MEASUREMENT OF TOTAL FACTOR PRODUCTIVITY IN HIGH-TECH AND LOW-TECH INDUSTRIES IN JAPAN.

AN EMPIRICAL ANALYSIS AND COMPARISONS BETWEEN PHARMACEUTICAL AND TEXTILE MANUFACTURING FIRMS SPINNING 2 DECADES.

By

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DECLARATION

I, hereby declare that, the contents of this work are the results of my own research, under the supervision of Professor Asgari Behrooz, and that every source of information used in this paper has been acknowledged and referenced appropriately. Thus, I acknowledge my complete responsibility for the contents of this research.

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LIST OF ACRONYMS AND TERMS

TFP: Total Factor Productivity

TFPG: Total Factor Productivity Growth

R&D: Research and Development

FDI: Foreign Direct Investment

ASEAN-4: The Association of South East Asian Nations

TECH: Technological

ICT: Information and Communication Technologies

DEA: Data Envelopment Analysis

BLS: Bureau of Labour Statistics

OECD**:** Organization for Economic Co-operation and Development

EU: European union

CPI: Consumer Price Index

ABSTRACT

Total Factor Productivity (TFP), is a technology-induced factor of productivity that considers all factors of production that is it measures the outputs in comparison to inputs ratio used to produce such as labour and capital.

TFP continue to be most important and known measure of economic growth of industries and nation at large. But due to macroeconomic reasons, burst of bubble economy and Asian crisis, Japan experienced decline of TFP hence economy slump during the1990s than usual. This led to economic dynamism and stagnation, which later termed “lost decades”.

Thus, this paper gives explanation and analysis of Total Factor Productivity of Japanese manufacturing industries for the past two decades, 1990-2011. As it is known that since economic slump in Japan, many manufacturing firms in Japan continue investing huge amount of R&D to boost productivity growth, this paper also analyses the role of Research and Development as important determinant of TFP between high-tech pharmaceutical and low-tech textile firms in Japan.

Parametric, Cobb-Douglas Production function and Tornqvist index has been used to analyse and compare the TFP and TFPG of manufacturing firms in Japan. Not only these two important models used in this paper but also perpetual inventory model, expanded Cobb-Douglas and Regression analysis have also been used to analyse technology stock and technology spillovers as a function of R&D to value added of Japanese pharmaceutical and textile firms throughout the period, 1990-2011. Value added has been used as a measure of output growth instead of sales because of being

largely immune to sales problems in a sense that output and materials vary proportionally.

This paper has specifically compare TFP, TFPG and the role of R&D between pharmaceutical as representative of high-tech firms and textiles as low-tech firm representative in Japan throughout the years; during the collapse of bubble economy (1990s) and to its slight recovery (2000s).

Having investigated and analyzed the Trends of TFP and TFPG and the role of R&D in Japanese manufacturing industries at the firm level that is pharmaceutical and textile firms, discussion from the findings has been made with conclusions and policy implications based on the findings.

Keywords: *Total Factor Productivity (TFP), R&D, High-tech, Low-tech, Japan*

Chapter 1
INTRODUCTION

INTRODUCTION

1.1 TFP and Japan for the past two decades

Total factor productivity (TFP), is a technology-induced factor of productivity that considers all factors of production that is it measures the outputs in comparison to inputs ratio used to produce such as labour and capital. Though it is urged that productivity can also be affected by factors such as economies of scale, increase capacity utilization, movement from technically inefficient towards technically efficient production in short run, but in long run technological change is very significant factor of productivity (Dudley J. , 1998).

More than a dozen years ago, 1989, Japan was completing a decade of excellent economic performance, with 3.9 percent GDP growth (Saxonhouse & Stern, 2004). For more than a decade Japan has experienced a phase of unprecedentedly slow growth (Fukao & Kwon, 2006).

The Japanese episode, known as the Great Stagnation, has received much attention during the 1990s and 2000s, in which Japan experienced the burst of the bubble economy and more than a decade-long deflation and stagnation (Wakatabe, 2012).

Some scholars attribute the disappointing performance to a lack of effective demand and liquidity trap caused by deflation (Fukao & Kwon, 2006) and repeated series of mistakes in macroeconomic policy (Wakatabe, 2012). While others point out, Japan's aging population and a gradual reduction in the statutory working week have contributed to a slowdown in the growth of labour input (Fukao & Kwon, 2006).

Japan also experienced a decline in total factor productivity (TFP), which has important effects in economic growth not only because it reduces output growth by itself but because it diminishes the rate of return to capital and discourages private investment. It is found that, the slowdown in TFP growth was more serious in manufacturing than in the non-manufacturing sector (Fukao & Kwon, 2006).

Due to this, it is noted that Japan average annual real GDP growth rates were 10.4 % in the 1960s, 5.0% in the 1970s, 3.8% in the 1980s, but only 1.7 % in the 1990s and only 1.8% in the 2000s (2000-2004) (Miyakoshi & Okubo, 2007). As a results of this economic dynamism and stagnation, it has been discussed by different scholars that Japanese manufacturing industries have put more effort on R&D investment or knowledge since past two decades to boost productivity growth and output growth.

Apart from many previous detailed studies done on manufacturing industries and TFP but there are none studies on micro data analysis at firm level between low-tech and high tech manufacturing industries in Japan as presently firms are at the core of innovation activities and henceforth economic growth.

1.2 Research Questions

To comprehend Total Factor Productivity in Japanese manufacturing industries for the past two decades, 1990-2011 and the role of research and development and general environment, the following questions have been identified:

- What is the productivity growth trend of high-tech pharmaceutical and low-tech textile firms?

- To what extent R&D have contributed to the productivity growth of Japanese high-tech pharmaceuticals and low-tech textiles during and after the burst of bubble economy?
- What is the current and future trend of Japanese textile firms?
- Is low-tech textile firms adopted good strategy than high-tech pharmaceutical firms?
- How can both high-tech Pharmaceutical and low-tech textile firms improve or maintain its productivity growth?

Chapter 4 and 5 is expected to answer TFP and TFPG trends, and the role of R&D between high-tech pharmaceutical and low-tech textile firms in Japan for the past two decades, 1990-2011. Chapter 6 gives the discussion of findings and predicts the future trend very briefly of Japanese textile and pharmaceutical industries. Chapter 7 concludes the analysis with policy implications.

1.3 Research Objectives

- To understand and compare the TFP trends of high-tech and low-tech firms in the Japanese manufacturing sector during and after the burst of the bubble economy.
- To evaluate and understand the pharmaceutical and textile firms neutral nature of technological change.
- To understand and compare the capacity and contribution of R&D to productivity growth between high-tech and low-tech manufacturing firms throughout the period of economic downturn and slight recovery.

1.4 Significance of the Research

Exploring TFP and R&D role in this paper, helps to understand the real trends of Japanese manufacturing industries at the firm level especially pharmaceuticals and textiles for the past two decades and thus further helps policy making and future forecasting in economic perspectives.

1.5 Scope and Limitations of the Research

This paper analyzed and gives comparison on TFP, TFPG and the role of R&D in Japanese manufacturing industries between high-tech pharmaceutical and low-tech textile firms over the past two decades, 1990-2011. Parametric, Cobb-Douglas production function and perpetual inventory models with regression analysis has been used to measure the trends. Top 30 high-tech and low-tech Japanese manufacturing firms have been taken for TFP, TFPG and R&D role measurements according to their sales in 2011**.** Focusing on R&D as one among many determinants of TFP and using Cobb-Douglas model is not enough. For accurate needs this paper paves a way for further TFP determinants such as ICT presently and other methodology such as non-parametric DEA.

1.6 Structure of the Thesis

This thesis is organized as follows: the second chapter is the Literature Review, whereby previous studies relevant for this research have been summarized and detailed information and concepts of this research have also been provided.

In the next chapter, the methodologies of this research have been explained. The overview about Cobb-Douglas Production Function and inventory model and its significance have been explained. Expanded Cobb-Douglas method to technology spillover and technology stock as a function of R&D to firms has also been explained which is then regressed to give clear picture on R&D. This chapter also gives explanation about research process, data construction and limitations.

The chapters 4, 5, 6 and 7 are the chapters intended to answer the research questions introduced in the first chapter.

The fourth chapter explains about data analysis and results on comparisons between high-tech pharmaceutical and low-tech textile in Japan whereby Cobb-Douglas production function has been used to provide this detailed results. Therefore TFP, TFPG trends have been compared and analyzed between these two industries in Japan for the past two decades, 1990-2011, during the burst of the bubble economy and slight recovery in 44 manufacturing firms.

The fifth chapter gives explanation and analysis of the results on role of R&D on productivity and output growth. The role of R&D in this case has been captured and analyzed through technology stock and technology spillover pool between pharmaceutical and textile firms, 1990-2011.

The sixth chapter discussed the findings of this paper while the seventh chapter concludes this research on TFP and R&D with further policy implications and recommendations.

Chapter 2
LITERATURE REVIEW

LITERATURE REVIEW

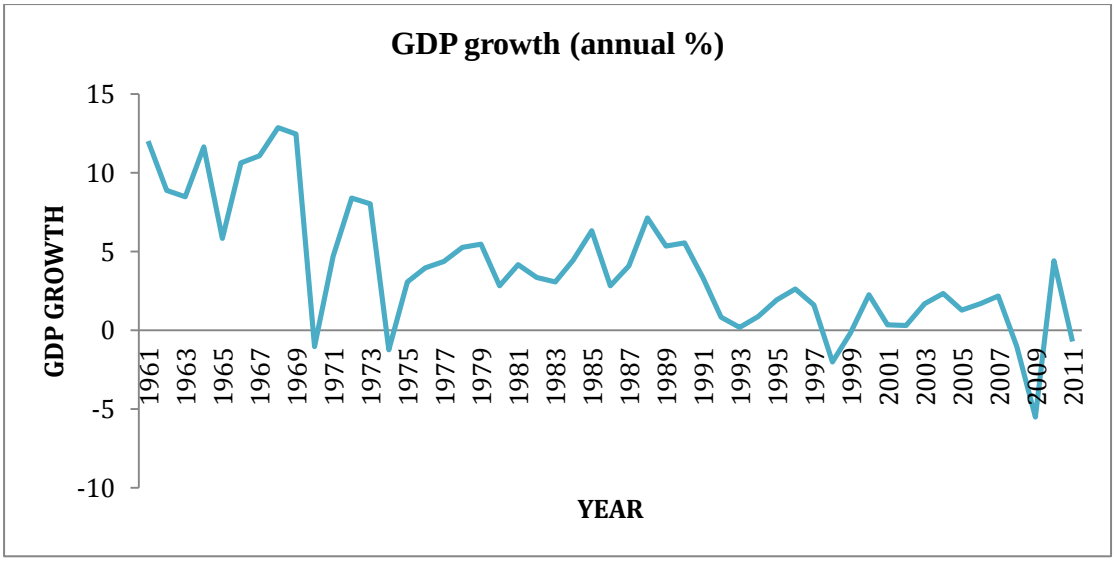
The purpose of this chapter is to explain the major concepts used in this research. First, the GDP trends of Japan for the past five decades, 1961-2011 has been described. Second, TFP measurements and techniques have been explained followed by the role of R&D on productivity and output growth. Third, TFP determinants from general perspectives have been described. Finally, economic environment of Japan for the past two decades; bubble burst, Asian crisis and credit crunch and reasons for the decline of TFP have briefly explained.

2.1 Japan Annual Gross Domestic Product (GDP) Growth rate

Japanese economy of the 1990's was mired in unfavourable conditions following the collapse of the bubble economy in early 1990's as a result Japan's GDP growth rate averaged 1.4% in 1990's, in contrast to 4.1% in 1980's (Motohashi K. , 2008).

The average annual growth rate of per capital GDP was 0.5% in the 1991-2000 period while the comparable figure for the United States was 2.6% (Hayashi & Prescott, 2002).

It is also urged that, after steady catch-up for 35 years, Japan not only stopped catching up but lost ground relative to the industrial leader in the last decades. Average annual real GDP growth rates were 10.4 % in the 1960s, 5.0% in the 1970s, 3.8% in the 1980s, but only 1.7 % in the 1990s and only 1.8% in the 2000s (2000-2004) (Miyakoshi & Okubo, 2007).



Source: World Development Indicators (WDI). World Bank.

FIGURE 2.1. GROSS DOMESTIC PRODUCT OF JAPAN FROM 1961-2011.

2.2 Research and Development role in productivity growth

Previous study on estimating contribution of research activity indicated that, the rate of productivity increase is significantly affected by the intensity of research activity. And also found that there is positive contribution of R&D intensity in total factor productivity increase in manufacturing industry (Hiroyuki, 1985).

R&D including basic research plays a more important role in the pharmaceutical firm's performance than in other industries. R&D output, such as new drug development, is likely to influence firm growth. Further, R&D output protected by intellectual property, including patent rights, occasionally yields large monopoly profits. In order to obtain R&D output, R&D expenditures are inevitable, and R&D activities will determine the economic performance of firms in high-technology industries, such as pharmaceuticals. Therefore, in order for pharmaceutical firms to defend against hostile takeovers, M&A's seem to provide scale economies and

stimulate new product development by integrating their own technologies (Zhang & Honjo, 2007).

Furthermore, Japanese pharmaceutical firms experienced a decline of pharmaceutical sales, although Takeda Pharmaceutical (Takeda), which is the largest pharmaceutical firm in Japan, increased pharmaceutical sales by 24.7% from 1997 to 2003 as a result of research and development. The need for innovative products in order to obtain higher process increased the motivation for Japanese firms to undertake R&D. Under the presence of economic policy changes in the Japanese pharmaceutical industry, firms are more receptive to high innovative performance than before. Thus, larger research efforts are more productive in the pharmaceutical industry; not only because they enjoy economies of scale, but also because they realize economies of scope by sustaining diverse portfolios of research projects that capture internal and external knowledge spillovers. In addition, firms with higher R&D capital are more likely to produce R&D output (Zhang & Honjo, 2007).

Further study on R&D and productivity found that innovation is a fundamental source of technological change hence productivity growth as a result there is a little doubt that research and development is the root of all increases in productivity. In addition, formal R&D is an important factor in explaining productivity growth, as the effect of R&D on productivity is included in the estimate of TFP (Congressional Budget Office, 2005).

Consistent to this study, argued that longer history of R&D expenditures clearly helps in the sense that an R&D variable is a more potent predictor of productivity growth (Mairesse & Hall, 1995).

2.3 Significance of Technology stock and technology spillovers in industry R&D

Currently, economic globalization dramatically increases the trans boundary flows and recent technology has a general tendency to increase complementarity with capital stock and labour forces. It is also found that, the stagnation of R&D investment common to almost all advanced countries in the 1990s drives the substitution of spillover technology from the global market place for indigenous technology (Ti) (Watanabe C. , Zhu, Griffy-Brown, & Asgari, 2001).

Facing with structural trends such as dramatic increase in global technology spillovers, substitution of spillover technology for indigenous technology, and deterioration of assimilation capacity which has dramatically altered Japan's international competitiveness structure, the restructuring of industry's R&D strategy has become a crucial subject in Japan's major manufacturing industries. This is due to the fact that rigidness and less-flexibility as a result of life time employment and the seniority system, have revealed their negative aspects as Japan faces new and dynamic trends of economic growth, globalization, a service intensified industrial structure, and a rapidly aging society (Watanabe C. , Zhu, Griffy-Brown, & Asgari, 2001).

Donor		**Host**		
T_s		**T (Total technology stock)**		
	Assimilation capacity			
	Z			
Potential spillover pool	→	$T = T_i + Z.T_s$	→	$Value\ Added\ (V)$

Source: Author's description based on (Watanabe & Asgari, 2003)

2.4 Total Factor Productivity (TFP) measurements and its advantages

Total Factor Productivity is the average product of all inputs used in production. It measures the economic and technical efficiency with which resources are converted into products. An increase in TFP implies an increase in efficiency of production factors utilization such as technological progress, scale increase, and improvement in management skills (Pramongkit, Shawyun, & Sirinaovakul, 2002).

The index of total factor productivity, measures annual change in output per unit of combined labour and capital input. Also Total Factor Productivity (TFP) can be interpreted as one of a number of indicators of the economic progress because it shows the growth in output that has been obtained from a given amount of resources (capital and labour), or, conversely, the reduction over time in the quantity of these resources used to produce a unit of output (U.S Department of Labour, 1983).

Productivity is important in determining national economic well-being. Productivity gains account for most of the increases in real compensation, so the slowdown means a retarded growth in standard of living. In addition, gains in productivity can contribute to price stability. Productivity increases help to offset the effects of increases in hourly compensation on unit labour cost, which in turn, are closely associated with changes in prices (U.S Department of Labour, 1983).

Moreover, the frontier approach can decompose output growth into not just input growth and TFP growth, but goes a step further to decompose TFP growth into various efficiency components. For instance, TFP growth can be decomposed into technical progress and gains in technical efficiency using the theoretical framework

by Nishimizu and Page (1982). Also, the estimation of the cost frontier, on the other hand enables TFP growth decomposition to provide information on technical progress, technical efficiency and allocative efficiency and the nature of returns to scale in which such decompositional analysis is important for more accurate policy prescriptions based on the various sources of TFP growth (Mahadevan, 2004).

Value added output, which is gross output corrected for purchases of intermediate inputs where by single deflation is appropriate, remains a useful concept as output measure to calculate TFP growth because it is simple, avoids the need for estimates of intra-industry transactions, and bears closer resemblance to primary statistics such representative firm data (Mahadevan, 2004).

2.4.1 TFP measurements

Mahadevan (2004) study on Malaysia manufacturing sector's productivity growth by using Tornqvist TFP growth measure, found that productivity is a possible source of economic growth. Also a case study of Hong Kong's manufacturing sector by Mahadevan (2004) is among the studies attempted to estimate TFP by Cobb-Douglas production function using value added, capital and workers employed. Furthermore, Mahadevan (2004) in Australian manufacturing sector found that, the Cobb-Douglas model was considered the better model to fit the data as Cobb-Douglas functional form allows maximum flexibility in dealing with secondary data (Mahadevan, 2004).

In estimating R&D contribution in productivity growth, econometric Cobb-Douglas production function analysis was used which includes a variety of statistical techniques for examining the relationship between economic variables. Supported by Griliches (1979), the TFP measure-output per unit of combined factor input-is

typically estimated as a constant in regression equation (Congressional Budget Office, 2005).

In exploring the relationship between R&D and productivity in French manufacturing firms, Mairesse and Hall (1995) using individual firm data, uses Cobb-Douglas production function with constant returns to scale in the three inputs, physical capital C, labour L and R&D or knowledge capital K in which value added was a measure of output (Mairesse & Hall, 1995).

2.5 Determinants of Total Factor Productivity (TFP)

It is assumed that capital intensity is one of the main determinants of TFP and that policies that encourage investment also have a positive impact on TFP growth (Isaksson, 2007).

Furthermore, knowledge has a direct effect on TFP where it concerns how to best organize production (for example, what combination of labour and capital that produces the greatest output holding the costs constant). The more one has of knowledge and labour and capital, the more can be produced. Thus, output growth is driven by the accumulation of inputs and knowledge. Because knowledge cannot be measured, it is proxied by, for example, R&D and patent data, and more recently by information and communication technologies (ICT) whereas, R&D and patents (representing knowledge) are included as determinants of TFP (Isaksson, 2007).

In exploiting series data of the U.S, it is found that, an effective innovation system is important for TFP growth, which will foster R&D that, in turn, leads to new products, processes and knowledge which will ultimately promote overall economic

development through enhanced productivity: and it has two sources domestic and international spillovers and in long run a positive relationship between TFP and the stock of knowledge has been found (Isaksson, 2007).

2.6 Size of firm plays a great role in productivity and output growth

Large firms have more resources and can more easily diversify their risks. This enables them to withstand poor economic conditions, but their reactivity is also weaker compared to smaller firms. Small firms frequently suffer from a lack of resources even when they have good projects. It is difficult to anticipate the existence of a specific relation between firm size and sales growth. Mature firms exhibit low growth rates but tend to generate abundant cash flows, while growth firms are usually characterized by the opposite. However strong cash flows are likely to induce firms to increase their capital expenditures or make acquisitions, which are both, expected to boost their sales growth. Highly leveraged firms are likely to face financial constraints, which should curb their potential developments; leading to lower sales growth. Also firms with low cash balances are certain to experience greater difficulties in achieving their full development (Nivoix & Nguyen, 2012).

Thus findings by Zhang and Honjo (2007) found that, on April 1, 2005, Yamanouchi pharmaceutical and Fujisawa pharmaceutical merged to form a new company, Astellas Pharma, the second largest pharmaceutical firm in Japan. Also, on September 28, 2005, Sankyo and Daichii pharmaceutical merged their operations through the formation of new joint holding company named Daichii Sankyo and Dainippon Sumitomo fusion. This was done in order to increase size of firm by sharing resources

through integrating their own technologies for new product development (Zhang & Honjo, 2007).

2.7 Japanese economic environment for the past two decades (1990s and 2000s)

2.7.1 Japan's Bubble burst and lost Decade in 1990s

In the last twenty years Japanese economy has experienced a boom and burst accompanied by land and stock price increases, followed by the stagnant, low growth period in the 1980's, which accompanied by the declines in land and stock prices (SaxonHouse & Stern, 2004). According to Ihori, Nakazato and Kawade, (2004), the boom is now known as the bubble period while stagnation known as the lost decade.

The situation in1990s was the worst of any G7 country, having deteriorated rapidly with the collapse of the 'bubble economy' in 1991 and the deep and prolonged period of macroeconomic recession from which the recovery has been slow and modest despite the implementation of counter-cyclical Keynesian policy (Ito, 2004).

The increase in Asset prices started in the mid-1980s. The stock prices and land prices rise sharply at around 1984, and continued their increase toward the 1990s whereby the economic growth rate in 1990 was above 4 percent and it was still at three percent in 1991 while 1992, the economic growth rate came down to below one percent. Thus, stagnation has been observed from 1992 to 1995 before recovery in autumn of 1995 to 1997 though it was quickly aborted in a series of events in 1997 (Ito, 2004).

The Causes of bubble burst were;

- Ineffective Fiscal Policy: neither government spending nor tax cuts did much to stimulate the economy. Fiscal policy was becoming ineffective in the 1990s as concerns about the size of Japan's public debt grew (Ito, 2004).
- The Domestic Consequences of International Finance: the bursting of the bubble in 1990 and thereafter meant that many of the loans made in the 1980s to the real estate sector by Japanese banks could not be repaid. The Japanese banks, the BOJ, and the MOF were slow to publicly acknowledge the scale of this problem. I.e. Microeconomic and macroeconomic issues (Ito, 2004).
- Deregulation, Corporate Governance, and Government-sponsored Financial Institutions: commercial lending is unattractive at a rate comparable to that of long-term bonds (Ito, 2004).
- The liquidity trap: Depressed investment due to over-investment during the "bubble" period of the late 1980s and early 1990s and problems with financial intermediation (Hayashi & Prescott, 2002).
- Non-Performing Loans: Land prices began to fall after 1991 and were still falling in mid-1998, causing the quality of loans to the real estate industry to deteriorate significantly.
- Fall in the growth rate of total factor productivity (TFP). It had consequence of reducing the slope of the steady-state growth and increasing the steady-state capital-output ratio. But, the drop in the rate of productivity growth alone cannot account for the near-zero output growth in the 1990s (Hayashi & Prescott, 2002).

- Reduction of the workweek length (average hours worked per week) from 44 hours to 40 hours between 1988 and 1993, brought about by the 1988 revision of the Labour Standards Law (Hayashi & Prescott, 2002).

2.7.2 Slow down of TFP growth and its outcome

The low productivity growth during the burst of the bubble economy in 1990s is due to policy that subsidizes inefficient firms and declining industries which results in lower productivity because the inefficient producers produce a greater share of the output. As a result it discourages investments that increase productivity whereby important empirical support is provided by the experience of the Japanese economy in the 1978-1983 period. In 1978 "Temporary Measures for Stabilization of Specific Depressed Industries" law was in effect (Peck et al. 1988) and the TFP growth rate was a dismal 0.64%. In the 3 years before, the TFP growth averaged 2.18 % and in the 6-year period after, it averaged slightly over 2.5% (Hayashi & Prescott, 2002).

2.7.3 The 1997 and Japanese economy

It is argued that, the consumption tax rate and social securities contribution rate were increased in April 1997, and the special tax cut of the preceding two years was repealed. The temporary decrease in spending from these measures was compounded by the deflationary impact of the Asian currency crisis that started in Thailand in July 1997 and spread to the rest of Asia by the end of the year and by the financial crisis in Japan in November 1997. The deflationary impact of these events hit the Japanese economy hard, and the growth rate in 1998 was negative for the first time since 1974. The asset price declines caused non-performing loans to increase, as more construction companies and real estate companies stopped repaying their borrowings (Ito, 2004).

It was only after the crisis of November 1997, 1998 and 1999 in which the government prepared funds for capital injection after two securities firms and three large banks failed. Thus, unemployment rate rose sharply by Japanese standards, after 1998 to exceed five percent while the debt-GDP ratio became the highest among the G7 nations and the position of Japanese economy was no better than immediately after the burst of bubble (Ito, 2004).

2.7.4 Credit Crunch of 2007-2008 and Japanese economy

As it has been discussed by many scholars that the credit crunch of 2007-2008 was the most substantial financial crisis since those preceded the Great Depression. The crisis started in the U.S with the collapse of the subprime mortgage market in early 2007 and the end of a major housing boom (Bordo, 2008).

According to the research done by NBER (2008), The causes of 2007-2008-credit crunch were;

- Major changes in regulation,
- Lax oversight,
- Relaxation of normal standards of prudent lending and prolonged period of abnormally low interest rates.

The defaults on mortgages spread to investment banks across the world via an elaborate network of derivatives and spilled over into the real economy through a virulent credit crunch and collapsing equities market, which produce a significant recession. The spread of the credit crunch has been widespread and dramatic across different financial markets, which led to the increased volatility in multiple markets. Thus, the 2007-2008, believed to be another scale in the economy of Japan especially in the financial markets. (Bordo, 2008).

Added by Brunner Meier (2008) study that, emerging market in Asia lost about 15 percent, and Japanese and European markets were down around 5 percent.

Chapter 3
METHODOLOGY

METHODOLOGY

3.1 Cobb-Douglas Production Function

Cobb-Douglas production function is also known as "Factor input frontier production function" – "**factor"** because it deals only with factor inputs of labour and fixed capital, and assumes all other inputs are adjusted as required; and "**frontier"** because it relates to only technically efficient combinations of inputs- where there is no possibility to reduce the quantity of any one input without increasing the quantity of another input while still producing the same quantity of output per period (Dudley, 1998).

According to Mahadevan (2004), using the frontier coefficients from the models, output growth can be decomposed into not just input growth and TFP growth but TFP growth can be further decomposed into technological progress and gains in technical efficiency using the theoretical framework popularized by Nishimizu and Page (1982).

3.1.1 Reasons for using Cobb-Douglas Production Function

Cobb-Douglas production function, measures the responsiveness of output to a change in inputs.

Tornqvist Index is after the statistician who was among the first to use the general form of this index. Tornqvist index is a measure of TFP growth, which used moving average weights of shares in consumers' expenditure and chain method to calculate a consumer price index. The advantage of weights which was that it provided the possibility of an elastic adjustment to the alterations in the composition of consumption that occur in the course of time (Dudley J. , 1998).

a). The Cobb-Douglas Production Function used, can be expressed mathematically as:

$V = Z' L_t^{\alpha} K_t^{\beta}$ ……(1)

$Z' = \frac{V}{L_t^{\alpha} K_t^{\beta}}$ = TFP……(2)

Therefore;

$\frac{dVt}{dL} = \alpha Z' L_t^{\alpha-1} K_t^{\beta}$ …… (1a)

$w_t = \alpha Z_t' L_t^{\alpha-1} K_t^{\beta}$ ……..(1b)

$w_t L_t \equiv W_t$ ……...(1c)

$W_t = \alpha Z_t' L_t^{\alpha-1} K_t^{\beta} L_t$ ……..(1d)

$W_t = \alpha V_t$ $\alpha = \frac{W_t}{V_t}$ $\beta = 1 - \alpha$ ……...(1e)

Variable	Description
$\boldsymbol{V_t}$	The Value Added during period t (constant price money)
$\boldsymbol{Z_t'}$	Total Factor Productivity (TFP).
$\boldsymbol{L_t}$	Labour costs of period t (salaries and wages * no. of employees)
$\boldsymbol{\alpha}$	The partial elasticity of L-Measures the proportionate response of V to proportionate change in L (when K is constant)
$\boldsymbol{K_t}$	Fixed Capital input; Total Tangible fixed Assets in period t (in money acquisition cost of the fixed assets).
$\boldsymbol{\beta}$	The partial elasticity of K (Measures proportionate change of V to a proportionate change in K (when L is constant)

b. Tornqvist Index- An expression of TFP Growth Measure;

Consider Cobb-Douglas production function (2) in natural logarithm, the Tornqvist TFP growth is then taken as;

$$ln\left(\frac{Z_t'}{Z_{t-1}'}\right) = ln\left(\frac{V_t}{V_{t-1}}\right) - \frac{\hat{\alpha}t+\hat{\alpha}t-1}{2} ln\left(\frac{L_t}{L_{t-1}}\right) - \frac{\hat{\beta}t+\hat{\beta}t-1}{2} ln\left(\frac{K_t}{K_{t-1}}\right) \quad \text{.....(3)}$$

$$TFPG = (lnV_t - lnV_{t-1}) - \left(\frac{\hat{\alpha}t+\hat{\alpha}t-1}{2}\right)(lnL_t - lnL_{t-1}) - \left(\frac{\hat{\beta}t+\hat{\beta}t-1}{2}\right)(lnK_t - lnK_{t-1}) \quad \text{.....(4)}$$

Where V is a real Value added or output

$\hat{\alpha}$ and $\hat{\beta}$

$$\hat{\alpha} = \frac{1}{2}\left[\left(\frac{W}{V}\right)t_{-1} + \left(\frac{W}{V}\right)t\right]$$

$$\hat{\beta} = 1 - \hat{\alpha}$$

Variable	Description
$\hat{\alpha}$	An estimate of α (the two-year moving average of the share of labour paid in value added)
$\hat{\beta}$	An estimate of β (The two-year moving average of the share of gross operating surplus in value added)

b1). TFP Growth Measure from the Average Production function

As the Cobb-Douglas production function has constant returns to scale technology, it is expected that $\alpha + \beta = 1$. Similar to the Tornqvist method, TFP growth is calculated as the residual output growth after input growth and is netted out as

$$TFPG = (lnV_t - lnV_{t-1}) - \left(\frac{\hat{\alpha}t+\hat{\alpha}t-1}{2}\right)(lnL_t - lnL_{t-1}) - \left(\frac{\hat{\beta}t+\hat{\beta}t-1}{2}\right)(lnK_t - lnK_{t-1}) \quad \text{.....(5)}$$

3.2. Perpetual Inventory model, Expanded Cobb-Douglas Method

3.2.1 Reasons for using these models

- Advancement of information technology (IT) and economic globalization accelerated global spillovers (Watanabe & Asgari, 2003).
- Effective utilization of technology from the global market place has become an important competition strategy (Watanabe & Asgari, 2003).
- Effective utilization of potential spillover pool largely depends upon assimilation capacity (Watanabe & Asgari, 2003).

3.2.2 Research and Development role: Technology stock and spillovers, Value added and R&D intensity

R&D in this case is a function of **Ti** (technology stock) and **Ts** (spillover)

- In measuring the impact of technology stock on productivity

$$V = Z'L^{\alpha}K^{\beta}T^{\delta} \quad \text{.....(1)}$$

- To measure the impact of technology spillover on productivity

$$V = Z'L^{\alpha}K^{\beta}T_i^{\delta 1}T_s^{\delta 2} \quad \text{.....(2)}$$

3.2.3. Perpetual inventory Model

Firm *i's* technology knowledge stock at time *t* can be measured:

$T_t = R_{t-m} + (1-\rho)T_{t-1} \qquad T_0 = \frac{R_{1-m}}{\rho+g}$

Variable	Description
$\boldsymbol{T_t}$	Technology stock at time *t*
$\boldsymbol{m}$	Time lag between R&D and Commercialization
$\boldsymbol{\rho}$	Rate of obsolescence of technology
$\boldsymbol{g}$	Increase rate of *R* at initial period

Note: $\rho = 15\%$ and 12% for pharmaceuticals and textiles firms respectively.

Note: Technological of advanced sectors are known to have shorter product life cycles and higher scrapping rates.

From above models, we run Regression Analysis

$ln\,V = ln\,fn(Z, L, K, Ti, Ts)$ ……..(2a)

$lnV = lnZ + lnL^{\alpha} + lnK^{\beta} + lnTi^{\delta 1} + lnTs^{\delta 2}$ ……(2b)

$lnV = \beta° + lnZ + \alpha lnL + \beta lnK + \delta 1 lnTi + \delta 2 lnTs + \varepsilon i$ ……(2c)

$lnV = lnZ + \alpha lnL + \beta lnK + \delta 1 lnTi + \delta 2 lnTs$……..(3)

3.3 Data Process and construction

Under this section, the author tried to explain the way data was constructed and made in order to accomplish the objectives and research questions of this paper.

Labour productivity as partial measure only considers the use of a single input and ignores all other inputs, thereby causing misleading analyses. Unlike partial measure, the TFP measure considers the joint use of the production inputs (Mahadevan, 2007).

In this research value added as a measure of output is used for convenience and increase of accuracy.

Value added as a measure of output was calculated and deflated with Consumer Price Index (CPI) of 2005 fixed price in Japan while R&D was deflated by R&D deflator of 2005 fixed price as outlined in index 3. All factor inputs (capital and labour) were deflated by using CPI of 2005 fixed price in Japan.

3.3.1 Consumer Price Indices (CPI) and R&D deflator

Consumer price index reflects changes in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly (Lebanese-economy-forum.com). Consumer price index

(2005=100) in Japan was last reported at 99.30 in 2011, according to a World Bank report published in 2012 (Japan trading economics, 2012).

3.4 Data Collection

In this section, the data collection methods and instruments used for secondary data are explained.

There are so many data sources for Japanese manufacturing firms both digital and books. But due to specification of this study on consolidation, only two sources have been used mostly: EOL and Social Science Information Search. This is due to the fact that Toyokeiza books and CDs were expressed in Japanese language hence difficult to translate. Data collection involved 44 Japanese manufacturing firms for comparisons.

Source	Data and consolidation guidelines
EOL	It contains all the **Yuhos** for every publicly traded company (more than 3500 firms) and roughly 1000 privately-held **companies in Japan**
Social Science Information Search	Financial Data from companies and financial institutions, domestic and international macroeconomic data, stocks and regional economic numerical data**. All Data provided by Nikkei NEEDS (Nikkei Inc.)**

3.4.1 Methodological Limitations

The rigid assumption of constant returns to scale technology may have resulted in underestimation or overestimation of the TFP growth rate as any increasing or decreasing returns to scale is discarded. Also, Cobb-Douglas functional form is less restrictive when all of the coefficients are allowed to vary (Mahadevan, 2007).

3.5 Number of manufacturing firms and their code number according to their sales in 2011.

Comparison has been made among 44 manufacturing firms between high-tech pharmaceutical and low-tech Textile firms in Japan.

- Pharmaceutical industry has been known to be the most R&D intensive industry in Japan followed by precision and electrical machinery industries (Watanabe & Asgari, 2003).
- Textile industry is regarded as a low-tech due to its labour intensive than R&D intensive and also based on classification by OECD. But recently Japanese textile firms improve their productivity than some pharmaceuticals due to structural transformation.

TABLE 3.1. 44 MANUFACTURING FIRMS IN JAPAN ACCORDING TO THEIR SALES.

Manufacturing firms in Japan 2011-Consolidation (Appendix 3b).						
No.	**Sec**	**EDINET**	**PHARMACEUTICALS-High tech**	**Sec**	**EDINET**	**TEXTILES-Low-Tech**
	Code	**Code**		**Code**	**Code**	
1	4502	E00919	Takeda Pharmaceutical Company Limited	3402	E00873	TORAY INDUSTRIES
3	4503	E00920	Astellas Pharma Inc.	3401	E00872	TEIJIN LIMITED
5	4523	E00939	Eisai Co.,	8016	E02521	ONWARD HOLDINGS CO.,
6	4508	E00924	Mitsubishi Tanabe Pharma	3103	E00527	UNITIKA
7	4519	E00932	CHUGAI PHARMACEUTICAL CO.,	3591	E00590	WACOAL HOLDINGS CORP.
8	4506	E00922	Dainippon Sumitomo Pharma Co., Ltd.	3106	E00528	KURABO INDUSTRIES
9	4151	E00816	Kyowa Hakko Kirin Co.,	3002	E00520	GUNZE LIMITED

11	4507	E00923	Shionogi & Co.,	3201	E00552	THE JAPAN WOOL TEXTILE CO.,
12	4528	E00945	ONO PHARMACEUTICAL CO.,	3569	E00562	SEIREN CO.,
13	4530	E00944	HISAMITSU PHARMACEUTICAL CO., INC.	8114	E00601	DESCENTE,
14	4527	E00942	ROHTO PHARMACEUTICAL CO.,	3501	E00574	Suminoe Textile Co.,
15	4536	E00949	SANTEN PHARMACEUTICAL CO.,	8111	E00603	GOLDWIN INC
17	4540	E01018	TSUMURA & CO.	3001	E00524	Katakura Industries Co.,
18	4521	E00935	KAKEN PHARMACEUTICAL CO.,	3109	E00530	SHIKIBO LTD
19	4534	E00947	Mochida Pharmaceutical	3514	E00594	JAPAN VILENE COMPANY
20	4541	E00963	Nichi-Iko Pharmaceutical	3551	E00996	DYNIC
22	4516	E00931	Nippon Shinyaku Co.,	3580	E00591	KOMATSU SEIREN CO.,
23	4547	E00962	KISSEI PHARMACEUTICAL CO.,	3104	E00543	Fujibo Holdings, Inc.
27	4538	E00953	Fuso Pharmaceutical Industries	3205	E00550	DAIDOH LIMITED
28	4514	E00929	ASKA Pharmaceutical Co.,	3302	E00559	TEIKOKU SEN-1
29	4539	E00957	NIPPON CHEMIPHAR CO.,	8127	E00600	YAMATO INTERNATIONAL INC.
30	4549	E00961	EIKEN CHEMICAL	3529	E00567	ATSUGI CO.,

Source: Author's analysis based on EOL digital database

Note: 1990 is a starting point and the base year. 1990 values for TFP Index and Tornqvist Index and CFI are regarded as 100% so that we can observe the whole trend

of Japanese companies throughout the period (1990-2011) of the bubble burst and lost decades in Japan.

Measuring manufacturing output single deflation method is used which involves deflating current estimates of value added or net output by appropriate constant price indices such as CPI (Consumer Price Index) of Japan.

Chapter 4
DATA ANALYSIS AND RESULTS

DATA ANALYSIS AND RESULTS

In this chapter, general overview of the determinants of TFP in global perspective, Japanese pharmaceutical and textile firm's environment and TFP and TFPG trend comparison is explained and analyzed according to the Cobb-Douglas production function and Tornqvist Index outlined in chapter 3. Section 4.1 gives general picture of the determinants of TFP. Section 4.2 explains the environment of Japanese pharmaceutical firms, which further explained under two headings: R&D investments and competitive structure. Section 4.3 gives explanation about textile environment, which further explained under two headings: competition, and nanotechnology applications in textile industry. Section 4.4 gives general analysis and trends of TFP and TFPG between pharmaceutical and textile firms, 1990-2011 in Japan. Section 4.5 gives detailed analysis and comparisons of individual Japanese manufacturing firms.

Chapter 5 gives explanation and analysis on the role of R&D in form of technology stock and technology spillovers in high-tech pharmaceutical and low-tech textile firms, 1990-2011, in Japan. Expanded form of Cobb-Douglas production function and regression analysis is used as outlined in chapter 3. It has only one section, 5.1, which briefly analyzed the role of R&D both graphically and with description throughout the period of bubble burst and economic recovery. Thus, this structure presentation will help readers to understand the clear trends of Japanese pharmaceutical and textile industries throughout 1990-2011 and policy making for the future.

4.1 General overview of determinants of TFP

It is impossible to clearly demarcate between determinants groups. For example, whereas **International trade** may be important for technology transfer, it might also have other more direct positive effects on productivity growth (Isaksson, 2007).

TABLE 4.1.GENERAL OVERVIEW OF TFP DETERMINANTS

TFP DETERMINANTS	Creation, transmission and absorption of knowledge	Factor supply and efficient allocation	Institutions, integration and invariants	Competition, social dimension and environment
DESCRIPTION	Domestic and foreign, research and development (R&D), trade, FDI through importing relatively advanced goods can potentially increase the stock of knowledge. 'ICT'	Human capital (schooling, health and training) and physical infrastructure (roads and electricity). Structural change and financial system.	Economic institutions (property rights), trade (FDI)	Such as effects of privatization and regulation of natural monopolies. High hiring and firing costs have a negative effect on TFP.

Source: Author's description based on (Isaksson, 2007).

4.2 Japanese pharmaceutical industry and general environment

Like other high-tech sectors, pharmaceutical industry is driven by innovation, which requires large and sustained amounts of R&D investment. On the whole R&D expenditure represents about 3.39% of GDP in Japan compared to just 1.84% in Europe. However, the intensity of R&D expenditure relative to sales is by far the highest in the pharmaceutical industry, with an average greater than 10% over the

period 1998-2007, compared to an average of 5.03% in the electrical appliances industry and an average of 3.13% for all the other industries (Nivoix & Nguyen, 2007).

Consistent results on R&D intensity (the ratio between R&D expenditure and sales) in Japan's pharmaceutical industry was 8.1% in 1998, which is much higher than the manufacturing industry's average R&D intensity of 3.9%. This is because medical supplies are based purely on R&D, which requires highly intensive R&D activities including huge investments in R&D resources. Apart from that pharmaceutical industry also ranks highly in terms of R&D expenses per researcher, second only to telecommunications, and well ahead of the automobile industry (Watanabe C. , Takayama, Tagami, & Griffy-Brown, 2002).

4.2.1 R&D investments in Japanese pharmaceutical

Pharmaceutical revenue depends on new technologies and future products characterized by very long period for technological developments and a shorter period for the commercialization of products. While tangible assets such as R&D involves long term and generates seemingly random results. R&D expenditure is different from other investments as it creates intangible assets in the long run which are hard to evaluate Thus, small firms have less capability to implement large scope R&D programmes as research diversification is of necessity (Nivoix & Nguyen, 2007).

4.2.2 Competitive structure

The three largest geographic markets in the world are the United States, Japan and Western Europe. The U.S and Japan were nearly equal as the two largest single national markets, together accounting for almost 50% of total sales of about $170 billion for the year ended march 1990 (Sapienza, 1993). Presently, China and other

BRIC nations like India is becoming very crucial arena for business globally than other nations.

4.3 Textile industry and fluctuation in business environment

The internationalization of markets and competition advances in product, process and business technologies and changing consumer requirements have brought about radical and continuous change in the textile and apparel industries (Kilduff, 2000).

Diversity between companies and nations typically reflects different environmental conditions affecting the technologies they employ, the strategies they pursue and the specific nature of the product markets in which they operate. Business environments are shaped by a combination of sociological, political, legal, technological, natural and economic forces (Kilduff, 2000).

Business environments are becoming progressively more turbulent driven by events that are increasingly rapid, more difficult to understand, originating from a wider array of sources and becoming more unpredictable. As markets expanded through a combination of population increase, economic expansion, real price reductions and technological change, demand became more varied and subject to more change influences. (Kilduff, 2000).

4.3.1 Competition

Since the 1970s, international competition has steadily escalated, spurred by a continued reduction in trade barriers, further improvement in international communications and more conducive attitude towards international investments (Kilduff, 2000). The creation of regional trading blocs, such as EU, NAFTA and ASEAN has resulted in more rapid regional integration.

Firms are operating in significantly more complex and diverse environments that are more subject to intense competitive pressures, and rapid and unpredictable change. Companies have become more open to change, more flexible and creative, with an emphasis on continuous development. Because of technological change, capital requirements in both textile and clothing production have continued to increase appreciably (Kilduff, 2000).

4.3.2 Nanotechnology applications: current and future growth in textile industry.

The textile and clothing industry in general is regarded, as a conventional industry, which comprises an important element of manufacturing industry and GDP and a large share of employment. The textile sector has been radically changed in recent years by evolving consumer needs, new technologies, and globalization. The relatively new niche in textiles and clothing is driving a segmentation of the market based on nanotechnology (Kaonides, Yu, & Harper, 2007).

Adoption of nanotechnology is part of the strategies developed by textile companies to survive in a tough textiles market. Increase competition, particularly from Asia, coupled with the abolition of import quotas for textiles and clothing in the EU, USA, Canada and Norway in 2005, has forced the industry to streamline and modify. The key areas for increased competitiveness are widely believed to lie in information technology, biotechnology and emerging nanotechnology. Nanotechnology is an enabling technology that has the potential to transform the textile industry (Kaonides, Yu, & Harper, 2007).

Japan's textile and apparel market is the second largest after the USA. Companies such as Toray, Toyobo, Teijin and Mitsubishi lead the way in technical and

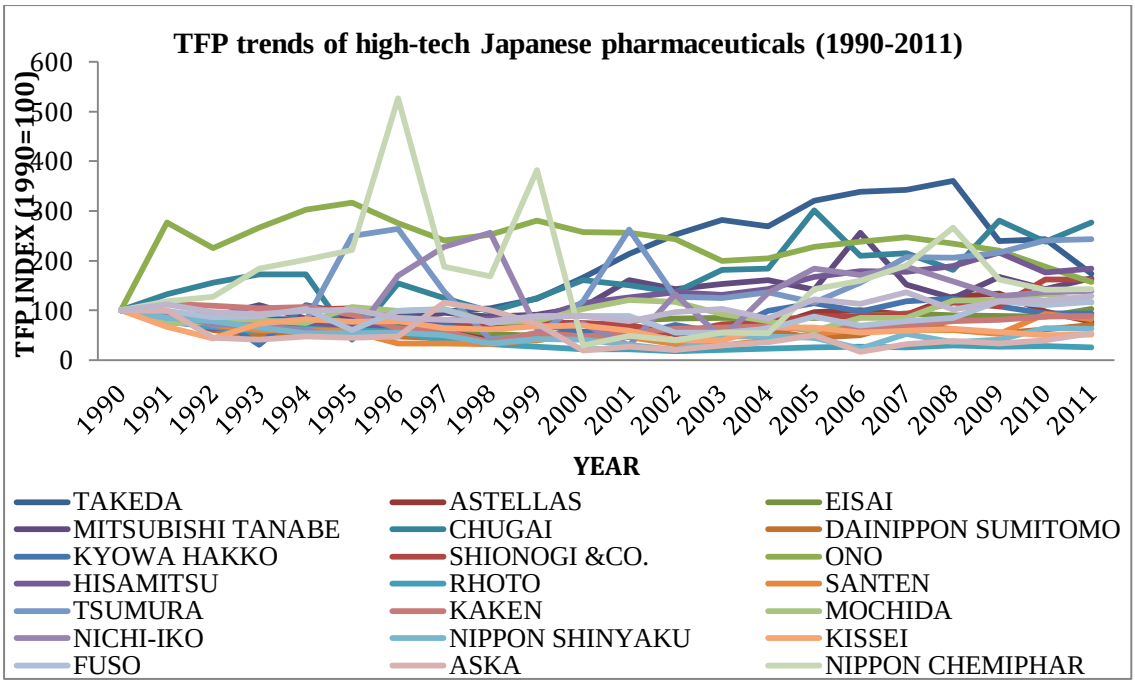
interactive textiles innovation. Japanese R&D in nanotechnology also includes efforts by AIST (National Institute of Advanced Industrial Science and Technology) in atomic architectonics and molecular engineering on a nanometer scale, new techniques of extremely precise machining of solid materials, and the construction of nanoscale assemblies (Kaonides, Yu, & Harper, 2007).

An example of Japan's innovation in textile science is in the area of carbon nanofibre composites at Shinshu University, which developed a nanopowder that can store 3300 farad per gram. This is reported to be 5-6 times better than activated carbon fibres. Another is the development by Teijin of what was claimed as the first optical coloring fibre in the world, Morphotex, using ultra-fine layer technology. Other companies developing nano-enabled textile products include Takeda chemical industries and Toray Industries Inc. (Kaonides, Yu, & Harper, 2007).

4.4 General TFP and TFPG trends of high-tech pharmaceutical and low-tech textile firms from 1990-2011: Cobb-Douglas production function, Tornqvist Index.

4.4.1 TFP trends of high-tech Japanese Pharmaceutical firms (1990-2011)

Description of TFP trends of high-tech Japanese pharmaceutical firms is expressed below graphically throughout the period of burst of bubble economy and slight recovery, 1990-2011.



Source: Author's description based on Cobb-Douglas Method

FIGURE 4.2. HIGH-TECH JAPANESE PHARMACEUTICALS.

TABLE 4.2. FURTHER DESCRIPTION AND ANALYSIS OF TFP TRENDS OF 22 HIGH-TECH PHARMACEUTICAL FIRMS.

Factor	Trend Analysis	Reasons
TFP	**High-tech Pharmaceuticals**: TFP is generally dynamic and decreasing but there was sharp increase in some companies such as Takeda, Astellas, Eisai and Dainippon Sumitomo especially in the second decade (2000s). Others like Ono, Nippon Chemiphar, Tsumura, and Chugai pharmaceuticals showed increased in the first decade (1990s).	**In 2005** Dainippon Sumitomo, Astellas **merged** to improve their capital intensity and therefore enhance TFP and output growth through integrating their own technologies. But before then in year 1990s labour was over used. In **1990s**: capital was worthwhile invested but 2000s was not worth due to overused of labour "labour intensive".

TABLE 4.3. TFPG OF 22 HIGH-TECH JAPANESE PHARMACEUTICALS TRENDS: AVERAGE (1990-2011) IN SELECTED PERIODS.

Sec.	Pharmaceuticals	1990-1996	1997-2005	2006-2011	1990-2011
4502	TAKEDA	-0.014	0.140	-0.102	0.026
4503	ASTELLAS	-0.059	0.000	-0.038	-0.012
4523	EISAI	-0.053	0.023	0.033	0.001
4508	MITSUBISHI TANABE	-0.020	0.085	0.025	0.025
4519	CHUGAI	0.056	0.033	-0.014	0.048
4506	DAINIPPON SUMIT.	-0.109	0.027	0.076	-0.017
4151	KYOWA HAKKO	-0.036	0.016	-0.035	-0.008
4507	SHIONOGI & CO.	-0.022	-0.016	0.104	0.022
4528	ONO	0.151	-0.038	-0.064	0.021
4530	HISAMITSU	-0.062	0.101	0.013	0.028
4527	RHOTO	-0.076	-0.121	-0.007	-0.064
4536	SANTEN	-0.153	0.013	0.076	-0.010
4540	TSUMURA	0.145	-0.093	0.128	0.039
4521	KAKEN	-0.063	0.006	0.065	-0.006
4534	MOCHIDA	-0.002	-0.031	0.111	0.006
4541	NICHI-IKO	0.074	-0.030	-0.046	0.015
4516	NIPPON SHINYAKU	-0.083	-0.020	0.057	-0.021
4547	KISSEI	-0.033	-0.029	-0.045	-0.033
4538	FUSO	0.000	-0.062	0.049	0.007
4514	ASKA	-0.105	-0.038	0.012	-0.029

4539	NIPPON CHEMIPHAR	0.241	-0.288	0.004	0.017
4549	EIKEN	-0.023	0.001	0.006	0.011

Source: Author's description based on Tornqvist Index

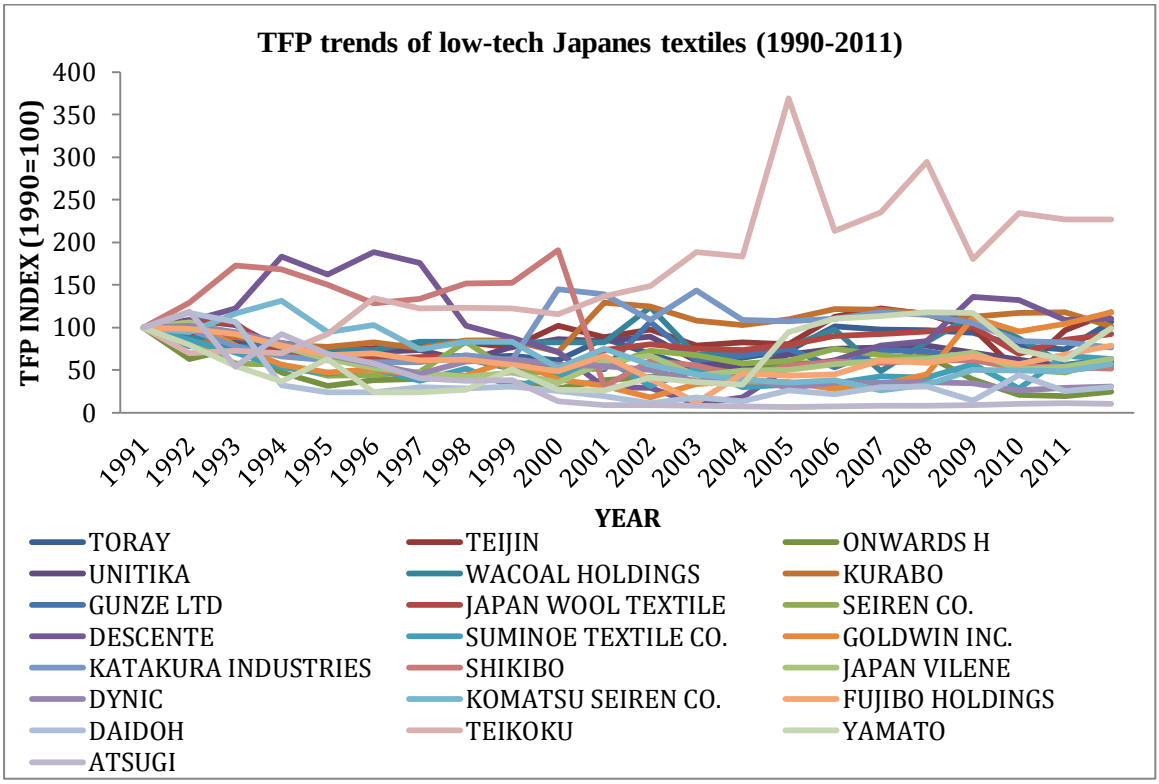
TABLE 4.4. FURTHER DESCRIPTION AND ANALYSIS OF TFP TRENDS OF 22 JAPANESE PHARMACEUTICAL FIRMS.

Factor	Trend Analysis	Reasons
TFPG	**High-tech Pharmaceuticals**: **In 1990-1996** periods, almost all firms had negative TFP growth with few exceptions of Chugai, Ono, Tsumura, Nichi-Iko and Fuso and Nippon Chemiphar pharmaceuticals that had experienced positive TFP growth. **In 1997-2005** periods, larger firms had positive growth such as Takeda, Astellas, Eisai, Mitsubishi Tanabe, Chugai, Dainippon Sumitomo, and Kyowa Hakko while smaller firms yet had negative growth. In **2006-2011** periods, most firms had improved but yet other still experienced stagnation and dynamism such as Takeda, Astellas, Chugai, Kyowa Hakko, Ono, Rhoto, Nichi-Iko, and Kissei pharmaceuticals dropped to negative. **In 1990-2011** periods, half number of firms had positive growth and other half had negative TFP growth such as Astellas, Dainippon Sumitomo, Kyowa Hakko, Rhoto, Santen, Kaken, Kissei, Nippon Shinyaku, and Aska pharmaceuticals.	**1990-1996**: most firms had installed little capital and therefore were not worth to improve capital intensity, which would trigger output (V) and TFP growth. **1995-2005**: Larger firms improved their resources through merging in order to integrate their own technologies in new product development. **2006-2011**: many firms tried to improve in several ways but because the market economy was dynamic due to bubble burst, some firms still experienced dynamism and negative growth.

Source: Author's description

4.4.2 TFP trends of low-tech Japanese Textile firms (1990-2011)

Description of TFP trends of low-tech Japanese textile firms is expressed graphically below throughout the period of burst of the bubble economy and slight recovery, 1990-2011.



Source: Author's description based on Cobb-Douglas Method.

FIGURE 4.3. LOW-TECH JAPANESE TEXTILES.

TABLE 4.5. FURTHER DESCRIPTION AND ANALYSIS OF TFP TRENDS OF 22 JAPANESE TEXTILE FIRMS

Factor	Trend Analysis	Reason
TFP	**Low-tech textiles**: TFP is so dynamic and continue decreasing for most firms throughout 1990-2011 periods. With few exception to some firms which still experienced larger TFP especially in **2000-2011** such as Teikoku and **1990-1999** such as Shikibo, Descente, Komatsu Seiren textile.	**2000-2011**: Labour was overused which affects capital intensity hence output (V) and TFP has been affected. But for Teikoku capital investment was worthwhile in this period. **1990-2011**: Capital was dynamic but with increase, which led to capital intensity and hence TFP and output increase.

Source: Author's description

TABLE 4.6. TFPG TRENDS OF LOW-TECH JAPANESE TEXTILES: AVERAGE (1990-2011) IN SELECTED PERIODS.

Sec	Japanese Textile firms	1990-1996	1997-2005	2006-2011	1990-2011
3402	TORAY	-0.075	0.011	0.008	-0.003
3401	TEIJIN	-0.032	0.001	0.007	0.007
8016	ONWARDS HOLDINGS CO.	-0.134	0.052	-0.175	-0.072
3103	UNITIKA	-0.048	-0.021	-0.038	-0.028
3591	WACOAL HOLDINGS	-0.027	-0.009	-0.055	-0.016
3106	KURABO	-0.029	0.042	-0.033	0.002
3002	GUNZE LTD	-0.067	0.019	0.001	-0.030
3201	JAPAN WOOL TEXTILE	-0.060	0.017	0.003	-0.007
3569	SEIREN CO.	-0.103	0.025	-0.031	-0.022
8114	DESCENTE	0.080	-0.177	0.099	0.000
3501	SUMINOE TEXTILE CO.	-0.154	-0.038	0.120	-0.027
8111	GOLDWIN INC.	-0.119	-0.044	0.231	-0.005
3001	KATAKURA	-0.083	0.076	-0.063	-0.014
3109	SHIKIBO	0.052	-0.154	-0.014	-0.040
3514	JAPAN VILENE	-0.115	-0.003	0.016	-0.027
3551	DYNIC	-0.115	-0.063	-0.026	-0.058
3580	KOMATSU SEIREN	-0.043	-0.100	0.067	-0.028
3104	FUJIBO HOLDINGS	-0.073	-0.045	0.093	-0.013
3205	DAIDOH	-0.182	-0.036	0.054	-0.064
3302	TEIKOKU	0.032	0.137	0.009	0.037
8127	YAMATO	-0.261	0.211	-0.024	-0.005
3529	ATSUGI CO.	-0.129	-0.239	0.058	-0.106

Source: Author's description based on Tornqvist Index

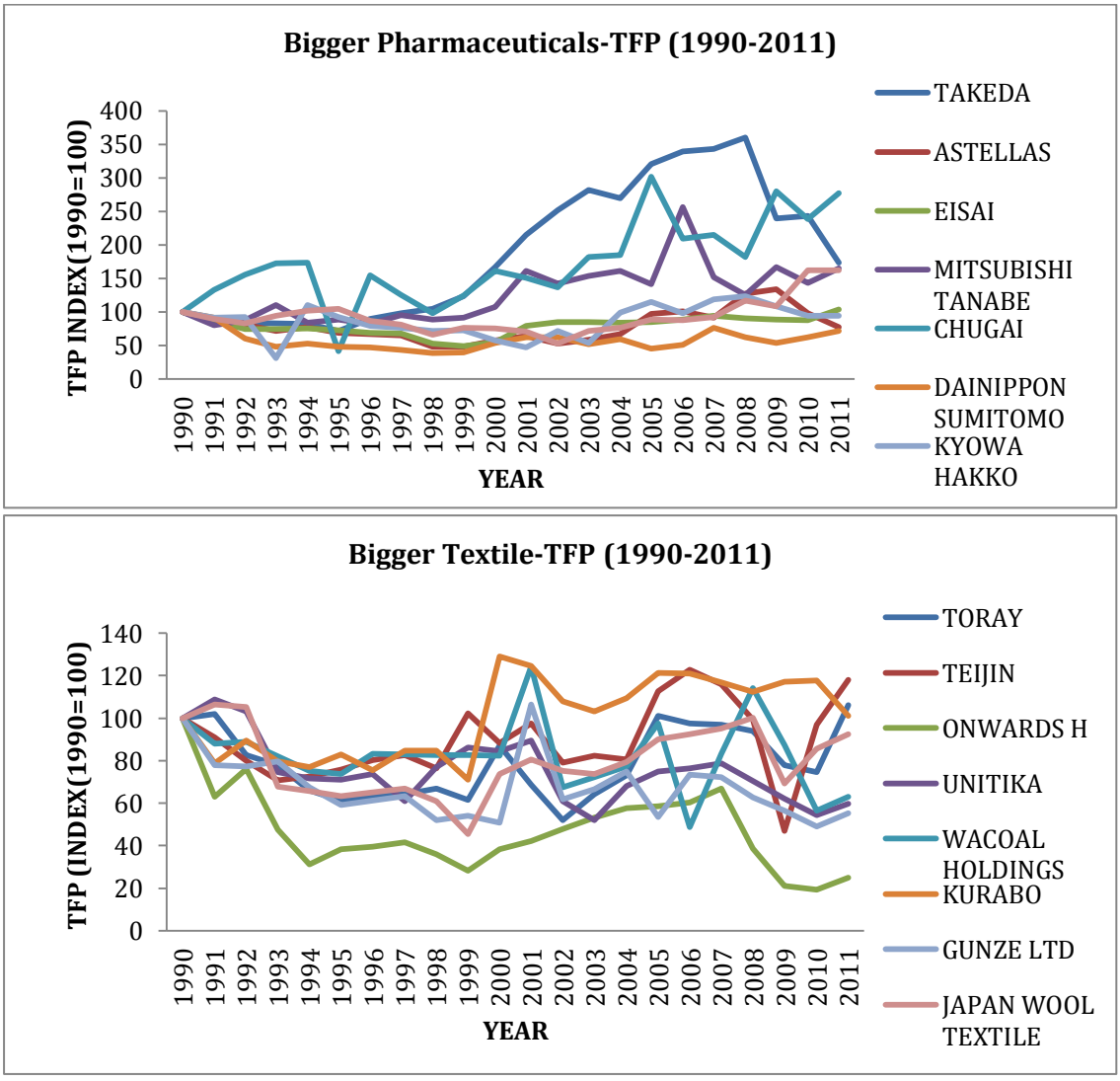
TABLE 4.7. FURTHER DESCRIPTION AND ANALYSIS OF TFPG TRENDS OF 22 LOW-TECH TEXTILE FIRMS, 1990-2011.

Factor	Trend Analysis	Reason
TFPG	**Low-tech textiles**: **In 1990-1996** periods, almost all firms had negative TFP growth with few exceptions such as Descente, Shikibo and Teikoku textiles. **In 1997-2005** periods, most large textile firms had positive TFP growth such as Toray, Teijin, onwards holdings, Kurabo and Gunze textiles. **2006-2011** periods, few firms including larger firms still experienced negative growth such as onwards holdings, Unitika, Wacoal holdings, Kurabo, Seiren, Katakura, Shikibo, Dynic and Yamato. **In 1990-2011** periods, most firms experienced negative TFP growth with few exceptions of Teijin, Kurabo, Descente and Teikoku, which experienced positive TFP growth.	**1990-1996**: most firms had small capital, which resulted into lower capital intensity hence TFPG and output growth decline. While others capital was not worthwhile during this period of bubble burst and great stagnation. **1997-2005**: during and after Asian financial crisis which affected capital. **2006-2011**: larger firms had devoted enough capital and labour was well utilized during this full-scale credit crisis in Japan while smaller firms labour was overused. **1990-2011**: generally, textile firms suffered due to dynamic environment over utilization of labour and underused of capital, which later affected TFPG and output growth.

Source: Author's description

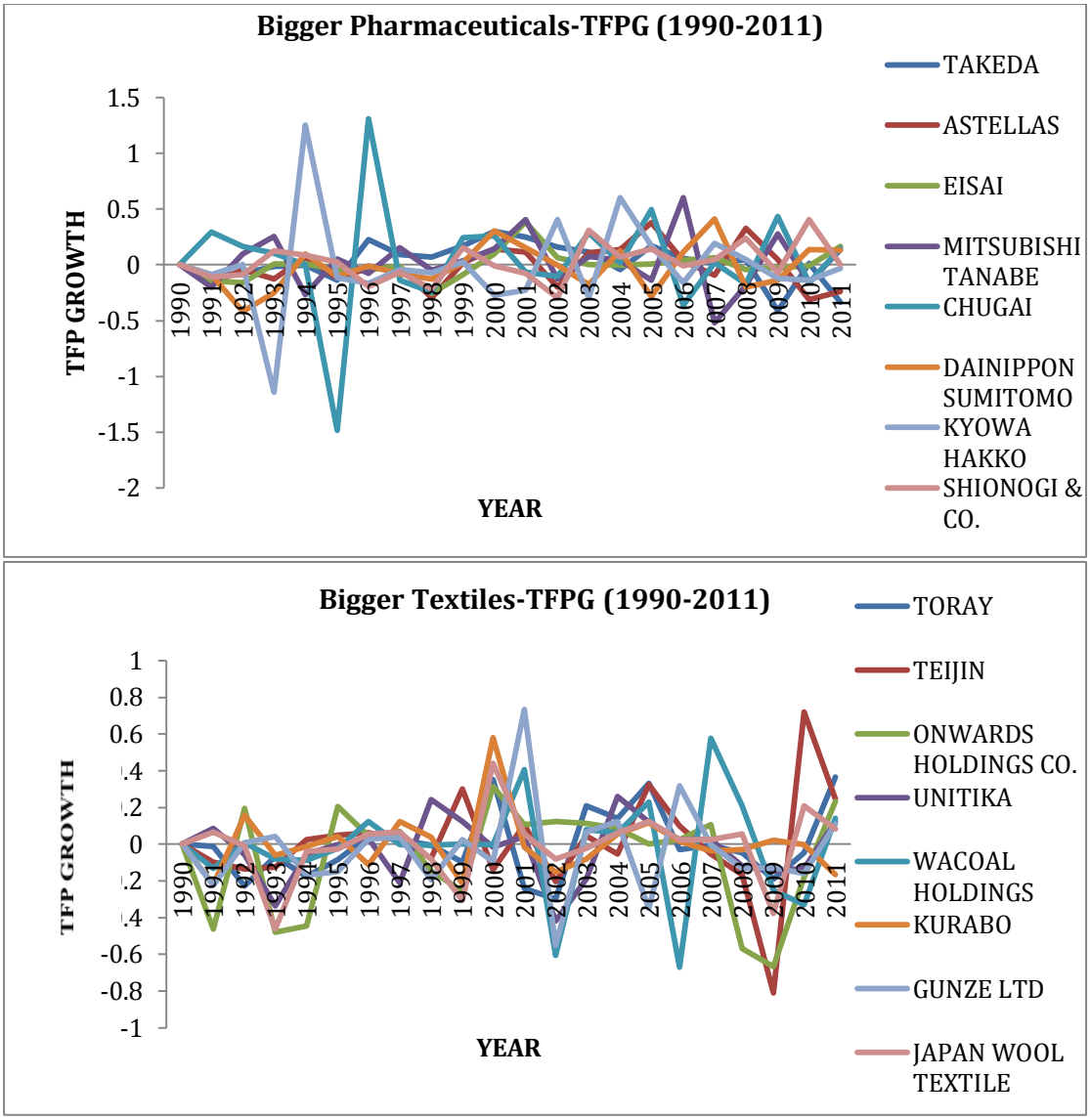
4.4.3 Comparisons of TFP, TFPG of bigger Pharmaceutical and Textile firms according to their sales in 2011.

Description of TFP and TFPG comparisons of 16 bigger Japanese manufacturing firms is expressed graphically below throughout the period of bubble burst and slight recovery, 1990-2011.



Source: Author's description based on Cobb-Douglas Method

FIGURE 4.4. TFP COMPARISONS BETWEEN BIGGER PHARMACEUTICAL AND BIGGER TEXTILE FIRMS 1990-2011.



Source: Author's description based on Tornqvist Index

FIGURE 4.5. TFPG COMPARISONS BETWEEN BIGGER PHARMACEUTICAL AND BIGGER TEXTILE FIRMS 1990-2011.

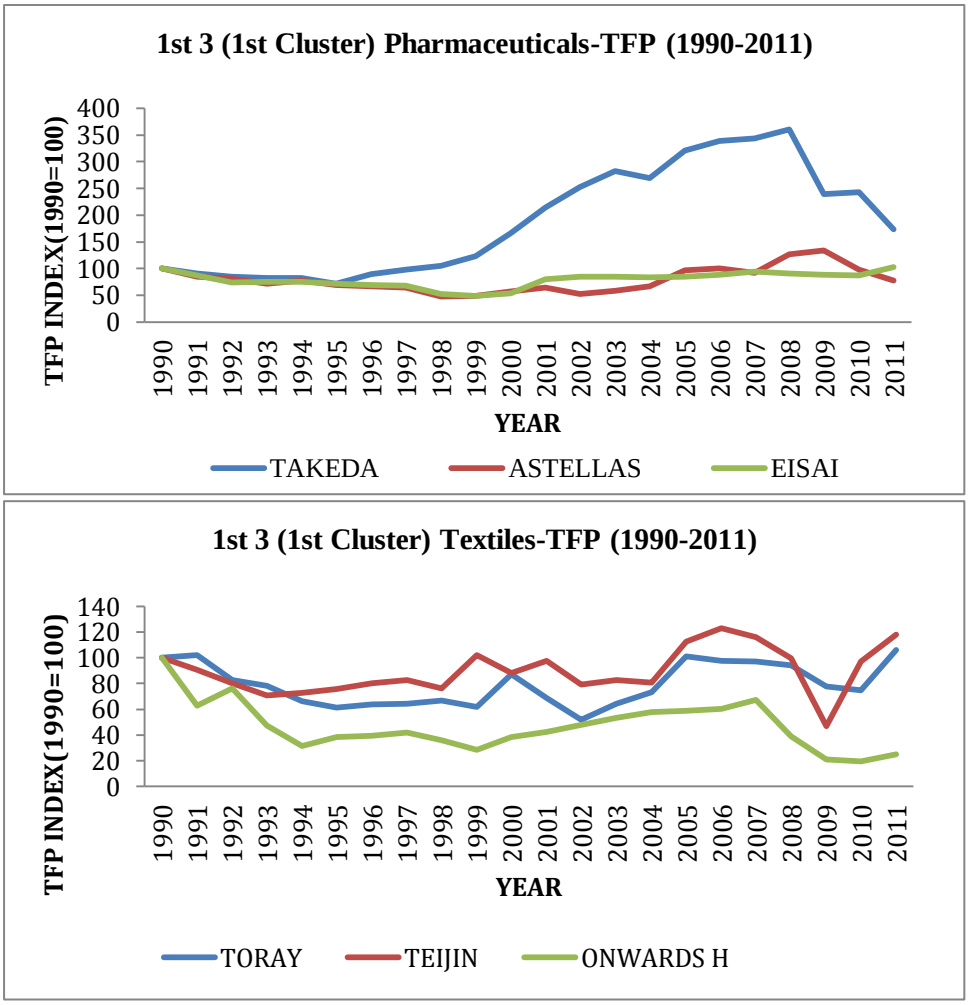
TABLE 4.8. ANALYSIS AND DESCRIPTION OF 16 BIGGER PHARMACEUTICAL AND BIGGER TEXTILE FIRMS, 1990-2011.

Factor	Bigger pharmaceuticals	Bigger textiles
TFP	TFP is so dynamic but is much higher than low-tech textiles and showed little increase for the whole period of "lost decades" in Japan.	TFP is so dynamic but with little increase though it's generally lower than high-tech pharmaceuticals.
TFPG	TFPG is almost stagnant	TFPG is very dynamic but with small growth.
Trend analysis and further description		
Size of the company matters in both pharmaceuticals and textiles in managing risks such as during economy of bubble burst. Generally, pharmaceuticals are good in risks management than textiles because R&D investment involves a lot of risks thus collapse of bubble burst affects textiles more than pharmaceuticals TFP. Also some pharmaceutical firms merged to integrate their own technologies for new product development such as R&D output. This enhances growth of capital intensity hence TFP growth.		

Source: Author's description

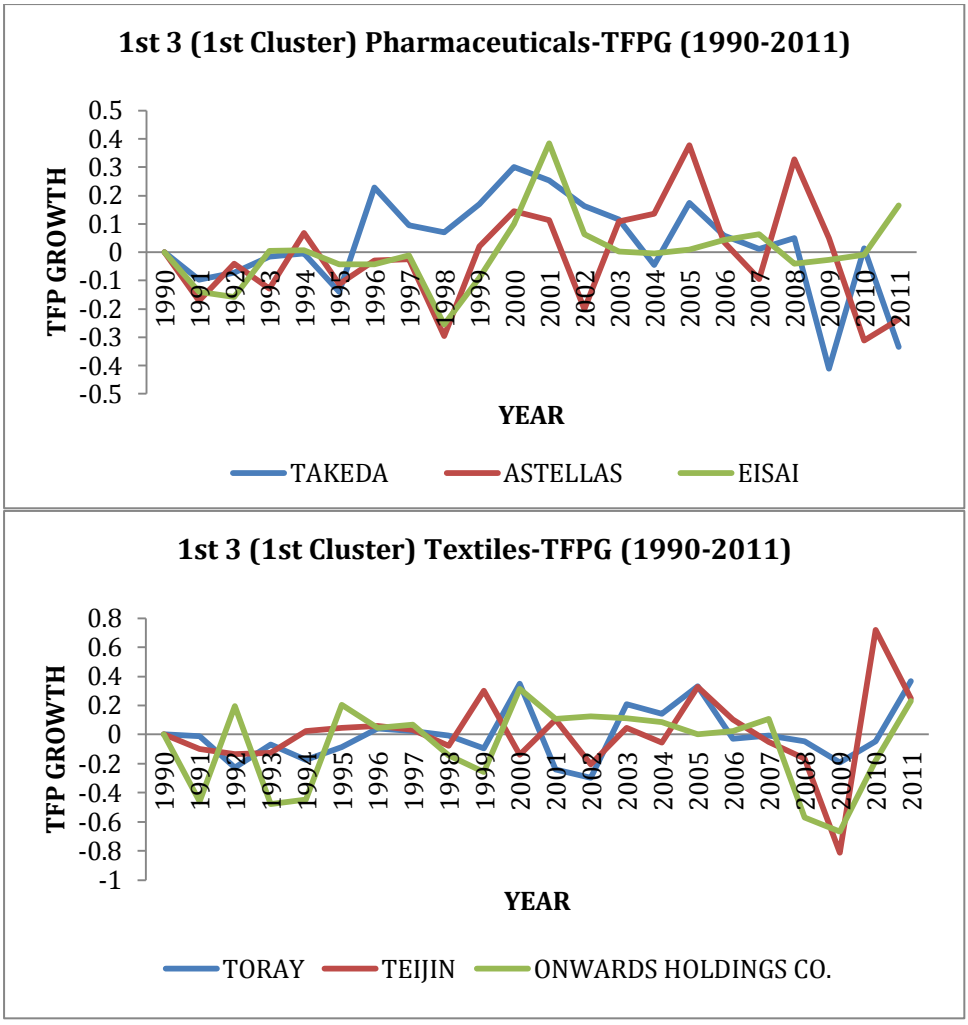
4.4.4 TFP, TFPG Comparisons between 1st Cluster Pharmaceuticals and Textiles 1990-2011 (Appendix 4).

Description and analysis of TFP and TFPG trends is expressed graphically below of 6 manufacturing firms as a 1st cluster according to their size.



Source: Author's description based on Cobb-Douglas Method

FIGURE 4.6. TFP COMPARISONS BETWEEN 1ST CLUSTER PHARMACEUTICALS AND TEXTILES 1990-2011.



Source: Author's description based on Tornqvist Index

FIGURE 4.7. TFPG COMPARISONS BETWEEN 1ST CLUSTER PHARMACEUTICALS AND TEXTILES 1990-2011.

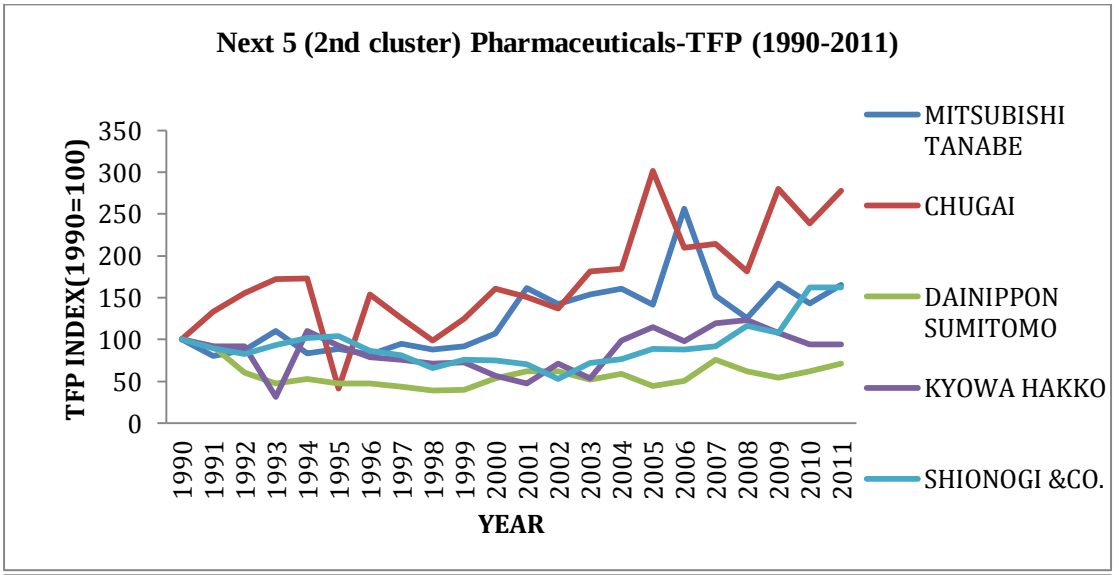
TABLE 4.9. ANALYSIS OF THE RESULTS OF 1ST CLUSTER PHARMACEUTICALS AND TEXTILE FIRMS 1990-2011 (APPENDIX 4).

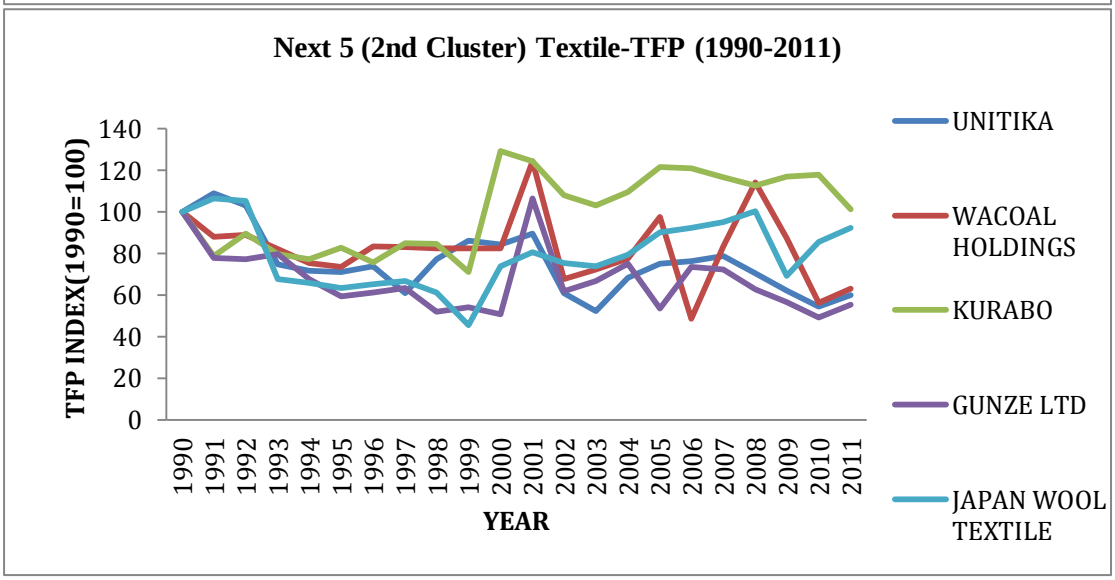
Factor	1st cluster high-tech pharmaceuticals	1st cluster low-tech textiles
TFP	The first three pharmaceuticals Takeda, Astellas have higher TFP than low-tech 1st cluster textiles, though it's decreasing.	The first three textiles Toray, Teijin and onwards holdings showed good TFP and it is increasing in 2010/2011 but it's generally lower than high-tech pharmaceuticals 1st cluster.
TFPG	TFP growth is so dynamic and dropped to negative in 2010/2011 except for Eisai pharmaceutical.	TFP growth is very dynamic and dropped to negative in year 2008/2009 but it is increasing for onwards holdings and Toray from year 2010/2011.
Trend analysis and further description		
Resources and size was very important for technology absorption and hence TFP growth of both textiles and pharmaceuticals 1st cluster. Type of business segments such as high performance carbon fiber, which inquires technology investment contributed to the TFP growth of Toray and Teijin textiles than other textiles. While, 1st cluster pharmaceuticals are most R&D expenditures firms than other Japanese pharmaceuticals.		

Source: Author's description

4.4.5 Comparisons of TFP, TFPG of 2nd Cluster Pharmaceuticals and Textiles 1990-2011 (Appendix 4)

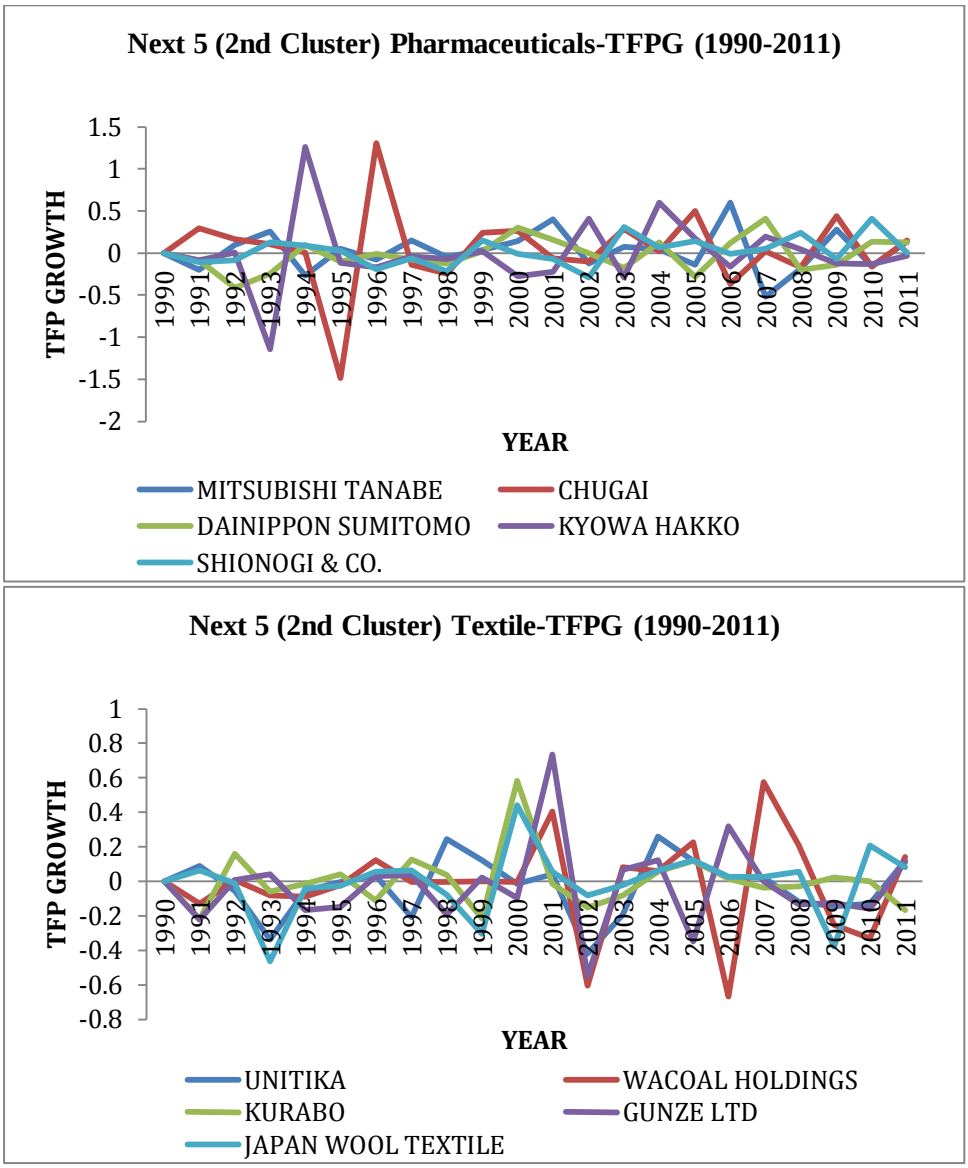
Description and analysis of TFP and TFPG trends comparisons of 2nd cluster manufacturing firms according to their size is expressed graphically below throughout the period of bubble burst and slight recovery, 1990-2011.





Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.8. TFP COMPARISONS BETWEEN 2ND CLUSTER PHARMACEUTICALS AND TEXTILE FIRMS 1990-2011.



Source: Author's analysis based on Tornqvist Index

FIGURE 4.9. TFPG COMPARISONS BETWEEN 2ND CLUSTER PHARMACEUTICALS AND TEXTILE FIRMS 1990-2011.

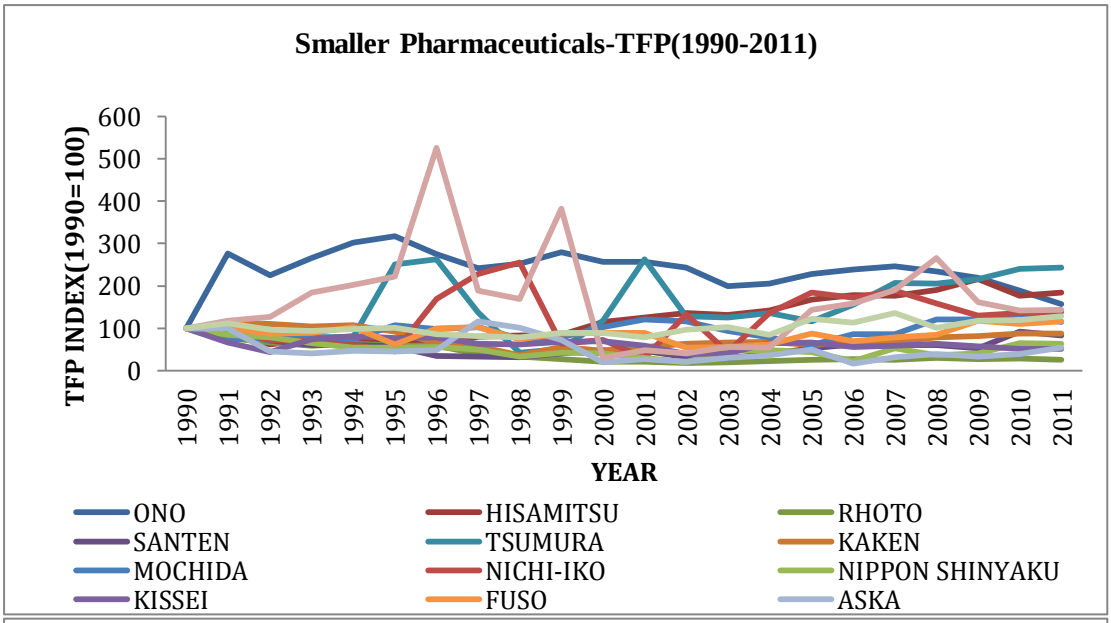
TABLE 4.10. DESCRIPTION AND ANALYSIS OF TFP & TFPG TRENDS OF 2ND CLUSTER PHARMACEUTICAL AND TEXTILE FIRMS, 1990-2011.

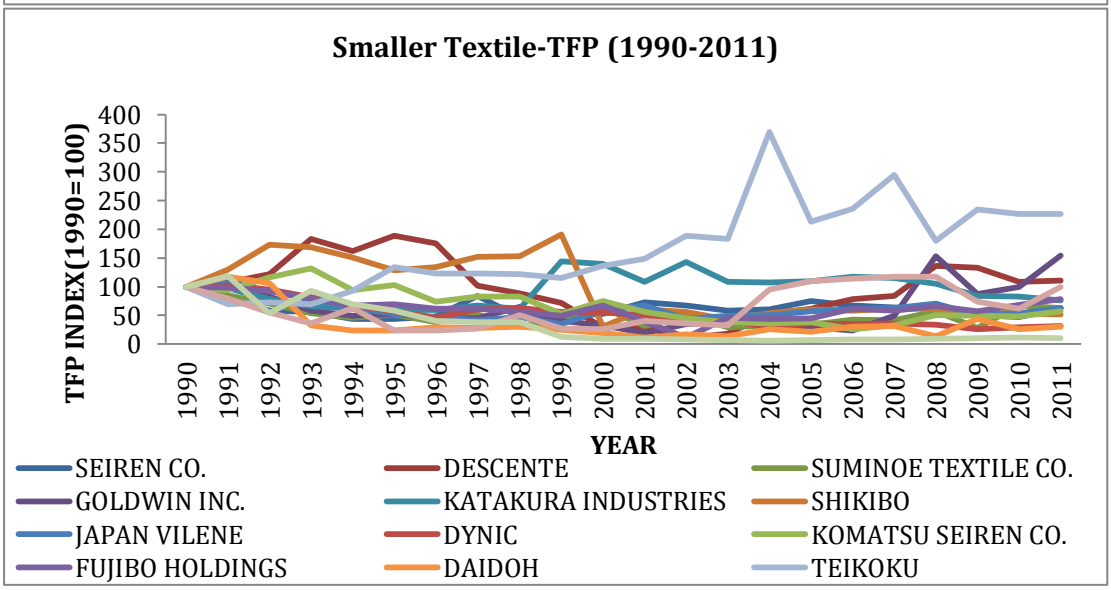
Factor	2nd cluster high-tech pharmaceuticals	2nd cluster low-tech textiles
TFP	TFP of these five pharmaceuticals or second cluster is dynamic but higher follows the first cluster. TFP is higher than second cluster textiles by average and keeps increasing. For the first decade '1990s' TFP declined sharply to negative especially for Chugai and Kyowa Hakko than second decade '2000s'	TFP is dynamic and dropped to negative in the second decade '2000s' than first decade '1990s' especially for Wacoal holdings and Gunze limited and it's lower than high-tech pharmaceuticals.
TFPG	TFP growth is dynamic for the whole period with little growth. 1993, 1995: TFP growth was highly negative.	TFP growth is very dynamic and declined sharply to negative in year 1993, 2002, 2006, 2009-2010.
Trend analysis and further description		
Capital intensity and size of the company was crucial throughout the period of bubble burst and great stagnation. For example Dainippon Sumitomo pharmaceutical before merging capital was going down but after merging in 2005 capital intensity and hence TFP was improved.		

Source: Author's description

4.4.6 TFP, TFPG Comparisons between smaller (3rd Cluster) Pharmaceutical and Textile firms, 1990-2011 (Appendix 4).

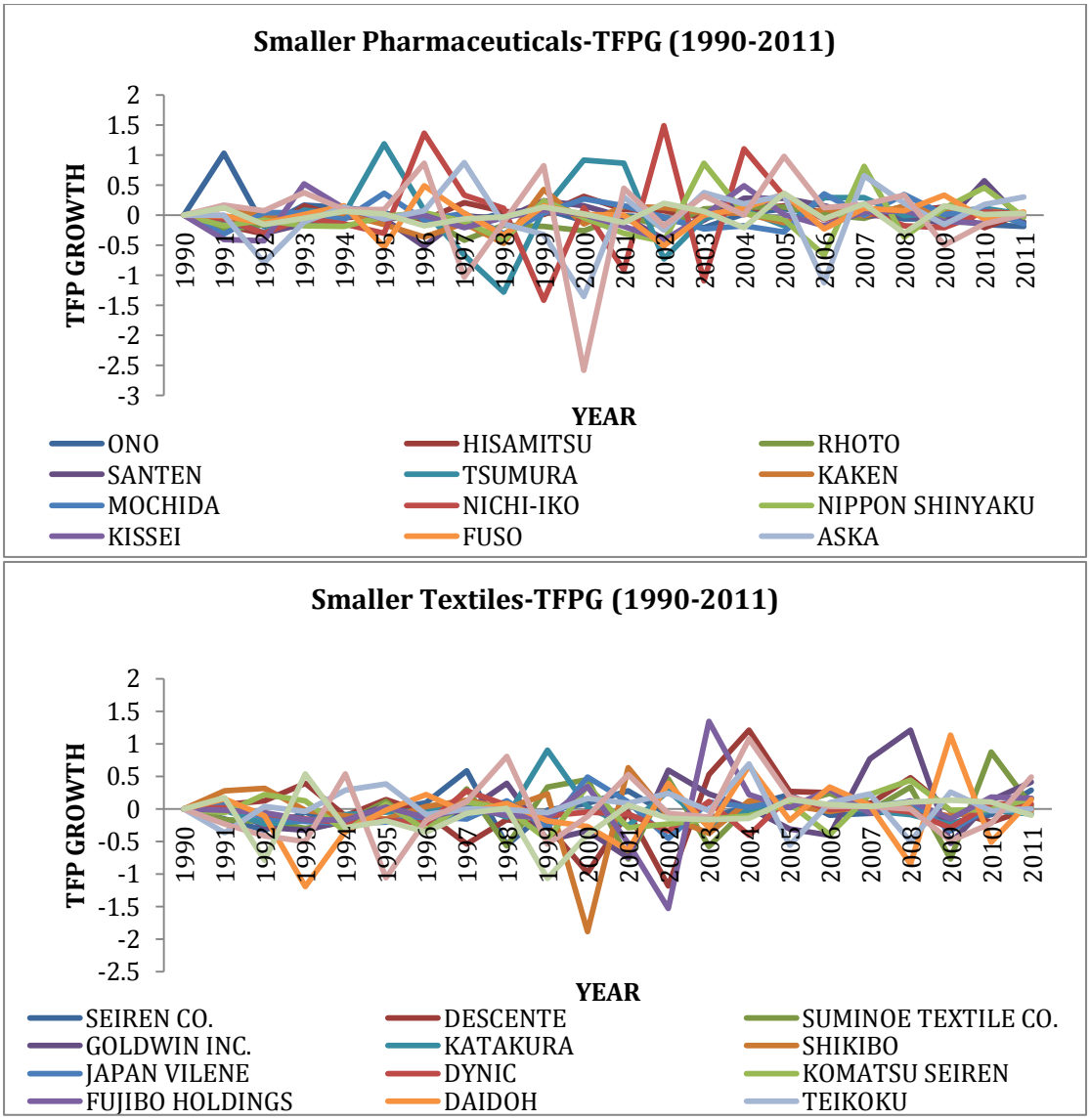
Description and analysis of TFP and TFPG trends of 3rd cluster (smaller firms) of Japanese manufacturing firms is expressed graphically below during burst of the bubble economy and slight recovery, 1990-2011.





Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.10. TFP COMPARISONS BETWEEN SMALLER PHARMACEUTICALS AND SMALLER TEXTILE FIRMS 1990-2011.



Source: Author's analysis based on Tornqvist Index

FIGURE 4.11. TFPG COMPARISONS BETWEEN SMALLER PHARMACEUTICAL AND TEXTILE FIRMS 1990-2011.

TABLE 4.11. DESCRIPTION AND ANALYSIS OF TFP & TFPG OF SMALLER PHARMACEUTICAL AND SMALLER TEXTILE FIRMS, 1990-2011.

Factor	High-tech smaller pharmaceuticals	Low-tech smaller textiles
TFP	TFP is so dynamic with little increase in both two decades '1990s and 2000s'	TFP is much smaller than that of high-tech smaller pharmaceuticals by average and its almost stagnant.
TFPG	TFP growth is dynamic and almost stagnant from 1990-2011. 1992,1997-2006: TFPG dropped sharply to negative	TFP growth is very dynamic and dropped sharply to negative in the year 1992-2002, 2008/2009.
Trend analysis and further description		
The smaller the size of the company the less the ability to absorb technology compared to larger firms due to resources and it is worse in textile firms as they are not R&D intensive. Thus TFP had little role throughout the period 1990-2011 for smaller textile firms than smaller pharmaceutical firms.		

Source: Author's description

4.5 Detailed Individual Firm Analysis between High-tech Pharmaceuticals and Low-tech Textiles: Cobb-Douglas, Tornqvist.

Productivity indicator and its significance in the comparison study between high-tech pharmaceuticals and low-tech textiles throughout 1990-2011.

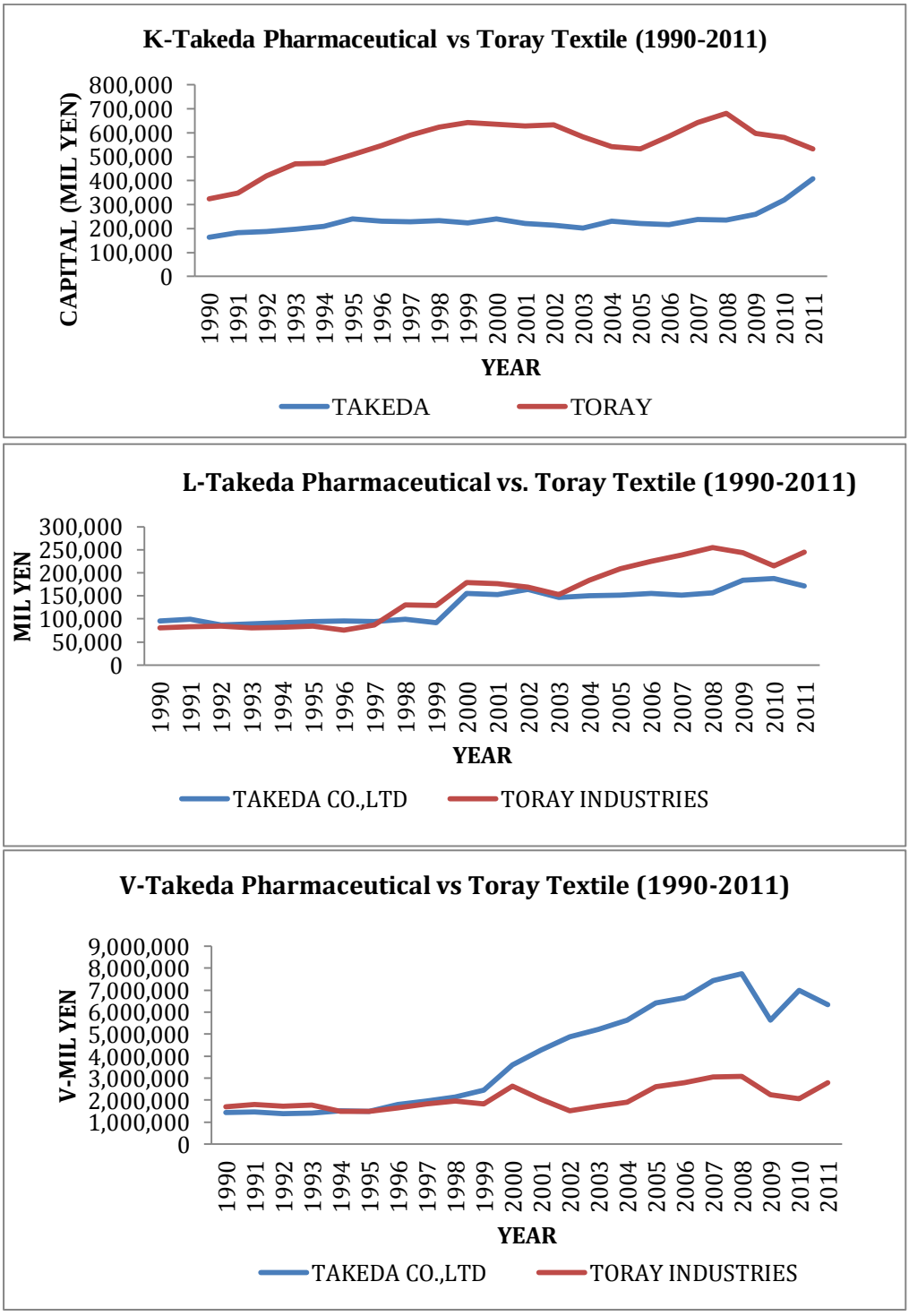
Indicator	Significance
TFP	A technology induced components (lee & Heshmati (2009)), which measure, combined labour and capital efficiency. The larger the measure, the efficient the plant in producing output per unit combined factor input of labour and capital. Unlike partial measure, the TFP measure considers the joint use of the production inputs (Mahadevan, 2007).
TFPG (Tornqvist Index)	Measure changes in TFP which indicate the extent to which an economy, or part thereof, is able to produce more with less factor input (Dudley J. , 1998).
K, L, V	Factor inputs of production function (K, L) and output in terms of value added (V).
K/L, V/L	Capital-labour ratio and labour productivity. The larger the measure of capital-labour ratio, the greater the productivity of labour. Labour productivity is considered as a partial measure of productivity as it considers the use of single inputs (Mahadevan, 2007).
Combined Factor Inputs (CFI) Index	Annual combination of capital and labour inputs in production (CFI). When the value is higher means increase in production expenses and when is lower means decrease in cost of production. If the increase in cost leads to output growth it is worth investing and if leads to decline in output it is not worthwhile (Raynon, 2009).

Source: Author's elaboration based on (Literature Review).

4.5.1 High-tech Pharmaceuticals vs. Low-tech Textiles Comparisons from 1990-2011.

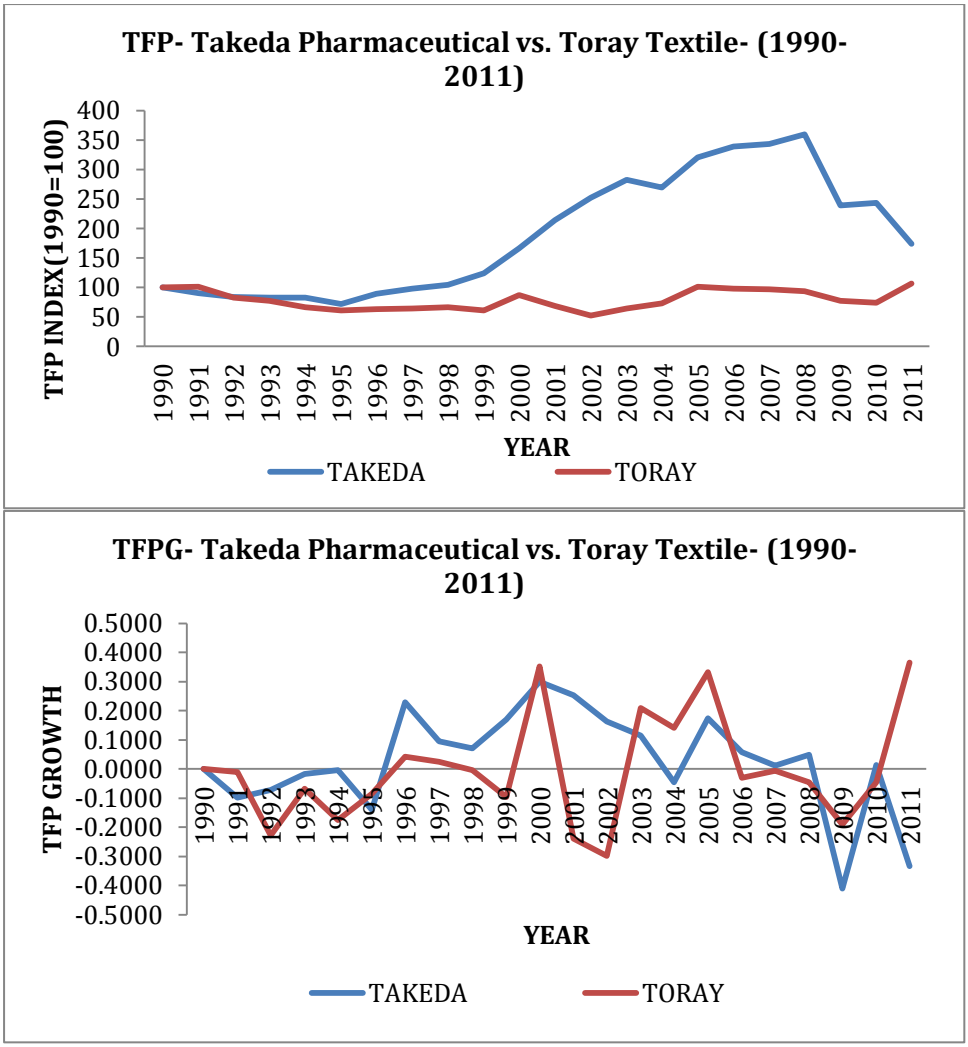
Detailed description and analysis of K, L, V, TFP, TFPG, CFI, V/L & K/L trends comparisons of individual manufacturing firms is expressed graphically and with description below during the burst of bubble economy and slight recovery, 1990-2011.

4.5.1.1 Takeda Pharmaceutical vs. Toray Industries Textile



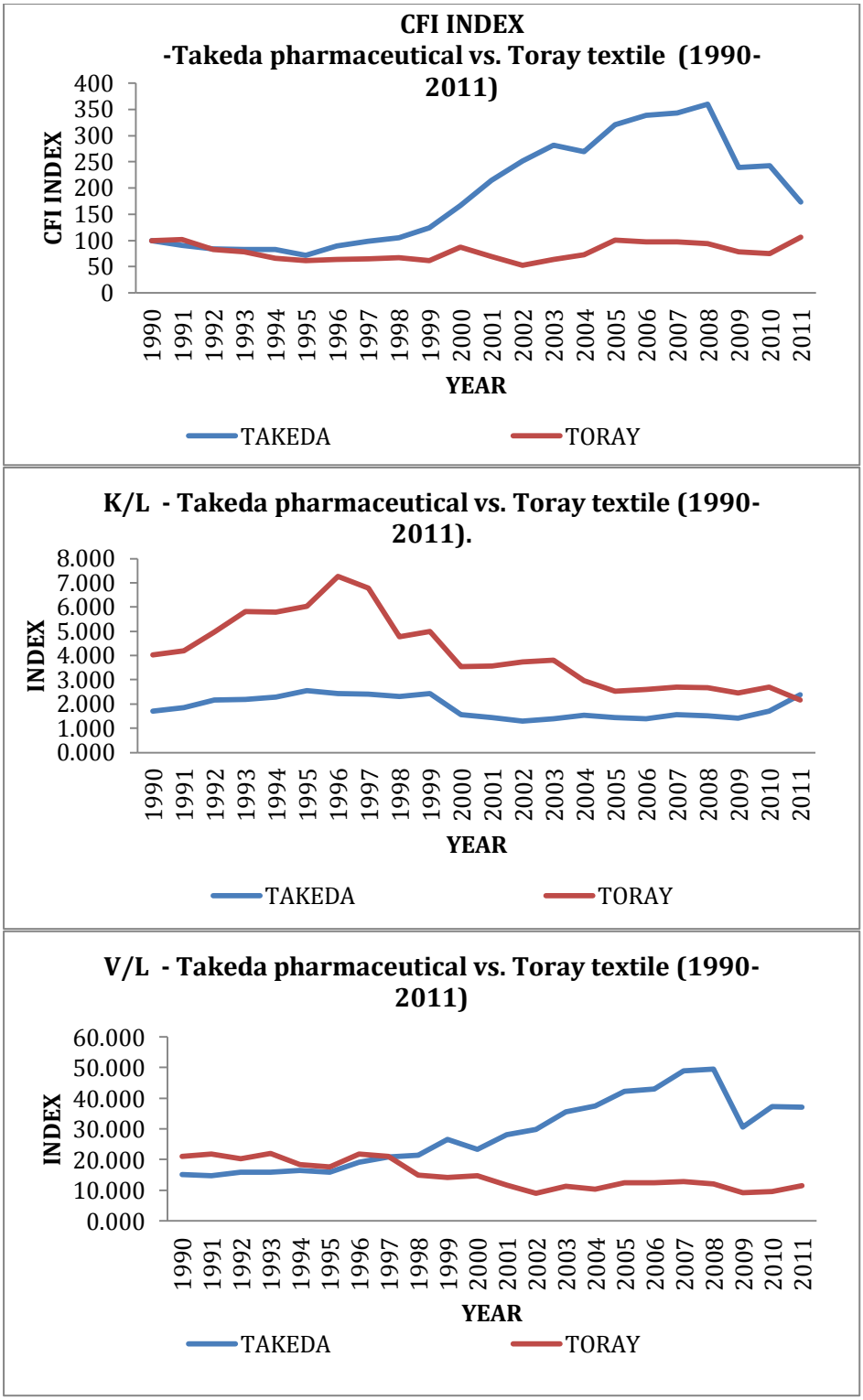
Source: Author's analysis based on EOL digital source

FIGURE 4.12. COMPARISONS K, L, V (4502 VS. 3402), 1990-2011.



Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.13. COMPARISONS TFP AND TFPG (4502 VS. 3402), 1990-2011.



Source: Author's description based on Cobb-Douglas Method

FIGURE 4.14. COMPARISONS CFI INDEX, K/L AND V/L (4502 VS. 3402), 1990-2011.

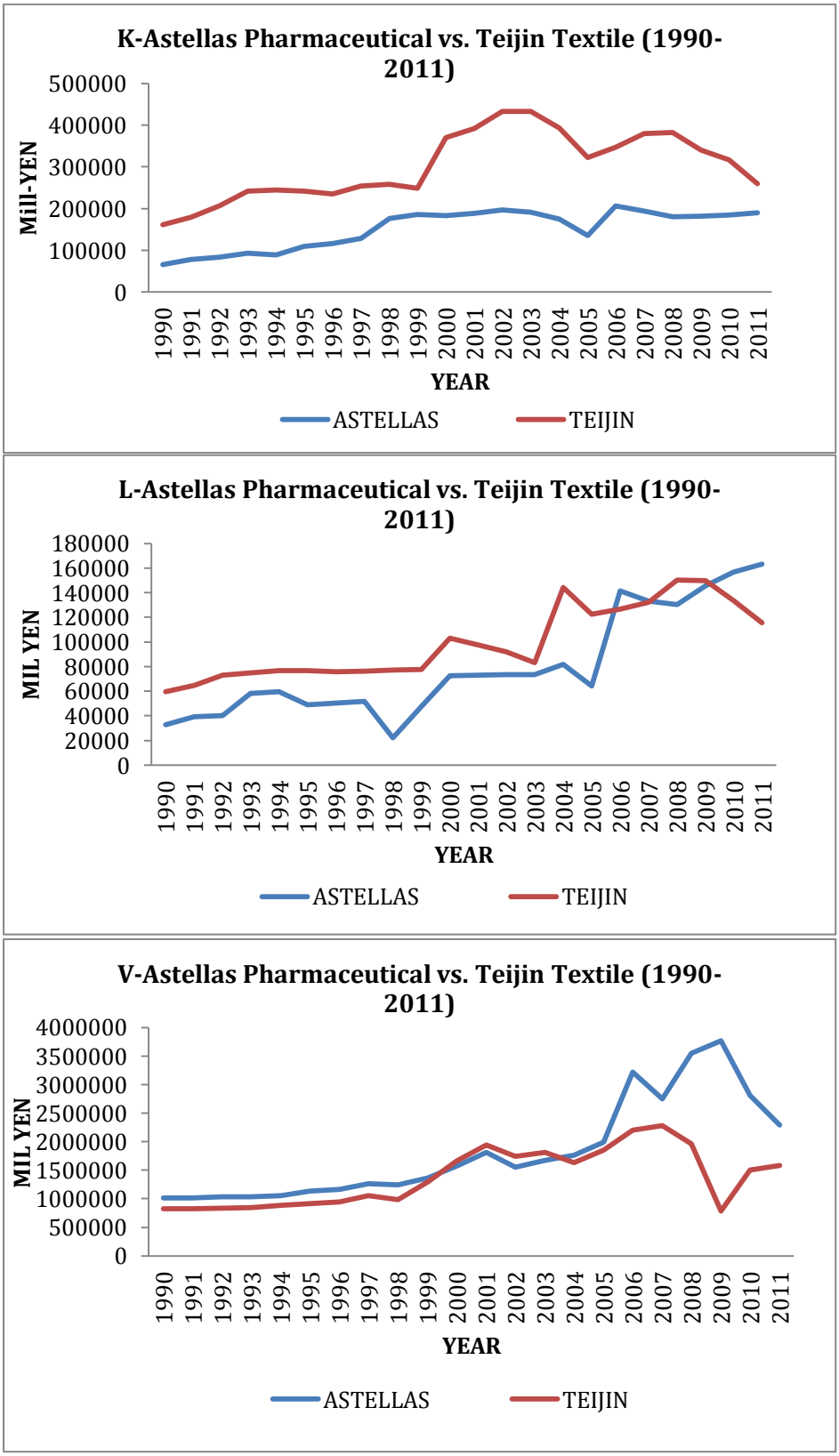
TABLE 4.12. DESCRIPTION AND ANALYSIS OF COMPARISONS OF TAKEDA PHARMACEUTICAL AND TORAY TEXTILE FIRMS, 1990-2011.

Factor	High-tech Takeda Pharmaceutical	Low-tech Toray industries textile
K	Capital is less compared to low-tech but there was a sharp increase in 2007 and hereafter.	Capital is larger compared to high-tech Takeda but it steadily decrease from 2008.
L	Labour is less compared to low-tech Toray textile and it steadily decrease from 2010.	Labour is larger compared to high-tech Takeda Pharmaceutical and steady increase observed from 2010.
V	Output (V) is larger compared to low-tech Toray textile but there was a steep decline in 2008.	Output (V) is less compared to high-tech Takeda Pharmaceutical and a steady increase is observed from year 2010.
CFI Index	CFI index is larger than low-tech Toray. 1999-2008: there was sharp increase, followed by sharp decline hereafter.	It's almost maintained throughout the period and is lower than high-tech Takeda pharmaceutical.
(K/L), (V/L)	There was a sharp increase of labour productivity from 1995 to 2008 followed by sharp decline hereafter and is higher than low-tech. While K/L is almost maintained.	Labour productivity V/L is declining throughout the period while K/L was sharply decline in 1997.
TFP	TFP is generally higher than low-tech Toray textile with highest peak in 2008 followed by steady decrease hereafter.	TFP is smaller but a steady increase is observed from year 2010.
TFPG	TFPG is so dynamic and it became lower than low-tech Toray textile from year 2009.	TFPG was smaller than high-tech Takeda Pharmaceutical before its growth in 2009.

Trend analysis and further description	
High-tech Takeda Pharmaceutical	**Low-tech Toray industries**
To tackle the effect of credit crisis, Takeda capital was increased from year 2007. Also rise in company expenses of Takeda Pharma was worth invested because output growth was increased. Increase of labour productivity led to increase in TFP in 1995-2008. Thus, technological change seemed to have great impact on Takeda Pharmaceutical throughout the period though it declined in 2010.	Toray segments its business into: textiles (40%), carbon fibers (4%) and others. Thus capital investment was higher than Takeda Pharma. This led to predictable trend of productivity growth though it's still lower than Takeda Pharma. Carbon fiber is currently an emerging business, which utilizes Nanoalloy technological material.

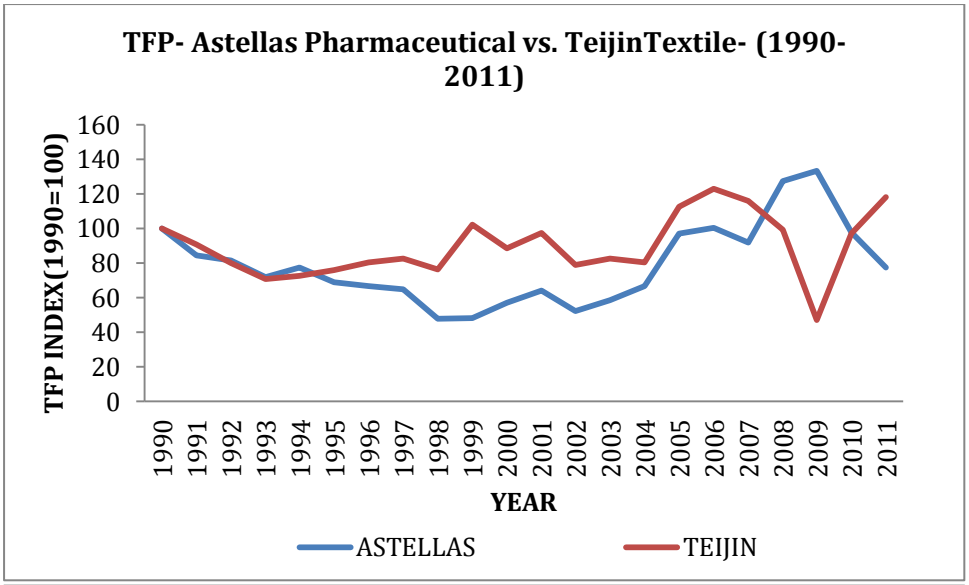
Source: Author's Description

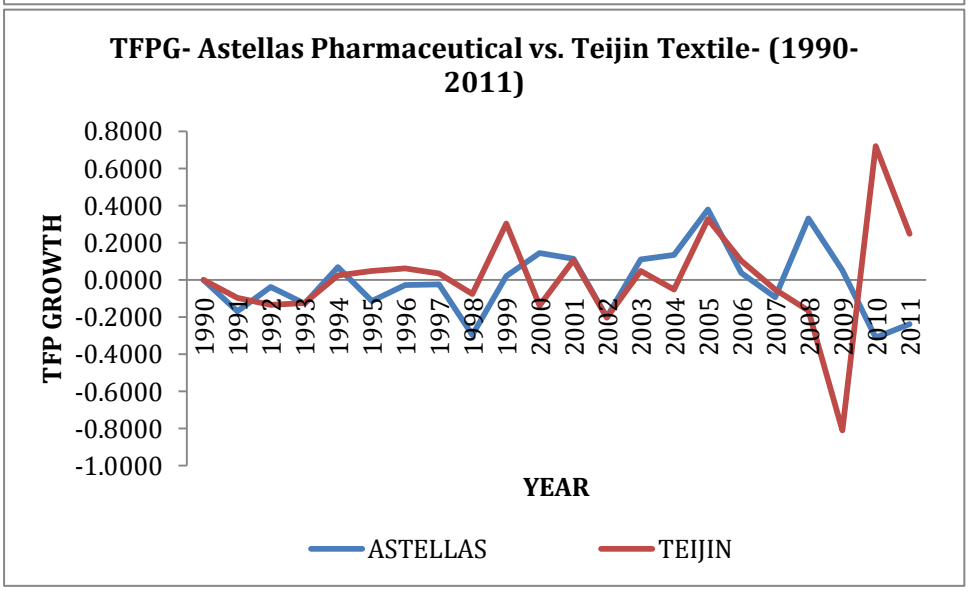
4.5.1.2 Astellas Pharmaceutical vs. Teijin Textile firms 1990-2011



Source: Author's analysis based on EOL digital data

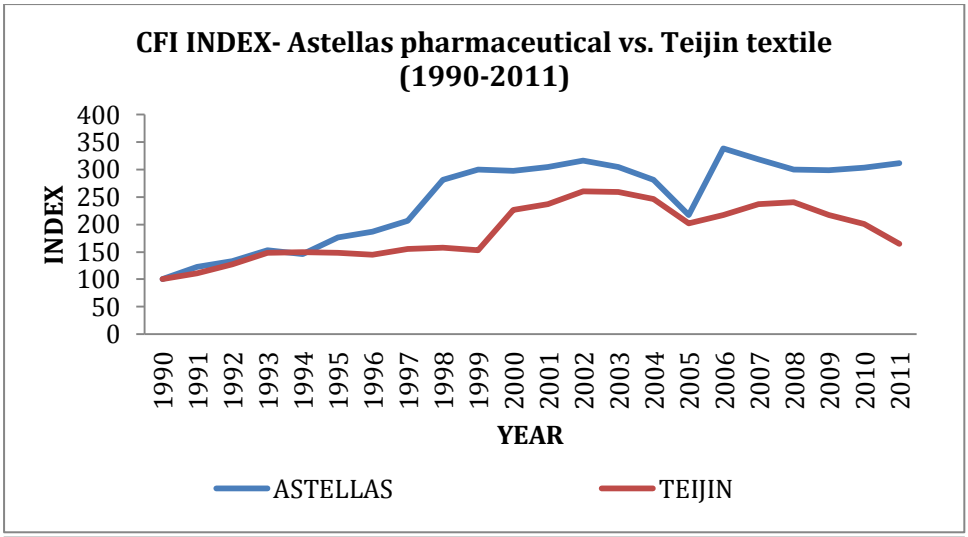
FIGURE 4.15. COMPARISONS K, L, V (4503 VS. 3401), 1990-2011.

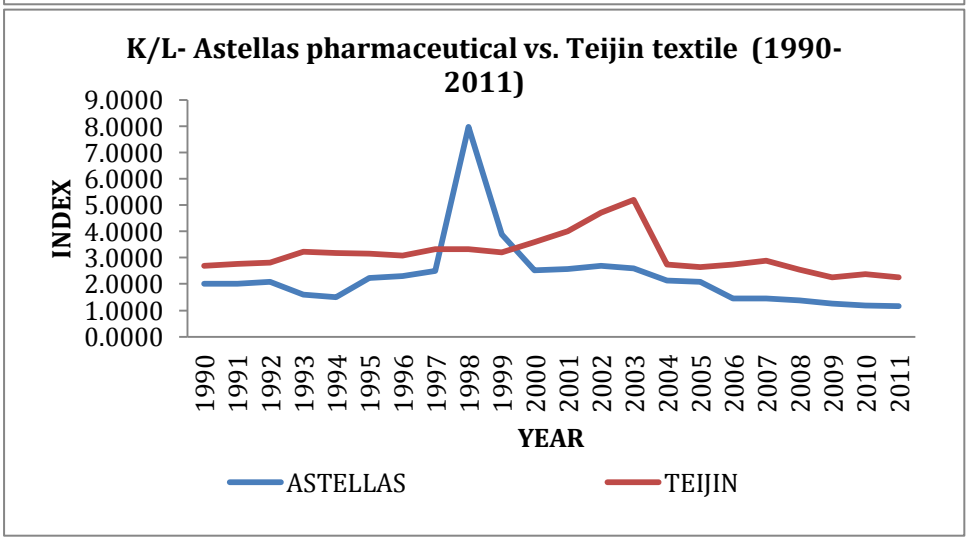


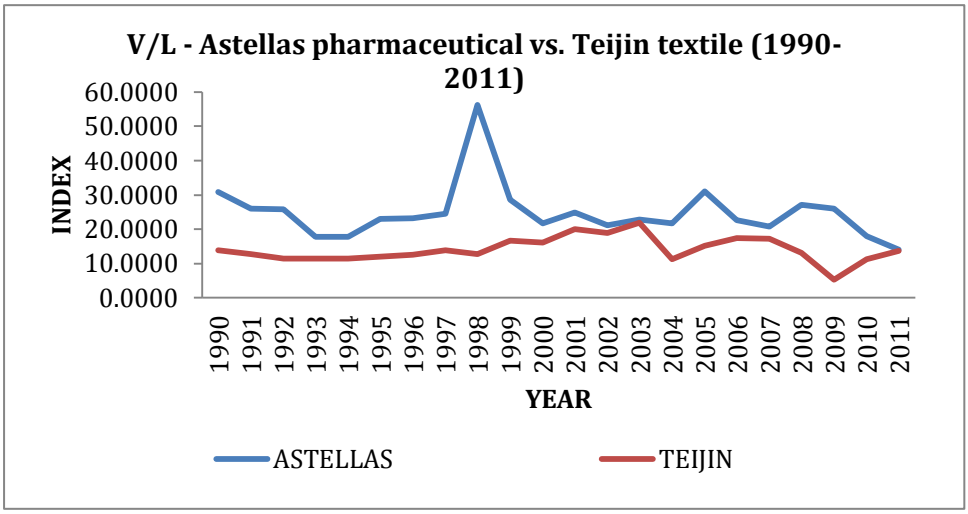


Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.17. TFP AND TFPG COMPARISONS (4503 VS. 3401), 1990-2011.







Source: Author's analysis based on Cobb-Douglas Method and Tornqvist Index

FIGURE 4.18. CFI, K/L AND V/L COMPARISONS (4503 VS. 3401), 1990-2011.

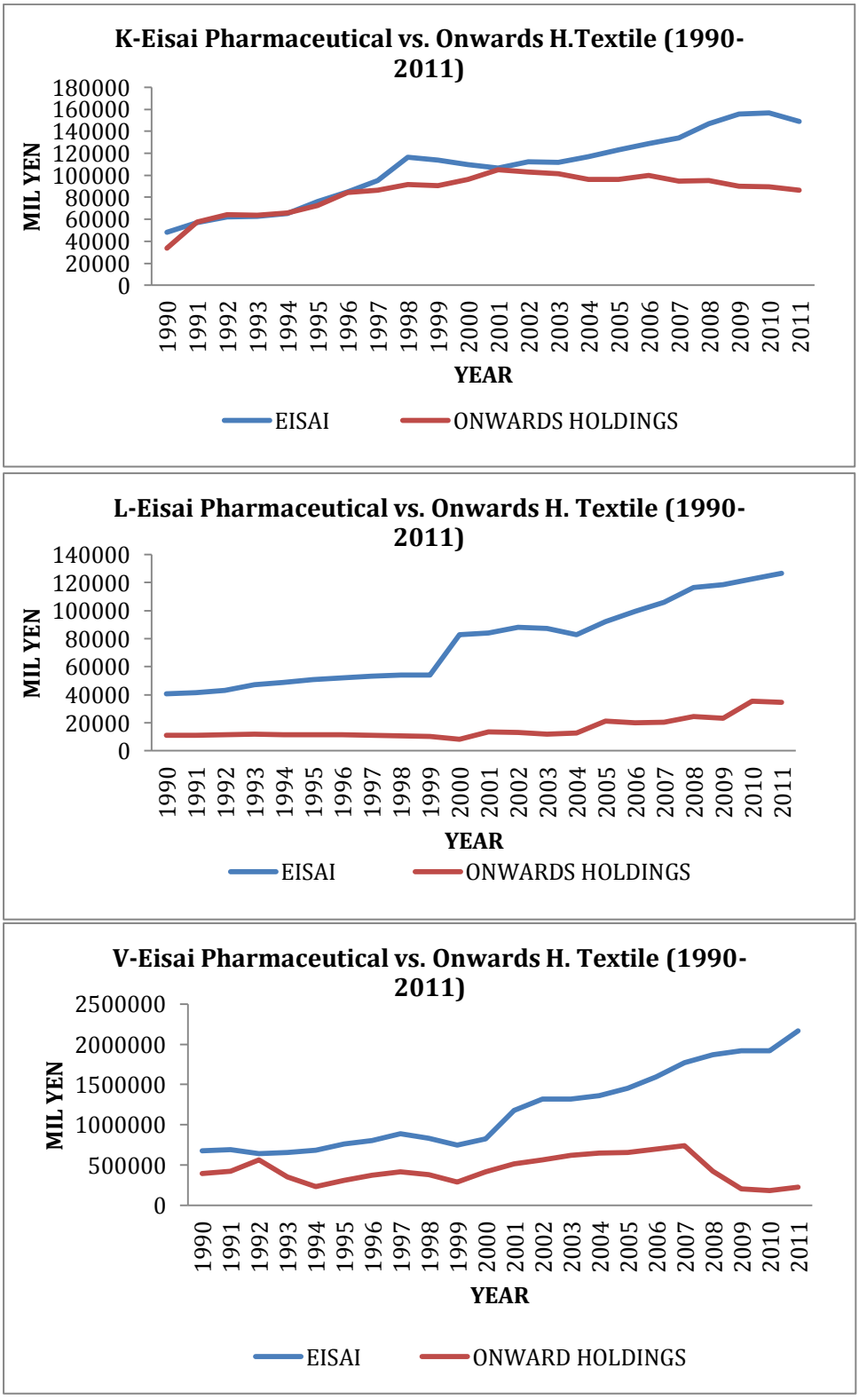
TABLE 4.13. DESCRIPTION AND ANALYSIS OF COMPARISONS OF ASTELLAS PHARMACEUTICAL AND TEIJIN TEXTILE FIRMS, 1990-2011.

Factor	High-tech Astellas pharmaceutical	Low-tech Teijin textile
K	A steady increase in capital has been observed throughout except in 2004/2005 but it's generally lower than Teijin textile.	Capital is higher compared to high-tech Astellas Pharmaceutical but a steep decline is observed in year 2008.
L	From 2009 there was sharp increase of labour	From 2009 labour was sharply decline
V	Output (V) is larger than low-tech Teijin textile but a steep decline is observed in 2008 and hereafter. 2005/06 output increased sharply	Output (V) decreased sharply in year 2009 followed by an increase in 2010 and hereafter.
CFI Index	A steady increase is observed throughout except in 2005 where there was a sharp decline.	There was sharp increase in 2000 followed by decline in 2006.
(K/L), (V/L)	A sharp increase of V/L is observed in 1998 followed by a steep decline hereafter. The same trend observed with K/L.	A sharp decline of V/L is observed in 2004 and hereafter. The same trend observed with K/L
TFP	TFP is lower than low-tech Teijin textile. In 2007 TFP was sharply increase with highest peak in 2009 followed by a steep decline in 2010 and hereafter.	In 1992/1993 and 2009 there was sharp decrease of TFP followed by a sharp increase here after. Generally the trend is fluctuating.
TFPG	TFPG trend is dynamic but in 2010 there was a steady increase	There was sharp increase from 2010 then became higher than high-tech Astellas Pharmaceutical.

Trend analysis and further description	
High-tech Astellas pharmaceutical	**Low-tech Teijin textile**
In 2005: there was **fusion** of Yamanouchi and Fujisawa into **Astellas Pharma** thus integrating their own technologies for new product development such as patent. This also led to the reduction in company expenses and increase in output growth capital intensity in the year 2005. This is due to the fact that, Pharmaceutical firms depends much on huge R&D investment for new product development.	Teijin textile is into high performance carbon fiber an emerging business like Toray. Capital growth was higher throughout but due to effects of credit crunch in 2008/2009 it dropped which resulted into lower output growth. Teijin textile seems to be labour intensive than Astellas Pharma though TFP is little higher due to carbon fiber, which requires investment of high technological Nanoalloy.

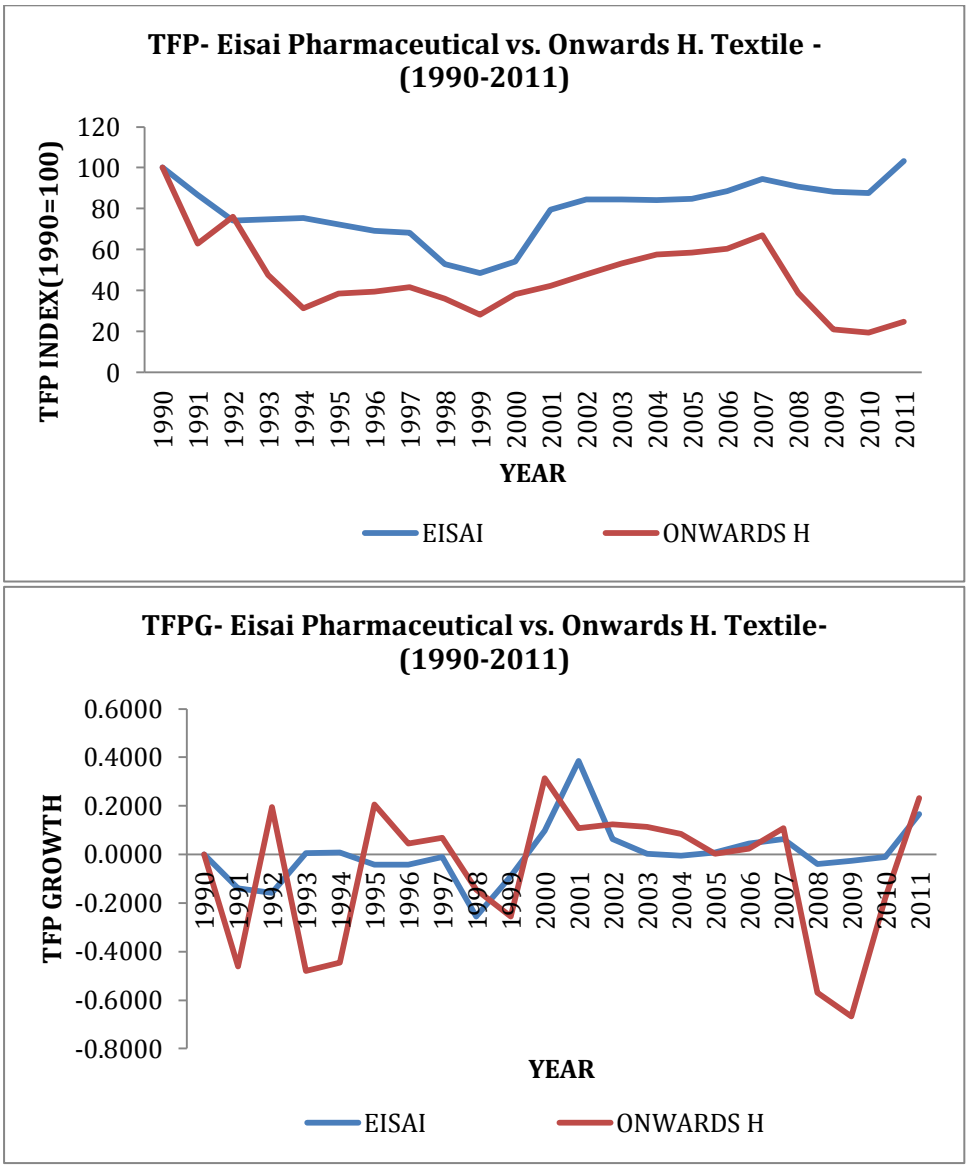
Source: Author's description

4.5.1.3 Eisai Pharmaceutical vs. Onwards Holdings textile firm 1990-2011



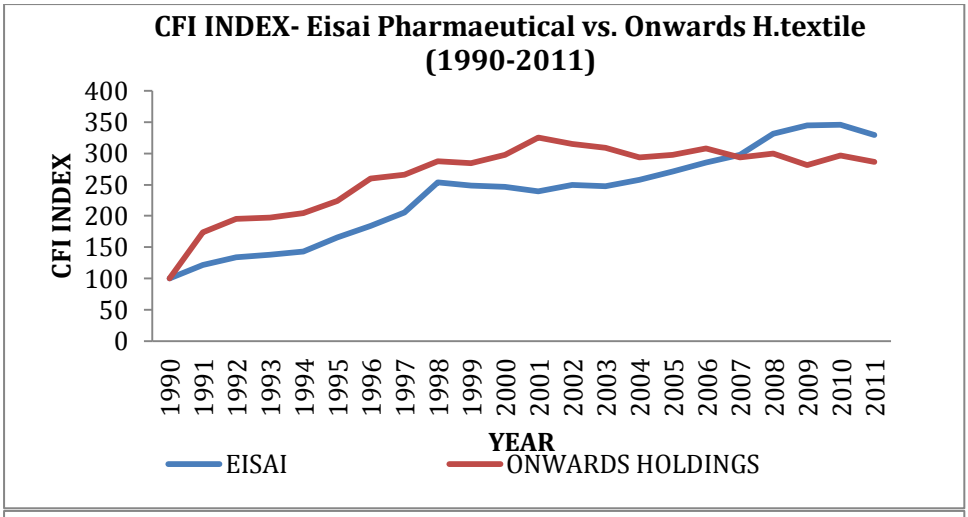
Source: Author's analysis based on EOL digital data

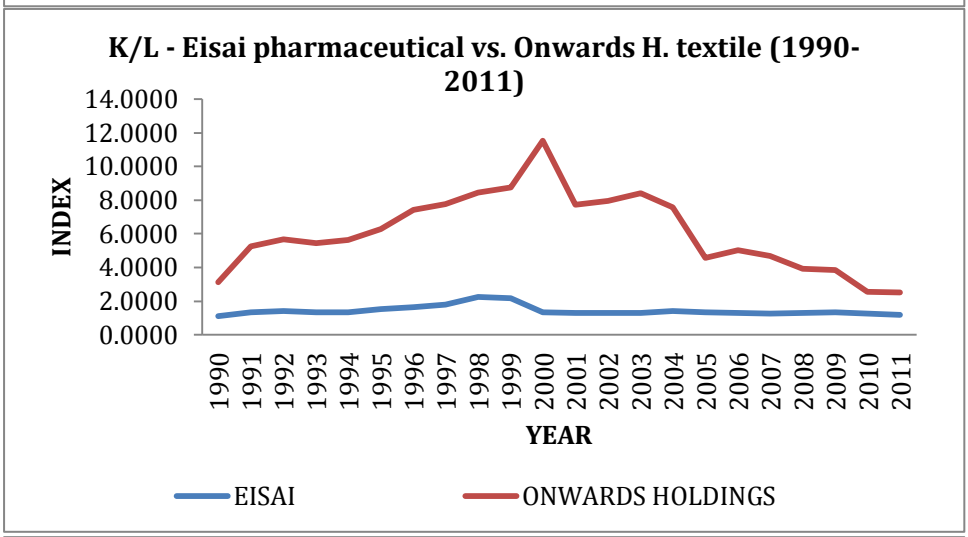
FIGURE 4.19. K, L, V COMPARISONS (4523 VS. 8016), 1990-2011.

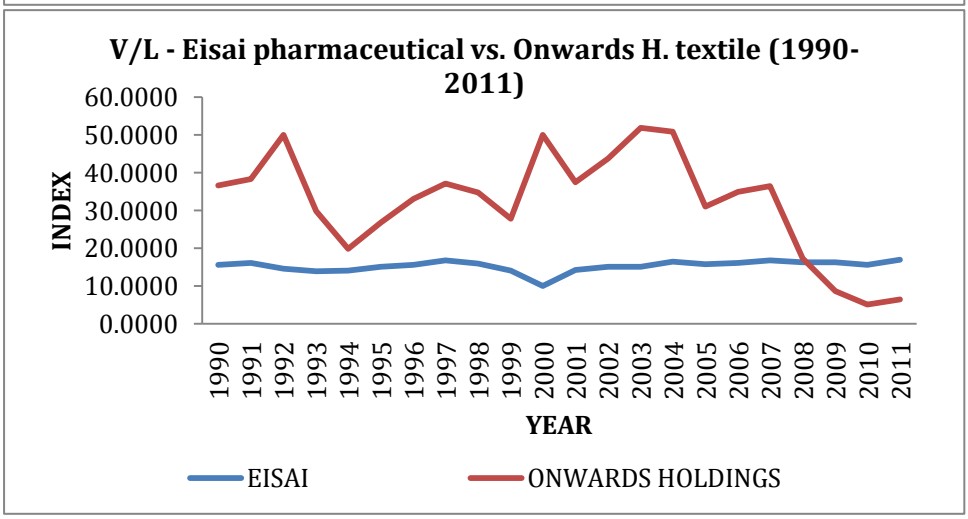


Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist (TFPG)

FIGURE 4.20. TFP AND TFPG COMPARISONS (4523 VS. 8016), 1990-2011.







Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.21. CFI, K/L AND V/L (4523 VS. 8016), 1990-2011.

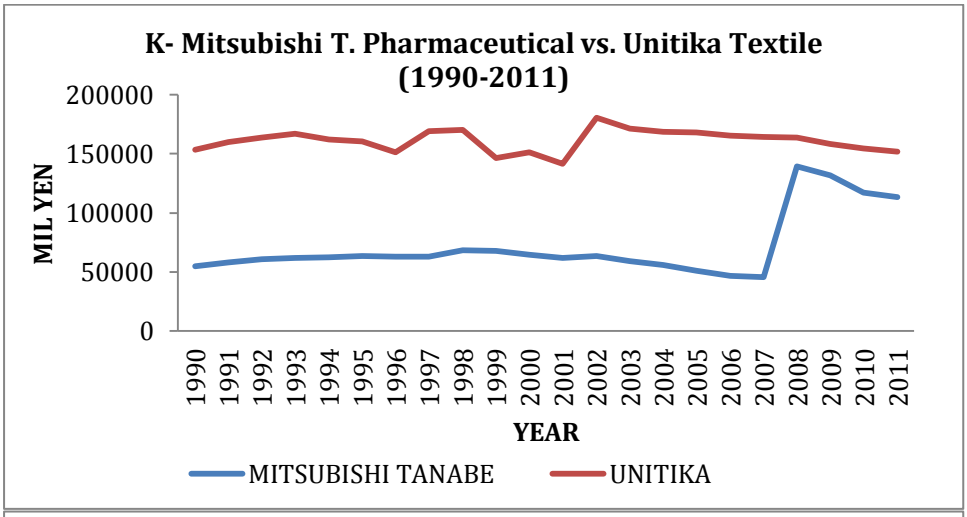
TABLE 4.14. DESCRIPTION AND ANALYSIS OF COMPARISONS OF EISAI PHARMACEUTICAL AND ONWARDS HOLDINGS TEXTILE FIRMS, 1990-2011.

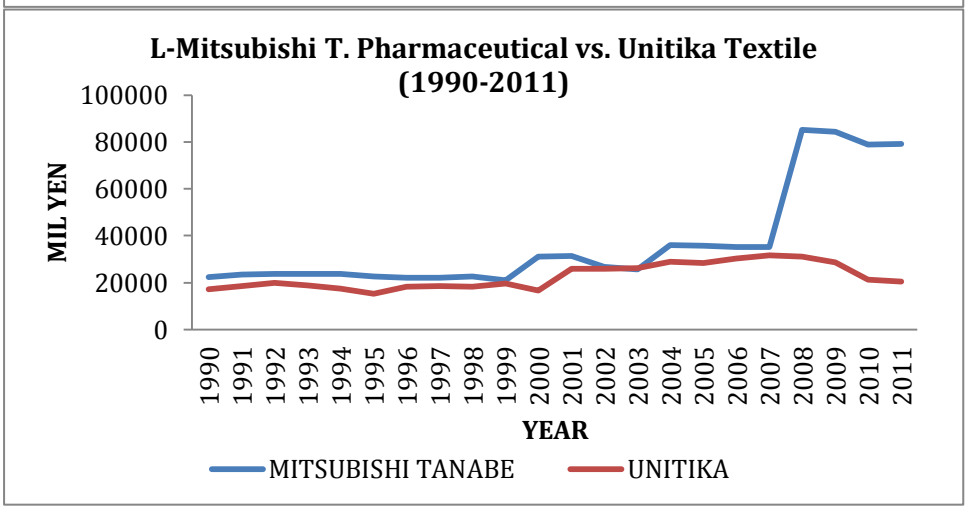
Factor	High-tech Eisai Pharmaceutical:	Low-tech Onwards holdings textile:
K	There was a steady increase of capital throughout except in 2010/2011 where it experienced a decline. Generally, it's lager than Onwards textile.	Capital is generally lower than high-tech Eisai Pharmaceutical and a steady decrease of capital observed from 2001 though at small rate.
L	There is proportional increase of labour throughout the period 1990-2011.	Labour is almost maintained throughout the period and it's generally lower than high-tech.
V	There is steady increase of output (V) throughout the period and it's larger than low-tech Onwards holdings textile	Output (V) is much smaller and a steady decrease is observed from year 2007/2008.
CFI Index	Steady increase throughout the period is observed and from 2007 became higher than low-tech	A steady decrease observed from 2002 and hereafter.
(K/L), (V/L)	Both V/L and K/L experienced stagnation with small decline in 2000	There was a sharp decline of labour productivity in 1994 and 2007 while steady decline of K/L is observed in 2001 and hereafter.
TFP	TFP is higher and experienced steady increase than low-tech Onwards holdings textile except in 1991/1992 and 1997/2000 with the highest peak being 2011.	TFP is smaller compared to high-tech Eisai Pharmaceutical. In 1991/1994 there was a steep decrease of TFP before maintained in 2007/2008.
TFPG	A fluctuating trend of TFPG throughout the two decades followed by an increase in 2011.	Fluctuating trend but a steady increase is observed from 2010. 1991/1994 and 2008/2009 there was a sharp decrease of TFPG.

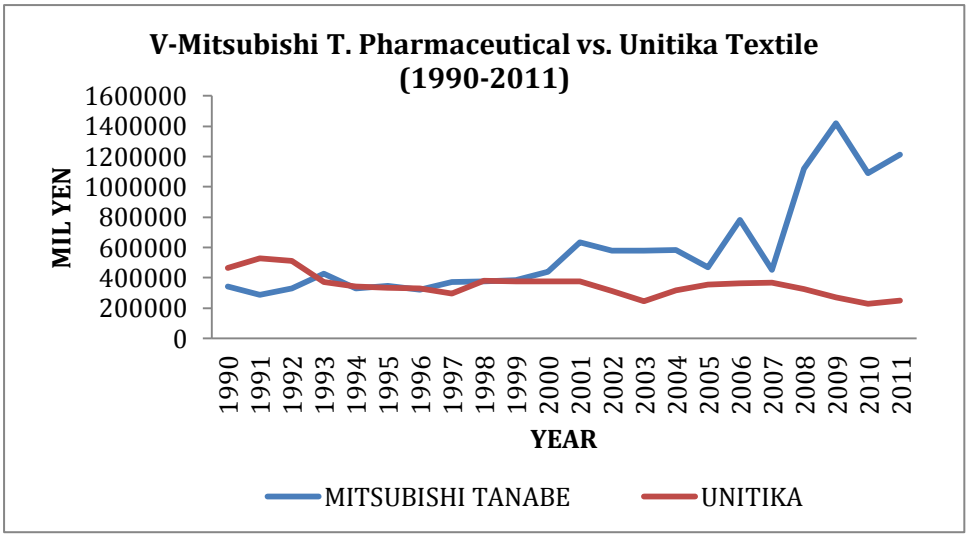
Trend analysis and further description	
In 2010/2011 capital declines due to tightening of loans i.e. credit crunch effects. Capital intensity and labour productivity was higher throughout with little decrease in 2010. This helps TFP and output growth to become higher than low-tech. Thus, increase of expenses of capital and labour was worthwhile invested.	Increase and decrease of capital and labour throughout the period of bubble burst and lost decade was not worthwhile invested as output growth and TFP was lower and keeps decreasing and therefore productivity was lower compared to high-tech Eisai pharmaceutical.

Source: Author's description

4.5.1.4 Comparisons of Mitsubishi Tanabe Pharmaceutical and Unitika Textile firms 1990-2011

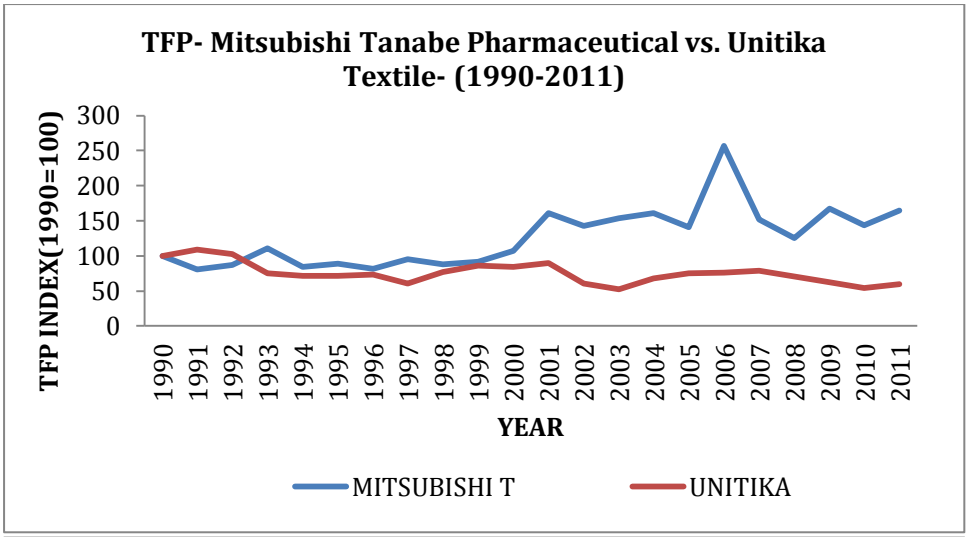


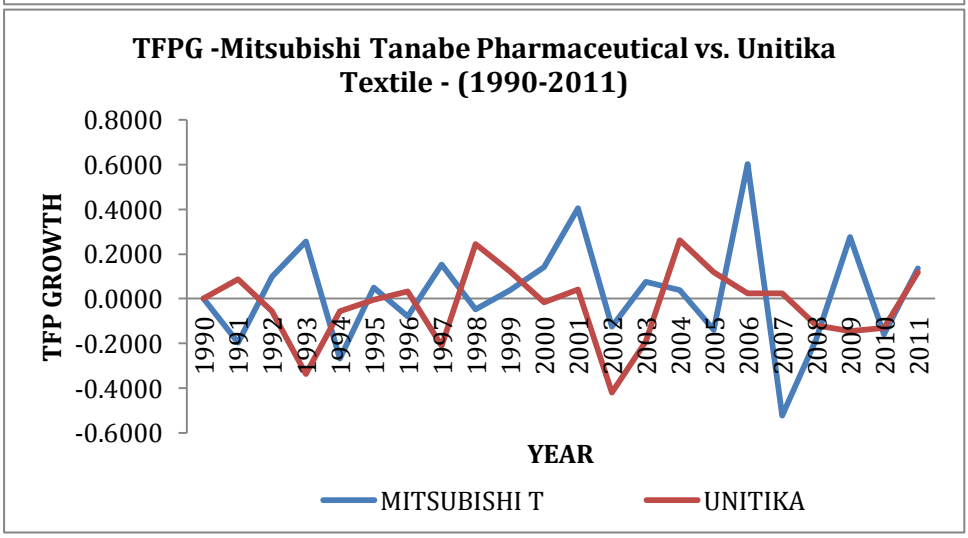




Source: Author's analysis (EOL digital database)

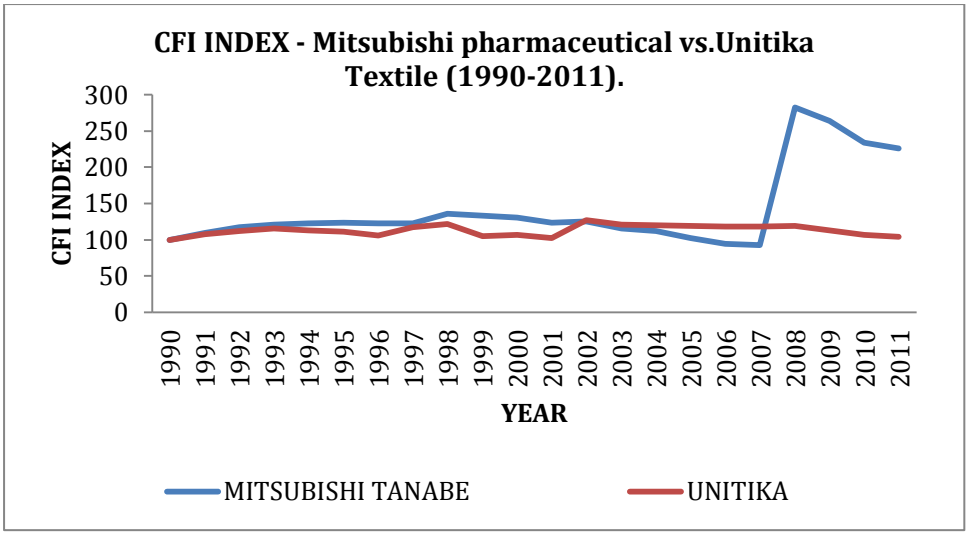
FIGURE 4.22. K, L, V COMPARISONS (4508 VS. 3103), 1990-2011.

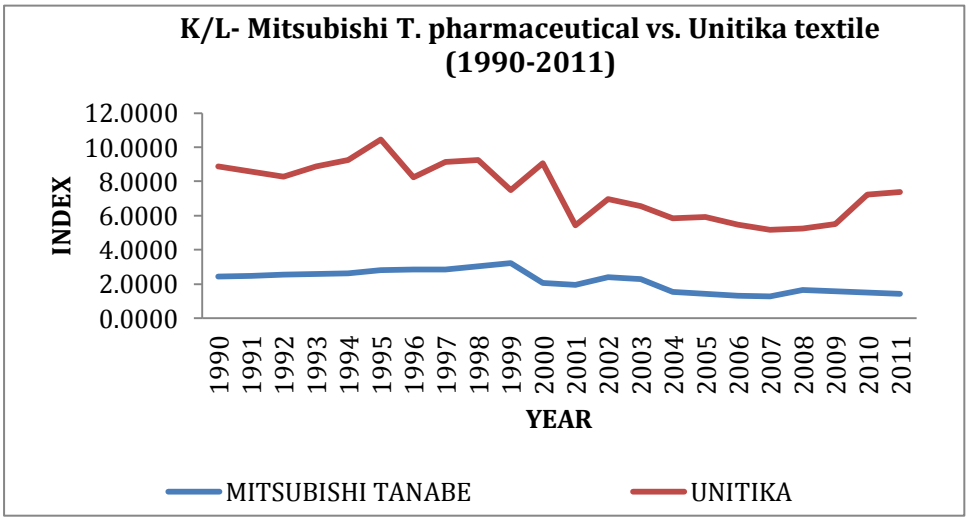


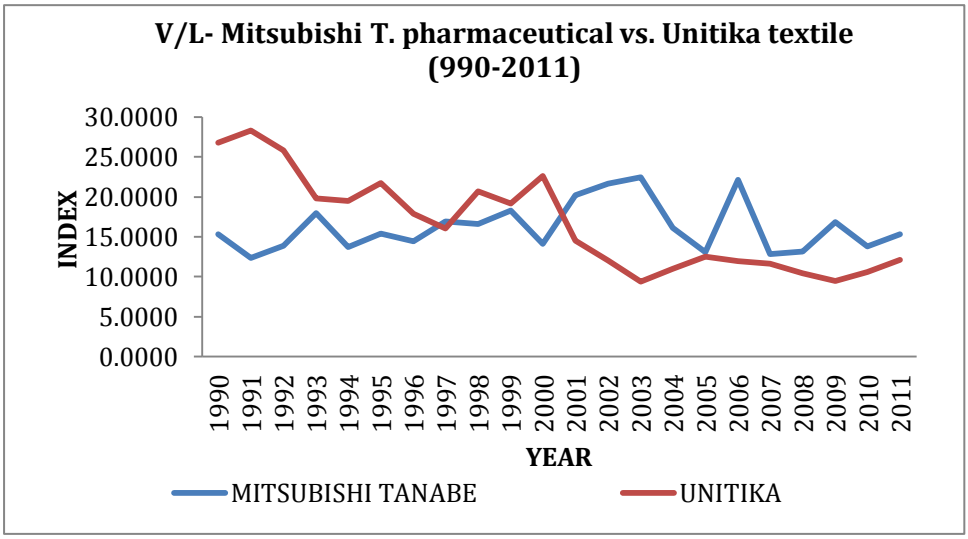


Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG

FIGURE 4.23. TFP AND TFPG COMPARISONS (4508 VS. 3103), 1990-2011.







Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.24. CFI, K/L AND V/L COMPARISONS (4508 VS. 3103), 1990-2011.

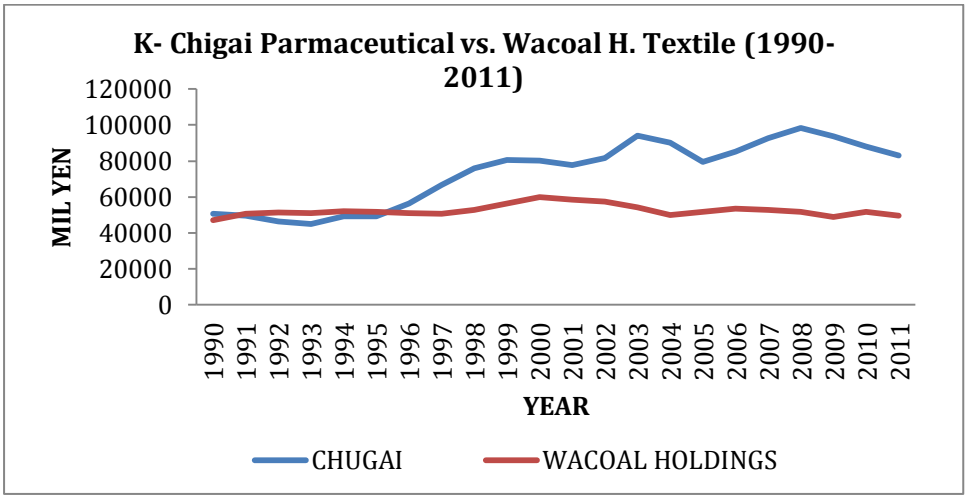
TABLE 4.15. DESCRIPTION AND ANALYSIS OF COMPARISONS OF MITSUBISHI TANABE PHARMACEUTICAL AND UNITIKA TEXTILE FIRMS, 1990-2011.

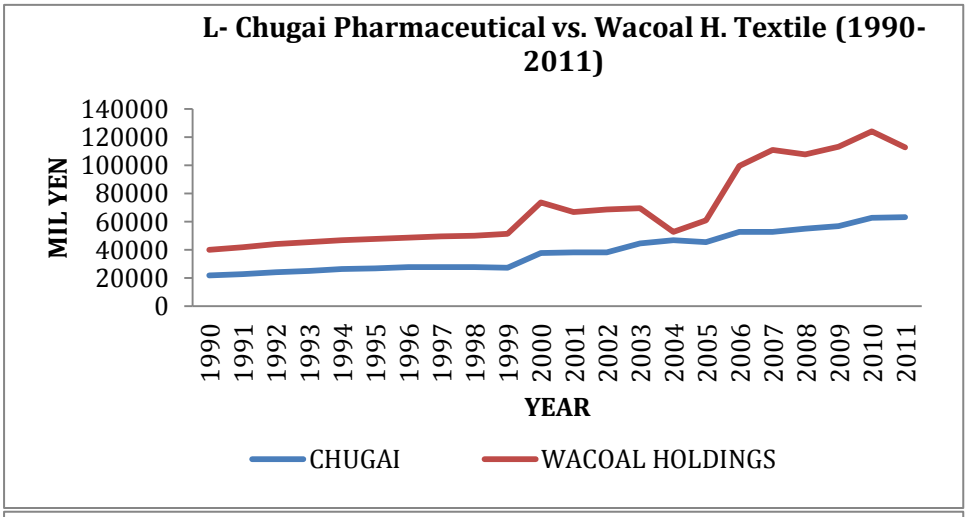
Factor	High-tech Mitsubishi T. Pharmaceutical:	Low-tech Unitika textile:
K	Capital is smaller compared to low-tech Unitika textile and it is increasing at low rate except in 2007/2008 where a sharp increase of capital is observed.	Capital is larger compared to high-tech M.Tanabe Pharmaceutical and it is maintained throughout the period.
L	A sharp increase of labour cost is observed in 2007/2008 and it is higher than low-tech Unitika textile.	Labour cost is smaller and a steady decrease is observed in 2007/2008/09 before maintained in 2010/11.
V	Output (V) is larger compared to low-tech Unitika textile and there was a sharp increase from 2008 and hereafter.	Output (V) is almost stagnant and it's generally smaller.
CFI Index	There was a sharp increase in 2007 followed by decline in 2009 and hereafter.	It's almost stagnant throughout the period 1990-2011.
(K/L), (V/L)	Labour productivity is so dynamic but higher while K/L experienced a steady decline from 2000 and became lower than low-tech.	V/L experienced steady decrease throughout the period where by a sharp decline of capital-labour ratio is observed in 1996 and hereafter.
TFP	TFP is higher compared to low-tech Unitika textile and there is proportional increase in 2011.	TFP is smaller and almost maintained throughout the period of bubble burst and economy recovery.
TFPG	TFPG trend is fluctuating but little higher than low-tech Unitika textile and keeps growing except in 2007/2008 where it was sharply decline.	TFPG trend is fluctuating throughout the period 1990-2011 and it's generally lower.

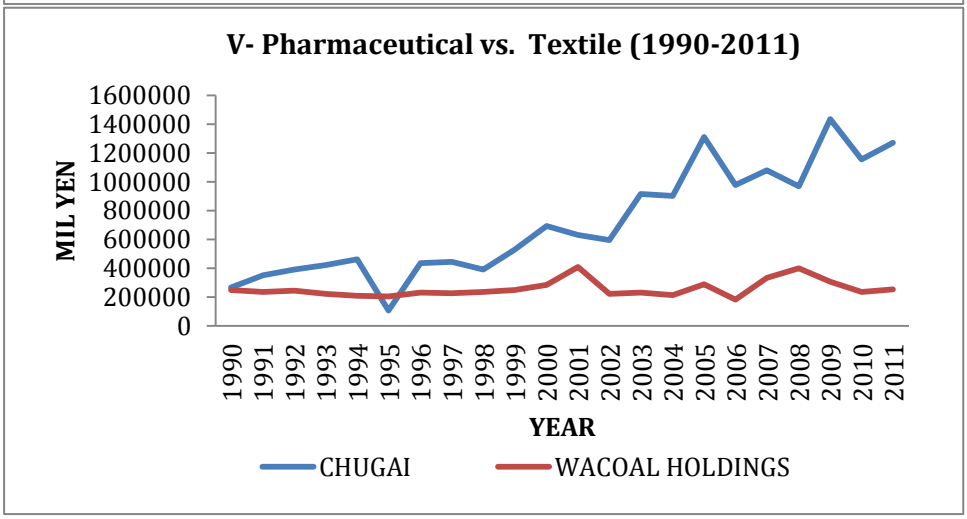
Trend Analysis and further description	
High-tech Mitsubishi Tanabe Pharmaceutical	**Low-tech Unitika textile**
Capital growth and company expenses (CFI) were worthwhile investing as there is proportion increase of output and a sharp growth in 2008 during credit crunch. In this case technological change had a great role in output growth and productivity as TFP increased and it's higher than low-tech Unitika textile. Throughout the period of bubble burst, economic stagnation and lost decade, Mitsubishi pharmaceutical labour productivity was little affected than that of Unitika textile.	Capital and labour expenses was not worth invested because output (V) growth is stagnant throughout the period and lower than that of high-tech Mitsubishi Pharma. As result technological change had a little role in output growth as TFP experienced steady decline.

Source: Author's description

4.5.1.5 Comparisons between Chugai Pharmaceutical and Wacoal Holdings Textile firms 1990-2011.

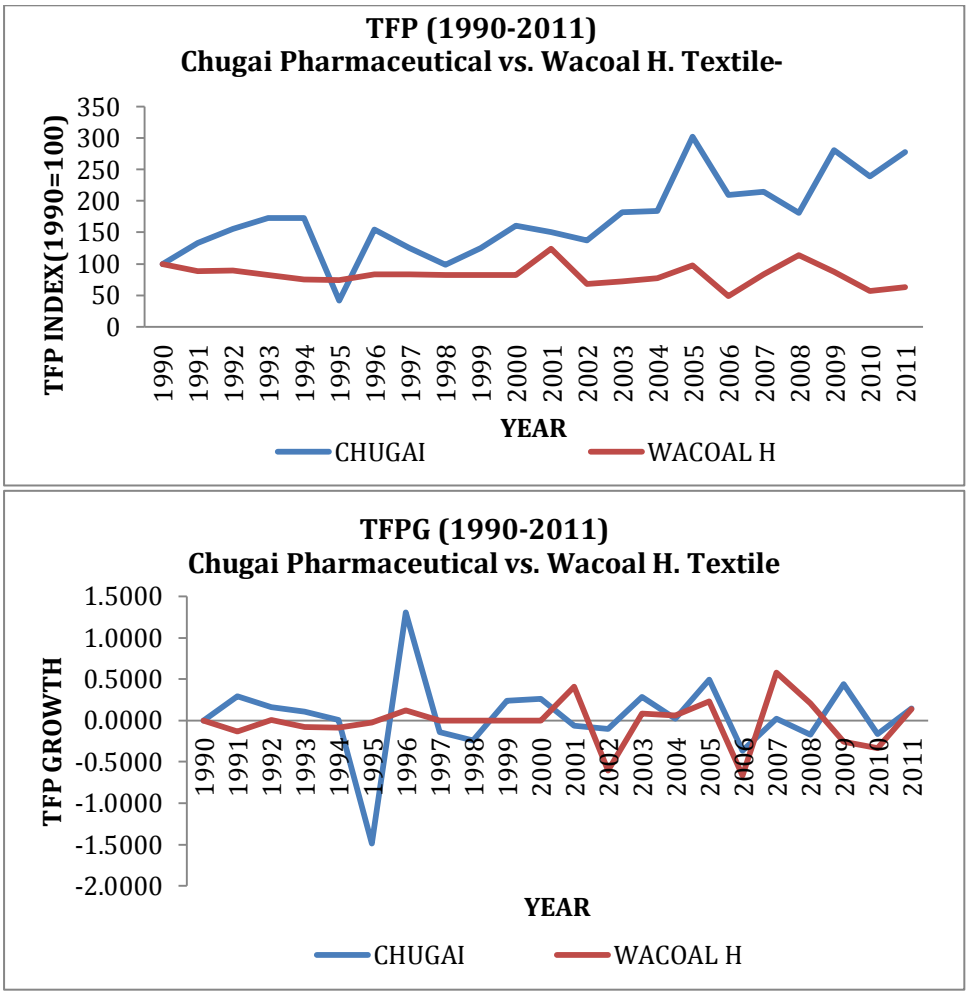






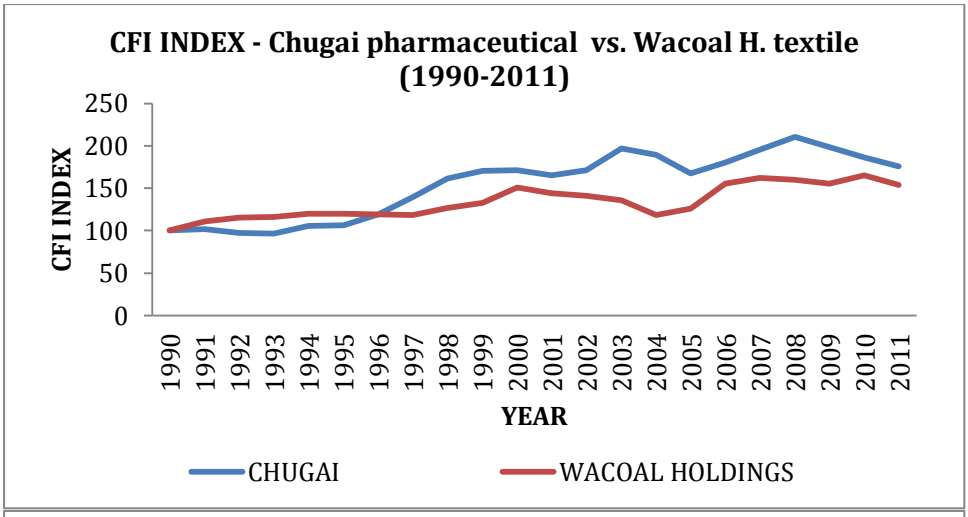
Source: Author's analysis (EOL digital database)

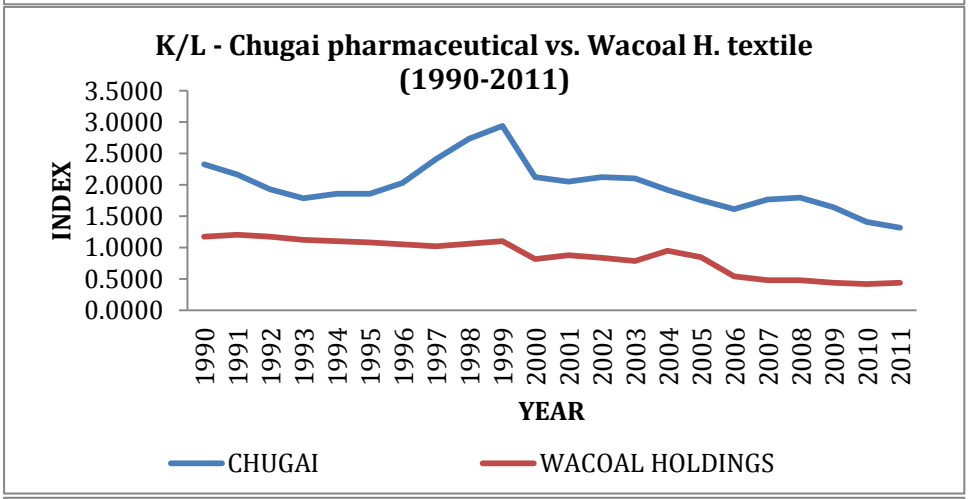
FIGURE 4.25. K, L, V COMPARISONS (4519 VS. 3591), 1990-2011.

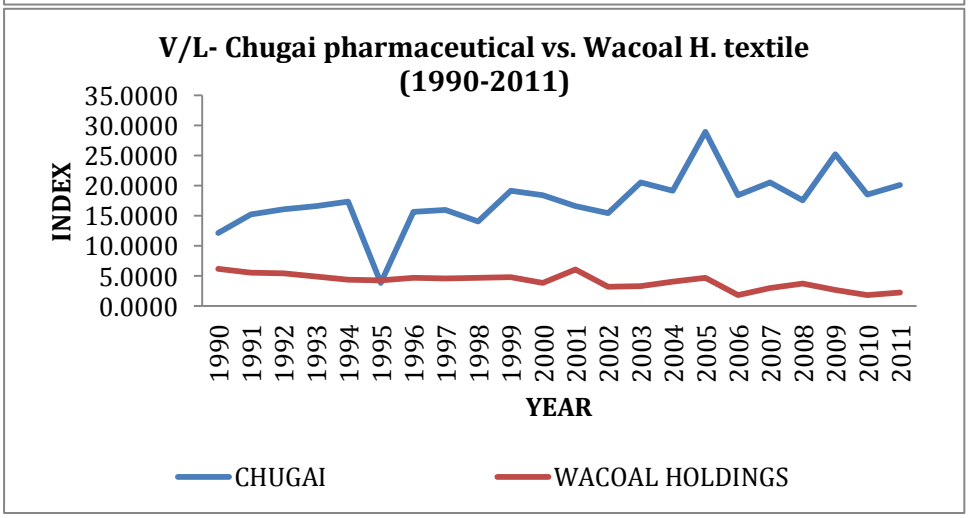


Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.26. TFP AND TFPG COMPARISONS (4519 VS. 3591) 1990-2011.







Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.27. CFI, K/L AND V/L COMPARISONS (4519 VS. 3591).

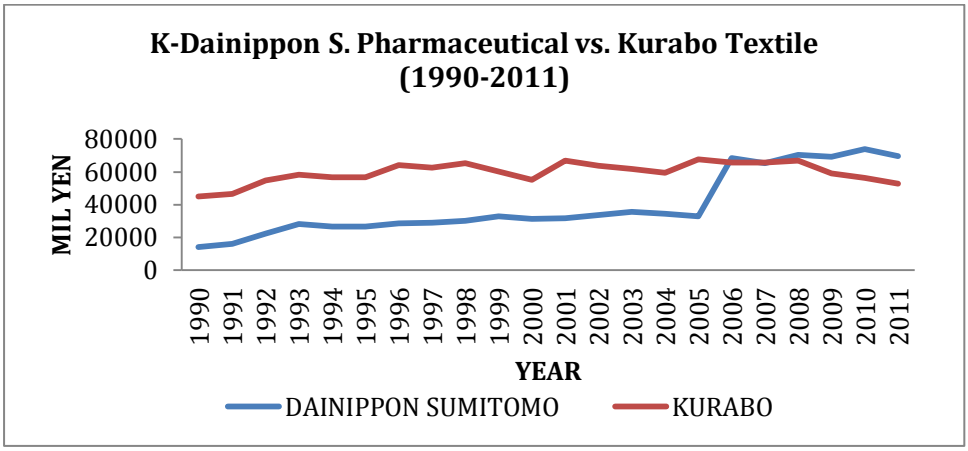
TABLE 4.16. DESCRIPTION AND ANALYSIS OF THE RESULTS OF CHUGAI PHARMACEUTICAL AND WACOAL HOLDINGS TEXTILE FIRMS 1990-2011.

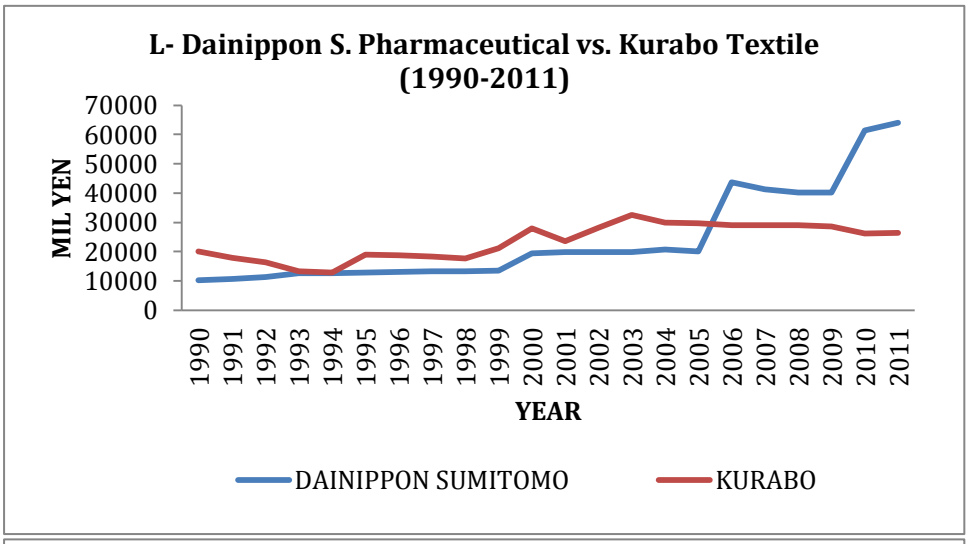
Factor	High-tech Chugai Pharmaceutical:	Low-tech Wacoal holdings textile:
K	Capital growth is higher than low-tech Wacoal H. textile except a proportion decrease observed in 2008/09.	Capital is maintained throughout the period (1990-2011) and is less than high-tech Chugai Pharmaceutical.
L	Lower labour cost compared to low-tech Wacoal H. textile, almost maintained.	Labour cost is much higher than Chugai Pharmaceutical and there was sharp increase in 2006 and hereafter.
V	Output (V) is very dynamic but there is a steady increase throughout and it's higher than low-tech.	Output (V) is lower than high-tech Chugai Pharma and it's generally stagnant throughout the decades.
CFI Index	A sharp decline observed in 2009 and hereafter and CFI is higher than low-tech textile.	There was a sharp increase from 1990 to 1995 and it was higher than high-tech.
(K, L), (V/L)	Fluctuating labour productivity trend with proportion increase while K/L experienced sharp increase in 1996 followed by sharp decline in 2000 and hereafter.	A steady decrease of K/L and V/L is observed throughout the period and are generally lower than high-tech pharmaceutical.
TFP	Fluctuating TFP trend is due to labour productivity but there is proportionate increase of TFP where by is higher than low-tech Wacoal H. textile.	Fluctuating TFP trend and almost stagnant throughout the period of bubble burst and economic recovery.
TFPG	TFPG trend is higher than low-tech Wacoal textile except in 1995 where TFPG dropped.	A proportionate increase of TFPG is observed in 2011.

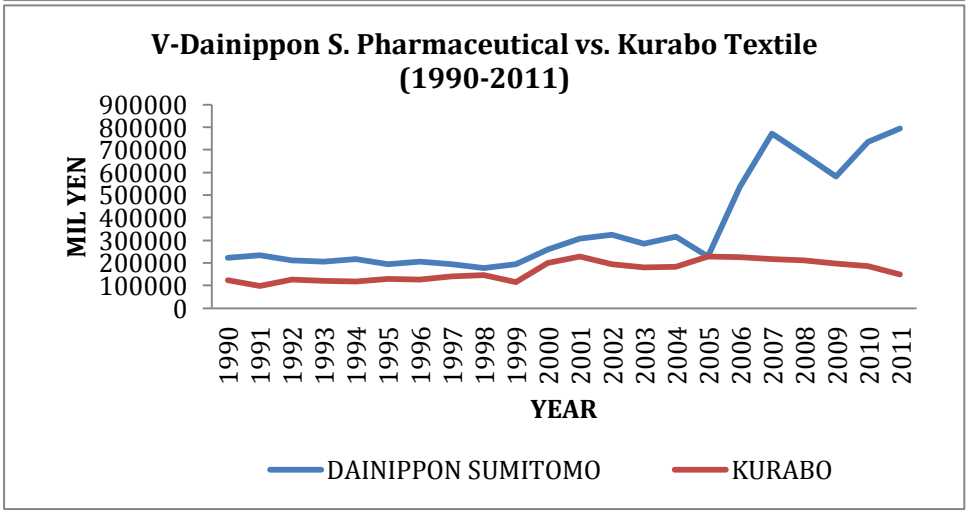
Trends analysis and further description	
High-tech Chugai Pharmaceutical	**Low-tech Wacoal textile**
Due to unavailability and tightening of funds in 2008/2009 capitals was lowered. But generally, capital and labour expenses was worth invested due to larger output growth throughout the period. Also technological change had important contribution in output growth because TFP is higher and there is proportionate increase throughout. Labour cost is lower which means Chugai Pharmaceutical is less "labour intensive" than Wacoal textile firm.	Labour and capital expenses were not worth invested as labour was overused especially from 2006. Therefore, output growth was not well reinforced by capital and labour throughout the period and thus went down. Generally, Wacoal textile is much labour intensive than high-tech Chugai. TFP had little contribution in output growth than Chugai pharmaceutical.

Source: Author's description

4.5.1.6 Comparisons between Dainippon Sumitomo Pharmaceutical and Kurabo Textile firms 1990-2011.

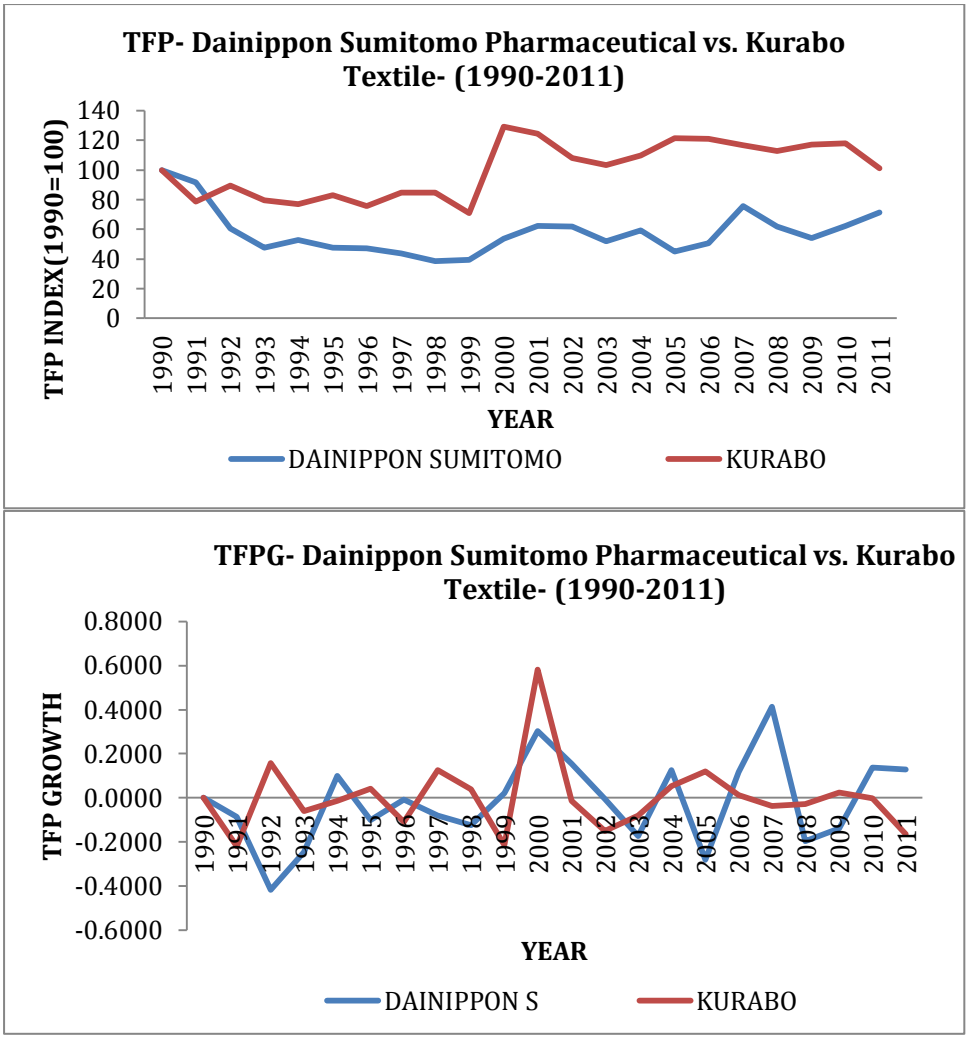






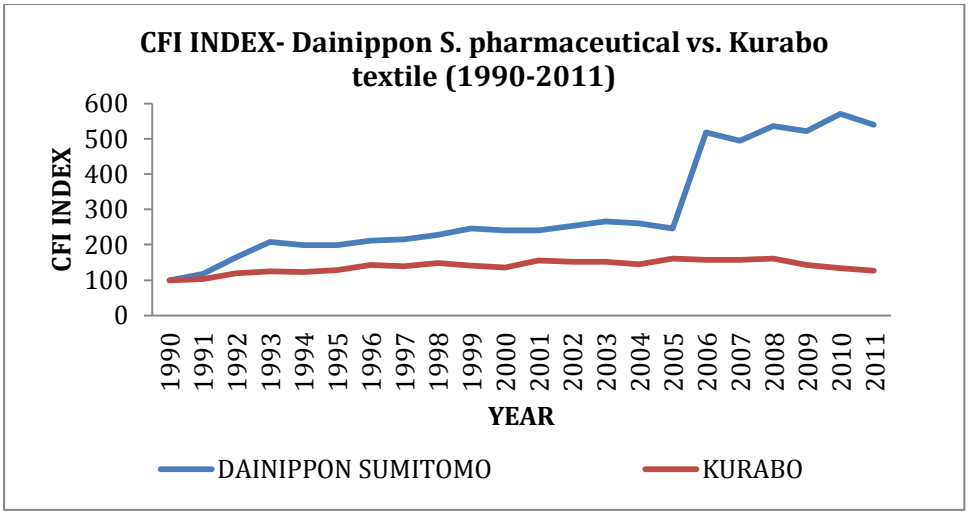
Source: Author's analysis (EOL digital database)

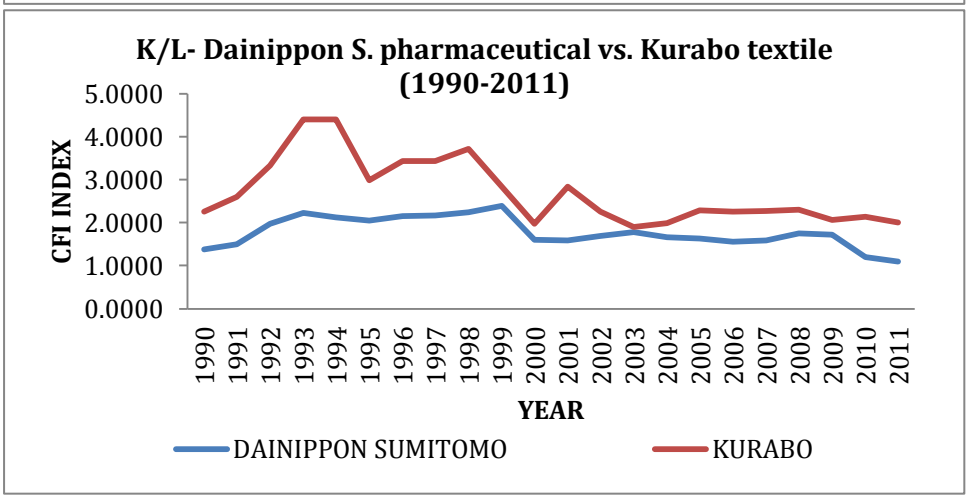
FIGURE 4.28. K, L, V COMPARISONS (4506 VS. 3106), 1990-2011.

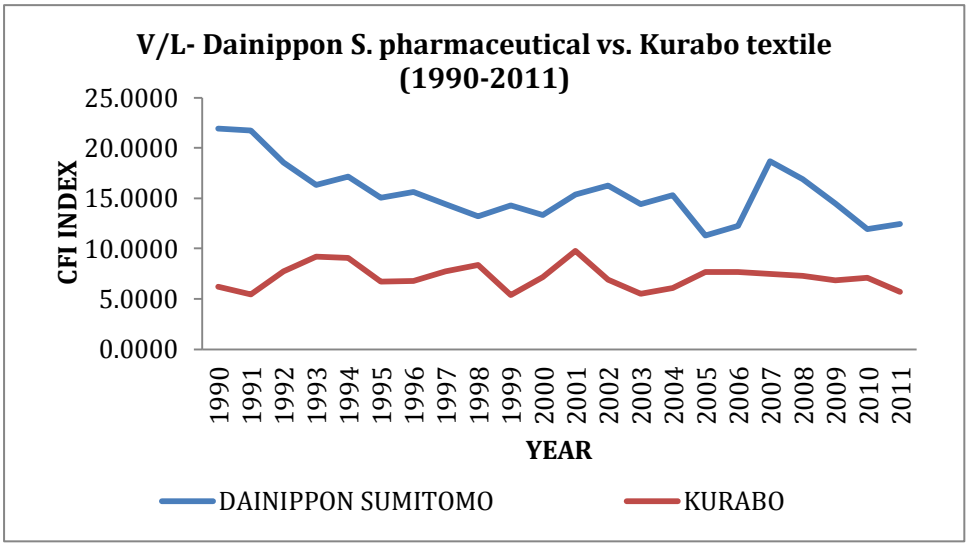


Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.29. TFP AND TFPG COMPARISONS (4506 VS. 3106), 1990-2011.







Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.30. CFI, K/L AND V/L COMPARISONS (4506 VS.3106), 1990-2011.

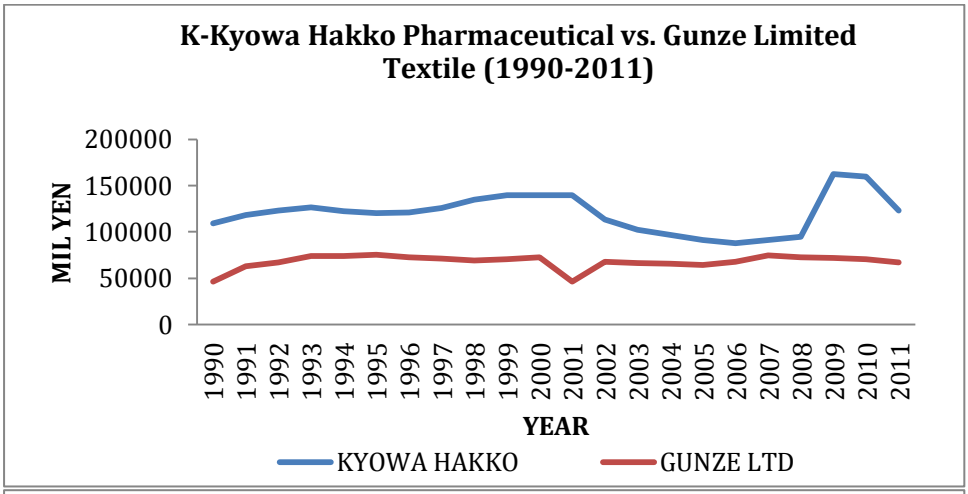
TABLE 4.17. DESCRIPTION AND ANALYSIS COMPARISONS OF DAINIPPON SUMITOMO PHARMACEUTICAL AND KURABO TEXTILE FIRMS, 1990-2011.

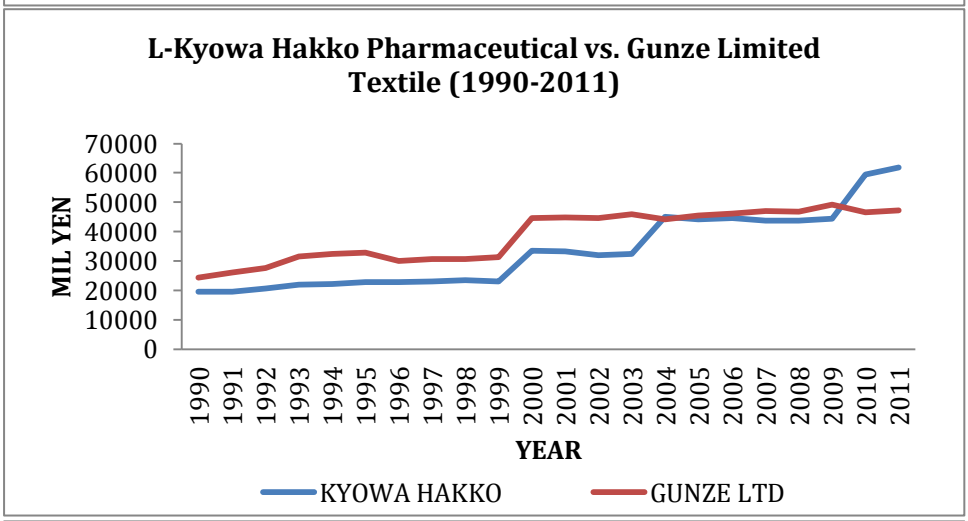
Factor	High-tech Dainippon Pharmaceutical	Low-tech Kurabo textile
K	Capital is lower than low-tech from year 1990-2005 followed by sharp increase in 2006 and hereafter.	From 1990-2006 capital was higher followed by decline in 2008 and hereafter.
L	Labour cost increased simultaneously from 2006-2011 and became higher than low-tech	Labour cost is maintained for the whole period with a smaller increase throughout.
V	Output (V) is much higher than low-tech Kurabo textile and a sharp increase observed in 2005/2006.	Output (V) is almost stagnant followed by steady decline from 2010 and hereafter.
CFI Index	A sharp increase observed in 2006 and hereafter and its generally higher.	It's almost stagnant with small decline in 2009-2011.
(K/L), (V/L)	A steady decline in labour productivity is observed throughout the period except in 2007 where there was a sharp increase in V/L. Capital-labour ratio steadily decline throughout the period.	V/L steadily decline from 2009-2011 while K/L experienced sharp increase in 1990-1992 followed by a sharp decline hereafter.
TFP	TFP is smaller than low-tech Kurabo textile but a steady increase is observed from 2009-2011. There was a steep decline in 1992/1993.	There is a steady decrease of TFP from 2010. A sharp increase of TFP is observed in 1999/2000.
TFPG	Fluctuating TFPG trend and there was a sharp decrease in 1992/1993 followed by proportion increase in 2010/2011.	Fluctuating TFPG trend and almost maintained except in 2010 where by a steady decline is observed. There was also a sharp increase in 2000.

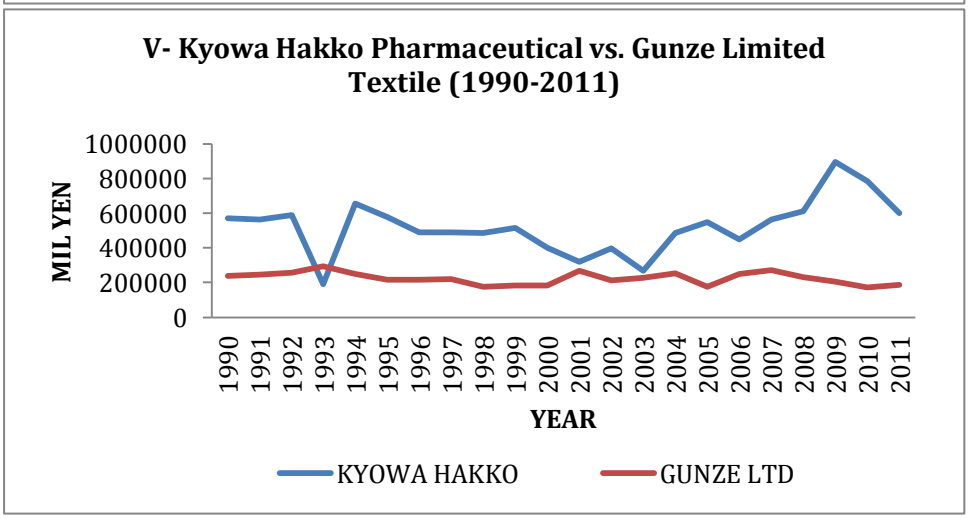
Trend Analysis and further description	
High-tech Dainippon Sumitomo pharmaceutical	**Low-tech Kurabo textile**
In 2005: fusion between Dainippon pharmaceutical and Sumitomo pharmaceutical to form **Dainippon Sumitomo Pharma** happened**.** Thus, capital investment from 2006 and hereafter was growing faster than before in order to integrate their own technologies for new product development after long stagnation. The merged decision was right because output (V) was sharply increased in 2005 and hereafter. Therefore, capital and labour expenses was worth invested throughout the period. After merging in2005 TFP experienced growth as result of labour productivity.	2007/2008 capital investments went down which indicate that, Kurabo textile was also affected by 2007 credit crunch due to tightening of funds. Thus, capital and labour expenses went down and almost stagnant. Capital intensity was higher throughout except from 2008 and hereafter thus TFP dropped down. Generally, TFP had little impact on Kurabo textile output growth.

Source: Author's description

4.5.1.7 Comparisons between Kyowa Hakko Pharmaceutical and Gunze Limited Textile firms 1990-2011.

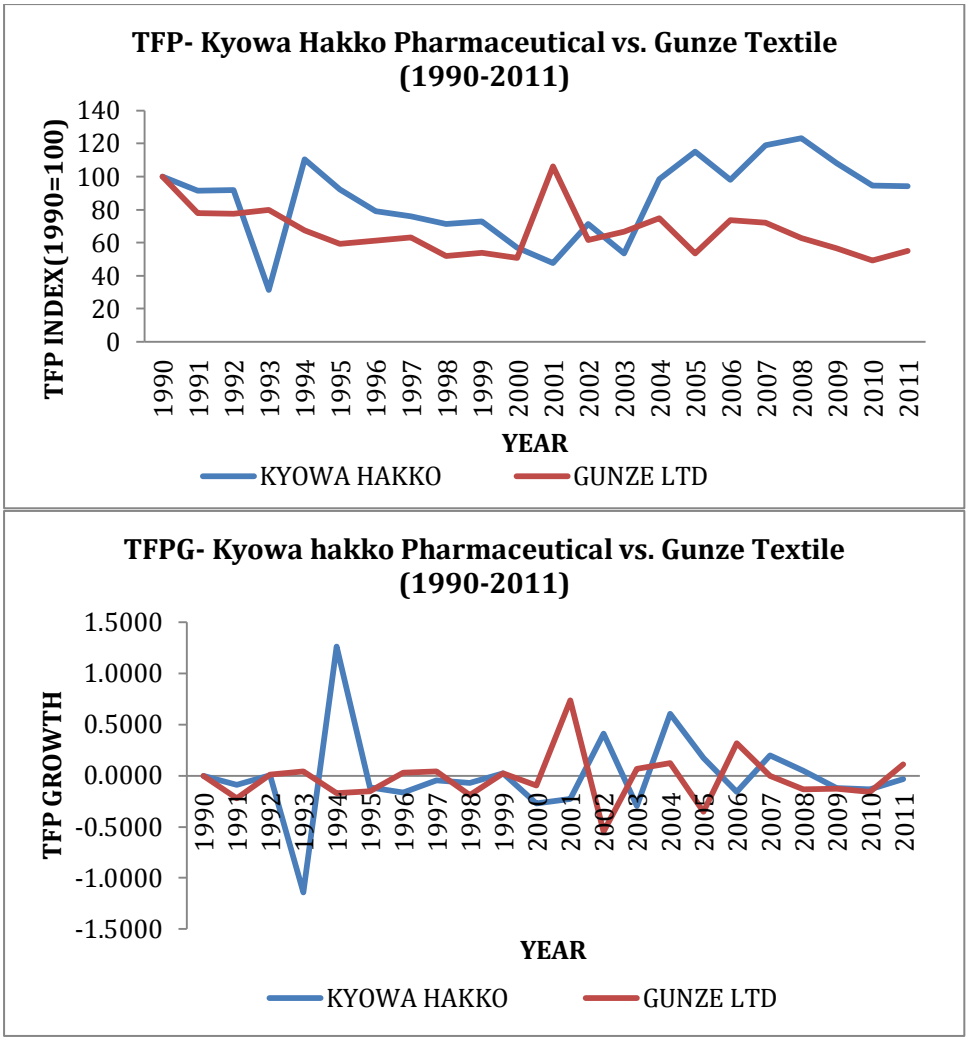






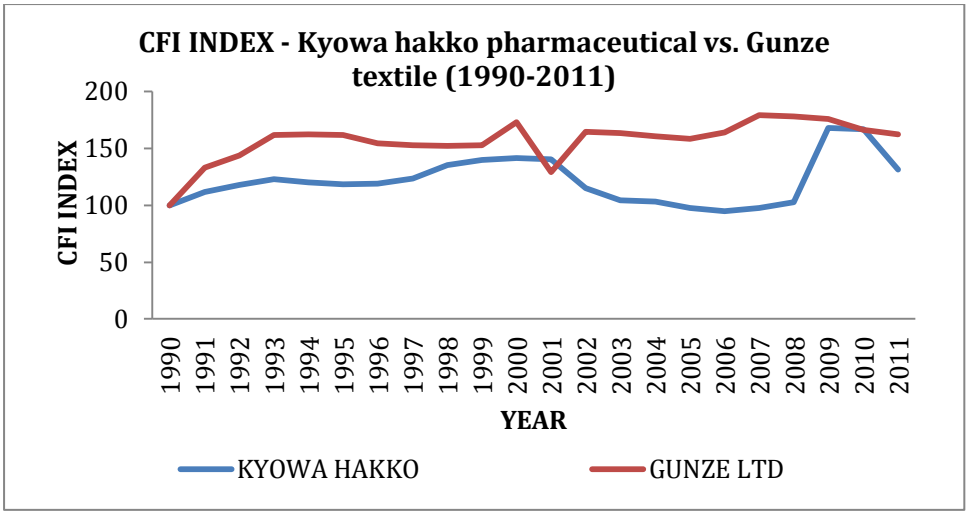
Source: Author's analysis (EOL digital database)

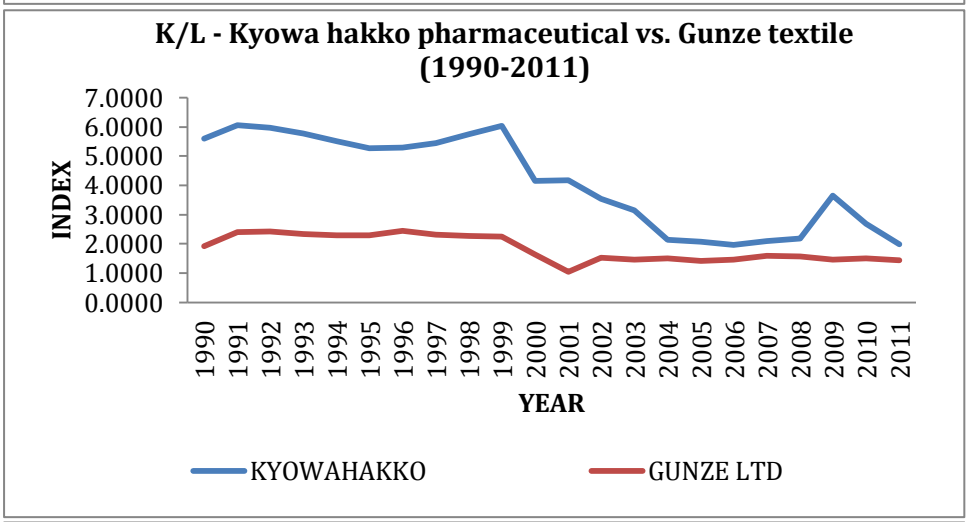
FIGURE 4.31. K, L, V COMPARISONS (4151 VS. 3002), 1990-2011.

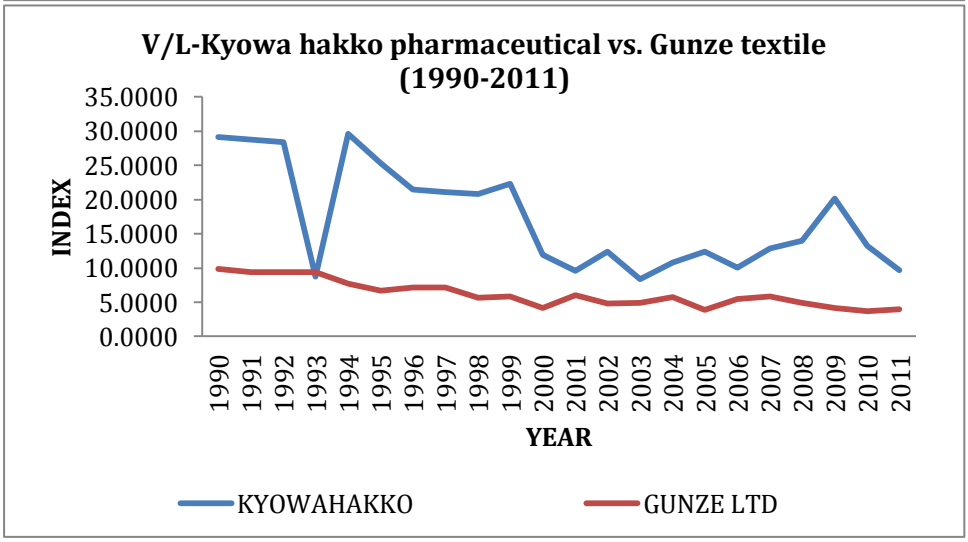


Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.32. TFP AND TFPG COMPARISONS (4151 VS. 3002), 1990-2011.







Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.33. CFI, K/L, V/L COMPARISONS (4151 VS. 3002), 1990-2011.

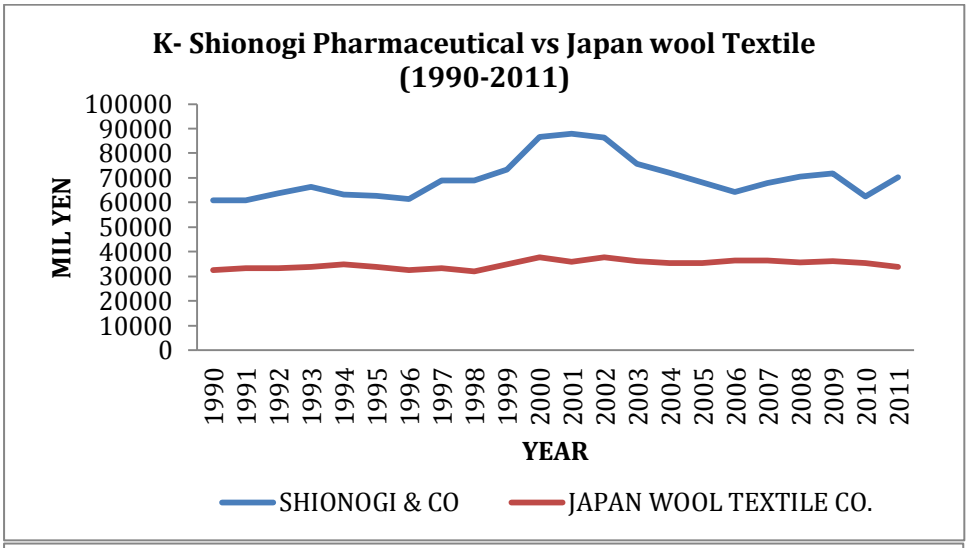
TABLE 4.18. DESCRIPTION AND ANALYSIS OF COMPARISONS OF KYOWA HAKKO PHARMACEUTICAL AND GUNZE LIMITED TEXTILE FIRMS 1990-2011.

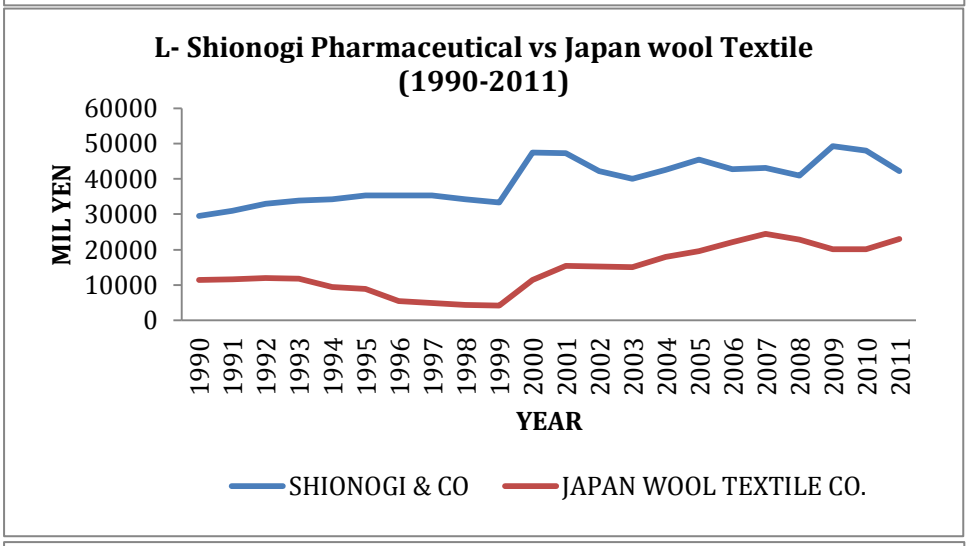
Factor	High-tech Kyowa Hakko Pharmaceutical	Low-tech Gunze textile
K	Capital is higher than low-tech Gunze limited textile but there was a steady decrease of capital from 2001-2008/11.	For the whole period (1990-2011) capital is maintained except 2001 where capital decline and it's generally lower than High-tech kyowa pharmaceutical.
L	A sharp increase of labour observed in 2010 and hereafter but before then it was lower than low-tech Gunze textile.	There was a decline in 2010 and hereafter but before then it was higher than high-tech Kyowa Hakko pharmaceutical.
V	Fluctuating output (V) growth but is much higher than low-tech Gunze textile. 1993, 2001-2003, 2009/2011, output (V) went down.	Output (V) is maintained throughout and is lower than high-tech Kyowa Pharmaceutical.
CFI Index	There was sharp increase of capital and labour input in 2009 but it's generally lower than low-tech.	There was a sharp decline of capital and labour input in 2001 but it's generally higher.
K/L, V/L	A steady decline of labour productivity is observed throughout but there was sharp decline in 1993 while K/L steadily decreased throughout but both factors are higher.	K/L and V/L factors are lower than high-tech and steadily decline throughout the period.
TFP	1993, 2001-2003, TFP decline. But it's generally higher than low-tech Gunze textile.	TFP is generally lower than high-tech kyowa Pharmaceutical.
TFPG	TFPG was affected in 1993 due to labour productivity decline but it is growing.	Fluctuating TFPG trend and 2002/2005/08 TFPG decline followed by an increase in 2010 and hereafter.

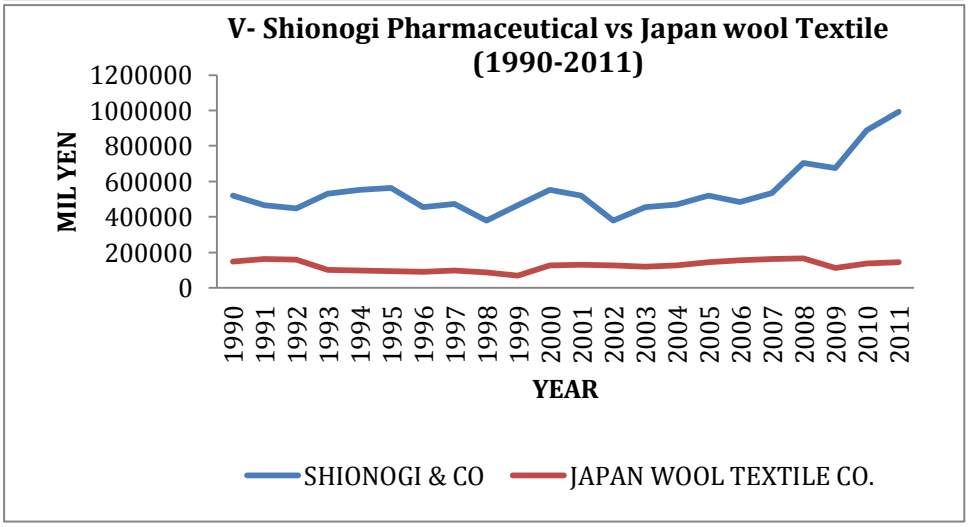
Trend analysis and further description	
High-tech Kyowa Hakko Pharmaceutical	**Low-tech Gunze textile**
Due to effects of financial crisis in 2007, Kyowa Hakko capital declined but the 2001 decline was due to effects of Asian financial crisis in 1997. Therefore, sharp increase of expenses of labour and capital was worth invested because output (V) continues growing throughout the period of 'lost decades' and economic stagnation except in 1993, 2001/2003 and 2009/2011 was not worthwhile invested. TFP seemed to contribute to the output growth throughout except in 1993, 2001-2003. In all these years labour productivity and capital intensity was also down.	Capital growth for Gunze textile was very low, almost stagnant throughout the period and labour cost experienced steady increase. Therefore increase of capital and labour expenses of Gunze textile was not worth invested, as output growth is almost stagnant except 2011 where there was a proportionate growth of output. TFP is real down compared to high-tech Kyowa Hakko, which indicate that, technological change had little contribution in output growth throughout the bubble burst and lost decade. It also indicates that the company is much labour intensive though it's maintained.

Source: Author's description

4.5.1.8 Comparisons between Shionogi & Co. Pharmaceutical and Japan wool Textile firms 1990-2011.

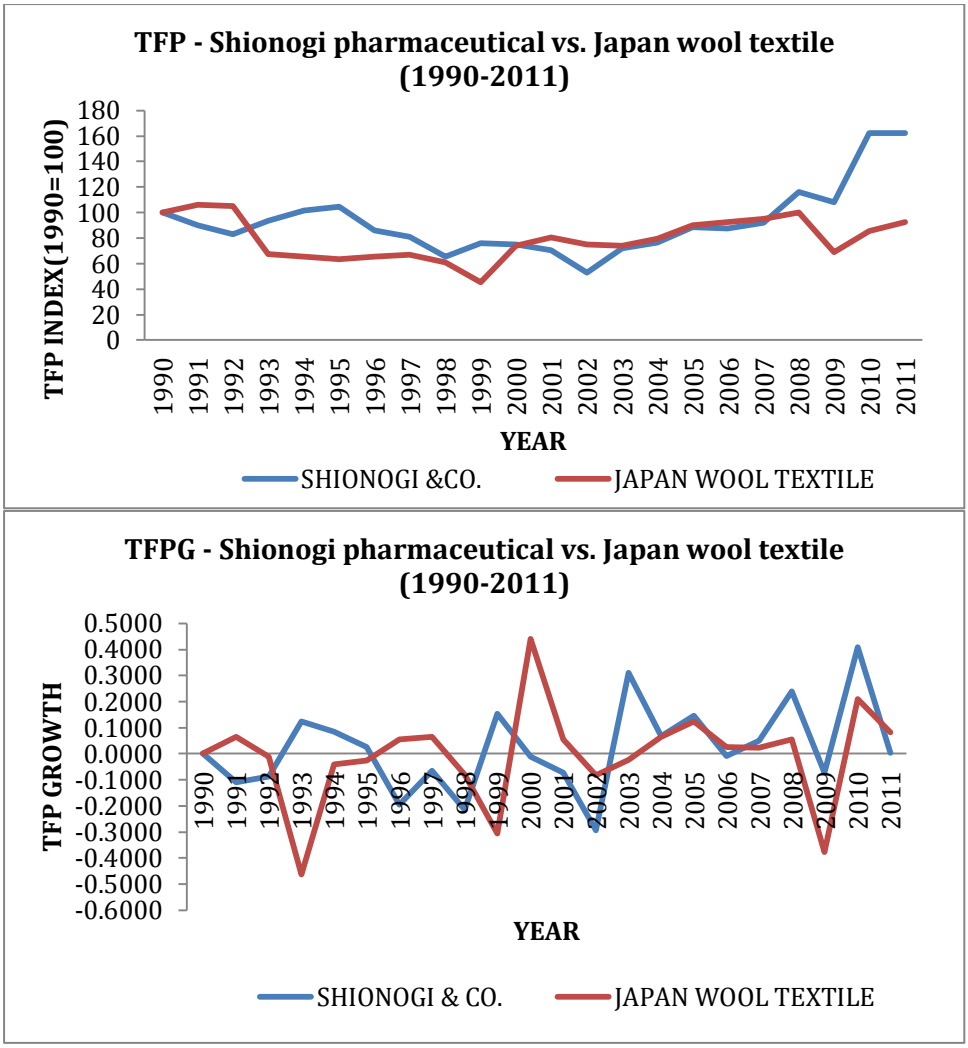






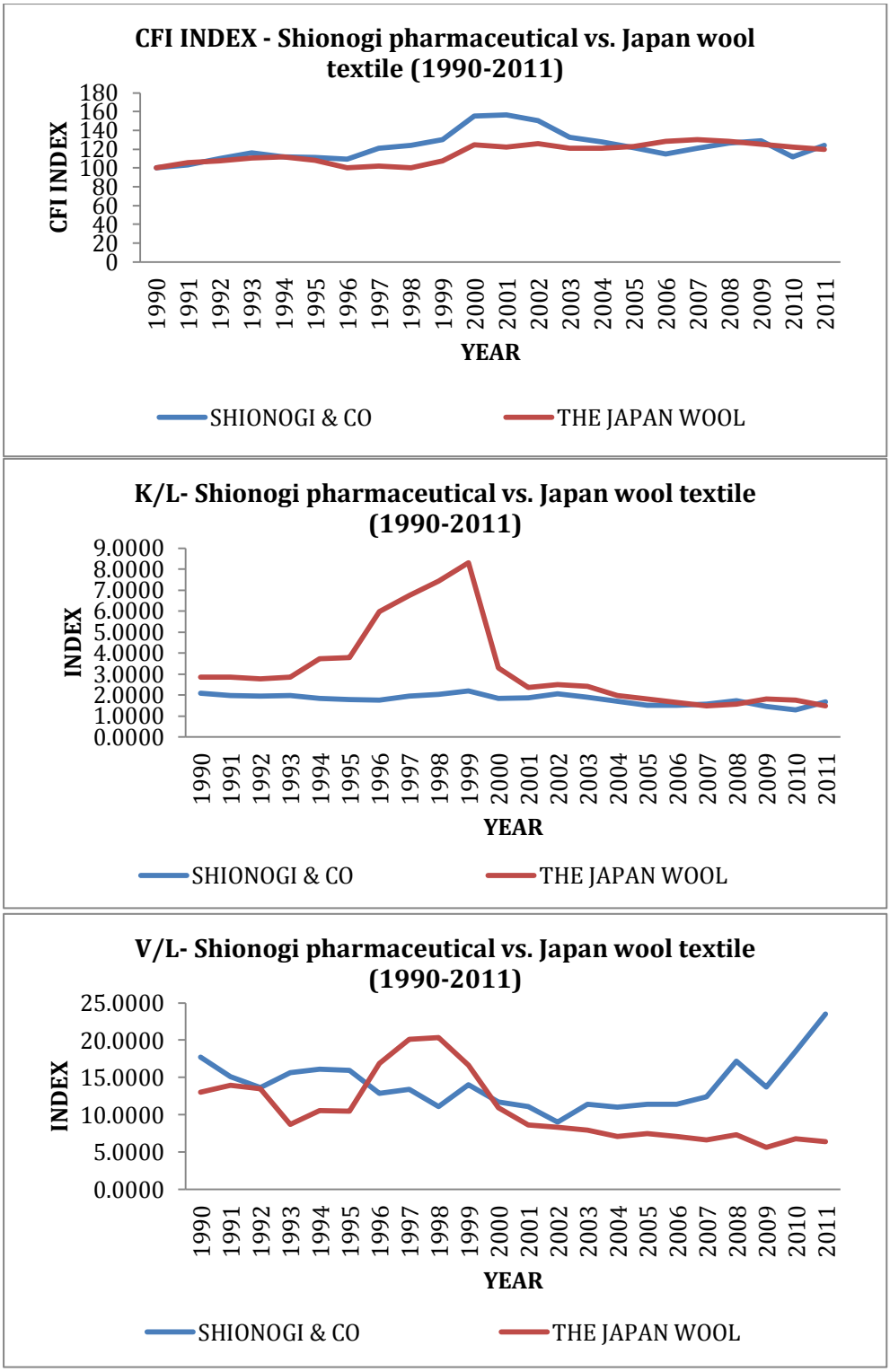
Source: Author's analysis (EOL digital database)

FIGURE 4.34. K, L, V. COMPARISONS (4507 VS. 3201), 1990-2011.



Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.35. TFP AND TFPG COMPARISONS (4507 VS. 3201), 1990-2011.



Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.36. CFI, K/L, V/L COMPARISONS (4507 VS. 3201), 1990-2011.

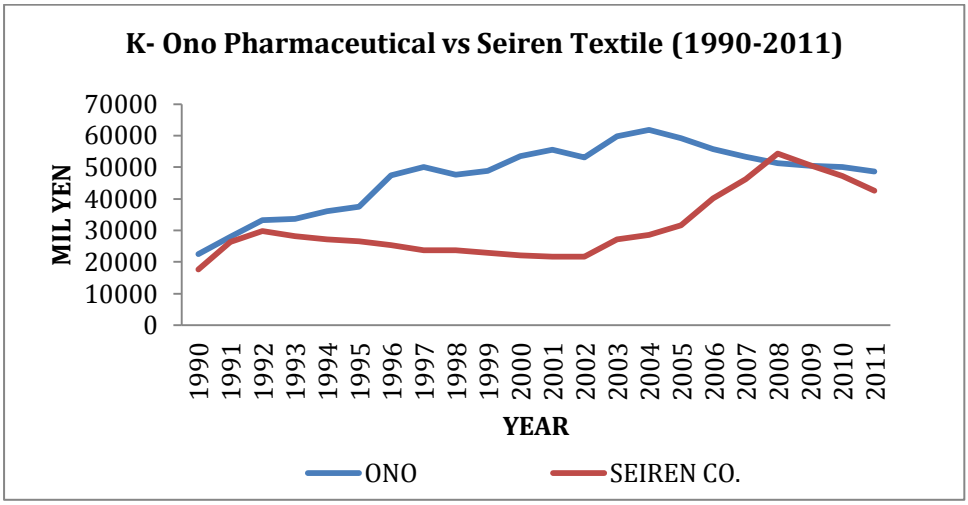
TABLE 4.19. DESCRIPTION AND ANALYSIS OF COMPARISONS OF SHIONOGI & CO. PHARMACEUTICAL AND JAPAN WOOL TEXTILE FIRMS, 1990-2011.

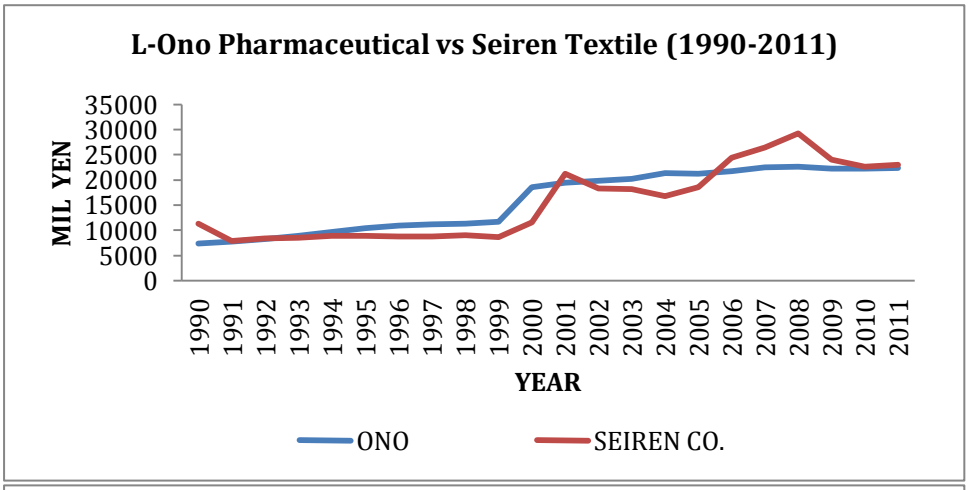
Factor	High-tech Shionogi Pharmaceutical	Low-tech Japan wool textile
K	There was a sharp increase of capital in 1996-2001 and it's generally higher than low-tech Japan wool textile.	Capital is maintained throughout the period (1990-2011).
L	A steady decrease of labour is observed from 2009 and hereafter but it's generally higher	Labour cost is lower than high-tech Shionogi Pharmaceutical but a steady increase is observed from 1999 and hereafter.
V	There is a steady increase in output (V) and it's generally higher than low-tech Japan wool textile.	Output growth (V) is stagnant it's lower than Shionogi pharmaceutical.
CFI Index	There was a sharp increase of CFI in 1996 followed by sharp decline in 2002 and hereafter.	A sharp increase of CFI is observed in 2000 before maintained hereafter.
K/L, V/L	A sharp increase of V/L is observed in 2009-2011 and it's much higher while K/L is almost stagnant.	There was sharp increase of V/L in 1996 followed by sharp decline in 1999 and hereafter.
TFP	TFP is higher than low-tech Japan wool textile due to growth of labour productivity. In 1992, 2002 TFP decline.	TFP is generally lower than high-tech Shionogi pharm. In 1990-1992/2002 it was higher than high-tech Shionogi Pharmaceutical.
TFPG	Fluctuating TFPG trend throughout the period. 1991/1992/1996-1998/200/2001 TFP decline.	Fluctuating TFPG trend throughout the period. 1993/1999/2009, there was a sharp decrease of TFPG.

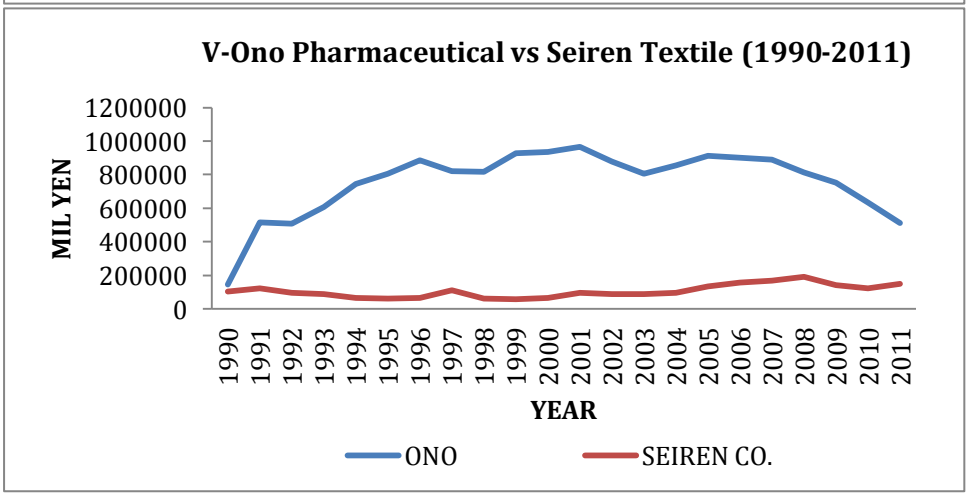
Trend Analysis and further description	
High-tech Shionogi pharmaceutical	**Low-tech Japan wool textile**
1996-2001, increase capital investment was so important for Shionogi pharmaceutical to enhance its output growth during Asian financial crisis and great stagnation. 2009 and hereafter, capital was also increased to recover from the effects of credit crunch in 2007 which affects financial markets of the world including Japan. Therefore, sharp increase of capital and labour expanses was worth invested in 1996 a steady increase of output (V) is observed throughout the two decades. TFP seemed to contribute in output growth except in 1992 and 2003 where it dropped. In addition, capital intensity and labour productivity had contributed to TFP growth.	Throughout the period there was no capital growth, it was almost stagnant while labour cost was increasing. Therefore, sharp increase of capital and labour expenses in 2000 was not worth to Japan wool textile, as output was not affected throughout the period. TFP had little contribution than high-tech Shionogi pharmaceutical on output growth except in 1990-1992, and 2002. Generally, Japan wool is less labour intensive than Shionogi pharmaceutical though there is a steady increase of labour.

Source: Author's description

4.5.1.9 Comparisons between ONO Pharmaceutical and Seiren Co. Textile firms 1990-2011.

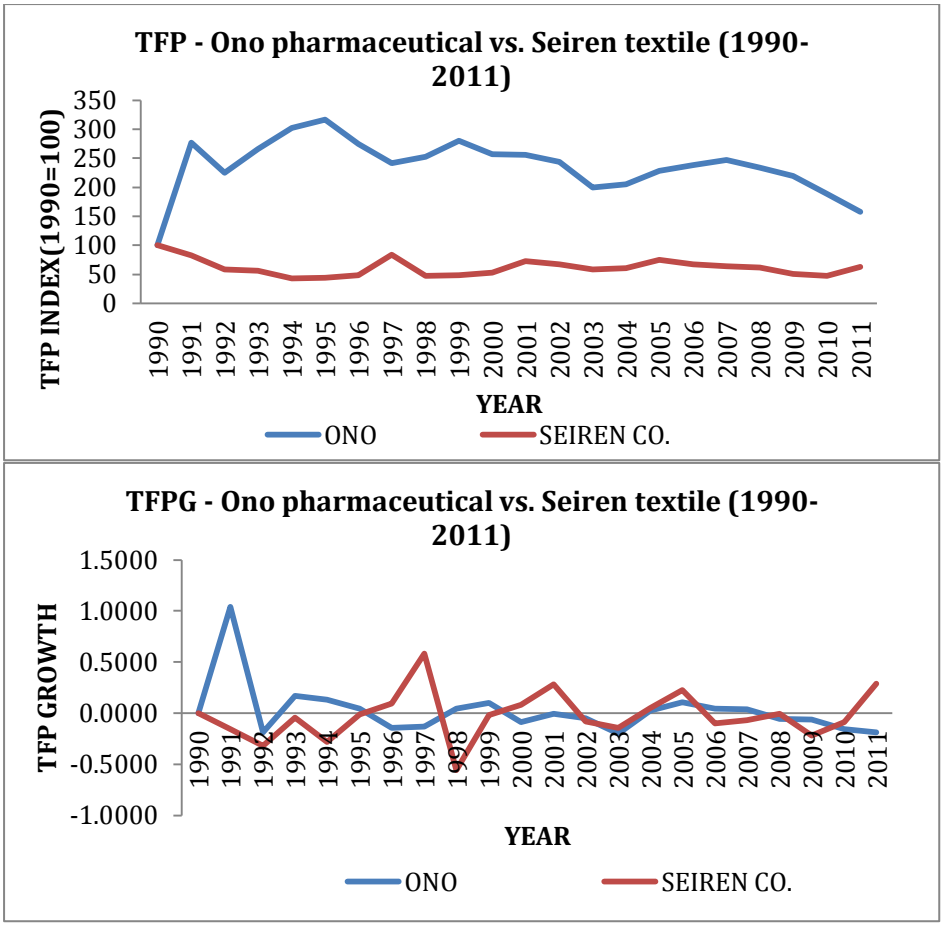






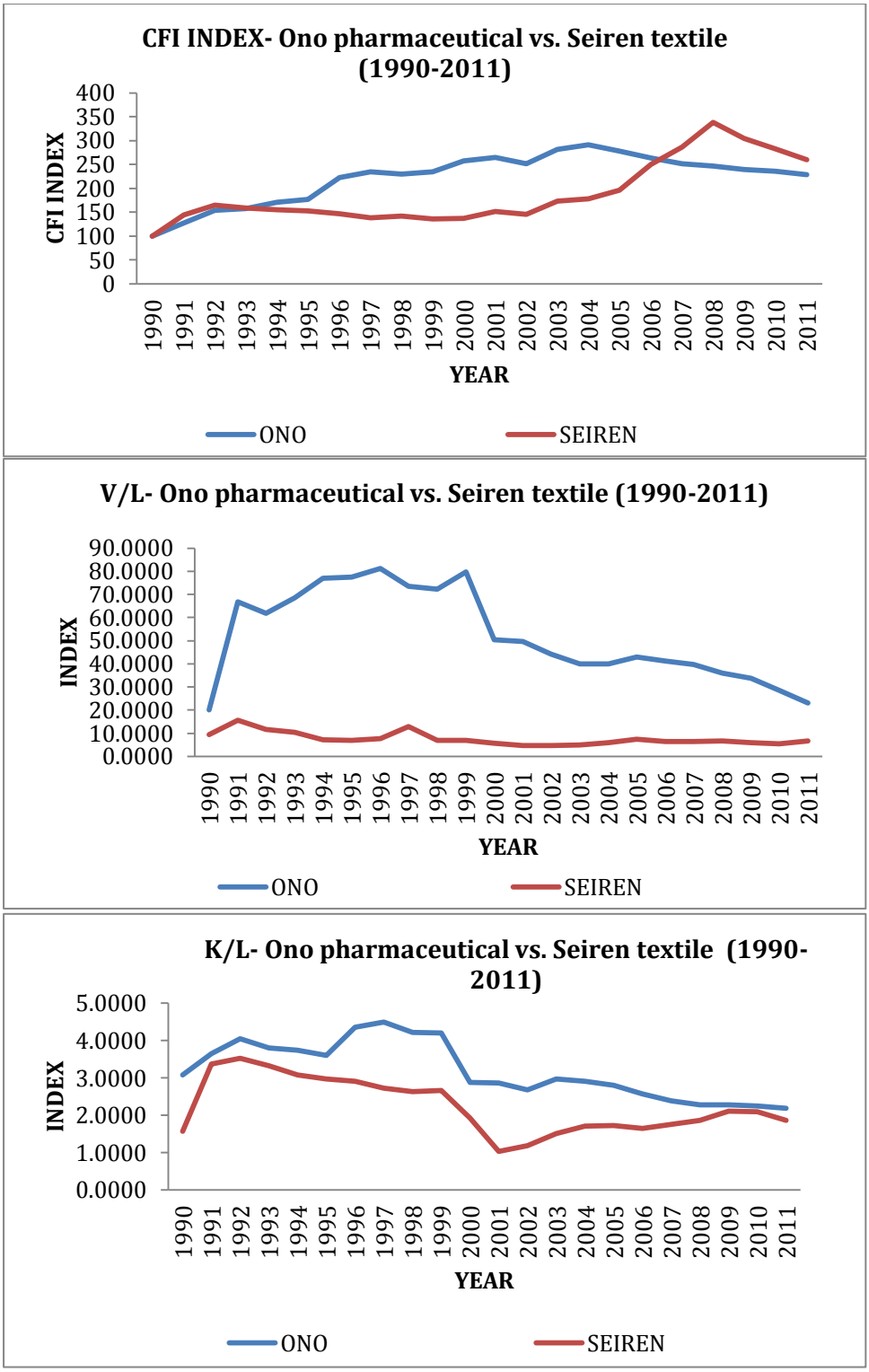
Source: Author's analysis (EOL digital database)

FIGURE 4.37. K, L, V COMPARISONS (4528 VS. 3569), 1990-2011.



Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.38. TFP AND TFPG COMPARISONS (4528 VS. 3569), 1990-2011.



Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.39. CFI, K/L, V/L COMPARISONS (4528 VS. 3569), 1990-2011.

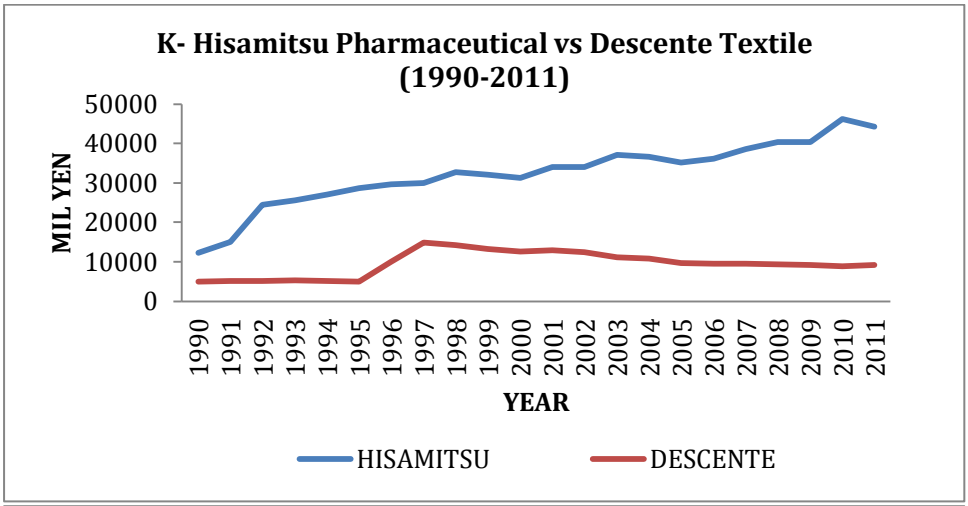
TABLE 4.20. DESCRIPTION AND ANALYSIS OF COMPARISONS OF ONO PHARMACEUTICAL AND SEIREN CO. TEXTILE FIRMS 1990-2011.

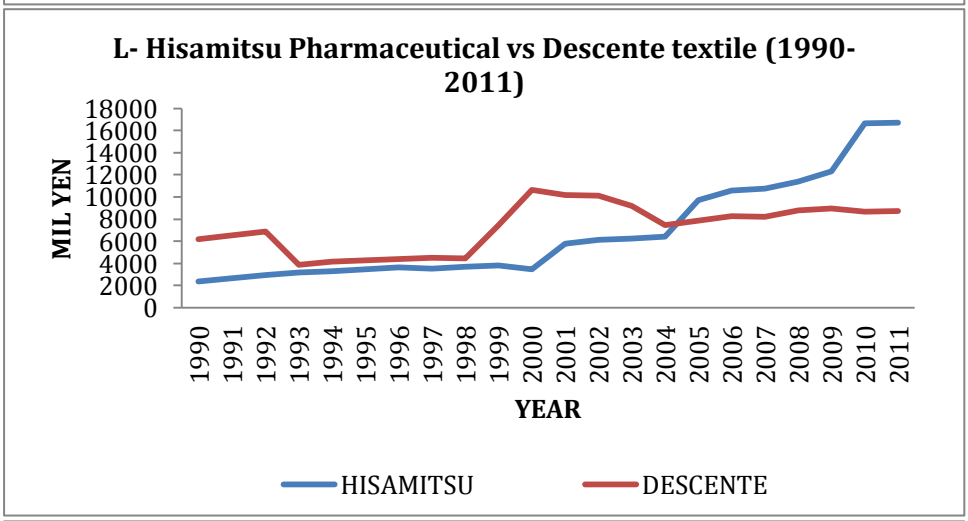
Factor	High-tech ONO Pharmaceutical	Low-tech Seiren textile
K	A steady decrease of capital observed in 2004 and hereafter but it's generally higher than low-tech Seiren textile.	There was a sharp increase of capital in 2002 followed by decline in 2008 and hereafter and it's generally lower than Ono pharmaceutical.
L	Labour cost is close to Seiren textile. 1990-2005: it was higher than low-tech Seiren textile. 2006-2011: it was less than low-tech Seiren textile.	There was a steady increase of labour from 2006-2011.
V	A steady decrease of output (V) is observed in 2007 and hereafter. But output is higher than low-tech Seiren textile.	Output (V) is lower than high-tech Ono pharmaceutical and it's almost stagnant.
CFI Index	There was sharp decline from 2005-2011.	There was sharp decline from 2009-2011 but it's higher than Ono Pharmaceutical.
K/L, V/L	There was a sharp decline of K/L and V/L in 2000 and hereafter and both factor are higher than low-tech.	V/L is almost stagnant throughout the period while K/L experienced a proportionate increase 2002 and hereafter.
TFP	TFP is much higher than low-tech Seiren textile though experienced a steady decline throughout. 1992 TFP decline sharply.	TFP is lower than high-tech Ono Pharmaceutical. A proportionate increase is observed in 2010 and hereafter.
TFPG	Fluctuating TFPG trend with steady decrease from 2007-2011.	Fluctuating TFPG trend with steady increase in 2010 and hereafter.

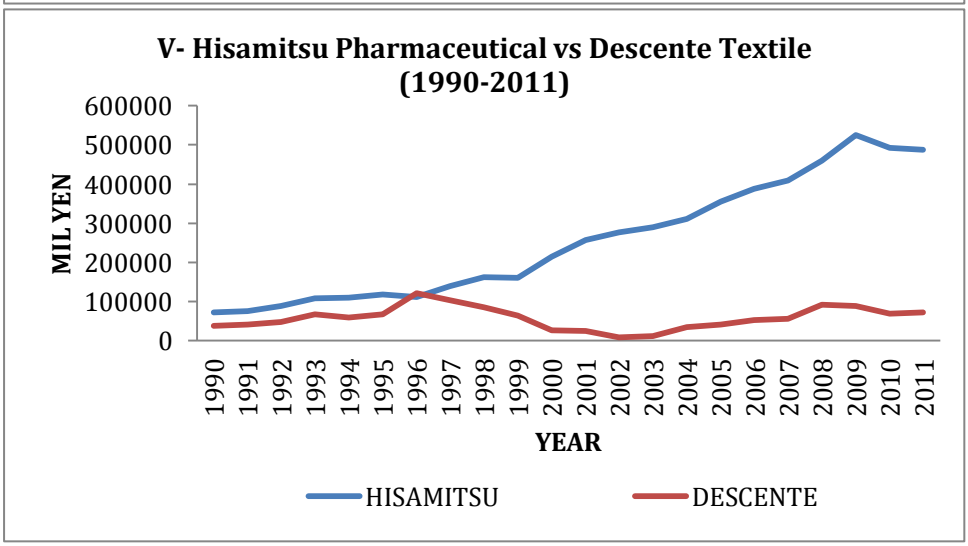
Trend analysis and further description	
High-tech Ono Pharmaceutical	**Low-tech Seiren textile**
Decrease of capital and labour expenses from 2004 and 2007 was worthwhile because output growth was still increasing for Ono pharmaceutical than low-tech Seiren textile except from 2008 and hereafter where output growth went down. TFP had little contribution in output growth as TFP steadily decline though is much higher than low-tech Seiren textile.	A steady decline of capital from 2008 is observed while labour cost is increasing. Thus capital and labour expenses was not worthwhile as output growth is stagnant throughout the period of lost decades and great stagnation. TFP seemed to have little contribution in output growth throughout the period except in 2011 where there was a proportionate growth of TFP.

Source: Author's description

4.5.2.0 Comparisons between Hisamitsu Pharmaceutical and Descente Textile firms 1990-2011.

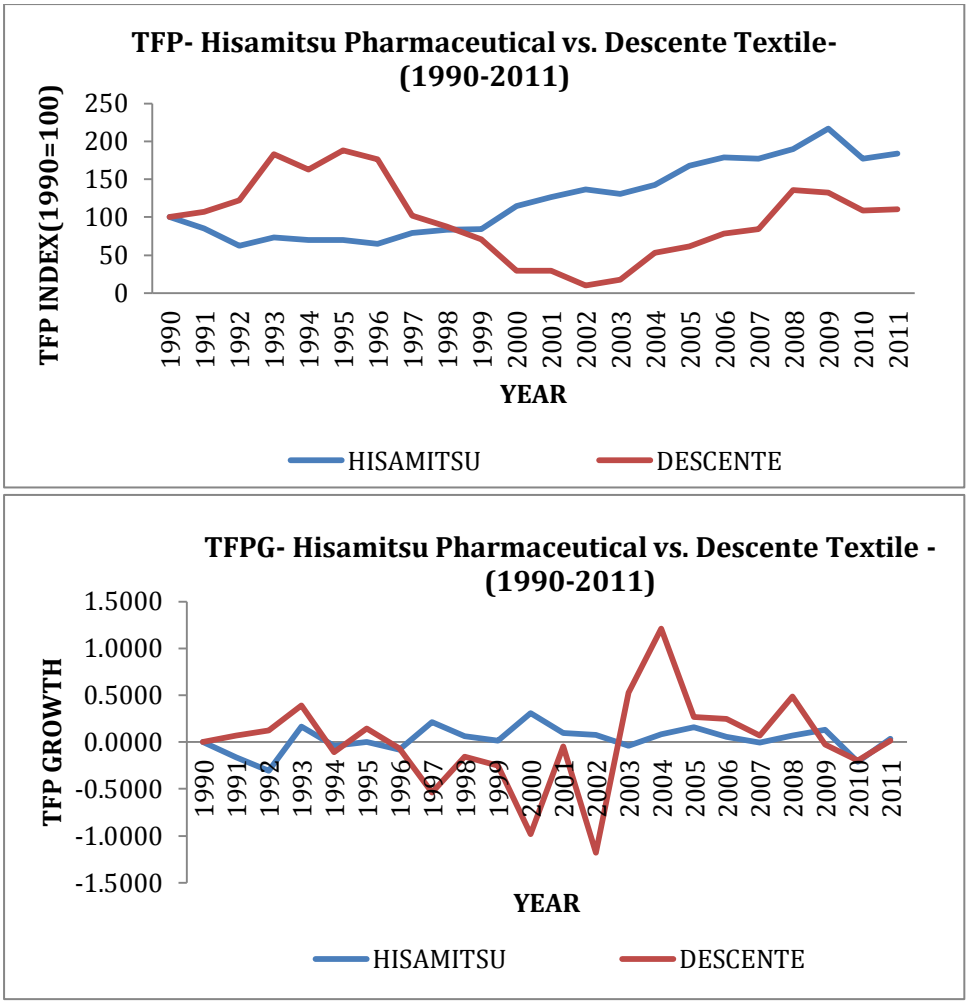






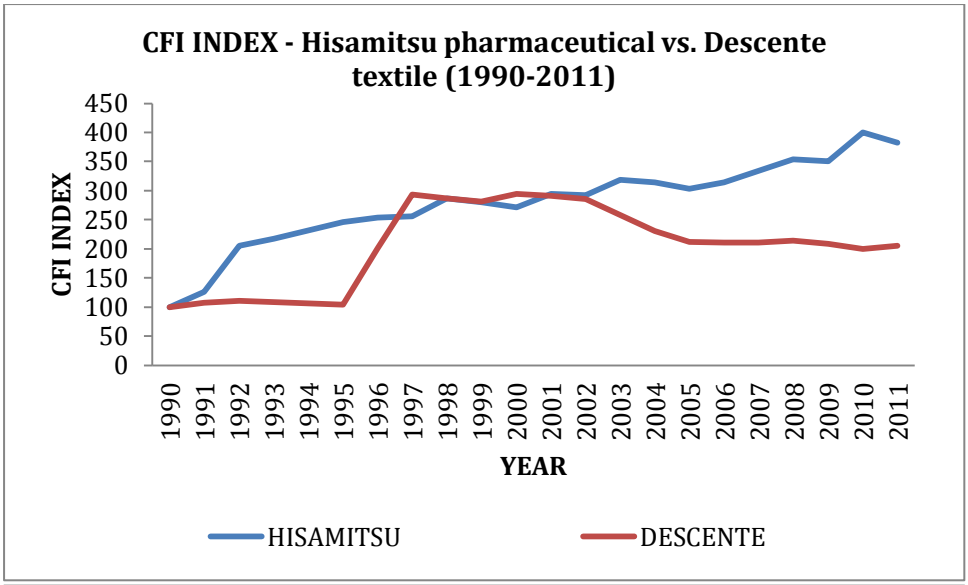
Source: Author's analysis (EOL digital database)

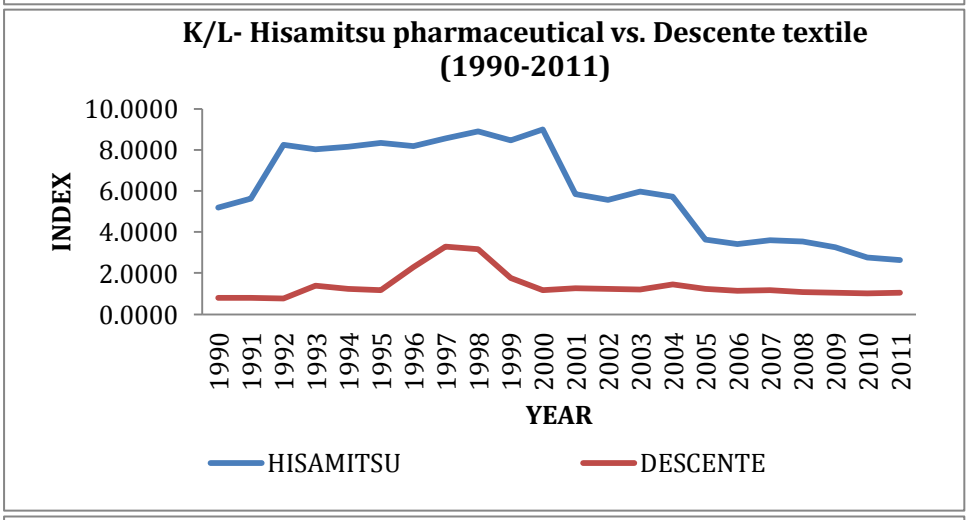
FIGURE 4.40. K, L, V COMPARISONS (4530 VS. 8114), 1990-2011.

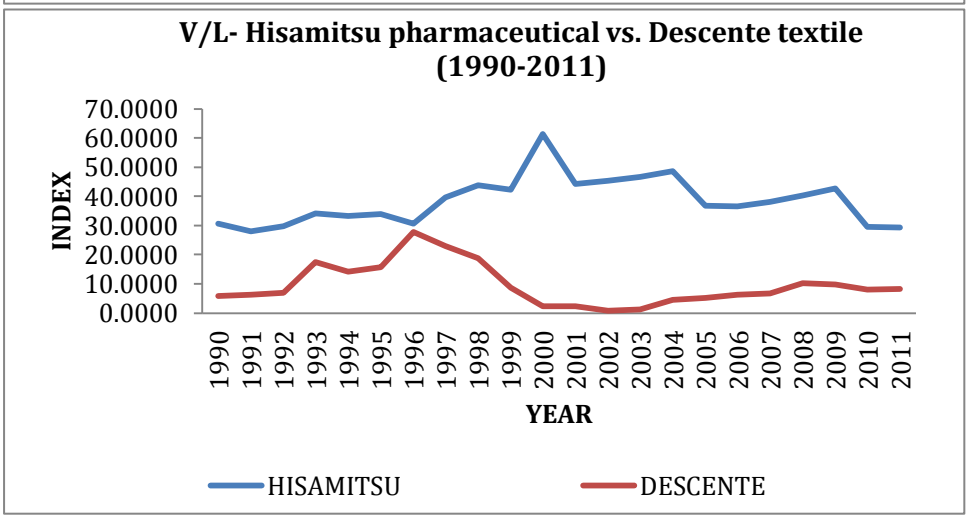


Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.41. TFP AND TFPG COMPARISONS (4530 VS. 8114), 1990-2011.







Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.42. CFI, K/L, V/L COMPARISONS (4530 VS. 8114), 1990-2011.

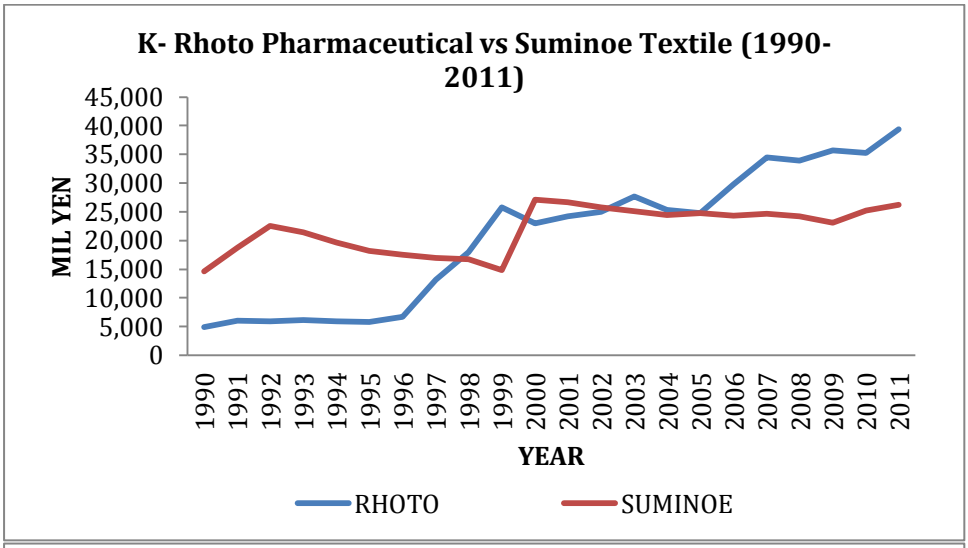
TABLE 4.21. DESCRIPTION AND ANALYSIS OF COMPARISONS OF HISAMITSU PHARMACEUTICAL AND DESCENTE FIRMS, 1990-2011.

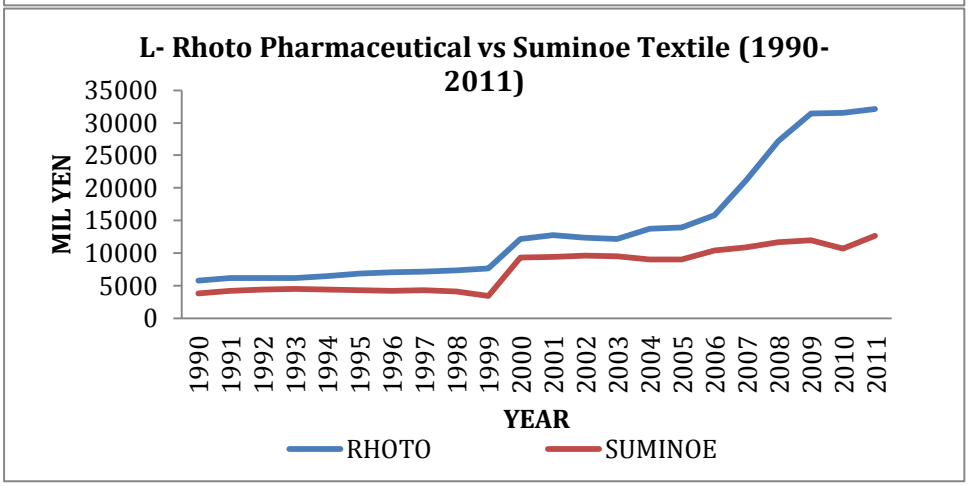
Factor	High-tech Hisamitsu pharmaceutical:	Low-tech Descente textile:
K	Capital is much higher and steadily increases throughout than low-tech Descente textile.	Capital is steadily decreasing in 1998 and hereafter with highest peak being 1997.
L	In 2005-2011: Labour cost was higher than low-tech Descente textile.	1990-2004: labour cost was higher than high-tech Hisamitsu pharmaceutical.
V	Output (V) is higher throughout the period, 1990-2011 compared to low-tech Descente textile.	Output (V) is almost stagnant throughout the period, 1990-2011.
CFI Index	There is a steady increase of CFI throughout the period and is higher than low-tech.	There was a sharp increase in 1996 followed by sharp decline in 2004.
K/L, V/L	V/L experienced fluctuation and a steady decrease while K/L experienced sharp decline from 2001 and hereafter. Both factor are higher than low-tech.	There was a sharp decrease of V/L in 1997 with very small increase in 2004. K/L experienced sharp increase in 1991-998 followed by decline hereafter.
TFP	1990-1998: TFP decline followed by increase in 1999-2011.	1990-1998: TFP was higher than high-tech Hisamitsu Pharmaceutical followed by decline in 1999-2011.
TFPG	Stagnant TFPG trend and 1991-1993 TFPG experienced a decline but it's generally higher than low-tech Descente textile.	A steady negative decline of TFPG with dynamism is observed in 1996-2002 before leveled hereafter.

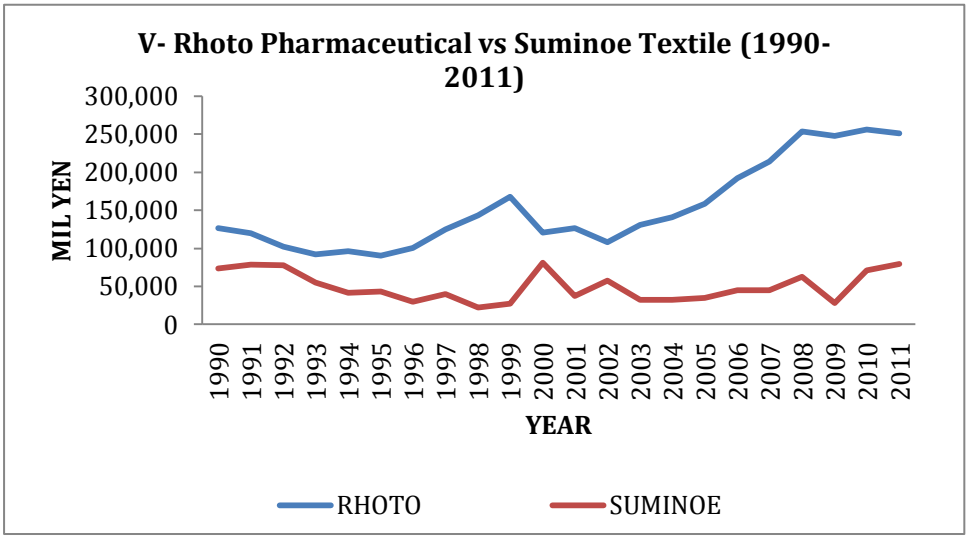
Trend analysis and further description	
High-tech Hisamitsu Pharmaceutical	**Low-tech Descente textile**
Increase of labour and capital expenses throughout the period 1990-2011, was worthwhile invested as it led to sharp output growth throughout compared to low-tech Descente textile. Technological progress had smaller contribution in the first decade (1990-1998) than in the second decade (1999 and hereafter), where by TFP experienced a steady increase.	A steady decline of capital and a steady increase in labour was not worth invested because output (V) was almost stagnant throughout the period. Technological progress had great contribution in output growth during the first decade (1990-1998) where TFP was higher than high-tech Hisamitsu pharmaceutical.

Source: Author's description

4.5.2.1 Comparisons between Rhoto Pharmaceutical and Suminoe Textile firms 1990-2011.

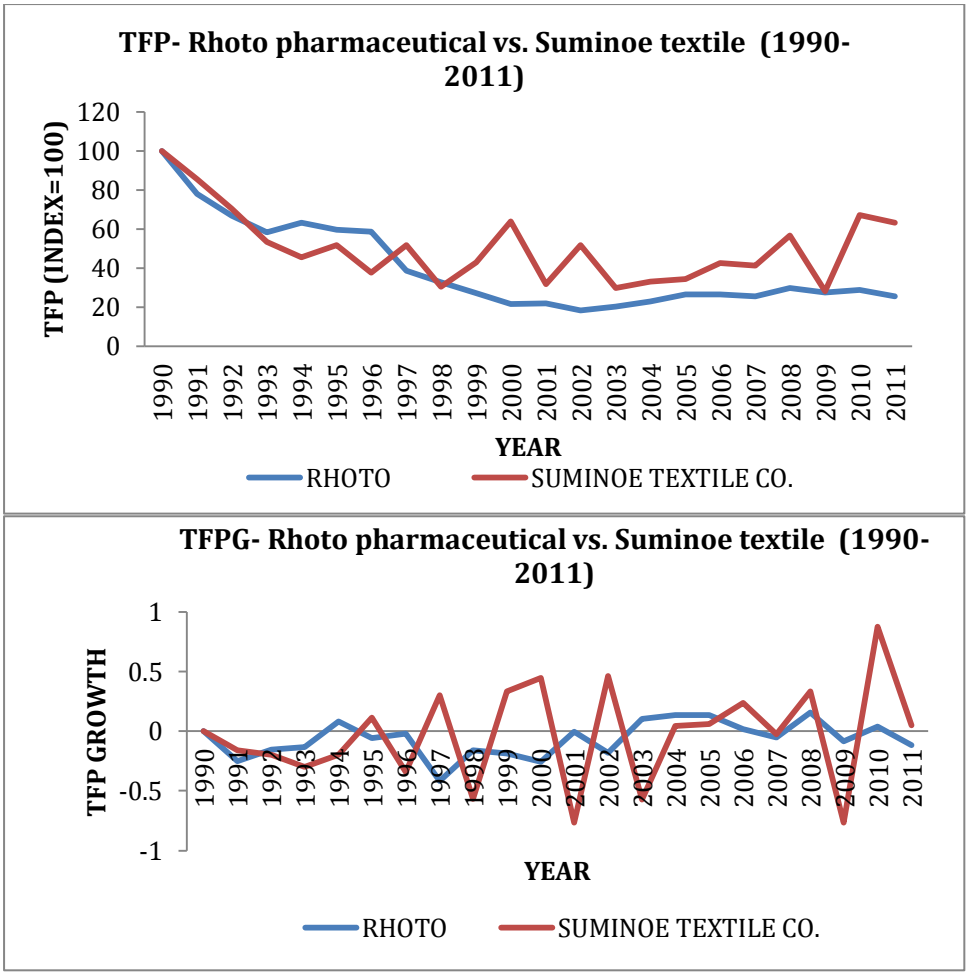






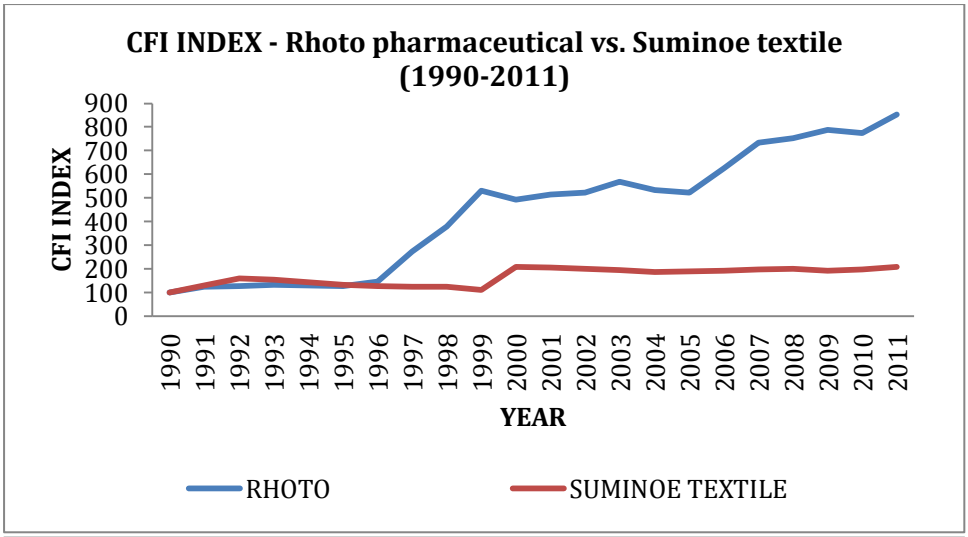
Source: Author's analysis (EOL digital database)

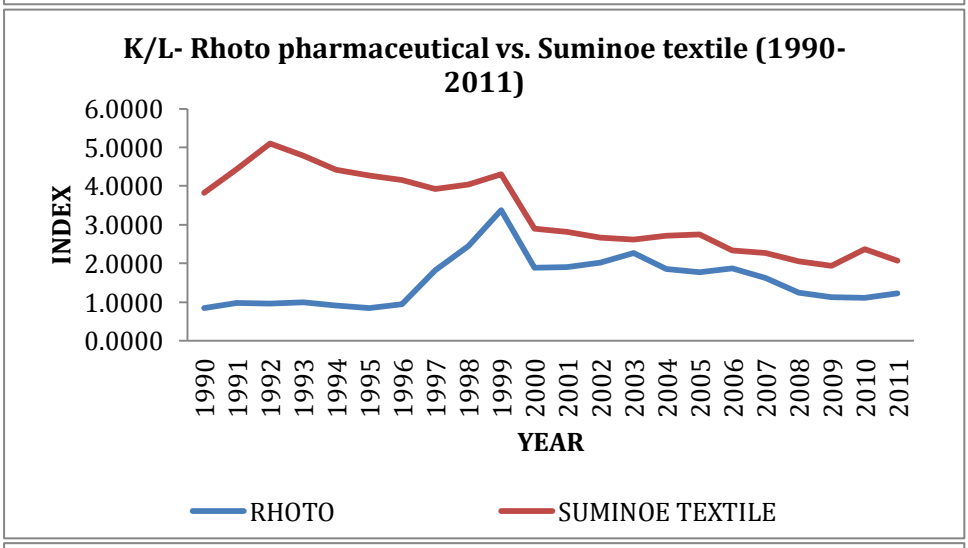
FIGURE 4.43. K, L, V COMPARISONS (4527 VS. 3501), 1990-2011.

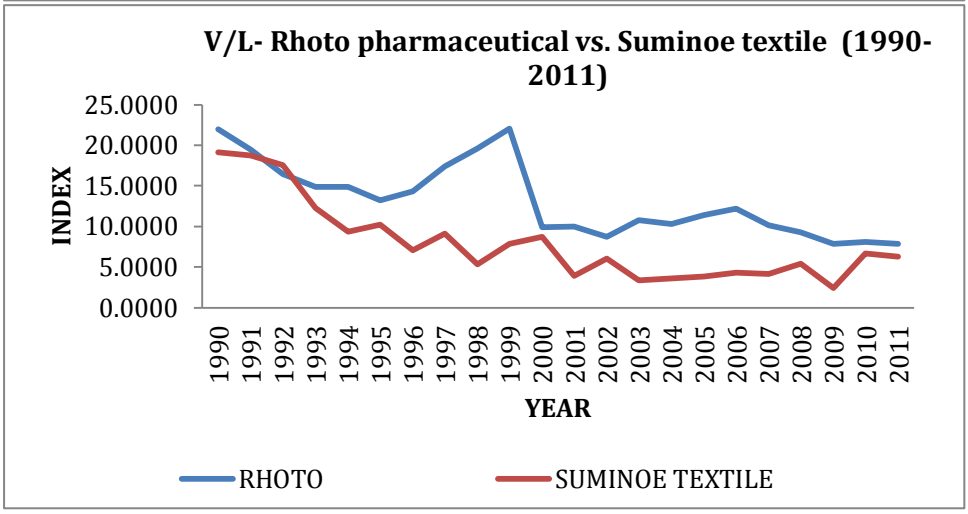


Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.44. TFP AND TFPG COMPARISONS (4527 VS. 3501), 1990-2011.







Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.45. CFI, K/L, V/L COMPARISONS (4527 VS. 3501), 1990-2011.

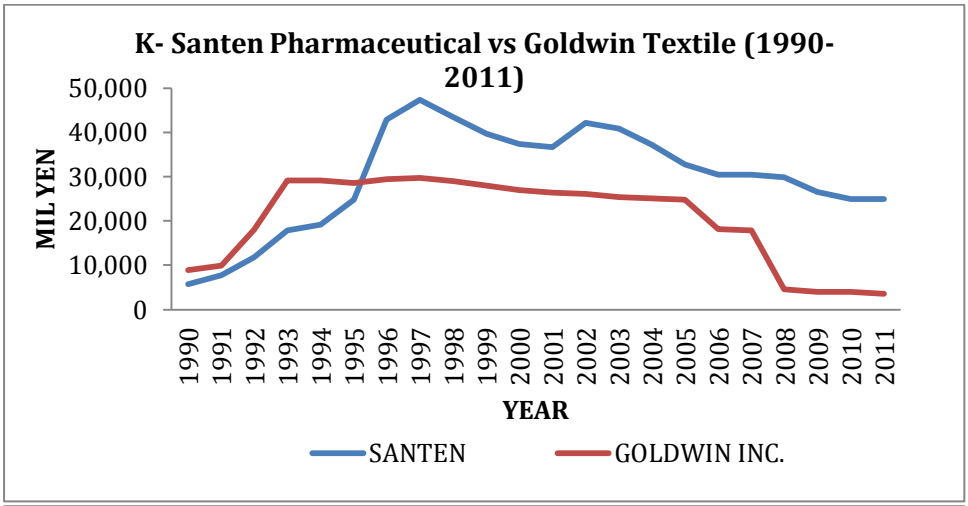
TABLE 4.22. DESCRIPTION AND ANALYSIS OF COMPARISONS OF RHOTO PHARMACEUTICAL AND SUMINOE TEXTILE FIRMS 1990-2011.

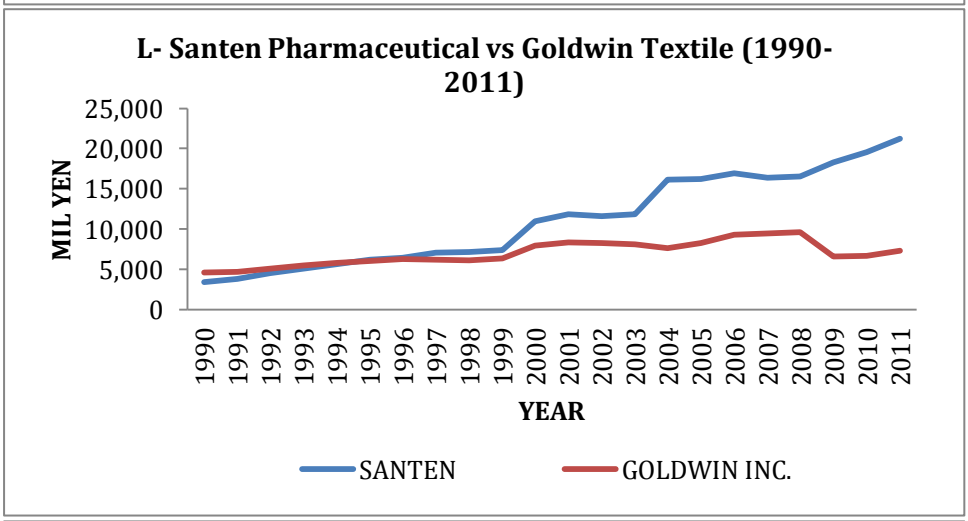
Factor	High-tech Rhoto Pharmaceutical:	Low-tech Suminoe textile:
K	Capital is higher compared to low-tech Suminoe textile except in 1990-1997; it was lower than Suminoe textile.	Capital is lower than high-tech Rhoto pharmaceutical except 1990-1997 where it was much higher.
L	Labour cost is higher throughout the period, 1990-2011 except in 2006-2011 a sharp increase of labour cost is observed.	Labour cost is lower compared to high-tech Rhoto pharmaceutical.
V	A steady increase of output (V) is observed in 2001-2011 and it's generally higher.	Output (V) is very fluctuating and almost stagnant with proportionate increase in 2010-2011.
CFI Index	There was a sharp increase in 1996 and hereafter and it's generally higher than low-tech.	It's almost stagnant throughout with proportionate increase in 2000.
K/L, V/L	V/L is higher than low-tech but a sharp decline is observed in 2000 and hereafter. A sharp increase of K/L was observed in 1997 followed by a sharp decline in 2000-2011.	K/L is higher than high-tech but steadily decreases while V/L experienced a sharp decrease throughout the period.
TFP	TFP is steadily decreasing throughout the period and it's lower than low-tech Suminoe textile except in 1993-1996, TFP was much higher.	Fluctuating TFP trend but higher than high-tech Rhoto pharmaceutical. A TFP increase is observed in 2010/2011.
TFPG	Fluctuating TFPG trend and it decline in 2010/2011.	Fluctuating TFPG trend and it decline in 2010/2011. There was a sharp decrease to negative in 1996,1998, 2001, 2003, and 2009.

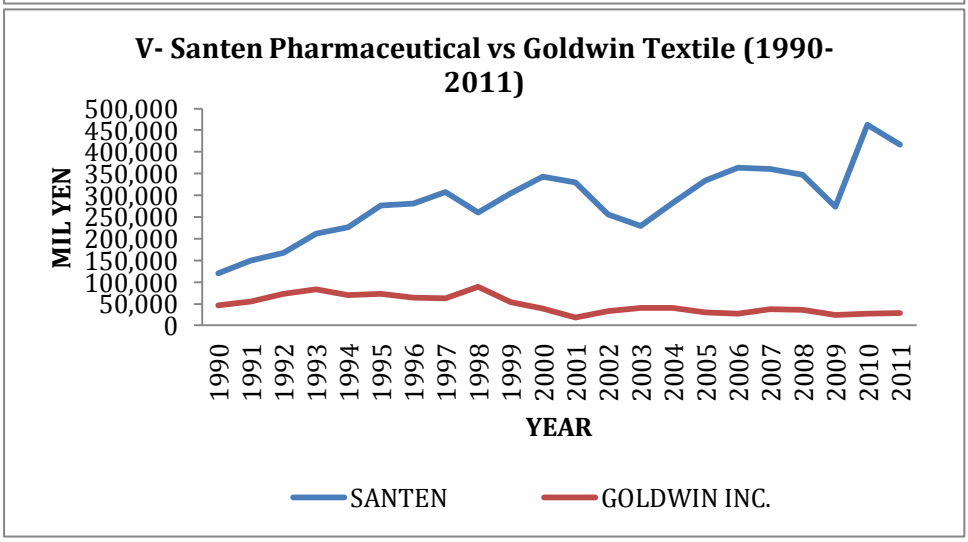
Trend analysis and further description	
High-tech Rhoto pharmaceutical	**Low-tech Suminoe textile**
Increase of capital and labour expenses of this Rhoto Pharma from 1996 were worth invested as output steadily increases and is much higher than low-tech Suminoe textile throughout the decades. Capital intensity and labour productivity experienced a steady decline from 2000 and hereafter as a result TFP is lower which indicate that technological change had little contribution in output growth especially during second decade.	Labour cost of Suminoe textile is lower and so it's less labour intensive because many Japanese textile firms were the first mover to cheap labour market than high-tech due to "labour intensive" nature of industry. Therefore, technological change for Suminoe was real important for output growth throughout the decades, as TFP is little higher than high-tech Rhoto Pharmaceutical.

Source: Author's description

4.5.2.2 Comparisons between Santen Pharmaceutical and Goldwin Inc. Textile firms 1990-2011.

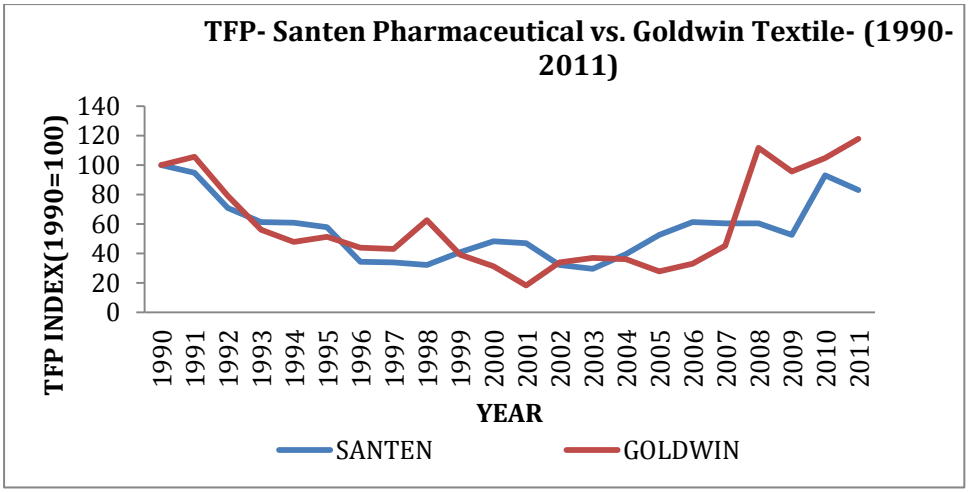


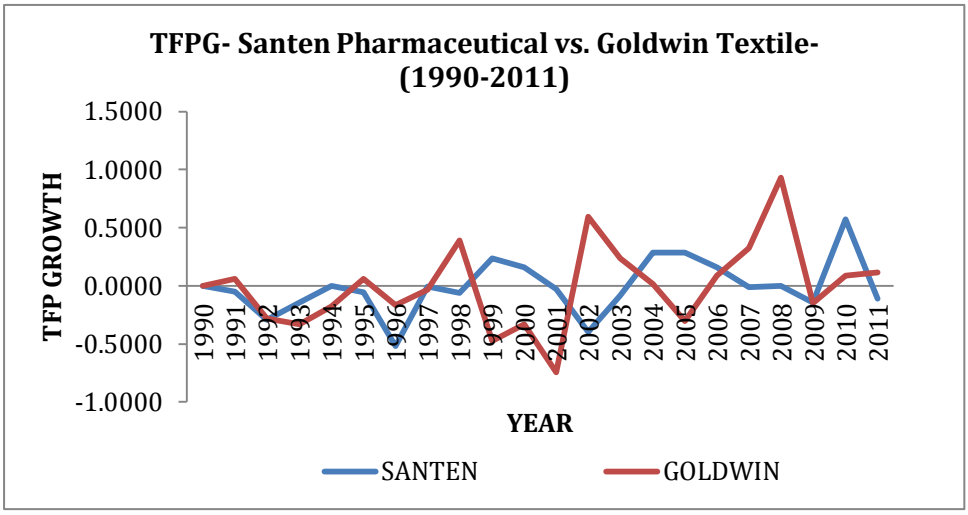




Source: Author's analysis (EOL digital database)

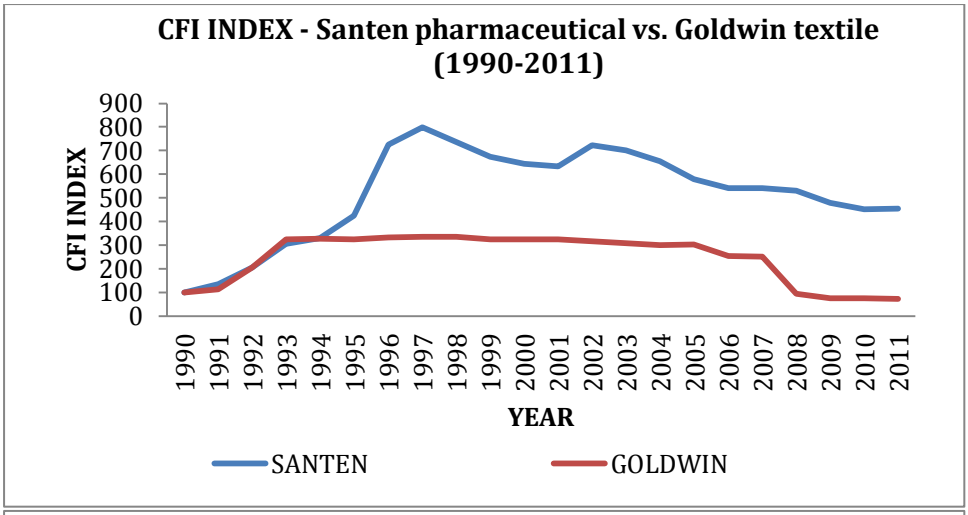
FIGURE 4.46. K, L, V COMPARISONS (4536 VS. 8111), 1990-2011.

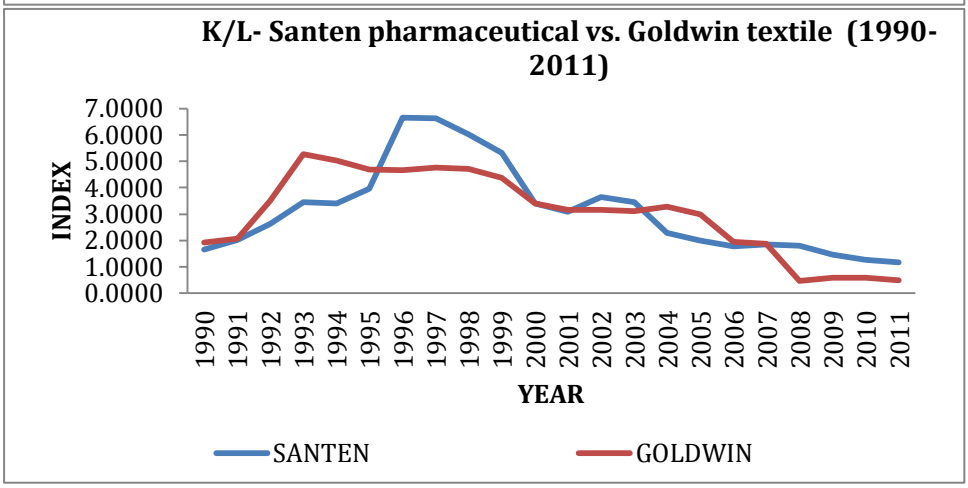


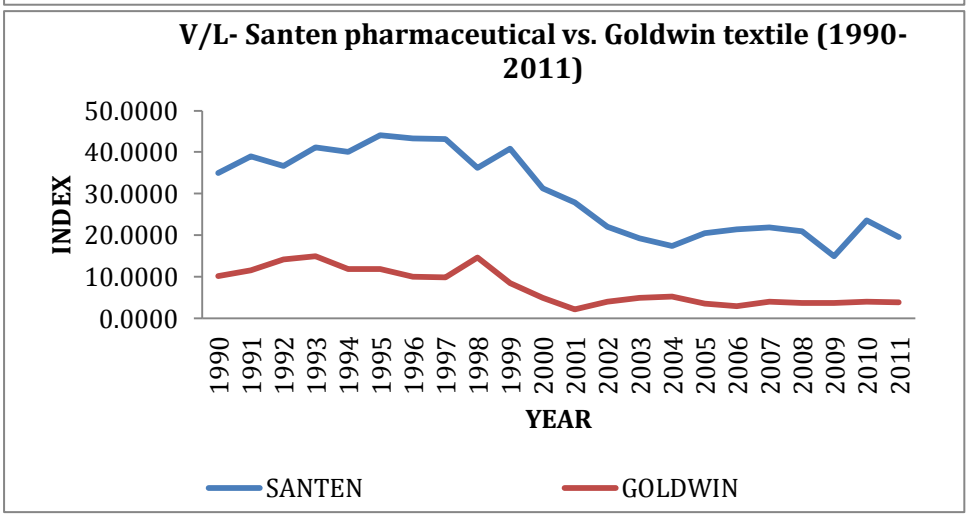


Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.47. TFP AND TFPG COMPARISONS (4536 VS. 8111), 1990-2011.







Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.48. CFI, K/L, V/L COMPARISONS (4536 VS. 8111), 1990-2011.

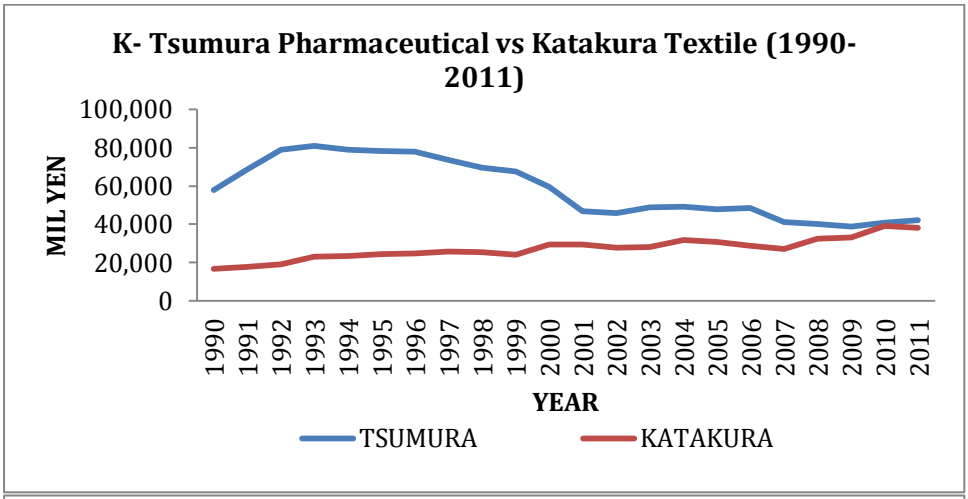
TABLE 4.23. DESCRIPTION AND ANALYSIS OF COMPARISONS BETWEEN SANTEN PHARMACEUTICAL AND GOLDWIN TEXTILE FIRMS, 1990-2011.

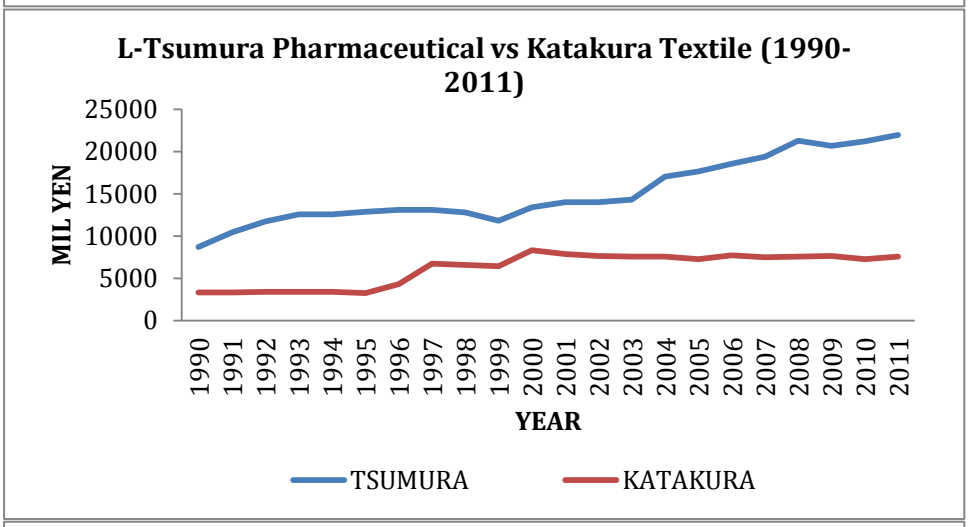
Factor	High-tech Santen pharmaceutical:	Low-tech Goldwin Textile:
K	A steady increase of capital is observed in 1990-1997 followed by decline in 1998 and hereafter.	1990-1992: a sharp increase of capital was observed followed by stagnation in 1992-2005. A sharp decrease is observed in 2006-2011.
L	A steady increase of labour is observed from 1990-2011.	A sharp decline of labour is observed in 2008 but throughout the period labour was declining.
V	A steady increase of output (V) is observed and it's generally higher than low-tech Goldwin textile.	Output (V) growth experienced stagnation with little increase and it's generally lower.
CFI Index	There was a sharp increase in 1994 followed by decline 1998 and hereafter and it's generally higher than low-tech.	There was a sharp decrease in 2008-2011.
K/L, V/L	A sharp decline of V/L and K/L is observed in 1998 and hereafter. K/L experienced increase from 1990-1997. Both factors are higher than low-tech.	There was sharp decline of V/L and K/L in 1998 and hereafter.
TFP	Fluctuating TFP trend with decrease. In 2007-2011 TFP was lower than low-tech Goldwin textile.	Fluctuating TFP trend with increase
TFPG	Fluctuating TFPG trend with steady decrease in 2010 and hereafter.	Fluctuating TFPG trend with increase in 2010/2011.

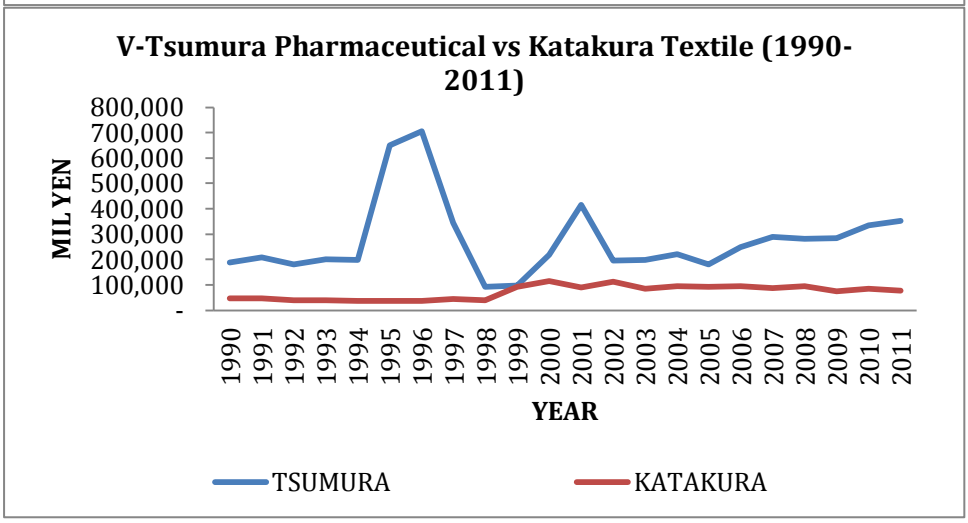
Trend Analysis and further description	
High-tech Santen pharmaceutical	**Low-tech Goldwin textile**
Increase of capital and labour expenses from 1998 was worth invested because output growth steadily increases at normal rate. From 2007 and hereafter, credit crunch effects led to lower TFP than low-tech and therefore TFP had smaller contribution in output growth than capital and labour.	Decrease of capital in 2006-2011 was worthwhile because output growth was still maintained and TFP increased. Generally, decrease of CFI in 2008-2011 was worthwhile because it didn't affect output growth negatively.

Source: Author's description

4.5.2.3 Comparisons between Tsumura Pharmaceutical and Katakura Textile firms 1990-2011.

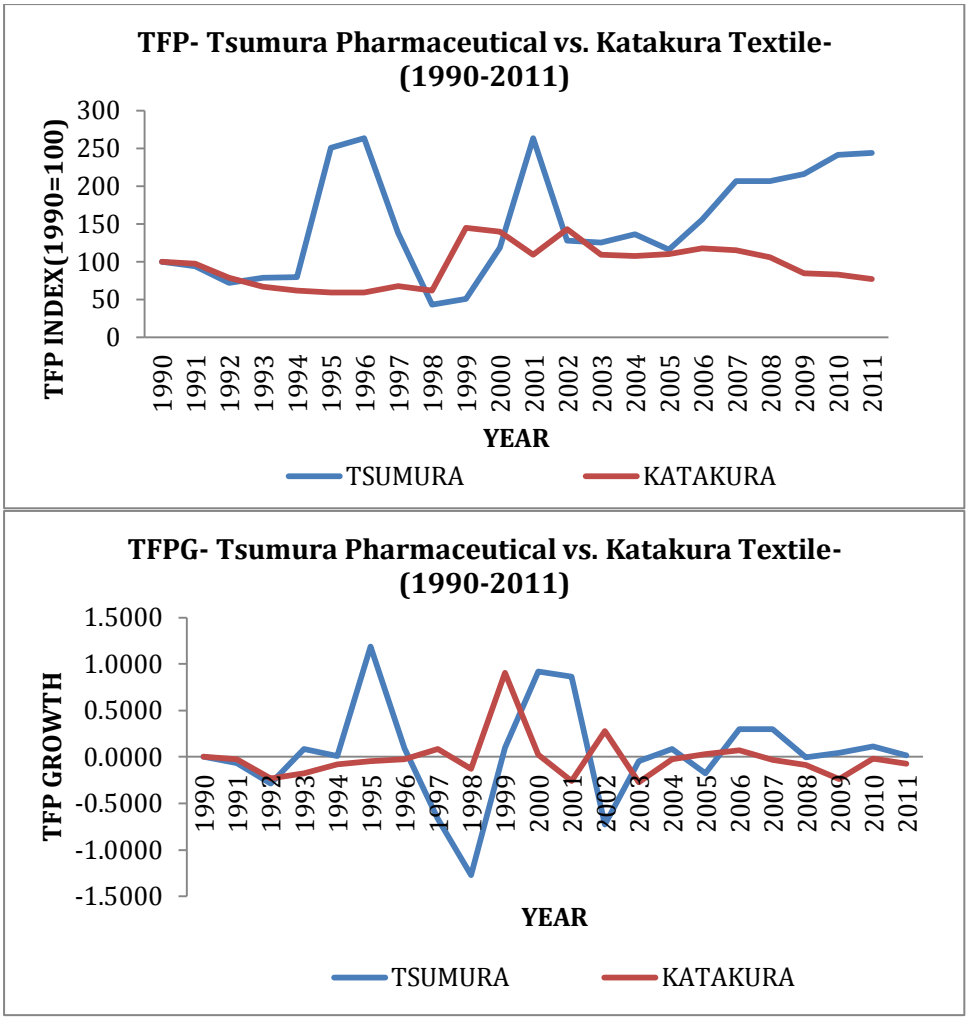






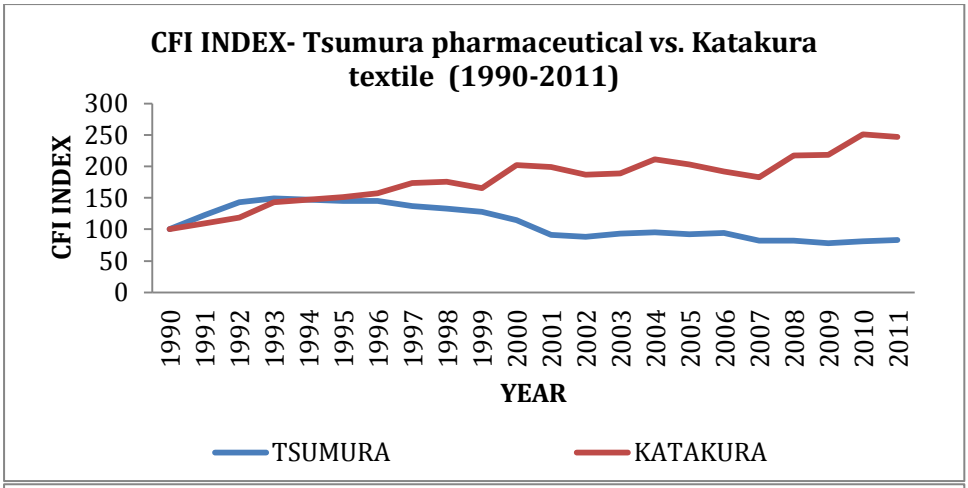
Source: Author's analysis (EOL digital database)

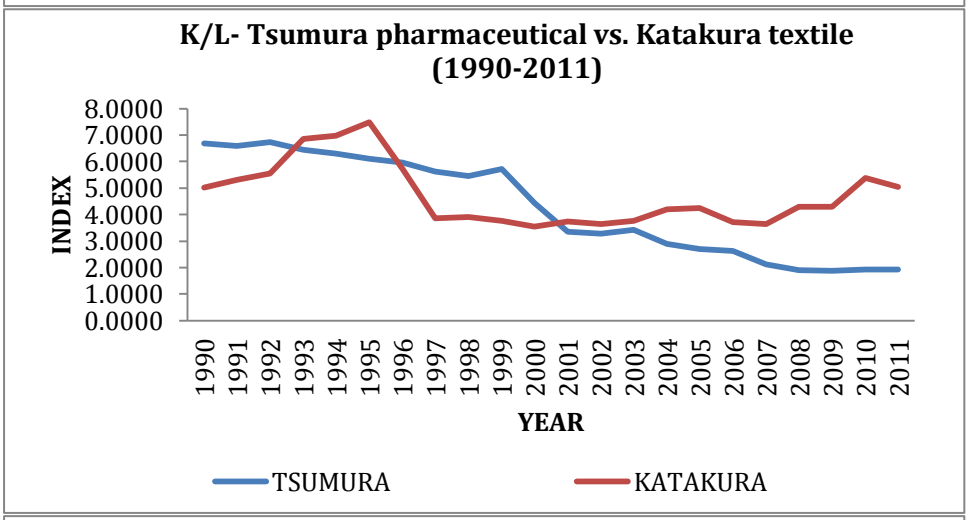
FIGURE 4.49. K, L, V COMPARISONS (4540 VS. 3001), 1990-2011.

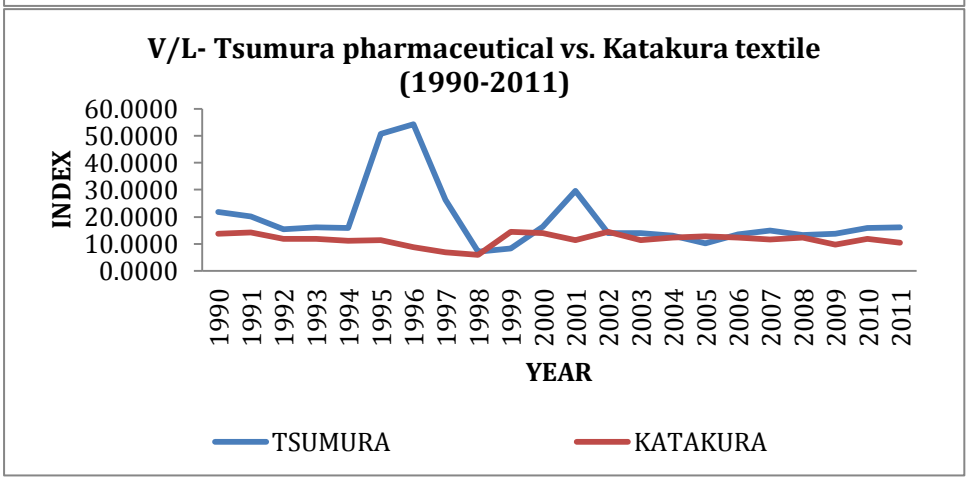


Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.50. TFP AND TFPG COMPARISONS (4540 VS. 3001), 1990-2011.







Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.51. CFI, K/L, V/L COMPARISONS (4540 VS. 3001), 1990-2011.

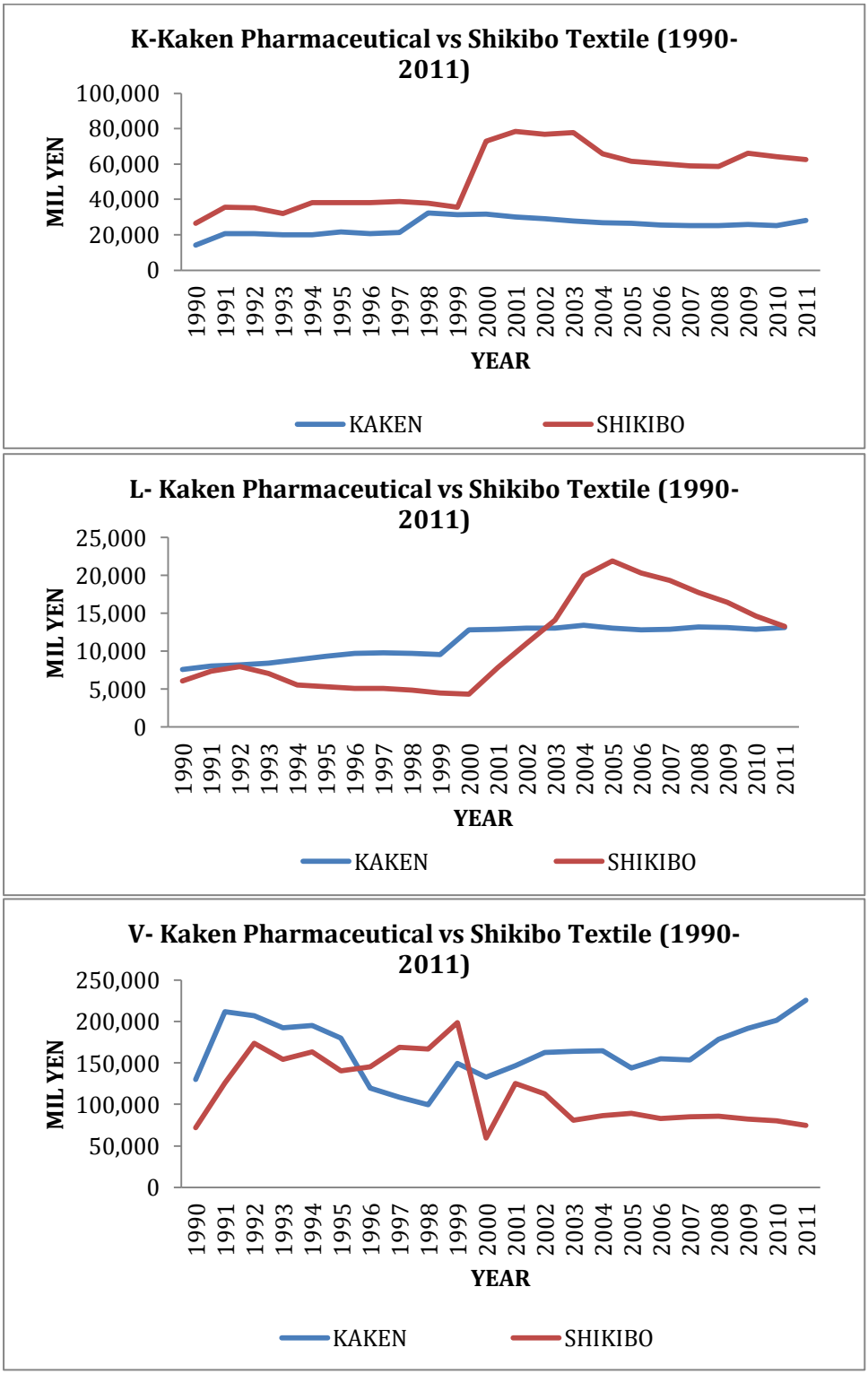
TABLE 4.24. DESCRIPTION AND ANALYSIS OF COMPARISONS OF TSUMURA PHARMACEUTICAL AND KATAKURA TEXTILE FIRMS, 1990-2011.

Factor	High-tech Tsumura pharmaceutical:	Low-tech Katakura textile:
K	Capital is generally fluctuating and higher than low-tech Katakura. In 1990/1992 there was sharp increase of capital followed by sharp decline in 1993-2001 before maintained	Capital increased at low rate throughout the period, 1990-2011.
L	Labour cost is much higher compared to low-tech Katakura textile and it is steadily increasing.	There is a proportionate increase of labour from 1995-2000.
V	Output (V) is fluctuating with steady increase and it's generally higher than low-tech Katakura textile.	Output (V) experienced stagnation with small proportionate increase.
CFI Index	Steadily decreases throughout and its lower than low-tech Katakura.	A steady increase is observed throughout and it's generally higher.
K/L, V/L	There was sharp increase of labour productivity in 1995 followed by sharp decrease in 1998 and hereafter and it's generally higher. K/L is declining throughout the period and became lower than low-tech in 2001-2011.	V/L is almost maintained throughout the period. K/L experienced a sharp decline in 1996 and hereafter.
TFP	A steady increase of TFP is observed except in 1997-2000, 2002-2004 where TFP decline sharply.	Fluctuating TFP trend with steady decrease and it's generally lower than high-tech Tsumura pharmaceutical.
TFPG	Fluctuating TFPG with steady decrease but it's higher than low-tech Katakura textile. In 1997/1998, 2002 dropped sharply to negative	Fluctuating TFPG trend and it's lower than high-tech Katakura textile.

Trend analysis and further description	
High-tech Tsumura pharmaceutical	**Low-tech Katakura textile**
Decreased in capital and labour expenses throughout was worthwhile because output is growing and is higher than low-tech for the past 2 decades. TFP was much affected during the first decade than second decade where by there was a steady increase of TFP. This indicate that TFP had little contribution in output growth throughout than low-tech.	Capital growth was lower to enhance output growth throughout the period though labour cost was lowered. Therefore, CFI increase was not worthwhile because output is almost stagnant for the whole period. And TFP had little contribution in output growth compared to high-tech Tsumura pharmaceutical.

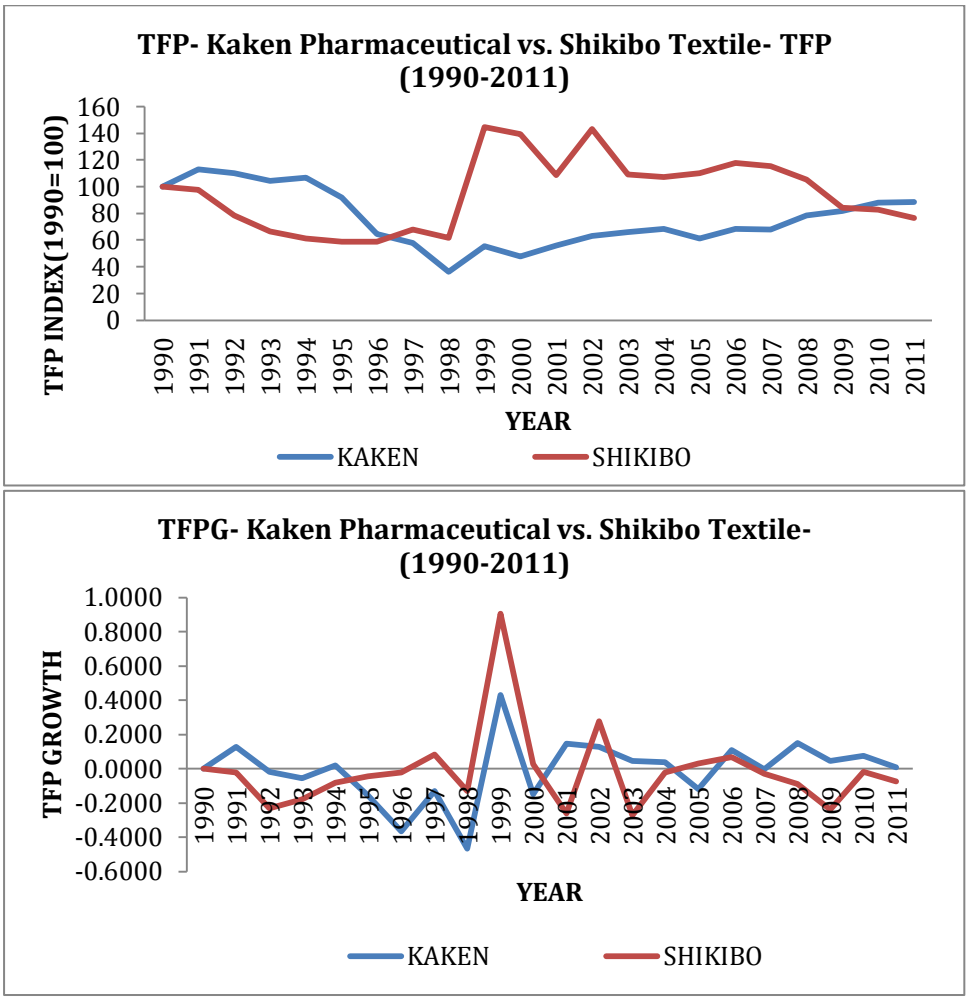
Source: Author's description

4.5.2.4 Comparisons between Kaken Pharmaceutical and Shikibo Textile firms 1990-2011.



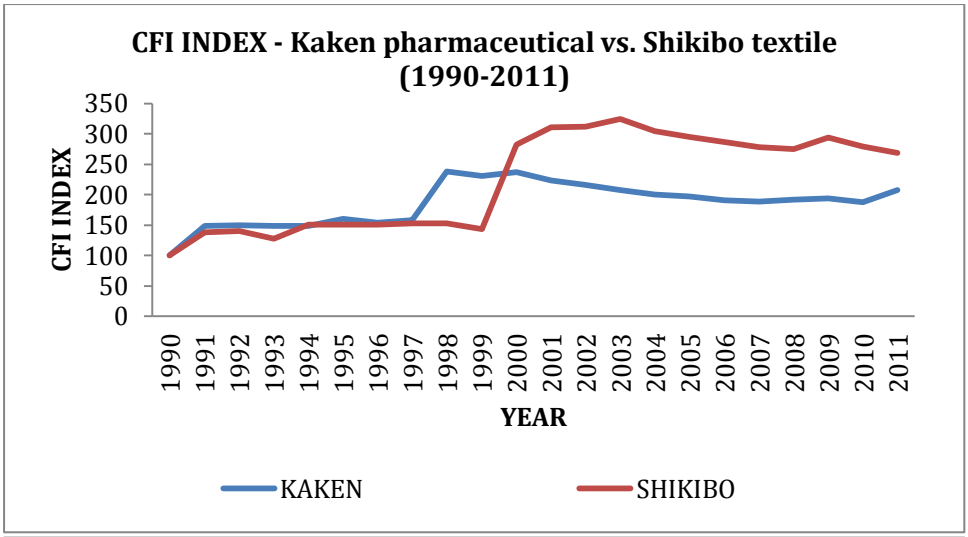
Source: Author's analysis (EOL digital database)

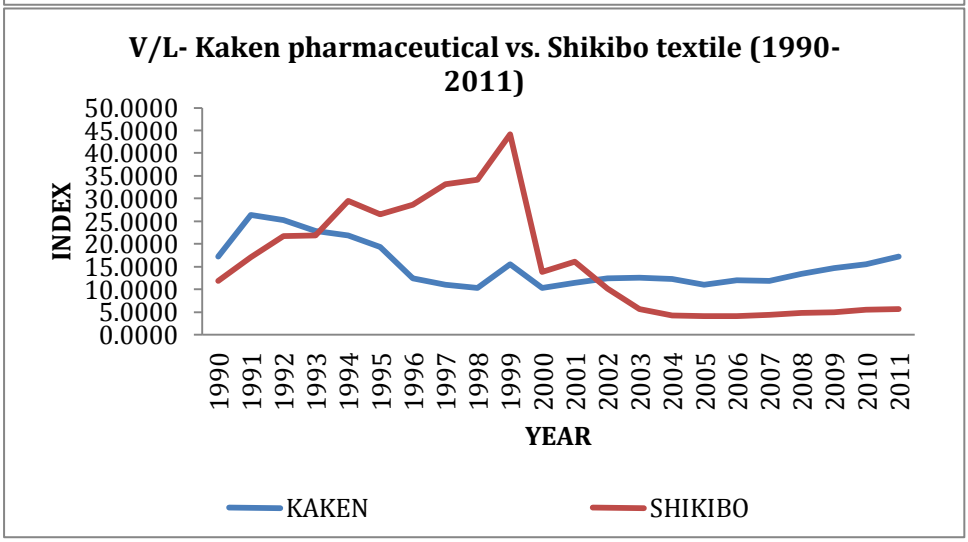
FIGURE 4.52. K, L, V COMPARISONS (4521 VS. 3109), 1990-2011.



Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.53. TFP AND TFPG COMPARISONS (4521 VS. 3109), 1990-2011.





Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.54. CFI, K/L, V/L COMPARISONS (4521 VS. 3109), 1990-2011.

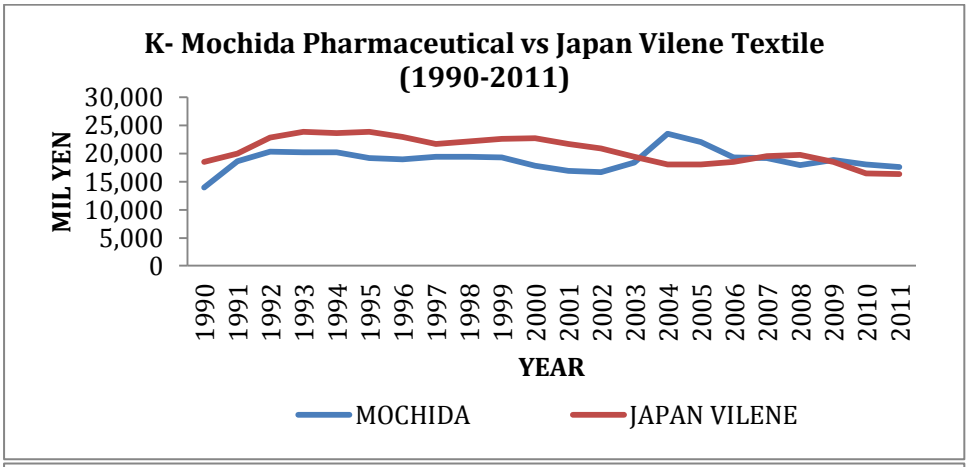
TABLE 4.25. DESCRIPTION AND ANALYSIS OF COMPARISONS OF KAKEN PHARMACEUTICAL AND SHIKIBO TEXTILE FIRMS 1990-2011.

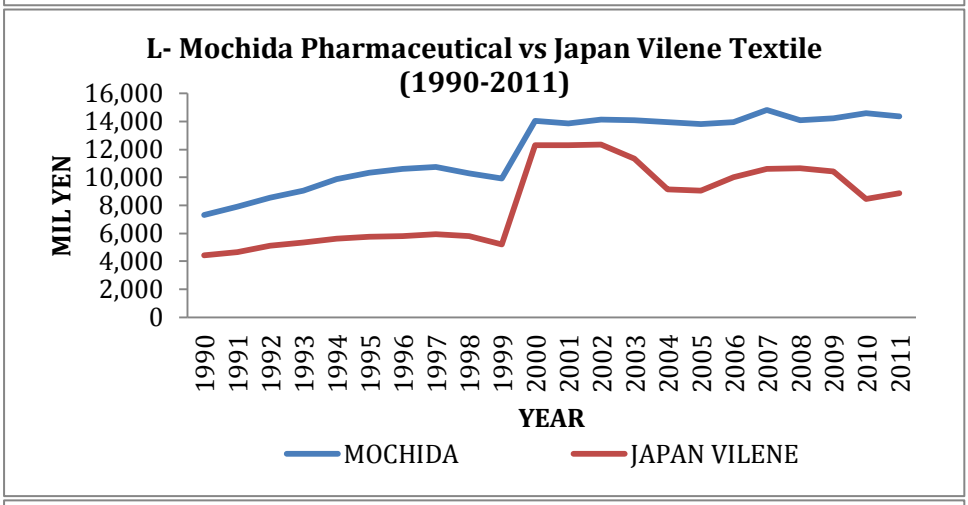
Factor	High-tech Kaken pharmaceutical:	Low-tech Shikibo textile:
K	Low rate of capital growth is observed throughout the period and it's generally lower than low-tech Shikibo textile except in 1997-1998.	A small decrease is observed in 2010 and hereafter. A sharp increase is observed in 2000 followed by a sharp decrease in 2003
L	In 1990-2003: labour cost was higher than low-tech Shikibo textile. 2003-2011: labour cost was lower than low-tech Shikibo textile	2003-2011: Labour cost is much higher than high tech Kaken pharmaceutical.
V	Output (V) is higher than low-tech Shikibo textile with small steady increase except in 1995-1999 where output decline.	In 1995-1999 output (V) was higher than high-tech Kaken pharmaceutical followed by decline hereafter.
CFI Index	There was a sharp increase in 1998 followed by small decline in 2001.	A sharp increase is observed in 2000 and hereafter and it's generally higher than high-tech Kaken pharmaceutical.
K/L, V/L	There was a sharp decline of V/L in 1992 and hereafter and it's generally higher than low-tech. K/L is maintained throughout and is lower.	A sharp decrease of V/L is observed in 2000 and hereafter while K/L experienced increases in 2000 followed by sharp decline in 2001.
TFP	1997-2009: TFP was lower than low-tech Shikibo textile but generally a steady increase of TFP is observed throughout and it's much higher than low-tech Shikibo textile.	In 1997-2009 TFP was higher than high-tech Kaken pharmaceutical followed by decline from 2009-2011. 1990-1996: TFP decline
TFPG	Fluctuating TFPG trend with stagnation but it's higher than low-tech Shikibo textile.	Fluctuating TFPG trend with steady decrease and it's generally lower than high-tech Kaken pharmaceutical.

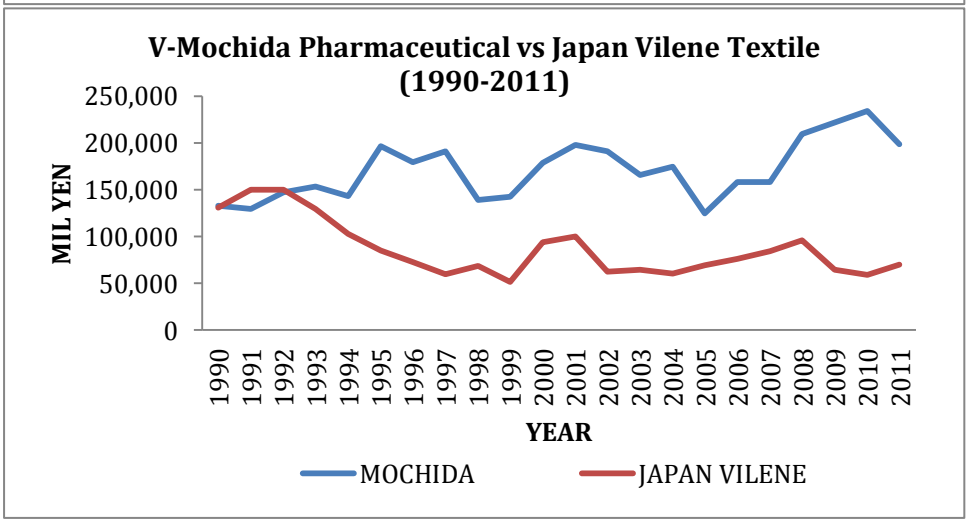
Trend analysis and further description	
High-tech Kaken pharmaceutical	**Low-tech Shikibo textile**
Decline of capital and labour expenses was worthwhile because output (V) is growing compared to low-tech Shikibo textile. Technological change contributed to the output growth because TFP experienced a steady increase and it's higher than low-tech Shikibo textile. Generally, TFP had a great role in Kaken pharmaceutical throughout the period for output growth.	Sharp increase of capital and labour expenses from 2000 was not worthwhile because output was stagnant. TFP played a great role in output growth from 1997 to 2007 than capital and labour input, as TFP was much higher before it's decline hereafter.

Source: Author's description

4.5.2.5 Comparisons between Mochida Pharmaceutical and Japan Vilene Textile firms 1990-2011.

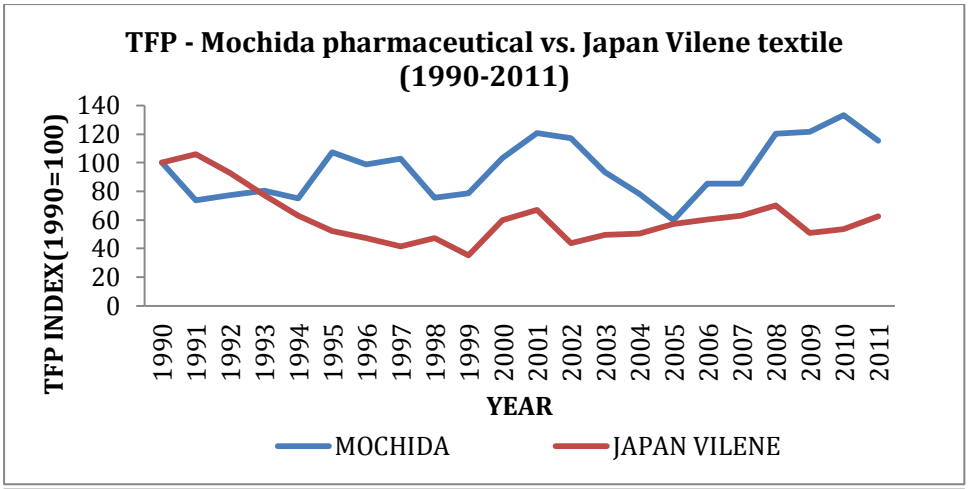


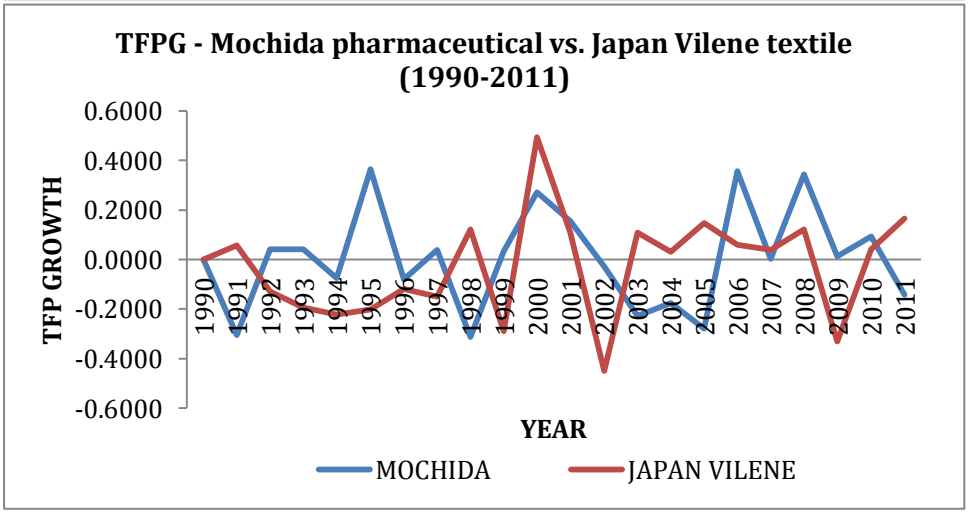




Source: Author's analysis (EOL digital database)

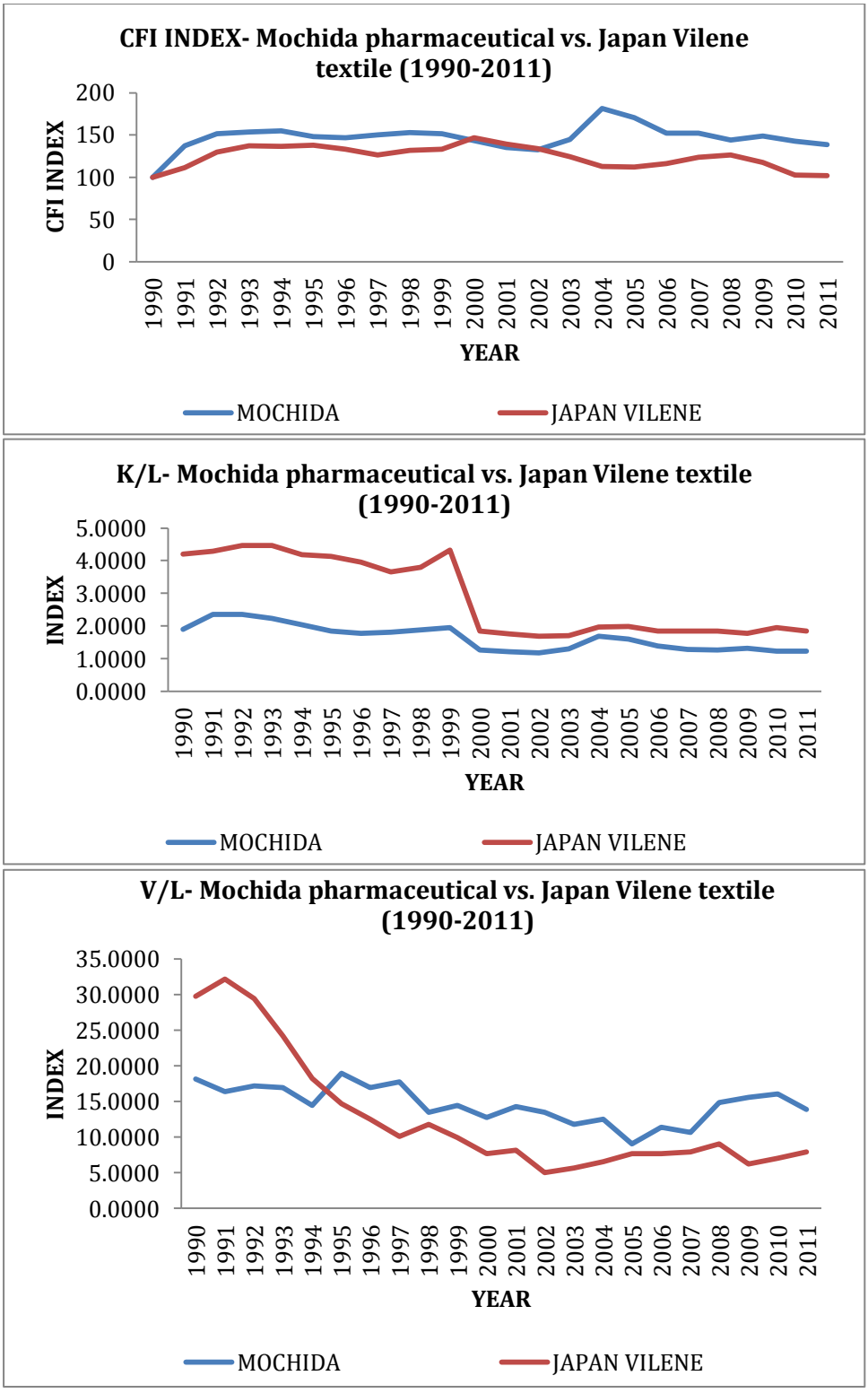
FIGURE 4.55. K, L, V COMPARISONS (4534 VS. 3514), 1990-2011.





Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.56. TFP AND TFPG COMPARISONS (4534 VS. 3514), 1990-2011.



Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.57. CFI, K/L, V/L COMPARISONS (4534 VS. 3514), 1990-2011.

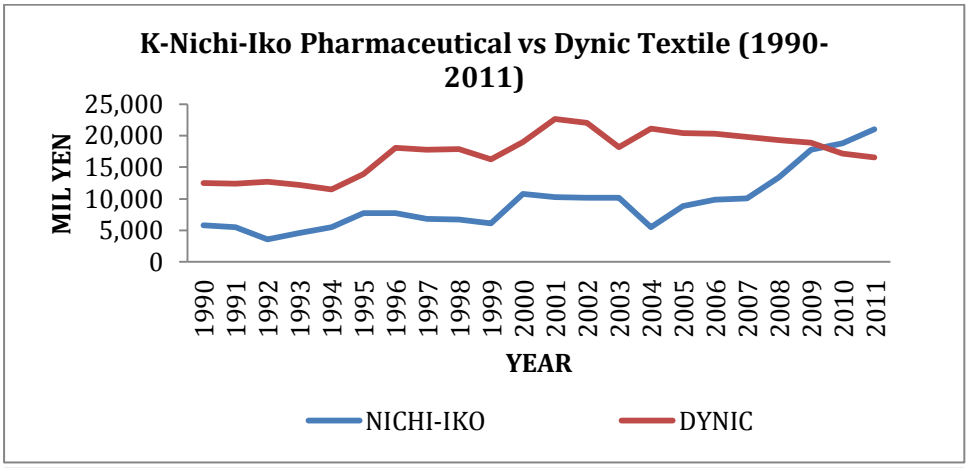
TABLE 4.26. DESCRIPTION AND ANALYSIS OF COMPARISONS OF MOCHIDA PHARMACEUTICAL AND JAPAN VILENE TEXTILE FIRMS, 1990-2011.

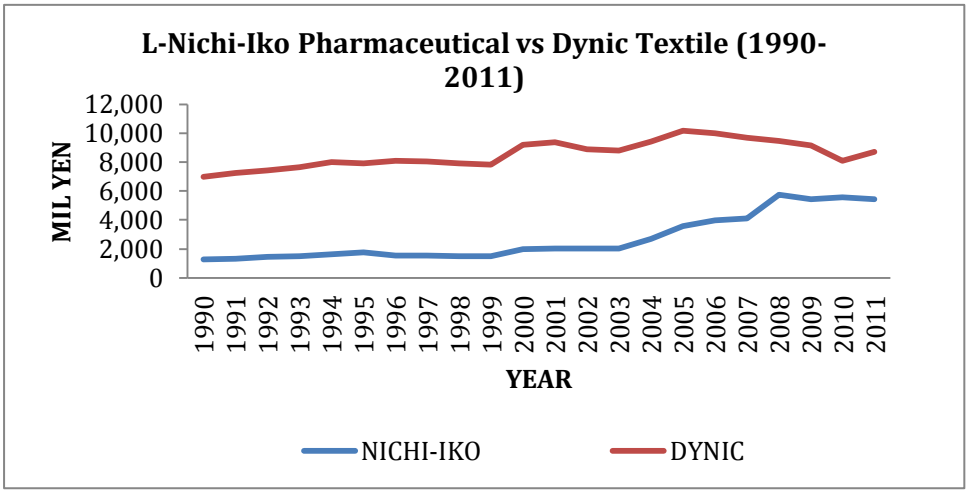
Factor	High-tech Mochida pharmaceutical	Low-tech Japan Vilene textile
K	In 1990-2003 there was capital decline followed by increase in 2003 and hereafter except 2007/2008.	In 1990-2002 there was capital increase followed by decrease in 2003 and hereafter except 2007/2008 where capital increase is observed also.
L	In 1998 a sharp increase of labour is observed before maintained hereafter but it's generally higher than low-tech Japan Vilene textile.	A steady increase of labour is observed in 1998 followed by decrease in 2003 and hereafter.
V	Fluctuating output (V) is observed throughout the period with an increase in 2008 but it's generally higher than low-tech Japan Vilene textile.	A sharp decline of output is observed in 1992 followed by increase in 2008 and hereafter.
CFI Index	There was a sharp increase in 2004 followed by decline hereafter.	There was sharp decline in 2000 and hereafter.
K/L, V/L	V/L is decreasing throughout but it's higher than low-tech while K/L experienced decrease also.	There was a sharp decrease of V/L in 1992 and hereafter. A sharp decline of K/L is observed in 2000 but it's generally higher than high-tech Mochida Pharma.
TFP	Fluctuating TFP trend throughout the period of two decades but its generally higher low-tech Japan Vilene textile.	TFP trend is very dynamic and it's lower than high-tech Mochida pharmaceutical.
TFPG	Fluctuating TFPG trend 1990/1991, 1998, 2003-2005, 2010/2011 TFPG decline is observed.	Fluctuating trend with small increase in 2010 and hereafter. In 1992-1997,2002,2009 TFPG decline is observed.

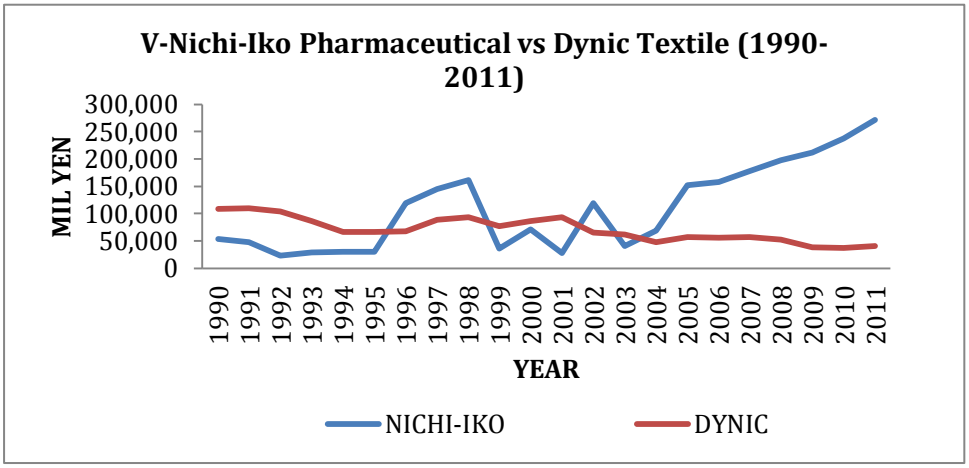
Trend analysis and further description	
High-tech Mochida pharmaceutical	**Low-tech Japan Vilene textile**
Decrease of capital and labour expenses in 2004 was worthwhile because output growth for Mochida pharmaceutical increased except in year 2010-2011. TFP seemed to have contribution in output growth of this company, as it's much higher than low-tech Japan Vilene textile.	Higher capital with less labour expenses triggered output growth of Japan Vilene textile except in 1992 to 1999 during burst of the bubble economy and Asian financial crisis. Many Japanese textiles benefited from cheap labour market as labour intensive industry. But generally, TFP had little role in output growth for Japan Vilene than Mochida pharmaceutical.

Source: Author's description

4.5.2.6 Comparisons between high-tech Nichi-Iko pharmaceutical and low-tech Dynic textile 1990-2011.

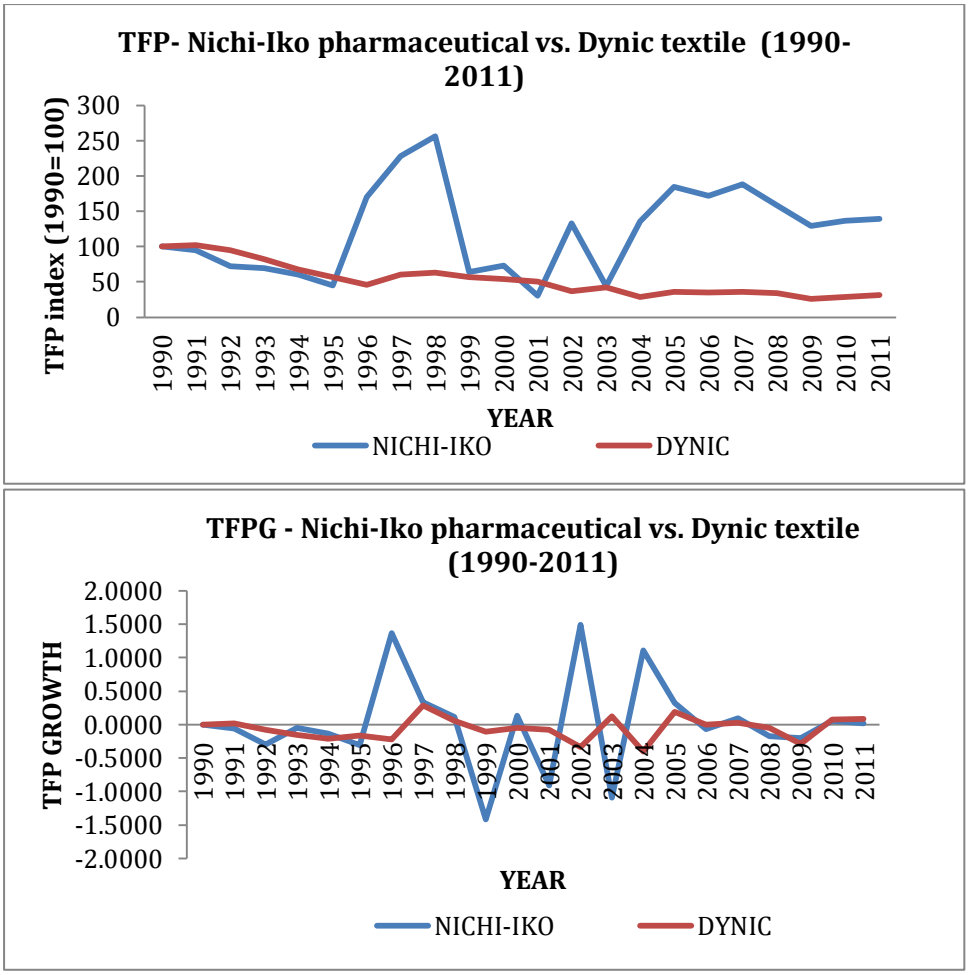






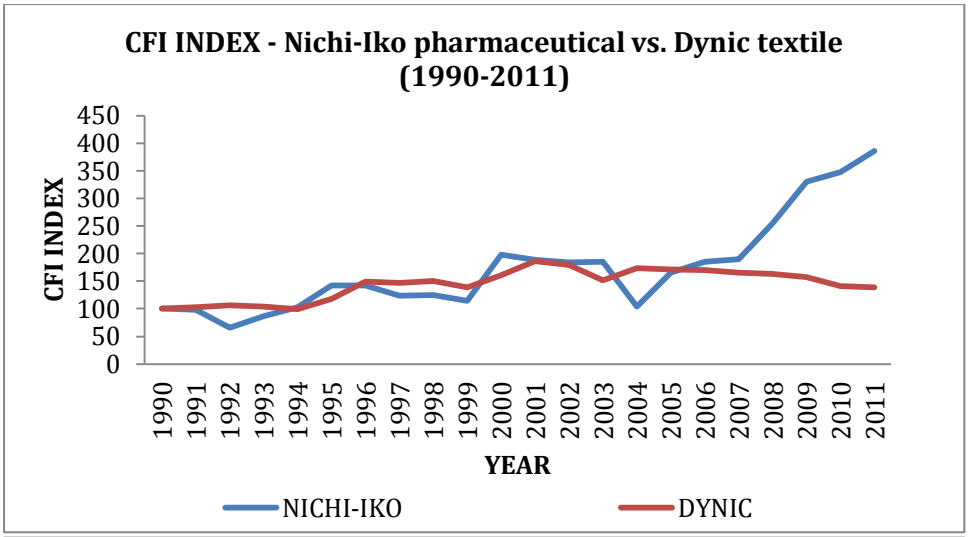
Source: Author's analysis (EOL digital database)

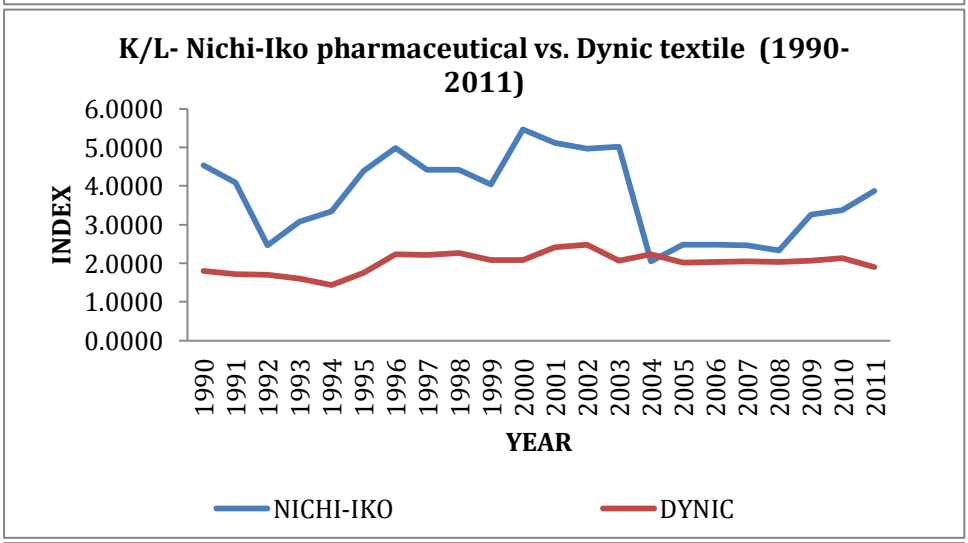
FIGURE 4.58. K, L, V COMPARISONS (4541 VS. 3551), 1990-2011.

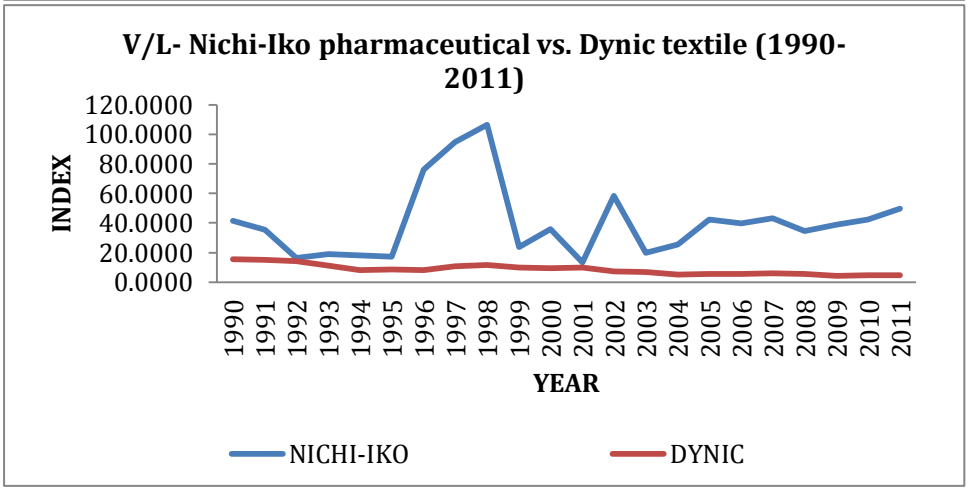


Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.59. TFP AND TFPG COMPARISONS (4541 VS. 3551), 1990-2011.







Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.60. CFI, K/L, V/L COMPARISONS (4541 VS. 3551), 1990-2011.

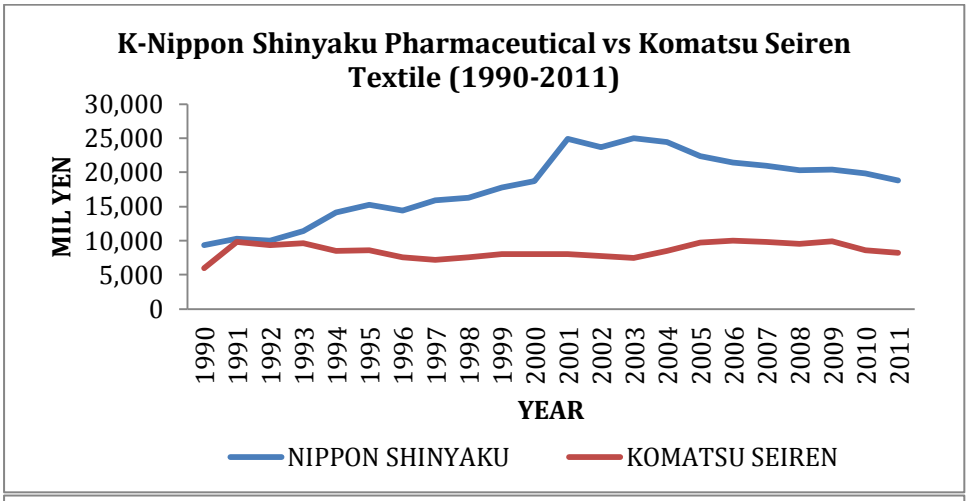
TABLE 4.27. DESCRIPTION AND ANALYSIS OF COMPARISONS OF NICHI-IKO PHARMACEUTICAL AND DYNIC TEXTILE FIRMS 1990-2011.

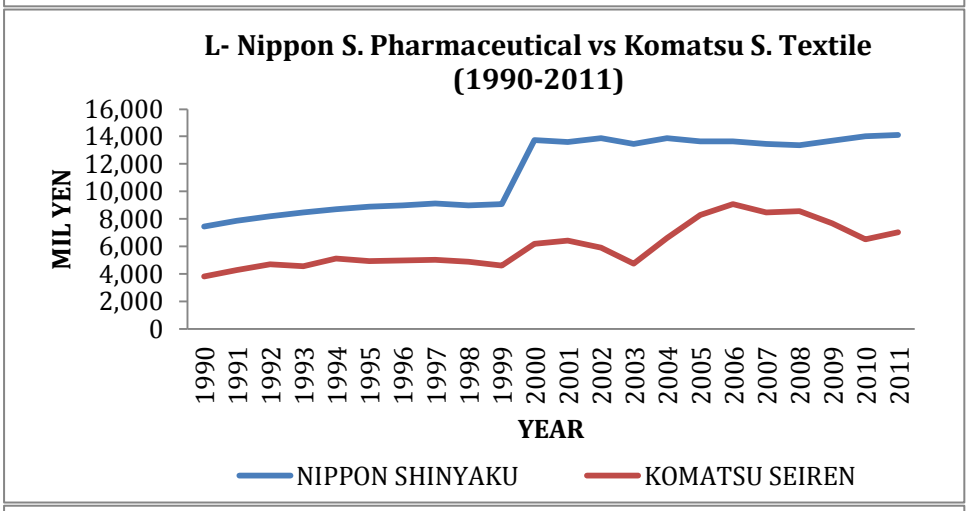
Factor	High-tech Nichi-Iko pharmaceutical	Low-tech Dynic textile:
K	Capital is lower than low-tech Dynic textile from 1990-2009. A steady increase of capital is observed in 2004 and hereafter.	Capital is higher than high-tech Nichi-Iko pharmaceutical from 1990-2008 but a steady decrease is observed from 2003-2011.
L	Low-rate of increase is observed throughout the period and it's generally lower than Dynic textile.	Low rate of increase is observed but it's generally higher than high-tech Nichi-Iko pharmaceutical.
V	A steady increase in output (V) is observed in 2005 and hereafter. 1999-2004 fluctuating output growth and lower.	Output (V) is lower and stagnant throughout the period, 1990-2011.
CFI Index	A sharp increase of capital and labour expenses is observed in 2005 and hereafter.	There was a sharp decline in 2005 and hereafter.
K/L, V/L	There was a sharp increase of V/L in 1996 followed by a sharp decline in 1999 while K/L experienced a decline in 2004 followed by proportionate increase in 2009.	A steady decrease of labour productivity V/L is observed throughout the period while capital-labour ratio K/L is almost stagnant.
TFP	Very fluctuating TFP trend throughout the period due to decline of labour productivity.	It's almost stagnant and lower than high-tech Nichi-Iko pharmaceutical.
TFPG	TFPG trend is almost stagnant for the whole period with small growth. 1999,2001, 2003: TFPG decline sharply to negative.	Stagnation with very small growth throughout the period, 1990-2011.

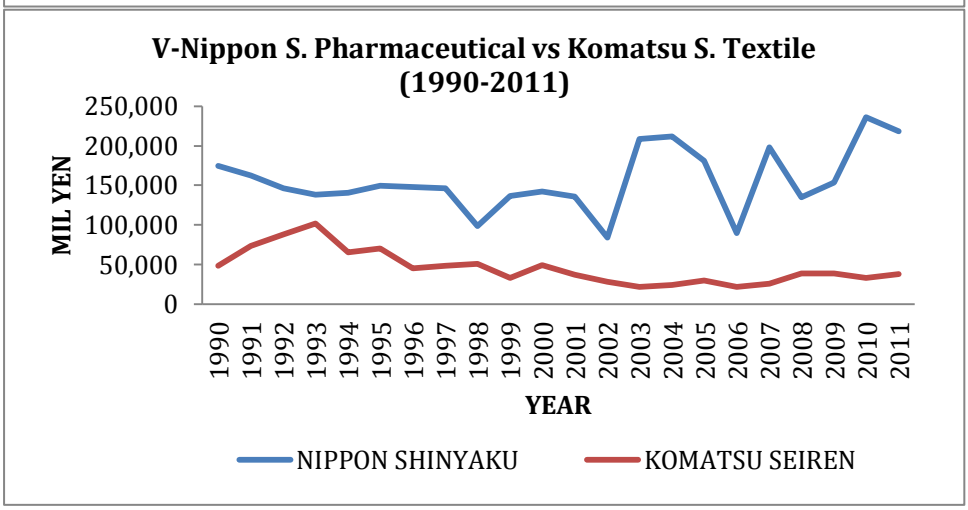
Trend analysis and further description	
High-tech Nichi-Iko pharmaceutical	**Low-tech Dynic textile**
Capital growth and less labour cost were very important in enhancing output growth throughout the period for Nichi-Iko pharmaceutical. Therefore increase of capital and labour expenses (CFI) from 2005 and hereafter was worthwhile as output was sharply increase from 2005-2011. TFP was very dynamic throughout lost decades but is much higher than low-tech Dynic textile and therefore it had small contribution to output growth.	Increase of capital and labour expenses from 1990-2004 was not worthwhile because output (V) was stagnant throughout the period of bubble burst and lost decades. But instead decrease of capital and labour hereafter was worthwhile because output growth was still maintained. TFP seemed to have small contribution in output growth also.

Source: Author's description

4.5.2.7 Comparisons between Nippon Shinyaku Pharmaceutical and Komatsu Seiren Textile 1990-2011.

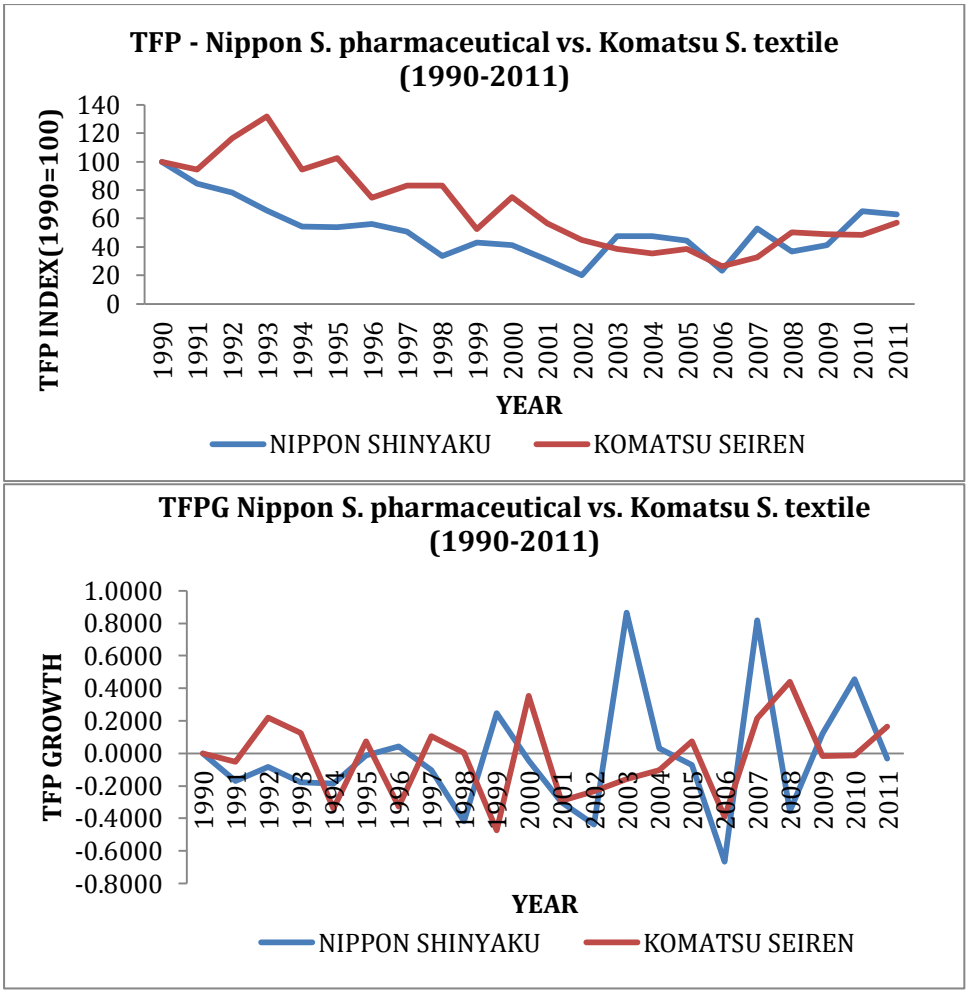






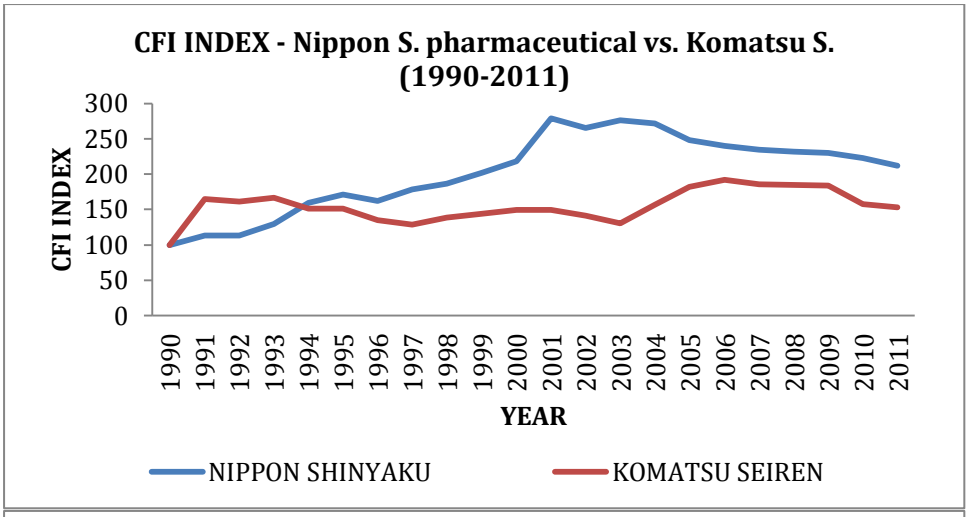
Source: Author's analysis (EOL digital database)

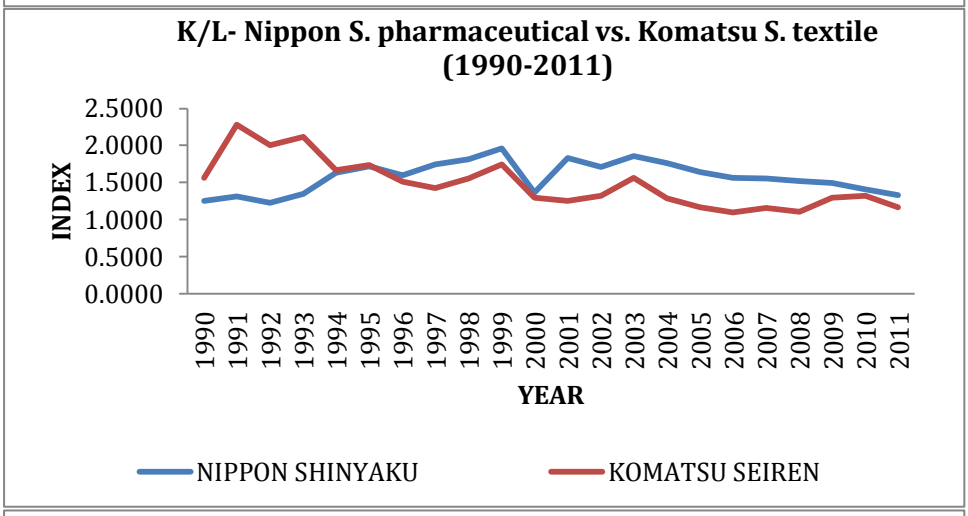
FIGURE 4.61. K, L, V COMPARISONS (4516 VS. 3580), 1990-2011.

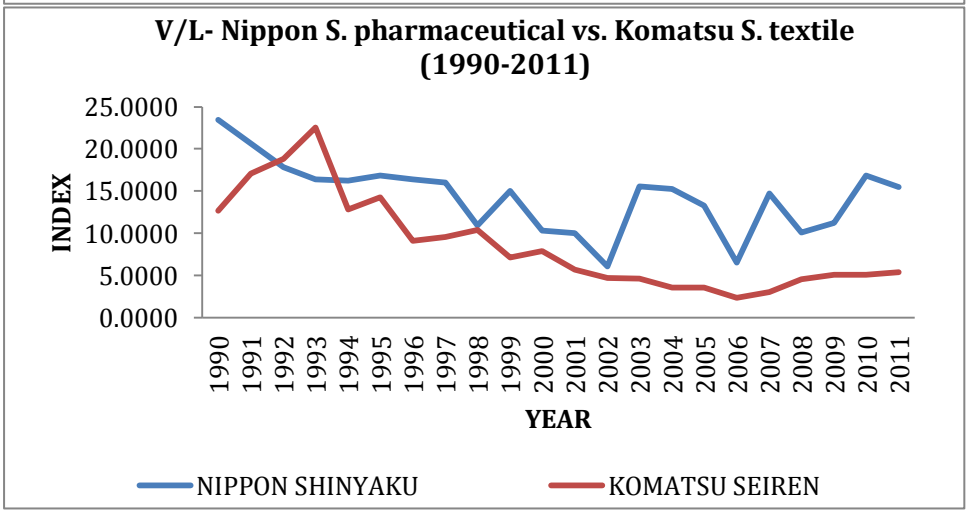


Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist (TFPG)

FIGURE 4.62. TFP AND TFPG COMPARISONS (4516 VS. 3580), 1990-2011.







Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.63. CFI, K/L, V/L COMPARISONS (4516 VS. 3580), 1990-2011.

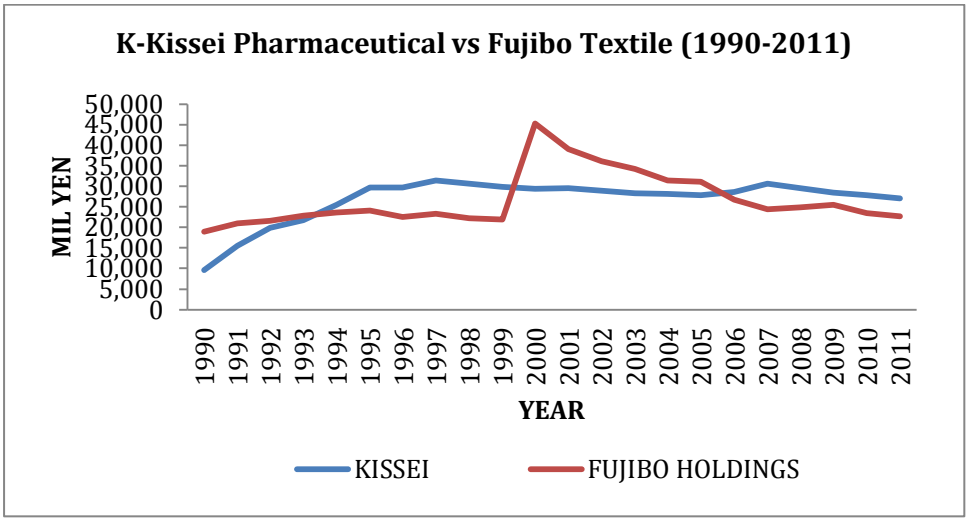
TABLE 4.28. DESCRIPTION AND ANALYSIS OF COMPARISONS OF NIPPON SHINYAKU PHARMACEUTICAL AND KOMATSU SEIREN TEXTILE FIRMS, 1990-2011.

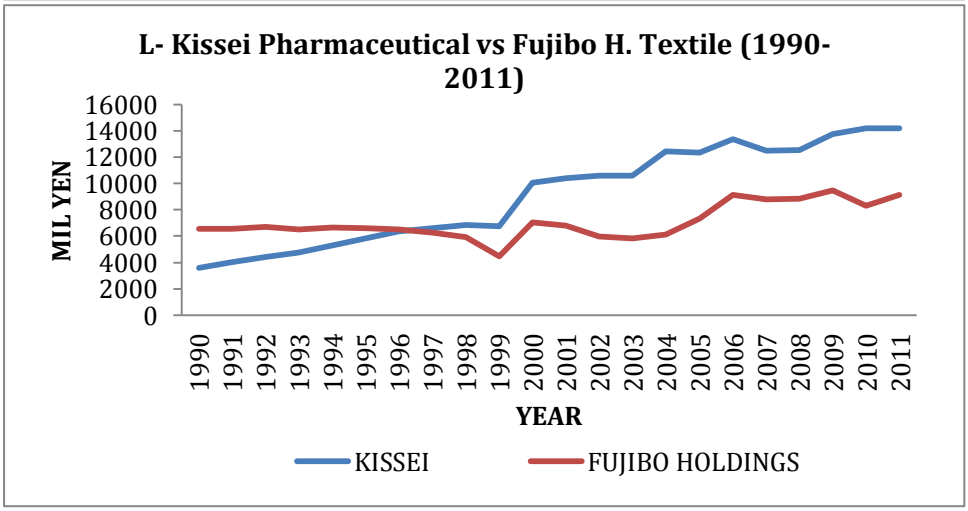
Factor	High-tech Nippon S. pharmaceutical	Low-tech Komatsu Seiren textile
K	Capital is much higher than low-tech Komatsu S. textile throughout the period, 1990-2011 though a steady decline is observed in 2000 and hereafter.	A steady decrease in capital is observed in 2010 and hereafter. Capital is generally lower than high-tech Nippon pharmaceutical.
L	There was a sharp increase in 2000 and hereafter.	There was a sharp increase in 2010 but it's generally lower than high-tech Nippon S. pharmaceutical.
V	A decrease in output (V) is observed in 2010 and hereafter but output is generally higher than low-tech Komatsu Seiren textile.	Output (V) is lower than high-tech Nippon S. Pharmaceutical with a steady decrease.
CFI Index	There was a sharp increase from 1990 to 2002 followed by sharp decline here after.	A sharp decrease is observed in 1993 and hereafter but it's generally lower than Nippon S. Pharmaceutical.
K/L, V/L	V/L is fluctuating but there was a sharp decrease in 1990 and hereafter while K/L experienced sharp decrease in 2000 and hereafter.	A sharp decline of labour productivity and capital-labour ratio is observed in 1993 and hereafter.
TFP	In 1990-2002 a steady decline of TFP is observed followed by low rate of increase in 2002 and hereafter.	A fluctuating decline of TFP is observed in 1993 followed by an increase in 2007 and hereafter. A decline of TFP is due to decline of labour productivity and capital intensity.
TFPG	Fluctuating TFPG trend with decline in 2010 and hereafter.	Fluctuating TFPG trend with increase in 2010 and hereafter.

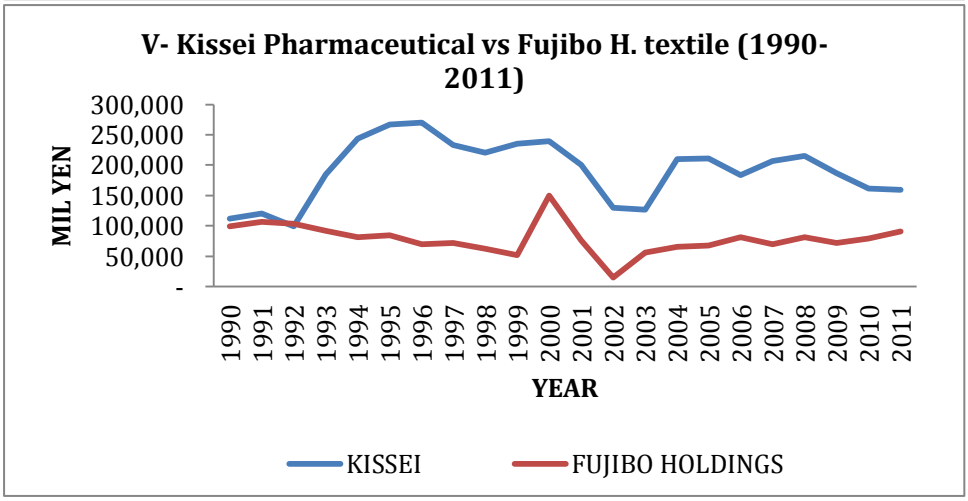
Trend analysis and further description	
High-tech Nippon Shinyaku pharmaceutical	**Low-tech Komatsu Seiren textile**
Sharp increase of labour and capital expenses from 1990-2011 was worth invested because output was growing and was much higher than low-tech throughout the period. TFP seemed to have contribution in output growth for both decades but second decade was much higher as TFP was increasing.	Decrease of capital and labour expenses was not worthwhile as output experienced steady decrease. TFP seemed to have contribution during and after bubble burst than recovery time 2000s.

Source: Author's description

4.5.2.8 Comparisons between Kissei Pharmaceutical and Fujibo Holdings Textile firms 1990-2011.

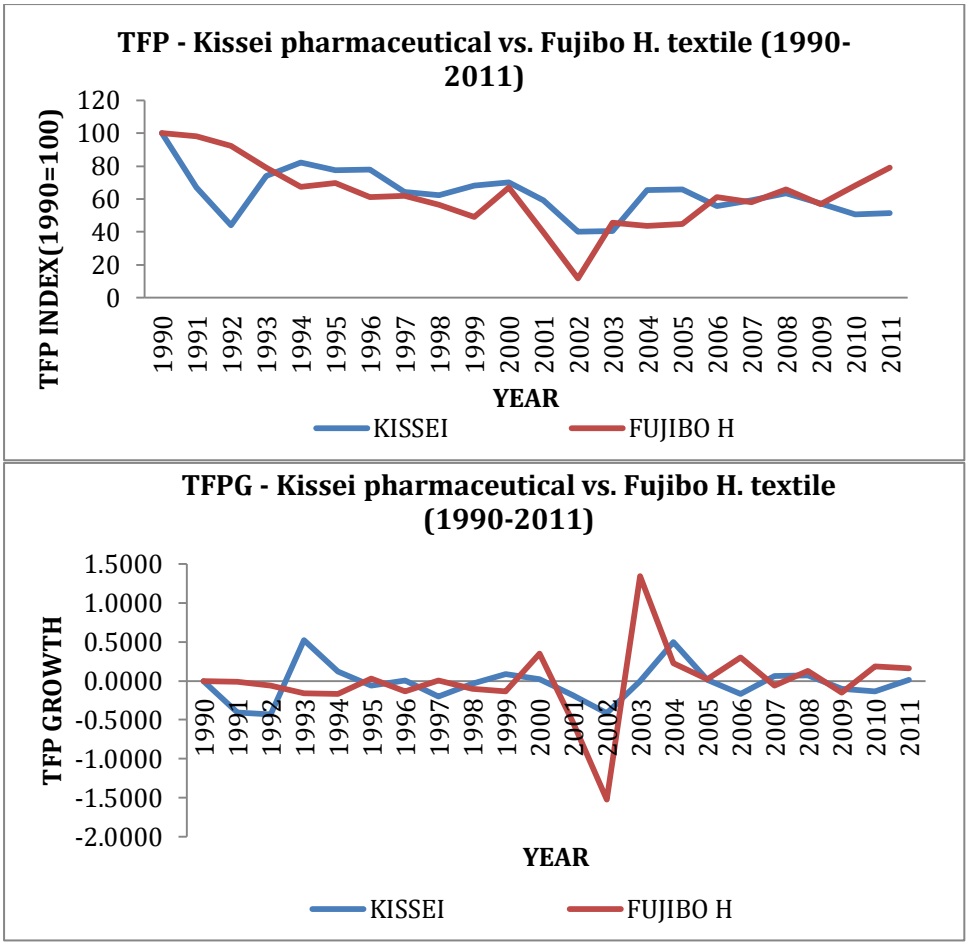






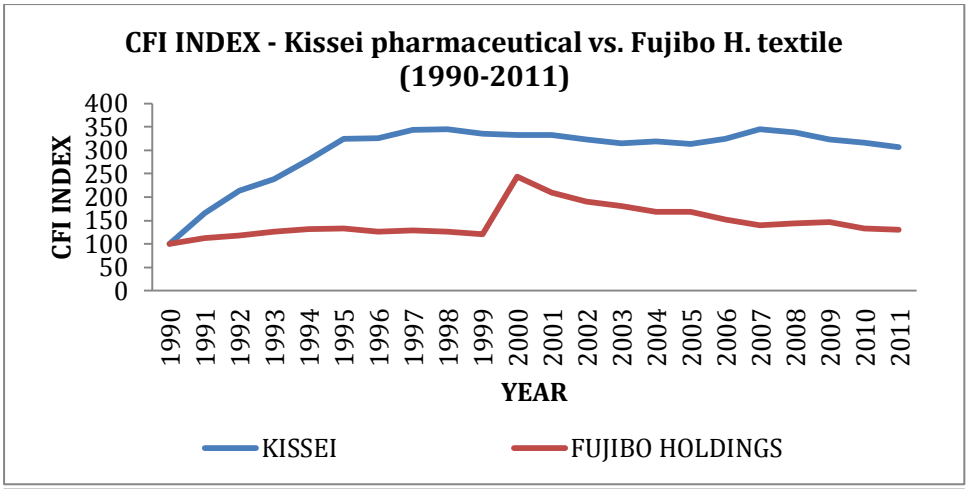
Source: Author's analysis (EOL digital database)

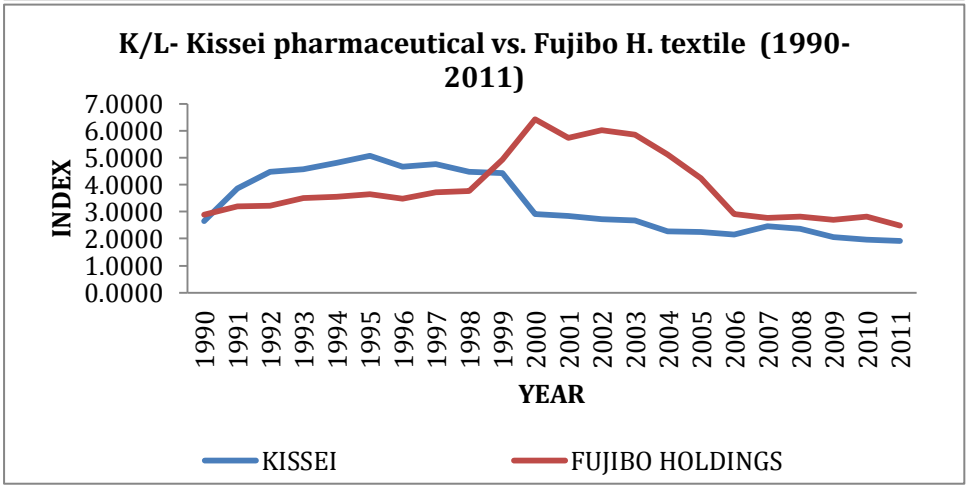
FIGURE 4.64. K, L, V COMPARISONS (4547 VS. 3104), 1990-2011.

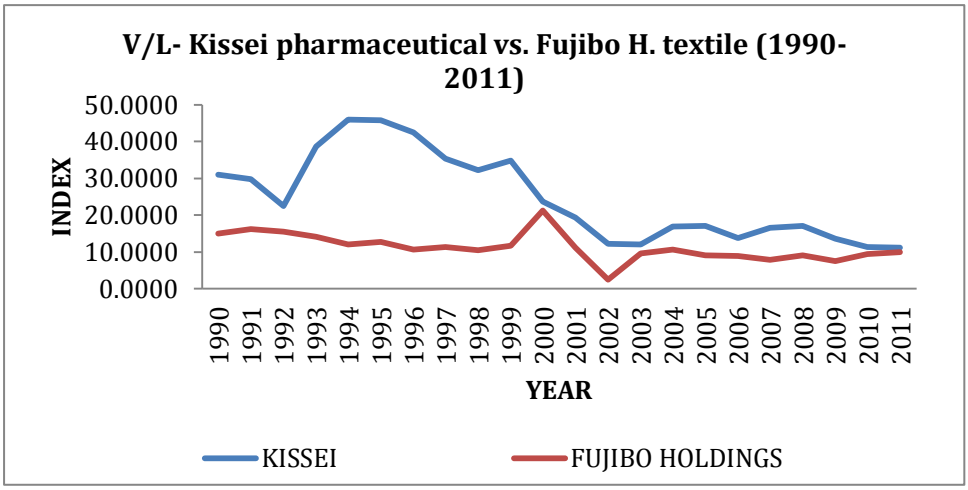


Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.65. TFP AND TFPG COMPARISONS (4547 VS. 3104), 1990-2011.







Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.66. CFI, K/L, V/L COMPARISONS (4547 VS. 3104), 1990-2011.

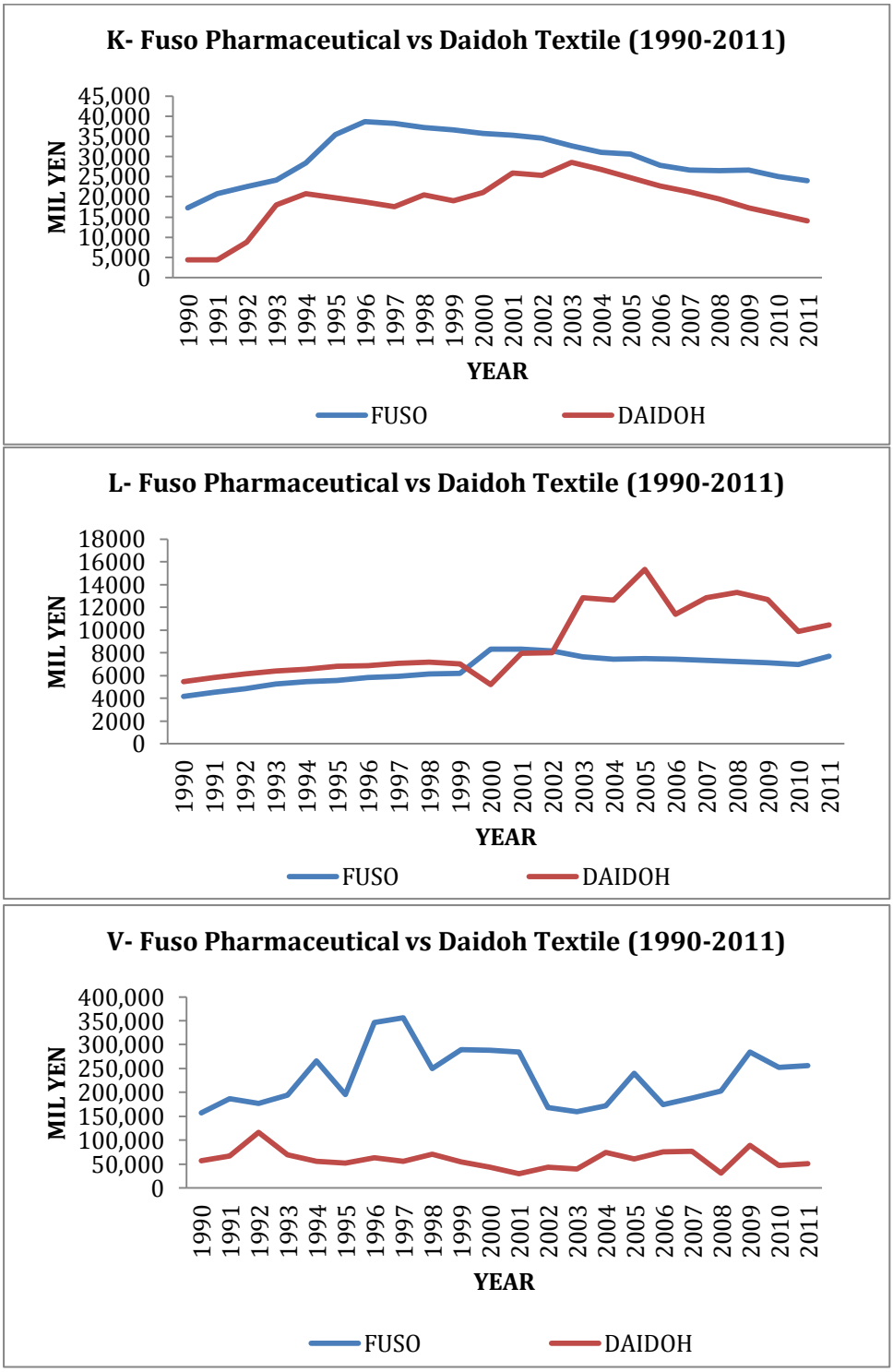
TABLE 4.29. DESCRIPTION AND ANALYSIS OF COMPARISONS OF KISSEI PHARMACEUTICAL AND FUJIBO HOLDINGS TEXTILE, 1990-2011.

Factor	High-tech Kissei pharmaceutical	Low-tech Fujibo Holdings textile
K	Fluctuating capital growth throughout the period of bubble burst and economic recovery.	A sharp increase in capital is observed in 1998 followed by decrease in 2001 and hereafter.
L	A steady increase is observed throughout the period whereby in 1997 labour was higher than low tech Fujibo H. textile.	A steady increase is observed in 2000 and hereafter with fluctuation. In 1990-1996 labour was higher than high-tech Kissei pharmaceutical.
V	Fluctuating output (V) growth with decrease. In 1992-1996 there was a sharp increase of output (V) followed by sharp decline in 1999-2002.	Decline in output is observed in 1991 and a sharp decline in 2001 followed by small increase in 2010 and hereafter.
CFI Index	There was a sharp increase from 1990 to 1995 followed by decline in 1998 and hereafter and is higher than low-tech Fujibo holdings.	There was a sharp increase in 2000 followed by sharp decline in 2001 and hereafter.
K/L, V/L	There was a sharp decrease of V/L in 1995 and hereafter while K/L decreased sharply in 1999 and hereafter.	There was a sharp decrease of V/L in 2000 before maintained in 2003 and hereafter. While a sharp increase of K/L is observed in 1999 followed by decline in 2001 and hereafter.
TFP	A decline of TFP is observed in 2009 and hereafter. TFP was higher than low-tech Fujibo holdings textile in 1994-2005.	A sharp increase of TFP is observed in 2010 and hereafter. Throughout the period TFP was lower than high-tech Kissei pharmaceutical.
TFPG	An increase in TFP is observed in 2010 and hereafter. Throughout the period TFP experienced small growth.	In 2000-2002 TFPG dropped to negative growth followed by an increase in 2009 and hereafter.

Trend analysis and further description	
High-tech Kissei pharmaceutical	**Low-tech Fujibo holdings textile**
Higher level of capital and labour expenses than low-tech Fujibo holdings textile was worth invested because output was higher though decreased steadily as a result of decline of capital. TFP had great influence on output growth from 1994 to 2004 than hereafter and during burst of the bubble economy in 1990-1992.	Decreased of capital in 2001 and hereafter had a great impact on output growth. Therefore, capital and labour expenses was not worthwhile because output growth decreased except in 2010-2011. TFP had a little contribution in output growth in 2010-2011 than before.

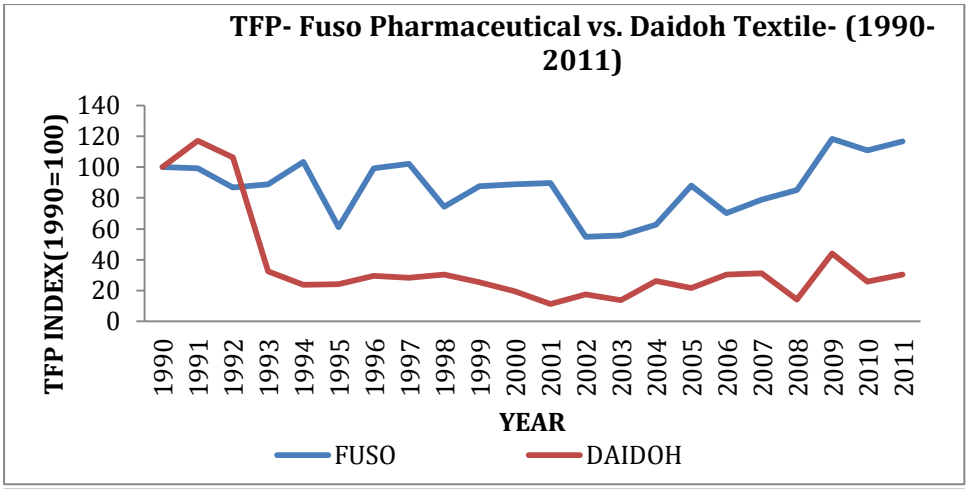
Source: Author's description

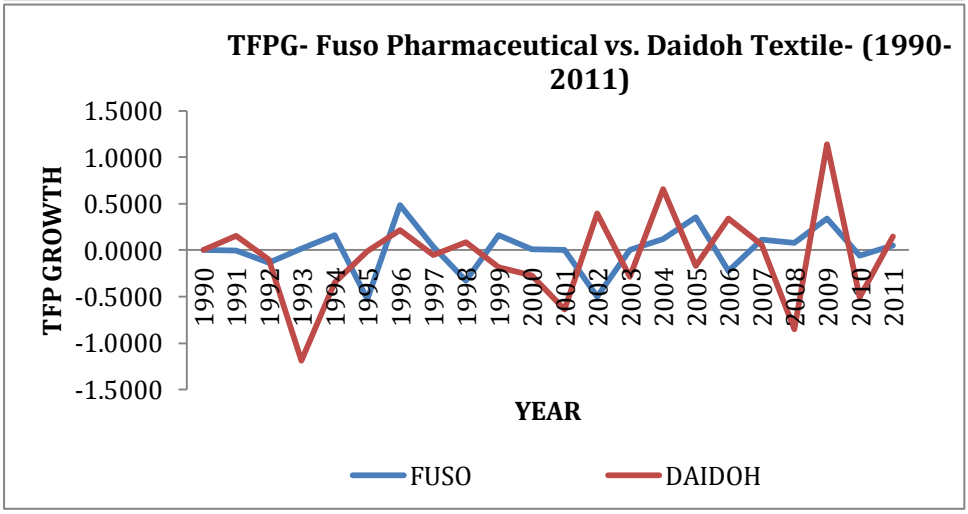
4.5.2.9 Comparisons between Fuso Pharmaceutical and Daidoh Textile firms in 1990-2011.



Source: Author's analysis (EOL digital database)

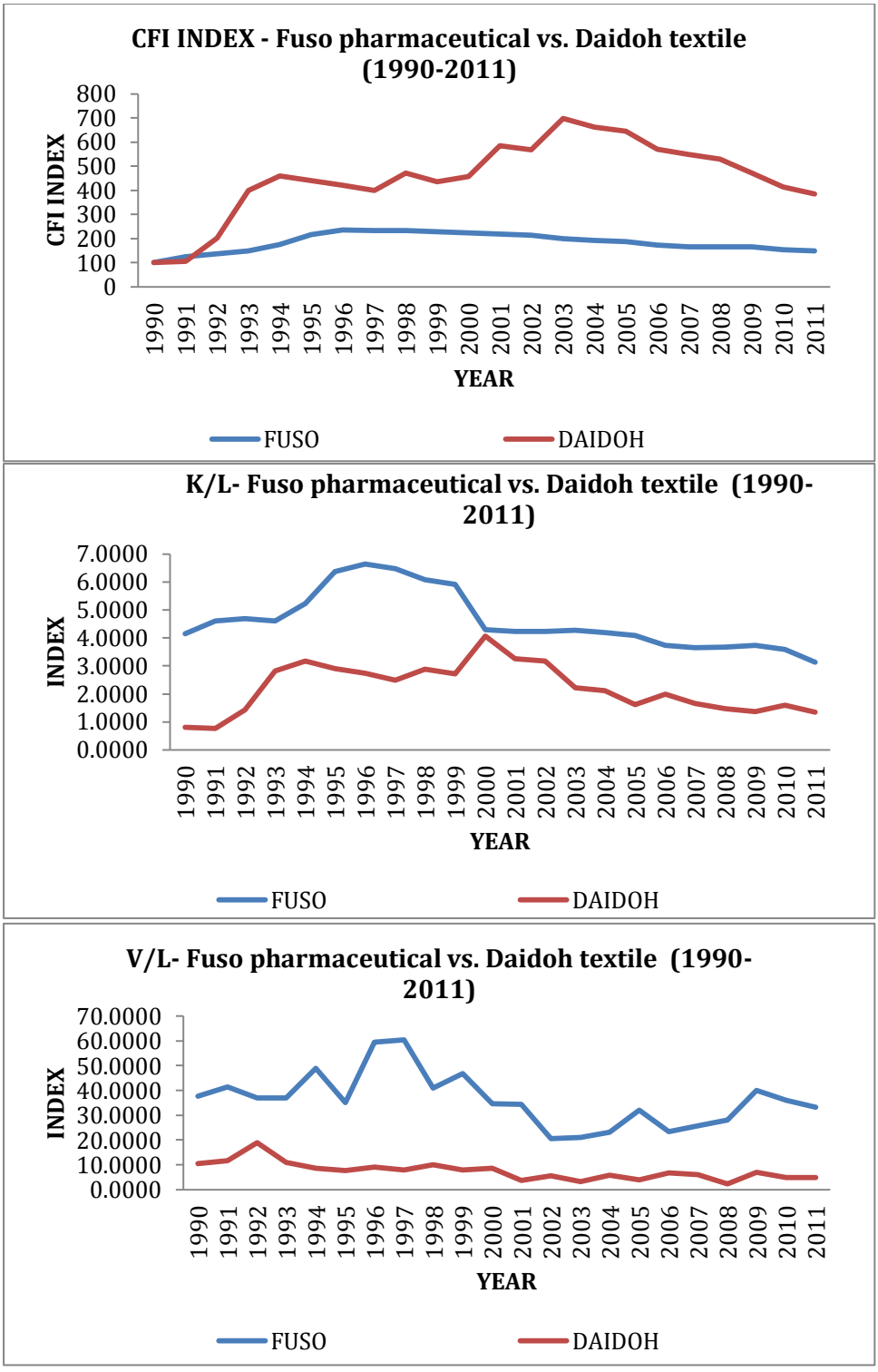
FIGURE 4.67. K, L, V COMPARISONS (4538 VS. 3205), 1990-2011.





Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.68. TFP AND TFPG COMPARISONS (4538 VS. 3205), 1990-2011.



Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.69. CFI, K/L, V/L COMPARISONS (4538 VS. 3205), 1990-2011.

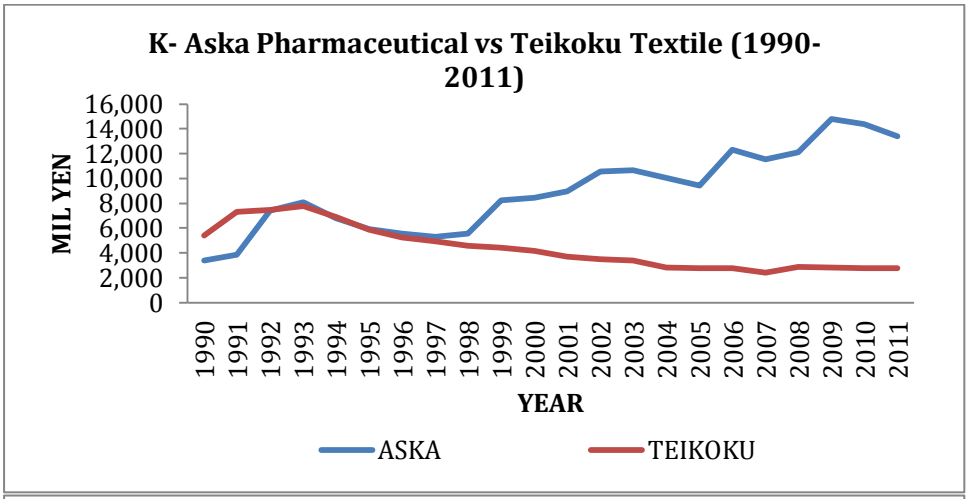
TABLE 4.30. DESCRIPTION AND ANALYSIS OF COMPARISONS OF FUSO PHARMACEUTICAL AND DAIDOH TEXTILE FIRMS, 1990-2011.

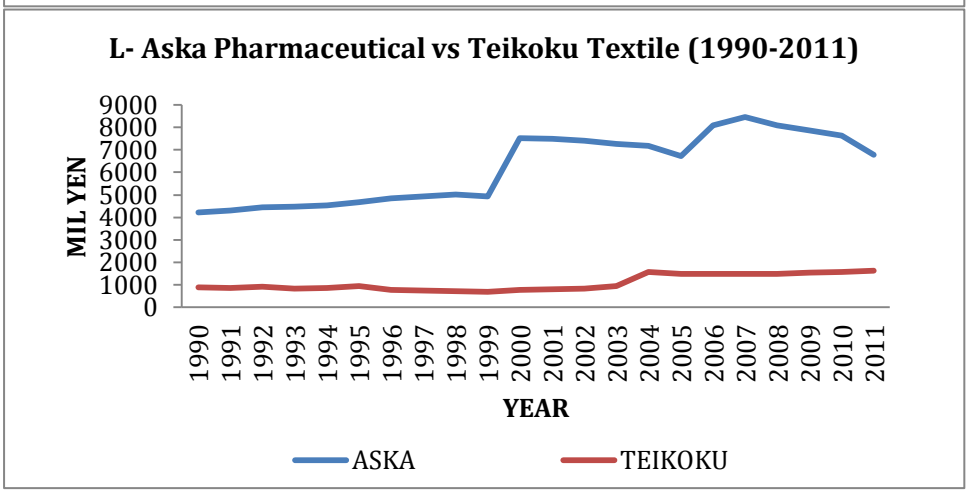
Factor	High-tech Fuso pharmaceutical	Low-tech Daidoh textile
K	A steady decrease in capital is observed in 1996 and hereafter though capital is generally higher than low-tech Daidoh textile	Capital is lower than high-tech Fuso pharmaceutical and a steady is observed in 2004 and hereafter.
L	Labour is almost maintained throughout the period except in 2000 and 2010 and it's generally lower than low-tech Daidoh textile	Small growth is observed throughout the period with fluctuation and it's higher than Fuso pharmaceutical.
V	Output (V) is fluctuating with steady increase and is much higher than low-tech Daidoh textile.	Output (V) is lower than high-tech Fuso pharmaceutical and it's almost stagnant throughout the period but a sharp decline is observed in 2008.
CFI	CFI is decreasing in 1997 and hereafter and much lower than low-tech Daidoh textile	There was a sharp increase in 1990 followed by decrease in 2004 and hereafter.
K/L, V/L	Both V/L and K/L are higher than low-tech but steadily decrease in 1998 and hereafter.	V/L is almost stagnant from 1994-2011 while K/L decreased sharply in 2001 and hereafter.
TFP	A low rate of increase of TFP is observed throughout the period. In 1990-1993 TFP was lower than low-tech Daidoh textile though it's generally higher.	A sharp decline of TFP is observed in 1991-1994 followed by stagnation hereafter.
TFPG	Fluctuating TFPG trend throughout the period with little increase in 2011.	Fluctuating TFPG trend throughout the period with small increase in 2011. 1992-1994,1999-2001, 2007/2008-2010: TFPG dropped sharply to negative.

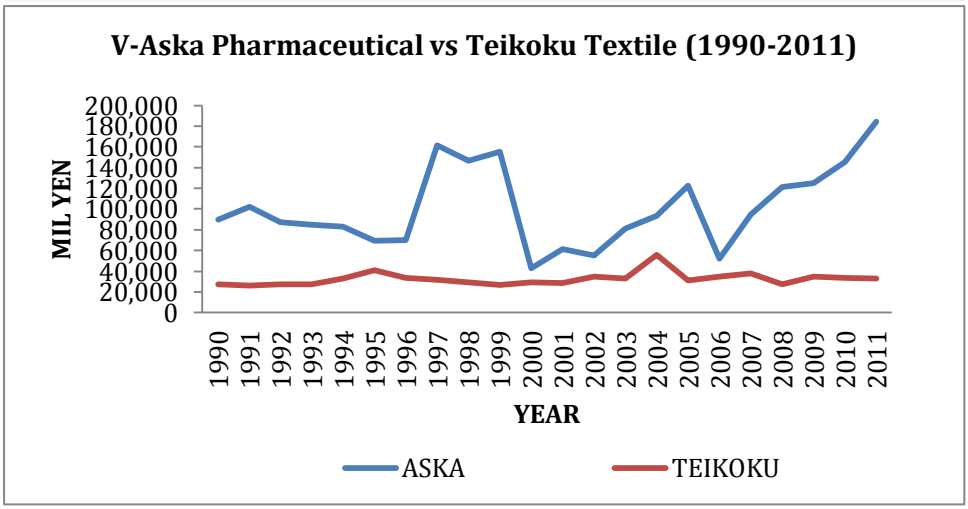
Trend analysis and further description	
High-tech Fuso pharmaceutical	**Low-tech Daidoh textile**
Decrease of capital was worthwhile because output (V) experienced steadily growth throughout the period. Thus decrease in capital and labour expenses from 1997-2011 was also worthwhile compared to low-tech Daidoh textile. TFP seemed to have great contribution in output growth, as it was higher throughout the period with an increase.	Labour cost was higher and experienced steadily increase throughout except 2000/2002 while capital was decreasing. As a result output was stagnant from 1990-2007 followed by decline hereafter. Generally Daidoh textile in more labour intensive and TFP seemed to have no or less contribution on output growth throughout except in 1990/1991.

Source: Author's description

4.5.3.0 Comparisons between Aska Pharmaceutical and Teikoku Textile firms 1990-2011

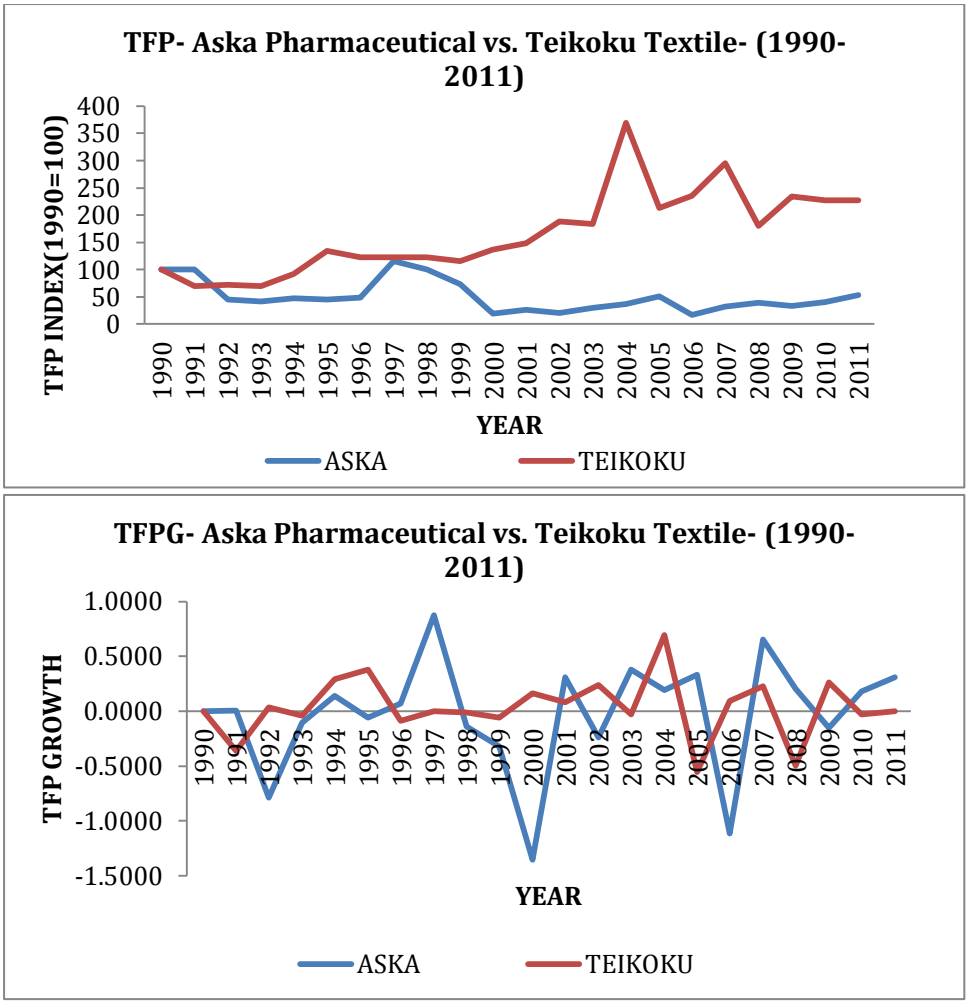






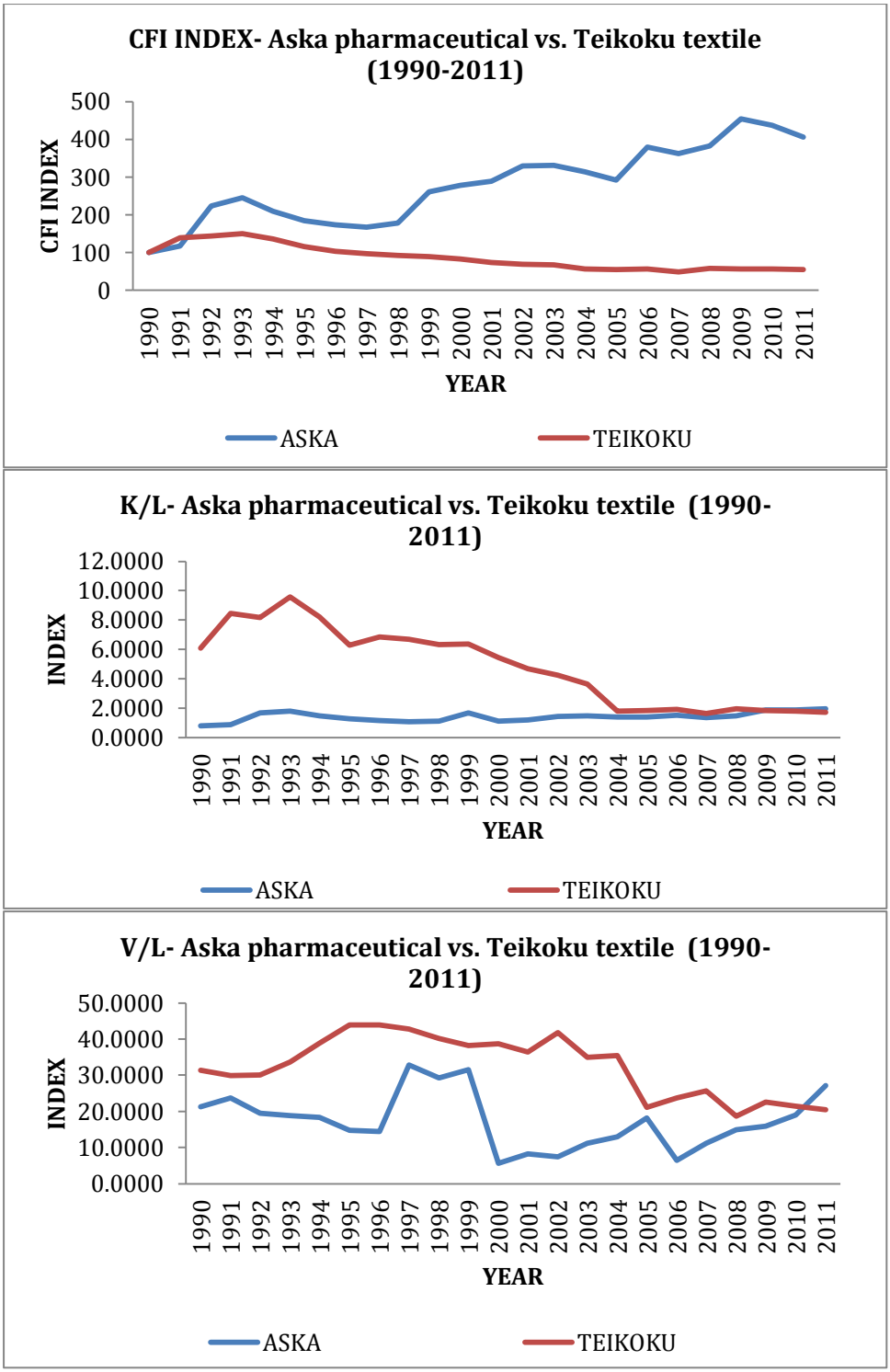
Source: Author's analysis (EOL digital database)

FIGURE 4.70. K, L, V COMPARISONS (4514 VS. 3302), 1990-2011.



Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.71. TFP AND TFPG COMPARISONS (4514 VS. 3302), 1990-2011.



Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.72. CFI, K/L, V/L COMPARISONS (4514 VS. 3302), 1990-2011.

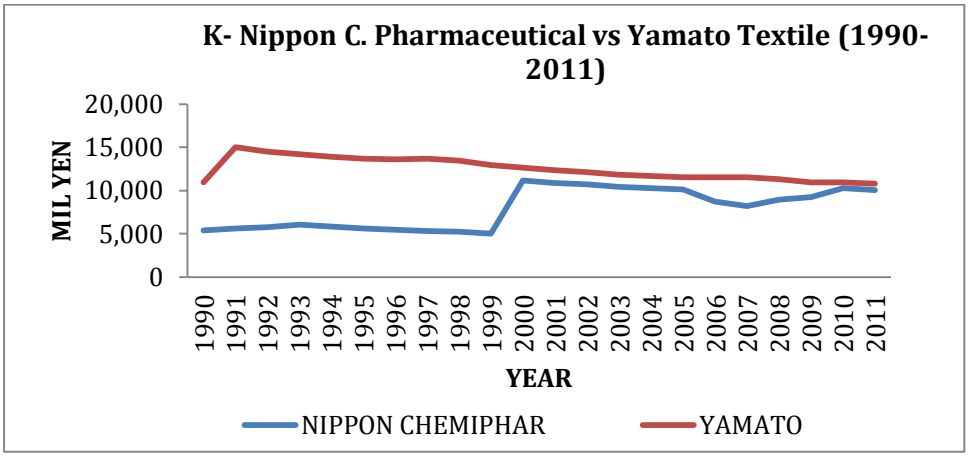
TABLE 4.31. DESCRIPTION AND ANALYSIS OF COMPARISONS OF ASKA PHARMACEUTICAL AND TEIKOKU TEXTILE FIRMS 1990-2011.

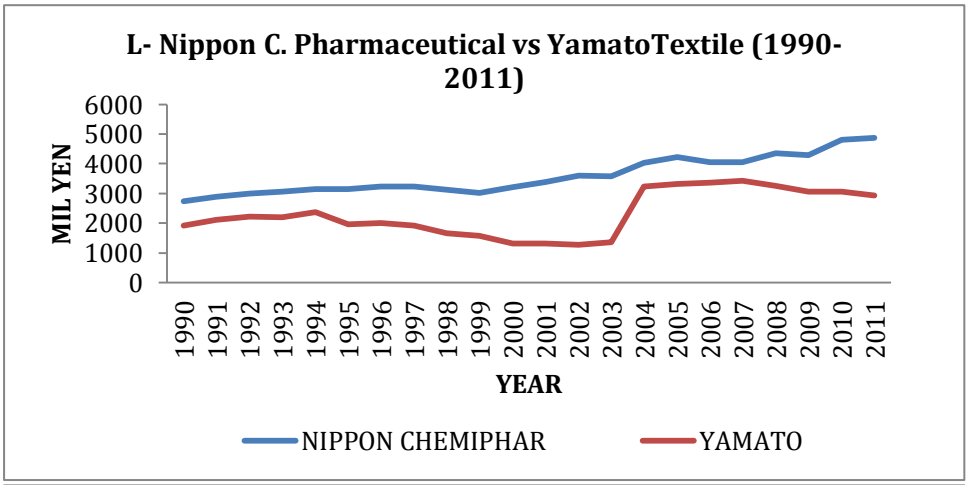
Factor	High-tech Aska pharmaceutical:	Low-tech Teikoku textile:
K	In 1993 there was capital decline followed by sharp increase in 1998 and hereafter except in 2011.	A steady decrease is observed in 1993 and hereafter and it's generally lower than high-tech Aska pharmaceutical.
L	A steady decrease is observed in 2007 and hereafter but it's generally higher than low-tech Teikoku textile.	It's almost stagnant with less increase in 2004.
V	Fluctuating output growth from 1996-2006 followed by a steady increase hereafter.	Output (V) is stagnant throughout the period, 1990-2011.
CFI Index	Fluctuating trend with an increase and it's generally higher than low-tech Teikoku textile.	A steady decrease in 1994 and hereafter is observed.
K/L, V/L	K/L is maintained throughout the period while fluctuating V/L trend is observed with an increase in 2010 and hereafter.	A sharp decrease of K/L is observed in 1993 and hereafter while V/L decline in 1994 and hereafter.
TFP	A steady increase is observed in 2009 and hereafter. In 1991 TFP was higher than low-tech Teikoku textile before decline in 1992.	TFP is generally higher than high-tech Aska pharmaceutical.
TFPG	In 1992,1999-2000, 2006 there was higher and sharp negative growth of TFPG. Generally, fluctuating TFPG trend is observed.	Fluctuating TFPG trend.

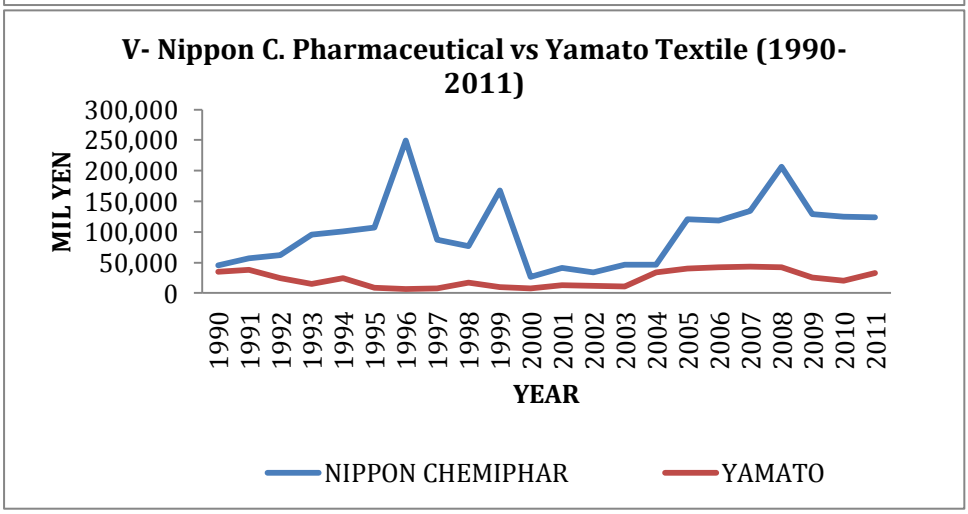
Trend analysis and further description	
High-tech Aska pharmaceutical	**Low-tech Teikoku textile**
Increase of capital and labour expenses were worth invested as a steady growth of output is observed from 2007 and hereafter. TFP is lower due to labour productivity and capital stagnation throughout the period.	Business segments: Disaster prevention (73%), Textiles (25%), Real estate leasing (1%), others (1%). Technological change had a great role in Teikoku textile because of the nature of business segment (disaster prevention), which require technology more. Thus, TFP was higher than high-tech though it is no more growing.

Source: Author's description

4.5.3.1 Comparisons between Nippon Chemiphar Pharmaceutical and Yamato Textile firms 1990-2011.

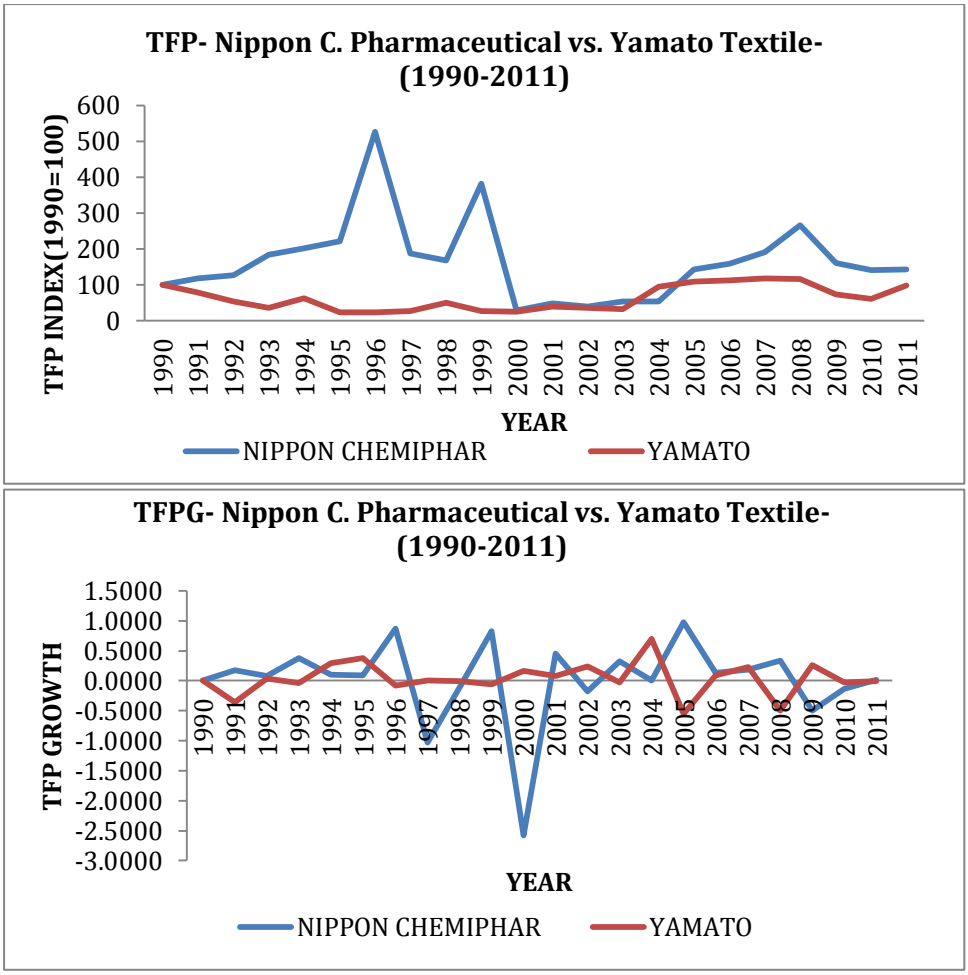






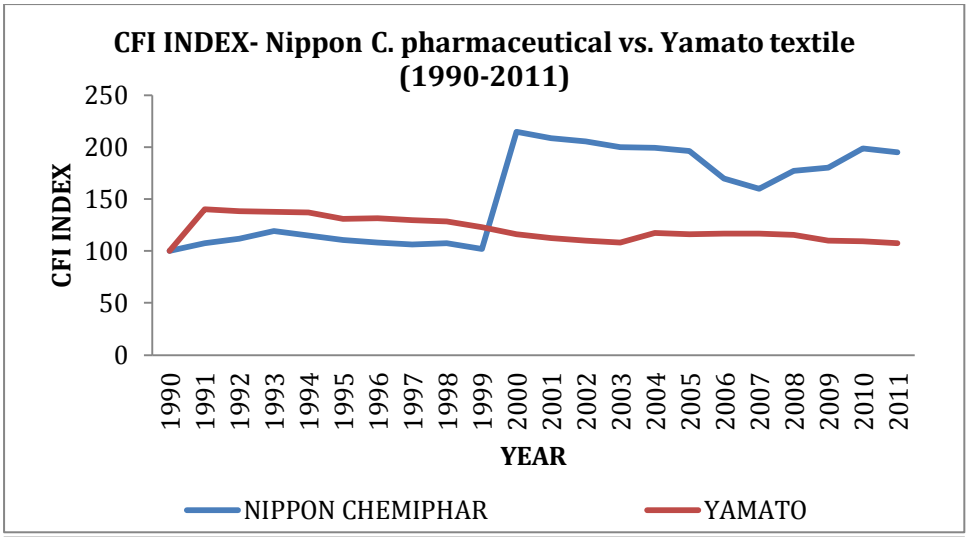
Source: Author's analysis (EOL digital database)

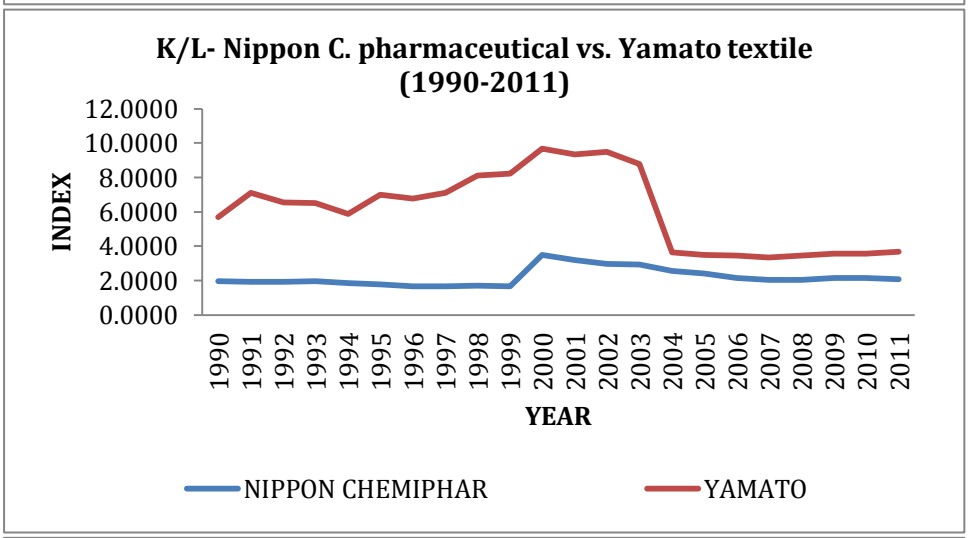
FIGURE 4.73. K, L, V COMPARISONS (4539 VS. 8127), 1990-2011.

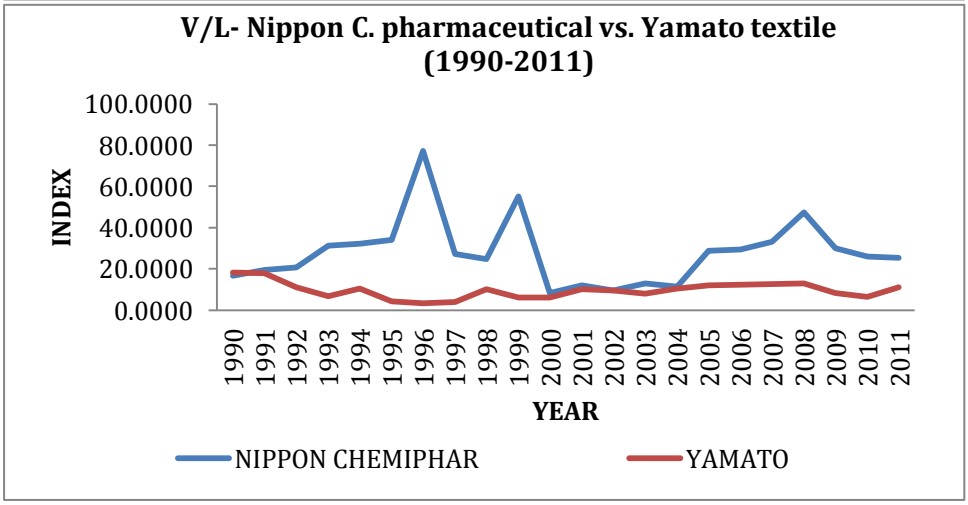


Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.74. TFP AND TFPG COMPARISONS (4539 VS. 8127), 1990-2011.







Source: Author's analysis based on Cobb-Douglas Method

FIGURE 4.75. CFI, K/L, V/L COMPARISONS (4549 VS. 3529), 1990-2011.

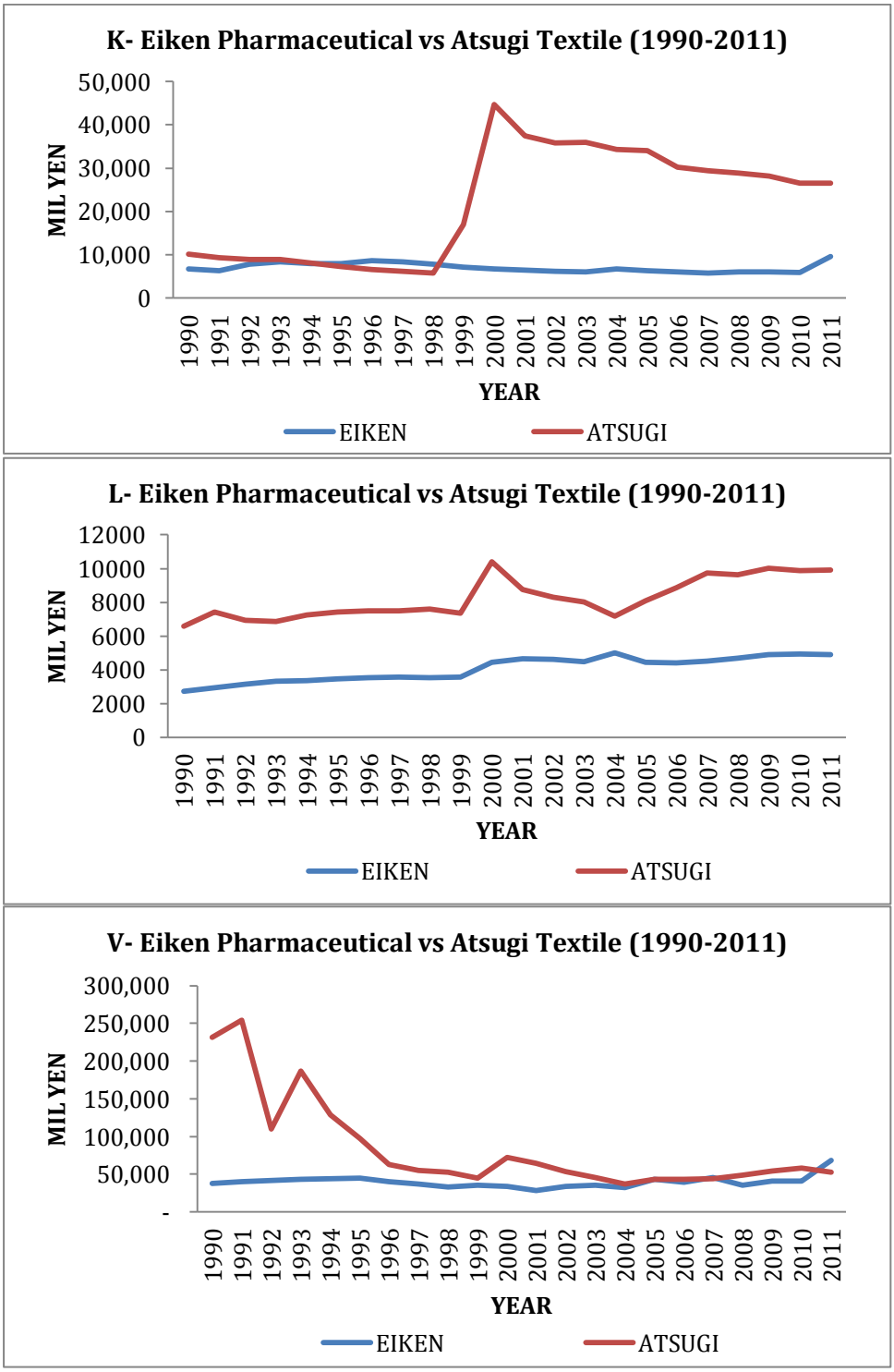
TABLE 4.32. DESCRIPTION AND ANALYSIS OF COMPARISONS OF NIPPON CHEMIPHAR PHARMACEUTICAL AND YAMATO TEXTILE FIRMS 1990-2011.

Factor	High-tech Nippon C. Pharmaceutical	Low-tech Yamato textile
K	Low-rate steady increase of capital is observed throughout the period. In 1999 there was sharp increase followed by sharp decrease in 2005 except in 2008 and hereafter.	A steady decrease of capital is observed from 1992-2011 but it's generally higher than high-tech Nippon pharmaceutical.
L	A steady increase is observed throughout the period.	A sharp increase of labour is observed in 2004 before maintained hereafter.
V	Fluctuating output with small increase throughout the period but it's generally higher.	Small increase of output is observed in 2004 and hereafter.
CFI Index	There was a sharp increase in 2000 followed by decline in 2001 and hereafter.	There was a sharp decline in 1992 and hereafter.
K/L, V/L	V/L is very dynamic and it decreases steadily but it's higher than Yamato textile. K/L increased sharply in 2000 followed by decline hereafter.	No growth of V/L throughout the period while K/L decrease sharply in 2004 and hereafter but its higher than high-tech Nippon Pharma.
TFP	Fluctuating TFP trend but higher than low-tech Yamato textile. In 1997 there was a sharp decrease of TFP followed by increase in 2004.	TFP is almost stagnant with small increase throughout the period.
TFPG	Fluctuating TFPG trend throughout the period with small growth. In 1997, 2000: TFPG decline sharply to negative.	TFPG is stagnant throughout the period, 1990-2011.

Trend analysis and further description	
High-tech Aska pharmaceutical	**Low-tech Yamato textile**
Increase of capital and labour expenses was worthwhile because output increase steadily throughout the period. TFP had a great contribution in output growth of Aska Pharma though TFP trend was fluctuating throughout the period of burst of the bubble economy and lost decades.	Decrease of capital and labour expenses (CFI) was not worthwhile for Yamato textile because output is stagnant throughout the period. TFP had small role in output growth throughout compared to high-tech Aska pharmaceutical. Labour cost has been lower than high-tech due to cheap labour market in developing world, as labour intensive industry.

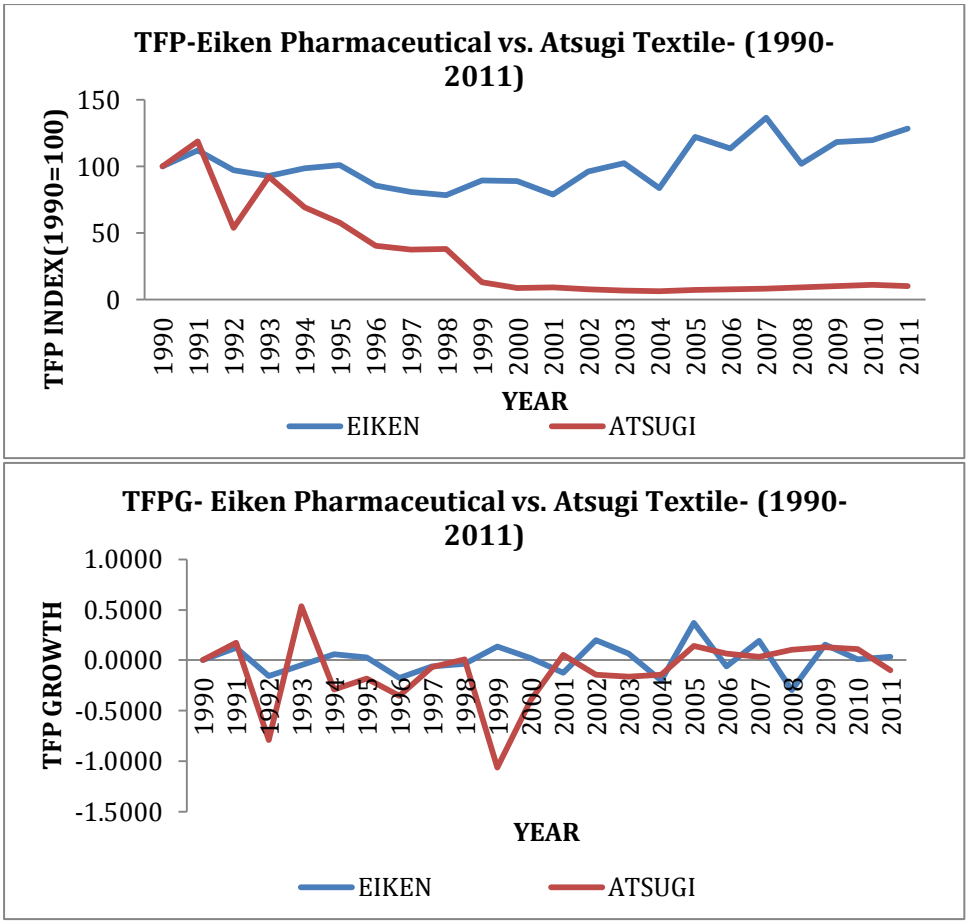
Source: Author's description

4.5.3.2 Comparisons between Eiken Pharmaceutical and Atsugi Textile firms 1990-2011



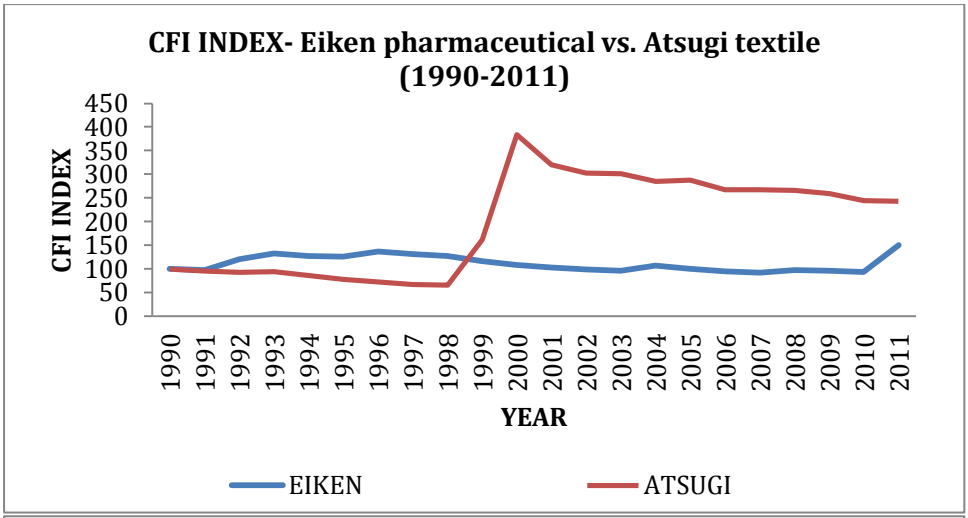
Source: Author's analysis (EOL digital database)

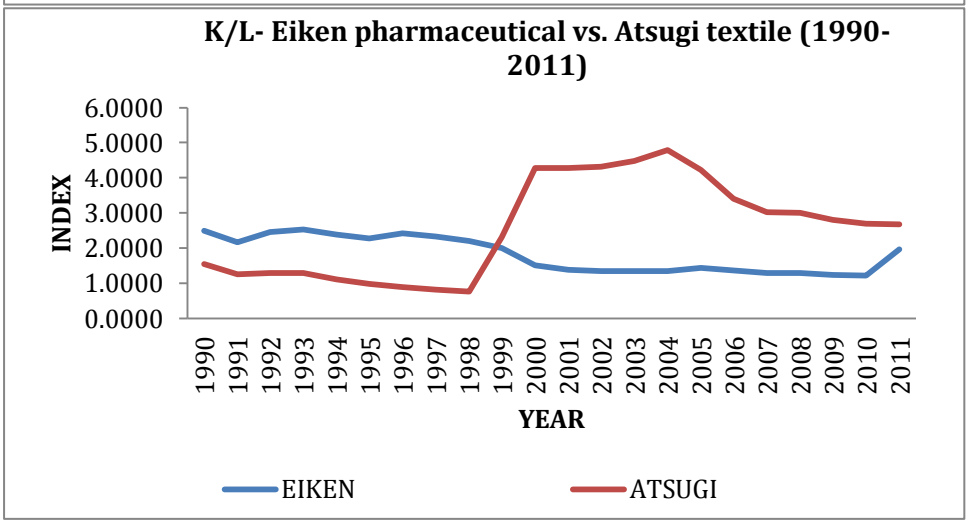
FIGURE 4.76. K, L, V COMPARISONS (4549 VS. 3529), 1990-2011.

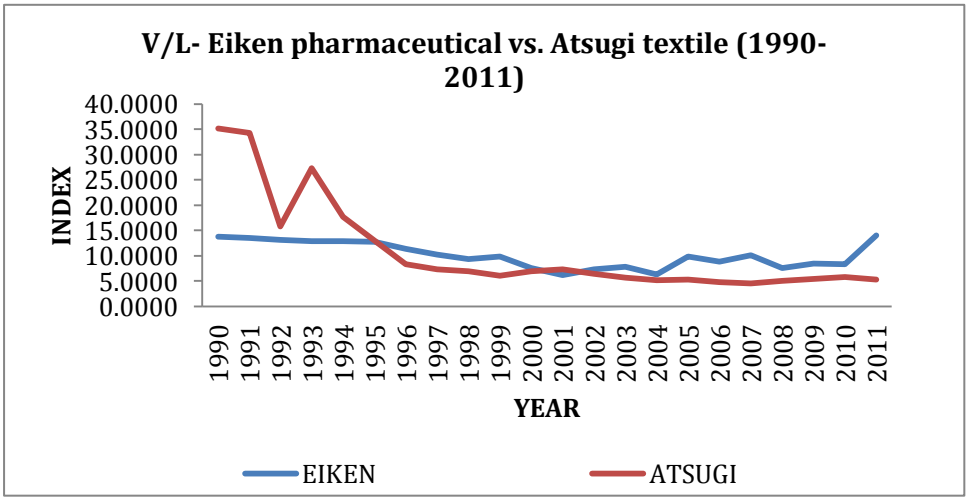


Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.77. TFP AND TFPG COMPARISONS (4549 VS. 3529), 1990-2011.







Source: Author's analysis based on Cobb-Douglas (TFP) and Tornqvist Index (TFPG)

FIGURE 4.78. CFI, K/L, V/L COMPARISONS (4549 VS. 3529), 1990-2011.

TABLE 4.33. DESCRIPTION AND ANALYSIS OF COMPARISONS OF EIKEN PHARMACEUTICAL AND ATSUGI TEXTILE FIRMS 1990-2011.

Factor	High-tech Eiken pharmaceutical	Low-tech Atsugi textile
K	Capital is almost stagnant throughout the period, 1990-2011 with small increase in 2011.	A sharp increase of capital is observed in 1998 and it's generally higher than high-tech Eiken pharmaceutical.
L	Small growth is observed throughout the period and it's generally lower than low-tech Atsugi textile.	Small steady increase of labour is observed throughout the period and the cost is generally higher than high-tech Eiken pharmaceutical. In 2007 there was a sharp growth of labour.
V	Output (V) growth is stagnant throughout the period except 2011 where there was small increase.	A steady decrease of output (V) is observed throughout the period but is little higher than Eiken Pharmaceutical.
CFI Index	A sharp increase is observed in 2011 but it's generally lower than low-tech Atsugi textile.	There was a sharp increase in 1999 followed by decline in 2001 and hereafter.
K/L, V/L	V/L is decreasing throughout except in 2011 where a sharp increase is observed; the same trend is observed with K/L.	There was a sharp decrease of V/L in 1994 and hereafter while K/L increased sharply in 1999 followed by decline in 2004 and hereafter and it's higher than high-tech Eiken Pharmaceutical.
TFP	A steady increase of TFP is observed throughout the period and it's generally higher than low-tech Atsugi textile.	A steady decrease of TFP is observed throughout the period followed by stagnation.
TFPG	Fluctuating TFPG trend with small growth.	Fluctuating TFPG trend with decrease. In 1992, 1999 TFPG decline sharply to negative.

Trend analysis and further description	
High-tech Eiken pharmaceutical	**Low-tech Atsugi textile.**
Decrease of capital and labour expenses was not worth for Eiken Pharmaceutical because output is almost stagnant throughout the period except in 2011. TFP had a great role in output maintenance than capital and labour as a steady increase is observed throughout the period of lost decades and economic recovery, 1990-2011.	Decrease of capital and labour expenses throughout the period was not worth because output steadily decreases throughout the period. TFP had very little role in output growth as it experienced a steady decrease and finally stagnation.

Source: Author's description

General description on trends analysis:

1). TFP and TFPG trends are fluctuating during and after the burst of the bubble economy on both high-tech Japanese pharmaceutical and low-tech textile firms.

2). TFP and TFPG are much higher in Japanese pharmaceutical firms due to higher capital intensity, labour productivity and being R&D intensive industry than low-tech Japanese textile firms.

3). Low-tech Japanese textile firms were much more labour intensive during first decade (1990s) than second decade (2000s).

4). TFP is a technology induced factor but can also be affected by capital intensity and knowledge (R&D and patent) apart from labour productivity.

5). Some low-tech textile firms which experienced higher TFP in 2011 than high-tech pharmaceuticals include; Teijin, Kurabo, Suminoe, Goldwin, Fujibo and Teikoku textile firms. This might be because of business diversification, which require the use of technology more.

Source: Author's overall description

CHAPTER 5
THE ROLE OF RESEARCH & DEVELOPMENT

5.1 The role of research and development (R&D)

According to many scholars, R&D has a great contribution on productivity of firms and important determinant of TFP. Thus, the role of R&D has been studied between pharmaceutical and textile firms, 1990-2011, during the burst of bubble economy and slight recovery in Japan. Further the role of R&D has been captured through spillover technology and stock of technology due to advancement of information technology and economic globalization, which accelerated growth, and spread of these spillovers (Watanabe & Asgari, 2003).

TABLE 5.1. STATE OF VALUE ADDED AND R&D STRUCTURE OF 22 R&D INTENSIVE JAPANESE PHARMACEUTICAL FIRMS IN 2011. YEN MIL AT 2005-FIXED PRICE.

NO	High-tech Pharmaceutical Firm	Value added (V)	R&D expenditure	R&D intensity	Ti	Ti/Ts (%)
1	Takeda	6299918	303231	4.81	303231.04	37.93
3	Astellas	2272368	208523	9.18	208522.91	23.32
5	Eisai	2152922	152237	7.07	152237.99	16.02
6	Mitsubishi T.	1205919	69053	5.73	69053.46	6.68
7	Chugai	1260314	58632	4.65	58632.04	5.62
8	Dainippon S.	788482	71547	9.07	71546.50	6.94
9	Kyowa Hakko	595950	50309	8.44	50308.97	4.78
11	Shionogi	984765	53452	5.43	53451.77	5.09
12	Ono	509861	45072	8.84	45072.02	4.26
13	Hisamitsu	484314	14495	2.99	14495.31	1.33
14	Rhoto	249427	3881	1.56	3880.74	0.35
15	Santen	413410	13878	3.36	13878.08	1.27
17	Tsumura	348979	4328	1.24	4327.91	0.39
18	Kaken	224174	7194	3.21	7193.59	0.66
19	Mochida	197403	12221	6.19	12220.61	1.12
20	Nichi-Iko	268940	2169	0.81	2168.62	0.20
22	Nippon Sh.	216824	9413	4.34	9412.66	0.86
23	Kissei	157740	12635	8.01	12635.24	1.16
27	Fuso	254342	2002	0.79	2001.78	0.18
28	Aska	182744	4589	2.51	4589.29	0.42
29	Nippon Chem.	122864	1841	1.50	1841.17	0.17

30	Eiken	68091	1978	2.90	1977.63	0.18
	Total 22 firms		**1,050,471**			
	Total Pharmaceutical Ind.		**1,081,963**			

Source: Author's description based on Cobb-Douglas Method and perpetual inventory model**.**

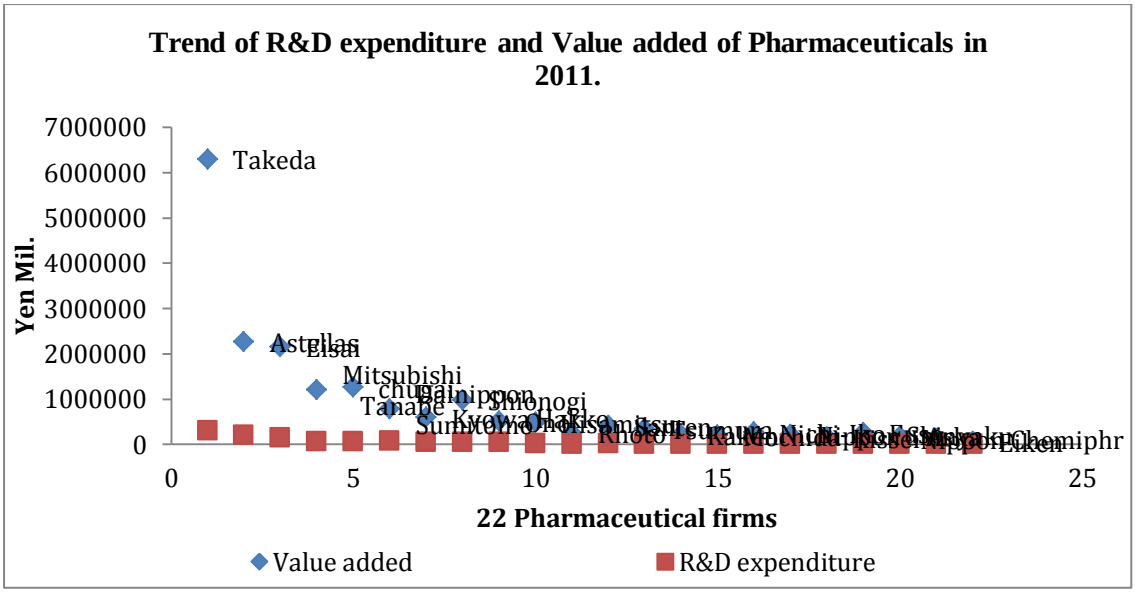
Data analysis and further description

R&D intensity is higher in Astellas and Dainippon Sumitomo pharmaceutical firms due to fusion happened in 2005 to integrate their own technologies for new product development, which is triggered by investment of huge amount of R&D. The first three companies which are Takeda (37.93%), Astellas (23.32%) and Eisai (16.02) carries higher percentage of indigenous technology dependency ratio over other pharmaceutical companies due to its size also. There is also little correlation exists between R&D intensity and output growth than low-tech textile firms. But generally output growth (Value added) depends on R&D expenditure. E.g. The first three companies Takeda, Astellas and Eisai have higher R&D expenditure, which triggered higher value added (output) than the other.

According to figure 5.3 during the burst of the bubble economy (1990s) R&D was lower for both G1 and G2 groups of pharmaceutical firms than after the burst of the bubble economy (2000s) R&D intensity showed an increase.

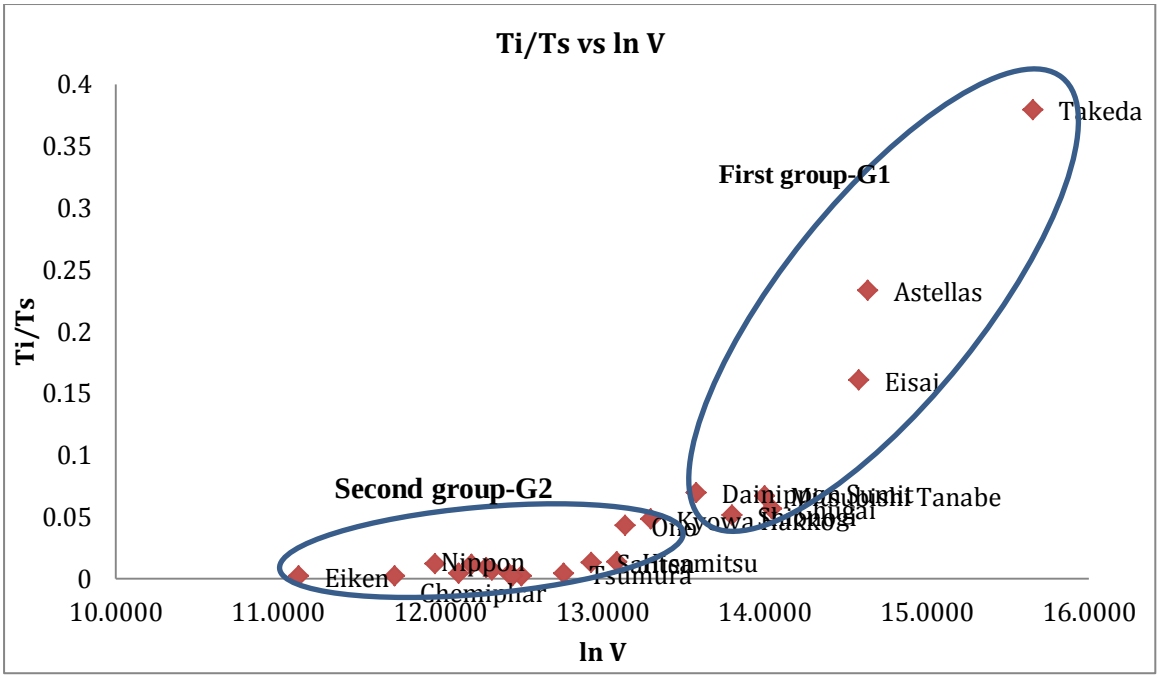
According to table 5.1, 22 pharmaceutical firms cover 97% R&D expenditure for Japan's entire pharmaceutical industry's R&D expenditure. This suggests that technology stock triggered the output (V) of the firms.

Source: Author's description



Source: Author's analysis based on Cobb-Douglas method and perpetual inventory model

FIGURE 5.1. TREND OF R&D EXPENDITURE AND VALUE ADDED (OUTPUT) OF 22 PHARMACEUTICAL FIRMS IN 2011.



Source: Author's analysis based on Cobb-Douglas method and perpetual inventory model

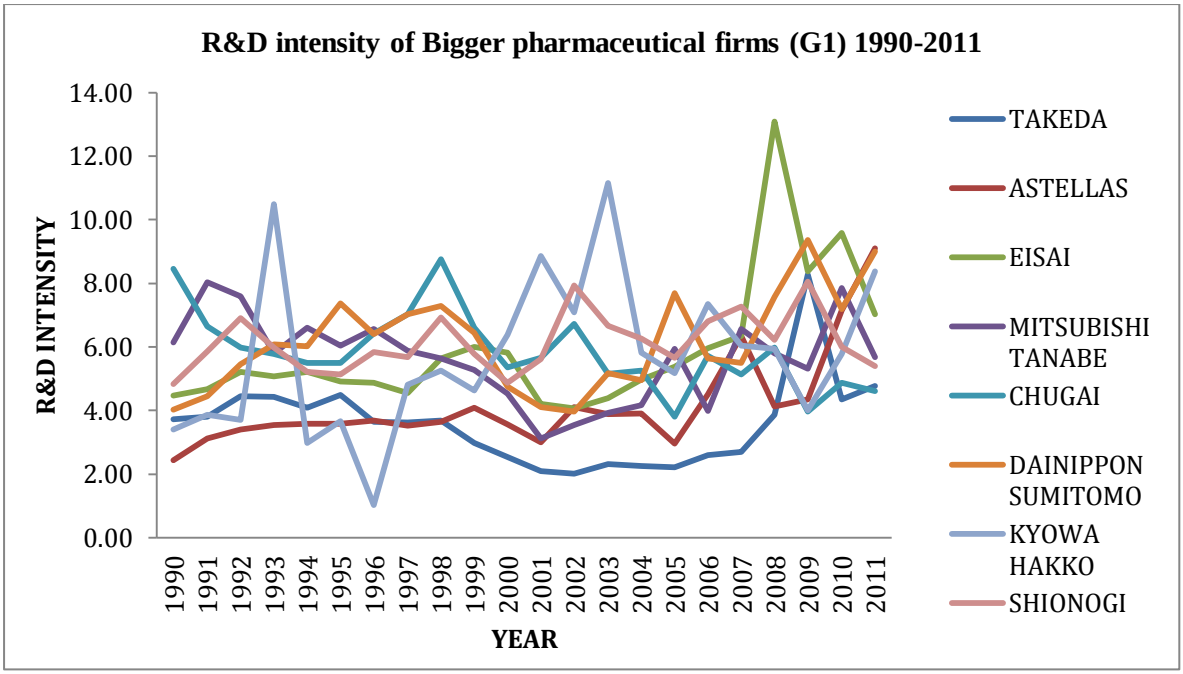
FIGURE 5.2. CORRELATION BETWEEN VALUE ADDED AND INDIGENOUS TECHNOLOGY DEPENDENCY RATIO IN 22 R&D INTENSIVE PHARMACEUTICAL FIRMS IN 2011.

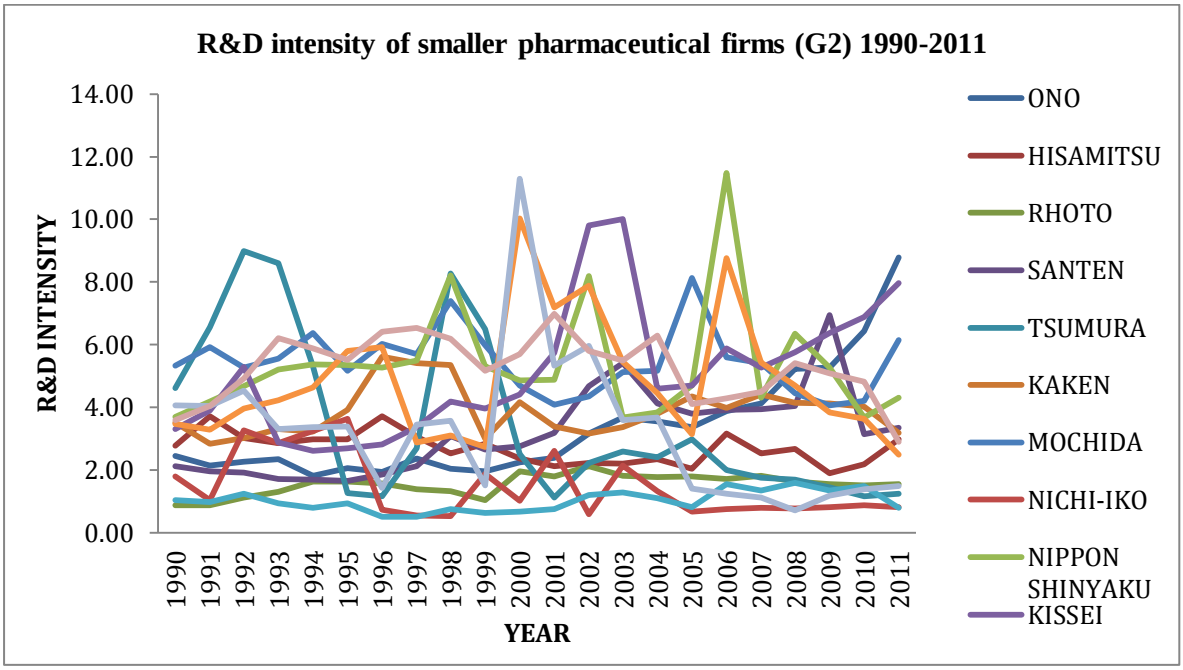
Data Analysis and further description

There is greater correlation exists between value added and indigenous technology dependency ratio (Ti/Ts) **in the first group** firms than **second group** although correlations are positive in both groups. First group consists of larger pharmaceutical firms in this case firms with high **R&D** expenditures and therefore larger value added or output. Thus, level of technology stock is **higher in the first group** than second group and significant contribution of technology stock to value added exists throughout the period of 1990-2011 in the Japanese pharmaceutical firms.

Generally, figure 5.2 explains the structural difference between the two groups **depending on their size by value added** and a higher indigenous technology stock ratio is observed as firm size increases. Therefore, first group (group 1) represents **bigger firms** while second group (group 2) represents **smaller firms** depending on their size by value added.

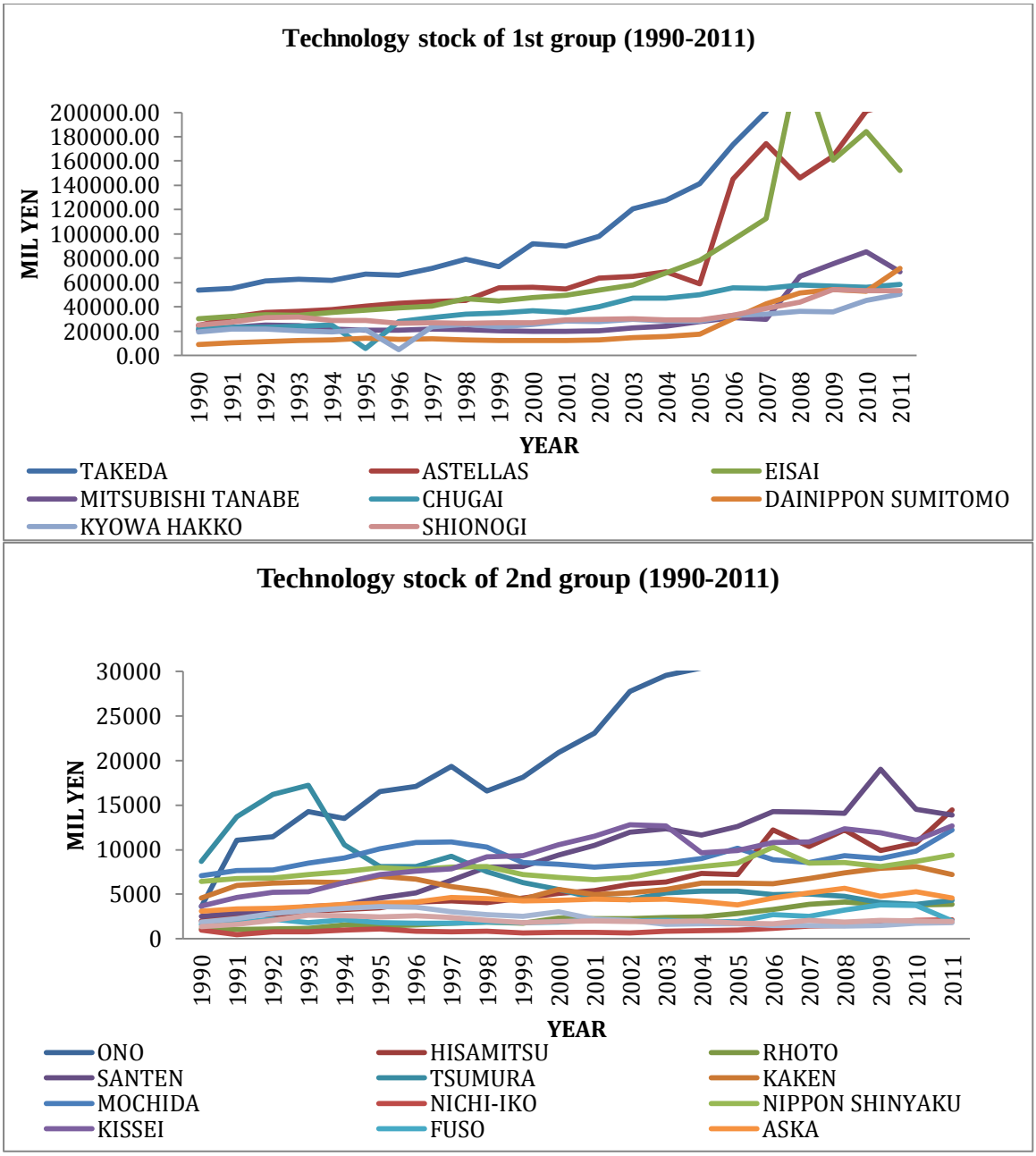
Source: Author's description





Source: Author's analysis based on Cobb-Douglas and Perpetual inventory model

FIGURE 5.3. TRENDS OF R&D INTENSITY IN 22 R&D INTENSIVE JAPANESE PHARMACEUTICAL FIRMS 1990-2011 DURING AND AFTER THE BURST OF THE BUBBLE ECONOMY: 2005-FIXED PRICES.



Source: Author's description based on Cobb-Douglas and Perpetual inventory model

FIGURE 5.4. TRENDS OF TECHNOLOGY STOCK (TI) OF THE FIRST AND SECOND GROUP R&D INTENSIVE JAPANESE PHARMACEUTICAL FIRMS 1990-2011.

Figure 5.3. R&D intensity: G1 and G2

Generally R&D intensity of larger pharmaceutical firms (G1) is higher than smaller pharmaceutical firms (G2). Most of smaller pharmaceutical firms R&D intensity are ranging from 0-6 while most larger pharmaceutical firms R&D intensity are ranging from 2-8.

Figure 5.4. Technology stock:

Generally technology stock is larger in larger pharmaceuticals (G1) than smaller pharmaceuticals (G2) throughout the period but they both keep increasing.

Source: Author's description

TABLE 5.2. STATE OF VALUE ADDED AND R&D STRUCTURE TO JAPANESE TEXTILE FIRMS IN 2011. YEN MIL AT 2005 FIXED PRICE.

NO	Low-tech Textile Firm	Value added	R&D expenditure	R&D intensity	Ti	Ti/Ts (%)
***1**	Toray	2770720	48880	1.76	48880.3302	83.63
***2**	Teijin	1568785	33048	2.11	33047.7051	44.49
***5**	Onwards	220620	0	0.00	0	0.00
6	Unitika	247665	3795	1.53	3794.6655	3.67
7	Wacoal	251645	856	0.34	855.5055	0.80
8	Kurabo	148654	1873	1.26	1872.6648	1.78
9	Gunze	184803	3512	1.90	3512.2962	3.38
11	Japan wool	145389	935	0.64	935.2827	0.88
12	Seiren	150839	4692	3.11	4692.159	4.57
***13**	Descente	71798	0	0.00	0	0.00
14	Suminoe	78651	240	0.31	240.3813	0.22
15	Goldwin	28719	407	1.42	407.2836	0.38
17	Katakura	77683	4484	5.77	4484.3184	4.36
18	Shikibo	74543	452	0.61	452.4207	0.42
19	Japan Vilene	69470	1887	2.72	1887.3606	1.79
20	Dynic	39944	337	0.84	336.9537	0.31
22	Komatsu Seiren	37662	508	1.35	508.0548	0.48
23	Fujibo	90341	765	0.85	765.2313	0.72
***27**	Daidoh	50571	0	0.00	0	0.00

28	Teikoku	32991	108	0.33	108.1191	0.10
***29**	Yamato	32158	0	0.00	0	0.00
30	Atsugi	51938	550	1.06	550.0428	0.52

Note: * no enough data

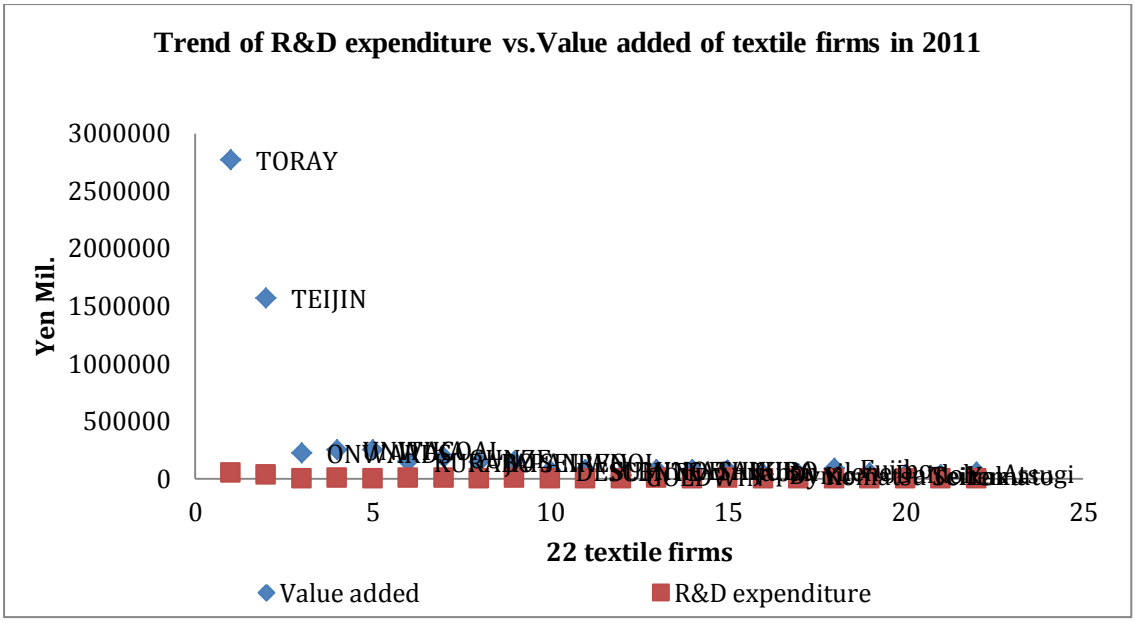
Data analysis and further description

R&D intensities for low-tech textile firms are smaller than high-tech pharmaceutical firms due to the fact that Japanese pharmaceutical firms are highly R&D intensive for drug processing and new product development than labour intensive as textile firms. The first two companies, Toray (84%) and Teijin (44%) textiles carries higher percentage of indigenous technology dependency ratio because of high performance carbon fiber, which is an emerging business, and therefore requires investment in Nanoalloy technological materials over other textile firms.

Generally, pharmaceuticals are R&D intensive than textiles thus R&D expenditures are higher for pharmaceutical firms. Furthermore there is no correlation between R&D intensity and value added in low-tech textiles than high-tech pharmaceutical firms but smaller relationship exists in R&D expenditure and value added especially for Toray and Teijin textiles.

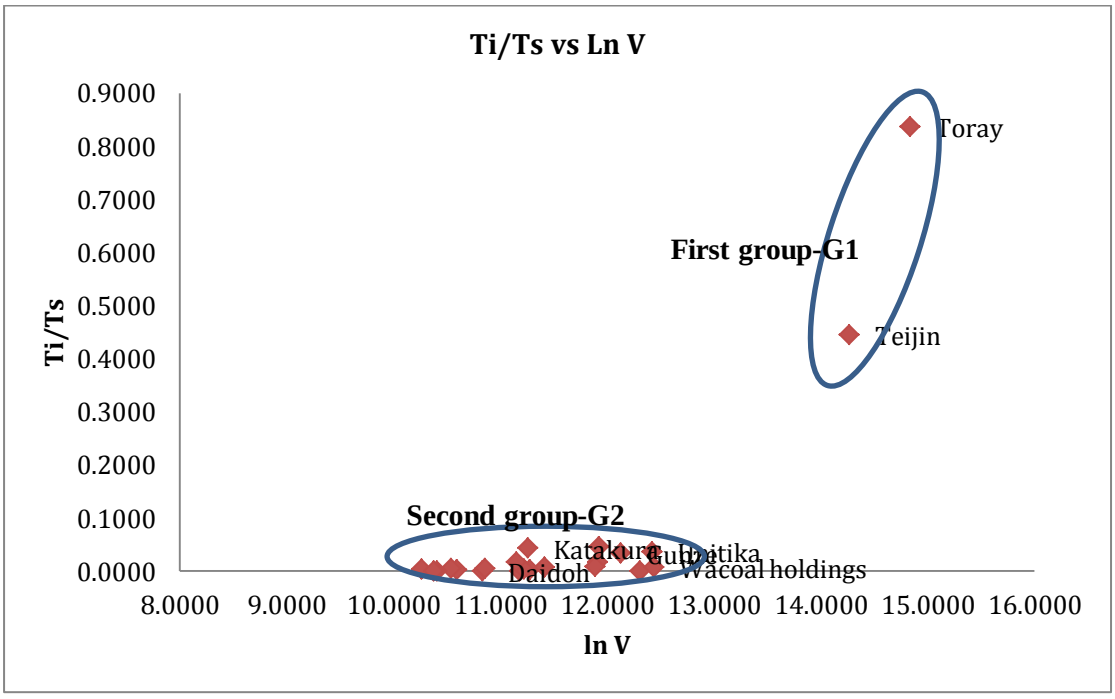
According to figure 5.7 R&D intensity for Japanese textile firms showed an increase after the burst of the bubble economy (2000s) than during the burst of the bubble economy (1990s). Generally, R&D intensity for low-tech textiles is lower than high-tech pharmaceutical firms throughout the period 1990-2011.

Source: Author's description



Source: Author's description based on Cobb-Douglas method and perpetual inventory model

FIGURE 5.5. TREND OF R&D EXPENDITURE AND VALUE ADDED (OUTPUT) OF 22 JAPANESE TEXTILE FIRMS IN 2011.

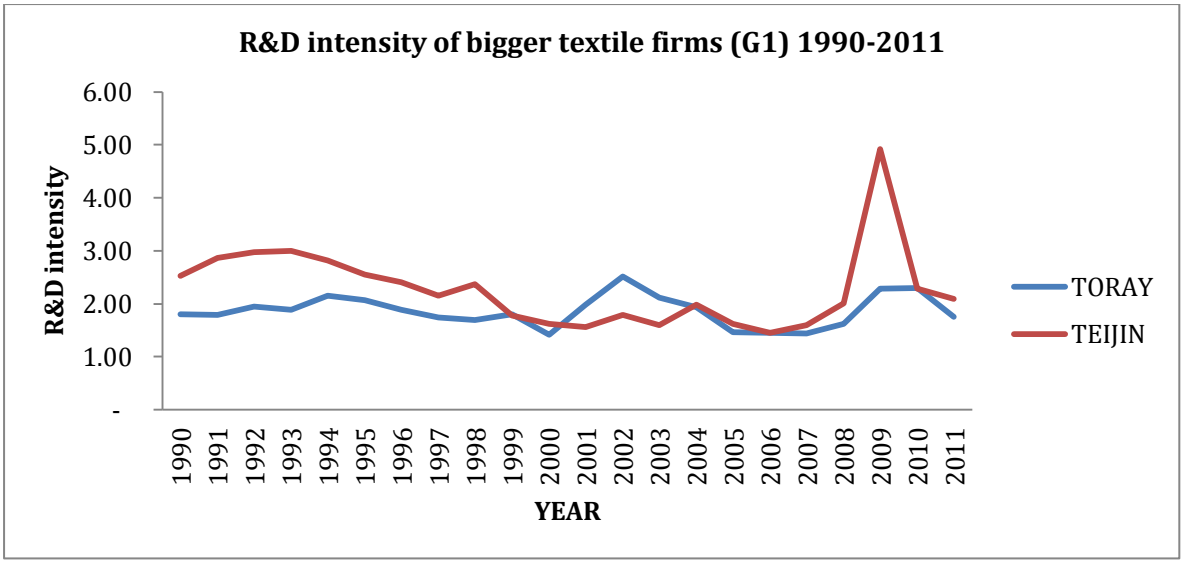


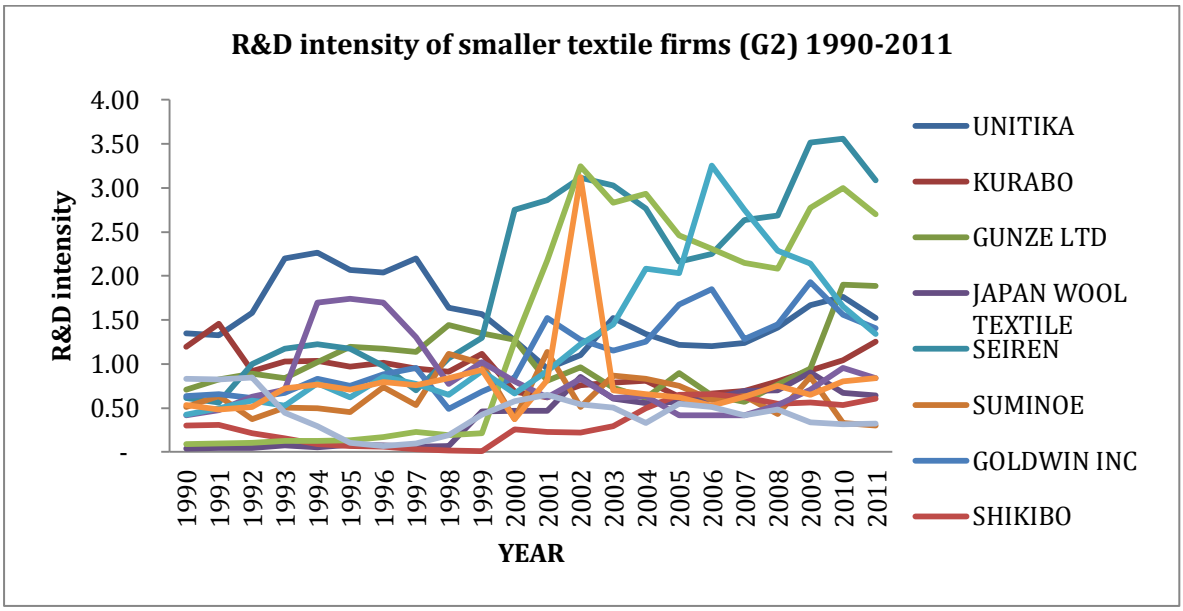
Source: Author's description based on Cobb-Douglas and Inventory model

FIGURE 5.6. CORRELATION BETWEEN VALUE ADDED AND INDIGENOUS TECHNOLOGY DEPENDENCY RATIO IN 22 TEXTILE FIRMS IN 2011.

Data analysis and further explanation
There is positive correlation between value added and indigenous technology dependency ratio in the first group (G1) than second group (G2) but existence of this correlation is generally lower compared to high-tech pharmaceutical firms. This is because low-tech textiles are labour intensive than R&D intensive and therefore lower technology stock compared to pharmaceutical firms. Therefore, figure 5.5 explains the structural difference between the two groups of firms depending on their size by value added and a higher indigenous technology stock ratio is observed as firm size increases. Thus, First group (G1) represents large firms (Toray and Teijin) by value added than second group.

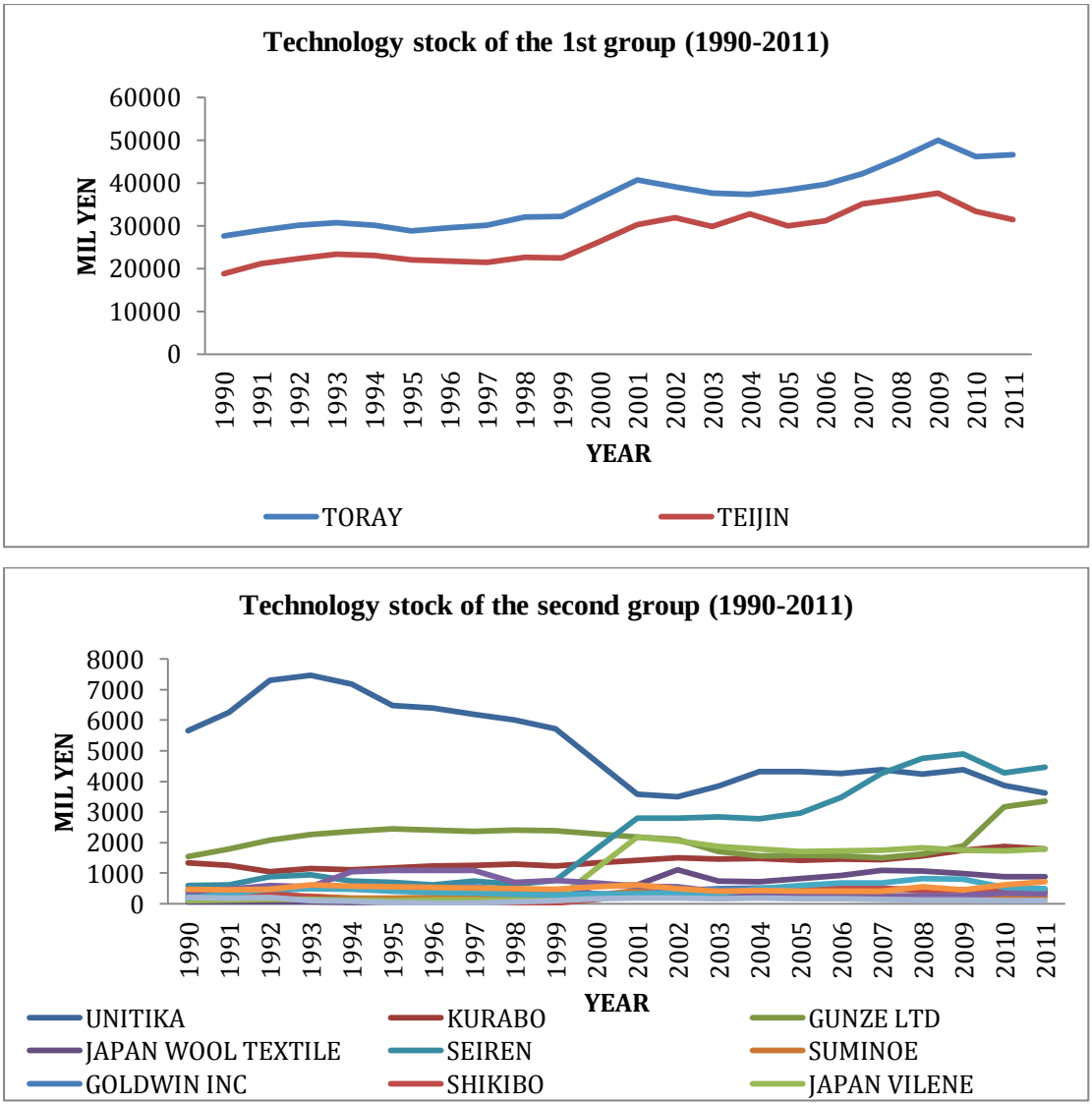
Source: Author's description





Source: Author's analysis based on Cobb-Douglas and perpetual inventory model.

FIGURE 5.7. TRENDS OF R&D INTENSITY IN 22 JAPANESE TEXTILE FIRMS 1990-2011 DURING AND AFTER THE BURST OF THE BUBBLE ECONOMY: 2005 FIXED PRICES.



Source: Author's analysis based on Cobb-Douglas and Perpetual inventory model

FIGURE 5.8. TRENDS OF TECHNOLOGY STOCK (TI) OF THE FIRST AND SECOND GROUP OF TEXTILE FIRMS 1990-2011.

Analysis from graphs:

Figure 5.7. R&D intensity: for bigger textile (G1) is higher but almost stagnant except for Teijin while smaller textile (G2) is very fluctuating but it is increasing especially from 2000.

Figure 5.8. Technology stock of bigger textile (G1) is higher and it is increasing while smaller textile (G2) is almost stagnant except for Unitika and seiren textile firms.

Source: Author's description

Overall description:

1). Japan's pharmaceutical firms and textile firms can be divided into two groups **G1** and **G2** according to their size in terms of value added.

2). Smaller firms belongs to G2 cannot manage to jump up to G1.

3). Technology structure is a major source to divide these firms into two groups, which is characterized by the level of technology stock.

4). R&D intensity is dynamic but continues increasing after the burst of the bubble economy (2000s) especially on high-tech pharmaceutical firms.

5). R&D intensity induces with multiplier impact on technology stock. 6). Technology spillover depends much on assimilation capacity of firm.

Source: Author's description

TABLE 5.3. REGRESSION ANALYSIS COEFFICIENTS OF Z, L, K, TI, TS OF 22 JAPANESE PHARMACEUTICAL FIRMS, 1990-2011.

Pharmaceutical Firm	Ln. Z	$\propto$	β	$\delta 1$	$\delta 2$	Adj.R^2
Takeda	1.0188***	0.0344***	0.9846***	0.002*	-0.006	0.999
Astellas	-0.1339	0.0717	-0.7378*	0.3234	0.633**	0.909
Eisai	1.0149***	0.0472***	0.9489***	0.0010	0.002	0.999
Mitsubishi Tanabe	1.0166***	0.0403***	0.9598***	-0.0136**	0.016**	0.999
Chugai	1.0131***	0.0469	0.9540***	0.0196	-0.0012	0.999
Dainippon Sumitomo	1.0167***	0.0443***	0.9443***	0.0067	0.0029	0.999
Kyowa Hakko	1.0508***	-0.0141	0.9932***	-0.0044	0.0143	0.996
Shionogi	1.0308***	0.0589***	0.9315***	0.0049	-0.0079	0.999
Ono	1.0227***	-0.0111	1.0277***	-0.0025	0.0065	0.999
Hisamitsu	1.0441***	0.0030	1.0139***	-0.0053	-0.0134**	0.999
Rhoto	1.0380***	0.0298	0.9662***	-0.0021	0.0187**	0.999
Santen	1.0065***	0.0232	0.9541***	-0.0119	0.0064	0.998
Tsumura	1.0732***	0.0443	0.8938***	0.0621**	-0.0278	0.997
Kaken	1.0459***	0.0573***	0.9511***	0.0321***	-0.0138***	0.999
Mochida	1.0210***	0.0418***	0.9449***	0.0041	-0.0014	0.999
Nichi-Iko	1.0227***	-0.0368	0.9727***	0.0017	0.0688**	0.999
Nippon Shinyaku	1.0169***	0.0652**	0.9234***	0.0355	-0.0055	0.999
Kissei	1.0441***	-0.0107	1.0069***	0.0046	0.0038	0.999
Fuso	1.0362***	-0.0112	1.0111***	0.0026	-0.0024	0.999
Aska	1.0094***	0.0163	0.9625***	0.0002	0.0024	0.999
Nippon Chemiphar	1.0071***	0.0512	0.8874***	0.0199*	0.0439**	0.999
Eiken	1.0172***	0.0226*	0.9106***	0.0219**	0.0081*	0.999

Source: Author's analysis based on regression method

NB: *, **, *** at 10%, 5%, 1% significance level respectively.

R^2 is a coefficient of determination.

$\boldsymbol{lnZ, \alpha, \beta, \delta 1, \delta 2}$ are coefficients of **TFP**, **labour, capital, technology stock and technology spillovers** respectively.

Data analysis and further description
There is interaction exists between technology stock which include indigenous technology stock (Ti) and spillover technology (Ts) and productivity throughout the period of 1990-2011 though many pharmaceutical firms showed insignificant. Few pharmaceutical firms showed **significance in both Ti and Ts** throughout the period of bubble burst and great stagnation in Japan such as **Kaken, Nippon Chemiphar and Eiken** pharmaceutical firms. The remaining pharmaceutical firms showed significance to one either Ti or Ts and not both. Chugai, Takeda, Shionogi, Hisamitsu, Tsumura, Mochida, Nippon Shinyaku and Fuso pharmaceuticals experienced negative impacts of technology spillovers throughout the period, 1990-2011. Therefore, contribution of technology spillover to production increase was negative to these firms for the past two decades than the other. While most pharmaceuticals **TFP and capital** were very significant at 1% confidence level, labour was insignificant to many companies and hence had less contribution than other factors in production especially for high-tech pharmaceuticals.

Source: Author's description

TABLE 5.4. REGRESSION ANALYSIS COEFFICIENTS OF Z, L, K, TI, TS OF 22 JAPANESE TEXTILE FIRMS, 1990-2011.

Textile Firm	Ln. Z	α	β	$\delta 1$	$\delta 2$	Adj.R^2
Toray	1.0807***	-0.0188	0.9224***	0.0768	-0.0274	0.9983
Teijin	1.0564***	-0.0118	0.9926***	0.1529**	-0.1337**	0.9991
Onwards holdings						
Unitika	1.1145***	-0.0093	0.9851***	0.0139	-0.0536*	0.9962
Wacoal holdings						
Kurabo	1.0448***	0.0595***	0.9666***	0.0221	0.0187	0.9979
Gunze ltd	1.0778***	0.0669***	0.9185***	0.0004	0.0077	0.9965
Japan wool textile	1.0878***	-0.0192	0.9207***	0.0094	0.0383	0.9966
Seiren	1.0671***	0.0521	0.8942***	-0.0146	0.1449	0.9975
Descente						
Suminoe	1.1033***	-0.0970	1.0840***	0.0325	0.0948	0.9878
Goldwin Inc.	1.1166***	-0.0075	0.8688***	0.1619*	-0.1201	0.9787
Katakura industries						
Shikibo	1.0966***	-0.0915***	1.1014***	0.0119*	-0.1899***	0.9979
Japan Vilene	1.0919***	0.0493	1.0055***	-0.0131	0.0267	0.9990
Dynic	1.0878***	0.1149***	0.9587***	0.0116*	-0.0203	0.9993
Komatsu seiren	1.0470***	0.1086***	0.9442***	0.0027	-0.0409*	0.9996
Fujibo holdings	1.1122***	0.2058	0.9617***	0.1129	-0.1693	0.9767
Daidoh						
Teikoku	1.0266***	-0.0070	0.9844***	-0.0064*	0.0101	0.9995
Yamato						
Atsugi						

Source: Author's analysis based on regression method

NB: *, **, *** at 10%, 5%, 1% significance level respectively.

R^2 is a coefficient of determination.

$\boldsymbol{lnZ, \alpha, \beta, \delta 1, \delta 2}$ are coefficients of **TFP**, **labour, capital, technology stock and technology spillovers** respectively.

Data analysis and further description
There is little interaction exists in low-tech textile firms than high-tech pharmaceutical firms throughout the period 1990-2011 on indigenous technology stock (Ti) and assimilated spillover technology (Ts) to output growth and productivity. **Teijin and Shikibo** textile firms showed **significance on both Ti and Ts** throughout the period while the remaining textile firms showed none or either of them (Ti or Ts). Toray, Teijin, Unitika, Goldwin Inc., Shikibo, Dynic, Komatsu Seiren and Fujibo holdings textiles experienced negative impacts of technology spillovers to production increase throughout the bubble burst and economic recovery in Japan. Not only TFP and Capital seem to be very significant in textile firms but also labour because textiles are labour intensive industry though almost 7 textile companies are missing due to un availability of R&D data to run regression.

Source: Author's description

Chapter 6
DISCUSSION OF FINDINGS

DISCUSSION OF FINDINGS

6.1 TFP and TFPG trends in Japanese high-tech pharmaceutical and low-tech textile firms.

Generally, high-tech pharmaceutical firms have higher TFP and TFPG throughout 1990-2011 compared to low-tech textile firms. This indicates that, high-tech pharmaceutical firms have higher productivity growth compared to low-tech firms as a result of ability to absorb and create knowledge in the form of R&D and patent rights. Also high-tech pharmaceutical firms are highly dependent on technological assimilation for productivity growth than low-tech textile firms.

Economic fluctuation and stagnation faced Japan, which is as a result of series of macroeconomic events including collapse of bubble economy in 1990's and also decline of Total Factor Productivity growth, enhances more R&D activities in high tech firms, offshoring and new emerging business such as carbon fiber business in low tech textile firms especially Toray and Teijin textile companies. It also seemed that change in composition of the labour force has been one of the most important sources of growth in Total Factor Productivity (TFP) in Japanese high-tech and low-tech manufacturing firms throughout the period of bubble burst and slight recovery, 1990-2011.

OVER THE PAST TWO DECADES 1990-2011		FUTURE FORECASTS
HIGH-TECH: **Pharmaceuticals**		
-Higher R&D intensive -Merging to integrate their own technologies for new product development -Higher capital investment	**TFP improved**	-More offshoring such as India, China, Hong Kong, America and Europe. -Increase R&D output such as patent rights: new technology -Higher ability to invest on R&D

Pharmaceuticals: High-tech and R&D intensive Japanese industry

Textiles: Transition from low-tech to medium high-tech firms

LOW-TECH: **Textiles**		
-First mover to cheap labour cost as labour intensive industry -More business diversification apart from textile -Higher capital investment	**TFP improved**	-Huge investment on high performance small-tow carbon fiber technology: Fields of aerospace, Boeing 787, Green innovation for active demand. -Increase applications of Nanoalloy technology.

6.2. R&D investment role

Pharmaceutical industry is among high-tech sectors, which are driven by innovation, and therefore requires large amount of R&D investments than low-tech textile industry. Though, pharmaceutical industry in Japan present the highest level of R&D as well as an extremely high level of risk with very long pay-back periods extending over a decade than low-tech industry yet continue investing more on R&D. This is due to the fact that value added of pharmaceutical firms is strongly governed by technology stock as a function of R&D.

Although low-tech textile firms showed interests in R&D investment not as much as high-tech pharmaceuticals. This huge R&D investment for low-tech is much more seen in companies with high performance carbon fiber emerging business segment such as Toray and Teijin firms. While some low-tech textile firms are slowly developing interests on R&D investments, Toray and Teijin are quite far in R&D investment. Such as Nanoalloy establishment by Toray industries, enables high performance and functionality in polymers through combination of multiple polymers to make the alloy. Thus, it requires high technology absorption and therefore R&D investment.

It is investigated that the major future R&D and technology trajectory in the textile sector will be shaped by advances in nanoscience and nanotechnology, which, may result in technology lock-in and come to dominate the sector under conditions of network externalities and increasing returns (Kaonides, Yu, & Harper, 2007).

6.2.1 Technology stock, technology spillover role to firms R&D and productivity

Trough growth and spread of global technology spillovers due to effects of new paradigm in 1990s, many Japanese manufacturing firms have profited from it while others have less profited. Pharmaceutical firms seemed to be benefited more from these spillovers pool than textile firms, which accelerate larger R&D investment and hence productivity growth. Although, some companies experienced negative effects of technology spillovers to productivity, many experienced positive impacts and thus TFP growth and output growth.

This ability has been observed much on Japanese pharmaceuticals than textiles throughout the period of bubble burst and economic recovery. This indicates that, the

host may not be capable to efficiently absorb spillovers from the market as the 'Donor' firms flow their results to 'Host', firms that do not undertake R&D activities or undertake less R&D activities. The ability to absorb seemed to be higher in R&D intensive firms than other firms, which perform less, or none R&D activities.

6.3 Foreign Direct Investment (FDI) and its role

Generally, Japanese firms were late to recognize the effects of FDI in knowledge generation in form of spillovers than other Asian countries due to regulations and institutional environment. FDI has been contributing to TFP growth for many companies especially in industrialised countries but currently Japanese manufacturing firms both low-tech textile and high-tech pharmaceutical firms have also recognized its potential in TFP growth. The findings of this paper indicate that, smaller firms serve domestic market and export while larger firms engage in FDI and export. Furthermore, being R&D intensive, Japanese pharmaceutical firms seemed to generate more technology transfer than low-tech textile firms. This is due to the fact that international trade (FDI) acts as a carrier of knowledge, the fact that importing equipment relating to foreign R&D generates more technology transfer, which in turn affects TFP positively.

6.4 Aging

Population aging in Japan is occurring faster than in any other country, putting also burden on the public health system including pharmaceutical firms. The increased life expectancy of Japanese people act as a key driver of consumption to people over 65

years of age because Japanese people at that age category spend five times more on their health. This positively encourages development and growth of pharmaceutical firms through capacity utilization of drugs and hence productivity and output growth.

On the other hand, aging and reduction in the statutory working week causes slowdown of labour input, which is very important factor in labour productivity.

For the past decades economy of Japan is explained in two aspects of population aging;

- Increase elderly population in the total population, and
- Slower growth of the population due to decrease in labour force and fall of fertility rate.

6.4.1 Domestic market saturation

Due to domestic market saturation and prolonged economic slump, Japanese firms have been forced to execute their business overseas especially China as a world factory or product diversification such as Toray textile industries have segmented into high performance carbon fiber. Faced with domestic market saturation, high production costs in Japan, Japanese textile whose production requires labour intensive technologies and processes set up manufacturing plants in other Asian countries especially China.

Henceforth, R&D investments provide the critical resources to break into new markets and successfully compete against incumbent firms. This is not only for low-tech firms but most important for high-tech R&D intensive pharmaceutical firms which invest huge amount of R&D for new product development, patent (R&D

output). The fact that Takeda pharmaceutical is the first Japanese pharmaceutical firm with huge R&D investment in the entire Japanese pharmaceutical industry in 2011.

6.5. Determinants of R&D investments in pharmaceutical industry in Japan

Due to large demand on R&D investments in pharmaceutical firms, Japanese pharmaceutical industry experienced number of mergers and restructuring from year 2005 as strategy to increase size and hence resources, which stimulate growth by integrating their own technologies for new product development (R&D output). Examples of mergers and acquisitions includes; Yamanouchi Pharmaceutical and Fujisawa Pharmaceutical to form Astellas pharmaceutical which is the second largest company in Japan. Another fusion was between Dainippon pharmaceutical and Sumitomo pharmaceutical to form Dainippon Sumitomo Pharma (DSP), and merger between Daiichi and Sankyo to form Daichii Sankyo.

Research and development of pharmaceutical industry in Japan involves a long and cumulative process of knowledge creation and the build-up of intangible assets, therefore small firms have less capability to implement large scope R&D programmes. It is noted in this paper that throughout the period of economic downturn and recovery, firms in group 2 (G2) have not managed to jump up to group 1 (G1). Thus, firms are divided into two groups depending on their structure of technology. This suggests the fact that large firms invest more in R&D, than small firms despite the weight of their structure because R&D investments are generally associated with a significant increase in subsequent output especially in pharmaceutical firms.

Generally, it seemed that high-tech pharmaceutical firms tend to be more R&D intensive and more internationalized hence higher TFP and productivity, which enhances more R&D, and internationalise than low-tech textile firms. Most high-tech Japanese firms have smaller labour cost due to the fact that reduction in the number of workers is higher in high-tech than low-tech textile.

6.6. ICT, TFP growth and Japanese absorptive capacity.

In explaining TFP by knowledge or effect of knowledge creation on TFP growth apart from most known measures such as R&D and patent data, information and communication technologies (ICT) have recently been included as determinants of TFP. Being part of OECD countries, Japan has access to technologies, strong trade and investment links. Though ability to innovate and adopt new technologies may differ between countries, yet Japan seemed to be the strength to Asian economy. Possessing interlocking characteristics with the overall other Asian economy, ICT presently play a great role in Japan, the fact that absorption capacity of Asian economy have great potential in Japanese economy too.

Chapter 7
CONCLUSION AND POLICY IMPLICATIONS

CONCLUSION AND POLICY IMPLICATIONS

7.1 Nature of the environment and Japanese firms

Developments of China factory, ethnic Chinese businesses and BRIC nations have been advantageous for most Japanese companies to transfer their factory and run their production outside Japan to break out or recover from its economic slump. This is due to the existence of both low-cost and high-quality labour in terms of educational level, motivation for advancement and dexterity. Thus, TFP and output were improved for Japanese manufacturing firms especially in the second decade after the burst of the bubble economy in 1990s and economic downturn. Moreover, increase tendency of Japanese companies to China is also accelerated by increasing magnitude of foreign direct investment (FDI), corporate restructuring and shifting toward more complex forms of R&D. Thus, principle reason for Japan's lead in markets in the highly volatile global economy is through new applications for existing technologies, developing new technologies and R&D performance such as increasing aerospace and pharmaceuticals.

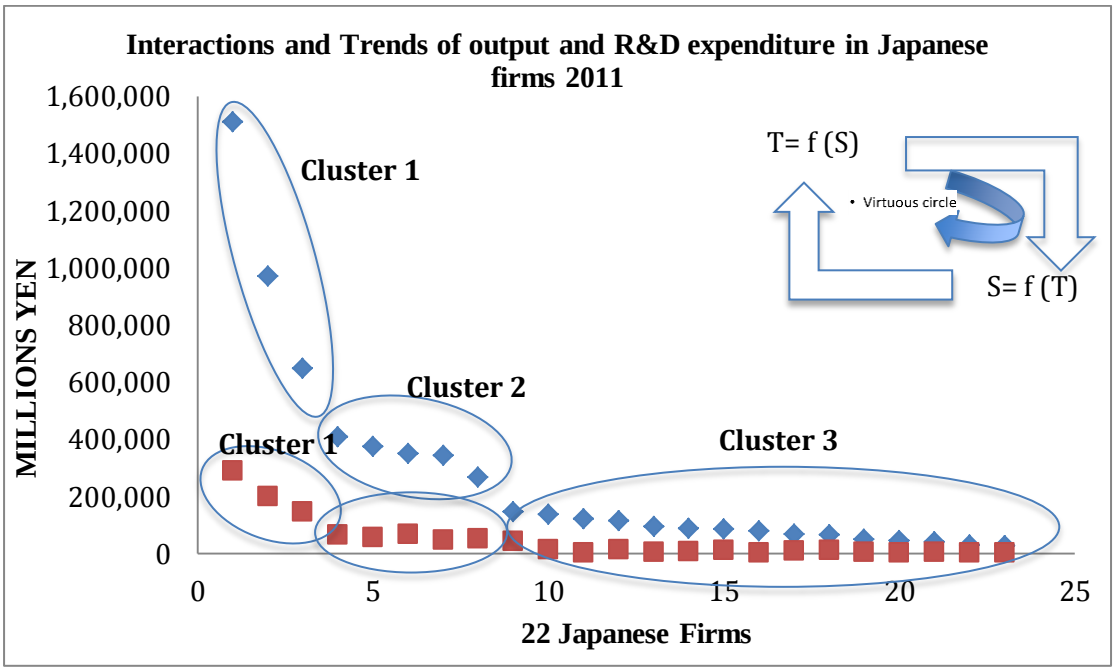
7.2 Japanese firms and clusters formation

In addressing two different periods (during and after the crisis of economic downturn in Japan) different clusters is discovered in both high-tech pharmaceutical and low-tech textile firms throughout the period of economic slump, 1990-2011.

- It is very difficult for smaller firms to jump up to reach larger firms due to less ability to invest in R&D for new product development and hence large value added or output. This is due to the fact that larger firms keep investing huge

amount of R&D, which later triggered large output for undertaking R&D. i.e. vicious circle.

- After the crisis and slight recovery smaller firms targeted merging and acquisition activities to have greater ability, which will enable them to develop new product, technologies and catch up with volatile global economy.



Source: Author's analysis based on (EOL digital database)

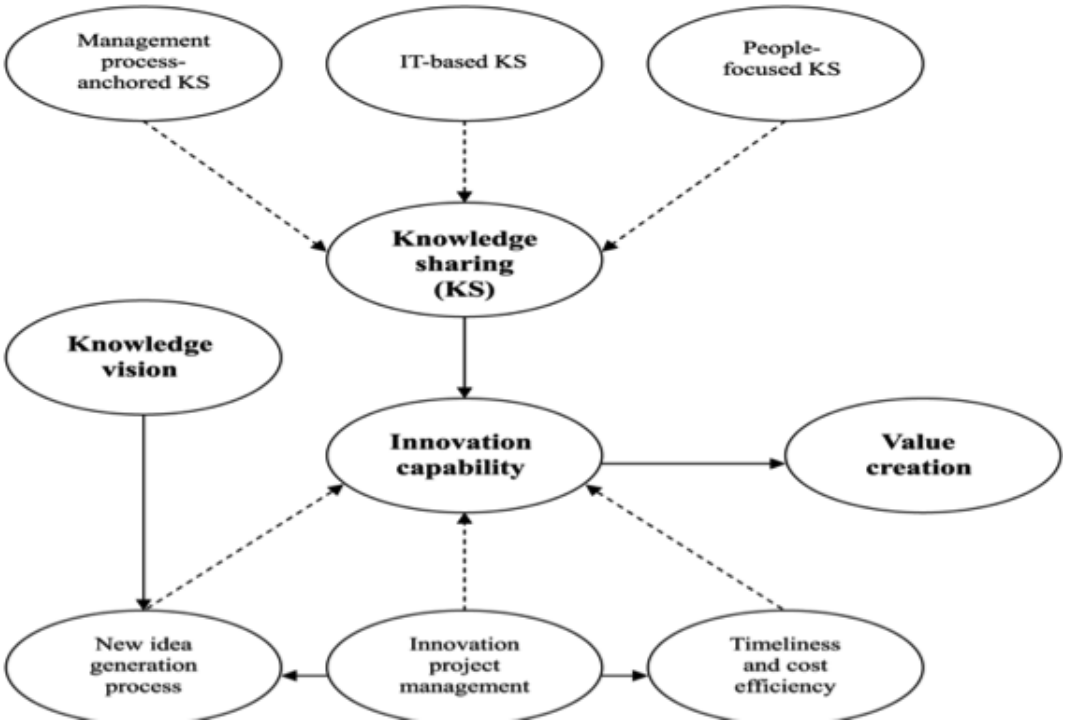
FIGURE 7.1. CLUSTERS ACCORDING TO SIZE OF FIRMS; CLUSTER 1 (LARGER FIRMS), CLUSTER 2 (MEDIUM FIRMS) AND CLUSTER 3 (SMALLER FIRMS).

- Smaller players will find it hard to adopt new technologies such as nanotechnology due to tight margins and the cost of switching. Larger textile or pharmaceuticals conglomerates with internal R&D capabilities and with multiple product divisions are better placed to be winners in global textiles or pharmaceuticals market place hence higher productivity growth (Kaonides, Yu, & Harper, 2007).

Therefore, the need for important strategy by policy makers is important to support smaller firms in catching up with larger firms in order to have important share in the economy.

7.3 Knowledge Sharing and value creation

In order to enhance smaller firms growth, knowledge sharing within industry will provide these firms opportunities to grow through developing new products in today's competitive environment and therefore improve productivity and output growth and hence value creation.



Source: Author's elaboration from (Saenz, Aramburu, & Rivera, 2009).

FIGURE 7.2. KNOWLEDGE SHARING AND VALUE CREATION.

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APPENDICES

Appendix 1: Cobb-Douglas Model and Value added calculation

Data: Cobb-Douglas Method

The consolidated Japanese manufacturing Industry (1990-2011) based on Japanese standard from (EOL, Toyokeiza and Social Science Information System).

a). Value added calculation (Output)

$V = OP + L + I + T$

$V = OP + L + I + D + (IBT - NI)$

Variable	Description
V	Value added to the firm or output
OP	Operating Profit (or Loss)
L	Labour Costs
I	Interest Expenses (paid on loans)
D	Depreciation
T	Taxes paid
IBT	Income Before Tax
NI	Net Income

b). Output, capital and labour are at constant prices with base year of 2005=100

V/L=Labour productivity

c). $\frac{1}{2}\left(\frac{W}{V}\right)t - 1 + \left(\frac{W}{V}\right)t = \alpha'$ Moving average

d). $1 - \alpha' = \beta'$ Moving average

e). All calculations (TFP, CFI) are made based on methods used by Jackson, Dudley (1998).

f). α =Partial elasticity of L

g). β =Partial elasticity of K

h). $Z'_t = Vt/L_t^{\alpha} K_t^{\beta}$ =Total factor productivity

Appendix 2: Cobb-Douglas- High-tech Japanese Pharmaceutical Industries **a).** TFPG INDEX: **Takeda Pharmaceutical firm (4502)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	(V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln. Kt-ln Kt-1	Tornqvist: TFPG
1990	1,446,005	163221	95175	14.124	11.942	11.403	15.193	1.715	0.066	0.934						0.000
1991	1,456,765	182199	98855	14.163	12.084	11.473	14.736	1.843	0.068	0.932	0.067	0.933	0.040	0.070	0.142	-0.097
1992	1,383,954	188144	87264	14.129	12.134	11.365	15.859	2.156	0.063	0.937	0.065	0.935	-0.034	-0.108	0.049	-0.073
1993	1,420,301	196440	89511	14.168	12.189	11.403	15.867	2.195	0.063	0.937	0.063	0.937	0.038	0.038	0.055	-0.016
1994	1,509,963	210236	91493	14.236	12.264	11.432	16.504	2.298	0.061	0.939	0.062	0.938	0.068	0.029	0.075	-0.004
1995	1,498,091	241506	94591	14.227	12.402	11.464	15.837	2.553	0.063	0.937	0.062	0.938	-0.009	0.032	0.137	-0.140
1996	1,811,467	231532	95137	14.418	12.361	11.471	19.041	2.434	0.053	0.947	0.058	0.942	0.191	0.007	-0.041	0.229
1997	1,972,576	229400	94876	14.501	12.349	11.466	20.791	2.418	0.048	0.952	0.050	0.950	0.083	-0.005	-0.011	0.094
1998	2,145,465	232092	99955	14.611	12.387	11.545	21.464	2.322	0.047	0.953	0.047	0.953	0.110	0.078	0.038	0.070
1999	2,452,388	224229	92008	14.742	12.349	11.459	26.654	2.437	0.038	0.962	0.042	0.958	0.130	-0.086	-0.038	0.170
2000	3,615,525	240531	154915	15.123	12.413	11.973	23.339	1.553	0.043	0.957	0.040	0.960	0.382	0.514	0.065	0.299
2001	4,275,286	220356	152546	15.283	12.317	11.950	28.026	1.445	0.036	0.964	0.039	0.961	0.159	-0.024	-0.096	0.252
2002	4,888,499	213385	163689	15.408	12.276	12.011	29.865	1.304	0.033	0.967	0.035	0.965	0.125	0.061	-0.041	0.163
2003	5,212,107	203282	146557	15.469	12.225	11.898	35.564	1.387	0.028	0.972	0.031	0.969	0.062	-0.113	-0.051	0.115
2004	5,636,238	230538	150808	15.547	12.351	11.926	37.374	1.529	0.027	0.973	0.027	0.973	0.078	0.028	0.126	-0.045
2005	6,412,029	220133	151949	15.674	12.302	11.931	42.199	1.449	0.024	0.976	0.025	0.975	0.126	0.005	-0.049	0.174
2006	6,663,576	215670	155226	15.715	12.284	11.955	42.928	1.389	0.023	0.977	0.023	0.977	0.041	0.024	-0.018	0.058
2007	7,438,789	238446	151879	15.825	12.385	11.934	48.978	1.570	0.020	0.980	0.022	0.978	0.111	-0.021	0.101	0.012
2008	7,740,486	236134	156086	15.879	12.389	11.975	49.591	1.513	0.020	0.980	0.020	0.980	0.053	0.041	0.004	0.049
2009	5,632,996	258493	184016	15.547	12.466	12.126	30.611	1.405	0.033	0.967	0.026	0.974	-0.331	0.151	0.077	-0.410
2010	7,001,991	318949	187401	15.758	12.669	12.137	37.364	1.702	0.027	0.973	0.030	0.970	0.210	0.011	0.2030	0.0131
2011	6,344,328	407480	171088	15.656	12.911	12.043	37.082	2.382	0.027	0.973	0.027	0.973	-0.102	-0.094	0.2420	-0.335

b. TFP INDEX: **Takeda pharmaceutical firm (4502)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	104.03	107.25	115.27	114.65	90.74
1992	100.53	96.31	121.07	119.30	84.27
1993	104.47	100.03	128.01	126.23	82.77
1994	111.84	102.96	137.96	135.78	82.37
1995	110.82	106.31	158.27	154.75	71.61
1996	134.18	107.06	151.93	149.53	89.73
1997	145.81	106.55	150.22	148.89	97.93
1998	162.81	115.24	156.03	155.35	104.80
1999	185.49	105.73	150.25	149.96	123.70
2000	271.66	176.84	160.11	162.99	166.67
2001	318.62	172.73	145.49	148.59	214.44
2002	361.05	183.68	139.62	143.35	251.87
2003	384.00	164.05	132.68	136.10	282.15
2004	415.20	168.79	150.46	154.09	269.46
2005	471.08	169.61	143.28	147.07	320.30
2006	490.74	173.68	140.71	144.67	339.20
2007	548.16	170.04	155.66	159.71	343.23
2008	578.24	177.15	156.28	160.57	360.12
2009	415.13	206.04	168.77	173.30	239.54
2010	512.32	208.32	206.74	210.86	242.97
2011	462.85	189.63	263.36	266.59	173.62

c. INDEX OF COMBINED FACTOR INPUT (CFI): **Takeda Pharmaceutical (4502)**

Year	$(W/V)_t$ (1)	1/2 ((W/V) t-1+(W/V) t)=α' (2)	1-α'=β' (3)	Lt/Lt-1 (4)	Kt/Kt-1 (5)	(Lt/Lt-1)^α' (6)	(Kt/Kt-1)^β' (7)	6*7	CFI
1990	0.0658								100
1991	0.0679	0.0668	0.9332	1.0725	1.1527	1.0047	1.1418	1.1471	114.71
1992	0.0631	0.0655	0.9345	0.8979	1.0504	0.9930	1.0470	1.0396	119.26
1993	0.0630	0.0630	0.9370	1.0387	1.0573	1.0024	1.0536	1.0561	125.95
1994	0.0606	0.0618	0.9382	1.0293	1.0777	1.0018	1.0727	1.0747	135.36
1995	0.0631	0.0619	0.9381	1.0325	1.1473	1.0020	1.1375	1.1398	154.28
1996	0.0525	0.0578	0.9422	1.0071	0.9599	1.0004	0.9622	0.9626	148.51
1997	0.0481	0.0503	0.9497	0.9952	0.9887	0.9998	0.9893	0.9891	146.88
1998	0.0466	0.0473	0.9527	1.0816	1.0387	1.0037	1.0368	1.0407	152.86
1999	0.0375	0.0421	0.9579	0.9175	0.9629	0.9964	0.9645	0.9610	146.90
2000	0.0428	0.0402	0.9598	1.6726	1.0656	1.0209	1.0629	1.0851	159.40
2001	0.0357	0.0393	0.9607	0.9767	0.9087	0.9991	0.9121	0.9113	145.25
2002	0.0335	0.0346	0.9654	1.0634	0.9597	1.0021	0.9610	0.9631	139.89
2003	0.0281	0.0308	0.9692	0.8931	0.9503	0.9965	0.9518	0.9485	132.68
2004	0.0268	0.0274	0.9726	1.0289	1.1340	1.0008	1.1301	1.1309	150.06
2005	0.0237	0.0252	0.9748	1.0048	0.9523	1.0001	0.9535	0.9536	143.09
2006	0.0233	0.0235	0.9765	1.0240	0.9821	1.0006	0.9825	0.9830	140.67
2007	0.0204	0.0219	0.9781	0.9790	1.1063	0.9995	1.1038	1.1033	155.20
2008	0.0202	0.0203	0.9797	1.0418	1.0039	1.0008	1.0038	1.0047	155.93
2009	0.0327	0.0264	0.9736	1.1631	1.0799	1.0040	1.0777	1.0821	168.72
2010	0.0268	0.0297	0.9703	1.0111	1.2250	1.0003	1.2177	1.2181	205.51
2011	0.0270	0.0269	0.9731	0.9103	1.2739	0.9975	1.2656	1.2624	259.44

a. TFPG INDEX: **Astellas pharmaceutical firm (4503)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t = α'	1- α'= β'	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornq vist: TFPG
1990	1013557	66,009	32817	13.768	11.037	10.338	30.885	2.011	0.032	0.968						0.000
1991	1016456	78,520	39186	13.803	11.243	10.548	25.939	2.004	0.039	0.961	0.035	0.965	0.035	0.209	0.206	-0.171
1992	1036485	83,466	40175	13.840	11.321	10.590	25.799	2.078	0.039	0.961	0.039	0.961	0.037	0.042	0.078	-0.040
1993	1033702	93,538	58172	13.850	11.447	10.972	17.770	1.608	0.056	0.944	0.048	0.952	0.010	0.383	0.126	-0.129
1994	1055149	88,789	59369	13.877	11.402	11.000	17.773	1.496	0.056	0.944	0.056	0.944	0.028	0.027	-0.045	0.069
1995	1134632	109,065	49152	13.949	11.607	10.810	23.084	2.219	0.043	0.957	0.050	0.950	0.071	-0.190	0.204	-0.113
1996	1165493	115,601	50343	13.977	11.666	10.835	23.151	2.296	0.043	0.957	0.043	0.957	0.028	0.025	0.059	-0.030
1997	1263289	128,936	51679	14.055	11.773	10.859	24.445	2.495	0.041	0.959	0.042	0.958	0.078	0.024	0.107	-0.025
1998	1245046	176,738	22136	14.067	12.115	10.037	56.245	7.984	0.018	0.982	0.029	0.971	0.012	-0.822	0.342	-0.296
1999	1360558	185,586	47698	14.152	12.160	10.802	28.524	3.891	0.035	0.965	0.026	0.974	0.085	0.764	0.046	0.021
2000	1572227	182,340	72347	14.290	12.136	11.212	21.732	2.520	0.046	0.954	0.041	0.959	0.138	0.410	-0.024	0.145
2001	1816204	188,241	73114	14.427	12.160	11.214	24.841	2.575	0.040	0.960	0.043	0.957	0.136	0.002	0.024	0.113
2002	1551147	197,119	73337	14.260	12.197	11.208	21.151	2.688	0.047	0.953	0.044	0.956	-0.167	-0.006	0.037	-0.202
2003	1675047	190,573	73597	14.334	12.161	11.209	22.760	2.589	0.044	0.956	0.046	0.954	0.074	0.001	-0.036	0.109
2004	1767137	174,120	81717	14.388	12.070	11.314	21.625	2.131	0.046	0.954	0.045	0.955	0.053	0.105	-0.090	0.135
2005	1992767	134,674	64387	14.505	11.811	11.073	30.950	2.092	0.032	0.968	0.039	0.961	0.117	-0.241	-0.260	0.376
2006	3214969	206,567	141539	14.986	12.241	11.863	22.714	1.459	0.044	0.956	0.038	0.962	0.481	0.790	0.430	0.037
2007	2753870	194,555	132990	14.832	12.181	11.801	20.707	1.463	0.048	0.952	0.046	0.954	-0.154	-0.062	-0.059	-0.095
2008	3545270	179,883	130520	15.098	12.117	11.796	27.163	1.378	0.037	0.963	0.043	0.957	0.266	-0.005	-0.065	0.328
2009	3770610	181,447	145580	15.146	12.112	11.892	25.901	1.246	0.039	0.961	0.038	0.962	0.048	0.096	-0.005	0.049
2010	2812815	184,489	156885	14.846	12.121	11.959	17.929	1.176	0.056	0.944	0.047	0.953	-0.300	0.068	0.009	-0.312
2011	2288387	190,160	162977	14.636	12.149	11.994	14.041	1.167	0.071	0.929	0.063	0.937	-0.209	0.035	0.027	-0.237

b. TFP INDEX: **Astellas pharmaceutical (4503)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	103.56	123.30	122.83	122.58	84.48
1992	107.41	128.58	132.81	132.07	81.33
1993	108.48	188.54	150.72	150.73	71.97
1994	111.50	193.77	144.07	144.07	77.40
1995	119.75	160.21	176.74	173.75	68.92
1996	123.16	164.31	187.58	185.09	66.54
1997	133.22	168.31	208.78	205.50	64.83
1998	134.79	74.02	293.80	282.75	47.67
1999	146.81	158.96	307.50	303.44	48.38
2000	168.53	239.52	300.12	295.70	56.99
2001	193.11	240.09	307.32	301.79	63.99
2002	163.45	238.66	318.93	312.41	52.32
2003	176.06	238.92	307.57	301.25	58.44
2004	185.72	265.25	280.99	277.78	66.86
2005	208.87	208.43	216.75	215.37	96.98
2006	337.79	459.29	333.25	335.99	100.53
2007	289.51	431.81	314.06	315.65	91.72
2008	377.84	429.62	294.37	297.02	127.21
2009	396.44	472.73	292.93	297.15	133.41
2010	293.62	505.78	295.70	300.16	97.82
2011	238.18	523.90	303.90	307.83	77.37

c. INDEX OF COMBINED FACTOR INPUT (CFI): **Astellas pharmaceutical firm (4503)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.032								100
1991	0.039	0.035	0.965	1.233	1.228	1.007	1.219	1.228	122.850
1992	0.039	0.039	0.961	1.043	1.081	1.002	1.078	1.080	132.646
1993	0.056	0.048	0.952	1.466	1.135	1.018	1.128	1.149	152.376
1994	0.056	0.056	0.944	1.028	0.956	1.002	0.958	0.960	146.246
1995	0.043	0.050	0.950	0.827	1.227	0.991	1.214	1.203	175.922
1996	0.043	0.043	0.957	1.026	1.061	1.001	1.059	1.060	186.428
1997	0.041	0.042	0.958	1.024	1.113	1.001	1.108	1.109	206.778
1998	0.018	0.029	0.971	0.440	1.407	0.976	1.393	1.360	281.224
1999	0.035	0.026	0.974	2.148	1.047	1.020	1.045	1.067	299.974
2000	0.046	0.041	0.959	1.507	0.976	1.017	0.977	0.993	297.980
2001	0.040	0.043	0.957	1.002	1.024	1.000	1.023	1.023	304.846
2002	0.047	0.044	0.956	0.994	1.038	1.000	1.036	1.036	315.765
2003	0.044	0.046	0.954	1.001	0.964	1.000	0.966	0.966	305.038
2004	0.046	0.045	0.955	1.110	0.914	1.005	0.917	0.922	281.136
2005	0.032	0.039	0.961	0.786	0.771	0.991	0.779	0.772	217.018
2006	0.044	0.038	0.962	2.204	1.538	1.031	1.512	1.559	338.283
2007	0.048	0.046	0.954	0.940	0.942	0.997	0.945	0.942	318.767
2008	0.037	0.043	0.957	0.995	0.937	1.000	0.940	0.940	299.542
2009	0.039	0.038	0.962	1.100	0.995	1.004	0.995	0.999	299.208
2010	0.056	0.047	0.953	1.070	1.009	1.003	1.009	1.012	302.871
2011	0.071	0.063	0.937	1.036	1.028	1.002	1.026	1.028	311.426

a. TFPG INDEX: **Eisai pharmaceutical firm (4523)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	679,316	48,090	40716	13.368	10.720	10.614	15.705	1.112	0.064	0.936						0.000
1991	692,840	57,105	41560	13.420	10.924	10.635	16.204	1.336	0.062	0.938	0.063	0.937	0.052	0.021	0.204	-0.141
1992	641,961	62,231	43161	13.361	11.027	10.673	14.706	1.426	0.068	0.932	0.065	0.935	-0.059	0.038	0.103	-0.158
1993	655,592	62,920	47082	13.394	11.051	10.760	13.941	1.338	0.072	0.928	0.070	0.930	0.034	0.087	0.024	0.006
1994	684,131	65,185	48641	13.444	11.093	10.792	14.180	1.351	0.071	0.929	0.071	0.929	0.050	0.033	0.042	0.008
1995	759,819	76,156	50829	13.548	11.247	10.836	15.052	1.509	0.066	0.934	0.068	0.932	0.104	0.044	0.154	-0.043
1996	806,495	84,865	52165	13.609	11.357	10.862	15.587	1.640	0.064	0.936	0.065	0.935	0.061	0.026	0.110	-0.043
1997	889,846	95,249	53386	13.705	11.470	10.885	16.770	1.795	0.060	0.940	0.062	0.938	0.096	0.023	0.113	-0.011
1998	829,861	116,313	53861	13.661	11.696	10.894	15.914	2.231	0.063	0.937	0.061	0.939	-0.044	0.009	0.226	-0.256
1999	744,791	113,923	54181	13.550	11.672	10.900	14.152	2.165	0.071	0.929	0.067	0.933	-0.111	0.006	-0.024	-0.089
2000	822,467	109,536	82987	13.643	11.626	11.326	10.136	1.350	0.099	0.901	0.085	0.915	0.093	0.426	-0.046	0.098
2001	1,181,532	106,725	84002	13.997	11.592	11.339	14.268	1.289	0.070	0.930	0.084	0.916	0.354	0.012	-0.034	0.384
2002	1,322,695	112,112	88155	14.100	11.633	11.387	15.084	1.279	0.066	0.934	0.068	0.932	0.104	0.048	0.040	0.063
2003	1,320,915	111,685	87225	14.097	11.626	11.376	15.186	1.284	0.066	0.934	0.066	0.934	-0.004	-0.011	-0.006	0.003
2004	1,365,107	116,690	82627	14.129	11.670	11.322	16.566	1.416	0.060	0.940	0.063	0.937	0.033	-0.054	0.044	-0.005
2005	1,456,639	122,922	92199	14.192	11.719	11.432	15.799	1.333	0.063	0.937	0.062	0.938	0.062	0.110	0.049	0.009
2006	1,595,896	128,682	99346	14.285	11.767	11.506	16.103	1.298	0.062	0.938	0.063	0.937	0.094	0.075	0.048	0.044
2007	1,772,576	133,842	106026	14.391	11.807	11.571	16.768	1.266	0.060	0.940	0.061	0.939	0.106	0.065	0.040	0.064
2008	1,870,606	147,083	116466	14.458	11.915	11.665	16.331	1.284	0.061	0.939	0.060	0.940	0.067	0.094	0.108	-0.040
2009	1,920,714	155,497	118274	14.471	11.957	11.681	16.290	1.319	0.061	0.939	0.061	0.939	0.013	0.015	0.042	-0.028
2010	1,919,703	156,642	122463	14.464	11.958	11.716	15.612	1.274	0.064	0.936	0.063	0.937	-0.008	0.035	0.000	-0.010
2011	2,168,098	149,132	126418	14.582	11.906	11.747	17.030	1.171	0.059	0.941	0.061	0.939	0.119	0.032	-0.052	0.166

b. TFP INDEX: **Eisai pharmaceutical (4523)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	105.32	102.07	122.62	121.28	86.84
1992	99.26	106.00	135.92	133.74	74.22
1993	102.65	115.64	139.16	137.24	74.79
1994	107.87	119.46	145.18	143.00	75.43
1995	119.65	124.84	169.40	165.71	72.20
1996	127.16	128.12	189.01	184.13	69.06
1997	140.01	131.12	211.70	205.42	68.16
1998	134.05	132.28	265.40	254.04	52.77
1999	119.91	133.07	259.09	247.25	48.50
2000	131.54	203.82	247.47	242.64	54.21
2001	187.44	206.31	239.16	235.49	79.59
2002	207.95	216.51	248.98	246.36	84.41
2003	207.15	214.23	247.42	244.90	84.59
2004	214.06	202.94	258.48	254.46	84.12
2005	227.80	226.44	271.55	268.46	84.86
2006	250.18	244.00	284.95	282.11	88.68
2007	278.04	260.40	296.56	294.18	94.51
2008	297.45	286.04	330.38	327.45	90.84
2009	301.31	290.49	344.57	340.88	88.39
2010	298.99	300.77	344.62	341.59	87.53
2011	336.69	310.49	327.14	326.06	103.26

c. INDEX OF COMBINED FACTOR INPUT (CFI): **Eisai pharmaceutical firm (4523)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.064								100
1991	0.062	0.063	0.937	1.021	1.226	1.001	1.211	1.212	121.217
1992	0.068	0.065	0.935	1.039	1.108	1.002	1.101	1.104	133.801
1993	0.072	0.070	0.930	1.091	1.024	1.006	1.022	1.028	137.601
1994	0.071	0.071	0.929	1.033	1.043	1.002	1.040	1.043	143.451
1995	0.066	0.068	0.932	1.045	1.167	1.003	1.155	1.158	166.119
1996	0.064	0.065	0.935	1.026	1.116	1.002	1.108	1.110	184.346
1997	0.060	0.062	0.938	1.023	1.120	1.001	1.112	1.114	205.322
1998	0.063	0.061	0.939	1.009	1.254	1.001	1.236	1.237	254.006
1999	0.071	0.067	0.933	1.006	0.976	1.000	0.978	0.978	248.464
2000	0.099	0.085	0.915	1.532	0.955	1.037	0.959	0.994	246.999
2001	0.070	0.084	0.916	1.012	0.966	1.001	0.969	0.970	239.641
2002	0.066	0.068	0.932	1.049	1.041	1.003	1.038	1.042	249.616
2003	0.066	0.066	0.934	0.989	0.994	0.999	0.994	0.993	247.976
2004	0.060	0.063	0.937	0.947	1.045	0.997	1.042	1.038	257.468
2005	0.063	0.062	0.938	1.116	1.051	1.007	1.047	1.054	271.498
2006	0.062	0.063	0.937	1.078	1.049	1.005	1.046	1.051	285.375
2007	0.060	0.061	0.939	1.067	1.041	1.004	1.038	1.042	297.451
2008	0.061	0.060	0.940	1.098	1.114	1.006	1.107	1.113	331.093
2009	0.061	0.061	0.939	1.016	1.043	1.001	1.040	1.041	344.754
2010	0.064	0.063	0.937	1.035	1.000	1.002	1.000	1.002	345.550
2011	0.059	0.061	0.939	1.032	0.949	1.002	0.952	0.954	329.718

a. TFPG INDEX: **Mitsubishi Tanabe pharmaceutical (4508)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t =α'	1-α'=β'	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	341,435	54,474	22,295	12.741	10.905	10.012	15.315	2.443	0.0653	0.9347						0.000
1991	288,472	57,794	23,402	12.572	10.965	10.061	12.327	2.470	0.0811	0.9189	0.073	0.927	-0.136	0.081	0.059	-0.197
1992	328,340	60,802	23,710	12.702	11.015	10.074	13.848	2.564	0.0722	0.9278	0.077	0.923	0.146	0.030	0.051	0.097
1993	427,135	61,922	23,805	12.965	11.034	10.078	17.943	2.601	0.0557	0.9443	0.064	0.936	0.276	0.017	0.018	0.257
1994	327,783	62,575	23,873	12.700	11.044	10.081	13.730	2.621	0.0728	0.9272	0.064	0.936	-0.258	0.010	0.010	-0.268
1995	347,550	63,277	22,550	12.759	11.055	10.023	15.413	2.806	0.0649	0.9351	0.069	0.931	0.057	-0.058	0.011	0.051
1996	319,028	62,962	22,158	12.673	11.050	10.006	14.398	2.842	0.0695	0.9305	0.067	0.933	-0.084	-0.016	-0.005	-0.079
1997	371,823	62,955	22,033	12.826	11.050	10.000	16.876	2.857	0.0593	0.9407	0.064	0.936	0.151	-0.008	0.000	0.152
1998	374,554	68,326	22,534	12.833	11.132	10.023	16.621	3.032	0.0602	0.9398	0.060	0.940	0.034	0.049	0.082	-0.046
1999	384,408	67,483	21,048	12.859	11.120	9.955	18.263	3.206	0.0548	0.9452	0.057	0.943	0.023	-0.072	-0.012	0.038
2000	439,778	64,712	31,228	12.994	11.078	10.349	14.083	2.072	0.0710	0.9290	0.063	0.937	0.128	0.388	-0.042	0.143
2001	633,160	61,519	31,340	13.358	11.027	10.353	20.203	1.963	0.0495	0.9505	0.060	0.940	0.356	-0.005	-0.051	0.404
2002	577,492	63,631	26,672	13.266	11.061	10.191	21.651	2.386	0.0462	0.9538	0.048	0.952	-0.101	-0.170	0.034	-0.125
2003	578,584	58,875	25,794	13.268	10.983	10.158	22.431	2.283	0.0446	0.9554	0.045	0.955	-0.001	-0.036	-0.078	0.075
2004	580,910	55,618	36,030	13.272	10.926	10.492	16.123	1.544	0.0620	0.9380	0.053	0.947	0.004	0.334	-0.057	0.040
2005	467,006	50,971	35,746	13.054	10.839	10.484	13.065	1.426	0.0765	0.9235	0.069	0.931	-0.221	-0.011	-0.087	-0.139
2006	781,549	46,657	35,299	13.569	10.751	10.472	22.141	1.322	0.0452	0.9548	0.061	0.939	0.517	-0.010	-0.088	0.601
2007	452,165	45,434	35,245	13.022	10.724	10.470	12.829	1.289	0.0779	0.9221	0.062	0.938	-0.547	-0.001	-0.027	-0.522
2008	1,120,666	139,510	85,126	13.929	11.846	11.352	13.165	1.639	0.0760	0.9240	0.077	0.923	0.921	0.895	1.122	-0.183
2009	1,419,032	131,797	84,352	14.165	11.789	11.343	16.823	1.562	0.0594	0.9406	0.068	0.932	0.222	-0.023	-0.057	0.277
2010	1,089,033	117,218	78,863	13.901	11.672	11.275	13.809	1.486	0.0724	0.9276	0.066	0.934	-0.272	-0.074	-0.117	-0.157
2011	1,214,420	113,512	79,140	14.010	11.640	11.279	15.345	1.434	0.0652	0.9348	0.069	0.931	0.106	0.001	-0.032	0.136

b. TFP INDEX: **Mitsubishi Tanabe pharmaceutical firm (4508)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	87.24	108.39	109.55	108.70	80.26
1992	101.01	111.70	117.24	115.62	87.36
1993	133.06	113.57	120.91	120.57	110.36
1994	102.82	114.69	123.04	122.59	83.88
1995	108.88	108.19	124.26	122.69	88.75
1996	100.08	106.45	123.80	122.34	81.80
1997	116.40	105.63	123.52	122.39	95.10
1998	120.38	110.91	137.63	136.55	88.15
1999	123.14	103.25	135.49	134.33	91.67
2000	139.94	152.18	129.07	130.69	107.08
2001	199.84	151.49	121.70	123.88	161.32
2002	180.64	127.77	124.75	126.86	142.39
2003	180.53	123.25	115.14	117.57	153.55
2004	181.24	172.15	108.76	112.66	160.88
2005	145.31	170.33	99.40	102.82	141.33
2006	243.76	168.61	91.21	95.06	256.42
2007	141.11	168.45	88.87	92.75	152.14
2008	354.55	412.45	276.65	282.32	125.58
2009	442.89	403.19	257.83	265.18	167.01
2010	337.46	374.25	227.66	235.11	143.53
2011	375.22	374.47	219.82	227.32	165.06

C. INDEX OF COMBINED FACTOR INPUT (CFI) INDEX: **Mitsubishi Tanabe pharmaceutical firm (4508)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.065								100
1991	0.081	0.073	0.927	1.084	1.096	1.006	1.088	1.095	109.47
1992	0.072	0.077	0.923	1.031	1.070	1.002	1.065	1.067	116.81
1993	0.056	0.064	0.936	1.017	1.031	1.001	1.029	1.030	120.35
1994	0.073	0.064	0.936	1.010	1.018	1.001	1.016	1.017	122.41
1995	0.065	0.069	0.931	0.943	1.010	0.996	1.009	1.005	123.05
1996	0.069	0.067	0.933	0.984	0.996	0.999	0.997	0.995	122.49
1997	0.059	0.064	0.936	0.992	0.998	1.000	0.998	0.997	122.18
1998	0.060	0.060	0.940	1.050	1.114	1.003	1.107	1.110	135.65
1999	0.055	0.057	0.943	0.931	0.984	0.996	0.985	0.981	133.11
2000	0.071	0.063	0.937	1.474	0.953	1.025	0.956	0.979	130.33
2001	0.049	0.060	0.940	0.995	0.943	1.000	0.946	0.946	123.29
2002	0.046	0.048	0.952	0.843	1.025	0.992	1.024	1.016	125.21
2003	0.045	0.045	0.955	0.965	0.923	0.998	0.926	0.925	115.79
2004	0.062	0.053	0.947	1.397	0.945	1.018	0.947	0.964	111.68
2005	0.077	0.069	0.931	0.989	0.914	0.999	0.920	0.919	102.64
2006	0.045	0.061	0.939	0.990	0.918	0.999	0.922	0.922	94.61
2007	0.078	0.062	0.938	0.999	0.974	1.000	0.976	0.976	92.33
2008	0.076	0.077	0.923	2.448	3.113	1.071	2.852	3.056	282.15
2009	0.059	0.068	0.932	0.978	0.932	0.998	0.936	0.935	263.81
2010	0.072	0.066	0.934	0.928	0.883	0.995	0.890	0.886	233.71
2011	0.065	0.069	0.931	1.001	0.966	1.000	0.968	0.968	226.22

a. TFPG INDEX: **Chugai pharmaceutical firm (4519)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t = α'	1-α'=β'	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	263,917	50,578	21717	12.483	10.831	9.986	12.153	2.329	0.082	0.918						0.000
1991	348,869	49,572	22919	12.762	10.811	10.040	15.222	2.163	0.066	0.934	0.074	0.926	0.311	0.086	0.012	0.294
1992	387,733	46,427	24053	12.868	10.746	10.088	16.120	1.930	0.062	0.938	0.064	0.936	0.123	0.065	-0.049	0.164
1993	418,942	44,961	25182	12.945	10.714	10.134	16.637	1.785	0.060	0.940	0.061	0.939	0.090	0.058	-0.020	0.105
1994	459,596	49,233	26536	13.038	10.804	10.186	17.319	1.855	0.058	0.942	0.059	0.941	0.100	0.059	0.098	0.004
1995	104,243	49,389	26633	11.554	10.807	10.190	3.914	1.854	0.255	0.745	0.157	0.843	-1.485	0.002	0.002	-1.487
1996	433,253	56,241	27693	12.979	10.937	10.229	15.645	2.031	0.064	0.936	0.160	0.840	1.426	0.040	0.131	1.309
1997	442,295	66,765	27675	13.000	11.109	10.228	15.982	2.412	0.063	0.937	0.063	0.937	0.019	-0.003	0.169	-0.140
1998	390,532	75,845	27742	12.875	11.236	10.231	14.077	2.734	0.071	0.929	0.067	0.933	-0.098	0.029	0.154	-0.244
1999	526,901	80,712	27421	13.175	11.299	10.219	19.216	2.943	0.052	0.948	0.062	0.938	0.296	-0.015	0.059	0.242
2000	692,802	80,225	37692	13.448	11.293	10.537	18.381	2.128	0.054	0.946	0.053	0.947	0.267	0.312	-0.013	0.263
2001	629,737	77,797	37957	13.353	11.262	10.544	16.591	2.050	0.060	0.940	0.057	0.943	-0.104	-0.001	-0.039	-0.067
2002	594,395	81,444	38365	13.295	11.308	10.555	15.493	2.123	0.065	0.935	0.062	0.938	-0.067	0.002	0.037	-0.101
2003	915,574	93,969	44644	13.727	11.451	10.706	20.508	2.105	0.049	0.951	0.057	0.943	0.430	0.149	0.141	0.288
2004	898,952	90,051	46802	13.709	11.408	10.754	19.207	1.924	0.052	0.948	0.050	0.950	-0.018	0.047	-0.043	0.020
2005	1,308,221	79,459	45231	14.084	11.283	10.720	28.923	1.757	0.035	0.965	0.043	0.957	0.372	-0.037	-0.128	0.496
2006	977,108	85,150	52908	13.792	11.352	10.876	18.468	1.609	0.054	0.946	0.044	0.956	-0.289	0.159	0.072	-0.365
2007	1,078,855	92,495	52505	13.891	11.435	10.869	20.548	1.762	0.049	0.951	0.051	0.949	0.100	-0.007	0.083	0.021
2008	967,833	98,345	54883	13.783	11.496	10.913	17.634	1.792	0.057	0.943	0.053	0.947	-0.095	0.058	0.075	-0.169
2009	1,433,529	93,663	56869	14.176	11.447	10.949	25.208	1.647	0.040	0.960	0.048	0.952	0.379	0.022	-0.062	0.438
2010	1,154,847	87,954	62467	13.959	11.385	11.042	18.487	1.408	0.054	0.946	0.047	0.953	-0.223	0.087	-0.070	-0.161
2011	1,269,199	82,935	63119	14.054	11.326	11.053	20.108	1.314	0.050	0.950	0.052	0.948	0.092	0.007	-0.062	0.150

b. TFP INDEX: **Chugai pharmaceutical firm (4519)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	136.500	108.978	101.208	102.479	133.20
1992	154.313	116.333	96.415	99.110	155.70
1993	168.841	123.333	94.551	97.837	172.57
1994	186.521	130.876	104.259	107.773	173.07
1995	42.251	131.186	104.454	101.656	41.56
1996	175.830	136.583	119.100	114.021	154.21
1997	179.126	136.206	141.091	143.062	125.21
1998	162.375	140.172	164.549	164.941	98.44
1999	218.353	138.094	174.532	175.079	124.72
2000	285.208	188.566	172.333	177.468	160.71
2001	257.142	188.351	165.761	170.539	150.78
2002	240.533	188.669	171.975	175.904	136.74
2003	369.583	219.001	197.929	203.428	181.68
2004	362.838	229.567	189.657	196.723	184.44
2005	526.606	221.265	166.899	174.609	301.59
2006	394.265	259.439	179.282	188.183	209.51
2007	435.580	257.614	194.863	202.908	214.67
2008	396.133	272.992	210.038	218.356	181.42
2009	578.836	279.056	197.343	206.535	280.26
2010	462.961	304.325	183.985	194.101	238.52
2011	507.322	306.605	172.981	182.833	277.48

c. CFI INDEX: **Chugai pharmaceutical firm (4519)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.082								100
1991	0.066	0.074	0.926	1.090	1.012	1.006	1.011	1.018	101.76
1992	0.062	0.064	0.936	1.067	0.953	1.004	0.956	0.960	97.65
1993	0.060	0.061	0.939	1.060	0.981	1.004	0.982	0.985	96.22
1994	0.058	0.059	0.941	1.061	1.103	1.004	1.096	1.100	105.86
1995	0.255	0.157	0.843	1.002	1.002	1.000	1.002	1.002	106.07
1996	0.064	0.160	0.840	1.041	1.140	1.006	1.117	1.124	119.20
1997	0.063	0.063	0.937	0.997	1.185	1.000	1.172	1.172	139.68
1998	0.071	0.067	0.933	1.029	1.166	1.002	1.154	1.157	161.54
1999	0.052	0.062	0.938	0.985	1.061	0.999	1.057	1.056	170.57
2000	0.054	0.053	0.947	1.365	0.987	1.017	0.988	1.005	171.35
2001	0.060	0.057	0.943	0.999	0.962	1.000	0.964	0.964	165.17
2002	0.065	0.062	0.938	1.002	1.037	1.000	1.035	1.035	170.99
2003	0.049	0.057	0.943	1.161	1.151	1.008	1.142	1.151	196.89
2004	0.052	0.050	0.950	1.048	0.958	1.002	0.960	0.963	189.51
2005	0.035	0.043	0.957	0.964	0.880	0.998	0.885	0.883	167.43
2006	0.054	0.044	0.956	1.173	1.074	1.007	1.071	1.078	180.55
2007	0.049	0.051	0.949	0.993	1.087	1.000	1.082	1.082	195.34
2008	0.057	0.053	0.947	1.060	1.078	1.003	1.074	1.077	210.36
2009	0.040	0.048	0.952	1.022	0.940	1.001	0.942	0.943	198.45
2010	0.054	0.047	0.953	1.091	0.932	1.004	0.935	0.939	186.38
2011	0.050	0.052	0.948	1.007	0.940	1.000	0.943	0.944	175.86

a. TFPG INDEX: **Dainippon Sumitomo pharmaceutical firm (4506)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	223,443	14,082	10203	12.317	9.553	9.230	21.900	1.380	0.046	0.954						
1991	233,094	16,065	10724	12.359	9.684	9.280	21.736	1.498	0.046	0.954	0.046	0.954	0.074	0.082	0.164	-0.086
1992	210,856	22,352	11346	12.259	10.015	9.337	18.584	1.970	0.054	0.946	0.050	0.950	-0.083	0.073	0.347	-0.417
1993	206,116	28,186	12626	12.236	10.247	9.443	16.325	2.232	0.061	0.939	0.058	0.942	-0.010	0.119	0.244	-0.247
1994	215,692	26,624	12562	12.282	10.190	9.438	17.170	2.119	0.058	0.942	0.060	0.940	0.052	0.002	-0.050	0.099
1995	194,954	26,608	12964	12.181	10.189	9.470	15.038	2.052	0.066	0.934	0.062	0.938	-0.102	0.030	-0.002	-0.102
1996	206,271	28,501	13201	12.237	10.258	9.488	15.626	2.159	0.064	0.936	0.065	0.935	0.058	0.019	0.070	-0.009
1997	193,152	28,899	13382	12.171	10.272	9.502	14.434	2.160	0.069	0.931	0.067	0.933	-0.068	0.012	0.012	-0.080
1998	176,237	29,931	13337	12.080	10.307	9.498	13.214	2.244	0.076	0.924	0.072	0.928	-0.065	0.023	0.061	-0.124
1999	195,009	32,639	13619	12.181	10.393	9.519	14.319	2.397	0.070	0.930	0.073	0.927	0.098	0.018	0.083	0.019
2000	259,774	31,187	19464	12.468	10.348	9.876	13.346	1.602	0.075	0.925	0.072	0.928	0.280	0.350	-0.052	0.303
2001	306,062	31,486	19912	12.632	10.357	9.899	15.371	1.581	0.065	0.935	0.070	0.930	0.156	0.015	0.001	0.154
2002	324,005	33,637	19915	12.689	10.423	9.899	16.269	1.689	0.061	0.939	0.063	0.937	0.048	-0.009	0.057	-0.005
2003	285,144	35,374	19814	12.561	10.474	9.894	14.391	1.785	0.069	0.931	0.065	0.935	-0.130	-0.008	0.048	-0.174
2004	316,878	34,473	20688	12.666	10.448	9.937	15.317	1.666	0.065	0.935	0.067	0.933	0.105	0.043	-0.026	0.127
2005	226,793	32,610	20053	12.332	10.392	9.906	11.310	1.626	0.088	0.912	0.077	0.923	-0.337	-0.034	-0.058	-0.281
2006	536,427	68,335	43737	13.193	11.132	10.686	12.265	1.562	0.082	0.918	0.085	0.915	0.863	0.782	0.742	0.118
2007	772,451	65,241	41291	13.557	11.086	10.628	18.707	1.580	0.053	0.947	0.067	0.933	0.365	-0.057	-0.046	0.412
2008	679,005	70,279	40245	13.428	11.160	10.603	16.872	1.746	0.059	0.941	0.056	0.944	-0.115	-0.012	0.088	-0.198
2009	580,822	69,104	40102	13.272	11.143	10.599	14.484	1.723	0.069	0.931	0.064	0.936	-0.170	-0.017	-0.030	-0.140
2010	734,400	74,083	61390	13.507	11.213	11.025	11.963	1.207	0.084	0.916	0.076	0.924	0.227	0.419	0.062	0.138
2011	794,040	69,793	63950	13.585	11.153	11.066	12.417	1.091	0.081	0.919	0.082	0.918	0.075	0.038	-0.063	0.129

b. TFP INDEX: **Dainippon Sumitomo pharmaceutical firm (4506)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	107.72	108.53	117.80	117.35	91.79
1992	99.12	116.81	166.72	163.56	60.60
1993	98.12	131.62	212.89	206.29	47.56
1994	103.39	131.88	202.50	196.48	52.62
1995	93.33	135.92	202.11	196.11	47.59
1996	98.88	138.58	216.77	209.21	47.26
1997	92.39	140.19	219.34	211.46	43.69
1998	86.55	143.44	233.23	223.21	38.77
1999	95.45	145.99	253.49	241.40	39.54
2000	126.31	207.27	240.61	235.99	53.53
2001	147.61	210.32	240.95	236.80	62.34
2002	154.87	208.47	255.10	250.44	61.84
2003	135.95	206.89	267.61	261.46	52.00
2004	151.07	215.99	260.76	255.68	59.08
2005	107.83	208.80	246.01	240.50	44.84
2006	255.66	456.51	516.75	504.90	50.64
2007	368.36	431.23	493.65	485.74	75.84
2008	328.26	426.09	539.09	530.15	61.92
2009	277.01	418.85	522.93	512.47	54.05
2010	347.74	636.60	556.58	556.79	62.45
2011	374.88	661.22	522.83	526.78	71.16

c. CFI INDEX: **Dainippon Sumitomo pharmaceutical firm (4506)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.046								100
1991	0.046	0.046	0.954	1.085	1.178	1.004	1.169	1.174	117.36
1992	0.054	0.050	0.950	1.076	1.415	1.004	1.391	1.396	163.84
1993	0.061	0.058	0.942	1.127	1.277	1.007	1.259	1.268	207.71
1994	0.058	0.060	0.940	1.002	0.951	1.000	0.954	0.954	198.19
1995	0.066	0.062	0.938	1.031	0.998	1.002	0.998	1.000	198.21
1996	0.064	0.065	0.935	1.020	1.073	1.001	1.068	1.069	211.88
1997	0.069	0.067	0.933	1.012	1.012	1.001	1.011	1.012	214.39
1998	0.076	0.072	0.928	1.023	1.063	1.002	1.059	1.060	227.33
1999	0.070	0.073	0.927	1.018	1.087	1.001	1.080	1.082	245.90
2000	0.075	0.072	0.928	1.420	0.949	1.026	0.953	0.977	240.31
2001	0.065	0.070	0.930	1.015	1.001	1.001	1.001	1.002	240.87
2002	0.061	0.063	0.937	0.991	1.059	0.999	1.055	1.054	253.95
2003	0.069	0.065	0.935	0.992	1.049	1.000	1.046	1.045	265.44
2004	0.065	0.067	0.933	1.044	0.974	1.003	0.976	0.979	259.86
2005	0.088	0.077	0.923	0.967	0.943	0.997	0.948	0.945	245.61
2006	0.082	0.085	0.915	2.186	2.101	1.069	1.972	2.108	517.68
2007	0.053	0.067	0.933	0.945	0.955	0.996	0.958	0.955	494.16
2008	0.059	0.056	0.944	0.988	1.092	0.999	1.087	1.086	536.61
2009	0.069	0.064	0.936	0.983	0.970	0.999	0.972	0.971	520.97
2010	0.084	0.076	0.924	1.520	1.064	1.032	1.059	1.094	569.78
2011	0.081	0.082	0.918	1.039	0.939	1.003	0.944	0.947	539.66

a. TFPG INDEX: **Kyowa Hakko pharmaceutical firm (4151)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	$1-\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	570,158	17,472	19558	13.254	9.768	9.881	29.152	0.893	0.034	0.966						0.000
1991	563,478	19,478	19558	13.242	9.877	9.881	28.810	0.996	0.035	0.965	0.035	0.965	0.020	0.032	0.111	-0.088
1992	587,195	19,609	20655	13.283	9.884	9.936	28.429	0.949	0.035	0.965	0.035	0.965	0.058	0.072	0.056	0.002
1993	192,373	18,472	21893	12.167	9.824	9.994	8.787	0.844	0.114	0.886	0.074	0.926	-1.103	0.071	0.038	-1.144
1994	657,075	18,192	22185	13.396	9.809	10.007	29.618	0.820	0.034	0.966	0.074	0.926	1.235	0.020	-0.025	1.257
1995	578,078	19,898	22858	13.267	9.898	10.037	25.290	0.870	0.040	0.960	0.037	0.963	-0.129	0.029	-0.017	-0.114
1996	490,728	4,842	22858	13.104	8.485	10.037	21.469	0.212	0.047	0.953	0.043	0.957	-0.163	0.001	0.005	-0.167
1997	487,819	22,273	23099	13.098	10.011	10.048	21.119	0.964	0.047	0.953	0.047	0.953	-0.008	0.008	0.037	-0.044
1998	486,814	24,656	23404	13.096	10.113	10.061	20.800	1.053	0.048	0.952	0.048	0.952	0.024	0.039	0.096	-0.069
1999	516,049	23,313	23139	13.154	10.057	10.049	22.302	1.008	0.045	0.955	0.046	0.954	0.055	-0.015	0.033	0.024
2000	400,798	25,010	33538	12.901	10.127	10.420	11.951	0.746	0.084	0.916	0.064	0.936	-0.259	0.365	-0.009	-0.275
2001	320,122	28,344	33382	12.676	10.252	10.416	9.590	0.849	0.104	0.896	0.094	0.906	-0.233	-0.013	-0.007	-0.225
2002	396,807	28,731	32047	12.891	10.266	10.375	12.382	0.897	0.081	0.919	0.093	0.907	0.206	-0.050	-0.217	0.407
2003	269,511	30,932	32391	12.504	10.340	10.386	8.321	0.955	0.120	0.880	0.100	0.900	-0.389	0.008	-0.107	-0.294
2004	485,404	28,723	45104	13.093	10.265	10.717	10.762	0.637	0.093	0.907	0.107	0.893	0.588	0.331	-0.055	0.602
2005	546,912	28,324	44242	13.212	10.251	10.697	12.362	0.640	0.081	0.919	0.087	0.913	0.117	-0.022	-0.056	0.170
2006	449,456	32,317	44686	13.016	10.383	10.707	10.058	0.723	0.099	0.901	0.090	0.910	-0.194	0.012	-0.036	-0.162
2007	562,572	32,687	43642	13.240	10.395	10.684	12.891	0.749	0.078	0.922	0.088	0.912	0.225	-0.023	0.035	0.195
2008	611,542	33,457	43642	13.324	10.418	10.684	14.013	0.767	0.071	0.929	0.074	0.926	0.097	0.014	0.055	0.045
2009	896,212	34,795	44432	13.706	10.457	10.702	20.170	0.783	0.050	0.950	0.060	0.940	0.369	0.004	0.522	-0.122
2010	784,154	44,064	59444	13.572	10.693	10.993	13.191	0.741	0.076	0.924	0.063	0.937	-0.141	0.284	-0.025	-0.135
2011	600,151	47,927	61741	13.305	10.777	11.031	9.721	0.776	0.103	0.897	0.089	0.911	-0.270	0.035	-0.265	-0.032

b. TFP INDEX: **Kyowa Hakko pharmaceutical firm (4151)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	102.05	103.26	111.70	111.36	91.64
1992	108.17	110.92	118.11	117.72	91.89
1993	35.89	119.06	122.70	114.23	31.42
1994	123.43	121.49	119.65	111.91	110.30
1995	108.45	125.02	117.63	117.41	92.37
1996	92.19	125.18	118.17	116.69	79.00
1997	91.45	126.23	122.61	120.13	76.13
1998	93.69	131.31	134.95	131.69	71.14
1999	98.99	129.39	139.53	136.16	72.70
2000	76.37	186.30	138.33	133.91	57.03
2001	60.51	183.93	137.35	127.38	47.50
2002	74.33	174.99	110.56	104.35	71.23
2003	50.36	176.43	99.32	93.89	53.64
2004	90.69	245.65	94.05	91.99	98.59
2005	101.90	240.31	88.90	88.52	115.11
2006	83.95	243.31	85.76	85.57	98.10
2007	105.14	237.77	88.79	88.24	119.15
2008	115.86	241.04	93.84	93.94	123.33
2009	167.51	242.09	158.19	155.16	107.96
2010	145.51	321.56	154.33	153.88	94.56
2011	111.04	333.01	118.43	118.14	93.99

c. CFI INDEX: **Kyowa Hakko pharmaceutical (4151)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.0343								100
1991	0.0347	0.035	0.965	1.033	1.117	1.001	1.113	1.114	111.40
1992	0.0352	0.035	0.965	1.074	1.057	1.003	1.055	1.058	117.86
1993	0.1138	0.074	0.926	1.073	1.039	1.005	1.036	1.041	122.73
1994	0.0338	0.074	0.926	1.020	0.975	1.001	0.977	0.978	120.09
1995	0.0395	0.037	0.963	1.029	0.983	1.001	0.984	0.985	118.25
1996	0.0466	0.043	0.957	1.001	1.005	1.000	1.004	1.004	118.78
1997	0.0474	0.047	0.953	1.008	1.038	1.000	1.036	1.036	123.08
1998	0.0481	0.048	0.952	1.040	1.101	1.002	1.096	1.098	135.10
1999	0.0448	0.046	0.954	0.985	1.034	0.999	1.032	1.032	139.37
2000	0.0837	0.064	0.936	1.440	0.991	1.024	0.992	1.015	141.53
2001	0.1043	0.094	0.906	0.987	0.993	0.999	0.994	0.992	140.45
2002	0.0808	0.093	0.907	0.951	0.805	0.995	0.821	0.818	114.82
2003	0.1202	0.100	0.900	1.008	0.898	1.001	0.908	0.909	104.35
2004	0.0929	0.107	0.893	1.392	0.947	1.036	0.952	0.987	102.95
2005	0.0809	0.087	0.913	0.978	0.945	0.998	0.950	0.948	97.60
2006	0.0994	0.090	0.910	1.012	0.965	1.001	0.968	0.969	94.57
2007	0.0776	0.088	0.912	0.977	1.035	0.998	1.032	1.030	97.41
2008	0.0714	0.074	0.926	1.014	1.057	1.001	1.053	1.054	102.64
2009	0.0496	0.060	0.940	1.004	1.686	1.000	1.633	1.634	167.68
2010	0.0758	0.063	0.937	1.328	0.976	1.018	0.977	0.995	166.79
2011	0.1029	0.089	0.911	1.036	0.767	1.003	0.786	0.788	131.47

a. TFPG INDEX: **Shionogi & Co. pharmaceutical firm (4507)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	521,693	61,013	29443	13.165	11.019	10.290	17.719	2.072	0.056	0.944						0.000
1991	467,796	60,882	30976	13.056	11.017	10.341	15.102	1.965	0.066	0.934	0.061	0.939	-0.077	0.083	0.030	-0.110
1992	449,553	63,717	32953	13.016	11.062	10.403	13.642	1.934	0.073	0.927	0.070	0.930	-0.023	0.079	0.063	-0.086
1993	529,821	66,428	33831	13.180	11.104	10.429	15.661	1.964	0.064	0.936	0.069	0.931	0.177	0.039	0.054	0.124
1994	551,998	63,274	34298	13.221	11.055	10.443	16.094	1.845	0.062	0.938	0.063	0.937	0.048	0.021	-0.042	0.086
1995	563,925	62,825	35365	13.243	11.048	10.473	15.946	1.776	0.063	0.937	0.062	0.938	0.020	0.029	-0.008	0.026
1996	454,181	61,478	35231	13.026	11.026	10.470	12.891	1.745	0.078	0.922	0.070	0.930	-0.215	-0.002	-0.020	-0.196
1997	472,965	68,978	35215	13.067	11.142	10.469	13.431	1.959	0.074	0.926	0.076	0.924	0.038	-0.003	0.113	-0.066
1998	379,528	68,866	34178	12.847	11.140	10.439	11.105	2.015	0.090	0.910	0.082	0.918	-0.194	-0.004	0.025	-0.216
1999	466,905	73,269	33375	13.054	11.202	10.416	13.990	2.195	0.071	0.929	0.081	0.919	0.204	-0.027	0.059	0.152
2000	553,881	86,613	47441	13.225	11.369	10.767	11.675	1.826	0.086	0.914	0.079	0.921	0.164	0.345	0.161	-0.011
2001	521,548	87,971	47168	13.165	11.385	10.761	11.057	1.865	0.090	0.910	0.088	0.912	-0.068	-0.014	0.007	-0.074
2002	378,221	86,387	42091	12.843	11.367	10.648	8.986	2.052	0.111	0.889	0.101	0.899	-0.330	-0.123	-0.027	-0.293
2003	455,296	75,585	39986	13.029	11.233	10.596	11.386	1.890	0.088	0.912	0.100	0.900	0.183	-0.054	-0.136	0.311
2004	468,732	71,993	42562	13.058	11.184	10.659	11.013	1.692	0.091	0.909	0.089	0.911	0.029	0.062	-0.049	0.068
2005	519,122	68,191	45472	13.160	11.130	10.725	11.416	1.500	0.088	0.912	0.089	0.911	0.099	0.063	-0.057	0.146
2006	484,645	64,251	42655	13.091	11.071	10.661	11.362	1.506	0.088	0.912	0.088	0.912	-0.066	-0.062	-0.057	-0.009
2007	535,914	67,815	43114	13.192	11.125	10.672	12.430	1.573	0.080	0.920	0.084	0.916	0.101	0.011	0.055	0.050
2008	702,736	70,377	40866	13.463	11.162	10.618	17.196	1.722	0.058	0.942	0.069	0.931	0.285	-0.040	0.051	0.240
2009	674,572	71,811	49322	13.422	11.182	10.806	13.677	1.456	0.073	0.927	0.066	0.934	-0.054	0.174	0.007	-0.072
2010	888,626	62,447	48056	13.697	11.042	10.780	18.491	1.299	0.054	0.946	0.064	0.936	0.268	-0.033	-0.147	0.408
2011	991,707	70,220	42267	13.807	11.159	10.652	23.463	1.661	0.043	0.957	0.048	0.952	0.107	-0.131	0.114	0.004

b. TFP INDEX: **Shionogi & Co. pharmaceutical firm (4507)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	92.59	108.64	103.04	103.01	89.89
1992	90.51	117.56	109.69	109.16	82.92
1993	108.02	122.21	115.80	115.21	93.76
1994	113.33	124.77	111.08	111.36	101.77
1995	115.63	128.48	110.15	110.73	104.43
1996	93.25	128.16	107.92	108.15	86.22
1997	96.90	127.84	120.84	119.64	81.00
1998	79.83	127.38	123.85	121.83	65.53
1999	97.88	123.97	131.34	128.43	76.21
2000	115.35	175.06	154.23	153.29	75.25
2001	107.74	172.64	155.38	153.26	70.30
2002	77.43	152.68	151.21	146.54	52.84
2003	92.97	144.68	131.98	129.07	72.03
2004	95.71	153.98	125.69	124.96	76.59
2005	105.71	164.07	118.73	119.33	88.59
2006	98.93	154.27	112.14	112.72	87.76
2007	109.46	156.03	118.43	118.79	92.15
2008	145.51	149.93	124.60	125.03	116.38
2009	137.79	178.51	125.43	127.51	108.07
2010	180.22	172.68	108.29	110.97	162.40
2011	200.53	151.44	121.41	123.44	162.45

c. CFI INDEX: **Shionogi & Co. pharmaceutical firm (4507)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.056								100
1991	0.066	0.061	0.939	1.086	1.030	1.005	1.029	1.034	103.37
1992	0.073	0.070	0.930	1.082	1.065	1.006	1.060	1.066	110.17
1993	0.064	0.069	0.931	1.040	1.056	1.003	1.052	1.055	116.19
1994	0.062	0.063	0.937	1.021	0.959	1.001	0.962	0.963	111.89
1995	0.063	0.062	0.938	1.030	0.992	1.002	0.992	0.994	111.21
1996	0.078	0.070	0.930	0.998	0.980	1.000	0.981	0.981	109.10
1997	0.074	0.076	0.924	0.997	1.120	1.000	1.110	1.110	121.09
1998	0.090	0.082	0.918	0.996	1.025	1.000	1.023	1.023	123.83
1999	0.071	0.081	0.919	0.973	1.060	0.998	1.055	1.053	130.40
2000	0.086	0.079	0.921	1.412	1.174	1.027	1.160	1.191	155.37
2001	0.090	0.088	0.912	0.986	1.007	0.999	1.007	1.006	156.23
2002	0.111	0.101	0.899	0.884	0.973	0.988	0.976	0.964	150.58
2003	0.088	0.100	0.900	0.948	0.873	0.995	0.885	0.880	132.50
2004	0.091	0.089	0.911	1.064	0.952	1.006	0.957	0.962	127.45
2005	0.088	0.089	0.911	1.066	0.945	1.006	0.949	0.955	121.70
2006	0.088	0.088	0.912	0.940	0.944	0.995	0.949	0.944	114.90
2007	0.080	0.084	0.916	1.011	1.056	1.001	1.051	1.052	120.90
2008	0.058	0.069	0.931	0.961	1.052	0.997	1.048	1.045	126.40
2009	0.073	0.066	0.934	1.191	1.007	1.012	1.006	1.018	128.64
2010	0.054	0.064	0.936	0.967	0.863	0.998	0.871	0.870	111.87
2011	0.043	0.048	0.952	0.877	1.121	0.994	1.115	1.108	123.95

a. TFPG INDEX: **Ono pharmaceutical firm (4528)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t = α'	1-α'=β'	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	147,882	22,582	7362	11.904	10.025	8.904	20.087	3.067	0.050	0.950						0.000
1991	514,778	27,981	7698	13.151	10.239	8.949	66.870	3.635	0.015	0.985	0.032	0.968	1.279	0.077	0.246	1.038
1992	508,405	33,295	8235	13.139	10.413	9.016	61.738	4.043	0.016	0.984	0.016	0.984	0.005	0.084	0.191	-0.185
1993	606,958	33,587	8868	13.316	10.422	9.090	68.445	3.788	0.015	0.985	0.015	0.985	0.190	0.087	0.021	0.167
1994	743,015	36,096	9655	13.518	10.494	9.175	76.956	3.739	0.013	0.987	0.014	0.986	0.209	0.092	0.079	0.130
1995	807,319	37,407	10409	13.601	10.530	9.250	77.559	3.594	0.013	0.987	0.013	0.987	0.082	0.074	0.034	0.047
1996	885,619	47,353	10899	13.694	10.765	9.296	81.260	4.345	0.012	0.988	0.013	0.987	0.094	0.047	0.237	-0.141
1997	820,125	50,041	11165	13.617	10.821	9.321	73.457	4.482	0.014	0.986	0.013	0.987	-0.079	0.022	0.053	-0.132
1998	815,929	47,535	11279	13.612	10.769	9.331	72.341	4.215	0.014	0.986	0.014	0.986	0.021	0.036	-0.025	0.045
1999	927,719	48,728	11639	13.740	10.794	9.362	79.707	4.187	0.013	0.987	0.013	0.987	0.125	0.028	0.021	0.104
2000	936,042	53,454	18602	13.749	10.887	9.831	50.318	2.873	0.020	0.980	0.016	0.984	0.002	0.462	0.086	-0.090
2001	964,747	55,502	19457	13.780	10.924	9.876	49.584	2.853	0.020	0.980	0.020	0.980	0.022	0.037	0.029	-0.008
2002	876,246	53,012	19836	13.683	10.878	9.895	44.174	2.673	0.023	0.977	0.021	0.979	-0.105	0.010	-0.055	-0.052
2003	805,347	59,769	20167	13.599	10.998	9.912	39.934	2.964	0.025	0.975	0.024	0.976	-0.087	0.014	0.117	-0.202
2004	856,287	61,879	21367	13.660	11.033	9.970	40.076	2.896	0.025	0.975	0.025	0.975	0.061	0.058	0.035	0.026
2005	911,896	59,216	21236	13.723	10.989	9.963	42.941	2.788	0.023	0.977	0.024	0.976	0.060	-0.009	-0.047	0.106
2006	899,747	55,774	21777	13.710	10.929	9.989	41.317	2.561	0.024	0.976	0.024	0.976	-0.011	0.028	-0.057	0.044
2007	890,643	53,215	22433	13.700	10.882	10.018	39.703	2.372	0.025	0.975	0.025	0.975	-0.010	0.030	-0.046	0.035
2008	812,249	51,262	22639	13.608	10.845	10.027	35.879	2.264	0.028	0.972	0.027	0.973	-0.078	0.023	-0.024	-0.056
2009	750,997	50,540	22197	13.529	10.831	10.008	33.833	2.277	0.030	0.970	0.029	0.971	-0.092	-0.033	-0.028	-0.064
2010	635,423	50,009	22283	13.362	10.820	10.012	28.516	2.244	0.035	0.965	0.032	0.968	-0.174	-0.003	-0.018	-0.157
2011	513,455	48,616	22345	13.149	10.792	10.014	22.979	2.176	0.044	0.956	0.039	0.961	-0.216	0.000	-0.031	-0.186

b. TFP INDEX: **Ono pharmaceutical firm (4528)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	359.45	107.97	127.95	129.76	277.02
1992	361.10	117.49	154.86	160.23	225.37
1993	436.55	128.12	158.20	163.88	266.39
1994	538.15	140.47	171.20	177.76	302.73
1995	583.97	151.24	177.19	184.29	316.88
1996	641.43	158.56	224.60	233.13	275.14
1997	592.76	162.09	236.85	245.62	241.33
1998	605.43	168.11	230.98	239.47	252.83
1999	686.12	172.91	236.00	244.88	280.19
2000	687.70	274.53	257.18	267.33	257.25
2001	703.04	284.81	264.87	274.25	256.35
2002	632.82	287.75	250.71	259.58	243.78
2003	580.17	291.83	281.97	290.53	199.70
2004	616.80	309.16	291.89	300.55	205.23
2005	655.09	306.44	278.58	287.37	227.96
2006	647.91	314.99	263.02	271.97	238.23
2007	641.74	324.68	251.10	259.90	246.92
2008	593.31	332.17	245.21	253.72	233.84
2009	541.18	321.30	238.50	246.30	219.72
2010	454.61	320.22	234.30	241.36	188.35
2011	366.28	320.18	227.11	232.92	157.25

c. CFI INDEX: **Ono pharmaceutical firm (4528)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.050								100
1991	0.015	0.032	0.968	1.080	1.279	1.002	1.269	1.272	127.25
1992	0.016	0.016	0.984	1.088	1.210	1.001	1.207	1.208	153.76
1993	0.015	0.015	0.985	1.090	1.022	1.001	1.021	1.023	157.23
1994	0.013	0.014	0.986	1.096	1.082	1.001	1.081	1.082	170.19
1995	0.013	0.013	0.987	1.077	1.035	1.001	1.035	1.036	176.23
1996	0.012	0.013	0.987	1.048	1.268	1.001	1.264	1.264	222.84
1997	0.014	0.013	0.987	1.022	1.055	1.000	1.054	1.054	234.91
1998	0.014	0.014	0.986	1.037	0.975	1.001	0.976	0.976	229.28
1999	0.013	0.013	0.987	1.029	1.022	1.000	1.021	1.022	234.28
2000	0.020	0.016	0.984	1.588	1.090	1.008	1.088	1.096	256.87
2001	0.020	0.020	0.980	1.037	1.030	1.001	1.029	1.030	264.58
2002	0.023	0.021	0.979	1.010	0.947	1.000	0.948	0.948	250.80
2003	0.025	0.024	0.976	1.014	1.125	1.000	1.122	1.122	281.36
2004	0.025	0.025	0.975	1.059	1.035	1.001	1.034	1.036	291.44
2005	0.023	0.024	0.976	0.991	0.954	1.000	0.955	0.955	278.40
2006	0.024	0.024	0.976	1.028	0.944	1.001	0.945	0.946	263.38
2007	0.025	0.025	0.975	1.031	0.955	1.001	0.956	0.956	251.92
2008	0.028	0.027	0.973	1.023	0.977	1.001	0.977	0.978	246.32
2009	0.030	0.029	0.971	0.967	0.973	0.999	0.973	0.972	239.54
2010	0.035	0.032	0.968	0.997	0.982	1.000	0.983	0.983	235.43
2011	0.044	0.039	0.961	1.000	0.969	1.000	0.971	0.970	228.48

a. TFPG INDEX: **Hisamitsu pharmaceutical firm (4530)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	72,421	12,325	2371	9.419	9.419	7.771	30.539	5.197	0.033	0.967						0.000
1991	75,111	15,107	2681	9.623	9.623	7.894	28.015	5.635	0.036	0.964	0.034	0.966	0.069	0.155	0.236	-0.164
1992	88,438	24,495	2978	10.106	10.106	7.999	29.699	8.226	0.034	0.966	0.035	0.965	0.180	0.122	0.500	-0.307
1993	108,643	25,516	3183	10.147	10.147	8.065	34.137	8.017	0.029	0.971	0.031	0.969	0.218	0.079	0.053	0.164
1994	110,240	27,021	3320	10.204	10.204	8.108	33.202	8.138	0.030	0.970	0.030	0.970	0.022	0.049	0.064	-0.042
1995	117,167	28,752	3447	10.266	10.266	8.145	33.991	8.341	0.029	0.971	0.030	0.970	0.060	0.036	0.061	0.000
1996	111,493	29,673	3633	10.298	10.298	8.198	30.689	8.168	0.033	0.967	0.031	0.969	-0.048	0.054	0.033	-0.082
1997	139,087	30,026	3507	10.310	10.310	8.162	39.665	8.563	0.025	0.975	0.029	0.971	0.219	-0.037	0.010	0.211
1998	161,660	32,807	3690	10.398	10.398	8.213	43.811	8.891	0.023	0.977	0.024	0.976	0.177	0.077	0.115	0.063
1999	160,584	32,131	3804	10.378	10.378	8.244	42.218	8.447	0.024	0.976	0.023	0.977	-0.010	0.027	-0.024	0.013
2000	213,536	31,341	3482	10.353	10.353	8.155	61.323	9.000	0.016	0.984	0.020	0.980	0.278	-0.095	-0.032	0.311
2001	256,734	33,963	5800	10.433	10.433	8.666	44.261	5.855	0.023	0.977	0.019	0.981	0.176	0.502	0.072	0.096
2002	276,932	33,961	6102	10.433	10.433	8.716	45.387	5.566	0.022	0.978	0.022	0.978	0.067	0.042	-0.009	0.075
2003	290,261	37,164	6231	10.523	10.523	8.737	46.585	5.965	0.021	0.979	0.022	0.978	0.045	0.018	0.088	-0.042
2004	311,722	36,620	6402	10.508	10.508	8.764	48.691	5.720	0.021	0.979	0.021	0.979	0.071	0.027	-0.015	0.085
2005	354,962	35,168	9682	10.468	10.468	9.178	36.661	3.632	0.027	0.973	0.024	0.976	0.127	0.411	-0.043	0.160
2006	387,808	36,169	10598	10.496	10.496	9.268	36.592	3.413	0.027	0.973	0.027	0.973	0.091	0.093	0.030	0.059
2007	409,252	38,497	10722	10.558	10.558	9.280	38.169	3.590	0.026	0.974	0.027	0.973	0.054	0.012	0.063	-0.007
2008	459,306	40,299	11396	10.604	10.604	9.341	40.303	3.536	0.025	0.975	0.026	0.974	0.129	0.075	0.059	0.069
2009	526,051	40,325	12331	10.605	10.605	9.420	42.659	3.270	0.023	0.977	0.024	0.976	0.122	0.065	-0.013	0.133
2010	492,010	46,218	16640	10.741	10.741	9.720	29.567	2.777	0.034	0.966	0.029	0.971	-0.074	0.292	0.129	-0.208
2011	487,728	44,260	16688	10.698	10.698	9.722	29.226	2.652	0.034	0.966	0.034	0.966	-0.012	0.000	-0.046	0.033

b. TFP INDEX: **Hisamitsu pharmaceutical firm (4530)**.

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	107.10	116.74	126.57	125.91	85.06
1992	128.26	131.89	208.75	204.80	62.63
1993	159.56	142.74	220.20	217.67	73.31
1994	163.04	149.96	234.81	232.87	70.01
1995	173.06	155.48	249.54	247.26	69.99
1996	164.89	164.08	257.86	255.01	64.66
1997	205.27	158.04	260.38	258.28	79.48
1998	244.94	170.74	292.08	292.52	83.74
1999	242.51	175.42	285.12	286.36	84.69
2000	320.35	159.53	276.27	279.06	114.80
2001	382.03	263.59	296.96	302.83	126.15
2002	408.39	274.79	294.27	298.92	136.62
2003	426.98	279.91	321.23	326.12	130.93
2004	458.50	287.57	316.49	322.03	142.38
2005	520.70	433.74	303.13	310.22	167.85
2006	570.25	475.92	312.50	318.96	178.78
2007	602.14	481.77	332.82	339.46	177.38
2008	685.08	519.10	353.19	360.96	189.80
2009	774.06	554.13	348.65	357.62	216.45
2010	718.78	742.39	396.74	406.67	176.75
2011	710.45	742.36	378.82	386.78	183.68

c. CFI INDEX: **Hisamitsu pharmaceutical firm (4530)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.033								100
1991	0.036	0.034	0.966	1.167	1.266	1.005	1.255	1.262	126.22
1992	0.034	0.035	0.965	1.130	1.649	1.004	1.621	1.628	205.46
1993	0.029	0.031	0.969	1.082	1.055	1.002	1.053	1.056	216.90
1994	0.030	0.030	0.970	1.051	1.066	1.001	1.064	1.066	231.20
1995	0.029	0.030	0.970	1.037	1.063	1.001	1.061	1.062	245.52
1996	0.033	0.031	0.969	1.055	1.033	1.002	1.032	1.034	253.87
1997	0.025	0.029	0.971	0.963	1.010	0.999	1.009	1.008	256.00
1998	0.023	0.024	0.976	1.080	1.122	1.002	1.119	1.121	286.91
1999	0.024	0.023	0.977	1.027	0.976	1.001	0.977	0.977	280.40
2000	0.016	0.020	0.980	0.909	0.969	0.998	0.970	0.968	271.36
2001	0.023	0.019	0.981	1.652	1.075	1.010	1.073	1.084	294.12
2002	0.022	0.022	0.978	1.042	0.991	1.001	0.991	0.992	291.80
2003	0.021	0.022	0.978	1.019	1.092	1.000	1.090	1.090	318.04
2004	0.021	0.021	0.979	1.027	0.985	1.001	0.986	0.986	313.63
2005	0.027	0.024	0.976	1.508	0.958	1.010	0.959	0.968	303.67
2006	0.027	0.027	0.973	1.097	1.031	1.003	1.030	1.033	313.59
2007	0.026	0.027	0.973	1.012	1.065	1.000	1.063	1.064	333.52
2008	0.025	0.026	0.974	1.077	1.061	1.002	1.060	1.062	354.07
2009	0.023	0.024	0.976	1.067	0.987	1.002	0.987	0.989	350.19
2010	0.034	0.029	0.971	1.340	1.138	1.008	1.134	1.143	400.35
2011	0.034	0.034	0.966	1.000	0.955	1.000	0.956	0.956	382.88

a. TFPG INDEX: **Rhoto pharmaceutical firm (4527)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	126,276	4,896	5746	11.746	8.496	8.656	21.975	0.852	0.046	0.954						
1991	119,430	5,992	6140	11.690	8.698	8.723	19.452	0.976	0.051	0.949	0.048	0.952	-0.024	0.098	0.234	-0.251
1992	101,842	5,954	6202	11.531	8.692	8.733	16.422	0.960	0.061	0.939	0.056	0.944	-0.142	0.027	0.011	-0.154
1993	91,839	6,157	6189	11.428	8.725	8.730	14.840	0.995	0.067	0.933	0.064	0.936	-0.091	0.010	0.046	-0.135
1994	96,179	5,918	6479	11.474	8.686	8.776	14.845	0.913	0.067	0.933	0.067	0.933	0.053	0.053	-0.033	0.080
1995	90,010	5,838	6810	11.408	8.672	8.826	13.217	0.857	0.076	0.924	0.072	0.928	-0.068	0.049	-0.015	-0.057
1996	100,521	6,682	7011	11.518	8.807	8.855	14.337	0.953	0.070	0.930	0.073	0.927	0.112	0.030	0.136	-0.017
1997	124,980	13,125	7190	11.736	9.482	8.880	17.382	1.825	0.058	0.942	0.064	0.936	0.216	0.023	0.673	-0.416
1998	143,656	17,990	7326	11.875	9.798	8.899	19.608	2.456	0.051	0.949	0.054	0.946	0.166	0.045	0.342	-0.160
1999	167,944	25,755	7614	12.031	10.156	8.938	22.058	3.383	0.045	0.955	0.048	0.952	0.153	0.035	0.355	-0.187
2000	120,784	22,964	12172	11.702	10.042	9.407	9.923	1.887	0.101	0.899	0.073	0.927	-0.336	0.463	-0.121	-0.258
2001	126,950	24,255	12726	11.752	10.096	9.451	9.976	1.906	0.100	0.900	0.101	0.899	0.042	0.036	0.047	-0.004
2002	108,334	24,997	12374	11.593	10.127	9.423	8.755	2.020	0.114	0.886	0.107	0.893	-0.168	-0.037	0.021	-0.182
2003	131,098	27,630	12206	11.784	10.227	9.410	10.740	2.264	0.093	0.907	0.104	0.896	0.188	-0.016	0.098	0.102
2004	140,551	25,356	13701	11.853	10.141	9.525	10.258	1.851	0.097	0.903	0.095	0.905	0.070	0.115	-0.086	0.136
2005	158,452	24,822	13922	11.973	10.119	9.541	11.382	1.783	0.088	0.912	0.093	0.907	0.117	0.013	-0.024	0.138
2006	192,321	29,788	15821	12.167	10.302	9.669	12.156	1.883	0.082	0.918	0.085	0.915	0.196	0.130	0.185	0.016
2007	214,280	34,457	21210	12.275	10.447	9.962	10.103	1.625	0.099	0.901	0.091	0.909	0.109	0.294	0.146	-0.051
2008	253,293	33,908	27233	12.442	10.431	10.212	9.301	1.245	0.108	0.892	0.103	0.897	0.181	0.264	-0.002	0.156
2009	247,673	35,649	31433	12.420	10.481	10.356	7.879	1.134	0.127	0.873	0.117	0.883	-0.036	0.130	0.037	-0.083
2010	256,016	35,269	31546	12.453	10.471	10.359	8.116	1.118	0.123	0.877	0.125	0.875	0.026	-0.004	-0.018	0.042
2011	251,185	39,427	32085	12.434	10.582	10.376	7.829	1.229	0.128	0.872	0.125	0.875	-0.022	0.014	0.109	-0.119

b. TFP INDEX: **Rhoto pharmaceutical firm (4527)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	97.66	110.33	126.39	125.62	77.75
1992	84.71	113.36	127.74	127.11	66.65
1993	77.36	114.55	133.77	132.84	58.23
1994	81.58	120.76	129.47	129.32	63.08
1995	76.25	126.77	127.55	128.02	59.56
1996	85.26	130.68	146.19	145.64	58.54
1997	105.79	133.74	286.55	273.78	38.64
1998	124.83	139.90	403.22	381.25	32.74
1999	145.46	144.91	575.36	538.61	27.01
2000	103.92	230.14	509.61	482.98	21.52
2001	108.34	238.65	533.90	496.75	21.81
2002	91.62	229.98	545.30	502.02	18.25
2003	110.60	226.29	601.24	548.40	20.17
2004	118.56	253.98	551.70	516.49	22.96
2005	133.31	257.38	538.62	506.81	26.30
2006	162.19	293.19	647.93	609.52	26.61
2007	180.81	393.28	749.94	712.46	25.38
2008	216.67	511.92	748.15	726.09	29.84
2009	209.01	582.90	775.96	759.04	27.54
2010	214.50	580.81	762.18	746.16	28.75
2011	209.84	589.01	849.56	821.86	25.53

c. CFI INDEX: **Rhoto pharmaceutical firm (4527)**

Year	$(W/V)_{t-1}$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.046								100
1991	0.051	0.048	0.952	1.103	1.264	1.005	1.250	1.256	125.56
1992	0.061	0.056	0.944	1.027	1.011	1.002	1.010	1.012	127.02
1993	0.067	0.064	0.936	1.011	1.047	1.001	1.044	1.045	132.71
1994	0.067	0.067	0.933	1.054	0.968	1.004	0.970	0.973	129.19
1995	0.076	0.072	0.928	1.050	0.985	1.003	0.986	0.990	127.85
1996	0.070	0.073	0.927	1.031	1.146	1.002	1.135	1.137	145.41
1997	0.058	0.064	0.936	1.023	1.960	1.001	1.878	1.881	273.47
1998	0.051	0.054	0.946	1.046	1.407	1.002	1.381	1.385	378.68
1999	0.045	0.048	0.952	1.036	1.427	1.002	1.403	1.405	532.06
2000	0.101	0.073	0.927	1.588	0.886	1.034	0.894	0.924	491.80
2001	0.100	0.101	0.899	1.037	1.048	1.004	1.043	1.047	514.71
2002	0.114	0.107	0.893	0.964	1.021	0.996	1.019	1.015	522.43
2003	0.093	0.104	0.896	0.984	1.103	0.998	1.091	1.090	569.27
2004	0.097	0.095	0.905	1.122	0.918	1.011	0.925	0.935	532.48
2005	0.088	0.093	0.907	1.013	0.976	1.001	0.978	0.980	521.67
2006	0.082	0.085	0.915	1.139	1.203	1.011	1.184	1.197	624.63
2007	0.099	0.091	0.909	1.341	1.157	1.027	1.142	1.173	732.70
2008	0.108	0.103	0.897	1.302	0.998	1.028	0.998	1.025	751.30
2009	0.127	0.117	0.883	1.139	1.037	1.015	1.033	1.049	787.81
2010	0.123	0.125	0.875	0.996	0.982	1.000	0.984	0.984	775.20
2011	0.128	0.125	0.875	1.014	1.115	1.002	1.100	1.101	853.88

a. TFPG INDEX: **Santen pharmaceutical firm (4536)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	120,685	5,730	3,445	11.701	8.653	8.145	35.029	1.663	0.029	0.971						0.000
1991	149,538	7,758	3,828	11.915	8.957	8.250	39.067	2.027	0.026	0.974	0.027	0.973	0.246	0.137	0.303	-0.052
1992	166,645	11,871	4,535	12.024	9.382	8.419	36.750	2.618	0.027	0.973	0.026	0.974	0.125	0.186	0.425	-0.294
1993	211,925	17,815	5,155	12.264	9.788	8.548	41.114	3.456	0.024	0.976	0.026	0.974	0.253	0.141	0.406	-0.146
1994	226,444	19,200	5,654	12.330	9.863	8.640	40.051	3.396	0.025	0.975	0.025	0.975	0.073	0.099	0.075	-0.002
1995	276,236	24,796	6,266	12.529	10.118	8.743	44.085	3.957	0.023	0.977	0.024	0.976	0.197	0.102	0.256	-0.055
1996	280,506	42,918	6,466	12.544	10.667	8.774	43.380	6.637	0.023	0.977	0.023	0.977	0.017	0.033	0.549	-0.520
1997	308,101	47,277	7,131	12.638	10.764	8.872	43.208	6.630	0.023	0.977	0.023	0.977	0.092	0.096	0.097	-0.005
1998	260,736	43,424	7,206	12.471	10.679	8.883	36.181	6.026	0.028	0.972	0.025	0.975	-0.141	0.037	-0.085	-0.059
1999	304,187	39,638	7,447	12.625	10.588	8.916	40.845	5.322	0.024	0.976	0.026	0.974	0.151	0.030	-0.091	0.239
2000	342,960	37,415	10,980	12.745	10.530	9.304	31.234	3.407	0.032	0.968	0.028	0.972	0.113	0.382	-0.058	0.159
2001	330,207	36,683	11,857	12.707	10.510	9.381	27.849	3.094	0.036	0.964	0.034	0.966	-0.046	0.069	-0.020	-0.029
2002	255,496	42,159	11,596	12.451	10.649	9.358	22.033	3.636	0.045	0.955	0.041	0.959	-0.266	-0.031	0.139	-0.398
2003	228,758	40,850	11,848	12.340	10.618	9.380	19.309	3.448	0.052	0.948	0.049	0.951	-0.113	0.019	-0.032	-0.084
2004	283,049	37,237	16,189	12.553	10.525	9.692	17.484	2.300	0.057	0.943	0.054	0.946	0.213	0.312	-0.093	0.283
2005	333,540	32,676	16,260	12.718	10.394	9.696	20.513	2.010	0.049	0.951	0.053	0.947	0.161	0.002	-0.131	0.285
2006	364,135	30,395	16,965	12.805	10.322	9.739	21.463	1.792	0.047	0.953	0.048	0.952	0.090	0.045	-0.072	0.157
2007	359,891	30,485	16,381	12.794	10.325	9.704	21.970	1.861	0.046	0.954	0.046	0.954	-0.011	-0.034	0.003	-0.012
2008	347,649	29,848	16,539	12.759	10.304	9.713	21.020	1.805	0.048	0.952	0.047	0.953	-0.021	0.023	-0.021	-0.002
2009	274,087	26,574	18,287	12.521	10.188	9.814	14.988	1.453	0.067	0.933	0.057	0.943	-0.251	0.087	-0.116	-0.147
2010	462,095	24,956	19,565	13.044	10.125	9.881	23.619	1.276	0.042	0.958	0.055	0.945	0.515	0.060	-0.063	0.571
2011	416,324	24,956	21,204	12.939	10.125	9.962	19.634	1.177	0.051	0.949	0.047	0.953	-0.107	0.078	0.000	-0.111

b. TFP INDEX: **Santen pharmaceutical firm (4536)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	127.95	114.73	139.81	134.91	94.84
1992	145.04	138.25	217.61	205.23	70.67
1993	186.78	159.13	330.70	306.08	61.02
1994	200.97	175.77	358.90	330.53	60.80
1995	244.84	194.55	462.90	425.72	57.51
1996	248.95	201.03	802.25	729.17	34.14
1997	272.87	221.22	881.89	802.86	33.99
1998	237.07	229.52	831.59	736.53	32.19
1999	275.67	236.42	756.59	673.64	40.92
2000	308.75	346.26	709.44	641.49	48.13
2001	294.86	370.89	689.92	626.51	47.06
2002	226.10	359.46	785.79	709.75	31.86
2003	201.93	366.34	759.50	682.40	29.59
2004	249.83	500.53	692.26	631.29	39.57
2005	293.61	501.38	605.83	558.57	52.56
2006	321.31	524.39	564.89	524.43	61.27
2007	317.75	506.64	566.90	525.57	60.46
2008	311.17	518.56	562.69	515.50	60.36
2009	242.02	565.62	494.22	461.49	52.44
2010	405.10	600.82	460.80	436.74	92.76
2011	363.91	649.27	459.46	439.18	82.86

c. CFI INDEX: **Santen pharmaceutical firm (4536)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.029								100
1991	0.026	0.027	0.973	1.147	1.354	1.004	1.343	1.348	134.79
1992	0.027	0.026	0.974	1.205	1.530	1.005	1.513	1.521	204.96
1993	0.024	0.026	0.974	1.151	1.501	1.004	1.485	1.490	305.48
1994	0.025	0.025	0.975	1.105	1.078	1.002	1.076	1.078	329.43
1995	0.023	0.024	0.976	1.107	1.291	1.002	1.284	1.287	423.88
1996	0.023	0.023	0.977	1.033	1.731	1.001	1.709	1.711	725.07
1997	0.023	0.023	0.977	1.100	1.102	1.002	1.099	1.102	798.69
1998	0.028	0.025	0.975	1.038	0.919	1.001	0.920	0.921	735.87
1999	0.024	0.026	0.974	1.030	0.913	1.001	0.915	0.916	673.83
2000	0.032	0.028	0.972	1.465	0.944	1.011	0.945	0.956	643.98
2001	0.036	0.034	0.966	1.071	0.980	1.002	0.981	0.983	633.28
2002	0.045	0.041	0.959	0.969	1.149	0.999	1.143	1.141	722.80
2003	0.052	0.049	0.951	1.019	0.969	1.001	0.970	0.971	702.08
2004	0.057	0.054	0.946	1.366	0.912	1.017	0.916	0.932	654.25
2005	0.049	0.053	0.947	1.002	0.878	1.000	0.884	0.884	578.15
2006	0.047	0.048	0.952	1.046	0.930	1.002	0.933	0.935	540.81
2007	0.046	0.046	0.954	0.966	1.003	0.998	1.003	1.001	541.48
2008	0.048	0.047	0.953	1.024	0.979	1.001	0.980	0.981	531.26
2009	0.067	0.057	0.943	1.091	0.890	1.005	0.896	0.901	478.51
2010	0.042	0.055	0.945	1.062	0.939	1.003	0.942	0.945	452.40
2011	0.051	0.047	0.953	1.081	1.000	1.004	1.000	1.004	454.04

a. TFPG INDEX: **Tsumura pharmaceutical firm (4540)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	$1-\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	188,960	57,895	8660	12.149	10.966	9.066	21.820	6.685	0.046	0.954						0.000
1991	209,386	68,658	10436	12.252	11.137	9.253	20.064	6.579	0.050	0.950	0.048	0.952	0.135	0.219	0.203	-0.069
1992	180,423	79,054	11743	12.103	11.278	9.371	15.365	6.732	0.065	0.935	0.057	0.943	-0.132	0.135	0.158	-0.289
1993	200,716	80,752	12526	12.210	11.299	9.436	16.025	6.447	0.062	0.938	0.064	0.936	0.119	0.077	0.034	0.083
1994	199,021	79,024	12561	12.201	11.278	9.438	15.845	6.291	0.063	0.937	0.063	0.937	-0.002	0.010	-0.015	0.012
1995	648,699	78,381	12819	13.383	11.269	9.459	50.606	6.115	0.020	0.980	0.041	0.959	1.180	0.019	-0.009	1.189
1996	706,427	77,912	13057	13.468	11.263	9.477	54.103	5.967	0.018	0.982	0.019	0.981	0.087	0.020	-0.005	0.091
1997	344,047	73,609	13067	12.749	11.207	9.478	26.329	5.633	0.038	0.962	0.028	0.972	-0.722	-0.001	-0.059	-0.664
1998	91,205	69,607	12755	11.421	11.151	9.454	7.151	5.457	0.140	0.860	0.089	0.911	-1.301	0.002	-0.030	-1.275
1999	97,232	67,511	11802	11.485	11.120	9.376	8.238	5.720	0.121	0.879	0.131	0.869	0.061	-0.081	-0.034	0.101
2000	219,398	59,508	13398	12.299	10.994	9.503	16.375	4.442	0.061	0.939	0.091	0.909	0.807	0.120	-0.133	0.917
2001	415,104	46,883	14024	12.936	10.755	9.548	29.601	3.343	0.034	0.966	0.047	0.953	0.629	0.037	-0.247	0.863
2002	196,631	45,962	13991	12.189	10.736	9.546	14.054	3.285	0.071	0.929	0.052	0.948	-0.756	-0.011	-0.029	-0.728
2003	198,857	48,778	14257	12.200	10.795	9.565	13.948	3.421	0.072	0.928	0.071	0.929	0.009	0.016	0.057	-0.045
2004	221,165	49,219	17005	12.307	10.804	9.741	13.006	2.894	0.077	0.923	0.074	0.926	0.106	0.176	0.009	0.085
2005	180,316	47,702	17606	12.102	10.773	9.776	10.242	2.709	0.098	0.902	0.087	0.913	-0.207	0.032	-0.034	-0.179
2006	247,888	48,497	18518	12.421	10.789	9.827	13.386	2.619	0.075	0.925	0.086	0.914	0.321	0.053	0.019	0.299
2007	288,297	41,289	19377	12.572	10.628	9.872	14.879	2.131	0.067	0.933	0.071	0.929	0.152	0.046	-0.160	0.297
2008	282,446	40,251	21216	12.551	10.603	9.963	13.313	1.897	0.075	0.925	0.071	0.929	-0.007	0.104	-0.012	-0.003
2009	284,675	38,754	20645	12.559	10.565	9.935	13.789	1.877	0.073	0.927	0.074	0.926	-0.006	-0.041	-0.051	0.045
2010	335,295	40,857	21205	12.723	10.618	9.962	15.812	1.927	0.063	0.937	0.068	0.932	0.156	0.020	0.046	0.113
2011	351,439	42,154	21929	12.770	10.649	9.996	16.026	1.922	0.062	0.938	0.063	0.937	0.044	0.031	0.028	0.016

b. TFP INDEX: **Tsumura pharmaceutical firm (4540)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	114.42	124.44	122.46	122.09	93.72
1992	100.29	142.43	143.42	140.23	71.52
1993	112.98	153.84	148.36	143.72	78.61
1994	112.81	155.35	146.20	142.11	79.38
1995	367.22	158.34	144.82	146.57	250.54
1996	400.42	161.49	144.14	151.97	263.48
1997	194.61	161.28	135.89	141.20	137.83
1998	52.96	161.62	131.93	123.77	42.79
1999	56.28	149.06	127.54	110.79	50.80
2000	126.15	168.09	111.67	106.34	118.63
2001	236.74	174.51	87.27	89.91	263.30
2002	111.13	172.55	84.79	86.90	127.88
2003	112.11	175.38	89.76	89.69	125.01
2004	124.68	209.18	90.56	91.30	136.56
2005	101.38	215.98	87.53	87.54	115.81
2006	139.70	227.72	89.20	89.57	155.96
2007	162.57	238.42	75.99	78.57	206.91
2008	161.46	264.64	75.10	78.28	206.26
2009	160.54	254.06	71.33	74.29	216.11
2010	187.74	259.07	74.66	77.91	240.96
2011	196.20	267.13	76.81	80.43	243.95

c. CFI INDEX: **Tsumura pharmaceutical firm (4540)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.046								100
1991	0.050	0.048	0.952	1.244	1.225	1.011	1.213	1.226	122.55
1992	0.065	0.057	0.943	1.145	1.171	1.008	1.161	1.170	143.34
1993	0.062	0.064	0.936	1.080	1.034	1.005	1.032	1.037	148.68
1994	0.063	0.063	0.937	1.010	0.985	1.001	0.986	0.987	146.74
1995	0.020	0.041	0.959	1.019	0.991	1.001	0.991	0.992	145.53
1996	0.018	0.019	0.981	1.020	0.995	1.000	0.995	0.996	144.92
1997	0.038	0.028	0.972	0.999	0.943	1.000	0.944	0.944	136.85
1998	0.140	0.089	0.911	1.002	0.971	1.000	0.973	0.974	133.23
1999	0.121	0.131	0.869	0.922	0.967	0.989	0.971	0.961	128.01
2000	0.061	0.091	0.909	1.128	0.876	1.011	0.886	0.896	114.70
2001	0.034	0.047	0.953	1.038	0.781	1.002	0.791	0.792	90.85
2002	0.071	0.052	0.948	0.989	0.972	0.999	0.973	0.972	88.35
2003	0.072	0.071	0.929	1.016	1.059	1.001	1.054	1.056	93.26
2004	0.077	0.074	0.926	1.193	1.009	1.013	1.008	1.022	95.27
2005	0.098	0.087	0.913	1.033	0.967	1.003	0.969	0.972	92.61
2006	0.075	0.086	0.914	1.054	1.019	1.005	1.017	1.022	94.66
2007	0.067	0.071	0.929	1.047	0.852	1.003	0.862	0.864	81.83
2008	0.075	0.071	0.929	1.110	0.988	1.007	0.989	0.996	81.54
2009	0.073	0.074	0.926	0.960	0.950	0.997	0.953	0.951	77.51
2010	0.063	0.068	0.932	1.020	1.047	1.001	1.043	1.045	80.99
2011	0.062	0.063	0.937	1.031	1.029	1.002	1.027	1.029	83.33

a. TFPG INDEX: **Kaken pharmaceutical firm (4521)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	129,901	14,169	7,561	11.775	9.559	8.931	17.181	1.874	0.058	0.942						0.000
1991	211,660	20,647	8,010	12.263	9.935	8.988	26.424	2.578	0.038	0.962	0.048	0.952	0.520	0.090	0.409	0.127
1992	207,030	20,540	8,210	12.241	9.930	9.013	25.216	2.502	0.040	0.960	0.039	0.961	-0.005	0.042	0.012	-0.018
1993	192,093	20,085	8,423	12.166	9.908	9.039	22.806	2.384	0.044	0.956	0.042	0.958	-0.062	0.038	-0.010	-0.054
1994	194,961	19,893	8,901	12.181	9.898	9.094	21.903	2.235	0.046	0.954	0.045	0.955	0.022	0.062	-0.003	0.022
1995	180,023	21,494	9,313	12.101	9.976	9.139	19.330	2.308	0.052	0.948	0.049	0.951	-0.081	0.044	0.076	-0.156
1996	119,980	20,493	9,690	11.695	9.928	9.179	12.382	2.115	0.081	0.919	0.066	0.934	-0.404	0.041	-0.046	-0.364
1997	108,808	21,163	9,798	11.597	9.960	9.190	11.106	2.160	0.090	0.910	0.085	0.915	-0.100	0.009	0.030	-0.128
1998	99,462	32,164	9,682	11.508	10.379	9.178	10.273	3.322	0.097	0.903	0.094	0.906	-0.064	0.014	0.445	-0.468
1999	149,319	31,320	9,589	11.914	10.352	9.168	15.572	3.266	0.064	0.936	0.081	0.919	0.403	-0.013	-0.030	0.432
2000	132,986	31,606	12,803	11.798	10.361	9.457	10.387	2.469	0.096	0.904	0.080	0.920	-0.122	0.282	0.002	-0.147
2001	146,675	29,931	12,863	11.896	10.307	9.462	11.403	2.327	0.088	0.912	0.092	0.908	0.090	-0.003	-0.063	0.147
2002	162,512	29,052	13,021	11.999	10.277	9.474	12.480	2.231	0.080	0.920	0.084	0.916	0.094	0.003	-0.039	0.129
2003	164,141	27,891	13,071	12.008	10.236	9.478	12.557	2.134	0.080	0.920	0.080	0.920	0.007	0.001	-0.043	0.047
2004	164,863	26,795	13,413	12.013	10.196	9.504	12.291	1.998	0.081	0.919	0.080	0.920	0.004	0.026	-0.040	0.039
2005	144,103	26,402	13,083	11.878	10.181	9.479	11.015	2.018	0.091	0.909	0.086	0.914	-0.137	-0.028	-0.017	-0.119
2006	155,349	25,435	12,849	11.953	10.144	9.461	12.091	1.980	0.083	0.917	0.087	0.913	0.078	-0.016	-0.035	0.111
2007	153,883	25,237	12,903	11.944	10.136	9.465	11.926	1.956	0.084	0.916	0.083	0.917	-0.009	0.005	-0.007	-0.003
2008	178,329	25,151	13,209	12.091	10.133	9.489	13.501	1.904	0.074	0.926	0.079	0.921	0.161	0.037	0.010	0.149
2009	191,940	25,895	13,090	12.165	10.162	9.480	14.663	1.978	0.068	0.932	0.071	0.929	0.060	-0.023	0.016	0.047
2010	201,700	25,243	12,920	12.215	10.136	9.467	15.611	1.954	0.064	0.936	0.066	0.934	0.042	-0.020	-0.033	0.074
2011	225,754	28,148	13,134	12.327	10.245	9.483	17.189	2.143	0.058	0.942	0.061	0.939	0.110	0.013	0.106	0.009

b. TFP INDEX: **Kaken pharmaceutical firm (4521)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	168.25	109.40	150.48	149.14	112.82
1992	167.40	114.06	152.27	152.43	109.82
1993	157.29	118.49	150.78	150.82	104.29
1994	160.75	126.10	150.38	150.47	106.84
1995	148.24	131.77	162.27	161.60	91.74
1996	98.93	137.28	154.92	152.91	64.70
1997	89.53	138.51	159.65	155.05	57.74
1998	84.02	140.52	249.10	230.89	36.39
1999	125.72	138.71	241.77	227.90	55.16
2000	111.23	183.98	242.36	233.80	47.57
2001	121.68	183.34	227.65	218.48	55.69
2002	133.61	183.93	218.98	212.35	62.92
2003	134.61	184.18	209.71	204.74	65.75
2004	135.19	188.98	201.45	197.63	68.41
2005	117.85	183.82	197.96	193.29	60.97
2006	127.35	180.97	191.17	186.88	68.15
2007	126.23	181.84	189.80	186.16	67.80
2008	148.29	188.72	191.75	189.03	78.45
2009	157.46	184.50	194.76	192.44	81.82
2010	164.28	180.80	188.50	187.04	87.83
2011	183.33	183.25	209.58	207.48	88.36

c. CFI INDEX: **Kaken pharmaceutical (4521)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.058								100
1991	0.038	0.048	0.952	1.094	1.505	1.004	1.476	1.482	148.19
1992	0.040	0.039	0.961	1.043	1.012	1.002	1.011	1.013	150.13
1993	0.044	0.042	0.958	1.039	0.990	1.002	0.991	0.992	148.95
1994	0.046	0.045	0.955	1.064	0.997	1.003	0.998	1.000	149.00
1995	0.052	0.049	0.951	1.045	1.079	1.002	1.075	1.077	160.53
1996	0.081	0.066	0.934	1.042	0.955	1.003	0.958	0.960	154.14
1997	0.090	0.085	0.915	1.009	1.031	1.001	1.028	1.029	158.56
1998	0.097	0.094	0.906	1.015	1.560	1.001	1.497	1.499	237.63
1999	0.064	0.081	0.919	0.987	0.971	0.999	0.973	0.972	230.94
2000	0.096	0.080	0.920	1.326	1.002	1.023	1.002	1.025	236.77
2001	0.088	0.092	0.908	0.997	0.939	1.000	0.945	0.944	223.62
2002	0.080	0.084	0.916	1.003	0.962	1.000	0.965	0.965	215.86
2003	0.080	0.080	0.920	1.001	0.958	1.000	0.961	0.961	207.46
2004	0.081	0.080	0.920	1.026	0.961	1.002	0.964	0.966	200.35
2005	0.091	0.086	0.914	0.973	0.983	0.998	0.984	0.982	196.71
2006	0.083	0.087	0.913	0.984	0.966	0.999	0.969	0.967	190.27
2007	0.084	0.083	0.917	1.005	0.993	1.000	0.993	0.994	189.09
2008	0.074	0.079	0.921	1.038	1.010	1.003	1.009	1.012	191.45
2009	0.068	0.071	0.929	0.978	1.016	0.998	1.015	1.013	193.93
2010	0.064	0.066	0.934	0.980	0.968	0.999	0.970	0.969	187.84
2011	0.058	0.061	0.939	1.014	1.112	1.001	1.105	1.106	207.67

a. TFPG INDEX: **Mochida pharmaceutical firm (4534)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t = α'	1-α'=β'	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	132,736	13,892	7,306	11.796	9.539	8.896	18.169	1.902	0.055	0.945						0.000
1991	129,748	18,650	7,928	11.773	9.834	8.978	16.366	2.352	0.061	0.939	0.058	0.942	0.009	0.114	0.327	-0.305
1992	146,947	20,274	8,577	11.898	9.917	9.057	17.133	2.364	0.058	0.942	0.060	0.940	0.142	0.096	0.101	0.041
1993	153,342	20,257	9,062	11.940	9.916	9.112	16.921	2.235	0.059	0.941	0.059	0.941	0.055	0.068	0.012	0.040
1994	142,824	20,195	9,884	11.869	9.913	9.199	14.450	2.043	0.069	0.931	0.064	0.936	-0.064	0.094	0.004	-0.074
1995	196,160	19,166	10,360	12.187	9.861	9.246	18.934	1.850	0.053	0.947	0.061	0.939	0.316	0.046	-0.054	0.364
1996	179,456	18,948	10,626	12.098	9.849	9.271	16.889	1.783	0.059	0.941	0.056	0.944	-0.088	0.027	-0.010	-0.080
1997	190,720	19,412	10,740	12.159	9.874	9.282	17.757	1.807	0.056	0.944	0.058	0.942	0.059	0.009	0.022	0.037
1998	138,929	19,358	10,299	11.842	9.871	9.240	13.490	1.880	0.074	0.926	0.065	0.935	-0.291	-0.016	0.024	-0.312
1999	142,726	19,285	9,906	11.869	9.867	9.201	14.408	1.947	0.069	0.931	0.072	0.928	0.024	-0.042	-0.007	0.033
2000	178,586	17,810	14,066	12.093	9.788	9.552	12.696	1.266	0.079	0.921	0.074	0.926	0.218	0.344	-0.086	0.272
2001	198,118	16,849	13,868	12.197	9.732	9.537	14.286	1.215	0.070	0.930	0.074	0.926	0.096	-0.022	-0.064	0.156
2002	190,639	16,653	14,146	12.158	9.720	9.557	13.477	1.177	0.074	0.926	0.072	0.928	-0.047	0.011	-0.021	-0.029
2003	165,988	18,368	14,078	12.020	9.818	9.552	11.790	1.305	0.085	0.915	0.080	0.920	-0.141	-0.007	0.096	-0.228
2004	174,460	23,500	13,950	12.069	10.065	9.543	12.506	1.685	0.080	0.920	0.082	0.918	0.050	-0.009	0.246	-0.176
2005	124,722	22,064	13,842	11.734	10.002	9.535	9.010	1.594	0.111	0.889	0.095	0.905	-0.338	-0.010	-0.066	-0.278
2006	158,267	19,329	13,967	11.972	9.869	9.544	11.332	1.384	0.088	0.912	0.100	0.900	0.241	0.011	-0.130	0.356
2007	158,484	19,172	14,844	11.973	9.861	9.605	10.677	1.292	0.094	0.906	0.091	0.909	0.002	0.062	-0.008	0.003
2008	209,508	17,934	14,098	12.253	9.794	9.554	14.861	1.272	0.067	0.933	0.080	0.920	0.293	-0.038	-0.053	0.345
2009	221,941	18,805	14,241	12.310	9.842	9.564	15.585	1.321	0.064	0.936	0.066	0.934	0.044	-0.003	0.034	0.013
2010	234,279	18,036	14,579	12.364	9.800	9.587	16.069	1.237	0.062	0.938	0.063	0.937	0.047	0.016	-0.049	0.092
2011	198,795	17,630	14,375	12.200	9.777	9.573	13.829	1.226	0.072	0.928	0.067	0.933	-0.167	-0.017	-0.026	-0.142

b. TFP INDEX: **Mochida pharmaceutical firm (4534)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	100.94	112.06	138.63	136.66	73.86
1992	116.28	123.31	153.29	150.85	77.08
1993	122.88	131.94	155.09	153.26	80.17
1994	115.25	144.91	155.70	154.08	74.80
1995	158.08	151.70	147.58	147.26	107.35
1996	144.81	155.78	146.09	146.52	98.83
1997	153.58	157.13	149.35	149.53	102.71
1998	114.85	154.69	152.90	152.02	75.55
1999	117.60	148.30	151.83	149.95	78.43
2000	146.18	209.18	139.29	141.80	103.09
2001	160.85	204.56	130.70	133.46	120.52
2002	153.39	206.79	128.02	131.08	117.02
2003	133.22	205.29	140.86	142.87	93.24
2004	140.01	203.40	180.19	178.83	78.29
2005	99.82	201.29	168.73	167.19	59.71
2006	126.97	203.58	148.17	148.61	85.44
2007	127.22	216.51	147.05	148.84	85.48
2008	170.50	208.45	139.45	141.70	120.33
2009	178.18	207.72	144.25	146.74	121.43
2010	186.74	211.14	137.36	140.40	133.00
2011	157.99	207.57	133.88	136.80	115.49

c. CFI INDEX: **Mochida pharmaceutical firm (4534)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	$(Lt/Lt-1)^{\alpha'}$ 6	$(Kt/Kt-1)^{\beta'}$ 7	6*7	CFI
1990	0.055								100
1991	0.061	0.058	0.942	1.121	1.386	1.007	1.360	1.369	136.92
1992	0.058	0.060	0.940	1.100	1.106	1.006	1.099	1.105	151.36
1993	0.059	0.059	0.941	1.070	1.012	1.004	1.011	1.015	153.65
1994	0.069	0.064	0.936	1.098	1.004	1.006	1.004	1.010	155.14
1995	0.053	0.061	0.939	1.047	0.948	1.003	0.951	0.954	147.94
1996	0.059	0.056	0.944	1.027	0.990	1.001	0.990	0.992	146.75
1997	0.056	0.058	0.942	1.009	1.022	1.000	1.021	1.022	149.91
1998	0.074	0.065	0.935	0.984	1.024	0.999	1.022	1.021	153.09
1999	0.069	0.072	0.928	0.959	0.993	0.997	0.993	0.990	151.62
2000	0.079	0.074	0.926	1.411	0.917	1.026	0.923	0.947	143.61
2001	0.070	0.074	0.926	0.978	0.938	0.998	0.943	0.941	135.17
2002	0.074	0.072	0.928	1.011	0.980	1.001	0.981	0.982	132.70
2003	0.085	0.080	0.920	0.993	1.100	0.999	1.092	1.091	144.81
2004	0.080	0.082	0.918	0.991	1.279	0.999	1.254	1.253	181.40
2005	0.111	0.095	0.905	0.990	0.936	0.999	0.942	0.941	170.75
2006	0.088	0.100	0.900	1.011	0.878	1.001	0.890	0.891	152.07
2007	0.094	0.091	0.909	1.063	0.992	1.006	0.993	0.999	151.88
2008	0.067	0.080	0.920	0.963	0.948	0.997	0.952	0.949	144.20
2009	0.064	0.066	0.934	0.997	1.034	1.000	1.032	1.032	148.80
2010	0.062	0.063	0.937	1.016	0.952	1.001	0.955	0.956	142.28
2011	0.072	0.067	0.933	0.983	0.975	0.999	0.976	0.975	138.75

a. TFPG INDEX: **Nichi-Iko pharmaceutical firm (4541)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	53,390	5,796	1,280	10.885	8.665	7.154	41.719	4.529	0.024	0.976						0.000
1991	47,895	5,498	1,345	10.777	8.612	7.204	35.621	4.089	0.028	0.972	0.026	0.974	-0.077	0.082	-0.021	-0.058
1992	23,482	3,539	1,442	10.064	8.172	7.274	16.283	2.454	0.061	0.939	0.045	0.955	-0.696	0.087	-0.423	-0.295
1993	28,857	4,631	1,507	10.270	8.441	7.318	19.146	3.072	0.052	0.948	0.057	0.943	0.219	0.057	0.281	-0.050
1994	29,666	5,489	1,646	10.298	8.611	7.406	18.028	3.336	0.055	0.945	0.054	0.946	0.035	0.095	0.177	-0.138
1995	30,575	7,777	1,775	10.328	8.959	7.482	17.226	4.382	0.058	0.942	0.057	0.943	0.029	0.074	0.347	-0.303
1996	118,999	7,771	1,559	11.687	8.958	7.352	76.307	4.983	0.013	0.987	0.036	0.964	1.360	-0.128	0.000	1.364
1997	145,467	6,796	1,537	11.888	8.824	7.337	94.659	4.423	0.011	0.989	0.012	0.988	0.199	-0.017	-0.136	0.333
1998	160,873	6,678	1,513	11.988	8.807	7.322	106.341	4.414	0.009	0.991	0.010	0.990	0.127	0.011	0.009	0.118
1999	35,869	6,120	1,513	10.488	8.719	7.322	23.700	4.044	0.042	0.958	0.026	0.974	-1.504	-0.003	-0.091	-1.416
2000	70,960	10,765	1,969	11.170	9.284	7.585	36.032	5.466	0.028	0.972	0.035	0.965	0.676	0.257	0.558	0.128
2001	27,356	10,313	2,018	10.217	9.241	7.610	13.559	5.112	0.074	0.926	0.051	0.949	-0.961	0.016	-0.051	-0.914
2002	119,645	10,137	2,044	11.692	9.224	7.623	58.534	4.959	0.017	0.983	0.045	0.955	1.467	0.004	-0.026	1.491
2003	40,448	10,200	2,032	10.608	9.230	7.617	19.903	5.019	0.050	0.950	0.034	0.966	-1.087	-0.008	0.004	-1.090
2004	69,160	5,525	2,696	11.144	8.617	7.900	25.652	2.049	0.039	0.961	0.045	0.955	0.536	0.283	-0.613	1.110
2005	151,587	8,849	3,581	11.929	9.088	8.183	42.333	2.471	0.024	0.976	0.031	0.969	0.782	0.281	0.468	0.320
2006	158,174	9,871	3,991	11.971	9.197	8.292	39.630	2.473	0.025	0.975	0.024	0.976	0.045	0.111	0.112	-0.067
2007	178,166	10,113	4,112	12.090	9.222	8.322	43.329	2.459	0.023	0.977	0.024	0.976	0.120	0.030	0.025	0.095
2008	198,036	13,387	5,731	12.196	9.502	8.654	34.553	2.336	0.029	0.971	0.026	0.974	0.119	0.346	0.294	-0.176
2009	212,045	17,737	5,441	12.265	9.783	8.602	38.972	3.260	0.026	0.974	0.027	0.973	0.055	-0.066	0.268	-0.204
2010	237,624	18,808	5,586	12.378	9.842	8.628	42.537	3.367	0.024	0.976	0.025	0.975	0.107	0.019	0.051	0.056
2011	270,836	21,047	5,441	12.509	9.955	8.602	49.773	3.868	0.020	0.980	0.022	0.978	0.128	-0.029	0.110	0.021

b. TFP INDEX: **Nichi-Iko pharmaceutical firm (4541)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	92.63	108.49	97.94	97.90	94.62
1992	46.20	118.36	64.14	63.89	72.31
1993	57.49	125.27	84.98	82.67	69.54
1994	59.51	137.72	101.43	98.57	60.38
1995	61.26	148.36	143.53	136.85	44.76
1996	238.73	130.52	143.60	140.63	169.76
1997	291.22	128.35	125.33	127.68	228.08
1998	330.64	129.71	126.42	129.15	256.01
1999	73.48	129.35	115.47	115.49	63.62
2000	144.40	167.20	201.78	197.15	73.24
2001	55.22	169.90	191.75	183.02	30.17
2002	239.33	170.58	186.78	180.08	132.90
2003	80.71	169.18	187.48	184.11	43.84
2004	137.99	224.42	101.53	101.96	135.33
2005	301.63	297.25	162.19	163.47	184.52
2006	315.49	332.13	181.36	183.93	171.52
2007	355.58	342.37	185.92	188.63	188.51
2008	400.68	483.77	249.48	253.03	158.35
2009	423.24	453.08	326.11	327.40	129.27
2010	470.89	461.83	343.30	345.49	136.30
2011	535.14	448.55	383.06	385.65	138.76

c. CFI INDEX: **Nichi-Iko pharmaceutical firm (4541)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.024								100
1991	0.028	0.026	0.974	1.085	0.979	1.002	0.980	0.982	98.20
1992	0.061	0.045	0.955	1.091	0.655	1.004	0.667	0.670	65.80
1993	0.052	0.057	0.943	1.058	1.325	1.003	1.304	1.308	86.07
1994	0.055	0.054	0.946	1.099	1.194	1.005	1.182	1.188	102.28
1995	0.058	0.057	0.943	1.077	1.415	1.004	1.387	1.393	142.50
1996	0.013	0.036	0.964	0.880	1.000	0.995	1.000	0.996	141.92
1997	0.011	0.012	0.988	0.983	0.873	1.000	0.874	0.874	124.04
1998	0.009	0.010	0.990	1.011	1.009	1.000	1.009	1.009	125.12
1999	0.042	0.026	0.974	0.997	0.913	1.000	0.916	0.915	114.55
2000	0.028	0.035	0.965	1.293	1.747	1.009	1.714	1.729	198.06
2001	0.074	0.051	0.949	1.016	0.950	1.001	0.953	0.954	188.86
2002	0.017	0.045	0.955	1.004	0.974	1.000	0.975	0.975	184.22
2003	0.050	0.034	0.966	0.992	1.004	1.000	1.004	1.003	184.83
2004	0.039	0.045	0.955	1.327	0.542	1.013	0.557	0.564	104.18
2005	0.024	0.031	0.969	1.325	1.597	1.009	1.574	1.588	165.44
2006	0.025	0.024	0.976	1.117	1.118	1.003	1.115	1.118	185.00
2007	0.023	0.024	0.976	1.031	1.025	1.001	1.025	1.025	189.67
2008	0.029	0.026	0.974	1.413	1.342	1.009	1.332	1.344	254.86
2009	0.026	0.027	0.973	0.937	1.307	0.998	1.298	1.295	330.12
2010	0.024	0.025	0.975	1.019	1.053	1.000	1.051	1.052	347.25
2011	0.020	0.022	0.978	0.971	1.116	0.999	1.113	1.112	386.30

a. TFPG INDEX: **Nippon Shinyaku pharmaceutical firm (4516)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t =α'	1-α'=β'	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	174,561	9,361	7,451	12.070	9.144	8.916	23.427	1.256	0.043	0.957						0.000
1991	162,165	10,315	7,865	11.996	9.241	8.970	20.618	1.311	0.049	0.951	0.046	0.954	-0.042	0.086	0.129	-0.169
1992	145,966	10,041	8,196	11.891	9.214	9.011	17.809	1.225	0.056	0.944	0.052	0.948	-0.088	0.058	-0.010	-0.082
1993	138,340	11,424	8,450	11.837	9.343	9.042	16.372	1.352	0.061	0.939	0.059	0.941	-0.041	0.043	0.142	-0.177
1994	140,711	14,148	8,681	11.854	9.557	9.069	16.208	1.630	0.062	0.938	0.061	0.939	0.024	0.034	0.221	-0.185
1995	149,401	15,279	8,871	11.914	9.634	9.091	16.841	1.722	0.059	0.941	0.061	0.939	0.059	0.020	0.076	-0.014
1996	147,553	14,384	8,993	11.902	9.574	9.104	16.407	1.599	0.061	0.939	0.060	0.940	-0.011	0.015	-0.059	0.043
1997	146,313	15,912	9,123	11.894	9.675	9.119	16.038	1.744	0.062	0.938	0.062	0.938	-0.011	0.012	0.099	-0.104
1998	98,436	16,287	8,996	11.497	9.698	9.104	10.943	1.811	0.091	0.909	0.077	0.923	-0.370	0.012	0.050	-0.417
1999	136,607	17,788	9,077	11.825	9.786	9.114	15.050	1.960	0.066	0.934	0.079	0.921	0.324	0.006	0.085	0.246
2000	142,107	18,754	13,747	11.864	9.839	9.529	10.337	1.364	0.097	0.903	0.082	0.918	0.033	0.408	0.046	-0.043
2001	135,999	24,939	13,599	11.820	10.124	9.518	10.000	1.834	0.100	0.900	0.098	0.902	-0.052	-0.019	0.277	-0.300
2002	84,140	23,712	13,890	11.340	10.074	9.539	6.058	1.707	0.165	0.835	0.133	0.867	-0.489	0.012	-0.059	-0.439
2003	209,027	25,000	13,467	12.250	10.127	9.508	15.521	1.856	0.064	0.936	0.115	0.885	0.907	-0.033	0.050	0.867
2004	211,598	24,455	13,868	12.262	10.105	9.537	15.258	1.763	0.066	0.934	0.065	0.935	0.012	0.029	-0.022	0.031
2005	180,818	22,330	13,628	12.105	10.014	9.520	13.268	1.639	0.075	0.925	0.070	0.930	-0.160	-0.020	-0.094	-0.071
2006	89,650	21,414	13,660	11.404	9.972	9.522	6.563	1.568	0.152	0.848	0.114	0.886	-0.699	0.005	-0.039	-0.665
2007	198,365	20,925	13,455	12.198	9.949	9.507	14.743	1.555	0.068	0.932	0.110	0.890	0.795	-0.015	-0.023	0.816
2008	135,024	20,304	13,364	11.813	9.919	9.500	10.104	1.519	0.099	0.901	0.083	0.917	-0.371	0.007	-0.016	-0.356
2009	153,458	20,406	13,678	11.941	9.924	9.524	11.219	1.492	0.089	0.911	0.094	0.906	0.114	0.010	-0.009	0.121
2010	236,427	19,834	14,037	12373	9.895	9.549	16.843	1.413	0.059	0.941	0.074	0.926	0.425	0.019	-0.036	0.457
2011	218,353	18,823	14,103	12.294	9.843	9.554	15.483	1.335	0.065	0.935	0.062	0.938	-0.082	0.002	-0.055	-0.031

b. TFP INDEX: **Nippon Shinyaku pharmaceutical firm (4516)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	95.93	109.00	113.79	113.49	84.53
1992	87.83	115.54	112.67	112.57	78.02
1993	84.29	120.61	129.80	128.78	65.46
1994	86.34	124.79	161.88	158.64	54.43
1995	91.55	127.35	174.59	170.60	53.67
1996	90.54	129.27	164.58	161.56	56.04
1997	89.59	130.86	181.68	177.28	50.54
1998	61.88	132.47	190.92	184.19	33.59
1999	85.59	133.23	207.83	199.01	43.01
2000	88.45	200.44	217.67	214.30	41.27
2001	83.96	196.68	287.10	273.13	30.74
2002	51.48	199.08	270.53	254.48	20.23
2003	127.57	192.54	284.51	267.61	47.67
2004	129.12	198.26	278.28	270.84	47.68
2005	110.04	194.30	253.42	247.15	44.53
2006	54.69	195.22	243.61	233.71	23.40
2007	121.08	192.40	238.19	229.10	52.85
2008	83.55	193.73	234.30	228.48	36.57
2009	93.68	195.61	232.30	225.91	41.47
2010	143.30	199.32	224.17	220.63	64.95
2011	131.96	199.66	212.12	210.40	62.72

c. CFI INDEX: **Nippon Shinyaku pharmaceutical firm (4516)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.043								100
1991	0.049	0.046	0.954	1.090	1.138	1.004	1.131	1.136	113.56
1992	0.056	0.052	0.948	1.060	0.990	1.003	0.991	0.994	112.85
1993	0.061	0.059	0.941	1.044	1.152	1.003	1.143	1.145	129.26
1994	0.062	0.061	0.939	1.035	1.247	1.002	1.230	1.233	159.37
1995	0.059	0.061	0.939	1.021	1.079	1.001	1.074	1.075	171.31
1996	0.061	0.060	0.940	1.015	0.943	1.001	0.946	0.947	162.20
1997	0.062	0.062	0.938	1.012	1.104	1.001	1.097	1.098	178.11
1998	0.091	0.077	0.923	1.012	1.051	1.001	1.047	1.048	186.63
1999	0.066	0.079	0.921	1.006	1.089	1.000	1.081	1.082	201.89
2000	0.097	0.082	0.918	1.504	1.047	1.034	1.043	1.079	217.79
2001	0.100	0.098	0.902	0.981	1.319	0.998	1.284	1.281	279.03
2002	0.165	0.133	0.867	1.012	0.942	1.002	0.950	0.951	265.42
2003	0.064	0.115	0.885	0.967	1.052	0.996	1.046	1.042	276.47
2004	0.066	0.065	0.935	1.030	0.978	1.002	0.980	0.981	271.32
2005	0.075	0.070	0.930	0.980	0.911	0.999	0.917	0.915	248.36
2006	0.152	0.114	0.886	1.005	0.961	1.001	0.966	0.966	239.95
2007	0.068	0.110	0.890	0.986	0.978	0.998	0.980	0.979	234.82
2008	0.099	0.083	0.917	1.007	0.984	1.001	0.985	0.986	231.43
2009	0.089	0.094	0.906	1.010	0.991	1.001	0.992	0.993	229.86
2010	0.059	0.074	0.926	1.019	0.965	1.001	0.968	0.969	222.71
2011	0.065	0.062	0.938	1.002	0.946	1.000	0.950	0.950	211.48

a. TFPG INDEX: **Kissei pharmaceutical firm (4547)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t =α'	1-α'=β'	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	111,821	9,562	3601	11.625	9.166	8.189	31.051	2.655	0.032	0.968						0.000
1991	119,945	15,522	4035	11.695	9.650	8.303	29.724	3.847	0.034	0.966	0.033	0.967	0.102	0.146	0.517	-0.402
1992	99,279	19,807	4419	11.506	9.894	8.394	22.465	4.482	0.045	0.955	0.039	0.961	-0.172	0.108	0.261	-0.427
1993	184,641	21,799	4771	12.126	9.990	8.470	38.697	4.569	0.026	0.974	0.035	0.965	0.633	0.089	0.108	0.525
1994	243,467	25,463	5307	12.403	10.145	8.577	45.873	4.798	0.022	0.978	0.024	0.976	0.284	0.113	0.162	0.122
1995	267,328	29,654	5848	12.496	10.297	8.674	45.710	5.071	0.022	0.978	0.022	0.978	0.092	0.096	0.151	-0.058
1996	269,754	29,658	6364	12.505	10.297	8.758	42.389	4.660	0.024	0.976	0.023	0.977	0.010	0.086	0.001	0.007
1997	233,204	31,334	6594	12.360	10.352	8.794	35.365	4.752	0.028	0.972	0.026	0.974	-0.148	0.033	0.053	-0.200
1998	220,110	30,590	6840	12.302	10.328	8.830	32.181	4.472	0.031	0.969	0.030	0.970	-0.031	0.063	0.002	-0.036
1999	235,178	29,872	6748	12.368	10.305	8.817	34.849	4.426	0.029	0.971	0.030	0.970	0.063	-0.017	-0.027	0.090
2000	239,020	29,367	10060	12.384	10.288	9.216	23.760	2.919	0.042	0.958	0.035	0.965	0.010	0.393	-0.024	0.019
2001	200,779	29,581	10389	12.210	10.295	9.249	19.326	2.847	0.052	0.948	0.047	0.953	-0.182	0.024	-0.001	-0.183
2002	130,259	28,844	10599	11.777	10.270	9.268	12.290	2.721	0.081	0.919	0.067	0.933	-0.442	0.011	-0.034	-0.410
2003	126,937	28,223	10577	11.751	10.248	9.266	12.001	2.668	0.083	0.917	0.082	0.918	-0.028	-0.005	-0.024	-0.006
2004	210,137	28,174	12417	12.256	10.246	9.427	16.923	2.269	0.059	0.941	0.071	0.929	0.504	0.160	-0.002	0.494
2005	210,438	27,794	12348	12.257	10.233	9.421	17.042	2.251	0.059	0.941	0.059	0.941	-0.001	-0.008	-0.016	0.015
2006	183,542	28,649	13332	12.120	10.263	9.498	13.767	2.149	0.073	0.927	0.066	0.934	-0.134	0.079	0.033	-0.170
2007	206,531	30,630	12481	12.238	10.330	9.432	16.548	2.454	0.060	0.940	0.067	0.933	0.119	-0.065	0.067	0.060
2008	214,755	29,585	12535	12.277	10.295	9.436	17.132	2.360	0.058	0.942	0.059	0.941	0.053	0.018	-0.021	0.071
2009	186,948	28,368	13748	12.139	10.253	9.529	13.598	2.063	0.074	0.926	0.066	0.934	-0.152	0.079	-0.056	-0.106
2010	161,323	27,827	14183	11.991	10.234	9.560	11.374	1.962	0.088	0.912	0.081	0.919	-0.155	0.024	-0.026	-0.132
2011	158,852	27,096	14182	11.976	10.207	9.560	11.201	1.911	0.089	0.911	0.089	0.911	-0.018	-0.003	-0.030	0.009

b. TFP INDEX: **Kissei pharmaceutical firm (4547)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	110.76	115.71	167.62	165.47	66.94
1992	93.25	128.89	217.57	211.74	44.04
1993	175.63	140.93	242.48	237.20	74.04
1994	233.20	157.85	285.21	283.53	82.25
1995	255.73	173.71	331.73	330.40	77.40
1996	258.38	189.27	332.20	331.03	78.05
1997	222.91	195.71	350.24	347.12	64.22
1998	216.00	208.41	351.03	346.50	62.34
1999	230.02	204.95	341.67	337.25	68.21
2000	232.24	303.49	333.67	331.52	70.05
2001	193.50	310.89	333.38	327.55	59.07
2002	124.41	314.32	322.15	311.02	40.00
2003	120.93	312.89	314.43	299.29	40.41
2004	200.18	367.29	313.86	305.53	65.52
2005	199.93	364.27	308.79	303.79	65.81
2006	174.79	394.23	319.05	313.12	55.82
2007	196.80	369.29	341.32	331.80	59.31
2008	207.46	375.99	334.21	327.74	63.30
2009	178.16	406.83	316.14	311.03	57.28
2010	152.64	416.68	307.89	300.90	50.73
2011	149.86	415.45	298.93	291.28	51.45

c. CFI INDEX: **Kissei pharmaceutical firm (4547)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.032								100
1991	0.034	0.033	0.967	1.157	1.676	1.005	1.648	1.656	165.58
1992	0.045	0.039	0.961	1.114	1.298	1.004	1.285	1.290	213.65
1993	0.026	0.035	0.965	1.093	1.114	1.003	1.110	1.114	237.95
1994	0.022	0.024	0.976	1.120	1.176	1.003	1.172	1.175	279.56
1995	0.022	0.022	0.978	1.100	1.163	1.002	1.159	1.162	324.76
1996	0.024	0.023	0.977	1.090	1.001	1.002	1.001	1.003	325.85
1997	0.028	0.026	0.974	1.034	1.054	1.001	1.053	1.054	343.37
1998	0.031	0.030	0.970	1.065	1.002	1.002	1.002	1.004	344.77
1999	0.029	0.030	0.970	0.983	0.973	1.000	0.974	0.974	335.67
2000	0.042	0.035	0.965	1.481	0.977	1.014	0.977	0.991	332.68
2001	0.052	0.047	0.953	1.024	0.999	1.001	0.999	1.000	332.78
2002	0.081	0.067	0.933	1.011	0.966	1.001	0.969	0.969	322.54
2003	0.083	0.082	0.918	0.995	0.976	1.000	0.978	0.978	315.33
2004	0.059	0.071	0.929	1.174	0.998	1.011	0.998	1.010	318.40
2005	0.059	0.059	0.941	0.992	0.984	1.000	0.985	0.984	313.41
2006	0.073	0.066	0.934	1.082	1.033	1.005	1.031	1.036	324.81
2007	0.060	0.067	0.933	0.937	1.070	0.996	1.065	1.060	344.42
2008	0.058	0.059	0.941	1.018	0.979	1.001	0.980	0.981	338.03
2009	0.074	0.066	0.934	1.082	0.946	1.005	0.949	0.954	322.61
2010	0.088	0.081	0.919	1.024	0.974	1.002	0.976	0.978	315.46
2011	0.089	0.089	0.911	0.997	0.971	1.000	0.973	0.973	307.00

a. TFPG INDEX: **Fuso pharmaceutical firm (4538)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	156,717	17,292	4167	11.962	9.758	8.335	37.611	4.150	0.027	0.973						0.000
1991	187,040	20,790	4520	12.139	9.942	8.416	41.383	4.600	0.024	0.976	0.025	0.975	0.209	0.113	0.216	-0.005
1992	177,653	22,593	4823	12.088	10.025	8.481	36.838	4.685	0.027	0.973	0.026	0.974	-0.034	0.082	0.100	-0.134
1993	194,115	24,228	5265	12.176	10.095	8.569	36.866	4.601	0.027	0.973	0.027	0.973	0.101	0.100	0.082	0.018
1994	266,205	28,437	5445	12.492	10.255	8.603	48.887	5.222	0.020	0.980	0.024	0.976	0.323	0.041	0.167	0.159
1995	195,044	35,423	5564	12.181	10.475	8.624	35.054	6.366	0.029	0.971	0.024	0.976	-0.312	0.020	0.218	-0.526
1996	345,662	38,596	5822	12.753	10.561	8.669	59.368	6.629	0.017	0.983	0.023	0.977	0.574	0.047	0.087	0.487
1997	356,595	38,268	5915	12.784	10.552	8.685	60.288	6.470	0.017	0.983	0.017	0.983	0.029	0.014	-0.011	0.039
1998	250,517	37,226	6127	12.431	10.525	8.720	40.890	6.076	0.024	0.976	0.021	0.979	-0.327	0.061	-0.001	-0.327
1999	289,689	36,569	6189	12.577	10.507	8.730	46.810	5.909	0.021	0.979	0.023	0.977	0.142	0.007	-0.021	0.162
2000	288,151	35,692	8301	12.571	10.483	9.024	34.712	4.300	0.029	0.971	0.025	0.975	-0.012	0.287	-0.031	0.011
2001	284,739	35,220	8309	12.559	10.469	9.025	34.267	4.239	0.029	0.971	0.029	0.971	-0.020	-0.007	-0.021	0.001
2002	168,466	34,472	8156	12.034	10.448	9.006	20.656	4.227	0.048	0.952	0.039	0.961	-0.534	-0.028	-0.030	-0.503
2003	159,435	32,598	7625	11.979	10.392	8.939	20.909	4.275	0.048	0.952	0.048	0.952	-0.058	-0.070	-0.058	0.001
2004	171,714	31,105	7434	12.054	10.345	8.914	23.100	4.184	0.043	0.957	0.046	0.954	0.074	-0.026	-0.047	0.120
2005	240,512	30,597	7492	12.391	10.329	8.922	32.104	4.084	0.031	0.969	0.037	0.963	0.334	0.005	-0.019	0.353
2006	174,710	27,825	7450	12.071	10.234	8.916	23.450	3.735	0.043	0.957	0.037	0.963	-0.317	-0.003	-0.093	-0.228
2007	187,703	26,683	7313	12.143	10.192	8.897	25.666	3.649	0.039	0.961	0.041	0.959	0.072	-0.018	-0.041	0.113
2008	202,445	26,570	7225	12.218	10.188	8.885	28.019	3.677	0.036	0.964	0.037	0.963	0.089	0.002	0.009	0.080
2009	284,751	26,649	7131	12.559	10.191	8.872	39.932	3.737	0.025	0.975	0.030	0.970	0.328	-0.027	-0.011	0.339
2010	252,215	25,028	6985	12.438	10.128	8.852	36.107	3.583	0.028	0.972	0.026	0.974	-0.129	-0.028	-0.070	-0.060
2011	256,135	24,067	7695	12.453	10.089	8.948	33.287	3.128	0.030	0.970	0.029	0.971	0.013	0.094	-0.042	0.051

b. TFP INDEX: **Fuso pharmaceutical firm (4538)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	123.24	112.01	124.15	124.04	99.36
1992	119.07	121.57	137.23	136.99	86.92
1993	131.75	134.41	149.02	148.49	88.72
1994	181.94	139.97	176.14	175.88	103.45
1995	133.13	142.84	219.12	217.49	61.21
1996	236.24	149.66	239.06	237.85	99.32
1997	243.21	151.72	236.54	238.11	102.14
1998	175.41	161.34	236.22	236.42	74.20
1999	202.17	162.44	231.29	230.63	87.66
2000	199.77	216.46	224.25	224.53	88.97
2001	195.80	214.91	219.49	218.61	89.57
2002	114.81	209.04	212.90	209.09	54.91
2003	108.38	194.96	200.83	194.49	55.73
2004	116.72	190.04	191.61	186.44	62.60
2005	163.04	191.01	187.97	185.26	88.00
2006	118.72	190.41	171.35	169.52	70.03
2007	127.62	187.02	164.42	161.98	78.79
2008	139.54	187.31	165.98	164.20	84.98
2009	193.63	182.37	164.23	163.87	118.16
2010	170.27	177.37	153.13	153.77	110.73
2011	172.41	194.81	146.82	147.55	116.86

c. CFI INDEX: **Fuso pharmaceutical firm (4538)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.027								100
1991	0.024	0.025	0.975	1.120	1.241	1.003	1.235	1.238	123.82
1992	0.027	0.026	0.974	1.085	1.105	1.002	1.103	1.105	136.81
1993	0.027	0.027	0.973	1.106	1.086	1.003	1.083	1.086	148.64
1994	0.020	0.024	0.976	1.041	1.182	1.001	1.177	1.178	175.15
1995	0.029	0.024	0.976	1.021	1.244	1.000	1.237	1.238	216.85
1996	0.017	0.023	0.977	1.048	1.091	1.001	1.089	1.090	236.36
1997	0.017	0.017	0.983	1.014	0.989	1.000	0.990	0.990	233.96
1998	0.024	0.021	0.979	1.063	0.999	1.001	0.999	1.000	233.95
1999	0.021	0.023	0.977	1.007	0.979	1.000	0.980	0.980	229.21
2000	0.029	0.025	0.975	1.333	0.970	1.007	0.970	0.977	224.01
2001	0.029	0.029	0.971	0.993	0.979	1.000	0.979	0.979	219.35
2002	0.048	0.039	0.961	0.973	0.970	0.999	0.971	0.970	212.79
2003	0.048	0.048	0.952	0.933	0.943	0.997	0.946	0.943	200.61
2004	0.043	0.046	0.954	0.975	0.954	0.999	0.956	0.955	191.59
2005	0.031	0.037	0.963	1.005	0.981	1.000	0.982	0.982	188.12
2006	0.043	0.037	0.963	0.997	0.912	1.000	0.915	0.915	172.06
2007	0.039	0.041	0.959	0.982	0.960	0.999	0.961	0.960	165.25
2008	0.036	0.037	0.963	1.002	1.009	1.000	1.009	1.009	166.77
2009	0.025	0.030	0.970	0.974	0.989	0.999	0.990	0.989	164.93
2010	0.028	0.026	0.974	0.973	0.932	0.999	0.934	0.933	153.96
2011	0.030	0.029	0.971	1.098	0.959	1.003	0.960	0.963	148.19

a. TFPG INDEX: **Aska pharmaceutical firm (4514)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t =α'	1-α'=β'	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	89,884	3,370	4224	11.406	8.123	8.349	21.277	0.798	0.047	0.953						0.000
1991	102,132	3,834	4302	11.534	8.252	8.367	23.740	0.891	0.042	0.958	0.045	0.955	0.160	0.050	0.161	0.004
1992	87,049	7,410	4449	11.374	8.911	8.400	19.566	1.666	0.051	0.949	0.047	0.953	-0.143	0.051	0.676	-0.790
1993	84,775	8,074	4485	11.348	8.996	8.408	18.903	1.800	0.053	0.947	0.052	0.948	-0.014	0.021	0.098	-0.108
1994	83,272	6,808	4542	11.330	8.826	8.421	18.334	1.499	0.055	0.945	0.054	0.946	-0.011	0.020	-0.164	0.143
1995	69,201	5,932	4681	11.145	8.688	8.451	14.783	1.267	0.068	0.932	0.061	0.939	-0.186	0.029	-0.139	-0.058
1996	69,968	5,549	4848	11.156	8.621	8.486	14.432	1.145	0.069	0.931	0.068	0.932	0.012	0.036	-0.065	0.071
1997	161,320	5,304	4920	11.991	8.576	8.501	32.786	1.078	0.031	0.969	0.050	0.950	0.833	0.013	-0.047	0.878
1998	146,648	5,537	5008	11.896	8.619	8.519	29.282	1.106	0.034	0.966	0.032	0.968	-0.069	0.044	0.069	-0.138
1999	155,321	8,218	4921	11.953	9.014	8.501	31.561	1.670	0.032	0.968	0.033	0.967	0.054	-0.021	0.392	-0.324
2000	42,964	8,451	7535	10.668	9.042	8.927	5.702	1.122	0.175	0.825	0.104	0.896	-1.292	0.419	0.021	-1.354
2001	61,476	8,969	7481	11.026	9.102	8.920	8.217	1.199	0.122	0.878	0.149	0.851	0.350	-0.015	0.051	0.309
2002	55,441	10,536	7411	10.923	9.263	8.911	7.481	1.422	0.134	0.866	0.128	0.872	-0.112	-0.018	0.152	-0.243
2003	81,445	10,648	7260	11.308	9.273	8.890	11.218	1.467	0.089	0.911	0.111	0.889	0.382	-0.023	0.008	0.377
2004	93,642	10,039	7182	11.447	9.214	8.879	13.038	1.398	0.077	0.923	0.083	0.917	0.139	-0.011	-0.059	0.194
2005	122,375	9,410	6714	11.715	9.150	8.812	18.226	1.402	0.055	0.945	0.066	0.934	0.265	-0.070	-0.067	0.332
2006	51,901	12,290	8095	10.857	9.417	8.999	6.411	1.518	0.156	0.844	0.105	0.895	-0.855	0.189	0.269	-1.116
2007	94,941	11,534	8477	11.461	9.353	9.045	11.200	1.361	0.089	0.911	0.123	0.877	0.605	0.047	-0.063	0.654
2008	121,353	12,127	8093	11.706	9.403	8.999	14.995	1.498	0.067	0.933	0.078	0.922	0.259	-0.033	0.064	0.203
2009	125,044	14,781	7864	11.736	9.601	8.970	15.901	1.880	0.063	0.937	0.065	0.935	0.016	-0.042	0.184	-0.153
2010	145,481	14,367	7631	11.888	9.573	8.940	19.066	1.883	0.052	0.948	0.058	0.942	0.144	-0.037	-0.036	0.180
2011	184,032	13,390	6782	12.123	9.502	8.822	27.135	1.974	0.037	0.963	0.045	0.955	0.232	-0.121	-0.073	0.308

b. TFP INDEX: **Aska pharmaceutical firm (4514)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	117.33	105.16	117.47	116.83	100.43
1992	101.72	110.62	230.93	223.12	45.59
1993	100.32	112.92	254.79	244.51	41.03
1994	99.23	115.16	216.34	209.45	47.38
1995	82.35	118.53	188.26	183.60	44.86
1996	83.37	122.92	176.33	172.86	48.23
1997	191.83	124.49	168.19	165.79	115.70
1998	179.03	130.09	180.27	177.79	100.70
1999	188.99	127.41	266.66	259.43	72.85
2000	51.93	193.78	272.43	266.37	19.50
2001	73.71	190.85	286.79	276.21	26.68
2002	65.87	187.36	333.85	315.81	20.86
2003	96.53	183.09	336.56	319.10	30.25
2004	110.98	181.10	317.28	305.33	36.35
2005	144.64	168.85	296.61	287.04	50.39
2006	61.49	204.06	388.32	367.67	16.72
2007	112.55	213.82	364.65	347.43	32.40
2008	145.84	206.94	388.66	372.62	39.14
2009	148.25	198.38	467.34	443.88	33.40
2010	171.24	191.11	450.99	430.24	39.80
2011	215.99	169.36	419.10	402.27	53.69

c. CFI INDEX: **Aska pharmaceutical firm (4514)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.047								100
1991	0.042	0.045	0.955	1.052	1.175	1.002	1.166	1.169	116.892
1992	0.051	0.047	0.953	1.052	1.966	1.002	1.905	1.909	223.195
1993	0.053	0.052	0.948	1.021	1.103	1.001	1.098	1.099	245.258
1994	0.055	0.054	0.946	1.020	0.849	1.001	0.857	0.857	210.306
1995	0.068	0.061	0.939	1.029	0.870	1.002	0.878	0.879	184.897
1996	0.069	0.068	0.932	1.037	0.937	1.002	0.941	0.943	174.391
1997	0.031	0.050	0.950	1.013	0.954	1.001	0.956	0.957	166.841
1998	0.034	0.032	0.968	1.045	1.072	1.001	1.069	1.071	178.672
1999	0.032	0.033	0.967	0.979	1.479	0.999	1.460	1.459	260.741
2000	0.175	0.104	0.896	1.521	1.022	1.044	1.019	1.065	277.587
2001	0.122	0.149	0.851	0.985	1.053	0.998	1.045	1.042	289.335
2002	0.134	0.128	0.872	0.982	1.164	0.998	1.142	1.139	329.564
2003	0.089	0.111	0.889	0.977	1.008	0.997	1.007	1.005	331.089
2004	0.077	0.083	0.917	0.989	0.943	0.999	0.947	0.946	313.373
2005	0.055	0.066	0.934	0.932	0.935	0.995	0.939	0.935	292.909
2006	0.156	0.105	0.895	1.209	1.309	1.020	1.273	1.298	380.248
2007	0.089	0.123	0.877	1.048	0.939	1.006	0.946	0.952	361.900
2008	0.067	0.078	0.922	0.968	1.066	0.997	1.061	1.058	382.844
2009	0.063	0.065	0.935	0.959	1.202	0.997	1.188	1.185	453.633
2010	0.052	0.058	0.942	0.963	0.965	0.998	0.967	0.965	437.718
2011	0.037	0.045	0.955	0.886	0.929	0.995	0.932	0.927	405.903

a. TFPG INDEX: **Nippon Chemiphar pharmaceutical firm (4539)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t = α'	1-α'= β'	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	45,781	5,402	2741	10.732	8.595	7.916	16.702	1.971	0.060	0.940						0.000
1991	56,489	5,611	2889	10.942	8.632	7.969	19.551	1.942	0.051	0.949	0.056	0.944	0.242	0.085	0.070	0.171
1992	62,323	5,744	2993	11.040	8.656	8.004	20.823	1.919	0.048	0.952	0.050	0.950	0.115	0.052	0.040	0.074
1993	95,984	6,065	3064	11.472	8.710	8.028	31.325	1.979	0.032	0.968	0.040	0.960	0.444	0.036	0.067	0.379
1994	101,252	5,794	3152	11.525	8.665	8.056	32.120	1.838	0.031	0.969	0.032	0.968	0.060	0.035	-0.039	0.097
1995	107,170	5,577	3150	11.582	8.626	8.055	34.021	1.770	0.029	0.971	0.030	0.970	0.056	-0.002	-0.039	0.094
1996	249,018	5,419	3228	12.425	8.598	8.080	77.145	1.679	0.013	0.987	0.021	0.979	0.844	0.026	-0.027	0.871
1997	87,650	5,330	3230	11.381	8.581	8.080	27.134	1.650	0.037	0.963	0.025	0.975	-1.046	-0.001	-0.019	-1.028
1998	76,922	5,260	3122	11.251	8.568	8.046	24.640	1.685	0.041	0.959	0.039	0.961	-0.104	-0.008	0.013	-0.117
1999	167,182	5,027	3022	12.027	8.523	8.014	55.316	1.663	0.018	0.982	0.029	0.971	0.773	-0.036	-0.049	0.821
2000	26,913	11,186	3213	10.200	9.322	8.075	8.377	3.482	0.119	0.881	0.069	0.931	-1.833	0.054	0.793	-2.576
2001	41,165	10,837	3385	10.625	9.291	8.127	12.162	3.202	0.082	0.918	0.101	0.899	0.417	0.044	-0.040	0.448
2002	34,277	10,719	3607	10.442	9.280	8.191	9.504	2.972	0.105	0.895	0.094	0.906	-0.192	0.055	-0.020	-0.179
2003	46,059	10,432	3579	10.738	9.253	8.183	12.869	2.915	0.078	0.922	0.091	0.909	0.293	-0.010	-0.030	0.321
2004	46,057	10,298	4037	10.738	9.240	8.303	11.409	2.551	0.088	0.912	0.083	0.917	0.000	0.120	-0.013	0.002
2005	121,108	10,127	4218	11.704	9.223	8.347	28.713	2.401	0.035	0.965	0.061	0.939	0.964	0.041	-0.019	0.980
2006	119,050	8,703	4040	11.687	9.071	8.304	29.469	2.154	0.034	0.966	0.034	0.966	-0.015	-0.041	-0.149	0.131
2007	134,689	8,186	4049	11.811	9.010	8.306	33.264	2.022	0.030	0.970	0.032	0.968	0.124	0.003	-0.061	0.183
2008	206,207	8,925	4357	12.237	9.097	8.380	47.327	2.048	0.021	0.979	0.026	0.974	0.440	0.087	0.100	0.340
2009	129,166	9,231	4296	11.769	9.130	8.365	30.067	2.149	0.033	0.967	0.027	0.973	-0.481	-0.028	0.020	-0.500
2010	124,657	10,248	4807	11.733	9.235	8.478	25.934	2.132	0.039	0.961	0.036	0.964	-0.043	0.105	0.097	-0.140
2011	123,730	10,054	4860	11.726	9.216	8.489	25.460	2.069	0.039	0.961	0.039	0.961	-0.010	0.008	-0.022	0.010

b. TFP INDEX: **Nippon Chemiphar pharmaceutical firm (4539)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	127.41	108.84	107.26	107.66	118.35
1992	142.99	114.69	111.69	112.62	126.97
1993	223.00	118.90	119.42	121.02	184.27
1994	236.88	123.17	114.88	117.37	201.83
1995	250.41	122.93	110.43	113.04	221.52
1996	582.59	126.13	107.44	110.68	526.39
1997	204.64	125.96	105.46	108.47	188.66
1998	184.37	124.97	106.85	109.05	169.07
1999	399.39	120.59	101.78	104.43	382.46
2000	63.87	127.34	224.98	215.05	29.70
2001	96.90	133.06	216.19	200.23	48.39
2002	79.96	140.52	211.92	199.28	40.12
2003	107.18	139.10	205.73	194.29	55.17
2004	107.16	156.88	203.07	195.73	54.75
2005	281.03	163.47	199.16	196.58	142.96
2006	276.92	156.95	171.56	174.02	159.13
2007	313.49	157.40	161.47	164.42	190.66
2008	486.55	171.70	178.47	182.49	266.62
2009	300.66	167.01	182.10	185.75	161.87
2010	288.08	185.52	200.71	203.43	141.62
2011	285.11	187.03	196.34	198.77	143.43

c. CFI INDEX: **Nippon Chemiphar pharmaceutical firm (4539)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.060								100
1991	0.051	0.056	0.944	1.088	1.073	1.005	1.068	1.073	107.34
1992	0.048	0.050	0.950	1.054	1.041	1.003	1.039	1.042	111.84
1993	0.032	0.040	0.960	1.037	1.069	1.001	1.066	1.068	119.44
1994	0.031	0.032	0.968	1.036	0.962	1.001	0.963	0.964	115.17
1995	0.029	0.030	0.970	0.998	0.961	1.000	0.962	0.962	110.84
1996	0.013	0.021	0.979	1.026	0.973	1.001	0.973	0.974	107.96
1997	0.037	0.025	0.975	0.999	0.982	1.000	0.982	0.982	106.01
1998	0.041	0.039	0.961	0.992	1.013	1.000	1.013	1.012	107.32
1999	0.018	0.029	0.971	0.965	0.953	0.999	0.954	0.953	102.26
2000	0.119	0.069	0.931	1.056	2.210	1.004	2.093	2.101	214.86
2001	0.082	0.101	0.899	1.045	0.961	1.004	0.965	0.969	208.22
2002	0.105	0.094	0.906	1.056	0.980	1.005	0.982	0.987	205.54
2003	0.078	0.091	0.909	0.990	0.971	0.999	0.973	0.973	199.89
2004	0.088	0.083	0.917	1.128	0.987	1.010	0.988	0.998	199.49
2005	0.035	0.061	0.939	1.042	0.981	1.003	0.982	0.984	196.38
2006	0.034	0.034	0.966	0.960	0.861	0.999	0.866	0.865	169.80
2007	0.030	0.032	0.968	1.003	0.941	1.000	0.943	0.943	160.13
2008	0.021	0.026	0.974	1.091	1.105	1.002	1.102	1.105	176.93
2009	0.033	0.027	0.973	0.973	1.020	0.999	1.020	1.019	180.30
2010	0.039	0.036	0.964	1.111	1.102	1.004	1.098	1.103	198.78
2011	0.039	0.039	0.961	1.008	0.978	1.000	0.979	0.979	194.68

a. TFPG INDEX: **Eiken pharmaceutical firm (4549)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	37,361	6,775	2721	10.528	8.821	7.909	13.728	2.489	0.073	0.927						0.000
1991	39,773	6,375	2953	10.591	8.760	7.991	13.469	2.159	0.074	0.926	0.003	0.997	0.095	0.114	-0.029	0.123
1992	41,737	7,799	3167	10.639	8.962	8.061	13.178	2.462	0.076	0.924	0.003	0.997	0.065	0.087	0.219	-0.153
1993	43,009	8,413	3329	10.669	9.038	8.110	12.920	2.527	0.077	0.923	0.003	0.997	0.043	0.062	0.088	-0.046
1994	43,657	8,031	3377	10.684	8.991	8.125	12.929	2.378	0.077	0.923	0.003	0.997	0.022	0.021	-0.040	0.061
1995	44,537	7,963	3487	10.704	8.983	8.157	12.774	2.284	0.078	0.922	0.003	0.997	0.019	0.031	-0.010	0.028
1996	40,298	8,598	3558	10.604	9.059	8.177	11.326	2.416	0.088	0.912	0.003	0.997	-0.099	0.022	0.078	-0.176
1997	36,828	8,354	3588	10.514	9.030	8.185	10.265	2.328	0.097	0.903	0.004	0.996	-0.092	0.006	-0.031	-0.061
1998	33,304	7,808	3554	10.413	8.963	8.176	9.372	2.197	0.107	0.893	0.005	0.995	-0.074	0.017	-0.041	-0.033
1999	35,099	7,159	3579	10.466	8.876	8.183	9.808	2.001	0.102	0.898	0.005	0.995	0.049	0.004	-0.090	0.139
2000	33,773	6,741	4436	10.427	8.816	8.397	7.614	1.520	0.131	0.869	0.007	0.993	-0.045	0.208	-0.067	0.020
2001	28,443	6,422	4644	10.256	8.767	8.443	6.124	1.383	0.163	0.837	0.011	0.989	-0.180	0.038	-0.057	-0.124
2002	33,802	6,231	4638	10.428	8.737	8.442	7.289	1.344	0.137	0.863	0.011	0.989	0.164	-0.011	-0.039	0.202
2003	35,170	6,049	4493	10.468	8.708	8.410	7.828	1.346	0.128	0.872	0.009	0.991	0.037	-0.034	-0.032	0.069
2004	31,959	6,730	5027	10.372	8.814	8.523	6.358	1.339	0.157	0.843	0.010	0.990	-0.096	0.112	0.107	-0.202
2005	43,573	6,344	4437	10.682	8.755	8.398	9.821	1.430	0.102	0.898	0.008	0.992	0.307	-0.128	-0.062	0.370
2006	39,040	6,032	4406	10.572	8.705	8.391	8.861	1.369	0.113	0.887	0.006	0.994	-0.107	-0.005	-0.048	-0.060
2007	45,756	5,837	4536	10.731	8.672	8.420	10.088	1.287	0.099	0.901	0.006	0.994	0.159	0.030	-0.032	0.191
2008	35,313	6,058	4693	10.472	8.709	8.454	7.525	1.291	0.133	0.867	0.007	0.993	-0.245	0.048	0.051	-0.296
2009	41,188	6,050	4898	10.626	8.708	8.497	8.409	1.235	0.119	0.881	0.008	0.992	0.140	0.029	-0.015	0.155
2010	41,175	5,976	4925	10.626	8.696	8.502	8.360	1.213	0.120	0.880	0.007	0.993	-0.008	-0.002	-0.020	0.012
2011	68,571	9,652	4911	11.136	9.175	8.499	13.964	1.966	0.072	0.928	0.004	0.996	0.507	-0.006	0.476	0.033

b. TFP INDEX: **Eiken pharmaceutical firm (4549)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	109.93	112.04	97.17	98.13	112.02
1992	117.34	122.24	120.91	120.76	97.16
1993	122.44	130.11	132.09	131.48	93.13
1994	125.15	132.89	126.96	126.88	98.64
1995	127.51	137.04	125.73	126.00	101.20
1996	115.53	140.03	135.93	134.97	85.59
1997	105.36	140.91	131.79	130.22	80.91
1998	97.81	143.28	126.47	124.72	78.43
1999	102.75	143.81	115.57	114.89	89.43
2000	98.21	177.08	108.11	110.03	89.26
2001	82.04	183.91	102.15	104.08	78.82
2002	96.63	181.99	98.23	100.42	96.22
2003	100.28	175.87	95.12	97.73	102.62
2004	91.12	196.76	105.81	108.48	84.00
2005	123.90	173.19	99.48	101.50	122.07
2006	111.28	172.41	94.82	97.97	113.58
2007	130.49	177.58	91.80	95.52	136.61
2008	102.10	186.26	96.59	100.21	101.88
2009	117.48	191.79	95.16	99.03	118.63
2010	116.60	191.48	93.32	97.46	119.64
2011	193.61	190.35	150.29	150.57	128.59

c. CFI INDEX: **Eiken pharmaceutical firm (4549)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.073								100
1991	0.074	0.003	0.997	1.120	0.972	1.000	0.972	0.972	97.20
1992	0.076	0.003	0.997	1.091	1.244	1.000	1.244	1.244	120.91
1993	0.077	0.003	0.997	1.064	1.092	1.000	1.092	1.092	132.08
1994	0.077	0.003	0.997	1.021	0.961	1.000	0.961	0.961	126.97
1995	0.078	0.003	0.997	1.031	0.990	1.000	0.990	0.990	125.76
1996	0.088	0.003	0.997	1.022	1.081	1.000	1.081	1.081	135.93
1997	0.097	0.004	0.996	1.006	0.970	1.000	0.970	0.970	131.82
1998	0.107	0.005	0.995	1.017	0.960	1.000	0.960	0.960	126.53
1999	0.102	0.005	0.995	1.004	0.914	1.000	0.914	0.914	115.69
2000	0.131	0.007	0.993	1.231	0.935	1.001	0.936	0.937	108.42
2001	0.163	0.011	0.989	1.039	0.945	1.000	0.945	0.946	102.55
2002	0.137	0.011	0.989	0.990	0.962	1.000	0.962	0.962	98.64
2003	0.128	0.009	0.991	0.966	0.968	1.000	0.969	0.968	95.52
2004	0.157	0.010	0.990	1.119	1.112	1.001	1.111	1.112	106.26
2005	0.102	0.008	0.992	0.880	0.940	0.999	0.941	0.940	99.85
2006	0.113	0.006	0.994	0.995	0.953	1.000	0.953	0.953	95.19
2007	0.099	0.006	0.994	1.030	0.968	1.000	0.968	0.969	92.20
2008	0.133	0.007	0.993	1.049	1.052	1.000	1.052	1.052	97.00
2009	0.119	0.008	0.992	1.030	0.985	1.000	0.985	0.986	95.60
2010	0.120	0.007	0.993	0.998	0.981	1.000	0.981	0.981	93.77
2011	0.072	0.004	0.996	0.994	1.610	1.000	1.607	1.607	150.70

Appendix 3: Cobb-Douglas Method- **Low-tech Japanese Industries**

TFPG INDEX: **Toray industries textile firm (3402)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	1,698,536	323,985	80666	14.345	12.688	11.298	21.056	4.016	0.047	0.953						0.000
1991	1,807,281	349312	83161	14.407	12.764	11.329	21.732	4.200	0.046	0.954	0.047	0.953	0.094	0.063	0.107	-0.011
1992	1,716,168	419,897	84698	14.356	12.948	11.347	20.262	4.958	0.049	0.951	0.048	0.952	-0.035	0.035	0.201	-0.228
1993	1,777,811	469,393	80631	14.391	13.059	11.298	22.049	5.821	0.045	0.955	0.047	0.953	0.048	-0.037	0.124	-0.069
1994	1,502,189	472,476	81629	14.222	13.066	11.310	18.403	5.788	0.054	0.946	0.050	0.950	-0.161	0.019	0.014	-0.175
1995	1,483,661	509,582	84371	14.210	13.141	11.343	17.585	6.040	0.057	0.943	0.056	0.944	-0.014	0.032	0.074	-0.086
1996	1,645,374	546,589	75264	14.313	13.211	11.229	21.861	7.262	0.046	0.954	0.051	0.949	0.105	-0.113	0.071	0.043
1997	1,825,289	590,230	87199	14.417	13.288	11.376	20.933	6.769	0.048	0.952	0.047	0.953	0.102	0.145	0.075	0.024
1998	1,955,485	622,689	130705	14.486	13.342	11.781	14.961	4.764	0.067	0.933	0.057	0.943	0.095	0.431	0.080	-0.005
1999	1,829,313	643,914	128813	14.419	13.375	11.766	14.201	4.999	0.070	0.930	0.069	0.931	-0.070	-0.018	0.030	-0.097
2000	2,632,422	636,491	179642	14.783	13.364	12.099	14.654	3.543	0.068	0.932	0.069	0.931	0.357	0.326	-0.018	0.352
2001	2,046,335	629,007	176495	14.532	13.352	12.081	11.594	3.564	0.086	0.914	0.077	0.923	-0.260	-0.026	-0.020	-0.240
2002	1,522,606	633,345	169116	14.236	13.359	12.038	9.003	3.745	0.111	0.889	0.099	0.901	-0.305	-0.052	-0.002	-0.298
2003	1,725,922	583,280	152822	14.361	13.276	11.937	11.294	3.817	0.089	0.911	0.100	0.900	0.123	-0.104	-0.085	0.210
2004	1,894,845	543,315	183555	14.455	13.205	12.120	10.323	2.960	0.097	0.903	0.093	0.907	0.093	0.183	-0.071	0.141
2005	2,620,199	531,965	209489	14.779	13.184	12.252	12.508	2.539	0.080	0.920	0.088	0.912	0.321	0.129	-0.024	0.332
2006	2,796,327	586,215	225147	14.844	13.281	12.325	12.420	2.604	0.081	0.919	0.080	0.920	0.067	0.074	0.100	-0.030
2007	3,042,556	643,370	239166	14.928	13.374	12.385	12.722	2.690	0.079	0.921	0.080	0.920	0.085	0.061	0.094	-0.006
2008	3,077,763	680,993	255223	14.940	13.431	12.450	12.059	2.668	0.083	0.917	0.081	0.919	0.025	0.079	0.070	-0.046
2009	2,246,915	596,261	243245	14.625	13.298	12.402	9.237	2.451	0.108	0.892	0.096	0.904	-0.328	-0.062	-0.146	-0.190
2010	2,068,476	580,344	215666	14.542	13.271	12.281	9.591	2.691	0.104	0.896	0.106	0.894	-0.090	-0.128	-0.034	-0.046
2011	2,790,252	531,595	244992	14.842	13.184	12.409	11.389	2.170	0.088	0.912	0.096	0.904	0.296	0.125	-0.091	0.366

b. TFP INDEX**: Toray industries textile firm (3402)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	109.87	106.46	111.33	107.87	101.86
1992	106.13	110.29	136.13	128.57	82.54
1993	111.33	106.32	154.10	142.80	77.96
1994	94.73	108.39	156.20	143.20	66.15
1995	93.44	111.88	168.25	152.53	61.26
1996	103.75	99.93	180.70	163.33	63.52
1997	114.86	115.54	194.72	178.53	64.34
1998	126.33	177.80	210.90	188.64	66.97
1999	117.79	174.65	217.37	191.04	61.66
2000	168.38	241.96	213.45	193.10	87.20
2001	129.83	235.79	209.22	188.76	68.78
2002	95.74	223.90	208.78	183.95	52.05
2003	108.25	201.83	191.80	168.79	64.13
2004	118.83	242.39	178.64	162.51	73.13
2005	163.88	275.89	174.43	161.99	101.17
2006	175.32	297.23	192.68	179.55	97.64
2007	190.87	315.92	211.60	196.69	97.04
2008	195.73	341.77	227.05	208.31	93.96
2009	140.97	321.34	196.12	181.03	77.87
2010	128.84	282.86	189.52	172.67	74.62
2011	173.30	320.39	173.09	163.07	106.27

c. CFI INDEX**: Toray industries textile firm (3402)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.047								100
1991	0.046	0.953	0.094	1.065	1.113	1.003	1.108	1.111	111.10
1992	0.049	0.952	-0.035	1.036	1.223	1.002	1.211	1.213	134.78
1993	0.045	0.953	0.048	0.964	1.132	0.998	1.125	1.123	151.41
1994	0.054	0.950	-0.161	1.019	1.014	1.001	1.013	1.014	153.52
1995	0.057	0.944	-0.014	1.032	1.077	1.002	1.073	1.075	164.97
1996	0.046	0.949	0.105	0.893	1.074	0.994	1.070	1.064	175.51
1997	0.048	0.953	0.102	1.156	1.078	1.007	1.074	1.081	189.75
1998	0.067	0.943	0.095	1.539	1.083	1.025	1.078	1.105	209.70
1999	0.070	0.931	-0.070	0.982	1.031	0.999	1.029	1.027	215.42
2000	0.068	0.931	0.357	1.385	0.982	1.023	0.983	1.006	216.64
2001	0.086	0.923	-0.260	0.975	0.980	0.998	0.982	0.980	212.26
2002	0.111	0.901	-0.305	0.950	0.998	0.995	0.998	0.993	210.77
2003	0.089	0.900	0.123	0.901	0.919	0.990	0.926	0.917	193.26
2004	0.097	0.907	0.093	1.201	0.931	1.017	0.938	0.954	184.29
2005	0.080	0.912	0.321	1.138	0.976	1.012	0.979	0.990	182.41
2006	0.081	0.920	0.067	1.077	1.105	1.006	1.096	1.102	201.09
2007	0.079	0.920	0.085	1.063	1.098	1.005	1.090	1.095	220.26
2008	0.083	0.919	0.025	1.082	1.073	1.006	1.067	1.074	236.50
2009	0.108	0.904	-0.328	0.940	0.864	0.994	0.876	0.871	205.95
2010	0.104	0.894	-0.090	0.880	0.966	0.987	0.970	0.957	197.05
2011	0.088	0.904	0.296	1.133	0.913	1.012	0.921	0.932	183.73

a. TFPG INDEX**: Teijin textile firm (3401)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	826,724	161,357	59634	13.625	11.991	10.996	13.863	2.706	0.072	0.928						0.000
1991	826,591	178,353	64511	13.625	12.092	11.075	12.813	2.765	0.078	0.922	0.075	0.925	0.032	0.111	0.132	-0.099
1992	831,136	205,632	73076	13.631	12.234	11.199	11.374	2.814	0.088	0.912	0.083	0.917	0.023	0.142	0.159	-0.135
1993	849,578	241,258	74918	13.652	12.394	11.224	11.340	3.220	0.088	0.912	0.088	0.912	0.035	0.037	0.172	-0.126
1994	880,507	243,757	76577	13.688	12.404	11.246	11.498	3.183	0.087	0.913	0.088	0.912	0.043	0.029	0.017	0.024
1995	916,671	241,854	76751	13.729	12.396	11.248	11.943	3.151	0.084	0.916	0.085	0.915	0.039	0.001	-0.009	0.047
1996	946,790	234,659	75840	13.761	12.366	11.236	12.484	3.094	0.080	0.920	0.082	0.918	0.034	-0.011	-0.029	0.061
1997	1,051,846	253,604	76436	13.866	12.444	11.244	13.761	3.318	0.073	0.927	0.076	0.924	0.103	0.006	0.076	0.033
1998	988,887	257,746	77317	13.804	12.460	11.256	12.790	3.334	0.078	0.922	0.075	0.925	-0.035	0.038	0.042	-0.078
1999	1,289,048	247,978	77638	14.069	12.421	11.260	16.603	3.194	0.060	0.940	0.069	0.931	0.262	0.001	-0.042	0.301
2000	1,663,742	369,818	102892	14.325	12.821	11.541	16.170	3.594	0.062	0.938	0.061	0.939	0.249	0.275	0.393	-0.137
2001	1,944,287	391,382	97567	14.480	12.877	11.488	19.928	4.011	0.050	0.950	0.056	0.944	0.148	-0.061	0.049	0.105
2002	1,738,605	433,021	91975	14.369	12.979	11.429	18.903	4.708	0.053	0.947	0.052	0.948	-0.121	-0.068	0.092	-0.205
2003	1,811,954	432,998	83124	14.410	12.978	11.328	21.798	5.209	0.046	0.954	0.049	0.951	0.039	-0.104	-0.003	0.046
2004	1,630,367	393,819	144227	14.304	12.884	11.879	11.304	2.731	0.088	0.912	0.067	0.933	-0.106	0.551	-0.095	-0.054
2005	1,856,223	322,652	122273	14.434	12.684	11.714	15.181	2.639	0.066	0.934	0.077	0.923	0.127	-0.168	-0.202	0.326
2006	2,200,717	346,498	126407	14.604	12.756	11.747	17.410	2.741	0.057	0.943	0.062	0.938	0.173	0.036	0.074	0.101
2007	2,280,901	379,631	131961	14.640	12.847	11.790	17.285	2.877	0.058	0.942	0.058	0.942	0.036	0.044	0.092	-0.053
2008	1,965,443	382,567	150093	14.491	12.855	11.919	13.095	2.549	0.076	0.924	0.067	0.933	-0.135	0.142	0.021	-0.165
2009	787,615	339,703	149885	13.577	12.736	11.918	5.255	2.266	0.190	0.810	0.133	0.867	-0.928	-0.015	-0.132	-0.811
2010	1,500,344	316,901	133774	14.221	12.666	11.804	11.215	2.369	0.089	0.911	0.140	0.860	0.637	-0.121	-0.077	0.720
2011	1,579,844	259,659	115514	14.273	12.467	11.657	13.677	2.248	0.073	0.927	0.081	0.919	0.049	-0.150	-0.202	0.247

b. TFP INDEX**: Teijin textile firm (3401)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	103.24	111.71	114.14	113.62	90.87
1992	105.60	128.71	133.86	131.99	80.00
1993	109.30	133.62	159.03	154.15	70.91
1994	114.08	137.54	161.80	157.08	72.62
1995	118.61	137.67	160.33	156.19	75.94
1996	122.66	136.22	155.76	152.57	80.40
1997	135.99	137.00	167.99	164.69	82.57
1998	131.26	142.27	175.28	171.98	76.32
1999	170.53	142.39	168.08	166.65	102.33
2000	218.65	187.46	249.01	247.45	88.36
2001	253.44	176.32	261.39	259.83	97.54
2002	224.60	164.72	286.61	284.31	79.00
2003	233.49	148.50	285.88	283.12	82.47
2004	210.07	257.63	259.99	261.12	80.45
2005	238.53	217.83	212.43	211.78	112.63
2006	283.48	225.73	228.68	230.89	122.77
2007	293.98	235.79	250.70	253.44	116.00
2008	256.81	271.88	256.11	258.43	99.37
2009	101.52	267.85	224.35	216.14	46.97
2010	192.01	237.34	207.79	197.91	97.02
2011	201.59	204.35	169.76	170.80	118.03

c. CFI INDEX**: Teijin textile firm (3401)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.072								100
1991	0.078	0.075	0.925	1.117	1.105	1.008	1.097	1.106	110.62
1992	0.088	0.083	0.917	1.152	1.153	1.012	1.139	1.153	127.53
1993	0.088	0.088	0.912	1.038	1.173	1.003	1.157	1.161	148.03
1994	0.087	0.088	0.912	1.029	1.010	1.003	1.009	1.012	149.80
1995	0.084	0.085	0.915	1.001	0.992	1.000	0.993	0.993	148.75
1996	0.080	0.082	0.918	0.989	0.970	0.999	0.973	0.972	144.55
1997	0.073	0.076	0.924	1.006	1.081	1.000	1.074	1.075	155.37
1998	0.078	0.075	0.925	1.038	1.016	1.003	1.015	1.018	158.16
1999	0.060	0.069	0.931	1.001	0.962	1.000	0.965	0.965	152.58
2000	0.062	0.061	0.939	1.317	1.491	1.017	1.455	1.480	225.83
2001	0.050	0.056	0.944	0.941	1.058	0.997	1.055	1.051	237.42
2002	0.053	0.052	0.948	0.934	1.106	0.996	1.101	1.097	260.40
2003	0.046	0.049	0.951	0.902	1.000	0.995	1.000	0.995	259.06
2004	0.088	0.067	0.933	1.735	0.910	1.038	0.915	0.950	246.06
2005	0.066	0.077	0.923	0.845	0.819	0.987	0.832	0.821	202.09
2006	0.057	0.062	0.938	1.036	1.074	1.002	1.069	1.072	216.55
2007	0.058	0.058	0.942	1.045	1.096	1.003	1.090	1.093	236.60
2008	0.076	0.067	0.933	1.153	1.008	1.010	1.007	1.017	240.60
2009	0.190	0.133	0.867	0.985	0.888	0.998	0.902	0.900	216.62
2010	0.089	0.140	0.860	0.886	0.933	0.983	0.942	0.926	200.63
2011	0.073	0.081	0.919	0.861	0.819	0.988	0.833	0.823	165.05

a. TFPG INDEX**: Onwards holdings textile firm (8016)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	397,046	33,857	10836	12.892	10.430	9.291	36.642	3.125	0.027	0.973						0.000
1991	419,760	57,637	10960	12.947	10.962	9.302	38.298	5.259	0.026	0.974	0.027	0.973	0.088	0.044	0.564	-0.462
1992	565,830	63,966	11310	13.246	11.066	9.333	50.027	5.655	0.020	0.980	0.023	0.977	0.316	0.048	0.121	0.196
1993	348,918	63,612	11688	12.763	11.061	9.366	29.852	5.442	0.033	0.967	0.027	0.973	-0.471	0.045	0.007	-0.479
1994	230,384	65,660	11634	12.348	11.092	9.362	19.803	5.644	0.050	0.950	0.042	0.958	-0.408	0.002	0.039	-0.445
1995	310,198	72,387	11558	12.645	11.190	9.355	26.838	6.263	0.037	0.963	0.044	0.956	0.296	-0.008	0.096	0.204
1996	375,190	84,213	11320	12.835	11.341	9.334	33.143	7.439	0.030	0.970	0.034	0.966	0.192	-0.020	0.153	0.045
1997	412,129	86,509	11119	12.929	11.368	9.316	37.066	7.780	0.027	0.973	0.029	0.971	0.092	-0.020	0.025	0.068
1998	376,327	91,517	10827	12.838	11.424	9.290	34.757	8.452	0.029	0.971	0.028	0.972	-0.065	0.000	0.083	-0.145
1999	288,906	90,820	10386	12.574	11.417	9.248	27.816	8.744	0.036	0.964	0.032	0.968	-0.268	-0.045	-0.011	-0.256
2000	416,737	96,340	8347	12.940	11.476	9.030	49.925	11.542	0.020	0.980	0.028	0.972	0.360	-0.225	0.052	0.315
2001	512,032	105,260	13642	13.146	11.564	9.521	37.535	7.716	0.027	0.973	0.023	0.977	0.198	0.483	0.080	0.108
2002	565,742	102,888	12912	13.246	11.541	9.466	43.814	7.968	0.023	0.977	0.025	0.975	0.091	-0.064	-0.032	0.123
2003	622,730	101,188	12010	13.342	11.525	9.393	51.853	8.426	0.019	0.981	0.021	0.979	0.093	-0.075	-0.019	0.114
2004	644,756	96,017	12676	13.377	11.472	9.447	50.863	7.574	0.020	0.980	0.019	0.981	0.035	0.054	-0.053	0.085
2005	656,884	96,394	21104	13.395	11.476	9.957	31.126	4.568	0.032	0.968	0.026	0.974	0.016	0.507	0.001	0.002
2006	694,333	99,687	19853	13.451	11.510	9.896	34.974	5.021	0.029	0.971	0.030	0.970	0.058	-0.059	0.036	0.025
2007	736,508	94,850	20178	13.510	11.460	9.912	36.501	4.701	0.027	0.973	0.028	0.972	0.060	0.017	-0.049	0.107
2008	420,740	95,008	24310	12.950	11.462	10.099	17.307	3.908	0.058	0.942	0.043	0.957	-0.546	0.200	0.015	-0.569
2009	205,200	90,174	23370	12.232	11.409	10.059	8.781	3.859	0.114	0.886	0.086	0.914	-0.732	-0.053	-0.066	-0.667
2010	181,840	89,741	35310	12.111	11.405	10.472	5.150	2.541	0.194	0.806	0.154	0.846	-0.128	0.406	-0.012	-0.180
2011	222,175	86,622	34615	12.311	11.369	10.452	6.418	2.502	0.156	0.844	0.175	0.825	0.197	-0.023	-0.038	0.233

b. TFP INDEX**: Onwards holdings textile firm (8016)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	109.17	104.45	175.79	173.48	62.93
1992	149.69	109.64	198.45	196.70	76.10
1993	93.47	114.73	199.84	197.02	47.44
1994	62.15	115.00	207.72	199.26	31.19
1995	83.57	114.10	228.70	217.68	38.39
1996	101.21	111.90	266.41	256.85	39.41
1997	110.94	109.68	273.11	265.69	41.76
1998	104.01	109.64	296.61	288.30	36.07
1999	79.58	104.83	293.38	282.14	28.21
2000	114.04	83.69	309.16	297.82	38.29
2001	138.98	135.67	335.04	329.53	42.17
2002	152.18	127.27	324.55	318.05	47.85
2003	167.09	118.07	318.40	314.04	53.21
2004	172.98	124.62	302.10	299.59	57.74
2005	175.76	206.91	302.47	299.98	58.59
2006	186.23	195.11	313.55	307.99	60.47
2007	197.66	198.42	298.51	294.88	67.03
2008	114.47	242.34	303.13	295.06	38.79
2009	55.07	229.83	283.83	260.75	21.12
2010	48.45	344.77	280.44	250.58	19.34
2011	59.03	337.00	269.90	237.14	24.89

c. CFI INDEX**: Onwards holdings textile (8016)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.027								100
1991	0.026	0.027	0.973	1.044	1.758	1.001	1.732	1.734	173.36
1992	0.020	0.023	0.977	1.050	1.129	1.001	1.126	1.127	195.38
1993	0.033	0.027	0.973	1.046	1.007	1.001	1.007	1.008	196.96
1994	0.050	0.042	0.958	1.002	1.039	1.000	1.038	1.038	204.41
1995	0.037	0.044	0.956	0.992	1.101	1.000	1.096	1.096	224.03
1996	0.030	0.034	0.966	0.981	1.165	0.999	1.159	1.158	259.46
1997	0.027	0.029	0.971	0.980	1.025	0.999	1.024	1.024	265.64
1998	0.029	0.028	0.972	1.000	1.086	1.000	1.084	1.084	287.83
1999	0.036	0.032	0.968	0.956	0.989	0.999	0.989	0.988	284.39
2000	0.020	0.028	0.972	0.798	1.054	0.994	1.052	1.046	297.36
2001	0.027	0.023	0.977	1.621	1.084	1.011	1.082	1.094	325.30
2002	0.023	0.025	0.975	0.938	0.969	0.998	0.969	0.968	314.87
2003	0.019	0.021	0.979	0.928	0.981	0.998	0.981	0.980	308.53
2004	0.020	0.019	0.981	1.055	0.949	1.001	0.950	0.951	293.34
2005	0.032	0.026	0.974	1.660	1.001	1.013	1.001	1.014	297.57
2006	0.029	0.030	0.970	0.943	1.037	0.998	1.036	1.034	307.59
2007	0.027	0.028	0.972	1.017	0.952	1.000	0.953	0.954	293.38
2008	0.058	0.043	0.957	1.221	1.015	1.009	1.015	1.023	300.27
2009	0.114	0.086	0.914	0.948	0.936	0.995	0.942	0.937	281.46
2010	0.194	0.154	0.846	1.500	0.988	1.064	0.990	1.054	296.57
2011	0.156	0.175	0.825	0.977	0.962	0.996	0.969	0.965	286.20

a. TFPG INDEX**: Unitika textile firm (3103)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	464,226	153,530	17326	13.048	11.942	9.760	26.794	8.861	0.037	0.963						0.000
1991	528,738	160,092	18688	13.178	11.984	9.836	28.294	8.567	0.035	0.965	0.036	0.964	0.162	0.108	0.074	0.087
1992	511,519	163,690	19799	13.145	12.006	9.893	25.836	8.268	0.039	0.961	0.037	0.963	-0.016	0.075	0.039	-0.057
1993	371,975	167,219	18805	12.827	12.027	9.842	19.781	8.892	0.051	0.949	0.045	0.955	-0.306	-0.039	0.034	-0.337
1994	340,118	161,924	17488	12.737	11.995	9.769	19.449	9.259	0.051	0.949	0.051	0.949	-0.083	-0.066	-0.025	-0.055
1995	334,086	160,590	15366	12.719	11.987	9.640	21.742	10.451	0.046	0.954	0.049	0.951	-0.019	-0.131	-0.010	-0.004
1996	329,086	151,332	18396	12.704	11.927	9.820	17.889	8.227	0.056	0.944	0.051	0.949	-0.014	0.181	-0.058	0.032
1997	296,670	169,181	18530	12.600	12.039	9.827	16.010	9.130	0.062	0.938	0.059	0.941	-0.106	0.005	0.109	-0.209
1998	380,605	170,197	18395	12.850	12.045	9.820	20.690	9.252	0.048	0.952	0.055	0.945	0.275	0.019	0.032	0.244
1999	374,424	146,601	19574	12.833	11.895	9.882	19.128	7.489	0.052	0.948	0.050	0.950	-0.020	0.059	-0.153	0.122
2000	376,845	151,402	16675	12.840	11.928	9.722	22.599	9.080	0.044	0.956	0.048	0.952	0.000	-0.167	0.026	-0.016
2001	377,555	141,361	25965	12.841	11.859	10.165	14.541	5.444	0.069	0.931	0.057	0.943	-0.006	0.435	-0.077	0.042
2002	311,579	180,908	25919	12.649	12.106	10.163	12.021	6.980	0.083	0.917	0.076	0.924	-0.201	-0.011	0.238	-0.420
2003	245,380	171,594	26100	12.411	12.053	10.170	9.401	6.574	0.106	0.894	0.095	0.905	-0.241	0.004	-0.055	-0.192
2004	317,106	168,790	28896	12.667	12.036	10.271	10.974	5.841	0.091	0.909	0.099	0.901	0.256	0.102	-0.017	0.261
2005	355,782	168,336	28492	12.782	12.034	10.257	12.487	5.908	0.080	0.920	0.086	0.914	0.112	-0.017	-0.005	0.119
2006	361,325	165,666	30325	12.798	12.018	10.320	11.915	5.463	0.084	0.916	0.082	0.918	0.018	0.065	-0.014	0.025
2007	368,099	164,115	31639	12.816	12.008	10.362	11.634	5.187	0.086	0.914	0.085	0.915	0.019	0.043	-0.009	0.024
2008	326,120	164,012	31250	12.695	12.008	10.350	10.436	5.248	0.096	0.904	0.091	0.909	-0.107	0.001	0.013	-0.119
2009	271,057	158,337	28707	12.510	11.972	10.265	9.442	5.516	0.106	0.894	0.101	0.899	-0.199	-0.098	-0.049	-0.145
2010	226,057	154,732	21407	12.329	11.949	9.971	10.560	7.228	0.095	0.905	0.100	0.900	-0.189	-0.301	-0.030	-0.131
2011	249,411	151,669	20591	12.427	11.929	9.933	12.112	7.366	0.083	0.917	0.089	0.911	0.095	-0.042	-0.023	0.120

b. TFP INDEX**: Unitika textile firm (3103)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	117.61	111.38	107.67	108.04	108.86
1992	115.74	120.03	111.99	112.35	103.02
1993	85.23	115.44	115.85	114.00	74.76
1994	78.47	108.11	112.96	109.40	71.73
1995	76.98	94.87	111.89	108.27	71.10
1996	75.93	113.72	105.57	102.87	73.81
1997	68.31	114.32	117.78	112.10	60.93
1998	89.97	116.50	121.64	116.66	77.12
1999	88.21	123.56	104.43	102.38	86.16
2000	88.20	104.57	107.14	104.49	84.41
2001	87.65	161.50	99.22	97.81	89.61
2002	71.68	159.77	125.84	117.78	60.86
2003	56.31	160.49	119.07	108.05	52.11
2004	72.76	177.66	117.11	106.73	68.18
2005	81.42	174.70	116.48	108.54	75.01
2006	82.89	186.39	114.91	108.45	76.43
2007	84.49	194.58	113.90	107.44	78.64
2008	75.88	194.83	115.40	107.67	70.48
2009	62.22	176.57	109.90	100.36	62.00
2010	51.52	130.72	106.63	94.86	54.31
2011	56.68	125.37	104.21	94.72	59.84

c. CFI IN DEX**: Unitika textile firm (3103)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.037								100
1991	0.035	0.036	0.964	1.114	1.077	1.004	1.074	1.078	107.81
1992	0.039	0.037	0.963	1.078	1.040	1.003	1.039	1.041	112.27
1993	0.051	0.045	0.955	0.962	1.034	0.998	1.033	1.031	115.77
1994	0.051	0.051	0.949	0.936	0.975	0.997	0.976	0.973	112.65
1995	0.046	0.049	0.951	0.878	0.990	0.994	0.991	0.985	110.92
1996	0.056	0.051	0.949	1.199	0.944	1.009	0.946	0.955	105.95
1997	0.062	0.059	0.941	1.005	1.116	1.000	1.108	1.109	117.47
1998	0.048	0.055	0.945	1.019	1.033	1.001	1.031	1.032	121.23
1999	0.052	0.050	0.950	1.061	0.859	1.003	0.865	0.868	105.19
2000	0.044	0.048	0.952	0.846	1.026	0.992	1.025	1.016	106.92
2001	0.069	0.057	0.943	1.544	0.926	1.025	0.930	0.953	101.93
2002	0.083	0.076	0.924	0.989	1.268	0.999	1.246	1.245	126.85
2003	0.106	0.095	0.905	1.005	0.946	1.000	0.951	0.952	120.71
2004	0.091	0.099	0.901	1.107	0.984	1.010	0.985	0.995	120.12
2005	0.080	0.086	0.914	0.983	0.995	0.999	0.995	0.994	119.35
2006	0.084	0.082	0.918	1.067	0.987	1.005	0.988	0.993	118.50
2007	0.086	0.085	0.915	1.044	0.991	1.004	0.992	0.996	117.98
2008	0.096	0.091	0.909	1.001	1.013	1.000	1.012	1.012	119.40
2009	0.106	0.101	0.899	0.906	0.952	0.990	0.957	0.948	113.15
2010	0.095	0.100	0.900	0.740	0.970	0.970	0.973	0.944	106.84
2011	0.083	0.089	0.911	0.959	0.977	0.996	0.979	0.976	104.25

a. TFPG INDEX**: Wacoal holdings textile firm (3591)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	249,111	46,972	39881	12.426	10.757	10.594	6.246	1.178	0.160	0.840						0.000
1991	234,177	50,529	41917	12.364	10.830	10.643	5.587	1.205	0.179	0.821	0.170	0.830	-0.030	0.082	0.105	-0.131
1992	242,270	51,529	44040	12.398	10.850	10.693	5.501	1.170	0.182	0.818	0.180	0.820	0.051	0.066	0.037	0.009
1993	222,698	50,949	45578	12.314	10.839	10.727	4.886	1.118	0.205	0.795	0.193	0.807	-0.072	0.047	0.001	-0.082
1994	208,030	51,913	46940	12.245	10.857	10.757	4.432	1.106	0.226	0.774	0.215	0.785	-0.061	0.036	0.026	-0.089
1995	203,591	51,698	47861	12.224	10.853	10.776	4.254	1.080	0.235	0.765	0.230	0.770	-0.023	0.018	-0.005	-0.023
1996	228,512	50,914	48672	12.339	10.838	10.793	4.695	1.046	0.213	0.787	0.224	0.776	0.117	0.018	-0.014	0.124
1997	227,101	50,482	49541	12.333	10.829	10.811	4.584	1.019	0.218	0.782	0.216	0.784	-0.008	0.016	-0.011	-0.003
1998	234,898	52,878	50058	12.367	10.876	10.821	4.693	1.056	0.213	0.787	0.216	0.784	0.060	0.037	0.073	-0.005
1999	248,230	56,339	51150	12.422	10.939	10.843	4.853	1.101	0.206	0.794	0.210	0.790	0.052	0.018	0.060	0.001
2000	282,240	59,990	73400	12.551	11.002	11.204	3.845	0.817	0.260	0.740	0.233	0.767	0.122	0.355	0.056	-0.004
2001	407,924	58,644	66954	12.919	10.979	11.112	6.093	0.876	0.164	0.836	0.212	0.788	0.360	-0.100	-0.031	0.406
2002	219,927	57,291	68737	12.301	10.956	11.138	3.200	0.833	0.313	0.687	0.238	0.762	-0.627	0.017	-0.032	-0.606
2003	229,809	54,171	69279	12.345	10.900	11.146	3.317	0.782	0.301	0.699	0.307	0.693	0.041	0.005	-0.058	0.080
2004	213,487	49,932	52617	12.271	10.818	10.871	4.057	0.949	0.246	0.754	0.274	0.726	-0.074	-0.275	-0.082	0.061
2005	285,586	51,826	61066	12.562	10.856	11.020	4.677	0.849	0.214	0.786	0.230	0.770	0.288	0.146	0.035	0.228
2006	179,572	53,501	99212	12.098	10.887	11.505	1.810	0.539	0.552	0.448	0.383	0.617	-0.462	0.488	0.034	-0.670
2007	332,887	52,782	110927	12.716	10.874	11.617	3.001	0.476	0.333	0.667	0.443	0.557	0.618	0.112	-0.013	0.575
2008	399,376	51,548	107516	12.898	10.850	11.585	3.715	0.479	0.269	0.731	0.301	0.699	0.196	-0.018	-0.010	0.208
2009	304,718	49,039	113058	12.627	10.800	11.636	2.695	0.434	0.371	0.629	0.320	0.680	-0.284	0.037	-0.063	-0.253
2010	235,209	51,820	123819	12.368	10.856	11.727	1.900	0.419	0.526	0.474	0.449	0.551	-0.266	0.084	0.048	-0.330
2011	253,419	49,745	112639	12.443	10.815	11.632	2.250	0.442	0.444	0.556	0.485	0.515	0.072	-0.098	-0.044	0.142

b. TFP INDEX**: Wacoal holdings textile firm (3591)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	97.07	108.53	111.08	110.47	87.87
1992	102.15	115.99	115.23	114.98	88.84
1993	95.09	121.56	115.37	115.91	82.03
1994	89.44	126.06	118.37	118.91	75.22
1995	87.42	128.37	117.73	118.73	73.63
1996	98.25	130.72	116.10	117.98	83.28
1997	97.44	132.77	114.87	117.44	82.97
1998	103.47	137.73	123.53	125.32	82.57
1999	108.98	140.27	131.18	131.96	82.59
2000	123.10	199.96	138.76	149.30	82.45
2001	176.47	180.92	134.54	142.05	124.23
2002	94.29	184.07	130.26	139.65	67.52
2003	98.28	185.07	122.86	136.02	72.26
2004	91.29	140.54	113.24	117.92	77.42
2005	121.79	162.67	117.21	124.96	97.47
2006	76.76	264.92	121.29	157.75	48.66
2007	142.39	296.38	119.73	170.78	83.37
2008	173.18	291.21	118.54	151.85	114.04
2009	130.35	302.10	111.25	149.22	87.36
2010	99.90	328.48	116.72	177.12	56.40
2011	107.32	297.95	111.72	170.54	62.93

c. CFI INDEX**: Wacoal Holdings textile firm (3591)**

Year	$(W/V)_{t-1}$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.160								100
1991	0.179	0.170	0.830	1.085	1.111	1.014	1.091	1.106	110.645
1992	0.182	0.180	0.820	1.069	1.037	1.012	1.030	1.043	115.392
1993	0.205	0.193	0.807	1.048	1.001	1.009	1.001	1.010	116.559
1994	0.226	0.215	0.785	1.037	1.026	1.008	1.020	1.028	119.870
1995	0.235	0.230	0.770	1.018	0.995	1.004	0.996	1.000	119.870
1996	0.213	0.224	0.776	1.018	0.986	1.004	0.989	0.993	119.057
1997	0.218	0.216	0.784	1.016	0.989	1.003	0.992	0.995	118.469
1998	0.213	0.216	0.784	1.037	1.075	1.008	1.059	1.067	126.412
1999	0.206	0.210	0.790	1.018	1.062	1.004	1.049	1.053	133.071
2000	0.260	0.233	0.767	1.426	1.058	1.086	1.044	1.134	150.895
2001	0.164	0.212	0.788	0.905	0.970	0.979	0.976	0.955	144.180
2002	0.313	0.238	0.762	1.017	0.968	1.004	0.976	0.980	141.251
2003	0.301	0.307	0.693	1.005	0.943	1.002	0.960	0.962	135.864
2004	0.246	0.274	0.726	0.759	0.922	0.927	0.942	0.874	118.750
2005	0.214	0.230	0.770	1.157	1.035	1.034	1.027	1.062	126.124
2006	0.552	0.383	0.617	1.629	1.035	1.205	1.021	1.231	155.280
2007	0.333	0.443	0.557	1.119	0.987	1.051	0.993	1.043	162.020
2008	0.269	0.301	0.699	0.983	0.990	0.995	0.993	0.988	160.043
2009	0.371	0.320	0.680	1.037	0.939	1.012	0.958	0.969	155.096
2010	0.526	0.449	0.551	1.087	1.049	1.038	1.027	1.066	165.347
2011	0.444	0.485	0.515	0.907	0.957	0.954	0.978	0.933	154.186

a. TFPG INDEX**: Kurabo textile firm (3106)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	123,769	45,006	19999	11.726	10.715	9.903	6.189	2.250	0.162	0.838						0.000
1991	97,177	46,377	17837	11.484	10.745	9.789	5.448	2.600	0.184	0.816	0.173	0.827	-0.210	-0.082	0.030	-0.220
1992	127,307	54,690	16447	11.754	10.909	9.708	7.740	3.325	0.129	0.871	0.156	0.844	0.287	-0.064	0.165	0.158
1993	121,882	58,144	13222	11.711	10.971	9.490	9.218	4.398	0.108	0.892	0.119	0.881	-0.031	-0.206	0.061	-0.061
1994	116,444	56,696	12874	11.665	10.945	9.463	9.045	4.404	0.111	0.889	0.110	0.890	-0.039	-0.020	-0.025	-0.014
1995	128,023	56,786	18993	11.760	10.947	9.852	6.741	2.990	0.148	0.852	0.129	0.871	0.094	0.388	0.002	0.042
1996	126,991	64,268	18771	11.752	11.071	9.840	6.765	3.424	0.148	0.852	0.148	0.852	-0.007	-0.010	0.124	-0.111
1997	140,579	62,713	18239	11.854	11.046	9.811	7.708	3.438	0.130	0.870	0.139	0.861	0.100	-0.031	-0.024	0.125
1998	147,165	65,325	17625	11.899	11.087	9.777	8.350	3.706	0.120	0.880	0.125	0.875	0.072	-0.008	0.041	0.037
1999	114,034	60,026	21174	11.644	11.003	9.961	5.385	2.835	0.186	0.814	0.153	0.847	-0.258	0.180	-0.085	-0.214
2000	199,494	55,057	27864	12.204	10.916	10.235	7.160	1.976	0.140	0.860	0.163	0.837	0.553	0.268	-0.086	0.581
2001	229,323	66,682	23473	12.343	11.108	10.064	9.769	2.841	0.102	0.898	0.121	0.879	0.131	-0.180	0.192	-0.015
2002	194,751	63,551	28231	12.179	11.060	10.248	6.898	2.251	0.145	0.855	0.124	0.876	-0.172	0.176	-0.048	-0.152
2003	179,653	61,666	32563	12.099	11.029	10.391	5.517	1.894	0.181	0.819	0.163	0.837	-0.083	0.140	-0.030	-0.081
2004	181,737	59,612	29937	12.110	10.996	10.307	6.071	1.991	0.165	0.835	0.173	0.827	0.011	-0.084	-0.034	0.054
2005	227,817	67,570	29647	12.336	11.121	10.297	7.684	2.279	0.130	0.870	0.147	0.853	0.223	-0.012	0.125	0.118
2006	224,014	65,616	29074	12.319	11.092	10.278	7.705	2.257	0.130	0.870	0.130	0.870	-0.014	-0.017	-0.029	0.013
2007	215,974	65,750	28944	12.283	11.094	10.273	7.462	2.272	0.134	0.866	0.132	0.868	-0.036	-0.004	0.002	-0.037
2008	210,473	66,836	28973	12.257	11.110	10.274	7.264	2.307	0.138	0.862	0.136	0.864	-0.012	0.015	0.016	-0.028
2009	195,796	59,121	28656	12.185	10.987	10.263	6.833	2.063	0.146	0.854	0.142	0.858	-0.086	-0.025	-0.123	0.023
2010	185,845	56,125	26255	12.133	10.935	10.176	7.079	2.138	0.141	0.859	0.144	0.856	-0.059	-0.095	-0.052	-0.001
2011	149,702	52,648	26372	11.916	10.871	10.180	5.677	1.996	0.176	0.824	0.159	0.841	-0.219	0.002	-0.064	-0.166

b. TFP INDEX**: Kurabo textile firm (3106)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	81.08	92.10	106.41	102.87	78.82
1992	108.04	86.38	127.64	120.59	89.59
1993	104.74	70.32	137.41	131.37	79.73
1994	100.77	68.95	134.93	130.77	77.06
1995	110.65	101.59	134.97	133.53	82.86
1996	109.90	100.53	152.95	145.31	75.63
1997	121.40	97.48	148.94	143.05	84.87
1998	130.47	96.71	159.27	154.20	84.61
1999	100.77	115.80	145.87	141.83	71.05
2000	175.12	151.38	132.91	135.63	129.11
2001	199.67	126.49	159.67	160.42	124.47
2002	168.05	150.76	150.81	155.51	108.06
2003	154.64	173.46	145.97	149.95	103.12
2004	156.41	159.46	141.09	142.78	109.55
2005	195.55	157.49	159.50	161.04	121.43
2006	192.74	154.81	155.26	159.23	121.04
2007	185.94	154.21	155.67	159.26	116.75
2008	183.69	156.49	160.42	163.25	112.52
2009	168.58	152.69	139.99	143.99	117.08
2010	158.86	138.90	131.94	134.85	117.81
2011	127.60	139.11	123.40	126.07	101.21

c. CFI INDEX**: Kurabo textile firm (3106)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.162								100
1991	0.184	0.173	0.827	0.921	1.064	0.986	1.053	1.038	103.79
1992	0.129	0.156	0.844	0.938	1.200	0.990	1.166	1.154	119.80
1993	0.108	0.119	0.881	0.814	1.077	0.976	1.067	1.041	124.76
1994	0.111	0.110	0.890	0.981	0.982	0.998	0.984	0.982	122.48
1995	0.148	0.129	0.871	1.473	1.000	1.051	1.000	1.052	128.82
1996	0.148	0.148	0.852	0.990	1.133	0.998	1.112	1.111	143.08
1997	0.130	0.139	0.861	0.970	0.974	0.996	0.977	0.973	139.24
1998	0.120	0.125	0.875	0.992	1.069	0.999	1.060	1.059	147.52
1999	0.186	0.153	0.847	1.197	0.916	1.028	0.928	0.954	140.75
2000	0.140	0.163	0.837	1.307	0.911	1.045	0.925	0.966	136.01
2001	0.102	0.121	0.879	0.836	1.201	0.978	1.175	1.150	156.36
2002	0.145	0.124	0.876	1.192	0.944	1.022	0.951	0.972	151.99
2003	0.181	0.163	0.837	1.151	0.968	1.023	0.973	0.996	151.33
2004	0.165	0.173	0.827	0.919	0.967	0.986	0.972	0.958	145.01
2005	0.130	0.147	0.853	0.988	1.130	0.998	1.110	1.108	160.69
2006	0.130	0.130	0.870	0.983	0.973	0.998	0.977	0.975	156.62
2007	0.134	0.132	0.868	0.996	1.003	0.999	1.002	1.002	156.90
2008	0.138	0.136	0.864	1.015	1.031	1.002	1.026	1.028	161.34
2009	0.146	0.142	0.858	0.976	0.873	0.997	0.890	0.887	143.05
2010	0.141	0.144	0.856	0.910	0.943	0.986	0.951	0.938	134.14
2011	0.176	0.159	0.841	1.002	0.935	1.000	0.945	0.946	126.83

a. TFPG INDEX**: Gunze Limited textile firm (3002)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t = α'	1-α'=β'	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	239,918	46,695	24288	12.388	10.751	10.098	9.878	1.923	0.101	0.899						0.000
1991	244,778	62,834	26118	12.408	11.048	10.170	9.372	2.406	0.107	0.893	0.104	0.896	0.052	0.105	0.297	-0.225
1992	258,526	66,978	27516	12.463	11.112	10.223	9.395	2.434	0.106	0.894	0.107	0.893	0.072	0.069	0.064	0.007
1993	295,098	73,889	31558	12.595	11.210	10.360	9.351	2.341	0.107	0.893	0.107	0.893	0.145	0.150	0.098	0.041
1994	249,142	74,112	32322	12.426	11.213	10.384	7.708	2.293	0.130	0.870	0.118	0.882	-0.162	0.031	0.003	-0.169
1995	217,715	75,162	32755	12.291	11.227	10.397	6.647	2.295	0.150	0.850	0.140	0.860	-0.136	0.012	0.014	-0.150
1996	215,347	73,012	29937	12.280	11.198	10.307	7.193	2.439	0.139	0.861	0.145	0.855	-0.010	-0.089	-0.029	0.028
1997	219,514	71,045	30564	12.299	11.171	10.328	7.182	2.325	0.139	0.861	0.139	0.861	0.017	0.019	-0.027	0.038
1998	174,300	69,639	30580	12.069	11.151	10.328	5.700	2.277	0.175	0.825	0.157	0.843	-0.204	0.027	-0.020	-0.192
1999	181,481	70,499	31281	12.109	11.163	10.351	5.802	2.254	0.172	0.828	0.174	0.826	0.037	0.019	0.012	0.024
2000	183,571	73,071	44611	12.120	11.199	10.706	4.115	1.638	0.243	0.757	0.208	0.792	0.005	0.348	0.036	-0.096
2001	269,208	46,500	44738	12.503	10.747	10.709	6.017	1.039	0.166	0.834	0.205	0.795	0.375	-0.005	-0.452	0.735
2002	212,634	67,867	44614	12.267	11.125	10.706	4.766	1.521	0.210	0.790	0.188	0.812	-0.245	-0.012	0.378	-0.550
2003	226,460	66,879	45900	12.330	11.111	10.734	4.934	1.457	0.203	0.797	0.206	0.794	0.061	0.026	-0.015	0.067
2004	251,774	66,109	44084	12.436	11.099	10.694	5.711	1.500	0.175	0.825	0.189	0.811	0.106	-0.040	-0.012	0.123
2005	175,882	64,702	45462	12.078	11.078	10.725	3.869	1.423	0.258	0.742	0.217	0.783	-0.361	0.028	-0.022	-0.351
2006	251,041	67,755	46181	12.433	11.124	10.740	5.436	1.467	0.184	0.816	0.221	0.779	0.358	0.018	0.046	0.318
2007	273,125	74,934	46945	12.518	11.224	10.757	5.818	1.596	0.172	0.828	0.178	0.822	0.085	0.017	0.101	-0.001
2008	231,474	73,071	46754	12.352	11.199	10.753	4.951	1.563	0.202	0.798	0.187	0.813	-0.152	0.010	-0.025	-0.133
2009	206,243	72,187	49183	12.237	11.187	10.803	4.193	1.468	0.238	0.762	0.220	0.780	-0.129	0.037	-0.012	-0.128
2010	171,450	70,550	46620	12.052	11.164	10.750	3.678	1.513	0.272	0.728	0.255	0.745	-0.192	-0.061	-0.023	-0.159
2011	186,105	67,468	47155	12.134	11.119	10.761	3.947	1.431	0.253	0.747	0.263	0.737	0.079	0.008	-0.045	0.110

b. TFP INDEX**: Gunze limited textile firm (3002)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	105.35	111.04	138.95	135.51	77.75
1992	113.18	119.00	150.66	146.41	77.31
1993	130.83	138.20	168.31	164.22	79.67
1994	111.23	142.54	170.00	164.64	67.56
1995	97.07	144.26	172.18	163.75	59.28
1996	96.14	132.02	167.47	157.27	61.13
1997	97.79	134.50	162.62	154.51	63.29
1998	79.72	138.16	163.65	153.61	51.90
1999	82.73	140.86	165.12	153.17	54.01
2000	83.13	199.56	170.02	163.95	50.70
2001	120.92	198.50	107.32	113.75	106.30
2002	94.65	196.18	155.22	153.27	61.76
2003	100.56	201.33	152.58	150.84	66.66
2004	111.79	193.35	150.81	149.26	74.90
2005	77.88	198.85	147.20	145.69	53.46
2006	111.43	202.49	154.52	151.67	73.47
2007	121.30	205.95	170.99	168.11	72.16
2008	104.22	207.94	169.04	166.14	62.73
2009	91.61	215.80	164.74	161.75	56.64
2010	75.61	203.08	159.85	153.65	49.21
2011	81.83	204.82	152.42	148.23	55.21

c. CFI INDEX**: Gunze Limited textile firm (3002)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.101								100
1991	0.107	0.104	0.896	1.110	1.355	1.011	1.313	1.327	132.73
1992	0.106	0.107	0.893	1.072	1.080	1.007	1.072	1.080	143.28
1993	0.107	0.107	0.893	1.161	1.122	1.016	1.108	1.126	161.31
1994	0.130	0.118	0.882	1.031	1.003	1.004	1.002	1.006	162.27
1995	0.150	0.140	0.860	1.012	0.995	1.002	0.995	0.997	161.79
1996	0.139	0.145	0.855	0.915	0.960	0.987	0.966	0.954	154.30
1997	0.139	0.139	0.861	1.019	0.982	1.003	0.985	0.987	152.36
1998	0.175	0.157	0.843	1.027	0.994	1.004	0.995	0.999	152.25
1999	0.172	0.174	0.826	1.020	0.997	1.003	0.998	1.001	152.41
2000	0.243	0.208	0.792	1.417	1.070	1.075	1.055	1.135	172.92
2001	0.166	0.205	0.795	0.995	0.694	0.999	0.748	0.747	129.15
2002	0.210	0.188	0.812	0.988	1.347	0.998	1.274	1.271	164.16
2003	0.203	0.206	0.794	1.026	0.984	1.005	0.987	0.993	162.97
2004	0.175	0.189	0.811	0.960	0.989	0.992	0.991	0.984	160.34
2005	0.258	0.217	0.783	1.028	0.976	1.006	0.981	0.987	158.30
2006	0.184	0.221	0.779	1.018	1.041	1.004	1.032	1.036	163.99
2007	0.172	0.178	0.822	1.017	1.108	1.003	1.088	1.092	179.00
2008	0.202	0.187	0.813	1.010	0.988	1.002	0.990	0.992	177.62
2009	0.238	0.220	0.780	1.038	0.974	1.008	0.979	0.987	175.37
2010	0.272	0.255	0.745	0.941	0.950	0.985	0.962	0.948	166.20
2011	0.253	0.263	0.737	1.009	0.965	1.002	0.974	0.976	162.21

a. TFPG INDEX**: Japan wool textile firm (3201)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	148,826	32,512	11456	11.911	10.389	9.346	12.992	2.838	0.077	0.923						0.000
1991	162,403	33,281	11673	11.998	10.413	9.365	13.913	2.851	0.072	0.928	0.074	0.926	0.119	0.051	0.055	0.064
1992	160,966	33,263	11966	11.989	10.412	9.390	13.452	2.780	0.074	0.926	0.073	0.927	0.008	0.042	0.016	-0.010
1993	102,756	33,811	11866	11.540	10.429	9.381	8.660	2.849	0.115	0.885	0.095	0.905	-0.436	0.004	0.029	-0.463
1994	98,989	34,890	9359	11.503	10.460	9.144	10.577	3.728	0.095	0.905	0.105	0.895	-0.030	-0.230	0.038	-0.041
1995	93,450	33,818	8950	11.445	10.429	9.099	10.441	3.779	0.096	0.904	0.095	0.905	-0.059	-0.046	-0.032	-0.025
1996	91,720	32,559	5440	11.426	10.391	8.601	16.861	5.986	0.059	0.941	0.078	0.922	-0.017	-0.497	-0.037	0.055
1997	99,437	33,306	4947	11.507	10.413	8.507	20.100	6.732	0.050	0.950	0.055	0.945	0.079	-0.097	0.021	0.065
1998	87,978	32,073	4318	11.385	10.376	8.371	20.375	7.428	0.049	0.951	0.049	0.951	-0.096	-0.110	-0.011	-0.080
1999	69,872	34,796	4192	11.154	10.457	8.341	16.667	8.300	0.060	0.940	0.055	0.945	-0.234	-0.033	0.078	-0.306
2000	126,198	37,723	11508	11.746	10.538	9.351	10.966	3.278	0.091	0.909	0.076	0.924	0.585	1.003	0.074	0.440
2001	131,920	36,032	15370	11.790	10.492	9.640	8.583	2.344	0.117	0.883	0.104	0.896	0.036	0.281	-0.054	0.055
2002	126,805	37,832	15215	11.750	10.541	9.630	8.334	2.486	0.120	0.880	0.118	0.882	-0.049	-0.019	0.040	-0.081
2003	119,047	36,241	15037	11.687	10.498	9.618	7.917	2.410	0.126	0.874	0.123	0.877	-0.066	-0.014	-0.045	-0.024
2004	126,973	35,313	17893	11.752	10.472	9.792	7.096	1.974	0.141	0.859	0.134	0.866	0.064	0.174	-0.026	0.064
2005	145,814	35,426	19604	11.890	10.475	9.884	7.438	1.807	0.134	0.866	0.138	0.862	0.136	0.089	0.000	0.123
2006	156,169	36,524	22079	11.959	10.506	10.002	7.073	1.654	0.141	0.859	0.138	0.862	0.071	0.121	0.033	0.026
2007	162,016	36,426	24426	11.995	10.503	10.103	6.633	1.491	0.151	0.849	0.146	0.854	0.037	0.102	-0.002	0.024
2008	166,915	35,778	22815	12.025	10.485	10.035	7.316	1.568	0.137	0.863	0.144	0.856	0.043	-0.055	-0.004	0.055
2009	113,160	36,158	20060	11.637	10.496	9.906	5.641	1.803	0.177	0.823	0.157	0.843	-0.402	-0.142	-0.003	-0.377
2010	136,974	35,351	20164	11.828	10.473	9.912	6.793	1.753	0.147	0.853	0.162	0.838	0.184	-0.002	-0.030	0.209
2011	146,414	33,905	22934	11.894	10.431	10.040	6.384	1.478	0.157	0.843	0.152	0.848	0.064	0.126	-0.045	0.083

b. TFP INDEX**: Japan wool textile firm (3201)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	112.68	105.22	105.70	105.95	106.35
1992	113.60	109.71	107.46	108.06	105.13
1993	73.44	110.17	110.61	108.52	67.67
1994	71.24	87.50	114.94	108.48	65.67
1995	67.17	83.57	111.27	106.24	63.22
1996	66.01	50.86	107.26	101.17	65.24
1997	71.41	46.16	109.49	106.93	66.79
1998	64.87	41.36	108.25	106.23	61.06
1999	51.35	40.02	117.05	113.01	45.44
2000	92.13	109.14	126.06	124.88	73.78
2001	95.52	144.59	119.43	118.46	80.64
2002	91.00	141.85	124.27	120.91	75.26
2003	85.22	139.84	118.75	115.47	73.80
2004	90.88	166.38	115.70	114.49	79.38
2005	104.09	181.81	115.76	115.62	90.02
2006	111.75	205.25	119.63	120.94	92.40
2007	116.00	227.20	119.38	122.03	95.06
2008	121.15	215.13	118.87	120.74	100.34
2009	81.03	186.60	118.52	117.08	69.21
2010	97.38	186.23	115.04	113.80	85.56
2011	103.78	211.20	110.01	112.34	92.39

c. CFI INDEX**: Japan wool textile firm (3201)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.077								100
1991	0.072	0.074	0.926	1.052	1.057	1.004	1.053	1.057	105.67
1992	0.074	0.073	0.927	1.043	1.017	1.003	1.015	1.019	107.62
1993	0.115	0.095	0.905	1.004	1.029	1.000	1.027	1.027	110.52
1994	0.095	0.105	0.895	0.794	1.039	0.976	1.035	1.010	111.65
1995	0.096	0.095	0.905	0.955	0.968	0.996	0.971	0.967	107.94
1996	0.059	0.078	0.922	0.609	0.964	0.962	0.967	0.930	100.41
1997	0.050	0.055	0.945	0.908	1.021	0.995	1.020	1.014	101.85
1998	0.049	0.049	0.951	0.896	0.989	0.995	0.989	0.984	100.20
1999	0.060	0.055	0.945	0.968	1.081	0.998	1.077	1.075	107.69
2000	0.091	0.076	0.924	2.727	1.077	1.079	1.071	1.155	124.42
2001	0.117	0.104	0.896	1.325	0.947	1.030	0.953	0.981	122.05
2002	0.120	0.118	0.882	0.981	1.041	0.998	1.036	1.033	126.12
2003	0.126	0.123	0.877	0.986	0.956	0.998	0.961	0.959	120.98
2004	0.141	0.134	0.866	1.190	0.974	1.023	0.978	1.001	121.06
2005	0.134	0.138	0.862	1.093	1.000	1.012	1.000	1.013	122.60
2006	0.141	0.138	0.862	1.129	1.033	1.017	1.029	1.046	128.26
2007	0.151	0.146	0.854	1.107	0.998	1.015	0.998	1.013	129.94
2008	0.137	0.144	0.856	0.947	0.996	0.992	0.996	0.989	128.46
2009	0.177	0.157	0.843	0.867	0.997	0.978	0.997	0.975	125.30
2010	0.147	0.162	0.838	0.998	0.971	1.000	0.975	0.975	122.17
2011	0.157	0.152	0.848	1.134	0.956	1.019	0.963	0.981	119.90

a. TFPG INDEX**: Seiren textile firm (3569)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	105,928	17,706	11318	11.571	9.782	9.334	9.359	1.564	0.107	0.893						0.000
1991	122,762	26,300	7832	11.718	10.177	8.966	15.674	3.358	0.064	0.936	0.085	0.915	0.180	-0.336	0.396	-0.154
1992	98,499	29,688	8439	11.498	10.298	9.041	11.671	3.518	0.086	0.914	0.075	0.925	-0.203	0.092	0.121	-0.322
1993	88,617	28,142	8477	11.392	10.245	9.045	10.453	3.320	0.096	0.904	0.091	0.909	-0.093	0.017	-0.053	-0.046
1994	64,667	27,125	8847	11.077	10.208	9.088	7.310	3.066	0.137	0.863	0.116	0.884	-0.308	0.050	-0.037	-0.281
1995	62,597	26,488	8947	11.044	10.184	9.099	6.996	2.961	0.143	0.857	0.140	0.860	-0.034	0.010	-0.024	-0.015
1996	66,145	25,362	8735	11.100	10.141	9.075	7.573	2.904	0.132	0.868	0.137	0.863	0.056	-0.023	-0.043	0.097
1997	112,270	23,756	8730	11.629	10.076	9.075	12.860	2.721	0.078	0.922	0.105	0.895	0.527	-0.003	-0.065	0.586
1998	62,915	23,689	9005	11.050	10.073	9.106	6.987	2.631	0.143	0.857	0.110	0.890	-0.553	0.057	-0.003	-0.557
1999	59,889	22,915	8649	11.000	10.040	9.065	6.924	2.649	0.144	0.856	0.144	0.856	-0.053	-0.044	-0.033	-0.018
2000	66,283	22,038	11506	11.102	10.001	9.351	5.761	1.915	0.174	0.826	0.159	0.841	0.095	0.279	-0.039	0.083
2001	97,943	21,638	21190	11.492	9.982	9.961	4.622	1.021	0.216	0.784	0.195	0.805	0.382	0.603	-0.018	0.280
2002	87,906	21,604	18308	11.384	9.981	9.815	4.801	1.180	0.208	0.792	0.212	0.788	-0.117	-0.155	-0.002	-0.083
2003	90,916	27,105	18139	11.418	10.207	9.806	5.012	1.494	0.200	0.800	0.204	0.796	0.031	-0.012	0.227	-0.147
2004	98,769	28,619	16796	11.501	10.262	9.729	5.881	1.704	0.170	0.830	0.185	0.815	0.083	-0.077	0.054	0.053
2005	136,938	31,689	18487	11.827	10.364	9.825	7.407	1.714	0.135	0.865	0.153	0.847	0.324	0.093	0.102	0.223
2006	157,415	40,021	24334	11.967	10.597	10.100	6.469	1.645	0.155	0.845	0.145	0.855	0.142	0.277	0.233	-0.098
2007	168,150	46,093	26454	12.033	10.738	10.183	6.356	1.742	0.157	0.843	0.156	0.844	0.067	0.084	0.141	-0.066
2008	192,484	54,329	29174	12.168	10.903	10.281	6.598	1.862	0.152	0.848	0.154	0.846	0.149	0.112	0.164	-0.007
2009	143,315	50,630	24035	11.873	10.832	10.087	5.963	2.106	0.168	0.832	0.160	0.840	-0.309	-0.207	-0.071	-0.216
2010	123,672	47,266	22602	11.725	10.764	10.026	5.472	2.091	0.183	0.817	0.175	0.825	-0.155	-0.069	-0.069	-0.086
2011	151,902	42,635	23032	11.931	10.660	10.045	6.595	1.851	0.152	0.848	0.167	0.833	0.203	0.016	-0.103	0.286

b. TFP INDEX**: Seiren textile firm (3569)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	119.67	71.46	153.38	145.10	82.48
1992	97.67	78.32	176.11	168.16	58.08
1993	88.98	79.67	169.05	159.05	55.94
1994	65.39	83.72	164.08	151.10	43.27
1995	63.21	84.56	160.02	144.22	43.83
1996	66.88	82.66	153.42	138.99	48.12
1997	113.28	82.45	143.40	135.43	83.65
1998	65.17	87.31	146.81	138.40	47.09
1999	61.84	83.58	141.54	129.07	47.91
2000	67.99	110.45	135.23	127.92	53.14
2001	99.64	201.77	131.70	137.59	72.42
2002	88.63	172.76	130.31	131.97	67.16
2003	91.44	170.74	163.09	157.62	58.01
2004	99.32	158.08	172.18	163.67	60.68
2005	137.34	173.53	190.13	183.70	74.76
2006	158.25	228.96	240.70	234.94	67.36
2007	169.15	249.06	277.39	266.84	63.39
2008	196.29	278.45	331.45	315.85	62.15
2009	144.18	226.31	304.72	283.80	50.80
2010	123.52	211.28	282.43	260.34	47.45
2011	151.28	214.68	254.02	240.39	62.93

c. CFI INDEX**: Seiren textile firm (3569)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.107								100
1991	0.064	0.085	0.915	0.715	1.534	0.972	1.479	1.437	143.71
1992	0.086	0.075	0.925	1.096	1.148	1.007	1.136	1.144	164.43
1993	0.096	0.091	0.909	1.017	0.960	1.002	0.963	0.965	158.67
1994	0.137	0.116	0.884	1.051	0.971	1.006	0.974	0.980	155.43
1995	0.143	0.140	0.860	1.010	0.975	1.001	0.979	0.980	152.33
1996	0.132	0.137	0.863	0.978	0.959	0.997	0.964	0.961	146.44
1997	0.078	0.105	0.895	0.997	0.935	1.000	0.941	0.941	137.81
1998	0.143	0.110	0.890	1.059	1.024	1.006	1.021	1.028	141.61
1999	0.144	0.144	0.856	0.957	0.964	0.994	0.969	0.963	136.39
2000	0.174	0.159	0.841	1.321	0.955	1.045	0.962	1.006	137.21
2001	0.216	0.195	0.805	1.827	0.974	1.125	0.979	1.101	151.06
2002	0.208	0.212	0.788	0.856	0.989	0.968	0.992	0.960	144.95
2003	0.200	0.204	0.796	0.988	1.252	0.998	1.196	1.193	172.88
2004	0.170	0.185	0.815	0.926	1.056	0.986	1.045	1.030	178.14
2005	0.135	0.153	0.847	1.098	1.104	1.014	1.088	1.103	196.54
2006	0.155	0.145	0.855	1.319	1.266	1.041	1.223	1.274	250.31
2007	0.157	0.156	0.844	1.088	1.152	1.013	1.127	1.142	285.87
2008	0.152	0.154	0.846	1.118	1.195	1.017	1.162	1.183	338.09
2009	0.168	0.160	0.840	0.813	0.919	0.967	0.932	0.901	304.77
2010	0.183	0.175	0.825	0.934	0.927	0.988	0.939	0.928	282.84
2011	0.152	0.167	0.833	1.016	0.899	1.003	0.915	0.918	259.63

a. TFPG INDEX**: Descente textile firm (8114)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	36,869	4,974	6199	10.515	8.512	8.732	5.948	0.802	0.168	0.832						0.000
1991	41,170	5,173	6510	10.625	8.551	8.781	6.324	0.795	0.158	0.842	0.163	0.837	0.142	0.081	0.071	0.070
1992	47,370	5,204	6900	10.766	8.557	8.839	6.865	0.754	0.146	0.854	0.152	0.848	0.157	0.075	0.023	0.126
1993	67,797	5,354	3887	11.124	8.586	8.265	17.442	1.377	0.057	0.943	0.101	0.899	0.371	-0.561	0.041	0.391
1994	59,019	5,154	4179	10.986	8.548	8.338	14.123	1.233	0.071	0.929	0.064	0.936	-0.132	0.079	-0.031	-0.108
1995	67,361	5,063	4261	11.118	8.530	8.357	15.808	1.188	0.063	0.937	0.067	0.933	0.131	0.018	-0.019	0.148
1996	121,330	10,067	4370	11.706	9.217	8.383	27.761	2.303	0.036	0.964	0.050	0.950	0.590	0.027	0.689	-0.066
1997	103,641	14,900	4511	11.549	9.609	8.414	22.974	3.303	0.044	0.956	0.040	0.960	-0.160	0.030	0.390	-0.535
1998	84,414	14,196	4474	11.343	9.561	8.406	18.867	3.173	0.053	0.947	0.048	0.952	-0.179	0.018	-0.022	-0.159
1999	64,377	13,292	7467	11.073	9.495	8.918	8.622	1.780	0.116	0.884	0.084	0.916	-0.274	0.509	-0.069	-0.254
2000	25,471	12,555	10621	10.145	9.438	9.271	2.398	1.182	0.417	0.583	0.266	0.734	-0.934	0.346	-0.064	-0.979
2001	24,263	12,860	10153	10.097	9.462	9.226	2.390	1.267	0.418	0.582	0.418	0.582	-0.057	-0.053	0.016	-0.044
2002	7,388	12,372	10108	8.908	9.423	9.221	0.731	1.224	1.368	-0.368	0.893	0.107	-1.198	-0.013	-0.048	-1.181
2003	11,346	11,107	9166	9.337	9.315	9.123	1.238	1.212	0.808	0.192	1.088	-0.088	0.427	-0.100	-0.110	0.526
2004	33,859	10,872	7469	10.430	9.294	8.919	4.533	1.456	0.221	0.779	0.514	0.486	1.093	-0.205	-0.021	1.209
2005	40,936	9,699	7866	10.620	9.180	8.970	5.204	1.233	0.192	0.808	0.206	0.794	0.187	0.049	-0.117	0.270
2006	52,033	9,512	8293	10.860	9.160	9.023	6.274	1.147	0.159	0.841	0.176	0.824	0.242	0.055	-0.017	0.247
2007	55,793	9,498	8183	10.929	9.159	9.010	6.818	1.161	0.147	0.853	0.153	0.847	0.070	-0.013	-0.001	0.073
2008	90,776	9,413	8806	11.416	9.150	9.083	10.308	1.069	0.097	0.903	0.122	0.878	0.500	0.087	0.005	0.486
2009	87,568	9,287	8958	11.380	9.136	9.100	9.776	1.037	0.102	0.898	0.100	0.900	-0.050	0.003	-0.027	-0.026
2010	69,218	8,940	8678	11.145	9.098	9.069	7.976	1.030	0.125	0.875	0.114	0.886	-0.242	-0.039	-0.045	-0.198
2011	72,304	9,249	8754	11.189	9.132	9.077	8.260	1.057	0.121	0.879	0.123	0.877	0.041	0.006	0.031	0.013

b. TFP INDEX**: Descente textile firm (8114)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	115.31	108.44	107.39	107.45	107.32
1992	134.95	116.91	109.89	110.53	122.09
1993	195.59	66.69	114.49	106.80	183.13
1994	171.45	72.20	110.98	105.52	162.48
1995	195.44	73.53	108.88	103.72	188.43
1996	352.47	75.51	216.78	200.42	175.86
1997	300.46	77.78	320.18	294.22	102.12
1998	251.24	79.20	313.18	285.44	88.02
1999	190.97	131.74	292.27	268.25	71.19
2000	75.06	186.15	274.24	252.75	29.70
2001	70.92	176.51	278.62	243.26	29.15
2002	21.40	174.14	265.65	213.70	10.01
2003	32.78	157.52	237.89	186.01	17.62
2004	97.83	128.35	232.83	184.99	52.88
2005	117.95	134.80	207.15	191.18	61.70
2006	150.29	142.47	203.65	191.57	78.45
2007	161.25	140.66	203.47	191.66	84.13
2008	265.96	153.46	204.42	195.40	136.11
2009	253.10	153.99	198.97	191.05	132.48
2010	198.63	148.11	190.16	182.63	108.76
2011	206.88	148.97	196.16	187.75	110.19

c. CFI INDEX**: Descente textile firm (8114)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.168								100
1991	0.158	0.163	0.837	1.084	1.074	1.013	1.062	1.076	107.56
1992	0.146	0.152	0.848	1.078	1.023	1.011	1.020	1.031	110.94
1993	0.057	0.101	0.899	0.570	1.042	0.945	1.038	0.980	108.73
1994	0.071	0.064	0.936	1.083	0.969	1.005	0.971	0.976	106.15
1995	0.063	0.067	0.933	1.018	0.981	1.001	0.982	0.984	104.40
1996	0.036	0.050	0.950	1.027	1.991	1.001	1.924	1.927	201.13
1997	0.044	0.040	0.960	1.030	1.477	1.001	1.454	1.456	292.85
1998	0.053	0.048	0.952	1.018	0.978	1.001	0.979	0.980	287.00
1999	0.116	0.084	0.916	1.663	0.933	1.044	0.939	0.980	281.24
2000	0.417	0.266	0.734	1.413	0.938	1.097	0.954	1.046	294.31
2001	0.418	0.418	0.582	0.948	1.016	0.978	1.009	0.987	290.51
2002	1.368	0.893	0.107	0.987	0.953	0.988	0.995	0.983	285.58
2003	0.808	1.088	-0.088	0.905	0.896	0.897	1.010	0.905	258.55
2004	0.221	0.514	0.486	0.815	0.979	0.900	0.990	0.891	230.30
2005	0.192	0.206	0.794	1.050	0.890	1.010	0.911	0.921	212.03
2006	0.159	0.176	0.824	1.057	0.983	1.010	0.986	0.996	211.11
2007	0.147	0.153	0.847	0.987	0.999	0.998	0.999	0.997	210.54
2008	0.097	0.122	0.878	1.091	1.005	1.011	1.004	1.015	213.66
2009	0.102	0.100	0.900	1.003	0.973	1.000	0.976	0.976	208.60
2010	0.125	0.114	0.886	0.962	0.956	0.996	0.961	0.956	199.51
2011	0.121	0.123	0.877	1.006	1.032	1.001	1.028	1.028	205.16

a. TFPG INDEX**: Suminoe textile firm (3501)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	73,226	14,663	3836	11.201	9.593	8.252	19.090	3.823	0.052	0.948						0.000
1991	78,985	18,698	4215	11.277	9.836	8.346	18.740	4.436	0.053	0.947	0.053	0.947	0.108	0.126	0.275	-0.160
1992	77,755	22,561	4425	11.261	10.024	8.395	17.573	5.099	0.057	0.943	0.055	0.945	0.001	0.066	0.205	-0.196
1993	54,942	21,413	4472	10.914	9.972	8.406	12.286	4.788	0.081	0.919	0.069	0.931	-0.335	0.023	-0.040	-0.299
1994	41,621	19,620	4441	10.636	9.884	8.399	9.373	4.418	0.107	0.893	0.094	0.906	-0.271	0.000	-0.080	-0.198
1995	43,414	18,165	4254	10.679	9.807	8.356	10.206	4.270	0.098	0.902	0.102	0.898	0.041	-0.044	-0.078	0.116
1996	29,944	17,554	4224	10.307	9.773	8.349	7.089	4.156	0.141	0.859	0.120	0.880	-0.370	-0.006	-0.033	-0.340
1997	39,498	16,951	4318	10.584	9.738	8.371	9.147	3.926	0.109	0.891	0.125	0.875	0.275	0.020	-0.037	0.305
1998	22,035	16,721	4145	10.000	9.724	8.330	5.316	4.034	0.188	0.812	0.149	0.851	-0.557	-0.015	0.013	-0.566
1999	27,043	14,841	3443	10.205	9.605	8.144	7.854	4.310	0.127	0.873	0.158	0.842	0.202	-0.189	-0.123	0.335
2000	81,252	27,108	9322	11.305	10.208	9.140	8.716	2.908	0.115	0.885	0.121	0.879	1.093	0.989	0.596	0.450
2001	37,278	26,635	9448	10.526	10.190	9.154	3.946	2.819	0.253	0.747	0.184	0.816	-0.787	0.005	-0.026	-0.767
2002	57,949	25,790	9649	10.967	10.158	9.175	6.006	2.673	0.167	0.833	0.210	0.790	0.432	0.012	-0.041	0.462
2003	31,934	25,058	9554	10.371	10.129	9.165	3.342	2.623	0.299	0.701	0.233	0.767	-0.598	-0.012	-0.031	-0.571
2004	32,376	24,480	9016	10.385	10.106	9.107	3.591	2.715	0.278	0.722	0.289	0.711	0.014	-0.058	-0.023	0.047
2005	34,663	24,739	9013	10.453	10.116	9.106	3.846	2.745	0.260	0.740	0.269	0.731	0.066	-0.003	0.008	0.061
2006	45,147	24,347	10437	10.718	10.100	9.253	4.326	2.333	0.231	0.769	0.246	0.754	0.267	0.149	-0.014	0.240
2007	44,869	24,686	10869	10.712	10.114	9.294	4.128	2.271	0.242	0.758	0.237	0.763	-0.006	0.041	0.014	-0.026
2008	62,848	24,172	11708	11.048	10.093	9.368	5.368	2.065	0.186	0.814	0.214	0.786	0.351	0.088	-0.007	0.338
2009	28,545	23,150	11975	10.259	10.050	9.391	2.384	1.933	0.420	0.580	0.303	0.697	-0.803	0.009	-0.057	-0.766
2010	70,802	25,233	10662	11.168	10.136	9.274	6.640	2.367	0.151	0.849	0.285	0.715	0.901	-0.123	0.079	0.880
2011	79,205	26,259	12625	11.280	10.176	9.443	6.274	2.080	0.159	0.841	0.155	0.845	0.109	0.166	0.037	0.052

b. TFP INDEX**: Suminoe textile firm (3501)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	111.38	113.46	131.68	130.56	85.31
1992	111.53	121.16	161.61	158.48	70.38
1993	79.81	124.00	155.33	149.53	53.37
1994	60.88	123.99	143.32	133.70	45.53
1995	63.42	118.62	132.52	122.53	51.76
1996	43.80	117.94	128.22	116.02	37.75
1997	57.65	120.32	123.56	111.70	51.62
1998	33.02	118.57	125.13	109.09	30.27
1999	40.39	98.18	110.70	94.31	42.83
2000	120.56	264.04	200.86	189.36	63.66
2001	54.86	265.44	195.75	173.52	31.62
2002	84.52	268.65	187.84	163.93	51.56
2003	46.46	265.34	182.06	156.03	29.78
2004	47.10	250.37	177.84	142.97	32.94
2005	50.29	249.61	179.24	146.51	34.32
2006	65.66	289.75	176.82	154.06	42.62
2007	65.29	301.93	179.39	158.48	41.20
2008	92.71	329.70	178.07	163.55	56.69
2009	41.54	332.66	168.25	147.82	28.10
2010	102.30	294.08	182.07	152.79	66.95
2011	114.11	347.21	188.92	180.92	63.07

c. CFI INDEX**: Suminoe textile firm (3501)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.052								100
1991	0.053	0.053	0.947	1.135	1.317	1.007	1.298	1.306	130.64
1992	0.057	0.055	0.945	1.068	1.227	1.004	1.214	1.218	159.12
1993	0.081	0.069	0.931	1.023	0.961	1.002	0.964	0.965	153.60
1994	0.107	0.094	0.906	1.000	0.923	1.000	0.930	0.930	142.80
1995	0.098	0.102	0.898	0.957	0.925	0.995	0.932	0.928	132.50
1996	0.141	0.120	0.880	0.994	0.968	0.999	0.971	0.971	128.62
1997	0.109	0.125	0.875	1.020	0.964	1.003	0.968	0.971	124.83
1998	0.188	0.149	0.851	0.985	1.013	0.998	1.011	1.009	125.91
1999	0.127	0.158	0.842	0.828	0.885	0.971	0.902	0.875	110.23
2000	0.115	0.121	0.879	2.689	1.814	1.127	1.688	1.903	209.76
2001	0.253	0.184	0.816	1.005	0.975	1.001	0.979	0.980	205.60
2002	0.167	0.210	0.790	1.012	0.960	1.003	0.968	0.970	199.51
2003	0.299	0.233	0.767	0.988	0.969	0.997	0.976	0.973	194.22
2004	0.278	0.289	0.711	0.944	0.977	0.983	0.983	0.967	187.83
2005	0.260	0.269	0.731	0.997	1.008	0.999	1.006	1.005	188.75
2006	0.231	0.246	0.754	1.161	0.987	1.037	0.990	1.027	193.80
2007	0.242	0.237	0.763	1.042	1.015	1.010	1.011	1.021	197.87
2008	0.186	0.214	0.786	1.092	0.993	1.019	0.994	1.013	200.47
2009	0.420	0.303	0.697	1.009	0.945	1.003	0.961	0.964	193.21
2010	0.151	0.285	0.715	0.884	1.082	0.965	1.058	1.022	197.37
2011	0.159	0.155	0.845	1.181	1.038	1.026	1.032	1.059	208.94

a. TFPG INDEX**: Goldwin textile firm (8111)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t =α'	1-α'=β'	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	47,071	8,856	4601	10.759	9.089	8.434	10.230	1.925	0.098	0.902						0.000
1991	55,217	9,862	4737	10.919	9.196	8.463	11.657	2.082	0.086	0.914	0.092	0.908	0.192	0.061	0.140	0.059
1992	73,225	18,034	5145	11.201	9.800	8.546	14.232	3.505	0.070	0.930	0.078	0.922	0.299	0.100	0.621	-0.281
1993	82,581	29,075	5531	11.322	10.278	8.618	14.929	5.256	0.067	0.933	0.069	0.931	0.133	0.085	0.490	-0.330
1994	69,518	29,130	5798	11.149	10.280	8.665	11.990	5.024	0.083	0.917	0.075	0.925	-0.165	0.054	0.009	-0.178
1995	72,786	28,563	6106	11.195	10.260	8.717	11.921	4.678	0.084	0.916	0.084	0.916	0.045	0.050	-0.021	0.060
1996	63,629	29,408	6299	11.061	10.289	8.748	10.101	4.669	0.099	0.901	0.091	0.909	-0.133	0.032	0.030	-0.164
1997	62,037	29,668	6247	11.035	10.298	8.740	9.931	4.749	0.101	0.899	0.100	0.900	-0.027	-0.010	0.007	-0.032
1998	89,867	28,992	6147	11.406	10.275	8.724	14.620	4.717	0.068	0.932	0.085	0.915	0.397	0.010	0.003	0.393
1999	54,148	27,957	6378	10.899	10.238	8.761	8.490	4.383	0.118	0.882	0.093	0.907	-0.510	0.034	-0.040	-0.477
2000	39,087	27,009	7937	10.574	10.204	8.979	4.925	3.403	0.203	0.797	0.160	0.840	-0.333	0.212	-0.041	-0.332
2001	18,590	26,435	8380	9.830	10.182	9.034	2.218	3.155	0.451	0.549	0.327	0.673	-0.751	0.046	-0.030	-0.746
2002	33,174	26,047	8264	10.410	10.168	9.020	4.014	3.152	0.249	0.751	0.350	0.650	0.570	-0.023	-0.024	0.594
2003	40,978	25,363	8168	10.621	10.141	9.008	5.017	3.105	0.199	0.801	0.224	0.776	0.209	-0.014	-0.029	0.235
2004	40,666	25,051	7636	10.613	10.129	8.941	5.326	3.281	0.188	0.812	0.194	0.806	-0.008	-0.068	-0.012	0.015
2005	30,330	24,828	8320	10.320	10.120	9.026	3.645	2.984	0.274	0.726	0.231	0.769	-0.296	0.083	-0.012	-0.306
2006	27,615	18,127	9315	10.226	9.805	9.139	2.965	1.946	0.337	0.663	0.306	0.694	-0.091	0.115	-0.312	0.090
2007	37,919	17,843	9499	10.543	9.789	9.159	3.992	1.879	0.250	0.750	0.294	0.706	0.318	0.020	-0.015	0.322
2008	35,551	4,633	9641	10.479	8.441	9.174	3.687	0.481	0.271	0.729	0.261	0.739	-0.051	0.029	-1.335	0.928
2009	24,588	3,960	6608	10.110	8.284	8.796	3.721	0.599	0.269	0.731	0.270	0.730	-0.382	-0.391	-0.171	-0.152
2010	26,807	3,948	6667	10.196	8.281	8.805	4.021	0.592	0.249	0.751	0.259	0.741	0.079	0.002	-0.010	0.086
2011	28,922	3,637	7332	10.272	8.199	8.900	3.945	0.496	0.253	0.747	0.251	0.749	0.073	0.092	-0.085	0.114

b. TFP INDEX**: Goldwin textile firm (8111)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	121.13	106.29	114.99	114.61	105.68
1992	163.39	117.44	213.90	206.78	79.02
1993	186.60	127.86	349.22	332.23	56.17
1994	158.18	134.95	352.33	332.68	47.55
1995	165.40	141.94	345.02	323.29	51.16
1996	144.78	146.62	355.69	329.36	43.96
1997	140.87	145.11	358.08	326.75	43.11
1998	209.49	146.58	359.25	335.92	62.36
1999	125.81	151.60	345.28	320.79	39.22
2000	90.22	187.41	331.37	290.26	31.08
2001	42.56	196.26	321.69	235.57	18.07
2002	75.27	191.80	314.13	224.09	33.59
2003	92.74	189.11	305.12	252.31	36.76
2004	92.03	176.76	301.34	255.26	36.05
2005	68.45	192.10	297.85	246.66	27.75
2006	62.47	215.58	217.98	189.58	32.95
2007	85.84	219.95	214.70	190.17	45.14
2008	81.58	226.33	56.51	72.94	111.85
2009	55.67	153.04	47.65	58.33	95.42
2010	60.25	153.29	47.17	57.59	104.63
2011	64.82	168.08	43.33	55.08	117.68

c. CFI INDEX**: Goldwin textile firm (8111)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.098								100
1991	0.086	0.092	0.908	1.063	1.150	1.006	1.135	1.142	114.17
1992	0.070	0.078	0.922	1.105	1.860	1.008	1.772	1.786	203.90
1993	0.067	0.069	0.931	1.089	1.633	1.006	1.579	1.588	323.77
1994	0.083	0.075	0.925	1.055	1.009	1.004	1.008	1.012	327.76
1995	0.084	0.084	0.916	1.052	0.979	1.004	0.981	0.985	322.89
1996	0.099	0.091	0.909	1.033	1.031	1.003	1.028	1.031	332.93
1997	0.101	0.100	0.900	0.990	1.007	0.999	1.006	1.005	334.60
1998	0.068	0.085	0.915	1.010	1.003	1.001	1.003	1.004	335.88
1999	0.118	0.093	0.907	1.034	0.961	1.003	0.965	0.968	325.04
2000	0.203	0.160	0.840	1.236	0.960	1.035	0.966	0.999	324.87
2001	0.451	0.327	0.673	1.047	0.971	1.015	0.980	0.995	323.30
2002	0.249	0.350	0.650	0.977	0.976	0.992	0.985	0.977	315.79
2003	0.199	0.224	0.776	0.986	0.971	0.997	0.978	0.975	307.76
2004	0.188	0.194	0.806	0.935	0.988	0.987	0.990	0.977	300.72
2005	0.274	0.231	0.769	1.087	0.988	1.019	0.991	1.010	303.83
2006	0.337	0.306	0.694	1.122	0.732	1.036	0.805	0.834	253.41
2007	0.250	0.294	0.706	1.020	0.985	1.006	0.989	0.995	252.20
2008	0.271	0.261	0.739	1.029	0.263	1.007	0.373	0.376	94.73
2009	0.269	0.270	0.730	0.676	0.843	0.900	0.883	0.794	75.26
2010	0.249	0.259	0.741	1.002	0.990	1.000	0.992	0.993	74.72
2011	0.253	0.251	0.749	1.097	0.919	1.023	0.938	0.960	71.76

a. TFPG INDEX**: Katakura textile firm (3001).**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	45,961	16,701	3331	10.736	9.723	8.111	13.800	5.014	0.072	0.928						0.000
1991	47,643	17,784	3353	10.771	9.786	8.118	14.208	5.303	0.070	0.930	0.071	0.929	0.068	0.039	0.095	-0.023
1992	40,191	18,953	3411	10.601	9.850	8.135	11.782	5.556	0.085	0.915	0.078	0.922	-0.153	0.034	0.081	-0.230
1993	39,985	22,955	3355	10.596	10.041	8.118	11.917	6.841	0.084	0.916	0.084	0.916	0.007	-0.004	0.204	-0.179
1994	37,615	23,494	3365	10.535	10.065	8.121	11.178	6.982	0.089	0.911	0.087	0.913	-0.054	0.010	0.030	-0.083
1995	37,173	24,394	3263	10.523	10.102	8.090	11.394	7.477	0.088	0.912	0.089	0.911	-0.013	-0.032	0.036	-0.043
1996	37,693	24,636	4313	10.537	10.112	8.369	8.739	5.712	0.114	0.886	0.101	0.899	0.015	0.280	0.011	-0.023
1997	45,431	25,921	6711	10.724	10.163	8.812	6.769	3.862	0.148	0.852	0.131	0.869	0.185	0.440	0.049	0.085
1998	39,291	25,529	6551	10.579	10.148	8.787	5.998	3.897	0.167	0.833	0.157	0.843	-0.119	0.002	0.011	-0.129
1999	91,864	24,017	6384	11.428	10.087	8.762	14.390	3.762	0.069	0.931	0.118	0.882	0.846	-0.029	-0.064	0.906
2000	115,836	29,399	8306	11.660	10.289	9.025	13.946	3.540	0.072	0.928	0.071	0.929	0.225	0.257	0.196	0.025
2001	88,970	29,421	7890	11.396	10.289	8.973	11.276	3.729	0.089	0.911	0.080	0.920	-0.272	-0.060	-0.007	-0.260
2002	111,346	27,820	7656	11.620	10.234	8.943	14.544	3.634	0.069	0.931	0.079	0.921	0.215	-0.039	-0.065	0.278
2003	85,841	28,254	7521	11.360	10.249	8.925	11.414	3.757	0.088	0.912	0.078	0.922	-0.263	-0.020	0.013	-0.273
2004	93,616	31,805	7556	11.447	10.367	8.930	12.390	4.209	0.081	0.919	0.084	0.916	0.087	0.005	0.118	-0.022
2005	93,081	30,666	7241	11.441	10.331	8.887	12.855	4.235	0.078	0.922	0.079	0.921	-0.008	-0.045	-0.039	0.031
2006	94,000	28,623	7690	11.451	10.262	8.948	12.224	3.722	0.082	0.918	0.080	0.920	0.012	0.063	-0.067	0.068
2007	87,076	27,242	7496	11.375	10.213	8.922	11.617	3.634	0.086	0.914	0.084	0.916	-0.076	-0.025	-0.049	-0.029
2008	93,505	32,437	7565	11.446	10.387	8.931	12.360	4.288	0.081	0.919	0.083	0.917	0.085	0.023	0.188	-0.089
2009	75,013	32,975	7663	11.225	10.404	8.944	9.789	4.303	0.102	0.898	0.092	0.908	-0.234	-0.001	0.003	-0.236
2010	85,234	39,002	7254	11.353	10.571	8.889	11.749	5.376	0.085	0.915	0.094	0.906	0.121	-0.062	0.161	-0.019
2011	78,231	38,296	7591	11.267	10.553	8.935	10.306	5.045	0.097	0.903	0.091	0.909	-0.089	0.042	-0.021	-0.073

b. TFP INDEX**: Katakura textile firm (3001)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	107.04	103.97	109.96	109.70	97.57
1992	91.85	107.58	119.20	117.27	78.32
1993	92.54	107.16	146.19	139.70	66.24
1994	87.66	108.22	150.67	143.09	61.26
1995	86.52	104.79	156.24	146.93	58.88
1996	87.84	138.70	158.00	148.89	58.99
1997	105.65	215.38	165.89	156.19	67.65
1998	93.81	215.84	167.73	152.22	61.62
1999	218.60	209.64	157.28	151.16	144.61
2000	273.83	270.95	191.25	196.61	139.28
2001	208.61	255.29	189.84	192.00	108.65
2002	258.74	245.49	177.90	180.64	143.23
2003	198.97	240.56	180.23	182.65	108.94
2004	216.97	241.66	202.86	202.02	107.40
2005	215.15	230.97	195.07	195.55	110.03
2006	217.80	245.87	182.51	184.70	117.92
2007	201.88	239.80	173.81	175.29	115.16
2008	219.76	245.36	209.80	208.81	105.24
2009	173.93	245.17	210.41	206.91	84.06
2010	196.21	230.45	247.08	237.23	82.71
2011	179.56	240.42	241.90	234.62	76.53

c. CFI INDEX**: Katakura textile firm (3001)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.072								100
1991	0.070	0.071	0.929	1.040	1.100	1.003	1.092	1.095	109.52
1992	0.085	0.078	0.922	1.035	1.084	1.003	1.077	1.080	118.29
1993	0.084	0.084	0.916	0.996	1.226	1.000	1.206	1.205	142.56
1994	0.089	0.087	0.913	1.010	1.031	1.001	1.028	1.029	146.67
1995	0.088	0.089	0.911	0.968	1.037	0.997	1.034	1.031	151.17
1996	0.114	0.101	0.899	1.324	1.011	1.029	1.010	1.039	157.08
1997	0.148	0.131	0.869	1.553	1.050	1.059	1.043	1.105	173.61
1998	0.167	0.157	0.843	1.002	1.011	1.000	1.009	1.010	175.30
1999	0.069	0.118	0.882	0.971	0.938	0.997	0.945	0.942	165.06
2000	0.072	0.071	0.929	1.292	1.216	1.018	1.199	1.221	201.58
2001	0.089	0.080	0.920	0.942	0.993	0.995	0.993	0.988	199.25
2002	0.069	0.079	0.921	0.962	0.937	0.997	0.942	0.939	187.10
2003	0.088	0.078	0.922	0.980	1.013	0.998	1.012	1.010	189.06
2004	0.081	0.084	0.916	1.005	1.126	1.000	1.114	1.115	210.77
2005	0.078	0.079	0.921	0.956	0.962	0.996	0.965	0.961	202.57
2006	0.082	0.080	0.920	1.065	0.936	1.005	0.941	0.945	191.49
2007	0.086	0.084	0.916	0.975	0.952	0.998	0.956	0.954	182.73
2008	0.081	0.083	0.917	1.023	1.207	1.002	1.188	1.191	217.55
2009	0.102	0.092	0.908	0.999	1.003	1.000	1.003	1.003	218.10
2010	0.085	0.094	0.906	0.940	1.174	0.994	1.157	1.150	250.83
2011	0.097	0.091	0.909	1.043	0.979	1.004	0.981	0.985	247.00

a. TFPG INDEX**: Shikibo textile firm (3109)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	71,793	26,441	6063	11.182	10.183	8.710	11.840	4.361	0.084	0.916						0.000
1991	126,043	35,494	7393	11.744	10.477	8.908	17.050	4.801	0.059	0.941	0.072	0.928	0.595	0.230	0.327	0.275
1992	173,655	35,308	7995	12.065	10.472	8.987	21.719	4.416	0.046	0.954	0.052	0.948	0.337	0.095	0.012	0.321
1993	154,058	31,938	7038	11.945	10.372	8.859	21.888	4.538	0.046	0.954	0.046	0.954	-0.107	-0.115	-0.088	-0.018
1994	163,243	38,111	5533	12.003	10.548	8.619	29.501	6.887	0.034	0.966	0.040	0.960	0.065	-0.234	0.184	-0.102
1995	140,479	38,105	5289	11.853	10.548	8.573	26.561	7.205	0.038	0.962	0.036	0.964	-0.151	-0.047	-0.001	-0.148
1996	145,594	38,138	5084	11.889	10.549	8.534	28.635	7.501	0.035	0.965	0.036	0.964	0.037	-0.038	0.002	0.036
1997	168,995	38,644	5095	12.038	10.562	8.536	33.168	7.585	0.030	0.970	0.033	0.967	0.147	0.000	0.011	0.136
1998	167,093	37,851	4893	12.026	10.541	8.495	34.152	7.736	0.029	0.971	0.030	0.970	0.015	-0.014	0.006	0.010
1999	198,262	35,607	4492	12.197	10.480	8.410	44.134	7.926	0.023	0.977	0.026	0.974	0.168	-0.089	-0.064	0.233
2000	59,592	73,015	4302	10.995	11.198	8.367	13.854	16.974	0.072	0.928	0.047	0.953	-1.209	-0.050	0.711	-1.884
2001	125,485	78,254	7785	11.740	11.268	8.960	16.118	10.051	0.062	0.938	0.067	0.933	0.737	0.585	0.061	0.640
2002	112,633	76,836	11033	11.632	11.249	9.309	10.209	6.964	0.098	0.902	0.080	0.920	-0.117	0.340	-0.027	-0.119
2003	81,001	77,616	14111	11.302	11.260	9.555	5.740	5.500	0.174	0.826	0.136	0.864	-0.332	0.244	0.008	-0.372
2004	86,312	65,733	19942	11.366	11.093	9.901	4.328	3.296	0.231	0.769	0.203	0.797	0.063	0.346	-0.166	0.126
2005	89,194	61,514	21914	11.399	11.027	9.995	4.070	2.807	0.246	0.754	0.238	0.762	0.030	0.092	-0.069	0.061
2006	83,004	60,333	20304	11.327	11.008	9.919	4.088	2.971	0.245	0.755	0.245	0.755	-0.070	-0.074	-0.017	-0.039
2007	85,282	58,863	19362	11.354	10.983	9.871	4.405	3.040	0.227	0.773	0.236	0.764	0.028	-0.047	-0.024	0.057
2008	85,529	58,489	17769	11.357	10.977	9.785	4.813	3.292	0.208	0.792	0.217	0.783	0.017	-0.072	0.007	0.027
2009	82,689	65,921	16459	11.323	11.096	9.709	5.024	4.005	0.199	0.801	0.203	0.797	-0.047	-0.090	0.106	-0.113
2010	80,267	64,076	14627	11.293	11.068	9.591	5.488	4.381	0.182	0.818	0.191	0.809	-0.037	-0.125	-0.036	0.016
2011	75,069	62,624	13309	11.226	11.045	9.496	5.640	4.705	0.177	0.823	0.180	0.820	-0.070	-0.097	-0.026	-0.031

b. TFP INDEX**: Shikibo textile firm (3109)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	181.29	125.90	138.62	140.31	129.21
1992	254.06	138.50	140.26	146.95	172.89
1993	228.24	123.47	128.48	135.74	168.14
1994	243.54	97.75	154.38	161.90	150.42
1995	209.31	93.30	154.16	162.67	128.67
1996	217.21	89.81	154.49	162.61	133.57
1997	251.60	89.81	156.21	165.62	151.91
1998	255.39	88.54	157.08	167.39	152.57
1999	302.03	81.03	147.28	158.06	191.09
2000	90.18	77.08	300.02	297.07	30.36
2001	188.36	138.37	318.94	309.36	60.89
2002	167.55	194.34	310.35	300.91	55.68
2003	120.20	247.93	312.72	280.81	42.80
2004	128.06	350.35	264.82	235.50	54.38
2005	131.98	383.95	247.15	218.84	60.31
2006	123.12	356.60	242.99	210.70	58.43
2007	126.57	340.26	237.21	206.67	61.25
2008	128.69	316.56	238.95	208.85	61.62
2009	122.74	289.27	265.68	226.88	54.10
2010	118.29	255.23	256.39	219.09	53.99
2011	110.31	231.55	249.85	214.19	51.50

c. CFI INDEX**: Shikibo textile firm (3109)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.084								100
1991	0.059	0.072	0.928	1.259	1.386	1.017	1.354	1.377	137.67
1992	0.046	0.052	0.948	1.100	1.012	1.005	1.011	1.016	139.91
1993	0.046	0.046	0.954	0.891	0.916	0.995	0.920	0.915	127.99
1994	0.034	0.040	0.960	0.792	1.202	0.991	1.193	1.182	151.27
1995	0.038	0.036	0.964	0.955	0.999	0.998	0.999	0.997	150.81
1996	0.035	0.036	0.964	0.963	1.002	0.999	1.002	1.001	150.91
1997	0.030	0.033	0.967	1.000	1.011	1.000	1.011	1.011	152.54
1998	0.029	0.030	0.970	0.986	1.006	1.000	1.005	1.005	153.30
1999	0.023	0.026	0.974	0.915	0.938	0.998	0.939	0.937	143.65
2000	0.072	0.047	0.953	0.951	2.037	0.998	1.969	1.965	282.23
2001	0.062	0.067	0.933	1.795	1.063	1.040	1.059	1.101	310.77
2002	0.098	0.080	0.920	1.404	0.973	1.028	0.975	1.002	311.41
2003	0.174	0.136	0.864	1.276	1.008	1.034	1.007	1.041	324.03
2004	0.231	0.203	0.797	1.413	0.847	1.073	0.876	0.939	304.39
2005	0.246	0.238	0.762	1.096	0.933	1.022	0.949	0.970	295.17
2006	0.245	0.245	0.755	0.929	0.983	0.982	0.987	0.970	286.18
2007	0.227	0.236	0.764	0.954	0.976	0.989	0.982	0.971	277.87
2008	0.208	0.217	0.783	0.930	1.007	0.984	1.006	0.990	275.11
2009	0.199	0.203	0.797	0.914	1.112	0.982	1.088	1.068	293.93
2010	0.182	0.191	0.809	0.882	0.965	0.976	0.972	0.949	278.84
2011	0.177	0.180	0.820	0.907	0.974	0.983	0.979	0.962	268.26

a. TFPG INDEX**: Japan Vilene textile (3514)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	131,003	18,521	4413	11.783	9.827	8.392	29.686	4.197	0.034	0.966						0.000
1991	149,754	20,006	4664	11.917	9.904	8.448	32.111	4.290	0.031	0.969	0.032	0.968	0.166	0.087	0.109	0.057
1992	150,267	22,878	5117	11.920	10.038	8.540	29.364	4.471	0.034	0.966	0.033	0.967	0.020	0.110	0.151	-0.129
1993	129,140	23,891	5350	11.769	10.081	8.585	24.137	4.465	0.041	0.959	0.038	0.962	-0.139	0.057	0.056	-0.195
1994	102667	23,629	5637	11.539	10.070	8.637	18.214	4.192	0.055	0.945	0.048	0.952	-0.222	0.059	-0.004	-0.221
1995	84,818	23,831	5768	11.348	10.079	8.660	14.705	4.131	0.068	0.932	0.061	0.939	-0.192	0.022	0.007	-0.200
1996	72,608	22,894	5798	11.193	10.039	8.665	12.522	3.948	0.080	0.920	0.074	0.926	-0.154	0.006	-0.039	-0.119
1997	59,526	21,657	5926	10.994	9.983	8.687	10.045	3.655	0.100	0.900	0.090	0.910	-0.201	0.020	-0.058	-0.150
1998	68,356	22,091	5826	11.132	10.003	8.670	11.732	3.792	0.085	0.915	0.092	0.908	0.165	0.009	0.046	0.122
1999	51,749	22,595	5229	10.854	10.025	8.562	9.896	4.321	0.101	0.899	0.093	0.907	-0.282	-0.111	0.019	-0.289
2000	93,968	22,719	12288	11.451	10.031	9.416	7.647	1.849	0.131	0.869	0.116	0.884	0.590	0.848	-0.001	0.493
2001	100,404	21,656	12294	11.517	9.983	9.417	8.167	1.761	0.122	0.878	0.127	0.873	0.058	-0.008	-0.056	0.108
2002	62,226	20,882	12336	11.039	9.947	9.420	5.044	1.693	0.198	0.802	0.160	0.840	-0.487	-0.006	-0.045	-0.448
2003	64,363	19,435	11363	11.072	9.875	9.338	5.664	1.710	0.177	0.823	0.187	0.813	0.031	-0.085	-0.074	0.108
2004	60,172	18,031	9172	11.005	9.800	9.124	6.560	1.966	0.152	0.848	0.164	0.836	-0.067	-0.214	-0.075	0.031
2005	69,414	17,990	9054	11.148	9.798	9.111	7.667	1.987	0.130	0.870	0.141	0.859	0.140	-0.016	-0.005	0.147
2006	76,435	18,472	10015	11.244	9.824	9.212	7.632	1.844	0.131	0.869	0.131	0.869	0.099	0.103	0.029	0.060
2007	84,249	19,577	10619	11.342	9.882	9.270	7.934	1.844	0.126	0.874	0.129	0.871	0.098	0.059	0.059	0.039
2008	95,947	19,782	10667	11.472	9.893	9.275	8.995	1.854	0.111	0.889	0.119	0.881	0.144	0.018	0.024	0.120
2009	64,736	18,482	10436	11.078	9.825	9.253	6.203	1.771	0.161	0.839	0.136	0.864	-0.407	-0.035	-0.082	-0.332
2010	59,381	16,487	8461	10.992	9.710	9.043	7.018	1.949	0.142	0.858	0.152	0.848	-0.094	-0.217	-0.121	0.042
2011	69,960	16,333	8860	11.156	9.701	9.089	7.896	1.844	0.127	0.873	0.135	0.865	0.161	0.043	-0.012	0.166

b. TFP INDEX**: Japan Vilene textile firm (3514)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	118.04	109.13	111.54	111.67	105.71
1992	120.48	121.80	129.74	129.68	92.91
1993	104.85	128.96	137.20	136.09	77.05
1994	83.94	136.81	136.65	133.85	62.71
1995	69.26	139.82	137.64	132.39	52.31
1996	59.36	140.73	132.40	125.54	47.29
1997	48.57	143.53	124.98	116.77	41.59
1998	57.26	144.88	130.88	121.45	47.15
1999	43.20	129.60	133.43	122.19	35.36
2000	77.93	302.53	133.27	130.25	59.83
2001	82.59	300.23	126.01	123.10	67.10
2002	50.73	298.56	120.41	116.15	43.68
2003	52.34	274.31	111.79	106.10	49.33
2004	48.93	221.40	103.70	97.39	50.24
2005	56.29	217.95	103.19	98.28	57.28
2006	62.13	241.67	106.21	102.89	60.39
2007	68.53	256.41	112.63	109.27	62.71
2008	79.12	261.12	115.38	112.53	70.30
2009	52.66	252.02	106.34	103.25	51.00
2010	47.96	202.85	94.18	89.32	53.69
2011	56.34	211.79	93.03	89.92	62.65

c. CFI INDEX**: Japan Vilene textile firm (3514)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.034								100
1991	0.031	0.032	0.968	1.091	1.115	1.003	1.111	1.115	111.46
1992	0.034	0.033	0.967	1.116	1.163	1.004	1.157	1.162	129.48
1993	0.041	0.038	0.962	1.059	1.057	1.002	1.055	1.058	136.93
1994	0.055	0.048	0.952	1.061	0.996	1.003	0.996	0.999	136.79
1995	0.068	0.061	0.939	1.022	1.007	1.001	1.007	1.008	137.90
1996	0.080	0.074	0.926	1.007	0.962	1.000	0.965	0.965	133.10
1997	0.100	0.090	0.910	1.020	0.944	1.002	0.949	0.951	126.52
1998	0.085	0.092	0.908	1.009	1.047	1.001	1.043	1.044	132.04
1999	0.101	0.093	0.907	0.895	1.019	0.990	1.018	1.007	132.98
2000	0.131	0.116	0.884	2.334	0.999	1.103	0.999	1.102	146.56
2001	0.122	0.127	0.873	0.992	0.945	0.999	0.952	0.951	139.42
2002	0.198	0.160	0.840	0.994	0.956	0.999	0.963	0.962	134.09
2003	0.177	0.187	0.813	0.919	0.928	0.984	0.941	0.927	124.24
2004	0.152	0.164	0.836	0.807	0.928	0.965	0.939	0.907	112.65
2005	0.130	0.141	0.859	0.984	0.995	0.998	0.996	0.994	111.92
2006	0.131	0.131	0.869	1.109	1.029	1.014	1.025	1.039	116.32
2007	0.126	0.129	0.871	1.061	1.060	1.008	1.052	1.061	123.36
2008	0.111	0.119	0.881	1.018	1.024	1.002	1.021	1.024	126.28
2009	0.161	0.136	0.864	0.965	0.922	0.995	0.932	0.927	117.12
2010	0.142	0.152	0.848	0.805	0.886	0.968	0.902	0.873	102.23
2011	0.127	0.135	0.865	1.044	0.988	1.006	0.989	0.995	101.74

a. TFPG INDEX**: Dynic textile firm (3551)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	108,741	12,537	6971	11.597	9.436	8.850	15.598	1.798	0.064	0.936						0.000
1991	110,358	12,430	7238	11.611	9.428	8.887	15.247	1.717	0.066	0.934	0.065	0.935	0.047	0.070	0.023	0.020
1992	104,320	12,666	7420	11.555	9.447	8.912	14.059	1.707	0.071	0.929	0.068	0.932	-0.039	0.042	0.036	-0.076
1993	86,842	12,200	7632	11.372	9.409	8.940	11.379	1.599	0.088	0.912	0.080	0.920	-0.171	0.041	-0.025	-0.151
1994	66,763	11,457	7983	11.109	9.346	8.985	8.363	1.435	0.120	0.880	0.104	0.896	-0.256	0.052	-0.056	-0.211
1995	66,962	13,926	7922	11.112	9.541	8.977	8.452	1.758	0.118	0.882	0.119	0.881	0.002	-0.009	0.194	-0.168
1996	67,859	18,087	8099	11.125	9.803	9.000	8.379	2.233	0.119	0.881	0.119	0.881	0.015	0.023	0.263	-0.220
1997	88,216	17,716	8026	11.388	9.782	8.990	10.991	2.207	0.091	0.909	0.105	0.895	0.260	-0.011	-0.023	0.282
1998	93,689	17,832	7889	11.448	9.789	8.973	11.876	2.260	0.084	0.916	0.088	0.912	0.086	0.009	0.033	0.056
1999	77,401	16,287	7821	11.257	9.698	8.965	9.897	2.083	0.101	0.899	0.093	0.907	-0.194	-0.012	-0.094	-0.108
2000	86,455	19,023	9172	11.367	9.853	9.124	9.426	2.074	0.106	0.894	0.104	0.896	0.104	0.153	0.149	-0.045
2001	93,910	22,602	9352	11.450	10.026	9.143	10.042	2.417	0.100	0.900	0.103	0.897	0.075	0.011	0.164	-0.074
2002	65,044	21,976	8872	11.083	9.998	9.091	7.331	2.477	0.136	0.864	0.118	0.882	-0.376	-0.062	-0.037	-0.336
2003	62,251	18,174	8795	11.039	9.808	9.082	7.078	2.066	0.141	0.859	0.139	0.861	-0.046	-0.011	-0.192	0.121
2004	47,700	21,073	9428	10.773	9.956	9.151	5.059	2.235	0.198	0.802	0.169	0.831	-0.266	0.069	0.148	-0.401
2005	57,308	20,424	10166	10.956	9.924	9.227	5.637	2.009	0.177	0.823	0.188	0.812	0.181	0.073	-0.034	0.195
2006	56,572	20,291	10005	10.943	9.918	9.211	5.654	2.028	0.177	0.823	0.177	0.823	-0.011	-0.014	-0.004	-0.005
2007	56,766	19,816	9694	10.947	9.894	9.179	5.856	2.044	0.171	0.829	0.174	0.826	0.004	-0.031	-0.023	0.028
2008	52,620	19,279	9473	10.871	9.867	9.156	5.555	2.035	0.180	0.820	0.175	0.825	-0.062	-0.009	-0.014	-0.049
2009	38,393	18,839	9129	10.556	9.844	9.119	4.205	2.064	0.238	0.762	0.209	0.791	-0.329	-0.051	-0.037	-0.289
2010	37,489	17,146	8071	10.532	9.750	8.996	4.645	2.124	0.215	0.785	0.227	0.773	-0.031	-0.130	-0.101	0.077
2011	40,225	16,546	8704	10.602	9.714	9.072	4.622	1.901	0.216	0.784	0.216	0.784	0.068	0.073	-0.039	0.082

b. TFP INDEX**: Dynic textile firm (3551)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	104.80	107.21	102.37	102.64	102.11
1992	100.77	111.80	106.11	106.23	94.86
1993	84.94	116.44	103.50	103.53	82.04
1994	65.76	122.65	97.88	97.89	67.18
1995	65.87	121.56	118.81	115.36	57.10
1996	66.84	124.44	154.52	145.83	45.83
1997	86.71	123.05	151.04	144.30	60.09
1998	94.54	124.18	156.07	150.88	62.66
1999	77.85	122.69	142.08	137.84	56.48
2000	86.38	142.95	164.86	158.72	54.42
2001	93.07	144.57	194.28	184.23	50.52
2002	63.88	135.92	187.20	174.65	36.58
2003	60.99	134.40	154.43	144.98	42.07
2004	46.73	144.06	179.05	162.22	28.80
2005	55.99	154.93	173.07	157.67	35.51
2006	55.40	152.83	172.35	157.89	35.09
2007	55.63	148.18	168.42	154.44	36.02
2008	52.27	146.78	166.11	152.26	34.33
2009	37.62	139.55	160.13	142.91	26.33
2010	36.48	122.49	144.69	126.66	28.80
2011	39.02	131.71	139.22	125.84	31.01

c. CFI INDEX**: Dynic textile firm (3551)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.064								100
1991	0.066	0.065	0.935	1.072	1.024	1.005	1.022	1.027	102.68
1992	0.071	0.068	0.932	1.043	1.037	1.003	1.034	1.037	106.48
1993	0.088	0.080	0.920	1.041	0.975	1.003	0.977	0.980	104.40
1994	0.120	0.104	0.896	1.053	0.946	1.005	0.951	0.956	99.83
1995	0.118	0.119	0.881	0.991	1.214	0.999	1.186	1.185	118.30
1996	0.119	0.119	0.881	1.024	1.301	1.003	1.261	1.264	149.54
1997	0.091	0.105	0.895	0.989	0.977	0.999	0.980	0.979	146.35
1998	0.084	0.088	0.912	1.009	1.033	1.001	1.030	1.031	150.91
1999	0.101	0.093	0.907	0.988	0.910	0.999	0.918	0.917	138.43
2000	0.106	0.104	0.896	1.165	1.160	1.016	1.143	1.161	160.69
2001	0.100	0.103	0.897	1.011	1.178	1.001	1.159	1.160	186.42
2002	0.136	0.118	0.882	0.940	0.964	0.993	0.968	0.961	179.10
2003	0.141	0.139	0.861	0.989	0.825	0.998	0.847	0.846	151.51
2004	0.198	0.169	0.831	1.072	1.159	1.012	1.131	1.144	173.34
2005	0.177	0.188	0.812	1.075	0.967	1.014	0.973	0.986	170.94
2006	0.177	0.177	0.823	0.986	0.996	0.998	0.997	0.994	169.95
2007	0.171	0.174	0.826	0.970	0.977	0.995	0.981	0.976	165.84
2008	0.180	0.175	0.825	0.991	0.986	0.998	0.989	0.987	163.69
2009	0.238	0.209	0.791	0.951	0.964	0.990	0.971	0.961	157.34
2010	0.215	0.227	0.773	0.878	0.904	0.971	0.925	0.898	141.24
2011	0.216	0.216	0.784	1.075	0.962	1.016	0.970	0.986	139.20

a. TFPG INDEX**: Komatsu Seiren textile firm (3580)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t =α'	1-α'= β'	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	48,526	6,001	3826	10.790	8.700	8.250	12.683	1.568	0.079	0.921						0.000
1991	73,283	9,802	4293	11.202	9.190	8.365	17.071	2.283	0.059	0.941	0.069	0.931	0.444	0.147	0.523	-0.053
1992	88,209	9,386	4689	11.387	9.147	8.453	18.813	2.002	0.053	0.947	0.056	0.944	0.202	0.105	-0.026	0.221
1993	102,135	9,610	4535	11.534	9.171	8.420	22.520	2.119	0.044	0.956	0.049	0.951	0.159	-0.021	0.036	0.126
1994	65,508	8,539	5118	11.090	9.052	8.540	12.800	1.669	0.078	0.922	0.061	0.939	-0.437	0.128	-0.111	-0.341
1995	70,478	8,547	4928	11.163	9.053	8.503	14.301	1.734	0.070	0.930	0.074	0.926	0.072	-0.039	0.000	0.075
1996	45,290	7,537	4990	10.721	8.928	8.515	9.077	1.511	0.110	0.890	0.090	0.910	-0.441	0.014	-0.124	-0.329
1997	47,976	7,155	5006	10.778	8.876	8.518	9.585	1.429	0.104	0.896	0.107	0.893	0.056	0.001	-0.054	0.104
1998	50,591	7,586	4881	10.832	8.934	8.493	10.365	1.554	0.096	0.904	0.100	0.900	0.079	0.001	0.085	0.003
1999	32,884	8,011	4594	10.401	8.989	8.432	7.158	1.744	0.140	0.860	0.118	0.882	-0.434	-0.064	0.051	-0.472
2000	48,919	8,045	6200	10.798	8.993	8.732	7.890	1.297	0.127	0.873	0.133	0.867	0.391	0.293	-0.002	0.354
2001	36,763	8,054	6433	10.512	8.994	8.769	5.715	1.252	0.175	0.825	0.151	0.849	-0.294	0.029	-0.007	-0.292
2002	27,802	7,776	5892	10.233	8.959	8.681	4.719	1.320	0.212	0.788	0.193	0.807	-0.288	-0.097	-0.044	-0.234
2003	21,924	7,442	4754	9.995	8.915	8.467	4.611	1.565	0.217	0.783	0.214	0.786	-0.240	-0.217	-0.046	-0.157
2004	23,788	8,517	6618	10.077	9.050	8.798	3.594	1.287	0.278	0.722	0.248	0.752	0.082	0.331	0.135	-0.102
2005	29,927	9,677	8297	10.307	9.178	9.024	3.607	1.166	0.277	0.723	0.278	0.722	0.227	0.223	0.125	0.075
2006	21,364	9,974	9094	9.969	9.208	9.115	2.349	1.097	0.426	0.574	0.351	0.649	-0.335	0.094	0.033	-0.389
2007	25,618	9,835	8468	10.151	9.194	9.044	3.025	1.161	0.331	0.669	0.378	0.622	0.182	-0.071	-0.013	0.217
2008	39,013	9,515	8573	10.572	9.161	9.056	4.551	1.110	0.220	0.780	0.275	0.725	0.434	0.026	-0.019	0.441
2009	38,773	9,944	7673	10.565	9.205	8.945	5.053	1.296	0.198	0.802	0.209	0.791	-0.020	-0.125	0.031	-0.018
2010	33,156	8,631	6526	10.409	9.063	8.784	5.081	1.323	0.197	0.803	0.197	0.803	-0.164	-0.169	-0.149	-0.011
2011	37,927	8,184	7027	10.543	9.010	8.858	5.397	1.165	0.185	0.815	0.191	0.809	0.132	0.071	-0.056	0.163

b. TFP INDEX**: Komatsu Seiren textile firm (3580)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	155.94	115.86	168.67	165.13	94.44
1992	190.93	128.72	164.30	163.76	116.59
1993	223.87	126.08	170.34	170.14	131.58
1994	144.59	143.27	152.42	153.05	94.47
1995	155.36	137.79	152.36	151.56	102.51
1996	99.96	139.69	134.54	134.32	74.42
1997	105.67	139.84	127.44	127.08	83.15
1998	114.40	140.00	138.73	137.52	83.19
1999	74.11	131.32	146.02	141.68	52.31
2000	109.53	176.08	145.66	145.78	75.14
2001	81.64	181.21	144.64	144.87	56.35
2002	61.19	164.46	138.40	135.90	45.02
2003	48.13	132.38	132.13	124.36	38.70
2004	52.22	184.27	151.20	147.18	35.48
2005	65.52	230.39	171.33	170.09	38.52
2006	46.88	253.11	177.01	177.54	26.41
2007	56.25	235.84	174.65	171.00	32.90
2008	86.85	242.05	171.29	172.46	50.36
2009	85.15	213.70	176.60	173.33	49.12
2010	72.29	180.46	152.18	149.21	48.45
2011	82.45	193.76	143.88	144.80	56.94

c. CFI INDEX**: Komatsu Seiren textile firm (3580)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.079								100
1991	0.059	0.069	0.931	1.159	1.687	1.010	1.627	1.644	164.38
1992	0.053	0.056	0.944	1.111	0.974	1.006	0.976	0.981	161.29
1993	0.044	0.049	0.951	0.979	1.037	0.999	1.035	1.034	166.76
1994	0.078	0.061	0.939	1.136	0.895	1.008	0.901	0.908	151.42
1995	0.070	0.074	0.926	0.962	1.000	0.997	1.000	0.997	150.92
1996	0.110	0.090	0.910	1.014	0.883	1.001	0.893	0.894	134.94
1997	0.104	0.107	0.893	1.001	0.947	1.000	0.953	0.953	128.58
1998	0.096	0.100	0.900	1.001	1.089	1.000	1.079	1.079	138.80
1999	0.140	0.118	0.882	0.938	1.053	0.992	1.046	1.038	144.12
2000	0.127	0.133	0.867	1.341	0.998	1.040	0.998	1.038	149.54
2001	0.175	0.151	0.849	1.029	0.993	1.004	0.994	0.998	149.30
2002	0.212	0.193	0.807	0.908	0.957	0.981	0.965	0.947	141.40
2003	0.217	0.214	0.786	0.805	0.955	0.955	0.964	0.920	130.15
2004	0.278	0.248	0.752	1.392	1.144	1.085	1.107	1.201	156.33
2005	0.277	0.278	0.722	1.250	1.133	1.064	1.094	1.165	182.05
2006	0.426	0.351	0.649	1.099	1.033	1.034	1.021	1.056	192.19
2007	0.331	0.378	0.622	0.932	0.987	0.974	0.992	0.966	185.57
2008	0.220	0.275	0.725	1.026	0.981	1.007	0.986	0.993	184.29
2009	0.198	0.209	0.791	0.883	1.031	0.974	1.024	0.998	183.95
2010	0.197	0.197	0.803	0.844	0.862	0.967	0.887	0.858	157.88
2011	0.185	0.191	0.809	1.074	0.945	1.014	0.956	0.969	152.94

a. TFPG INDEX**: Fujibo holdings textile firm (3104)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t =α'	1-α'=β'	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST: TFPG
1990	98,837	18,994	6557	11.501	9.852	8.788	15.073	2.897	0.066	0.934						0.000
1991	106,756	20,957	6566	11.578	9.950	8.790	16.258	3.192	0.062	0.938	0.064	0.936	0.109	0.033	0.130	-0.015
1992	103,333	21,550	6683	11.546	9.978	8.807	15.462	3.225	0.065	0.935	0.063	0.937	-0.016	0.035	0.045	-0.060
1993	92,330	22,793	6530	11.433	10.034	8.784	14.139	3.490	0.071	0.929	0.068	0.932	-0.100	-0.011	0.069	-0.163
1994	80,902	23,650	6672	11.301	10.071	8.806	12.125	3.545	0.082	0.918	0.077	0.923	-0.125	0.028	0.044	-0.168
1995	84,384	24,101	6614	11.343	10.090	8.797	12.758	3.644	0.078	0.922	0.080	0.920	0.041	-0.010	0.018	0.025
1996	69,438	22,564	6508	11.148	10.024	8.781	10.670	3.467	0.094	0.906	0.086	0.914	-0.194	-0.015	-0.065	-0.133
1997	71,538	23,252	6278	11.178	10.054	8.745	11.395	3.704	0.088	0.912	0.091	0.909	0.028	-0.038	0.028	0.006
1998	61,828	22,204	5908	11.032	10.008	8.684	10.465	3.758	0.096	0.904	0.092	0.908	-0.120	-0.034	-0.020	-0.098
1999	51,962	21,929	4452	10.858	9.996	8.401	11.671	4.925	0.086	0.914	0.091	0.909	-0.177	-0.286	-0.016	-0.137
2000	149,492	45,217	7042	11.915	10.719	8.860	21.229	6.421	0.047	0.953	0.066	0.934	1.050	0.452	0.717	0.351
2001	76,574	39,012	6804	11.246	10.572	8.825	11.254	5.734	0.089	0.911	0.068	0.932	-0.677	-0.042	-0.156	-0.529
2002	15,238	36,039	5988	9.632	10.492	8.698	2.545	6.018	0.393	0.607	0.241	0.759	-1.623	-0.137	-0.088	-1.524
2003	56,092	34,232	5852	10.935	10.441	8.674	9.586	5.850	0.104	0.896	0.249	0.751	1.301	-0.026	-0.054	1.348
2004	64,998	31,325	6118	11.082	10.352	8.719	10.624	5.120	0.094	0.906	0.099	0.901	0.147	0.044	-0.089	0.223
2005	67,164	31,013	7334	11.115	10.342	8.900	9.158	4.229	0.109	0.891	0.102	0.898	0.030	0.179	-0.013	0.023
2006	81,092	26,660	9132	11.303	10.191	9.120	8.880	2.919	0.113	0.887	0.111	0.889	0.191	0.222	-0.149	0.299
2007	70,223	24,408	8813	11.159	10.103	9.084	7.968	2.770	0.125	0.875	0.119	0.881	-0.143	-0.035	-0.088	-0.062
2008	81,218	24,898	8848	11.305	10.123	9.088	9.179	2.814	0.109	0.891	0.117	0.883	0.159	0.018	0.034	0.127
2009	71,939	25,555	9479	11.184	10.149	9.157	7.590	2.696	0.132	0.868	0.120	0.880	-0.135	0.055	0.012	-0.153
2010	78,878	23,420	8308	11.276	10.061	9.025	9.494	2.819	0.105	0.895	0.119	0.881	0.085	-0.139	-0.094	0.185
2011	90,978	22,678	9138	11.418	10.029	9.120	9.956	2.482	0.100	0.900	0.103	0.897	0.140	0.092	-0.035	0.162

b. TFP INDEX**: Fujibo holdings textile firm (3104)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	111.53	103.40	113.93	113.52	98.25
1992	109.81	107.05	119.17	118.77	92.46
1993	99.36	105.92	127.64	125.85	78.95
1994	87.67	108.98	133.36	129.89	67.50
1995	91.33	107.90	135.73	131.26	69.58
1996	75.25	106.30	127.23	122.68	61.34
1997	77.36	102.33	130.84	124.68	62.05
1998	68.64	98.87	128.28	121.92	56.30
1999	57.50	74.26	126.26	117.27	49.03
2000	164.33	116.68	258.64	245.31	66.99
2001	83.49	111.82	221.34	210.93	39.58
2002	16.47	97.53	202.63	141.11	11.67
2003	60.46	95.07	192.00	132.80	45.53
2004	70.05	99.39	175.67	160.32	43.70
2005	72.19	118.82	173.46	160.76	44.91
2006	87.37	148.31	149.47	142.43	61.35
2007	75.71	143.20	136.92	130.15	58.17
2008	88.76	145.76	141.59	134.59	65.95
2009	77.56	154.04	143.37	136.54	56.80
2010	84.44	134.05	130.45	123.81	68.20
2011	97.10	147.01	125.95	123.09	78.89

c. CFI INDEX**: Fujibo holdings textile firm (3104)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.066								100
1991	0.062	0.064	0.936	1.034	1.139	1.002	1.130	1.132	113.23
1992	0.065	0.063	0.937	1.035	1.046	1.002	1.043	1.045	118.35
1993	0.071	0.068	0.932	0.989	1.071	0.999	1.066	1.065	126.09
1994	0.082	0.077	0.923	1.029	1.045	1.002	1.041	1.044	131.59
1995	0.078	0.080	0.920	0.990	1.018	0.999	1.016	1.015	133.62
1996	0.094	0.086	0.914	0.985	0.937	0.999	0.943	0.941	125.80
1997	0.088	0.091	0.909	0.963	1.028	0.997	1.026	1.022	128.59
1998	0.096	0.092	0.908	0.966	0.980	0.997	0.982	0.979	125.90
1999	0.086	0.091	0.909	0.751	0.984	0.974	0.986	0.960	120.93
2000	0.047	0.066	0.934	1.571	2.048	1.030	1.953	2.013	243.39
2001	0.089	0.068	0.932	0.958	0.856	0.997	0.865	0.862	209.89
2002	0.393	0.241	0.759	0.872	0.916	0.968	0.935	0.905	189.93
2003	0.104	0.249	0.751	0.975	0.947	0.994	0.960	0.954	181.23
2004	0.094	0.099	0.901	1.045	0.915	1.004	0.923	0.927	168.03
2005	0.109	0.102	0.898	1.196	0.987	1.018	0.989	1.007	169.17
2006	0.113	0.111	0.889	1.248	0.862	1.025	0.876	0.898	151.89
2007	0.125	0.119	0.881	0.966	0.916	0.996	0.926	0.922	140.02
2008	0.109	0.117	0.883	1.018	1.034	1.002	1.030	1.032	144.52
2009	0.132	0.120	0.880	1.057	1.013	1.007	1.011	1.018	147.09
2010	0.105	0.119	0.881	0.870	0.910	0.984	0.920	0.905	133.13
2011	0.100	0.103	0.897	1.097	0.965	1.010	0.969	0.978	130.23

a. TFPG INDEX**: Daidoh Limited textile firm (3205)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST : TFPG
1990	57,071	4,393	5471	10.952	8.388	8.607	10.431	0.803	0.096	0.904						0.000
1991	67,701	4,434	5801	11.123	8.397	8.666	11.671	0.764	0.086	0.914	0.091	0.909	0.203	0.091	0.041	0.157
1992	115,970	8,782	6110	11.661	9.080	8.718	18.981	1.437	0.053	0.947	0.069	0.931	0.555	0.069	0.701	-0.102
1993	69,066	18,037	6376	11.143	9.800	8.760	10.832	2.829	0.092	0.908	0.073	0.927	-0.506	0.055	0.732	-1.189
1994	55,733	20,810	6553	10.928	9.943	8.788	8.505	3.176	0.118	0.882	0.105	0.895	-0.208	0.034	0.150	-0.345
1995	52,942	19,825	6812	10.877	9.895	8.826	7.772	2.910	0.129	0.871	0.123	0.877	-0.053	0.037	-0.050	-0.014
1996	62,880	18,772	6860	11.049	9.840	8.833	9.166	2.736	0.109	0.891	0.119	0.881	0.173	0.008	-0.053	0.219
1997	56,514	17,598	7074	10.942	9.776	8.864	7.989	2.488	0.125	0.875	0.117	0.883	-0.109	0.029	-0.067	-0.053
1998	70,757	20,567	7147	11.167	9.931	8.874	9.900	2.878	0.101	0.899	0.113	0.887	0.251	0.037	0.182	0.085
1999	54,751	18,984	7001	10.911	9.851	8.854	7.820	2.712	0.128	0.872	0.114	0.886	-0.260	-0.024	-0.083	-0.183
2000	44,035	21,053	5185	10.693	9.955	8.553	8.493	4.061	0.118	0.882	0.123	0.877	-0.224	-0.307	0.097	-0.272
2001	30,016	25,982	7976	10.309	10.165	8.984	3.763	3.258	0.266	0.734	0.192	0.808	-0.391	0.423	0.202	-0.636
2002	43,795	25,386	8005	10.687	10.142	8.988	5.471	3.171	0.183	0.817	0.224	0.776	0.369	-0.005	-0.032	0.395
2003	40,479	28,550	12859	10.609	10.259	9.462	3.148	2.220	0.318	0.682	0.250	0.750	-0.081	0.472	0.115	-0.285
2004	74,453	26,829	12643	11.218	10.197	9.445	5.889	2.122	0.170	0.830	0.244	0.756	0.609	-0.017	-0.062	0.661
2005	61,399	24,706	15319	11.025	10.115	9.637	4.008	1.613	0.249	0.751	0.210	0.790	-0.195	0.189	-0.085	-0.168
2006	76,130	22,744	11370	11.240	10.032	9.339	6.696	2.000	0.149	0.851	0.199	0.801	0.217	-0.296	-0.080	0.341
2007	77,340	21,228	12810	11.256	9.963	9.458	6.037	1.657	0.166	0.834	0.157	0.843	0.016	0.120	-0.068	0.055
2008	31,536	19,515	13316	10.359	9.879	9.497	2.368	1.466	0.422	0.578	0.294	0.706	-0.883	0.052	-0.070	-0.849
2009	88,924	17,261	12684	11.396	9.756	9.448	7.011	1.361	0.143	0.857	0.282	0.718	1.023	-0.062	-0.136	1.138
2010	47,196	15,674	9866	10.762	9.660	9.197	4.784	1.589	0.209	0.791	0.176	0.824	-0.641	-0.259	-0.104	-0.510
2011	50,928	14,078	10468	10.838	9.552	9.256	4.865	1.345	0.206	0.794	0.207	0.793	0.073	0.056	-0.110	0.149

b. TFP INDEX**: Daidoh Limited textile firm (3205)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	122.49	109.48	104.21	104.56	117.15
1992	213.43	117.29	209.96	200.49	106.46
1993	128.72	123.95	436.67	396.53	32.46
1994	104.60	128.28	507.34	440.04	23.77
1995	99.23	133.18	482.70	414.40	23.95
1996	118.01	134.29	457.66	397.58	29.68
1997	105.84	138.18	428.14	376.78	28.09
1998	136.05	143.34	513.69	446.33	30.48
1999	104.92	139.95	472.59	412.83	25.42
2000	83.83	102.95	520.64	429.20	19.53
2001	56.68	157.09	637.32	497.60	11.39
2002	81.95	156.25	617.11	466.47	17.57
2003	75.56	250.38	692.30	555.24	13.61
2004	138.97	246.15	650.50	530.24	26.21
2005	114.29	297.44	597.41	529.20	21.60
2006	142.05	221.30	551.29	470.11	30.22
2007	144.40	249.47	514.85	465.59	31.01
2008	59.69	262.90	479.82	419.90	14.22
2009	166.04	247.05	418.68	375.80	44.18
2010	87.49	190.77	377.46	340.71	25.68
2011	94.14	201.82	338.04	311.28	30.24

c. CFI INDEX**: Daidoh limited textile firm (3205)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.096								100
1991	0.086	0.091	0.909	1.095	1.042	1.008	1.038	1.047	104.67
1992	0.053	0.069	0.931	1.071	2.015	1.005	1.919	1.929	201.88
1993	0.092	0.073	0.927	1.057	2.080	1.004	1.972	1.980	399.77
1994	0.118	0.105	0.895	1.035	1.162	1.004	1.144	1.148	458.86
1995	0.129	0.123	0.877	1.038	0.951	1.005	0.957	0.962	441.28
1996	0.109	0.119	0.881	1.008	0.948	1.001	0.954	0.955	421.47
1997	0.125	0.117	0.883	1.029	0.936	1.003	0.943	0.946	398.71
1998	0.101	0.113	0.887	1.037	1.200	1.004	1.175	1.180	470.57
1999	0.128	0.114	0.886	0.976	0.920	0.997	0.929	0.926	435.87
2000	0.118	0.123	0.877	0.736	1.102	0.963	1.089	1.048	456.96
2001	0.266	0.192	0.808	1.526	1.224	1.084	1.178	1.277	583.50
2002	0.183	0.224	0.776	0.995	0.968	0.999	0.975	0.974	568.41
2003	0.318	0.250	0.750	1.602	1.122	1.125	1.090	1.227	697.17
2004	0.170	0.244	0.756	0.983	0.940	0.996	0.954	0.950	662.34
2005	0.249	0.210	0.790	1.208	0.918	1.040	0.935	0.973	644.31
2006	0.149	0.199	0.801	0.744	0.923	0.943	0.938	0.884	569.57
2007	0.166	0.157	0.843	1.127	0.934	1.019	0.944	0.962	547.93
2008	0.422	0.294	0.706	1.054	0.932	1.016	0.951	0.966	529.43
2009	0.143	0.282	0.718	0.940	0.873	0.983	0.907	0.891	471.74
2010	0.209	0.176	0.824	0.772	0.902	0.956	0.918	0.877	413.87
2011	0.206	0.207	0.793	1.058	0.896	1.012	0.916	0.927	383.67

a. TFPG INDEX**: Teikoku textile firm (3302)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	TORNQVIST : TFPG
1990	27,694	5,391	884	10.229	8.592	6.784	31.327	6.098	0.032	0.968						0.000
1991	25,935	7,324	865	10.163	8.899	6.763	29.982	8.467	0.033	0.967	0.033	0.967	-0.034	0.010	0.339	-0.361
1992	27,483	7,477	913	10.221	8.920	6.817	30.086	8.185	0.033	0.967	0.033	0.967	0.075	0.072	0.038	0.036
1993	27,301	7,755	811	10.215	8.956	6.698	33.677	9.567	0.030	0.970	0.031	0.969	0.006	-0.107	0.049	-0.038
1994	32,711	6,901	841	10.395	8.839	6.734	38.902	8.207	0.026	0.974	0.028	0.972	0.188	0.044	-0.110	0.293
1995	40,934	5,863	934	10.620	8.676	6.840	43.824	6.277	0.023	0.977	0.024	0.976	0.223	0.104	-0.164	0.381
1996	33,360	5,222	760	10.415	8.561	6.634	43.875	6.867	0.023	0.977	0.023	0.977	-0.203	-0.204	-0.115	-0.087
1997	31,547	4,924	737	10.359	8.502	6.602	42.823	6.684	0.023	0.977	0.023	0.977	-0.058	-0.034	-0.061	0.002
1998	28,961	4,558	721	10.274	8.425	6.580	40.180	6.323	0.025	0.975	0.024	0.976	-0.059	0.004	-0.051	-0.010
1999	26,555	4,423	695	10.187	8.394	6.544	38.209	6.364	0.026	0.974	0.026	0.974	-0.090	-0.040	-0.033	-0.056
2000	29,489	4,144	761	10.292	8.329	6.635	38.738	5.443	0.026	0.974	0.026	0.974	0.098	0.084	-0.072	0.166
2001	28,820	3,712	791	10.269	8.219	6.674	36.426	4.691	0.027	0.973	0.027	0.973	-0.031	0.030	-0.118	0.083
2002	34,591	3,504	828	10.451	8.162	6.719	41.758	4.230	0.024	0.976	0.026	0.974	0.173	0.037	-0.067	0.238
2003	32,682	3,387	935	10.395	8.128	6.840	34.970	3.625	0.029	0.971	0.026	0.974	-0.059	0.118	-0.036	-0.027
2004	55,569	2,811	1570	10.925	7.941	7.359	35.385	1.790	0.028	0.972	0.028	0.972	0.531	0.519	-0.187	0.697
2005	31,142	2,747	1481	10.346	7.918	7.300	21.032	1.855	0.048	0.952	0.038	0.962	-0.582	-0.062	-0.026	-0.554
2006	34,662	2,788	1466	10.453	7.933	7.291	23.638	1.901	0.042	0.958	0.045	0.955	0.109	-0.007	0.017	0.093
2007	37,791	2,402	1475	10.540	7.784	7.297	25.613	1.628	0.039	0.961	0.041	0.959	0.087	0.007	-0.149	0.229
2008	27,274	2,871	1467	10.214	7.963	7.291	18.593	1.958	0.054	0.946	0.046	0.954	-0.312	0.008	0.192	-0.496
2009	34,684	2,803	1534	10.454	7.938	7.335	22.616	1.828	0.044	0.956	0.049	0.951	0.227	0.031	-0.038	0.261
2010	33,446	2,780	1559	10.418	7.930	7.352	21.459	1.784	0.047	0.953	0.045	0.955	-0.044	0.009	-0.015	-0.029
2011	33,223	2,761	1624	10.411	7.923	7.393	20.456	1.700	0.049	0.951	0.048	0.952	-0.010	0.038	-0.010	-0.002

b. TFP INDEX: Teikoku textile firm (3302)

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	96.70	101.04	140.30	138.63	69.76
1992	104.24	108.54	145.68	143.90	72.44
1993	104.85	97.54	153.02	150.99	69.44
1994	126.51	101.88	137.12	137.04	92.32
1995	158.11	113.02	116.35	117.89	134.12
1996	129.02	92.12	103.75	105.19	122.66
1997	121.75	89.07	97.62	98.99	123.00
1998	114.75	89.47	92.78	94.01	122.06
1999	104.87	85.98	89.73	90.67	115.66
2000	115.69	93.56	83.51	84.66	136.65
2001	112.15	96.45	74.20	75.44	148.66
2002	133.40	100.07	69.42	70.86	188.24
2003	125.72	112.62	66.95	68.56	183.36
2004	213.74	189.24	55.55	57.89	369.25
2005	119.46	177.94	54.13	56.02	213.26
2006	133.29	176.65	55.08	56.69	235.10
2007	145.40	177.84	47.47	49.30	294.91
2008	106.38	179.24	57.54	59.09	180.04
2009	133.46	184.87	55.41	56.99	234.18
2010	127.77	186.53	54.56	56.31	226.92
2011	126.55	193.81	54.03	55.81	226.76

c. CFI INDEX**: Teikoku textile firm (3302)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.032								100
1991	0.033	0.033	0.967	1.010	1.403	1.000	1.388	1.388	138.81
1992	0.033	0.033	0.967	1.074	1.038	1.002	1.037	1.040	144.29
1993	0.030	0.031	0.969	0.899	1.050	0.997	1.049	1.045	150.82
1994	0.026	0.028	0.972	1.044	0.896	1.001	0.899	0.900	135.72
1995	0.023	0.024	0.976	1.109	0.849	1.003	0.852	0.854	115.92
1996	0.023	0.023	0.977	0.815	0.892	0.995	0.894	0.890	103.15
1997	0.023	0.023	0.977	0.967	0.941	0.999	0.942	0.942	97.12
1998	0.025	0.024	0.976	1.004	0.950	1.000	0.952	0.952	92.42
1999	0.026	0.026	0.974	0.961	0.967	0.999	0.968	0.967	89.37
2000	0.026	0.026	0.974	1.088	0.931	1.002	0.932	0.935	83.52
2001	0.027	0.027	0.973	1.031	0.889	1.001	0.891	0.892	74.50
2002	0.024	0.026	0.974	1.038	0.935	1.001	0.937	0.938	69.88
2003	0.029	0.026	0.974	1.125	0.964	1.003	0.965	0.968	67.67
2004	0.028	0.028	0.972	1.680	0.830	1.015	0.834	0.847	57.29
2005	0.048	0.038	0.962	0.940	0.974	0.998	0.975	0.973	55.75
2006	0.042	0.045	0.955	0.993	1.018	1.000	1.017	1.016	56.67
2007	0.039	0.041	0.959	1.007	0.862	1.000	0.867	0.867	49.14
2008	0.054	0.046	0.954	1.008	1.212	1.000	1.201	1.202	59.06
2009	0.044	0.049	0.951	1.031	0.963	1.002	0.965	0.966	57.07
2010	0.047	0.045	0.955	1.009	0.985	1.000	0.985	0.986	56.26
2011	0.049	0.048	0.952	1.039	0.990	1.002	0.991	0.993	55.84

a. TFPG INDEX**: Yamato textile firm (8127)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t $=\alpha'$	1-$\alpha'=\beta'$	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	35,152	10,933	1922	10.467	9.300	7.561	18.293	5.690	0.055	0.945						0.000
1991	37,861	15,010	2111	10.542	9.616	7.655	17.937	7.111	0.056	0.944	0.055	0.945	0.106	0.126	0.349	-0.230
1992	24,374	14,505	2214	10.101	9.582	7.703	11.008	6.551	0.091	0.909	0.073	0.927	-0.423	0.065	-0.017	-0.412
1993	14,569	14,212	2189	9.587	9.562	7.691	6.655	6.492	0.150	0.850	0.121	0.879	-0.502	0.001	-0.008	-0.495
1994	24,805	13,870	2365	10.119	9.537	7.768	10.490	5.866	0.095	0.905	0.123	0.877	0.539	0.084	-0.017	0.544
1995	8,240	13,694	1960	9.017	9.525	7.580	4.205	6.988	0.238	0.762	0.167	0.833	-1.103	-0.189	-0.014	-1.060
1996	6,959	13,587	2009	8.848	9.517	7.605	3.464	6.763	0.289	0.711	0.263	0.737	-0.168	0.026	-0.007	-0.170
1997	7,746	13,641	1916	8.955	9.521	7.558	4.043	7.120	0.247	0.753	0.268	0.732	0.105	-0.050	0.002	0.117
1998	16,759	13,465	1659	9.727	9.508	7.414	10.101	8.116	0.099	0.901	0.173	0.827	0.798	-0.118	0.013	0.807
1999	9,426	12,951	1576	9.151	9.469	7.362	5.982	8.219	0.167	0.833	0.133	0.867	-0.579	-0.055	-0.042	-0.535
2000	8,018	12,656	1309	8.989	9.446	7.177	6.125	9.669	0.163	0.837	0.165	0.835	-0.168	-0.192	-0.030	-0.112
2001	13,286	12,308	1320	9.494	9.418	7.185	10.065	9.325	0.099	0.901	0.131	0.869	0.497	0.000	-0.036	0.528
2002	12,203	12,111	1275	9.409	9.402	7.151	9.571	9.499	0.104	0.896	0.102	0.898	-0.094	-0.044	-0.025	-0.067
2003	10,608	11,840	1352	9.269	9.379	7.209	7.849	8.760	0.127	0.873	0.116	0.884	-0.143	0.056	-0.025	-0.127
2004	33,961	11,696	3226	10.433	9.367	8.079	10.528	3.626	0.095	0.905	0.111	0.889	1.163	0.870	-0.012	1.078
2005	40,254	11,545	3318	10.603	9.354	8.107	12.133	3.480	0.082	0.918	0.089	0.911	0.167	0.025	-0.016	0.179
2006	41,920	11,542	3355	10.644	9.354	8.118	12.493	3.440	0.080	0.920	0.081	0.919	0.043	0.014	0.002	0.040
2007	43,508	11,513	3431	10.681	9.351	8.141	12.679	3.355	0.079	0.921	0.079	0.921	0.038	0.023	-0.002	0.038
2008	42,483	11,293	3260	10.657	9.332	8.089	13.033	3.464	0.077	0.923	0.078	0.922	-0.010	-0.038	-0.006	-0.002
2009	25,034	10,934	3061	10.128	9.300	8.027	8.177	3.572	0.122	0.878	0.100	0.900	-0.542	-0.076	-0.046	-0.494
2010	20,046	10,911	3053	9.906	9.298	8.024	6.566	3.574	0.152	0.848	0.137	0.863	-0.229	-0.010	-0.009	-0.220
2011	32,385	10,799	2936	10.385	9.287	7.985	11.028	3.678	0.091	0.909	0.121	0.879	0.477	-0.042	-0.013	0.493

b. TFP INDEX**: Yamato textile firm (8127)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	111.22	113.43	141.76	139.89	79.50
1992	72.83	121.03	139.34	133.52	54.55
1993	44.08	121.17	138.26	121.35	36.33
1994	75.58	131.80	135.87	120.25	62.85
1995	25.07	109.08	133.98	106.57	23.53
1996	21.20	111.98	133.10	88.50	23.96
1997	23.55	106.56	133.35	86.65	27.18
1998	52.32	94.74	135.14	103.42	50.59
1999	29.33	89.69	129.55	107.64	27.25
2000	24.78	74.01	125.76	95.07	26.07
2001	40.73	74.03	121.32	99.52	40.93
2002	37.07	70.86	118.30	103.43	35.85
2003	32.15	74.93	115.37	98.65	32.59
2004	102.91	178.82	113.95	108.59	94.77
2005	121.66	183.42	112.18	110.45	110.15
2006	127.00	185.96	112.42	111.82	113.57
2007	131.89	190.28	112.20	112.07	117.68
2008	130.55	183.24	111.57	111.39	117.20
2009	75.89	169.77	106.57	103.25	73.50
2010	60.34	168.11	105.59	97.49	61.89
2011	97.19	161.21	104.20	97.82	99.36

c. CFI INDEX**: Yamato textile firm (8127)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.055								100
1991	0.056	0.055	0.945	1.134	1.418	1.007	1.391	1.400	140.03
1992	0.091	0.073	0.927	1.067	0.983	1.005	0.984	0.989	138.47
1993	0.150	0.121	0.879	1.001	0.992	1.000	0.993	0.993	137.54
1994	0.095	0.123	0.877	1.088	0.983	1.010	0.985	0.995	136.86
1995	0.238	0.167	0.833	0.828	0.986	0.969	0.988	0.958	131.07
1996	0.289	0.263	0.737	1.027	0.993	1.007	0.995	1.002	131.35
1997	0.247	0.268	0.732	0.952	1.002	0.987	1.001	0.988	129.79
1998	0.099	0.173	0.827	0.889	1.013	0.980	1.011	0.991	128.58
1999	0.167	0.133	0.867	0.947	0.959	0.993	0.964	0.957	123.06
2000	0.163	0.165	0.835	0.825	0.971	0.969	0.976	0.945	116.29
2001	0.099	0.131	0.869	1.000	0.965	1.000	0.969	0.969	112.72
2002	0.104	0.102	0.898	0.957	0.975	0.996	0.978	0.973	109.71
2003	0.127	0.116	0.884	1.057	0.975	1.006	0.978	0.984	108.00
2004	0.095	0.111	0.889	2.386	0.988	1.102	0.989	1.090	117.67
2005	0.082	0.089	0.911	1.026	0.984	1.002	0.986	0.988	116.26
2006	0.080	0.081	0.919	1.014	1.002	1.001	1.002	1.003	116.62
2007	0.079	0.079	0.921	1.023	0.998	1.002	0.998	1.000	116.62
2008	0.077	0.078	0.922	0.963	0.994	0.997	0.995	0.992	115.68
2009	0.122	0.100	0.900	0.927	0.955	0.992	0.960	0.952	110.16
2010	0.152	0.137	0.863	0.990	0.991	0.999	0.992	0.991	109.13
2011	0.091	0.121	0.879	0.959	0.987	0.995	0.988	0.983	107.32

a. TFPG INDEX**: Atsugi textile firm (3529)**

Year	Output V (Mil Yen)	Capital (Mil Yen)	No. Emp* Sal. L (Mil Yen)	Ln V	Ln K	Ln L	Labour productivity (V/L)	K-L ratio	α	β	½ (w/v) t-1+(w/v) t =α'	1-α'= β'	Ln. Vt-lnVt-1	Ln. Lt-Ln Lt-1	Ln Kt-Ln Kt-1	Tornqvist: TFPG
1990	231,285	10,187	6585	12.351	9.229	8.793	35.123	1.547	0.028	0.972						0.000
1991	253,895	9,368	7415	12.445	9.145	8.911	34.242	1.263	0.029	0.971	0.029	0.971	0.125	0.151	-0.052	0.171
1992	110,182	8,984	6952	11.610	9.103	8.847	15.848	1.292	0.063	0.937	0.046	0.954	-0.818	-0.047	-0.025	-0.792
1993	187,086	8,905	6866	12.139	9.094	8.834	27.246	1.297	0.037	0.963	0.050	0.950	0.542	0.000	0.004	0.538
1994	128,552	8,112	7252	11.764	9.001	8.889	17.725	1.118	0.056	0.944	0.047	0.953	-0.368	0.062	-0.086	-0.289
1995	96,950	7,276	7420	11.482	8.892	8.912	13.066	0.981	0.077	0.923	0.066	0.934	-0.283	0.022	-0.110	-0.182
1996	62,794	6,640	7484	11.048	8.801	8.920	8.391	0.887	0.119	0.881	0.098	0.902	-0.433	0.010	-0.090	-0.353
1997	54,864	6,160	7514	10.913	8.726	8.924	7.302	0.820	0.137	0.863	0.128	0.872	-0.137	0.002	-0.077	-0.070
1998	52,847	5,811	7617	10.875	8.668	8.938	6.938	0.763	0.144	0.856	0.141	0.859	-0.011	0.040	-0.032	0.011
1999	44,851	16,973	7341	10.711	9.739	8.901	6.110	2.312	0.164	0.836	0.154	0.846	-0.167	-0.040	1.069	-1.065
2000	72,151	44,640	10411	11.187	10.706	9.251	6.930	4.288	0.144	0.856	0.154	0.846	0.469	0.343	0.960	-0.396
2001	64,065	37,443	8765	11.068	10.531	9.079	7.309	4.272	0.137	0.863	0.141	0.859	-0.127	-0.180	-0.184	0.056
2002	53,204	35,882	8314	10.882	10.488	9.026	6.399	4.316	0.156	0.844	0.147	0.853	-0.195	-0.062	-0.052	-0.142
2003	45,187	36,005	8037	10.719	10.491	8.992	5.623	4.480	0.178	0.822	0.167	0.833	-0.166	-0.036	0.001	-0.161
2004	36,900	34,395	7170	10.516	10.446	8.878	5.146	4.797	0.194	0.806	0.186	0.814	-0.203	-0.114	-0.046	-0.144
2005	43,301	34,067	8081	10.676	10.436	8.997	5.359	4.216	0.187	0.813	0.190	0.810	0.157	0.117	-0.012	0.145
2006	42,916	30,259	8876	10.667	10.318	9.091	4.835	3.409	0.207	0.793	0.197	0.803	-0.007	0.096	-0.116	0.068
2007	44,365	29,417	9735	10.700	10.289	9.183	4.557	3.022	0.219	0.781	0.213	0.787	0.034	0.093	-0.028	0.036
2008	48,419	28,918	9649	10.788	10.272	9.175	5.018	2.997	0.199	0.801	0.209	0.791	0.101	0.005	-0.003	0.103
2009	54,410	28,147	10030	10.904	10.245	9.213	5.425	2.806	0.184	0.816	0.192	0.808	0.103	0.025	-0.041	0.131
2010	57,744	26,583	9864	10.964	10.188	9.197	5.854	2.695	0.171	0.829	0.178	0.822	0.052	-0.024	-0.064	0.109
2011	52,305	26,516	9925	10.865	10.186	9.203	5.270	2.672	0.190	0.810	0.180	0.820	-0.102	0.003	-0.005	-0.098

b. TFP INDEX**: Atsugi textile firm (3529)**

Year	V_t	L_t	K_t	$L_t^{\alpha} K_t^{\beta}$	TFP (Z')
1990	100	100	100	100	100
1991	113.36	116.27	94.96	95.50	118.70
1992	50.04	110.90	92.64	92.69	53.98
1993	86.04	110.91	92.98	92.93	92.58
1994	59.53	117.96	85.29	85.91	69.30
1995	44.84	120.53	76.40	77.45	57.89
1996	29.08	121.73	69.82	71.52	40.66
1997	25.35	121.96	64.63	67.13	37.77
1998	25.07	126.93	62.59	65.83	38.09
1999	21.21	121.92	182.23	162.17	13.08
2000	33.89	171.77	476.10	385.24	8.80
2001	29.85	143.44	396.10	327.01	9.13
2002	24.57	134.84	376.18	307.42	7.99
2003	20.81	130.02	376.53	296.75	7.01
2004	17.00	115.99	359.66	272.00	6.25
2005	19.89	130.36	355.27	273.49	7.27
2006	19.76	143.54	316.31	251.61	7.85
2007	20.44	157.53	307.70	246.13	8.30
2008	22.61	158.28	306.64	246.73	9.17
2009	25.07	162.32	294.44	244.59	10.25
2010	26.41	158.48	276.09	234.41	11.27
2011	23.86	158.99	274.59	232.88	10.24

c. CFI INDEX**: Atsugi textile firm (3529)**

Year	$(W/V)_t$ 1	1/2 ((W/V) t-1+(W/V) t)=α' 2	1-α'=β' 3	Lt/Lt-1 4	Kt/Kt-1 5	(Lt/Lt-1)^α' 6	(Kt/Kt-1)^β' 7	6*7	CFI
1990	0.028								100
1991	0.029	0.029	0.971	1.163	0.950	1.004	0.951	0.955	95.51
1992	0.063	0.046	0.954	0.954	0.976	0.998	0.977	0.975	93.08
1993	0.037	0.050	0.950	1.000	1.004	1.000	1.004	1.004	93.41
1994	0.056	0.047	0.953	1.064	0.917	1.003	0.921	0.924	86.28
1995	0.077	0.066	0.934	1.022	0.896	1.001	0.902	0.904	77.96
1996	0.119	0.098	0.902	1.010	0.914	1.001	0.922	0.923	71.95
1997	0.137	0.128	0.872	1.002	0.926	1.000	0.935	0.935	67.28
1998	0.144	0.141	0.859	1.041	0.968	1.006	0.973	0.978	65.82
1999	0.164	0.154	0.846	0.961	2.911	0.994	2.470	2.454	161.56
2000	0.144	0.154	0.846	1.409	2.613	1.054	2.254	2.376	383.81
2001	0.137	0.141	0.859	0.835	0.832	0.975	0.854	0.832	319.49
2002	0.156	0.147	0.853	0.940	0.950	0.991	0.957	0.948	302.97
2003	0.178	0.167	0.833	0.964	1.001	0.994	1.001	0.995	301.36
2004	0.194	0.186	0.814	0.892	0.955	0.979	0.963	0.943	284.22
2005	0.187	0.190	0.810	1.124	0.988	1.023	0.990	1.012	287.74
2006	0.207	0.197	0.803	1.101	0.890	1.019	0.911	0.928	267.12
2007	0.219	0.213	0.787	1.097	0.973	1.020	0.978	0.998	266.61
2008	0.199	0.209	0.791	1.005	0.997	1.001	0.997	0.998	266.15
2009	0.184	0.192	0.808	1.026	0.960	1.005	0.968	0.972	258.81
2010	0.171	0.178	0.822	0.976	0.938	0.996	0.948	0.944	244.42
2011	0.190	0.180	0.820	1.003	0.995	1.001	0.996	0.996	243.48

a. Deflators used at 2005-fixed price in Japan.

Year	CPI	R&D DEFLATOR
1990	94.13	110.79
1991	97.2	111.95
1992	98.87	110.93
1993	100.12	109.21
1994	100.82	107.42
1995	100.69	106.51
1996	100.82	104.74
1997	100.61	105.43
1998	103.29	103.84
1999	102.95	102.32
2000	102.27	102.37
2001	101.44	100.03
2002	100.53	97.95
2003	100.28	97.13
2004	100.27	98.37
2005	100	100
2006	100.24	102.17
2007	100.3	103.95
2008	101.68	108.7
2009	100.31	102.99
2010	99.59	102.85
2011	99.3	104.97

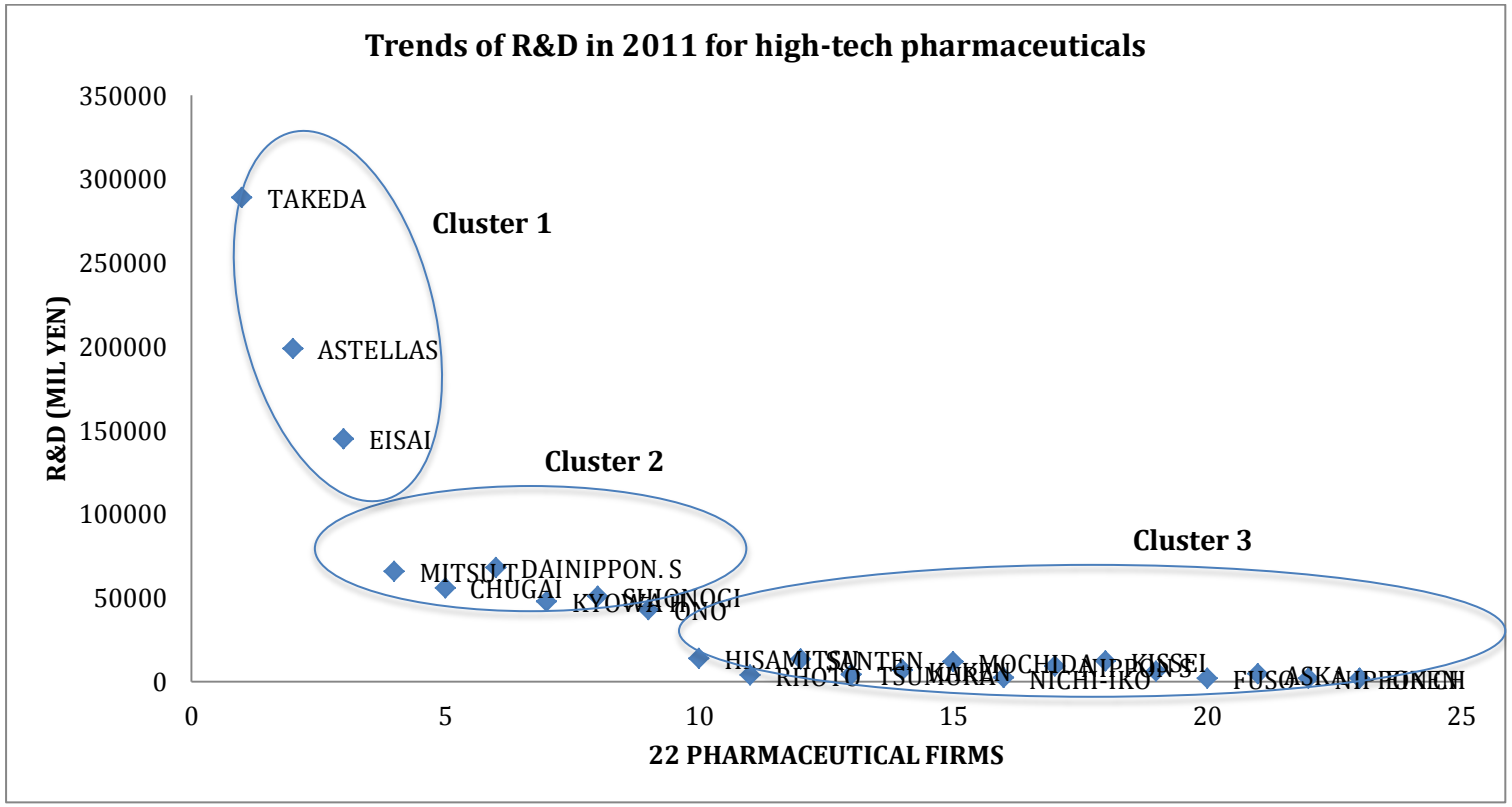
b. 2 Manufacturing Industries in Japan

Manufacturing firms in Japan 2011-Consolidation (Yen Mil.)						
No.	**Sec**	**Sales Yuhos:** Pharmaceutical	**PHARMACEUTICALS-High tech**	**Sec**	**Sales Yuhos:** Textiles	**TEXTILES-Low-Tech**
	Code			**Code**		
1	4502	1,508,932	Takeda Pharmaceutical Company Limited	3402	1,588,604	TORAY INDUSTRIES
3	4503	969,387	Astellas Pharma Inc.	3401	854,370	TEIJIN LIMITED
5	4523	647,976	Eisai Co.,	8016	242,402	ONWARD HOLDINGS CO.,
6	4508	407,156	Mitsubishi Tanabe Pharma	3103	174,662	UNITIKA
7	4519	373,516	CHUGAI PHARMACEUTICAL CO.,	3591	171,897	WACOAL HOLDINGS CORP.
8	4506	350,395	Dainippon Sumitomo Pharma Co., Ltd.	3106	159,081	KURABO INDUSTRIES
9	4151	343,722	Kyowa Hakko Kirin Co.,	3002	136,621	GUNZE LIMITED
11	4507	267,275	Shionogi & Co.,	3201	87,659	THE JAPAN WOOL TEXTILE CO.,

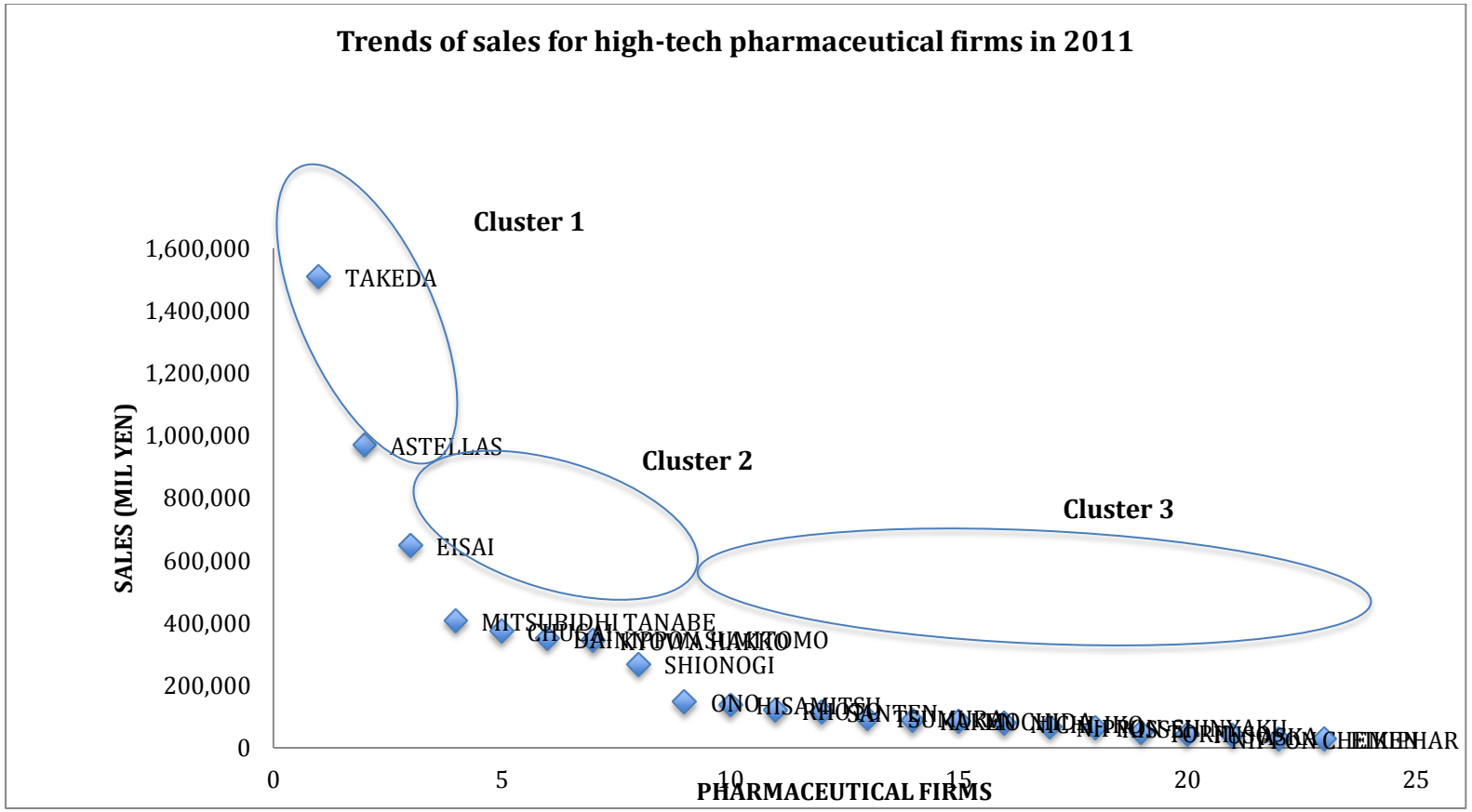
12	4528	145,778	ONO PHARMACEUTICAL CO.,	3569	86,059	SEIREN CO.,
13	4530	137,794	HISAMITSU PHARMACEUTICAL CO., INC.	8114	83,029	DESCENTE,
14	4527	120,292	ROHTO PHARMACEUTICAL CO.,	3501	75,324	Suminoe Textile Co.,
15	4536	114,416	SANTEN PHARMACEUTICAL CO.,	8111	48,641	GOLDWIN INC
17	4540	95,450	TSUMURA & CO.	3001	47,790	Katakura Industries Co.,
18	4521	87,997	KAKEN PHARMACEUTICAL CO.,	3109	45,870	SHIKIBO LTD
19	4534	86,205	Mochida Pharmaceutical	3514	44,004	JAPAN VILENE COMPANY
20	4541	77,740	Nichi-Iko Pharmaceutical	3551	40,325	DYNIC
22	4516	67,304	Nippon Shinyaku Co.,	3580	37,218	KOMATSU SEIREN CO.,
23	4547	64,618	KISSEI PHARMACEUTICAL CO.,	3104	36,282	Fujibo Holdings, Inc.

27	4538	44,358	Fuso Pharmaceutical Industries	3205	29,553	DAIDOH LIMITED
28	4514	40,637	ASKA Pharmaceutical Co.,	3302	24,926	TEIKOKU SEN-1
29	4539	28,513	NIPPON CHEMIPHAR CO.,	8127	22,971	YAMATO INTERNATIONAL INC.
30	4549	27,702	EIKEN CHEMICAL	3529	22,567	ATSUGI CO.,

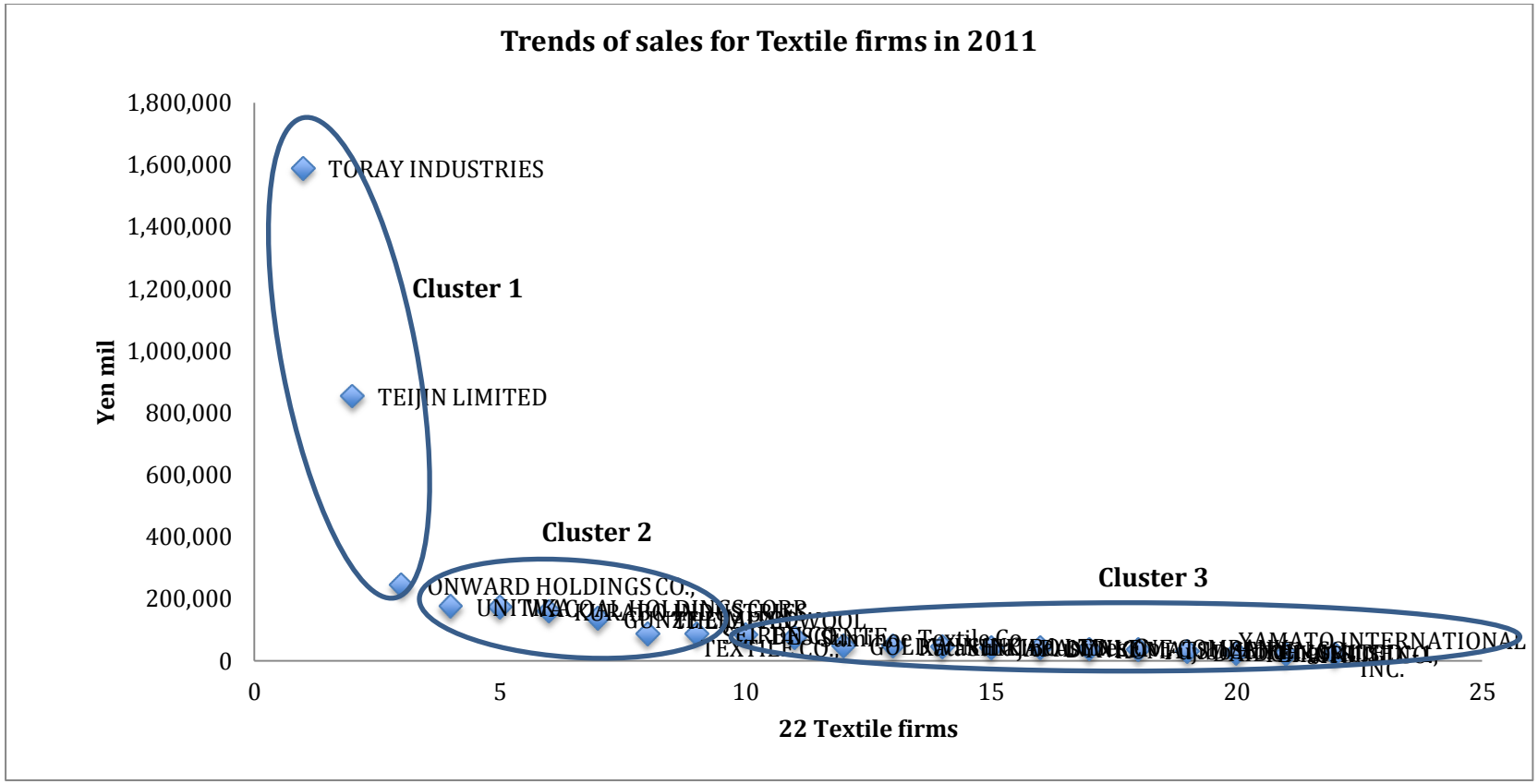
Appendix 4: Description of clusters of high-tech pharmaceutical and low-tech textile firms



High-tech pharmaceutical firms clusters according to their size by R&D



High-tech pharmaceutical firms clusters according to their size by sales



Low-tech textile firms clusters according to their size by sales

Appendix 5: REGRESSION ANALYSIS: High-tech Japanese pharmaceutical firm

Firm name	Ln Z	P ln Z	α	$P\alpha$	β	$P\beta$	$\delta 1$	$P\delta 1$	$\delta 2$	$P\delta 2$	Adj. R^2
Takeda	1.018857643	1.41108E-30	0.034360683	0.000659818	0.984545735	1.23728E-25	0.002474312	0.680723779	-0.006	0.514148671	0.9998
Astellas	-0.133928969	0.427843001	0.071664271	0.609085738	-0.737787611	0.013268077	0.323369068	0.147298616	0.633	0.03232992	0.9093 0
Eisai	1.014993054	1.04642E-32	0.047237049	1.089E-11	0.948920866	1.38393E-31	0.00103973	0.583298595	0.002	0.550904243	0.9999 9
Mitsubishi Tanabe	1.016600417	1.87291E-27	0.040258205	0.000387978	0.959779478	3.2894E-26	-0.013600158	0.049011821	0.016	0.030184969	0.9999 3
Chugai	1.013090664	1.15918E-16	0.046972148	0.328358837	0.95404668	1.60448E-12	0.019648863	0.49518413	-0.001166757	0.957793867	0.9993 3
Dainippon Sumitomo	1.016735527	1.27439E-28	0.044264746	3.17651E-06	0.944288464	5.30643E-25	0.006702483	0.120973608	0.002992469	0.658296035	0.9999 7
Kyowa Hakko	1.050795333	8.22618E-21	-0.01411397	0.659134732	0.993234055	1.50131E-16	-0.004382869	0.755774452	0.014250966	0.568485672	0.9963 4
Shionogi	1.030753416	6.99239E-27	0.058967109	6.56862E-05	0.931458068	1.03E-21	0.004963487	0.657897285	-0.007955445	0.146925245	0.9997 5
Ono	1.022666127	1.90817E-26	-0.011081038	0.217937586	1.027736061	6.38485E-23	-0.002516167	0.776510117	0.006459502	0.390351434	0.9998 8
Hisamitsu	1.044078666	1.22483E-29	0.003038148	0.552094989	1.013922821	1.69E-29	-0.005310553	0.341024486	-0.013351906	0.013038154	0.9999 8
Rhoto	1.038045739	2.73208E-20	0.029814977	0.171791095	0.966187248	3.85366E-21	-0.002103778	0.918594344	0.018658694	0.49676922	0.9993 3
Santen	1.006501115	3.79839E-19	0.023168568	0.344423961	0.954094557	8.60398E-22	-0.011881834	0.603841905	0.006348539	0.670215242	0.9989 6
Tsumura	1.073207826	2.64681E-23	0.044296933	0.512466163	0.893848386	3.19515E-12	0.062145772	0.012857141	-0.027776731	0.508875927	0.9978 8

Kaken	1.045948654	9.92184E-30	0.057249043	2.73418E-06	0.951127362	3.75441E-26	0.032109604	0.000423866	-0.013768037	0.000639302	0.9997 4
Mochida	1.021032139	7.22599E-30	0.041797508	1.41176E-08	0.944909922	5.56561E-25	0.004091044	0.433023585	-0.001433345	0.428880 48	0.9998 2
Nichi-Iko	1.022681554	1.02311E-28	-0.036786738	0.150014934	0.97267027	5.0456E-23	0.001650713	0.902108389	0.068767842	0.023700994	0.9997 9
Nippon Shinyaku	1.016900973	2.61228E-26	0.065171349	0.01592251	0.923408187	1.63837E-19	0.035523615	0.124476831	-0.005488 86	0.503555424	0.9991 0
Kissei	1.044064332	2.58635E-25	-0.010679374	0.423215744	1.006998323	1.38768E-24	0.004597854	0.788989967	0.003793524	0.546304658	0.9995 3
Fuso	1.036221674	2.58789E-26	-0.011202196	0.446294999	1.011101572	2.4215E-24	0.002547682	0.810390201	-0.002401475	0.746567226	0.9994 3
Aska	1.009416385	3.80351E-28	0.016247357	0.281058534	0.962506074	4.10107E-24	0.000214232	0.990172014	0.002437316	0.740841 58	0.9997 6
Nippon Chemiphar	1.007066151	1.83648E-26	0.051182012	0.299847672	0.887418854	3.38334E-17	0.01989239	0.071087295	0.043848289	0.006246681	0.9997 7
Eiken	1.017170541	5.11527E-25	0.022634371	0.026818121	0.910597544	3.19053E-24	0.021962111	0.009037459	0.008133481	0.074559375	0.9994 4

Note**: p** stands for **p value,** $\boldsymbol{lnZ, \alpha, \beta, \delta 1, \delta 2}$ are coefficients of **TFP**, **labour, capital, technology stock and technology spillovers** respectively.

APPENDIX 6: REGRESSION ANALYSIS: Low-tech Japanese textile firms

Firm name	Ln Z	P ln Z	α	$P\alpha$	β	$P\beta$	$\delta 1$	$P\delta 1$	$\delta 2$	$P\delta 2$	Adj. R^2
TORAY	1.080725127	9.22583E-21	-0.018755878	0.212832318	0.922385315	3.67444E-18	0.076747554	0.147166983	-0.027376671	0.514687809	0.998306866
TEIJIN	1.056429007	5.26629E-23	-0.011800908	0.601314821	0.992595131	4.37332E-21	0.152921015	0.030590915	-0.133678855	0.026941109	0.999124869
Onwards Holdings											
UNITIKA	1.114533997	3.98488E-19	-0.009337919	0.712079178	0.985078663	7.35981E-11	0.013953139	0.445115911	-0.053590253	0.081255214	0.996196683
Wacoal Holdings											
KURABO	1.044812912	2.22093E-17	0.059508535	0.005682748	0.966642388	6.60413E-16	0.022070293	0.628723152	0.018671911	0.617802237	0.997907654
GUNZE LTD	1.077796862	3.39337E-21	0.06695393	0.001994378	0.91844907	2.77231E-18	0.000395152	0.969057488	0.007696769	0.733569808	0.996530488
JAPAN WOOL	1.087838477	1.2393E-17	-0.01917316	0.231095302	0.920743813	6.29867E-08	0.009367605	0.146015665	0.038296996	0.356080909	0.996607689
SEIREN	1.067137012	1.20562E-19	0.052139139	0.116416274	0.894203142	3.02267E-16	-0.014585208	0.607438919	0.144971006	0.267132049	0.9975337
Descente											
SUMINOE	1.103291262	9.31748E-17	-0.097026178	0.228438066	1.0840333	1.53134E-08	0.032480876	0.491663773	0.094843831	0.541394698	0.987802873
GOLDWIN INC	1.116554488	2.07228E-12	-0.007512538	0.962054671	0.868830959	7.11097E-10	0.161981391	0.075473993	-0.120110837	0.664322473	0.978739906
Katakura industries											
SHIKIBO	1.096619855	2.78542E-21	-0.091455729	2.47006E-06	1.1013595	6.35344E-18	0.011938891	0.076837222	-0.18987051	0.000264912	0.997911185
JAPAN VILENE	1.091974752	1.00816E-24	0.049301582	0.202330719	1.005511164	8.07595E-14	-0.013117239	0.309608284	0.026690304	0.315962109	0.999004955
DYNIC	1.0877492	4.48216E-24	0.114849868	0.005059908	0.958666191	2.70649E-19	0.011641134	0.0548915	-	0.4073	0.9992796

	95							67	0.020252784	31866	84
KOMATSU S.	1.047041471	1.54455E-26	0.108564926	1.94837E-05	0.94417527	3.59274E-17	0.002648853	0.832514542	-0.040992246	0.055046537	0.999645524
FUJIBO HOLDINGS	1.112195595	1.14902E-13	0.205790944	0.211064398	0.961664725	1.32555E-09	0.112882061	0.214233142	-0.169321694	0.30848451	0.976672947
Daidoh											
TEIKOKU	1.026597571	3.07189E-26	-0.007010332	0.413035788	0.984419511	4.09133E-24	-0.006428661	0.016911918	0.010096839	0.513237777	0.999526684
Yamato											
Atsugi											

Note**: p** stands for **p value,** $\boldsymbol{lnZ, \alpha, \beta, \delta 1, \delta 2}$ are coefficients of **TFP**, **labour, capital, technology stock and technology spillovers** respectively.