
Lanka IOC Limited 584	22	0.936
Muller and Phipps (Ceylon) Limited 622	23	0.887
Richard Pieris Exports Limited 656	24	0.88
Tess Agro Limited 660		
State Owned Enterprises (SOEs)	**Rank**	**TFP**
Cey-Nor Foundation	1	1.058
Ceylon Fisheries Corporation	2	0.993
National Water Supply & Drainage Board	3	0.974
National Lotteries Board	4	0.921
Development Lotteries Board	5	0.836
Mixed Enterprises (MEs)	**Rank**	**TFP**
Sri Lanka Telecom Limited 632	1	1.061
Sathosa Motors Limited 520	2	1.033
Tea Smallholder Factories Limited	3	1.014
174	4	1.007
Lanka Ashok Leyland Limited 516		

Appendix 14

Enterprises observed and their ranks based on LP in the Trading Industry of Sri Lanka (2004-2007)

Private Enterprises(PEs)	**Rank**	**LP**
Hayleys Exports Limited 650	1	2.342
Radiant Gems International Limited 654	2	1.336
Autodrome Limited, The 510	3	1.249
Ceylon Tea Services Limited 150	4	1.202
United Motors Lanka Limited 522	5	1.198
Eastern Merchants Limited 648	6	1.162
Suntel Limited 634	7	1.12
Brown & Company Limited 642	8	1.118
Office Equipment Limited 652	9	1.094
E. B. Creasy & Company Limited 614	10	1.07
C.W. Mackie & Company Limited 644	11	1.07
Gestetner of Ceylon Limited 616	12	1.05
Associated Motorways Limited 506	13	1.027
Coco Lanka Limited 154	14	0.978
Diesel & Motor Engineering Company Limited	15	0.973
514	16	0.953
Singer (Sri Lanka) Limited 658	17	0.933
Lanka IOC Limited 584	18	0.928
Cargills (Ceylon) Limited 142	19	0.911
Hunter & Company Limited 618	20	0.894
Dialog Telekom Limited 628	21	0.875
Richard Pieris Exports Limited 656	22	0.843
Colonial Motors Limited 512	23	0.838
Muller and Phipps (Ceylon) Limited 622	24	0.622
Tess Agro Limited 660		
State Owned Enterprises (SOEs)	**Rank**	**LP**
Ceylon Fisheries Corporation	1	1.456
National Water Supply & Drainage Board	2	1.019
National Lotteries Board	3	0.916
Development Lotteries Board	4	0.702
Cey-Nor Foundation	5	0.69
Mixed Enterprises (MEs)	**Rank**	**LP**
Tea Smallholder Factories Limited 174	1	1.283
Sathosa Motors Limited 520	2	1.208
Lanka Ashok Leyland Limited 516	3	1.014
Sri Lanka Telecom Limited 632	4	0.994

Appendix 15

Bootstrap Results

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
xxxxxx.x.....xx.....x...xx..x.....x..x..x.xx..... 50

Tobit regression Number of obs = 783
Replications = 32
Wald chi2(9) = 303.21
Prob > chi2 = 0.0000
Log likelihood = -130.23909 Pseudo R2 = 0.4600

Observed TEcrs	Bootstrap Coef.	Std. Err.	z	P>z	Normal-based [95% Conf.	Interval]
Private	-.0187509	.0280696	-0.67	0.504	-.0737663	.0362644
Mixed	-.1226666	.0442614	-2.77	0.006	-.2094173	-.0359159
Industry	.0520299	.0057612	9.03	0.000	.0407382	.0633216
Competition	.1962602	.0392301	5.00	0.000	.1193706	.2731498
Privatized	-.0017818	.033372	-0.05	0.957	-.0671897	.0636261
Size	.0318404	.005405	5.89	0.000	.0212468	.042434
Growth	.5385939	.3467943	1.55	0.120	-.1411104	1.218298
Risk	-1.07e-07	2.03e-08	-5.25	0.000	-1.46e-07	-6.67e-08
Leverageco~t	-.1007558	.0219354	-4.59	0.000	-.1437484	-.0577633
_cons	.0287388	.0770988	0.37	0.709	-.1223721	.1798496
/sigma	.2505291	.0086714			.2335333	.2675248

Obs. summary: 0 left-censored observations
684 uncensored observations
99 right-censored observations at TEcrs>=1
Note: One or more parameters could not be estimated in 18 bootstrap replicates; standard error estimates include only complete replications.

(running tobit on estimation sample)

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..x.xxxx..x.x...x..xx....x..x..xxx.x.xx.....xxxxx 50

Tobit regression Number of obs = 784

Replications = 27
Wald chi2(9) = 322.89
Prob > chi2 = 0.0000
Log likelihood = -293.89037 Pseudo R2 = 0.2127

TEvrs	Observed Coef.	Bootstrap Std. Err.	z	P>z	Normal-based [95% Conf.	Interval]
Private	-.080794	.0353301	-2.29	0.022	-.1500398	-.0115482
Mixed	-.1408787	.0641447	-2.20	0.028	-.2666	-.0151574
Industry	.0402679	.0057775	6.97	0.000	.0289442	.0515916
Competition	.2858298	.056311	5.08	0.000	.1754624	.3961973
Privatized	.0658688	.0588635	1.12	0.263	-.0495015	.181239
Size	.0454269	.0089412	5.08	0.000	.0279025	.0629514
Growth	-.0182807	.4160885	-0.04	0.965	-.8337993	.7972378
Risk	-1.10e-07	2.25e-08	-4.88	0.000	-1.54e-07	-6.58e-08
Leverageco~t	-.0803026	.0215894	-3.72	0.000	-.122617	-.0379882
_cons	.0681006	.1167431	0.58	0.560	-.1607117	.2969129
/sigma	.2942257	.010885			.2728915	.31556

Obs. summary: 0 left-censored observations
582 uncensored observations
202 right-censored observations at TEvrs>=1
Note: One or more parameters could not be estimated in 23 bootstrap replicates; standard error estimates include only complete replications.

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
x.xxxx.....xx.xx..xxx...x...x..xxx.x.xxxxx.x..x. 50

Tobit regression Number of obs = 784
Replications = 25
Wald chi2(9) = 173.76
Prob > chi2 = 0.0000
Log likelihood = 72.267652 Pseudo R2 = -1.6123

LbrContoTE	Observed Coef.	Bootstrap Std. Err.	z	P>z	Normal-based [95% Conf.	Interval]

Private .0297039 .015657 1.90 0.058 -.0009833 .0603912
Mixed -.0306636 .0338102 -0.91 0.364 -.0969304 .0356032
Industry .0138135 .0037921 3.64 0.000 .006381 .0212459
Competition -.0701754 .0125576 -5.59 0.000 -.0947879 -.0455629
Privatized -.0212826 .0330339 -0.64 0.519 -.0860279 .0434627
Size .0193921 .0051878 3.74 0.000 .0092242 .0295599
Growth -.6320934 .1305818 -4.84 0.000 -.8880291 -.3761578
Risk -2.40e-08 1.88e-08 -1.28 0.202 -6.09e-08 1.29e-08
Leverageco~t -.0477185 .0168507 -2.83 0.005 -.0807453 -.0146917
_cons -.2457314 .0773115 -3.18 0.001 -.3972592 -.0942035

/sigma .2029947 .00967 .1840418 .2219476

Obs. summary: 7 left-censored observations at LbrContoTE<=0
749 uncensored observations
28 right-censored observations at LbrContoTE>=1
Note: One or more parameters could not be estimated in 25 bootstrap replicates; standard error estimates include only complete replications.

(running tobit on estimation sample)

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..... 50

Tobit regression Number of obs = 784
Replications = 50
Wald chi2(8) = 100.73
Prob > chi2 = 0.0000
Log likelihood = 70.309855 Pseudo R2 = -1.5415

Observed Bootstrap Normal-based
LbrContoTE Coef. Std. Err. z P>z [95% Conf. Interval]

State -.02547 .0162117 -1.57 0.116 -.0572443 .0063043
Industry .0135401 .0040268 3.36 0.001 .0056477 .0214326
Competition -.0750866 .019272 -3.90 0.000 -.112859 -.0373141
Privatized -.06289 .015127 -4.16 0.000 -.0925385 -.0332416
Size .0189407 .0051481 3.68 0.000 .0088506 .0290308
Growth -.6638721 .1236937 -5.37 0.000 -.9063073 -.4214368

Risk -2.21e-08 1.46e-08 -1.51 0.131 -5.08e-08 6.57e-09
Leverageco~t -.0505779 .014054 -3.60 0.000 -.0781232 -.0230327
_cons -.2154942 .0688113 -3.13 0.002 -.3503619 -.0806265

/sigma .2035182 .0150972 .1739283 .2331081

Obs. summary: 7 left-censored observations at LbrContoTE<=0
749 uncensored observations
28 right-censored observations at LbrContoTE>=1

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..... 50

Tobit regression Number of obs = 784
Replications = 50
Wald chi2(8) = 129.72
Prob > chi2 = 0.0000
Log likelihood = -294.75717 Pseudo R2 = 0.2104

Observed Bootstrap Normal-based
TEvrs Coef. Std. Err. z P>z [95% Conf. Interval]

State .0850285 .0351559 2.42 0.016 .0161242 .1539329
Industry .0399521 .0075808 5.27 0.000 .025094 .0548102
Competition .2805696 .0656846 4.27 0.000 .1518302 .409309
Privatized .0244894 .0285663 0.86 0.391 -.0314995 .0804782
Size .0450021 .0083225 5.41 0.000 .0286903 .0613139
Growth -.0481663 .5546953 -0.09 0.931 -1.135349 1.039017
Risk -1.08e-07 2.38e-08 -4.54 0.000 -1.55e-07 -6.14e-08
Leverageco~t -.0832816 .0213155 -3.91 0.000 -.1250592 -.041504
_cons -.0124464 .1115178 -0.11 0.911 -.2310173 .2061245

/sigma .2945722 .0100988 .2747789 .3143655

Obs. summary: 0 left-censored observations
582 uncensored observations
202 right-censored observations at TEvrs>=1

(running tobit on estimation sample)

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..... 50

Tobit regression Number of obs = 783
Replications = 50
Wald chi2(8) = 251.66
Prob > chi2 = 0.0000
Log likelihood = -133.96998 Pseudo R2 = 0.4445

Observed TEcrs	Bootstrap Coef.	Std. Err.	z	P>z	Normal-based [95% Conf.	Interval]
State	.0260031	.0272706	0.95	0.340	-.0274463	.0794525
Industry	.0515473	.0063791	8.08	0.000	.0390445	.06405
Competition	.1878046	.0482745	3.89	0.000	.0931883	.2824209
Privatized	-.0734137	.0258485	-2.84	0.005	-.1240758	-.0227517
Size	.0310559	.0060612	5.12	0.000	.0191761	.0429357
Growth	.4842246	.4326197	1.12	0.263	-.3636944	1.332144
Risk	-1.03e-07	1.98e-08	-5.22	0.000	-1.42e-07	-6.45e-08
Leverageco~t	-.1058431	.0177584	-5.96	0.000	-.140649	-.0710372
_cons	.0109873	.0776537	0.14	0.887	-.1412112	.1631859
/sigma	.2520336	.0077615			.2368214	.2672459

Obs. summary: 0 left-censored observations
684 uncensored observations
99 right-censored observations at TEcrs>=1

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
xx.xxxxxx.xxx.x..xxx.x.x...xxxxx..xxxx.xxx...xxx.x 50

Tobit regression Number of obs = 635
Replications = 17
Wald chi2(11) = 1925.89
Prob > chi2 = 0.0000
Log likelihood = -103.65924 Pseudo R2 = 0.3915

Observed Bootstrap Normal-based
TEcrs Coef. Std. Err. z P>z [95% Conf. Interval]

Mixed -.1139469 .0424369 -2.69 0.007 -.1971217 -.0307722
Industry .0468769 .003737 12.54 0.000 .0395525 .0542012
Competition .1701498 .0474658 3.58 0.000 .0771185 .263181
Privatized -.0010642 .0427438 -0.02 0.980 -.0848406 .0827121
Size .0297964 .0065326 4.56 0.000 .0169927 .0426001
Growth .1297695 .4213182 0.31 0.758 -.695999 .9555381
Leverage -.197639 .0502279 -3.93 0.000 -.2960838 -.0991941
Risk -1.03e-07 2.19e-08 -4.71 0.000 -1.46e-07 -6.03e-08
TotalDirec~s .002621 .0064466 0.41 0.684 -.0100142 .0152561
CEODuality -.0247585 .0281868 -0.88 0.380 -.0800036 .0304867
NonExRatio -.042454 .033206 -1.28 0.201 -.1075367 .0226286
_cons .2379496 .0901258 2.64 0.008 .0613063 .4145929

/sigma .2498668 .0081633 .2338671 .2658666

Obs. summary: 0 left-censored observations
560 uncensored observations
75 right-censored observations at TEcrs>=1
Note: One or more parameters could not be estimated in 33 bootstrap replicates;

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..... 50

Tobit regression Number of obs = 635
Replications = 50
Wald chi2(11) = 159.35
Prob > chi2 = 0.0000
Log likelihood = -103.65924 Pseudo R2 = 0.3915

Observed Bootstrap Normal-based
TEcrs Coef. Std. Err. z P>z [95% Conf. Interval]

Private .1139469 .0312685 3.64 0.000 .0526617 .1752321
Industry .0468769 .0075106 6.24 0.000 .0321565 .0615973
Competition .1701498 .0583211 2.92 0.004 .0558426 .2844569
Privatized -.0010642 .026592 -0.04 0.968 -.0531837 .0510552
Size .0297964 .0066974 4.45 0.000 .0166698 .042923

Growth .1297695 .4427065 0.29 0.769 -.7379193 .9974584
Leverage -.197639 .0748289 -2.64 0.008 -.3443009 -.0509771
Risk -1.03e-07 2.38e-08 -4.34 0.000 -1.50e-07 -5.66e-08
TotalDirec~s .002621 .0050996 0.51 0.607 -.007374 .012616
CEODuality -.0247585 .0218125 -1.14 0.256 -.0675102 .0179933
NonExRatio -.042454 .0229084 -1.85 0.064 -.0873537 .0024456
_cons .1240027 .1012514 1.22 0.221 -.0744464 .3224518

/sigma .2498668 .0081583 .2338768 .2658568

Obs. summary: 0 left-censored observations
560 uncensored observations
75 right-censored observations at TEcrs>=1

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..... 50

Tobit regression Number of obs = 636
Replications = 50
Wald chi2(11) = 145.63
Prob > chi2 = 0.0000
Log likelihood = -225.82028 Pseudo R2 = 0.1930

Observed Bootstrap Normal-based
TEvrs Coef. Std. Err. z P>z [95% Conf. Interval]

Private .0664878 .0653021 1.02 0.309 -.061502 .1944777
Industry .0327816 .0074062 4.43 0.000 .0182658 .0472974
Competition .215434 .0670557 3.21 0.001 .0840073 .3468607
Privatized .0610011 .0585423 1.04 0.297 -.0537396 .1757418
Size .0539415 .0099675 5.41 0.000 .0344056 .0734775
Growth -.0320571 .561866 -0.06 0.955 -1.133294 1.06918
Leverage -.1295141 .068833 -1.88 0.060 -.2644242 .0053961
Risk -9.96e-08 2.86e-08 -3.49 0.000 -1.56e-07 -4.37e-08
TotalDirec~s .0050245 .0075382 0.67 0.505 -.0097501 .0197991
CEODuality .0590261 .0215615 2.74 0.006 .0167663 .1012859
NonExRatio -.0523198 .0279967 -1.87 0.062 -.1071924 .0025528
_cons -.0912474 .1299052 -0.70 0.482 -.3458569 .163362

/sigma .2869936 .0101185 .2671616 .3068255

Obs. summary: 0 left-censored observations
483 uncensored observations
153 right-censored observations at TEvrs>=1

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
.... 50

Tobit regression Number of obs = 636
Replications = 50
Wald chi2(11) = 129.91
Prob > chi2 = 0.0000
Log likelihood = -225.82028 Pseudo R2 = 0.1930

Observed TEvrs	Coef.	Bootstrap Std. Err.	z	P>z	Normal-based [95% Conf.	Interval]
Mixed	-.0664878	.0463123	-1.44	0.151	-.1572582	.0242825
Industry	.0327816	.0075788	4.33	0.000	.0179275	.0476357
Competition	.215434	.0732743	2.94	0.003	.0718189	.3590491
Privatized	.0610011	.0475951	1.28	0.200	-.0322835	.1542858
Size	.0539415	.0088346	6.11	0.000	.036626	.0712571
Growth	-.0320571	.5049643	-0.06	0.949	-1.021769	.9576547
Leverage	-.1295141	.0622222	-2.08	0.037	-.2514673	-.0075609
Risk	-9.96e-08	3.29e-08	-3.03	0.002	-1.64e-07	-3.51e-08
TotalDirec~s	.0050245	.0068861	0.73	0.466	-.0084721	.0185211
CEODuality	.0590261	.0229809	2.57	0.010	.0139845	.1040678
NonExRatio	-.0523198	.0349827	-1.50	0.135	-.1208846	.016245
_cons	-.0247596	.1220604	-0.20	0.839	-.2639936	.2144744
/sigma	.2869936	.0106371			.2661452	.3078419

Obs. summary: 0 left-censored observations
483 uncensored observations
153 right-censored observations at TEvrs>=1

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
.... 50

Tobit regression Number of obs = 636
Replications = 50
Wald chi2(11) = 79.03
Prob > chi2 = 0.0000
Log likelihood = -4.4814692 Pseudo R2 = 0.8524

Observed LbrContoTE	Coef.	Bootstrap Std. Err.	z	Normal-based P>z	[95% Conf.	Interval]
Mixed	-.0642256	.027752	-2.31	0.021	-.1186185	-.0098328
Industry	.0127386	.0052538	2.42	0.015	.0024413	.0230358
Competition	-.0883228	.0157922	-5.59	0.000	-.1192749	-.0573706
Privatized	-.0226088	.0325347	-0.69	0.487	-.0863757	.0411581
Size	.0194062	.0064211	3.02	0.003	.0068212	.0319913
Growth	-.9647061	.1844345	-5.23	0.000	-1.326191	-.6032212
Leverage	-.091118	.0451127	-2.02	0.043	-.1795372	-.0026988
Risk	-2.89e-08	2.26e-08	-1.28	0.201	-7.32e-08	1.54e-08
TotalDirec~s	-.0002589	.0044166	-0.06	0.953	-.0089153	.0083974
CEODuality	-.0044266	.0194347	-0.23	0.820	-.0425179	.0336648
NonExRatio	-.0095666	.0271646	-0.35	0.725	-.0628082	.043675
_cons	-.123174	.0812219	-1.52	0.129	-.282366	.036018
/sigma	.2228857	.0173745			.1888323	.2569391

Obs. summary: 3 left-censored observations at LbrContoTE<=0
605 uncensored observations
28 right-censored observations at LbrContoTE>=1

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..... 50

Tobit regression Number of obs = 636
Replications = 50
Wald chi2(11) = 86.19
Prob > chi2 = 0.0000
Log likelihood = -4.4814692 Pseudo R2 = 0.8524

Observed Bootstrap Normal-based
LbrContoTE Coef. Std. Err. z P>z [95% Conf. Interval]

Private .0642256 .0276229 2.33 0.020 .0100858 .1183655
Industry .0127386 .0057463 2.22 0.027 .0014759 .0240012
Competition -.0883228 .024541 -3.60 0.000 -.1364224 -.0402232
Privatized -.0226088 .0322948 -0.70 0.484 -.0859055 .0406879
Size .0194062 .0071417 2.72 0.007 .0054088 .0334036
Growth -.9647061 .203996 -4.73 0.000 -1.364531 -.5648813
Leverage -.091118 .0357191 -2.55 0.011 -.1611261 -.0211098
Risk -2.89e-08 1.88e-08 -1.54 0.124 -6.57e-08 7.89e-09
TotalDirec~s -.0002589 .006873 -0.04 0.970 -.0137298 .013212
CEODuality -.0044266 .0234584 -0.19 0.850 -.0504041 .041551
NonExRatio -.0095666 .0364805 -0.26 0.793 -.0810671 .0619339
_cons -.1873996 .0952749 -1.97 0.049 -.3741351 -.0006642

/sigma .2228857 .0173402 .1888996 .2568718

Obs. summary: 3 left-censored observations at LbrContoTE<=0
605 uncensored observations
28 right-censored observations at LbrContoTE>=1

.
Tobit regression Number of obs = 636
LR chi2(11) = 51.77
Prob > chi2 = 0.0000
Log likelihood = -4.4814692 Pseudo R2 = 0.8524

LbrContoTE Coef. Std. Err. t P>t [95% Conf. Interval]

Private .0642256 .0338045 1.90 0.058 -.0021585 .1306097
Industry .0127386 .0051054 2.50 0.013 .0027128 .0227644
Competition -.0883228 .053292 -1.66 0.098 -.1929759 .0163303
Privatized -.0226088 .0316827 -0.71 0.476 -.0848263 .0396087
Size .0194062 .0052466 3.70 0.000 .0091031 .0297094
Growth -.9647061 .3503532 -2.75 0.006 -1.652718 -.2766942
Leverage -.091118 .0462379 -1.97 0.049 -.1819185 -.0003175
Risk -2.89e-08 1.97e-08 -1.47 0.143 -6.76e-08 9.80e-09
TotalDirec~s -.0002589 .0053698 -0.05 0.962 -.010804 .0102862
CEODuality -.0044266 .0194934 -0.23 0.820 -.042707 .0338539
NonExRatio -.0095666 .0260014 -0.37 0.713 -.0606274 .0414942
_cons -.1873996 .0807829 -2.32 0.021 -.3460383 -.028761

/sigma .2228857 .0065337 .210055 .2357164

replications.

Obs. summary: 3 left-censored observations at LbrContoTE<=0
605 uncensored observations
28 right-censored observations at LbrContoTE>=1

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..... 50

Tobit regression Number of obs = 578
Replications = 50
Wald chi2(9) = 56.71
Prob > chi2 = 0.0000
Log likelihood = -235.7239 Pseudo R2 = 0.0998

Observed LbrProdCh	Bootstrap Coef.	Std. Err.	z	P>z	Normal-based [95% Conf.	Interval]
Private	-.0065545	.0537271	-0.12	0.903	-.1118577	.0987488
Mixed	-.0435131	.0748529	-0.58	0.561	-.1902221	.1031959
Industry	-.0042403	.0078519	-0.54	0.589	-.0196297	.0111491
Competition	-.0458653	.066778	-0.69	0.492	-.1767478	.0850171
Privatized	.0795103	.051378	1.55	0.122	-.0211886	.1802093
Size	.0318776	.0130193	2.45	0.014	.0063602	.0573949
Growth	-2.992498	.516591	-5.79	0.000	-4.004998	-1.979998
Leverage	-.0032532	.0736797	-0.04	0.965	-.1476627	.1411563
Risk	-2.36e-08	2.74e-08	-0.86	0.390	-7.73e-08	3.02e-08
_cons	.7336704	.144037	5.09	0.000	.451363	1.015978

/sigma .2968264 .0275597 .2428103 .3508424

Obs. summary: 1 left-censored observation at LbrProdCh<=0
227 uncensored observations
350 right-censored observations at LbrProdCh>=1

.
Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..... 50

Tobit regression Number of obs = 578
Replications = 50
Wald chi2(8) = 48.19
Prob > chi2 = 0.0000
Log likelihood = -235.90003 Pseudo R2 = 0.0991

Observed LbrProdCh	Bootstrap Coef.	Std. Err.	z	P>z	Normal-based [95% Conf.	Interval]
State	.0093567	.0453302	0.21	0.836	-.0794888	.0982022
Industry	-.00453	.0075481	-0.60	0.548	-.0193241	.0102641
Competition	-.0486066	.063341	-0.77	0.443	-.1727526	.0755394
Privatized	.0535414	.0392602	1.36	0.173	-.0234072	.1304899
Size	.0315202	.0117803	2.68	0.007	.0084312	.0546092
Growth	-2.991627	.5998206	-4.99	0.000	-4.167254	-1.816001
Leverage	-.0074953	.0641874	-0.12	0.907	-.1333004	.1183097
Risk	-2.20e-08	3.00e-08	-0.73	0.462	-8.08e-08	3.67e-08
_cons	.7309749	.1447928	5.05	0.000	.4471863	1.014764
/sigma	.2967871	.0230424			.2516249	.3419493

Obs. summary: 1 left-censored observation at LbrProdCh<=0
227 uncensored observations
350 right-censored observations at LbrProdCh>=1

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..... 50

Tobit regression Number of obs = 463
Replications = 50
Wald chi2(11) = 41.36
Prob > chi2 = 0.0000
Log likelihood = -184.59453 Pseudo R2 = 0.1299

Observed LbrProdCh	Bootstrap Coef.	Std. Err.	z	P>z	Normal-based [95% Conf.	Interval]
Private	.0342488	.0457962	0.75	0.455	-.0555102	.1240078

Industry -.0025315 .0104269 -0.24 0.808 -.0229679 .0179049
Competition -.0766991 .0663077 -1.16 0.247 -.2066598 .0532617
Privatized .0952024 .0534664 1.78 0.075 -.0095898 .1999946
Size .0355002 .0130149 2.73 0.006 .0099914 .061009
Growth -4.007347 .7322707 -5.47 0.000 -5.442571 -2.572123
Leverage -.0521769 .0977123 -0.53 0.593 -.2436894 .1393357
Risk -2.50e-09 4.14e-08 -0.06 0.952 -8.37e-08 7.87e-08
NonExRatio -.1258398 .2002181 -0.63 0.530 -.5182601 .2665806
TotalDir -.0011155 .008404 -0.13 0.894 -.0175871 .0153561
CEODuality .0082142 .049583 0.17 0.868 -.0889667 .105395
_cons .7386812 .1906218 3.88 0.000 .3650693 1.112293

/sigma .2993424 .0280214 .2444214 .3542633

Obs. summary: 1 left-censored observation at LbrProdCh<=0
176 uncensored observations
286 right-censored observations at LbrProdCh>=1

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..... 50

Tobit regression Number of obs = 463
Replications = 50
Wald chi2(11) = 61.98
Prob > chi2 = 0.0000
Log likelihood = -184.59453 Pseudo R2 = 0.1299

Observed Bootstrap Normal-based
LbrProdCh Coef. Std. Err. z P>z [95% Conf. Interval]

Mixed -.0342488 .055562 -0.62 0.538 -.1431483 .0746507
Industry -.0025315 .010239 -0.25 0.805 -.0225995 .0175365
Competition -.0766991 .0863946 -0.89 0.375 -.2460294 .0926313
Privatized .0952024 .0536691 1.77 0.076 -.0099871 .2003919
Size .0355002 .0119007 2.98 0.003 .0121752 .0588252
Growth -4.007347 .7463264 -5.37 0.000 -5.47012 -2.544574
Leverage -.0521769 .0836487 -0.62 0.533 -.2161254 .1117716
Risk -2.50e-09 4.44e-08 -0.06 0.955 -8.96e-08 8.46e-08
NonExRatio -.1258398 .2057279 -0.61 0.541 -.529059 .2773795
TotalDir -.0011155 .0087221 -0.13 0.898 -.0182106 .0159796

CEODuality .0082142 .0535897 0.15 0.878 -.0968198 .1132481
_cons .77293 .1935435 3.99 0.000 .3935918 1.152268

/sigma .2993424 .0229088 .2544419 .3442429

Obs. summary: 1 left-censored observation at LbrProdCh<=0
176 uncensored observations
286 right-censored observations at LbrProdCh>=1

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..... 50

Tobit regression Number of obs = 591
Replications = 50
Wald chi2(9) = 18.26
Prob > chi2 = 0.0323
Log likelihood = -110.82315 Pseudo R2 = 0.0716

Observed Bootstrap Normal-based
ProdCh Coef. Std. Err. z P>z [95% Conf. Interval]

Private -.0045365 .0382474 -0.12 0.906 -.0795 .0704271
Mixed .0842657 .0574486 1.47 0.142 -.0283315 .196863
Industry -.0018764 .0068489 -0.27 0.784 -.0152999 .0115472
Competition .0027315 .0748064 0.04 0.971 -.1438863 .1493492
Privatized -.0970856 .047729 -2.03 0.042 -.1906328 -.0035384
Size -.0079473 .0066609 -1.19 0.233 -.0210024 .0051077
Growth .5848882 .5572108 1.05 0.294 -.5072249 1.677001
Risk -6.08e-08 1.90e-08 -3.20 0.001 -9.81e-08 -2.36e-08
ConvertedL~e .0120767 .0204031 0.59 0.554 -.0279127 .052066
_cons 1.21258 .0852252 14.23 0.000 1.045541 1.379618

/sigma .2910509 .0146273 .2623819 .3197198

Obs. summary: 1 left-censored observation at ProdCh<=.001
590 uncensored observations
0 right-censored observations

. tobit ProdCh State Industry Competition Privatized Size Growth Risk ConvertedLeverage, ll vce(bootstrap)
(running tobit on estimation sample)

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..... 50

Tobit regression Number of obs = 591
Replications = 50
Wald chi2(8) = 12.77
Prob > chi2 = 0.1199
Log likelihood = -112.36542 Pseudo R2 = 0.0587

Observed ProdCh	Bootstrap Coef.	Std. Err.	z	P>z	Normal-based [95% Conf.	Interval]
State	-.0024285	.0393468	-0.06	0.951	-.0795468	.0746898
Industry	-.001356	.0060671	-0.22	0.823	-.0132473	.0105353
Competition	.0103382	.0599576	0.17	0.863	-.1071766	.127853
Privatized	-.0363508	.0326932	-1.11	0.266	-.1004284	.0277268
Size	-.0073023	.0064457	-1.13	0.257	-.0199355	.005331
Growth	.6036969	.4373209	1.38	0.167	-.2534363	1.46083
Risk	-6.44e-08	2.26e-08	-2.85	0.004	-1.09e-07	-2.01e-08
ConvertedL~e	.0170339	.0196345	0.87	0.386	-.021449	.0555168
_cons	1.208801	.105234	11.49	0.000	1.002546	1.415056
/sigma	.2918118	.0145428			.2633083	.3203152

Obs. summary: 1 left-censored observation at ProdCh<=.001
590 uncensored observations
0 right-censored observations

Bootstrap replications (50)
1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..... 50

Tobit regression Number of obs = 473
Replications = 50
Wald chi2(10) = 19.40
Prob > chi2 = 0.0354
Log likelihood = -93.266916 Pseudo R2 = 0.0985

Observed ProdCh	Bootstrap Coef.	Std. Err.	z	P>z	Normal-based [95% Conf.	Interval]
NonExRatio	.0042001	.1324858	0.03	0.975	-.2554673	.2638675
TotalDir	.0077805	.0069423	1.12	0.262	-.0058261	.021387
CEODuality	.0145599	.0221491	0.66	0.511	-.0288516	.0579714
Industry	-.0033986	.0054927	-0.62	0.536	-.014164	.0073668
Competition	.0276159	.1239047	0.22	0.824	-.2152328	.2704646
Privatized	-.0335268	.0394306	-0.85	0.395	-.1108093	.0437557
Size	-.0077358	.0067706	-1.14	0.253	-.021006	.0055343
Growth	1.059875	.6429109	1.65	0.099	-.2002068	2.319958
Risk	-8.01e-08	2.50e-08	-3.20	0.001	-1.29e-07	-3.11e-08
LeverageCon	.016518	.0300495	0.55	0.583	-.0423779	.0754138
_cons	1.158877	.1510591	7.67	0.000	.862807	1.454948
/sigma	.2936712	.0180776			.2582398	.3291025

Obs. summary: 1 left-censored observation at ProdCh<=.001
472 uncensored observations
0 right-censored observations