

**GROWTH ACCOUNTING OF JAPANESE
ECONOMY, 1990-2005**

*Dissertation submitted to Jawaharlal Nehru University
in partial fulfillment of the requirements
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MASTER OF PHILOSOPHY

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DECLARATION

I declare that the dissertation entitled “**Growth Accounting of Japanese Economy; 1990-2005**” submitted by me in partial fulfilment of the requirements for the award of the degree of **Master of Philosophy** of Jawaharlal Nehru University is my own work. The dissertation has not been submitted for any other degree of this University or any other University.

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CERTIFICATE

We recommend that this dissertation be placed before the examiners for evaluation.

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DECLARATION

I hereby declare that the dissertation titled, **Growth Accounting of Japanese Economy, 1990-2005**, being submitted to the Centre for East Asian Studies, School of International Studies, **Jawaharlal Nehru University**, in partial fulfillment of the requirement for the award of the degree of **Master of Philosophy**, is my own work and has not been previously submitted for any degree of this or any other university to the best of my knowledge.

July²⁰, 2007



Mohd. Faisal

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Dedicated to

My Parents

&

Prof. Moin Uddin

(Director of NIT, Jalandhar, Punjab)

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Preface

As the title of this dissertation "*Growth Accounting of Japanese Economy; 1990-2005*" suggests, it intends to work out sources of Japanese economic growth or contribution of factor inputs, and total factor productivity (TFP) to real gross domestic product (GDP) growth in the period covered by the research. However, in the first twelve years of observation period, Japan had experienced stagnant GDP growth; one point which needs to be mentioned is that research does not assume that there was a high growth or no growth in the aforementioned period. But, instead, research assumes the decade-long less growth in the period, which is also an observed fact of Japanese economy in 1990s. Consistent with this stylized fact, this research attempts to analyse and understand the cause of this less growth and cause of subsequent recovery that started after 2002. To that end, research decomposes GDP growth in its contributing factors and interprets the results in context of Japan's experience during the period. Thus, this research attempts to cover major aspects of Japanese economy of the period, including a brief history of economic miracle of 1960s and other developments, process of bubble boom and the burst, crisis after the bubble burst, problems associated with the crisis and instrumental factor for growth revival. However, main thrust of this research is on the economic factors for growth. Political factors have been referred but have not been dealt with in great detail.

This research follows the guidelines of School of International Studies, JNU, and New Delhi, given in research manual, May 2006 for citation.

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I am also indebted to Prof. Kyoji Fukao of *REITI*, Japan, for providing *EU-KLEMS* database through e-mail.

Glossary of Terminology used in Dissertation

Inputs

The economic resources used in production process.

Output

The final product of the activity of production obtained from the combination of resources such as labour, capital, and technology. This is equal to Gross Domestic Product through Production or Value added method.

Value Added

A measure of production in the same way as is gross output. However, it has the advantage of eliminating double counting. An economy's value added is equal to its gross output (mainly sales) less its intermediate goods. To measure real value added: real intermediate inputs are subtracted from real gross output. It is a measure of GDP.

Labour Input

This measures the services derived from the labour. Labour services are obtained by aggregation of the hours worked by all persons, classified by education and work experience with weights determined by their shares of labour compensation.

Labour share

Labour share is equal to the labour compensation divided by current price output.

Capital Input

This measures the services derived from the stock of physical assets and software. The assets included are fixed business equipment, structures, inventories, and land.

Total Factor productivity (TFP)

TFP indicates the efficiency with which inputs are being used in the production process and it is an important indicator of technological change. In practice, TFP is derived as a residual and includes a host of effects such as improvements in allocative and technical efficiency, and changes in returns to scale and mark-ups and technological change proper. All these effects can be broadly summarised as "improvements in efficiency", as they improve the productivity with which inputs are being used in the production process. In this way TFP captures anything that changes the relation between measured inputs and measured output. To put it in a different way, TFP is defined as the shift in production function frontier and factor accumulation is associated with the movement along this function. The magnitude of shifts is measured by the residual growth rate of output not explained by the weighted growth of real factor inputs.

Labour Productivity

The ratio of output to number of person employed and hours worked in production activities.

Growth Accounting

Growth accounting is way to decompose GDP growth to its contributing factors, namely Capital, Labour, and TFP. In other words Growth accounting is a method whereby economic technique or model is used to determine what specific factor contributes to economic growth of a nation. In order to analyse the growth of Japanese economy during 1990-2005 GDP growth has been decomposed in to contribution of capital labour and TFP to GDP growth. Indeed, it is a useful tool in analysing the growth of a nation.

Glossary of Japanese word Used in Research

Iwato Boom-Refers to an era in which Sun goddess *Amaterasu-Omikami* was lured out of her sullen seclusion cave (Iwato) by a Conclave Deities-Trans.

Jimmu Boom- It was named after first emperor of Japan.

Kyoaran Bukka- It is a high rate of inflation.

Kamikaze-Wind of God.

Keiretsu- Post War business Conglomerates.

Ushinawareta Junen- The time after collapse of Bubble in Japan.

Zaibatsu-Pre War business Conglomerates.

ABBREVIATIONS

ATF-Aggregate Total Factor Productivity.

AREPF-Annual Report on Economy and Public Finance, Japan.

BoJ-Bank of Japan.

BIS- Bank of International Settlements.

DIC-Deposit Insurance Corporation.

EPA- Economic and Planning Agency.

EU-KLEMS- European Union Capital Labour Energy Material Services.

ESRI-Economic and Social Research Institute, Japan

FSA- Financial Service Agency.

GoJ- Government of Japan.

GVA-Gross Value Added.

HLAC-Housing Loan Administration Corporation.

ICT-Information Communication and Technology.

IT-Information and Technology.

MoF-Ministry of Finance.

MITI- Ministry of International Trade and Industry.

METI-Ministry of Economy, Trade and Industry.

NFSF-New Financial Stabilization Fund.

NPLs-Non-Performing Loans.

PCA-Prompt Corrective Action.

REITI-Research Institute of Economy, Trade & Industry

SMEs- Small and Medium Enterprises.

TFP-Total Factor Productivity.

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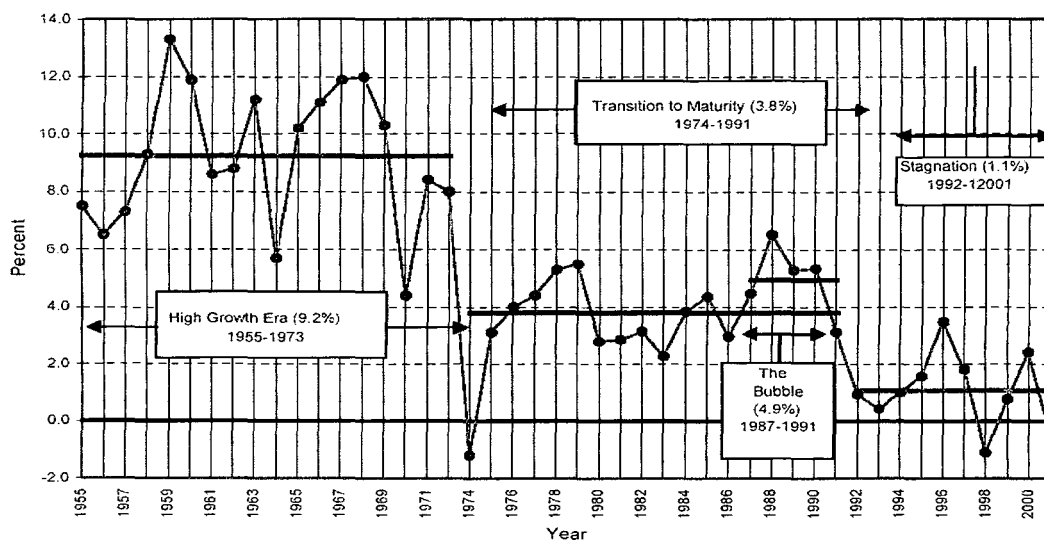
Chapter 1

INTRODUCTION

Research Theme

There has been perceptible rise in the Japanese economy since the cessation of the Second World War and the 1980s. The average growth rate of the real GDP during the period of high growth (1956-1973) was around 10%. The era of high growth ended in the early 1970s, but the growth rate during the period beginning from the mid-1970s to 1980 remained as high as 4.9% on an average. In the late 1980s, when stock and land prices tripled, the Japanese economy enjoyed a boom led by domestic demand. But this economic bubble could not be sustained for long and it burst in early 1991, consequently leading to a slump in the Japanese economy.

Figure 1: Evidence of Decade-Long less GDP Growth



Sources: Cabinet office, ESRI, Japan. Cited in J.Edward Lincoln (2002)

The performance of Japanese economy had become dismal. The growth rate of nominal and real GDP fell from 5.4% to 1.1% within two years from 1990 to 1993 (See figure 1). Around thirty years of economic prosperity and growth Japan had faced its decade long less growth. In a way, in 1990s the state of Japan's economy was sharply different from what it had been two or three decades earlier. However, by any standard, the poor performance of the Japanese economy during the 1990s stands out whether it is falling industrial production, falling factor productivity, retrospective trends of factor of production, namely, capital and labour or decade-

long stagnation. It is evident from the figure 1, Japan's stagnation (lasted more than twelve years) after the bubble burst is much greater than the average while Japan's bubble is only slightly larger than the average. This fact suggests that Japanese economy cannot be explained by the scale of the bubble. It should be explained by the crisis that occurred after the bubble burst and problem associated with crisis, not by the magnitude of the bubble.

The decade long stagnation which started after bursting of bubble can be explained by two theories, namely, the structural factor theory and deflationary gap theory. Whereas the structural factor theory attributes the long lasting stagnation of the economy to the lack or delay in structural adjustment and disposal of NPLs, the deflationary gap theory suggests that deflationary gap was the fundamental reason behind the continuing weak economy, and that monetary policy has been less than optimal in fight against deflation. These textbook explanations are good for theoretical generality; however, they are unable to provide root cause of chronic stagnation of the Japanese economy. However, the economy has begun to show some signs of recovery after 2002. It is believed that Japan in coming years will be able to achieve fully-fledged (recovered) economy.

Therefore, theme of the research would be twofold, to work out contribution of factor inputs and TFP to GDP growth and to reveal root cause of stagnation and to understand subsequent recovery in light of Japan's experiences during 1990-2005.

Hypotheses and Objectives: In light of the above discussion on the state of Japanese economy during the period, research hypothesised that:

- Capital has a greater role in the explanation of growth of Japanese economy.
- Total factor productivity has increased over the period.

Objectives of the Research: The objectives of the research are as follows:

- To examine critically the era of high growth and changes that have taken place after 1970s.
- To work out the contribution of each factor input and TFP in GDP growth during 1990-2004.

- To analyse and understand the bubble burst, the crisis and problem associated with the crisis and their impact on economic growth.
- To quantify the causes of decade-long stagnation of growth.
- To provide an alternative explanation of slowdown of TFP growth.
- To study and understand causes of recent recovery of Japanese economy.

Rationale and Relevance of the Research

As mentioned earlier, during 1990s Japan's economy was sharply different from what it had been two or three decades earlier. Japan in the last decade, after steady catch-up for 35 years, not only stopped catching up but also lost ground relative to the industrial leader. Japan's economic growth rate dropped from 4% in the first half of the 1980s to one percent in the 1990s and beyond. One might, then, reasonably call the Japanese economic situation as 'the great recession' or 'the lost decade'. What went wrong in Japan? Why did Japan face such an economic slump? The answers to such questions have been inadequately traced back, by many economists such as inadequate macroeconomic policies, depressed investment due to over-investment during the bubble period (late 1980s-early 1990s), the lost competitiveness and the 'hollowing out' phenomenon and deflation due to liquidity trap. The supporter of the liquidity trap hypothesis claims that the monetary authority's inability to stimulate investment by lowering interest rate or to stimulate consumer spending by creating inflationary expectations unnecessary prolonged the recovery phase. These arguments are relevant for business cycles; but they do not seem to be capable of accounting for the lost decade of 1990s (Hayashi and Prescott 2002:3). There are two ways of explaining causes of Japan's great recession of 1990s. First is in terms of the demand side and the second is in terms of the supply side. From the viewpoint of growth accounting Japan's low economic growth in the 1990s can be explained by the following two factors. The first factor is a slowdown of the labour supply caused by structural changes, such as population aging and a reduction of the work week. The second factor is the slowdown in total factor of productivity. Many economists take into consideration the first factor as more important of the two.

However, in the previous study, such as Hayashi and Prescott's, the first and second factors have been taken into consideration; but the question of why the TFP growth rate had declined has been left unanswered. Their research does not consider and analyse process of boom and burst of bubble economy, crisis after the bubble burst and problem associated with crisis, for instance, forbearance lending, credit crunch and under-performance of manufacturing sector etc. as responsible factors to slowdown in TFP growth of Japan's economy in 1990s. In other words, previous study does not provide conclusive evidence concerning the role played by process of boom, burst and financial distress in growth slump. The present research attempts to fill up this gap. Firstly, the research calculates the contribution of total factor of productivity and other factor inputs through decomposition of GDP growth under certain assumptions of standard growth accounting framework using the EU-KLEMS database; secondly, analytical and critical approach are applied on available literature and empirical evidences of previous research to find out alternative causes of decline in aggregate TFP growth.

Relevance of the research lies in addressing the questions such as: Why did Japan face such a decade-long slump in economic growth? Secondly, it relates malfunctioning of banks to the slump in economic growth through TFP growth in 1990s. The time period, which has been taken up under observation, encompasses three major economic events in recent economic history of Japan. First is the bubble boom and burst; the second is crisis after the bubble burst and problem associated with it; and finally, the major change in investment pattern led to moderate recovery of growth. It has been admitted by many Japanologists both inside and outside Japan, in fact, it is the period in which Japan's economic policy makers were dictated by the state of economy to design a 'New Japanese Economic Model' in order to revitalize the economy. On account of this background, the present research entitled as "Growth Accounting of Japanese Economy; 1990-2005" argues that it has a relevance in explaining the kink, which lasted more than twelve years, in stable growth curve of Japanese economy. Thus it presents an analysis and understanding of the Japanese economy through supply side by using a growth accounting model based on aggregate production function.

Outline of the Dissertation

The present research consists of six chapters. Chapter 1 introduces the research and has been divided into two sections. First section includes theme of the research, the rationale and relevance of the research, research objectives and the hypotheses. Second section of the chapter gives outline of each chapter.

Chapter 2, entitled as “Japanese Economy in High Growth Era”, explains the Japanese economic growth from 1950s onward. It primarily focuses on the circumstances and factors that enabled Japan to emerge from a war-torn economy to an economic giant. It has six sections. Section 1 explains the economic growth of Japan during each decade; and section 2 considers the Japanese growth policy and role of its government in creating conducive environment to such an eye-opening growth. Section 3 gives an account of saving and investment in 1960s and 1970s and its share as percentage of National Income. Since high rate of household savings and high rate of capital accumulation have been two unique features of Japanese economy in post war period, it explains the role of household and corporate savings in financing investment during the period. It reveals that post war rapid growth was largely financed by the indigenous sources. Section 4 of the chapter explains the Japanese technological progress and productivity performance during 1960s. It has been argued that the imported technology played a decisive role in economic growth led by the manufacturing sector, particularly Iron and Steel industries, in which labour productivity significantly arose after introducing revolving furnace. Last section of the chapter discusses those negative developments during and after 1980s, which are helpful in understanding the state of Japanese economy in subsequent years. It encompasses the high capital output ratio and low return on capital, which reveals the scarcity of profitable investment opportunities, revision of Labour Standard Laws (LSL) and recent problem of demographic transition, that is, the ageing population and its macroeconomic impact in Japanese economy.

Chapter 3, entitled as “Japanese Economy in the Lost Decade”, provides an account of emergence and expansion of bubble, its characteristics and its subsequent bursting, and the aftermath of the crisis. It also discusses the causes of crisis. It is said that bubble in asset prices typically have three distinct phases. The first phase starts with the financial liberalisation or a conscious decision by the central bank to increase

lending or some other similar event. The resulting expansion in credit is accompanied by an increase in the prices for assets such as real estate and stocks. This rise in prices continues for sometime, possibly several years, as the bubble inflates. During the second phase, the bubble bursts and asset prices collapse, often in a short period of time. The third phase is characterised by the default of many firms and other agents that have borrowed to buy assets at inflated prices. Banking crises may follow this wave of defaults. The difficulties associated with the defaults and banking and foreign exchange crises often cause problems in the real sector of the economy, which can last for a number of years. Thus, there is a significant interaction between the financial system and growth (Allen Franklin and Hiroko Oura 2004:16). The Japanese bubble in the real estate and stock markets, which occurred in the 1980s, provides a good example of the phenomenon; first two phases have been discussed in chapter 3 and the last phase in the chapter 4. The chapter takes a schematic look of Japan's experience in the lost decade. It has been divided into six sub-sections. Section one explains paradigms under which an economic bubble might occur. Section two explains emergence and expansion of the economic bubbles. Section 3 identifies the characteristics of the bubble economy. These are identified as substantial rise increase in asset and stock prices, overheating of economic activity and increase in money supply credit. Section 4 describes the bursting of the bubble. Last two sections of the chapter discuss the causes of banking crisis and theoretical explanation of boom and burst process respectively. In short, the chapter presents a detailed analytical explanation of Japan's experiences in the lost decade.

Chapter 4, entitled as "Problem Associated with the Crisis and Other Changes of 1990s" identifies and reviews the problems associated with the crisis after the bubble burst. It has been designed to analyse and understand the causes of slowdown in TFP growth. Further, it also explains the revival of TFP growth arising out of high investment in information and technology (IT) manufacturing and using sector. The negative effect of the burst lasted more than twelve years and affected adversely productivity performance of Japan. Since the collapse of the bubble, Japan faced a chronological failure of banks one by one due to non-payment of their lending by the borrowers. This in turn created a huge amount of bad loan in Japanese banking sector. The second problem is low TFP of debt-ridden and inefficient firms. These firms are recognized as the 'Zombie firms' in terms of their low TFP growth. It is argued that

ever greening¹ of loans to such firms became one of the causes of slowdown in TFP growth at macro level.

Another problem has also emerged from the crisis, that is, the problem of credit crunch. It is also identified as a cause of slowdown in the aggregate TFP growth through unavailability of investment fund causing less output growth. This situation resulted from the increase in bankruptcy of firms, together with fall of the land prices, and increased non-performing loans, which in turn caused the banks to reduce their loans to firms, that is, credit crunch. One important change, which has been proved empirically and also considered to have caused the slowdown in aggregate TFP growth, is slowdown in TFP growth of manufacturing sector. The TFP growth in this sector has been negative in 1990s. The reasons of such trend, in manufacturing sector, are dominated by negative entry and exit effects. However, some signs of improvement in aggregate total factor productivity (ATFP) growth are visible mainly due to rise in investment in use as well as manufacturing of IT goods and services. All these factors have been discussed in detail with empirical evidences of various researches in chapter 4.

Chapter 5 entitled as “Theoretical framework, Methodology, Data Description, Findings and Discussion of Results” explains the theoretical basis of growth accounting model used in the research, and then it explains the assumptions under which the model has been used. Next section of the chapter explains the derivation of the model used to work out the contribution of total factor of productivity (TFP) and other factor inputs. Section 3 of the chapter explains the methodology and data source adopted to work out the values of each variable of the model. Moreover, it explains the each and every step undertaken in computing the weighted values of inputs and factor share in the model. Last section analyses and discusses the results of growth accounting in context of Japanese economy during 1990-2005.

Chapter 6 Concludes first, summarizing the discussion, outlines some policy implications and gives major findings of the research second, it also offers some policy prescriptions.

¹ Continuing loans to inefficient and debt ridden companies.

Research is largely dictated by unavailability of data. Due to unavailability of data on factor inputs until 2005, the research findings cover, at its best, time period from 1990 to 2004. Given this limitation, the study has used “Annual Report on Japanese Economy and Public Finance” published by Cabinet Office, Japan, to review state of Japanese economy and bring to date the research work.

Chapter 2

Japanese Economy in High Growth Era

Introduction

Japan's reconstruction of its nation to become one of the greatest economic powers in less than 40 years, after the defeat in the World War II, has been remarkable in modern economic history. The industrialization and modernization that made rapid growth possible stretch back to the 19th century. It is often identified with the Meiji restoration of 1868². In fact, the roots of economic success can be traced back even farther to factors, for instance, the high literacy rate prevailing at the time of the restoration. Therefore, contemporary development of the Japanese economy illustrates its adaptability and the participation of government dexterity in making Japan the second largest economy in the world today.

The present chapter gives a detailed historical account of growth of Japanese economy, which is designed to show the position of Japan as an economic superpower, before the lost decade in order that Japan's experience in lost decade of 1990s could be analysed properly.

Dynamics of Japan's Growth

Japan's growth experience can be divided into three sub-periods: the 1950s, the 1960s and the 1970s-1990s. The 1950s was the decade in preparation for rapid growth, the 1960s was a decade of true rapid growth or take-off period, and 1970s-1990s was a period of steady growth.

The 1950s: Recovery

The Second World War gave severe set back to Japan due to its involvement in the war. Consequently, the Japanese population was near starvation. However, during the occupation under SCAP³, new institutional apparatuses for democratising the Japanese economy were established. The economic democratisation program

² An event, which initiated the creation of modern political nation-state.

³ Supreme commander of Allied Powers.

included farm-land reform, liberalisation of labour movements and anti-monopoly policy, including the dissolution of *Zaibatsu* (pre-war family-owned business conglomerates), division of big business, breaking up of cartel organisations, and enactment of the Anti-monopoly Law (Ukesa M. and H. Ide 1999). These de-concentration measures formed the groundwork for Japan's postwar economic development. However, immediately after the war inflation was rampant. The three digit inflation was controlled only after a package of drastic emergency measures known as the Dodge Plan⁴ (1949) under which Joseph Dodge introduced three basic policies (Takada Masahiro 1999). First was a balanced budget. The second was the suspension of new loans from finance banks under the name of reconstruction. The third was reduction and abolition of subsidies. The main objective of these three policies was to stop inflation by tightening the fiscal budget so that the government would not need to print money in order to finance its spending. At that point of time the exchange rate was set at \$ 1 = Yen 360 and various other steps were also taken to encourage exports (Ito Takatoshi 1999). It is said that through the Dodge Plan only Japan returned to the world market and revived its free economy. The early phase of the Dodge Plan caused Japan to enter into recession, thereby increasing the labour unrest, and a full-scale depression was feared.

The outbreak of the Korean War produced a sudden change in the situation. Japan became a decisive and important supply base. As orders were concentrated on special procurements and munitions, exports grew rapidly along with the worldwide military expansion. Markets boomed, inventory backlog were sold out and mining and manufacturing production also grew at a fast pace and accounted for an increase of approximately 50% in the year after the war began. The balance of payments improved, capital became plentiful and profits rose as well. In conjunction with the outbreak of the Korean War, prosperity came to call on the Japanese economy as economic activity suddenly expanded. The Korean War was hailed as 'wind of the god' (*Kamikaze*). This is because this boom was created by the huge supply of war material owing to American military force's orders (Kosai Yutaka 1986).

⁴ Dodge Plan (1949) named after Joseph Dodge, who headed the fiscal department of the U.S military government in occupied Germany

By the third year of the Korean conflict, standard of living in Japan had been improved amazingly. A 14% improvement in consumption levels was noticed. As production and exports levelled off with the abatement of war boom, consumers' purchasing power sustained the prosperity. The White Paper of that time termed it as a 'consumption boom'. Indeed it was actually an explosion of consumer demand. In short, it was, in one respect, supported by such increases in mass purchasing power. In addition to it, the Korean War had increased investment in capital goods and technological innovation. Due to such rapid increase in production as well as consumption in the economy as a whole, full recovery and stabilization was obviously achieved. After the Korean War, Japanese industry was preparing for its take off in the economic growth by filling up the technical gaps that developed between Japan and other advanced industrial countries during and after the War (Kosai Yutaka 1986).

Apart from the Korean War boom, there are two additional factors that helped Japan achieve post-war recovery and put Japanese economy on a rapid growth path. Firstly, the Prime Minister Yoshida Shigeru developed a policy to achieve recovery; it is known as the Yoshida Doctrine that he developed during the early stage of the Korean War. It was primarily aimed to set economic reconstruction and development as the nation's immediate goals while saving on military expenses by leaving defence to the U.S. army. The substantial reduction on military spending has allowed Japan to allocate and direct all its resources solely on reconstructing the economy, and it was proved very influential in achieving rapid recovery after the defeat (Takada Masahiro 1999). Thus, the American government, under the aegis of the Supreme Commander of the Allied Powers (SCAP), played a crucial role in Japan's initial economic recovery. In a way, one might say that shifting of commercial burdens of wartime expenses towards U.S, Dodge Plan to combat inflation, supply under Special Military Procurement to American forces during the Korean War, and the United States' back up to Japan to be admitted to GATT as a 'temporary member', despite British opposition are some of the major contributions from the United States side to Japan's recovery.

Secondly, the Prime Minister Ikeda Hayato, who is "...the single most important individual architect of the Japanese economic miracle..." pursued a policy of heavy industrialisation. This policy led to the emergence of over-loaning in which

the Bank of Japan issued loans to city banks which in turn issued loans to the industrial conglomerates. The system of over-lending, which was combined with the government's relaxation of anti-monopoly laws (a remnant of SCAP control), led also to the re-emergence of conglomerate groups called keiretsu that mirrored the wartime conglomerates, or *zaibatsu*. *Keiretsu* efficiently allocated resources and became internationally competitive. Under the stewardship of Prime Minister Ikeda, Japanese government also undertook an ambitious 'income-doubling plan', which was aimed to move towards a conspicuous increase in national standard of living and the achievement of full employment in order that maximal stable growth of the economy could be achieved. In this plan the private sector was given utmost importance that sought economic rationality through free business enterprises and the market mechanism. In order to make and provide an environment which is conducive to rapid growth, Ikeda lowered interest rates and taxes to private players to motivate spending. In table given in *appendix 1*, the targeted growth rate and achieved growth rate under Ikeda's income doubling plan within ten years is depicted (Kosai Yutaka 1986). One can easily observe the difference between the two growth rates in which the actual growth rate had always remained high to targeted growth rate. This plan has contributed greatly to Japan's rapid growth with an average growth rate of 10.8% in the late 1960s and drove the economy to become the second largest in the world by the year 1968.

The 1960s: Economic Miracle

During the 1960s, Japan's economy grew at a rapid pace, exceeding 10% per annum. It took everyone by surprise. This rapid economic growth was supported by: (i) expansion of capital investment in the private sector, which was backed by a high rate of personal savings; (ii) abundant supply of high-quality labour supported by high population growth and (iii) growth in productivity driven by adopting and improving foreign technologies. Since the late 1960s Japan's economic growth accelerated and was accompanied by large trade surpluses. Table 1 given on next page, shows the real gross national income growth rate from 1960 to 1969. One can easily observe that Japan's growth in 1960s has been 10% on an average, and this high rate of growth was sustained for nearly 20 years (Ito Takatoshi 1992). A significant change occurred in 1960s, that is, the flow of labour force from rural agriculture sector to urban

modern industries. During the period the agriculture labour force declined from 14 million in 1960 to 8.4 million in 1970. The high movement of labour force suggests that not only teenagers but also grown up farmers would have left farming and shifted towards urban industries. This relative movement of retaining and relocating farmers for new jobs was great assistance in labour shortage industries of that time (Kazuo Sato 2004).

Table 1: Real Gross National Income Growth Rate; 1960-1969

Calendar Year	Real GDP Growth %
1960	13.6
1961	11.9
1962	8.9
1963	8.4
1964	11.6
1965	5.9
1966	10.7
1967	11.1
1968	12.8
1969	12.5

Source: Economic Planning Agency, 1988

The demand for producer goods also grew rapidly throughout the decade and many firms adopted new technologies from the western nations at cheap rate. Japanese technology imports were given in a big spurt. Such improvement and innovation kept profit level high, thereby keeping propensity to investment high. A significant improvement among small firms was also noticed in terms of their productivity; they discontinued the practice of buying old machinery from large firms, and improved their productivity by acquiring old techniques of production, which had become obsolete for large firms (Kazuo Sato 2004). Thus, not only large firms but also small firms adopted advanced technology, though a little later.

In short, since mid-1950s the Japanese economy had been running flat-out on the path of rapid growth. Booms such as the “*Jimmu*”⁵ (1956-57) and the “*Iwato*”⁶ (1959-61) arose in the course of that process (Kosai Yutaka 1986). The rapid growth process was the Japanese economy’s ‘historical period of ascendancy’. In other words,

⁵ It was named after first emperor of Japan.

⁶ Referred to an era, in which sun goddess Amaterasu-Omikami was lured out of her sullen seclusion cave (Iwato) by a conclave of Deities-Trans

it was a mechanism whereby investment called forth more investment, and it was made manifest in industry's technological revolution, the consumer revolution, wholesale production shift, the achievement of full employment and so on.

The 1970-90: Sustainable Average Growth

The transition from rapid growth to steady growth started at the end of the 1960s. The rapid growth ended because of the factors, which had stimulated the growth in 1960s, ceased to work in 1970s. The first factor, which was the ample labour supply to industry, reduced sharply; nevertheless, there was a strong demand for labour in the market due to tight labour market (Kazuo Sato 2004). As the labour market turned tighter due to shortage of supply of labour, firms started substituting capital for labour, thereby resulting in the rise of capital-output ratio. The return on capital started diminishing, which in turn depressed new investment in the economy. Thus shortage of labour supply reduced output and slower growth by depressing investment in early 1970s. In August 1971, the United States of America's President Nixon suspended the gold convertibility of the dollar. After the adjustment period, which was provided by the Smithsonian regime from December 1971 to February 1973, the major currencies began to float in the spring of 1973. Since Japan's government and private sector had been accustomed to the fixed exchange rate, the transition took sometime. However, the revaluation of Yen was strongly opposed by business community and politicians in Japan due its adverse impact on the economy through fear of losing competitiveness in exporting industries.

Another major event of 1970s was the oil embargo, which was announced and imposed by the Organization of Petroleum Exporting Countries (OPEC), in October 1973. As a result of it, inflation took off. Inflationary expectations made the situation worse. 'Wild inflation'⁷ reached 30 % in 1976. Japan's GNP growth rate in first oil crisis has been shown in the table given below. It is evident from the table that the growth rate of GNP which was 4.3% in 1971 and 8.5% in 1972 had become negative (-1.4) in 1974.(see table 2) This was due to first oil shock that Japan experienced in early 1970s, which was caused by external factors altogether. Table 2 also shows the trend of inflation and money supply during first oil crisis. It can be noticed from the

⁷ It is known as "*Kyoaran Bukka*" in Japanese language. It is a very high rate of inflation.

table that the rate of inflation, which had been going on around -0.8% in 1971, reached its peak in 1974. It shot up to 31.6% while money supply, which was around 24.3%, had also fallen to 11.5% in the same period (Ito Takatoshi 1992). It took several years for Japan to reallocate resources from unconditionally growth-oriented sectors to energy-conservation and pollution-control sectors. Thus rapid growth period ended with the first oil shock during 1973-1974.

Table 2: Japan in First Oil Crises

Year	GNP Growth	Inflation	Money supply
1971	4.3	-0.8	24.3
1972	8.5	0.8	24.7
1973	7.9	15.7	16.8
1974	-1.4	31.6	11.5
1975	2.7	3.0	14.5
1976	4.8	5.0	13.5

Sources: Takatoshi Ito (1992:70)

However, in the second oil crisis Japan was able to manage the inflation. This is because by the time of the second oil crisis (1979-1980), Japan's monetary policy had become more prudent, and the inflation rate was not greatly affected. It is evident from the table 3 given below.

Table 3: Japan in Second Oil Crises, 1979-80

YEAR	REAL GROWTH RATE OF GDP (%)	INFLATION (%)
1977	4.4	8.1
1978	5.3	4.2
1979	5.5	3.7
1980	2.8	7.7
1981	2.8	4.9

Source: Economic and Social Research Institute, Japan

It can be seen easily from the table that even after second oil crisis Japanese GDP growth rate remained stable from 1977 to 1979, and showed an increment of 1%. In comparison with the first oil crisis, Japan had been capable of managing the second external oil shock more prudently. As can be seen from the table 3, in the second oil crisis inflation rate had shown declining trend. This is because Japan adopted tighter monetary and fiscal policies that had been successful up to a large extent in shifting to an energy-saving industrial structure and in producing energy-saving goods and

services. Therefore, Japan was able to absorb the rise in oil prices with comparative ease by introducing and implementing stringent policies for a short period of time.

Consequently, Japan was able to achieve better performance than other major countries and strengthen its international competitiveness. On the other hand, following the second oil crisis in 1978, efforts were made to change Japan's industrial structure from 'energy-dependent' to 'energy-saving', enabling Japan to successfully overcome inflation (Edward Lincoln 1988). Japanese producers and investors suddenly became aware of the limits of the world's natural resources and of Japan's vulnerability as an importer of raw materials. Since expected future earnings fell, investment demand also fell. The decline in investment lowered current aggregate demand as well as future capacity, and slowed the rate of adopting advanced imported technology.

Therefore, the events of 1973 and 1974 are important in order to understand subsequent economic developments in Japan. In other words, these two shocks included a variety of symbolic and real events that heralded an era of lower economic growth. Firstly, the problem was far extensive than just the oil crisis of October 1973. The economy was overheated and inflation was building early in 1973; prices for imports other than oil were also rising; and the government provided too much monetary stimulus (see table 2). Secondly, the monetary and fiscal policy actions taken in 1971 and 1972, which helped feed the inflationary burst of 1973 and 1974, demonstrated that the economy had already started undergoing a long-term structural change, and growth potential was declining. Thus, the effort to sustain the high growth of demand generated high inflation rather than the smooth decline in growth; the pattern was a bubble of inflation followed by recession.

From 1974 to 1985 Japan suffered no more recession, nevertheless, the economic growth was far slower than before. The average annual growth for the entire period (after oil shocks) was 4.3%; it was less than half of the rate that prevailed in the previous twenty years. Since 1974 the share of growth due to the expansion of net exports of goods and services has often been high, as shown in table 4 given on the next page. Despite the small share of GNP accounted for by exports and imports, net exports accounted for nearly 40% of growth. By the 1986 the effect

of Yen appreciation became so strong that net exports began contracting, putting a drag on the economy (Ito Takatoshi 1992).

In the late 1980s, a 70% appreciation of Yen's value against the US dollar helped narrow Japan's trade surplus by 19% for two consecutive years in 1988-89 and

Table 4: GNP Growth after Two Oil Shocks

Year	Real GNP Yen (Trillion)	GNP Growth %	% point of GNP growth due to Net export.	Share of GNP growth due to net exports.
1981	248.7	3.7	1.5	40.9
1982	256.4	3.1	0.3	9.7
1983	264.7	3.2	1.5	46.3
1984	278.1	5.1	1.3	25.7
1985	291.2	4.7	1.0	21.2

Sources: Economic Planning Agency, Annual Report on National Accounts, 1987. Cited in Ito Takatoshi (1992)

1989-90. It was accompanied by the low rate of unemployment as well as strong growth in consumer spending and private investment, thereby contributing to a healthy 5% annual growth rate in the GNP between 1987 and 1990. The boom ended in April 1991 with the collapse of bubble economy and Japanese economy plunged into recession. It was called Heisei recession. Some economists characterized it as a compounded recession in terms of its impact. It not only depressed real side but also financial side of the economy. The period that followed, 1991 to 2003, was characterized by very low to stagnant growth, and three dips into recession. A spurt of recovery to 5% in 1996 was cut short by the Asian financial crisis, and Japan saw its first recession year in 1974 when GDP had declined 1% in 1998. Recovery from the Asian financial crisis was itself cut short in 2001, because of the onset of a global slowdown and the aftershocks of the 11th September 2001 terrorist attacks on the United States. Thus, the last decade of the century has been characterised as the lost decade in terms of economic growth, and has paramount significance in the recent economic history of Japan. Japan's experience in the lost decade and problem associated with the crisis have been analysed in detail in the next two chapters of the research.

Japanese Post War Growth Planning

Although rapid economic growth was produced primarily by the efforts of Japanese themselves, this is not to say that the economic policies and planning had no role in the process of revival. In 1955 Economic Planning Agency (EPA) announced five year plans setting targets for the growth rate of the GNP and for its demand components. Moreover, actual growth outpaced each of the EPA's plans until the first oil shock. In table of *appendix 2*, post war economic plans under different administration are given (Ito Takatoshi 1992). In the beginning of planning period specific industries were targeted mainly because of their importance for Japan's overall economic growth. The industries targeted in order to obtain the government's support were synthetic fibers, plastic, petroleum refining, petrochemicals, automobiles, electronics, and several machinery industries. During the 1950s and the 1960s, targeted industries received favourable allocation of foreign exchange and subsidized loans through government agencies. The main purpose of industrial policy in those years was to identify 'sunrise' industries and nurture them first. For instance, the First Iron and Steel Rationalization Plan (1951-1954) called for the investment of 63 billion Yen. The actual investment amounted to 120 billion Yen. A huge amount of government subsidies were provided and output of all industries was used extensively on the public works. During the Second Rationalization Plan, there was a fixed investment (over 8 years) of 500 billion Yen. As a result, the demand for consumer durable goods had increased and funds for investment were available through commercial loans from the private sector banks (Kosai Yutaka 1986). One of the major tools of Japanese industrial policy was the allocation of foreign reserves for the purchase of capital equipment and raw materials. In order to enforce these policies, known as the Priority Production Formula, the government enacted the Foreign Exchange Control Law, controlled imports of raw materials and foreign technologies by requiring special permits, and established publicly owned financial intermediaries.⁸ All this was carried out under the slogan of 'solving starvation and reconstructing a production mechanism' (Ukesa M. and H.Ide 1999).

⁸ The Reconstruction Finance Corporation in 1947, the Japan Export-Import Bank in 1950 and the Japan Development Bank in 1951 are some examples.

In addition to these policies and economic planning set forth by leaders of the country, the role of Ministry of International Trade and Industry (MITI)⁹, which was regarded as the most powerful government organization during the time of rapid expansion, was mostly responsible for the industrial growth; it supplied administrative guidance to regulate the speed of investment in order to avert excessive competition due to 'overcapacity' arising out of trade surplus and abundant private domestic funds. These policies were generally effective. MITI distributed new technologies also to domestic companies to promote even growth within industries. During high growth era, growth policy pursued by the Japanese government, in essence, has been highly pro-business. The measures adopted in monetary, fiscal, industrial, and balance-of-payments fields all helped big businesses to grow fast (Kazuo Sato 2002). In this process, the government and the business community were in cahoots with each other. They demonstrated 'you scratch my back and I'll scratch yours' kind of attitude and mentality in order to help each other.

Saving-Investment and Growth

Theoretically, macroeconomic balance between saving and investment and promoting growth over time is crucial in maintaining an economy's equilibrium at any given point of time. In order to sustain economic growth, a balance between supply of saving and investment demand is required. High potential growth can only be realized if the economy is able to mobilize adequate supply of (fund) saving or reducing the investment demand. Japan has been able to show its ability to mobilise large proportion of national saving towards capital formation. The dramatic high growth of 1960s caused a steady rise in the saving ratio as the demand for investment steadily increased. This, in turn, endogenously financed growth of the economy. Table 5 given below depicts the saving and investment as a percentage of national income during 1950-74. In the rapid growth period of the 1960s and early 1970s, national saving was nearly 25% of GDP. Correspondingly, the growth rate was also high around 10% per year. The saving ratio begins to decline in the late 1970s in response to slower economic growth (Sato Kazuo 1987).

This causality illustrates the interaction among saving, investment and economic growth. Had the saving ratio not been rapidly increased after World War II,

⁹ MITI has been converted in to METI since 2002.

Japan's remarkable post-war economic growth would not have been achieved. The high level of household saving, which was needed to expand the productive capacity of the economy, was made available through the rapid increase in household income.

Table 5: Saving and Investment as % of National Income

Year	Gross National Investment	Gross National Saving
1950-54	24.6	26.1
1955-59	29.3	29.4
1960-64	38.4	37.7
1965-69	35.7	36.5
1970-74	38.7	39.6

Sources: Sato Kazuo (1987)

If we look at the sources or composition of savings, household saving broadly comprises savings from labour income, saving from capital income and saving from transfer income. Labour income is the total of wages and salary-less employee's contribution to social security; capital income incorporates proprietor's income and property income; and transfer income includes transfer payments such as social security benefits, social assistance grants, employers' contributions to private pension funds, and imputed rent etc. The composition of household saving of Japan is shown in given table of *appendix 3*. According to the table given in *appendix 3*, the proportion of employers' contributions to private pension funds has greater share and followed by equal share of labour income and capital income (Sato Kazuo 1987). In Japan households' financial savings covers bank deposits, postal savings, and life insurance policies, therefore household sector has been an important source of fund for the rest of the economy.

Many authors have cited 'tradition', 'culture' or 'national character' as one of the explanations of Japan's high household saving rate. The most common argument is that the proclivity of the Japanese people for hard work and saving is due, by and large, to their Confucian heritage and ideals of diligence, frugality and virtues. Such ethos might be traced back to the Tokugawa period (1603-1868); but one might find that it was shaped not only by Confucianism but also by Buddhism, Shintoism and Christianity. It is believed that Japanese high household saving rate was also a result of bonus system, whereby large sum bonuses were paid to workers twice a year as a part of their compensation (Horioka C.Y 1990). Japanese government has also engaged in variety of activities designed to promote saving. Government established

various channels to promote saving during post-war, for instance, the Central Council for Saving Promotion (1952), the Savings Promotion Department of the Bank of Japan (1946), and the Savings Promotion Centre of the Ministry of Finance (1957).

High ratio of investment/GDP: After the Second World War Japanese government adopted low interest rate policy and placed ceilings on loans rates. As a result of this, a strong demand for investment fund emerged from private sector in the 1960s, and demand for fund exceeded from supply of funds at prevailing loan leading the financial institution to engage in the process of credit rationing (Kazumasa and Hamada 1980). Table given below shows average value of the ratio of investment to GDP growth rate of non-financial corporate sector and the entire economy. For the entire economy, it is noticed that business investment continued to depicts a constant share in 1970-74 for the 1960s, despite a fall in the growth rate. Since 1975, both the growth rate and the capital formation proportion have declined to lower levels (Sato Kazuo 1987).

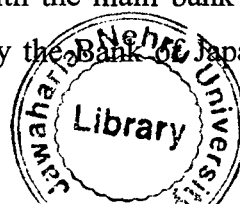
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Table 6: Investment/GDP ratio and Growth rate

Year	Investment/GDP ratio	Growth rate of NFS*	Growth rate of Economy
1960-1964	-	.194	.124
1965-1969	-	.180	.116
1970-1979	.335	.189	.081
1980-1983	.251	.153	.051

Sources: EPA's annual report on National Income Statistics, 1987. Cited in Sato Kazuo 1987
*Non-Financial Sector.

Thus, the period between 1960 and 1975 was a profit-cum-income led growth. In this period, savings from the corporate sector and household sector was high. According to Uemera Hiroyasu (2000), both saving rates, saving from profit and from wages, were high during 1963-1971, and investment was very sensitive to both the profit rate and capacity utilization. The high saving ratio was the very characteristics for the 1960s. It suggests that the rise in profit share leads to an increase in excess demand because of the high sensitivity of investment to the profit rate. Therefore, the growth pattern during 1960-75 can be characterized as 'profit led growth'. All this could become possible because of high availability of capital in the form of indirect financing by banks. In particular, big companies were privileged and enjoyed access to funds by utilizing their strong connection with the main bank called as 'Kieretsu Financing'. Kieretsu financing was supported by the Bank of Japan that gave equal



finance opportunities to each main bank. But in the period of 1976-95, both saving rates (profit and wage) became little lower than those in the previous period, and the sensitivity of the accumulation rate to profit rate decreased to a relatively low level. This was because Japan began to experience some adverse changes in terms of utilization of fund, emerging from profit and wage income, such as Zaitech activities and speculative activities in 1980s.

Technological catch-up and Productivity Performance

Japanese economy is a high-tech economy. Its rapid growth, whose nucleus was technological catch-up, had major impact on its present industrial structure and finance. Japan is a classic example of industrialization based on borrowed technology. From the very beginning of its modern economic growth until now, manufacturing depended heavily on advanced technology borrowed from abroad. Importing foreign technology was a way for Japan to catch up with the rest of the industrialized nations. The best documented source of technological advance has been Japan's extensive purchase of foreign technology through patent and license agreements, combined with complementary research and development by Japanese firms, and an eventual diffusion domestically. Peck and Tamura's excellent study points out that Japan's research and development (R & D) efforts differed from those in western nations. Japanese R & D focuses on commercial application and economic pay-off rather than basic science, space exploration, defence or other national goals; it relies heavily on technological search, import and on R & D expenditure by private industry. Its active government policy was to encourage the terms of technology flow, especially, controls over technology imports until the late 1960s. However, there is no doubt at all that technological innovations were foreign in source, since Japan's ground-breaking role and commanding international market position in shipbuilding, especially, of very large tankers and other bulk cargo ships-attests (Patrick, H.1977). Nowadays Western engineers and scientist seem keen to learn from wonder of Japanese technology. Eleanor Westney rightly explains it:

"Emulation produces innovation', generating technological systems different from, and in some respects superior to, the models on which they were once based. It is in this process of acquiring, reproducing and ultimately improving on imported techniques which concerns present-day development economists seeking to analyse the creation of indigenous technological capacity" (Westney, E. 1987:224).

Indeed, during 1955 to 1972, the Japanese economy enjoyed an average growth rate of 10% due to extremely high investment and very rapid technological progress. The leading sector was manufacturing industry. During the post-war time a kind of virtuous circle prevailed in the economy, consequently, firms invested a huge amount of fund in consumer goods industry due to high demand of consumer durable goods. This high level of investment brought new technology in the industry and economy as a whole. Introduction of new technologies and large scale of production significantly reduced prices. This, in turn, enhanced real income in the economy, leading both the household income and corporate income through two different channels, that is, wage income and corporate profit. The metabolism of introducing new technology worked through explosion of demand for consumer durable goods. Higher income and lower prices, in turn, boosted demand, especially, the demand for new consumer durable such as refrigerators, washing machines and television sets etc. High demand of consumer durable goods produced high demand for intermediated goods or raw materials. High demand of final goods and intermediate goods in the economy raised propensity of the potential investor to invest. This, in turn, encouraged firms to introduce more advanced technologies in production process to meet increasing demand of the economy (Yoshikawa Hiroshi 2000). Thus, force behind working of virtuous circle was high demand in the economy and this high demand was sustained by flow of population from rural areas to urban areas during high growth period.

However, Iron and Steel industry of Japan was leading sector in introducing advanced imported technology in the 1950s. Modernization in this sector began with the improvement of rolling technology. About 70% of the new equipment introduced in the late 1950s was imported and played a crucial role in modernization of Japan's manufacturing industry. The introduction of revolving furnace¹⁰ is regarded as a very important breakthrough. The introduction of the rolling technology doubled the labour productivity in the 1960s. Table given in *appendix 4*, depicts the increment in the labour productivity after introduction of new technology. Table reveals that the labour productivity had become almost double after the introduction of revolving technology;

¹⁰ This technology had been imported from Austria.

it was around 0.16 in 1970, and after the introduction of new technology, it became around 0.34. It is evident from the example of Iron and Steel industry that the technological progress was the key to the industrial growth, in other words, economic growth. It played a decisive role in Japan's growth in the 1950s and 1960s. The very important factor which made possible the introduction of new techniques in production was the strong prospects of high demand. It would not have been possible for the firms to invest and explore new technology, if buoyant demand had not existed.

Therefore, during the high growth era Japanese entrepreneurs were not only able to decipher safe investment opportunities and technology availability but also demand for their products. The technical progress in the electrical machinery industry during the period also played very important role. The integrated circuit (IC) industry is the perfect example of catching-up with the West. In the 1980s, Japan overtook the United States of America as world leader in IC production; it secured 55 percent of the world market of 64 K DRAM in 1982, whereas the United States 40%. In 1988, the two players' shares in the 1M DRAM market had become a total of 95%. Along with the IC producers, the Japanese IC equipment manufactures grew very rapidly during this period. In Japan, during 1975-85, a major source of demand for machinery was exports. This is evident from the figure of the contribution of net exports to the 10% growth recorded in 1955-70 was about zero, while it contributed 1% to 4% growth in 1975-85 (Ibid, 2000:40). Technical progress was, thus, key to industrial growth, confirmed time to time by the standard growth accounting exercises.

In fact, Japan fairly showed a well behaved trend in resources allocations and productivity. The contribution of labour, capital and total factor productivity, which is also known as technological progress, are shared out an average into 21% 63% and 16% during the period (see table 7). Before the oil crises, the contribution of TFP growth was higher than 25%, while it was negligible after the oil crisis in 1972. Even during the period 1960-72, the contribution of productivity growth reached up to 26% on average. During the same period, the contributions of capital and labour inputs were 56% and 18%, respectively. On the other hand, after oil crises, the contribution of capital input increased rapidly by 73%, and that of productivity (TFP) decreased by about 20% (Koji Nomura and Masahiro Kuroda 2000).

Table 7: Sources of Growth -Decomposition of GDP

Period	Value Added (GDP)	Contribution of Labour	Contribution of Capital	Total Factor Productivity (TFP)
1960-65	10.126 (100)%	1.819 (18)%	5.688 (56)%	2.619
1965-70	11.790 (100)%	1.956 (17)%	5.260 (44)%	4.575
1970-75	5.009 (100)%	.687 (14)%	6.402 (128)%	-2.080
1975-80	4.277 (100)%	1.780 (42)%	2.516 (59)%	-0.019
1980-85	3.795 (100)%	1.130 (30)%	1.975 (52)%	0.690
1985-90	4.629 (100)%	1.311 (28)%	2.409 (52)%	0.909
1990-92	2.349 (100)%	-0.326 (-14)%	2.842 (121)%	-0.167

Sources: Masahiro and Nomura (2000)

Thus, TFP declined around 16%, from its earlier average of 26%, before the oil crises. This decline in productivity tends to suggest Japan's failure in maintaining pace under new era of globalization.

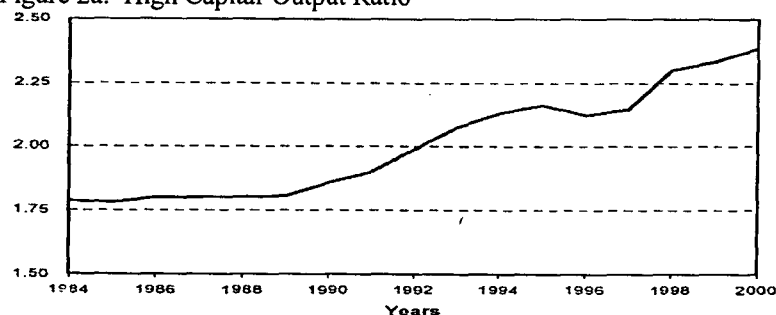
Other developments in Japanese economy since 1980

After catching up with the Western nations in the decades of 1960s and 1970s, Japanese economy achieved steady growth in late seventies. Thenceforwards, there are some developments which have taken place and consistently affecting Japan's actual and potential productive capacity. These are as follows:

Falling Return on Capital & High Capital Output Ratio

There are empirical evidences which suggest that mid-eighties onwards capital started deepening as the rate of return on capital started falling. This tends to suggest that more and more capital was required to produce given level of output in a year; therefore the return on invested capital started declining (see figure 2a).

Figure 2a: High Capital-Output Ratio

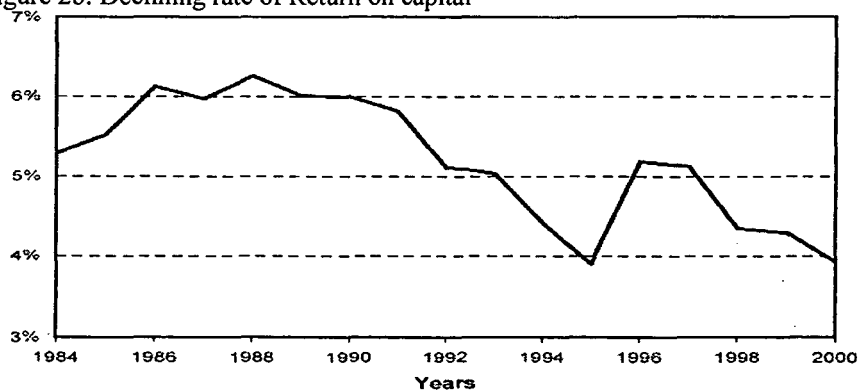


Source: Hayashi and Prescott, (2002:8)

The vertical axis measures capital output ratio which is measured by dividing aggregate output to capital used. It is a measure of capital intensity. The figure 2a

reveals a significant capital deepening. The capital output ratio was around 1.75 in 1988; it rose up to 2.00 in 1998. Further capital output ratio increasing by nearly 30% from 1.86 at the beginning of 1990 to 2.39 in 2000. Associated with the capital deepening, there was decline in the after tax (net return) return on capital as depicted in the figure 2b given below. It declined from 6.1% from late 1980 to 4.2% in the late 1990s. On account of this, Hayashi and Prescott maintain that as the output growth falls, capital output ratio rises because of the association between capital output ratio and lower productivity, growth is higher. They suggest that under diminishing returns to capital, the output ratio must be higher. According to them, under steady state with lower productivity growth, the consumption growth would be lower, which means that rate of return from capital is lower (Hayashi and Prescott 2002).

Figure 2b: Declining rate of Return on capital



Sources: Hayashi and Prescott (2002:8)

There is ample evidence of declined rate of return on capital suggesting presence of scarcity of profitable investment opportunity. As documented in table of *appendix 4a*, accounting data also suggest that before-tax net returns on capital declined substantially in the 1990s. Net returns on capital ranged from around 6% to 8% in the 1980s, while they were reduced to about 3% in 1995, and it reached even below 2% in 1999. Scarcity of profitable investment opportunities also shows up in aggregate statistics (Nishimura Kyohiko, G. 2003 and 2006).

Ando (2002) analysed closely the Japanese National Accounts, and demonstrated that vigorous investments in plants and equipment, a high level of the capital-output ratio and low rates of returns on fixed capital have been a consistent pattern exhibited for the Japanese data since at least 1970. The rate of return on capital net of tax and depreciation was rather low, but still positive in 1996 ranging from 1.6% to 2.9%, depending on the choice of capital and sectors.

Changing Demographic Trend and its Macroeconomic Impacts

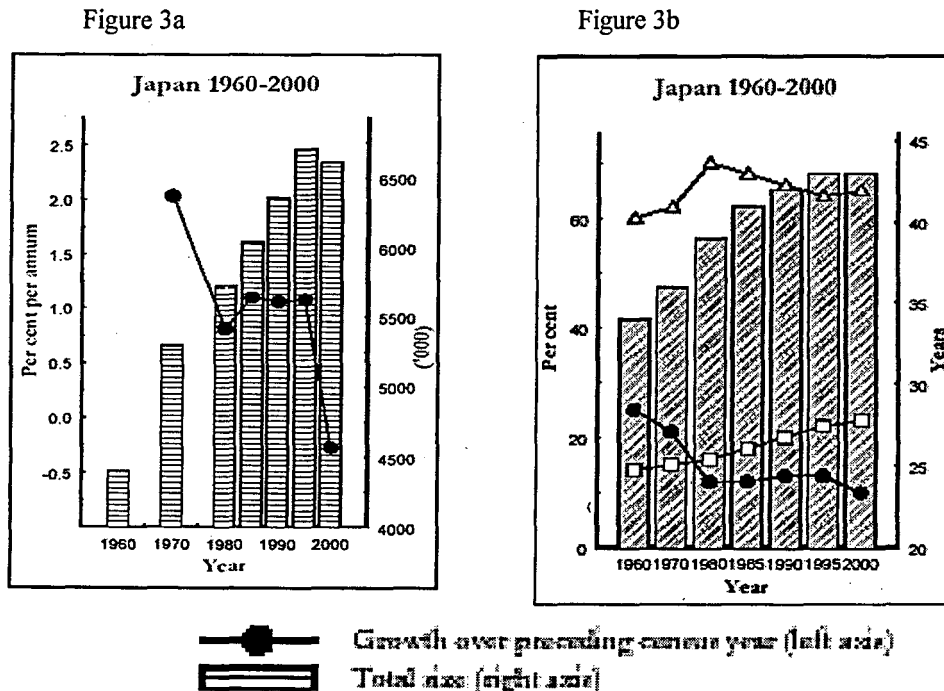
Japan is one of the most rapidly ageing countries in the world. The ageing process has been promoted by a lower fertility rate, preceded by a lower mortality rate and a higher life expectancy (See appendix 5a, 5b). The chart given in *appendix 6* compares the composition of the population into three groups: the child population (from 0 to 14 years of age), the working-age population (from 15 to 64 years of age) and the elderly population (from 65 years and over). The component ratio of the working-age population, which is the core of society and constitutes labour input, will decline from 66.1% to 51.1%, and that of the children, who are the working-age population of the future, will drop from 13.8% to 8.4%. The component ratio of the elderly, on the other hand, the elderly population will increase up to 41.5%. Of every 10 people in Japan, only five will be in the working-age population. Four will be elderly, and the number of children will be less than one. This is the demographic picture in coming 50 Years as projected by the National Institute of Population and Social Security Research affiliated with the Ministry of Health, Labour and welfare, released Report on Population Projection (MERI 2007).

This fact Japan has been raising concern about probable labour input growth. The ageing process brings about not only a sharp increase in the dependency ratio, but also a sharp decline in the working-age population as well as the total population. Japan, thus, faces two problems: first, an increase in the proportion of retired elderly people; and the second, a decreasing population. The share of the working-age population had already peaked out in the early 1990s. According to the 2000 census of population of Japan, total labour supply was 66.1 million. Although this number was 22 million higher than the number in 1960, but it was reduced to nearly 1 million in 1995. This was the first time in the last 40 years that the size of total labour force decreased. It was the result of stagnation and deceleration of labour force growth, noticeably extant in Japan since 1960s.

The labour force growth had declined from 2% per annum during 1960-70 to 1.1% in 1985-1990; it declined further up to the negative value of -0.3% per annum between 1995 and 2000 (See figures 3a and 3b). The decline of the labour force share of aged from 15 to 24 was around 65.2% in the year 2000. It was a sign of increase in the median age population in Japan; it increased within nearly 10 years from 34.3

years in 1960 up to 43.9 years in 2000 (See figure 3b). The share of aged 55 plus in the labour force started to increase in Japan from 1960s onwards. In Japan in the year 2000, the share of aged 55 plus was 24% (Ewa Orzechowaska-Fisher 2004).

Figure 3a: The Size in thousand ('000) and Growth (in percent per annum) of the Total Labour force: Japan 1960-2000; Figure 3b: The Share of Aged 15-24, 25-54, 55+ in the Labour force (in years), Japan 1960-2000



Sources: Japan: Bureau of statistics, Management and -Coordination Agency, Population census of Japan (various years). Cited in Ewa Orzechowaska-Fisher (2004)

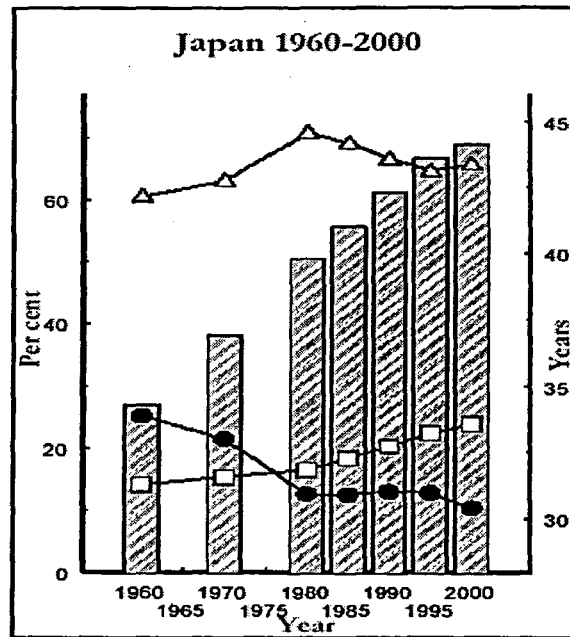
Ageing of Employed Persons: The ageing of employed constitutes center of aging labour supply. Responsible for its ageing declines in the share of those aged from 15 to 24, and increases in the share of those aged 55 plus in total labour supply, often mirrored in total employment. The ageing of employed labour force is a little more advanced than the ageing of total labour force. As shown in the figure 3c, in Japan the median age employed increased from 34.3 years in 1960 up to 44.1 years in 2000, experiencing 0.2 years increase above that of the total labour force. Higher than the total labour force, the median age of total employed, was due to high unemployment rates in the youngest part of the labour force aged 15-24, resulting in their lower share in the total employment prevalent in Japan (Ibid, 2004).

Thus, the compositional change of population such as aging proportion of those aged fifty five plus and 25-54 have resulted in to rapid aging of the population

aged fifteen plus in Japan. This dramatic compositional change in population has occurred due to steep drop in the post war fertility rate (see appendix 5a&6).

Figure 3c: The Share of Aged 15-24, 25-54 and 54+ in Total Employment (in percent) and (in percent) and Median Age of Employed (in years)

Figure 3c



Sources: Bureau of statistics, Management and -Coordination Agency, Population census of Japan (various years). Cited in Ewa Orzechowska-Fisher Japan (2004)

Revision of Labour Standards Law: Reduction in Work Hours or Week Length

Japan's strong labour market was attributed to its role in the remarkable recovery and high growth rate of Japanese economy after Second World War. Given the fact, the job training and system of lifetime employment resulted into a skilled labour force, and the hours worked per week averaged at 44 hours during 1980 to 1992. But in 1988 to 1993, due to huge support amongst the Japanese population, the Labour Standards Law was revised (Chakrboty Suparna 2004). Generally, working hours are decided on the basis of negotiations between labour and the management at the individual enterprise level. The new legislation reduced work week length (average hours worked per week) from 44 to 40 hours between 1988 and 1993 brought about by the 1988 revision of the labour standards law (See appendix 7a and 7b). It was for the first time in 40 years that there was a major revision of labour standards laws in 1988, which stipulated a gradual reduction in the statutory work

week from 48 hours to 40 hours, that is, six days to five days per week, to be phased in over several years. During this period, the number of national holidays also increased by three. The revision of labour standards laws in 1998 further added one day to paid vacation (Hayshi and Prescott 2002). Before the revision of law, the labour standard law (LSL) maintained an eight hours work day and 48 hours work week system until a large scale revision in 1987¹¹. Government had also set the standards for the maximum hours of overtime¹² as guidelines calling for voluntary compliance. In 1998, LSL was revised to provide overtime limitation in the article 36, that is, labour management agreement. The overtime limitation was set up to 45 hours per month.

According to the results of a survey conducted by the Ministry of Health, Labour and Welfare (the General Survey on Wages and Working Hours Systems) as of January 2002, the average scheduled working week was 39 hours and 25 minutes for full-time workers. This represented an 11 minute increase as compared with the previous survey (covering the period until January 2001). However, there is fairly substantial disparity according to company size, with the scheduled working week, ranging from 38 hours 40 minutes for companies with 1,000 employees or more in the year 2002 (38 hours and 34 minutes in 2001) to 38 hours 55 minutes for companies with 300-999 employees (previously 38 hours 35 minutes); and 39 hours and 3 minutes for those with 100-299 employees (previously 38 hours 57 minutes); and 39 hours 36 minutes for those with 30-99 employees (previously 39 hours 24 minutes) (Asao Yutaka 2003). This tends to suggest that the smaller the company the longer would be working hours. Scheduled working hours are determined by collective agreements or 'work rules' (uniform rules on working conditions that employers are required by law to compile) with the minimum condition that these conform to the minimum standard laid down by the Labour Standard Law.

On the other hand, changes in the hours actually worked referred to as 'total hours actually worked' do occur from time to time. Of these, the hours worked within the scheduled working hours laid down by the company are referred to as 'scheduled

¹¹ Implemented in 1988.

¹² Overtime working hours are defined as hours worked exceeding the legal weekly working hours (No. hours per week).

working hours', and any additional hours worked are referred to as 'non-scheduled working hours' (over time working hours). These hours are also covered by the Monthly Labour Survey conduct by the Ministry of Labour and Family Welfare Japan. In the table 8 total numbers of day worked and schedule and non schedule working hours are given from 1995 to 2005. It is evident from the table that total days worked have substantially decreased. It was 159.2 in 1995 that fell up to 150.2 in 2005. Similarly schedule working hours were 149.6 in 1995; they also came down to 139.8. But non-schedule working hours showed little increment that was 9.6 in 1995, and increased up to 10.4 in five years. The comparative buoyancy in non-scheduled working hours was believed to be a reflection of the brief expansionary period that occurred during the 2002 business cycle, despite the overall sluggishness. Whereas reduction schedule working hours was direct consequence of revision of Labour Standards Law (LSL).

Table 8: Declining Working Hours

Year	Days Worked	Total	Schedule	Non-Schedule	Total
1995	20.3	159.2	149.6	9.6	363
2000	20.0	154.4	144.6	9.8	355
2003	19.7	152.3	142.3	10.0	333
2004	19.7	151.3	141.0	10.3	330
2005	19.5	150.2	139.8	10.4	325

Sources: Ministry of Labour and Family Welfare, Japan (2007)

Conclusion

The conditions and policies that made Japan's explosive growth possible can be grouped under the rapid technological progress, high rate of savings and movement of labour force from agriculture to manufacturing industries. One way to understand and explain Japan's growth is the viewpoint of growth accounting or decomposition of growth. The contribution of labour, capital input and TFP has been fairly noteworthy. Labour contribution increased partly because of the population increase. The very success of growth itself allowed a relocation of labour from rural agriculture sector to urban manufacturing sector. Since Japan is a market economy, capital stock lies mostly in private sector and economic decisions¹³ are highly motivated by the desire to earn profits. Under such private sector dominated setting,

¹³ Decision regarding production, prices etc.

the lag in technology, the availability of labour supply and ability to absorb new technology stimulated investments after the Second World War. It is credible to mention that high corporate profit, generated from heavy investment in physical assets and imported technology, and cheap supply of labour at constant wage rate provide ample supply of investment fund through corporate savings. While high household income also made fund available for investment through saving from wage income. Thus, three decades of growth can be regarded as a profit-wage-income led growth. The high rate of private sector savings to feed the strong demand for investment fund was supported by the government decision of not to borrow heavily from abroad to finance domestic investment. Saving-investment led growth provides organized explanation, which is consistent with the growth decomposition analysis; and other factors, such as Japanese government's supportive economic policies, were also involved. At the industry level variety of aids were supplied like subsidized loans to the industrial conglomerates, for instance, EPA's five year plan aimed at growth rate of GNP and its components, rationalization plan, adopted to nurture sunrise industries first. However, with the passage of time some adverse developments have also taken place in 1980s, for instance, the declining working hours, thereby increasing high capital output ratio followed by falling rate of return on capital, and the ageing population causing declining working age population. These factors continuously putting a drag on potential economic growth of Japanese economy from capital and labour inputs side have also been responsible for the stagnant growth in 1990s.

Chapter 3

Japanese Economy in Lost Decade of 1990s

Introduction

The last decade of the twentieth century for the Japanese economy is often described as the 'Lost Decade'-*Ushinawareta Jūnen*-that is, the time period after the collapse of bubble or decade-long stagnant growth in Japan. This chapter, which primarily focuses on the 1990s, known as period of economic bubble and crisis, will follow a relatively chronological order to describe major economic events associated with the bubble of Japanese economy. The term 'bubble economy' came into vogue in Japan at the end of the 1980s, at a time, when the prices of Japanese land and stocks were being pushed over higher amid a surge of speculative investments. With a sharp increase in the supply of money in the background, the Japanese had been diverted from their normal business of producing things by a sudden enthusiasm for money games on the securities and real estate markets. The whole economy, it seemed, was being inflated into a gigantic financial bubble (Sunriko Iwao 1992:14)

Paradigms of Bubble Creation

An economic bubble, also known as a 'financial bubble' or a 'speculative mania', refers to a market condition in which the prices of commodities or asset increase to absurd or unsustainable levels. It occurs when the speculation in the underlying asset causes the price to increase, thereby encouraging even more speculation. The bubble is usually followed by a sudden drop in prices, known as a crash or a bubble burst (Wikipedia 2007). There are two major approaches to explain how an economic bubble swell and crash may occur. The first approach is known as the neoclassical approach, based on standard neoclassical axiom of rationality or rational behaviour. This approach is exemplified by Kindelberg. An example of this sort of bubble is given by Shiller, who models stock prices as being subject to 'fads' (R.Shiller 1984). These 'fads' were noticed in the technology stock obsession. Investor were witnessing spectacular rise in the valuation of technology related stocks such as software etc. across the world, which disappeared with harsh corrections in NASDAQ Index (Charles P. Kindelberg 1978). Another example is given by Delong

et al. According to them, some traders in the financial market continue to hold beliefs for better outlook; even after it is clear, these probabilities are rejected by the empirical data. In other words, traders behave irrationally in the sense that traders don't change their portfolio position with market movements. They are consistently overtly optimistic or overtly pessimistic, and take larger positions than they would, if they were rational. It suggests that they bear more risk than is optimal, but their wealth is not driven to zero. They, therefore, pessimistically cause stock prices to deviate from their fundamentals. The second approach of explaining bubble and its crash is to maintain the standard neoclassical assumption of rational behaviour, but to relate the assumption of perfect markets and symmetric information Gorton et al. have developed models of the bubble and its subsequent crash. It explains that the bubble occurs because of asymmetric information and agency problems. They provide an example: consider a real estate market where purchases are financed by borrowing. If the prices of land go up, the speculations will make a profit; but if the prices go down, their loss will be limited because of default on the loan. (Sharma Manish 2000).

Other experts argue that the cause of emergence of the bubble is excessive 'monetary liquidity' in the financial system. Excessive monetary liquidity potentially occurs when the central banks are implementing expansionary monetary policy.¹⁴ When interest rates are going down, investors tend to avoid putting their capital into savings accounts. Instead, investors tend to leverage their capital by borrowing from banks and invest the leveraged capital in financial assets, such as the equities and real estate. In other words, the economic bubbles often occur when too much money is chasing too few assets, thereby causing both good assets and bad assets to appreciate excessively beyond their fundamentals to an unsustainable level. The bubble will burst only when the central bank reverses its monetary accommodation policy, and soaks up the liquidity in the financial system¹⁵.

Emergence and Expansion of the Bubble

The latter half of the 1980s was an extraordinary period in the Japanese economic history. Stock and land prices increased remarkably and the economy

¹⁴ Lowering of interest rates and flushing the financial system with money supply.

¹⁵ The removal of monetary accommodation policy is commonly known as a contractionary monetary policy. When the central bank raises interest rates, investors tend to become risk averse and thus avoid leveraged capital because the costs of borrowing may become too expensive.

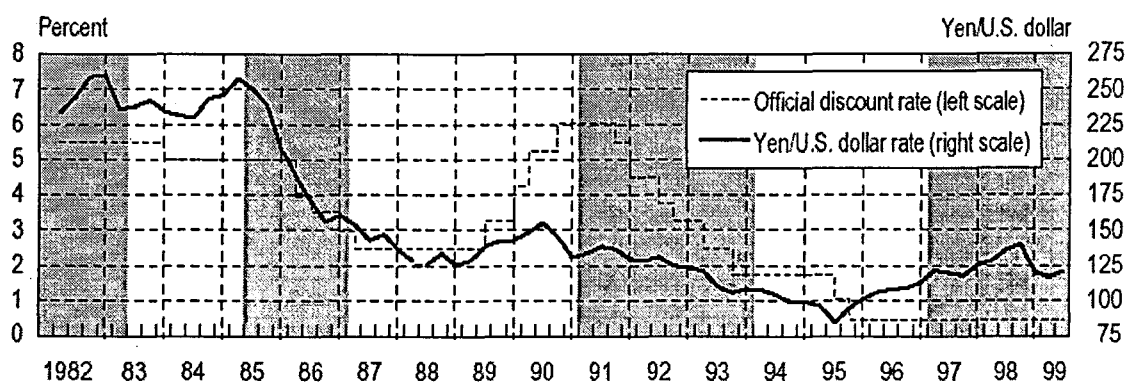
enjoyed an investment and consumption boom. Overseas investment in Japan increased very rapidly; and Japan became the world's largest creditor country, thereby leading the economy to record a spectacular growth. In second half of 1980s, after overcoming the recession brought about by the sharp appreciation of the Yen, economy started to expand in December 1986 and went on to record the second longest boom since the Second World War. By April 1988 the market had climbed past the previous October's record, and prices continued to rise until 1989, when Nikkei average hit 38,915 Yen. Stock prices were, by this time, more than four times to the level they had been in 1983. According to Uekusa Kazuhide (1992), the financial fluctuations of the period from 1985 to 1990 had two important characteristics. First was the fact that they were largely powered by the drastic shifts that occurred in foreign exchange rates (Yen-Dollar rates) during this period, which in turn were motivated by the exchange rate policies adopted by the United States. Second was the Japanese bubble of the late 1980s; like the bubble that preceded it, it was possible only because the monetary authorities provided liquidity necessary for formation. At macro level, Japan's international financial policy, as with that of other major advanced industrialized countries, began to face serious challenge of the Mundell-Flemming trilemma. Because of its heavy dependence on U.S markets for exports and the rise of Reaganomics¹⁶ in the United States, the Mundell-Flemming trilemma in Japan appeared to be closely related to tense international trade disputes with United States (Baigo 2001). As a result of slumping exports and booming imports, the United States turned into net debtor.

Against this back ground under the Plaza agreement of September 1985, five leading industrial democracies agreed to encourage orderly appreciation of the main non-dollar currencies against dollar. The system of floating exchange rates that had started in 1973 changed from a free-float to a managed-float, and in the years that followed the Yen-Dollar rates shifted dramatically. The dollar had stood at 260 Yen in February 1985, by January 1988 it was worth only 121 Yen; it represented a 53% devaluation of the dollar against the Yen. It is shown in the figure given on the next page. The horizontal axis of the figure is depicting year and vertical axis (right hand

¹⁶ The U.S Economic policies of the first half of 1980s, which came to be dubbed "Reaganomics", engineered a long expansion, which also led to a Mushrooming federal budget deficit, sharp worsening of the current account balance, a rise in real interest rates, and a strong dollar.

side) measuring Yen/ US dollar exchange rate. Where as left vertical axis is showing percentage of official discount rate percentage (see figure 4a).

Figure 4a: Trends of Official Discount Rate and Exchange Rate.



Sources: Bank of Japan. Cited in Okina et al. (For figure 4a and 4b)

Thus, the Plaza agreement played a key role in the subsequent fluctuations in Japan's financial markets. The rise in Yen led naturally to lower interest rates in Japan. The official discount rate, which was 5% at the time of the Plaza agreement, was lowered in five steps to 2.5% by February 1987, and the yield on 10-years government bonds dropped from a high of 7.2% in February 1985 to a low of 3.7% in May 1987. In the two years from late 1987 to late 1989, though interest rates remained basically unchanged, both stock and land prices surged (Kazuhide Uekusa 1992). These rises went far beyond anything that could be explained on a theoretical basis. In other words, a speculative bubble was forming. Due to change in monetary policy of Japan, the growth of money supply M2 + CDs somewhat decelerated in 1986, but it gradually accelerated afterwards and exceeded 10%. From 1987 to 1990, the broad money supply grew at the high average rate of 10.8% a year, exceeding the growth of nominal gross national product (GNP) by an annual average of 4.5% points. This difference is significant from the point of view of inflation. At a time of low inflation, the liquidity required for normal economic activity needs only to expand at a rate close to that of normal economic activity; growth in excess of this level becomes available for asset transactions, or to put it in another way, for the formation of speculative bubble.

Another factor which led to emergence and expansion of economic bubble in Japan is the 'land myth', which propagated the idea that investment in land was the objectively most profitable investment. The 1980s experienced an extraordinary surge

in land prices. In 1986 land prices in Tokyo's metropolitan area began to rise sharply, and the rise continued till 1987. Land prices in these areas approximately tripled during this period. The following years saw prices in Tokyo area more or less level off, but meanwhile they had started rising in other regions of the country. Land in the Osaka and Nagoya area appreciated sharply in 1988 and 1989. The land price escalation, subsequently, spread to resort areas and to other major cities. At the same time, demand for office rooms also swelled, especially, in the metropolitan area. Corresponding to such movements, construction of office buildings became a boom in these years, and promoted the rise of land prices initiating from Tokyo area. According to the Economic Planning Agency's statistics on National Accounts, the household sector has consistently been a net seller of land during the period; the main purchasers have been non-official corporations and the public sector. The total net sale by the household sector, over the five-year period from fiscal 1985 to 1990, amounted to approximately 64 trillion Yen. Net purchase of non-financial corporations had ranged from several hundred million to a trillion Yen annually until the mid-1980s, but the pace picked up dramatically; total purchases for the fiscal 1985-90 period came to about 40 trillion Yen. By sector, the real estate industry was by far the largest purchaser of land in this period with total acquisitions of approximately 28 trillion Yen, or 38% of the total. The peak year for purchases was fiscal 1987, during which real estate companies' holdings of land shot up by 15.5 trillion Yen (Noguchi Yukio 1994).

One remarkable feature of the latter part of the 1980s was the sharp rise in the volume of funds raised through the issuance of stocks and bonds both domestically and internationally. Major corporations found it very cheap to raise money in the booming stock market. Even without directly issuing new stocks, they could sell convertible bonds or bonds with warrants, which investors bought at low interest rates in the hopes of realizing capital gains. In three years, from 1987 to 1989, corporations raised over 58 trillion Yen in this manner (Ibid, 1994). This accounted for about 23% of the total funds raised during this period, and not all channeled into plant and equipment investment. Instead, quite a large proportion was used for what was called as 'Zaitech'¹⁷ or financial engineering; including deposits in banks, trust accounts and

¹⁷ Zaitech is the process whereby companies generate profits by investing in stocks and bonds.

the purchase of other financial assets offering high yields. In a sense, corporation increased both their liabilities and their assets. According to the Ministry of Finance, for incorporated business as a whole, borrowing from financial institutions accounted for roughly 80% of the outstanding volume of funds as in 1985, and this level was substantially different from that in the past. In the manufacturing sector, however, the share of borrowing fell from 70% to 56% in the second half of 1980s. And among the largest manufacturing corporations, the proportion of loans fell even more sharply, from 59% to 34 %. By contrast, business other than large manufacturing corporations basically remained dependent on borrowing. More than 181 trillion Yen was borrowed during 1985-1980, of which 70% consisted of borrowing by small and medium-sized corporations and approximately 26% (48 trillion Yen) of the total amount Yen was borrowed by the real estate industry. Due to tendency of large corporations, especially, in the manufacturing sector, to borrow less, banks and other financial institutions faced difficulties in finding takers for their fund. They, therefore, started shifting their lending from large corporations and the manufacturing sector to smaller companies and the real estate industry. Also, increasing numbers of loans were channeled towards non-bank intermediaries, instead of being made directly. This attitude of financial institution reveals how funds for speculation were supplied. The balance of outstanding loans for different industries declined steadily for manufacturing in the years from 1986 to 1989, reflecting the decreased reliance on banks by large manufacturing corporations. For real estate, by contrast, a remarkable increment had been noticed. In 1984 outstanding loans to the real estate industry amounted to 16.5 trillion Yen, only 27% of the figure of the manufacturing sector, but by the end of 1991 the balance had risen to 40 trillion Yen; approximately 74% of the size of the loans to the manufacturing industry's unprecedented land speculation of the latter part of the 1980s was largely supported by an enormous volume of lending by financial institutions to the real estate industry. Behind this lending were the 'Zaitech' activities. Bubbles of prices of shares and land were very much accelerated by such Zaitech activities among capitalist firms (Ibid: 293-294).

The pattern of banks' aggressive lending continued throughout the 1980s. The total loans to all industries increased about 120% and loans to the real estate industry increased more than 300%. Most of the loans to non-banking industries went to real estate speculation, which increased more than 700%. It suggests the trend of

aggressive capital supply during the high growth period, which remained unchanged during the bubble. During 1980s, banks granted loans to medium-size and small companies against land or stock assets as collateral. Of total bank loans, the proportion of bank loans with land as collateral increased from 17% in 1984 to more than 20% after 1987. The proportion of bank loans with stocks as collateral increased from 1.5% to more than 2.5%. Between 1986 and 1989, both equity finance and bank loans increased more than 20% each year (Baigo 2001). These loans served to increase credits and became a responsible factor to swell of the bubble. It is clear that the huge bubble in the form of swelling prices of land and other real estate was substantially facilitated by the inflow of money fund or loans directly or indirectly from the banks.

In order to reap the benefit from soaring stock and land prices, other players, for instance, the postal offices and insurance companies in the loan market started to threaten Japanese banks. These loan market players offered new models of financial commodities to individual households by means of information technologies. As a result, Japanese banks expanded their business activities abroad, especially in the later half of the 1980s, by utilizing the appreciation of Yen. The share of Japanese international banking asset increased sharply from 26% to 38% between 1985 and at the end of 1989. Such rapid expansion of Japanese international banking operations attracted international financier's concerns. Therefore, Bank of International Settlement (BIS) introduced agreement on capital adequacy requirements (Basel agreement) in 1988¹⁸. Japanese banks asked and obtained allowance in the agreement to include 45% of their latent asset of holding share prices, or the latent capital gain between current prices, and booked old prices to shares they hold, into own capital (Itoh Makotoh 1999).

So long as share prices continued to rise, the Basel agreement appeared to be clear with such allowance. Thus Japanese bank assumed that they could go on expanding loans in accordance with the international common rule in the process of swelling bubble. Thus, combination of all the above mentioned factors, such as excess

¹⁸ This agreement on "capital adequacy requirements" required banks doing international business to maintain to maintain own capital more than 8 percent of asset (after adjustment according to the different kinds of asset groups) after end of 1992.

money supply, asset price inflation, and aggressive bank lending, caused the bubble swelling.

Characteristics of Japanese Bubble Economy

According to Okina et al (2001), there are three characteristics associated with the emergence and expansion of the Japanese economic bubble; they were, namely, substantial rise increase in asset and stock prices, overheating of economic activity and increase in money supply credit. The first characteristic of the bubble period is rapid and substantial rise in asset prices. Asset prices started increasing in 1983, and it was around 1986 when the rise began to accelerate. Among the asset prices, stock prices mainly and rapidly arose. The magnitude of rising asset and stock prices is depicted in the table given below.

Table 9: Trends in GDP, Stock and Land Assets; 1981-92

Financial Year	GDP (TrillionYen)	Interest rate (%)	Asset Value (TrillionYen)		Ratioto GDP* ¹⁹ Interest Rate.	
			Stock	Land	Stock	Land
1981	261	8.34	81	128	2.572	4.089
1982	273	8.24	91	135	2.747	4.082
1983	286	7.71	107	139	2.885	3.760
1984	305	7.17	107	139	2.885	3.494
1985	324	6.09	169	176	3.177	3.308
1986	338	5.14	230	280	3.498	4.260
1987	354	4.90	301	449	4.166	6.217
1988	377	4.96	394	529	5.184	6.961
1989	403	5.63	527	521	7.362	7.272
1990	434	6.91	478	517	7.611	8.25
1991	457	5.49	373	504	4.4475	6.058
1992	465	5.54	297	428	3.400	4.900

Sources: National Account Statistics (For Land value), Tokyo stock exchange statistics (For Stock value).Cited in Noguchi (1994)

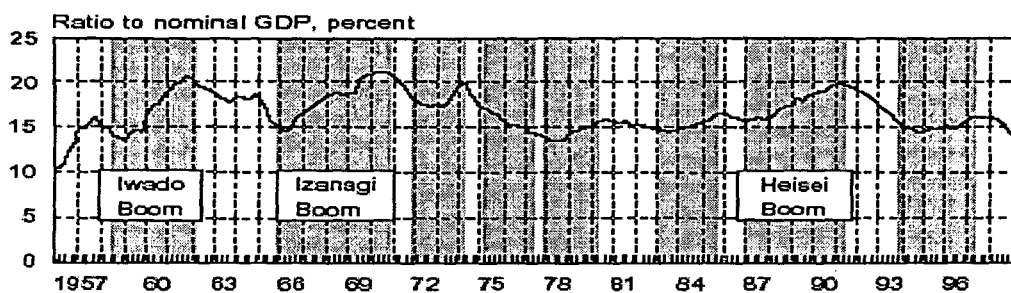
As shown in last columns of Table 10, the figures were fairly steady, for both stocks and land, in the first half of the 1980s; but in 1986 land prices in Tokyo area began to rise sharply, and had also started rising in other regions of the country. In the initial years of 1980s both stock and land prices were normal, and could be interpreted as ‘fundamental prices’²⁰. In the latter part of the decade, however, the figures for

¹⁹ Asterisk indicates multiply sign.

²⁰ Under normal circumstances, stock and land prices rise in line with growth in the economy and with declines in interest rates. This trend in asset prices is called the “fundamental prices” and is expressed

both stocks and land deviated greatly from the trend. The speed of rise in stock prices began to accelerate in 1986, and it hit the peak in 1989. The stock value was 301 trillion Yen in 1987, and it reached up to 527 trillion Yen in 1989. It was around three times higher than the level at the time of the Plaza Agreement in September 1985. Japan in 1980s experienced an extraordinary surge in land prices; it was followed by rise in stock with a time lag. The land value reached its peak in 1990. It was around 176 trillion Yen in 1985 and had risen up to 517 trillion Yen in 1990, which was almost five times higher than the level in 1985 since the end of the Second World War (Noguchi 1994). Japan has experienced number of substantial rises in land prices, but the rise during the bubble period was the greatest since 1950s in terms of both the inflation-adjusted rate of increase and its duration. The second characteristic of the bubble period was the overheating of economic activity. The economic expansion during the bubble period was the second longest after the expansion of the late 1960s known as Izangi boom; and the real GDP and industrial production grew at an average annual rate of 5.5% and 7.2%, respectively. Business fixed investment has been instrumental behind such expansion and continued to be almost 20% of GDP, a level comparable to that of the high economic growth period during the 1960s. It is shown in the figure 4b.

Figure 4b: Fixed Investment and Nominal GDP Ratios



Source: Economic Planning Agency, Annual Report on National Accounts, Japan. Cited in Okina et al.

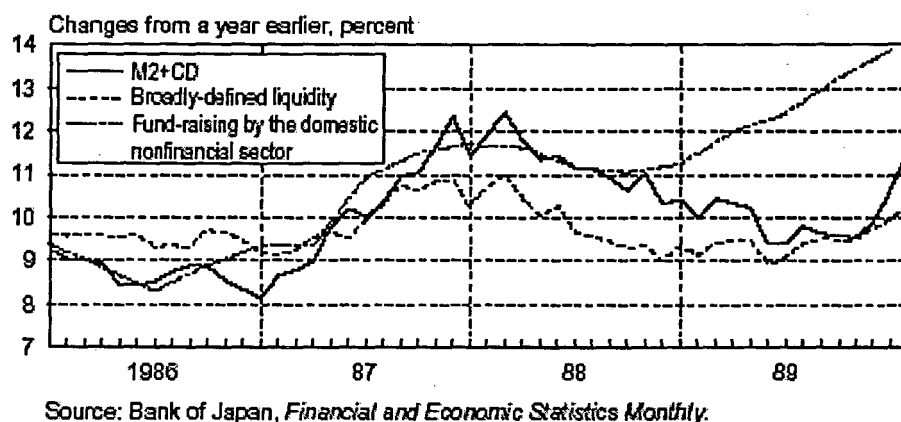
The third characteristic of the bubble period was the sizeable expansion of money supply and credit. The growth of money supply (M2 + CDs) decelerated in 1986²¹ but gradually accelerated afterwards and exceeded up to 10% in April-June

by the present value of income generated by asset. It is generally assumed that asset income (such as stock dividends) is a fixed percentage of GDP.

²¹ The lowest growth rate was 8.3 percent in October-December 1986.

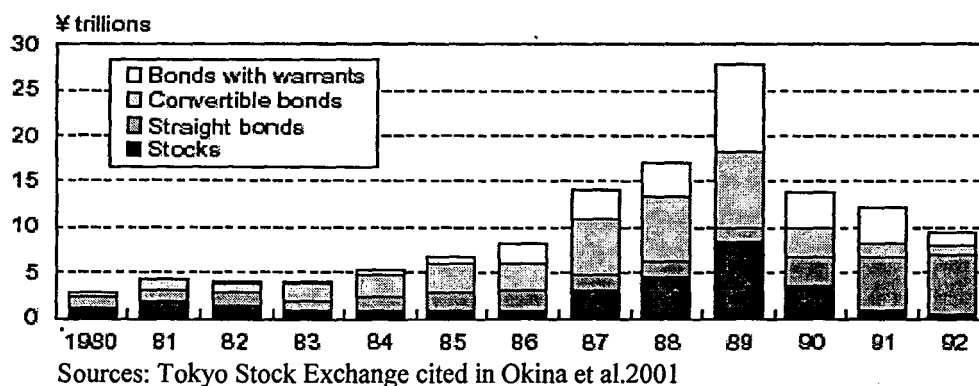
1987. It is shown in the figure 5. It can be seen from the figure that the growth of money supply (M2 +CD) has been rising till 1988 and started declining thenceforward.

Figure 5: Monetary Aggregates and Credits



However, the growth of credit was more noticeable than that of money supply. During the bubble period both bank borrowing and financing from capital markets substantially increased against the back ground of the progress of financial deregulation and the increase in stock prices. It is shown in the figure given below.

Figure 6a: Fund raising in Capital Markets by the Private Sector



It is evident from the above figure that the share of Bonds with Warrants had increased significantly and reached its peak in 1989. It is closely followed by the convertible bonds (see figure 6a).

Bubble Burst

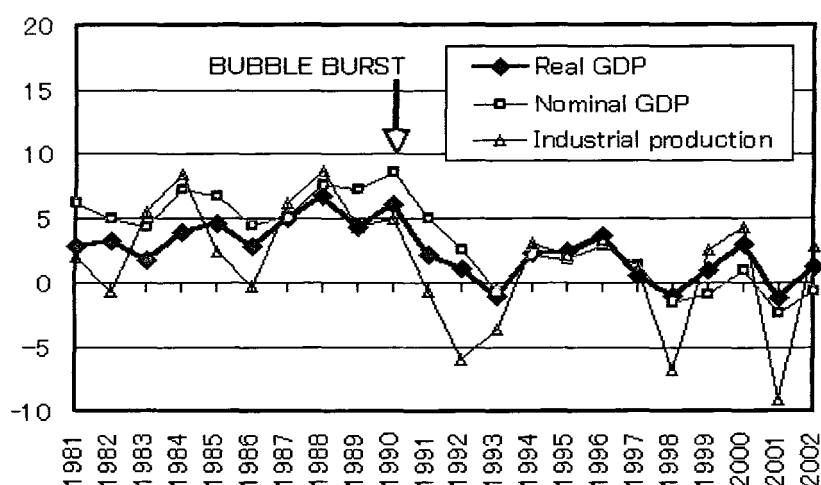
Asset inflation, fuelled by speculative transactions, had far outstripped the real economic growth. The subsequent collapse was inevitable. The inflated prices of shares and land, which went up by speculative transactions far beyond the trend of the real economic growth, were destined for a setback. Japan's economic bubble began to

shrink in the early 1990s, followed by a long economic slump. The stagnation of the Japanese economy during the 1990s was due to some of the same factors that helped to create economic growth in the preceding decade. As explained by Hamada (1995), “a turning point for Japanese economy came at the end of 1989, when the Dollar started rising again. A number of factors worked to push the dollar up, for instance, the prospect for defence-spending cuts with improvement of U.S-Soviet relations, the progress in negotiations between administration and the congress on cutting the federal deficit, and improvement in the U.S trade balance.” In Japan, meanwhile, the mechanism, which had linked the Yen’s climb to falling interest rates and rising assets prices, went ahead to reverse working, thereby making Yen weaker. The inflated prices of Japanese assets in the strong Yen environment had caused the rate of return on investment on such assets to fall. And with the Yen riding high, foreign assets, which offered higher rates of return, appeared to be real bargains. The result was a sharp increase in Japanese purchases of overseas assets. The selling of Yen and buying of other currencies to finance these transactions tended to undercut Yen’s value (Hamada 1995). Though the weak Dollar that followed the Plaza agreement was rapidly improving the US balance of payment by the late 1988, as a side effect, the cheap dollar triggered a surge in Japanese acquisitions of American property. Japanese investors, using the inflated assets they owned at home as collateral, were madly purchasing American real estate. The feeling that Japan was in effect buying up the United States, provided a nationalistic backlash, and it might have prompted the steps to prop up dollars, which marked a strategic shift in the U.S. policy.

In May 1989, the Bank of Japan finally raised its discount rate. The initial hike from 2.5 % to 3.5 was followed by four subsequent increases, which brought the rate up to 6%. Following the rate hikes, market interest rates also arose sharply. The yield on Japanese stock prices started to fall at the beginning of 1990. The yield on ten year government bonds, which was around 5% in the early months of 1989, hit the 8% level in October 1990. The jump in oil prices resulting from the crises in Persian Gulf, broke out in august 1990, was also a factor that magnified the rise in interest rates. As the interest rates went up, the stock market started tumbling down. After recording an unprecedented high of 38, 915 Yen at the end of 1989, the Nikkei average turned down sharply, dropping up to about 28,000 Yen in April 1990. In august, following Iraq’s invasion of Kuwait, the downward trend started moving upward again. The

total market value of shares listed on the Tokyo Stock Exchange fell from 850 trillion Yen in December 1989 to 365 trillion Yen in December 1990. Stock prices stabilized little in 1991, but started to fall again in 1992. Land prices also started to fall in the second half of 1990, and they dropped sharply in 1991. (Sharma Manish 2000). Despite the fall in share prices, real economic growth managed to continue at a comparatively healthy rate 5.1% in 1990, and in the same period investment in plant and equipment also continued at fairly high levels. In the spring of 1991 Japan did drop into decade-long economic stagnation and falling industrial production (see figure 6b). According to the National Land agency's 1992 appraisals, the rate of decline in the residential land prices over the year, from July 1991 to July 1992, was 14.7% in Tokyo, 23.8% in Osaka Prefecture, and 33.2% in the city Kyoto.

Figure 6b: Burst of Japanese Economic Bubble



Sources: Ohno, Kenichi (2002)

Given the fact that land prices had risen every year since the Second World War with the sole exception of 1975, when the country was reeling from the first oil shock, the precipitous fall in 1991 may fairly be described as an utterly new experience for the Japanese economy. The continued plunge in asset prices was particularly unusual as it occurred against a background of monetary relaxation. This showed that the bubble of the 1980s had burst. Most of the land acquired by the real estate industry in the second half of the 1980s was purchased for speculative purposes (Noguchi Yukio 1994). When land prices fell, it became impossible to resell it as planned, and in many cases firms could not keep up their interest payments on the

funds they had borrowed to make their purchases. This left banks with non-performing loans on their portfolios.

Despite a supportive monetary policy, the latent capital gains in prices of shares acquired by banks continued to melt down. Then, the BIS 8% regulation, which allowed to account 45% of the latent capital gains in the share prices to own capital of banks, and facilitated Japan's international banking substantially during the bubbly years of 1980s, turned to torture Japanese banks more severely. In order to keep own capital more than 8% of the total asset as international banks, they had to press down total asset by reducing loans (Ibid, 1994). This worked to worsen the real estate market through credit crunch and affected real estate market and business activities of medium and small firms. The worsened real estate market deteriorated to the mortgages and expanded bad loans by a fall in prices of land and other real estate. All these problems have been explained in detail in the next chapter of the research.

Crisis after Burst of the Bubble

The Japanese financial intermediaries have never experienced failures until the end of 1980s. In the 1990s Japan experienced financial crisis after bursting of the bubble. Japan began to experience sporadic failures of its financial institutions after 1991 once the bubble had burst. In the beginning these were cramped to relatively small institutions and were generally regarded as isolated events with limited orderly implications. This led to an expectation that asset prices, and thus collateral value, would sooner or later pick up again and eliminate the threat to the financial system. Most of 1993 and the first half of 1994 passed without a clear sign of economic recovery and without any serious measures being taken by the authorities. In December 1994, two urban credit cooperatives, Tokyo Kyowa and Anzen, failed. They were both ill-managed institutions, with combined deposits of 210 billion Yen. The fraud and real estate speculation were the major factors in these cases, and no 'white knight' bank could be found to take over the two bank's business. These failures were the first cases that involved urban deposit-taking institutions. Parliamentary hearing of Diet in 1995 revealed that Tokyo Kyowa had outstanding loans of about 13 billion Yen to lower house politician Yamaguchi Toshio. Moreover, out of the 37.6 billion Yen of loans from Tokyo Kyowa to companies controlled by Takahashi Harunori, the chairman of Tokyo Kyowa, 60% exceeded the legal

maximum of 20% or 800 million Yen to non-members. Between 1992 and 1994, Takahashi had arranged for loans of 18.2 billion Yen from both Tokyo Kyowa and Anzen Credit to his group of companies. Takahashi was accused of breach of trust and extending loans exceeding the legal limits for Shinkuni.²² In sum Tokyo Kyowa route and the Anzen Credit of illegal loans to his affiliated companies and other companies, such as real estate loans to Long Term Credit Banks (LTCB) totalled around more than 35 billion Yen (Schaede Urlike 1996).

The resolution regarding bailout of these banks was made by the Tokyo Metropolitan Office, the MoF and the Bank of Japan. The resolution package announced on December 9, 1994 laid down that the Bank of Japan and private financial institution established a new bank to assume the businesses of the two failed institutions. The new bank was known as the Tokyo Kyoudou Bank (TKB). In order to establish the capital base for the new bank, the Bank of Japan subscribed 20 billion Yen of capital and the private financial institutions subscribed another 20 billion Yen, making the capital for the new bank, total of which amounted to 40 billion Yen. The DIC would provide the TKB with financial assistance within the payoff cost limit. In this way, all the depositors were protected and they were able to withdraw their deposits from the new bank. Meanwhile, the shareholders' capital was drawn on to cover the losses (Nakaso Hiroshi 2001). After the Tokyo Kyowa and Anzen case, the Bank of Japan encountered heavy criticism on the basis that it was wrong to bail out the ill managed credit cooperatives using the central bank funds. In December 1994, the MoF announced the appointment of the Tokyo Kyodou Bank to take over two scandals and debt-ridden Tokyo credit unions, Tokyo Kyowa Credit Association and Anzen Credit Banks. At the end of July 1995, the Cosmo credit cooperative, Tokyo's largest credit union, went bust, and the Osaka-based Kizu Credit Cooperative went bankrupt in the following month. In March 1989, Cosmo Credit's loans exceeded deposits for the first time in April 1994; deposits were expected to be unrecoverable. The main regulator, the Tokyo Metropolitan Government allowed continuing its business and attracting new deposits 3% more than average. Major reason of Cosmo Credit's default was rouge management by its president, Taido Sanpachi. His objective was to turn the cooperative into a commercial bank, and he expanded his

²² Credit Cooperative (Shinso or Shinkumi) have their roots in the Meiji period but recognized in 1949 based on the Law for Small Business Cooperatives etc.

business aggressively into real estate financing. All of Cosmo Credit loans were based on the physical collateral, which was easier to evaluate, while third failure of Kizu Credit occurred at the same time as Hyogo Bank. With deposits of 1.17 trillion Yen (\$ 11.7 billion) and loans of 1.98 trillion Yen (\$ 10.7 billion) in 1995, Kizu Credit was assumed to be the second largest bank in Japan. The true extent of unrecoverable loans was estimated to be 960 billion Yen, that is, more than 90% of Kizu Credit's assets were unrecoverable and the total bailout and settlement was estimated to exceed 1.4 trillion Yen or \$ 14 billion (Schaede Urlike 1996). The MoF declared Hyogo Bank, a Kobe-based regional bank with deposits of 2.53 trillion Yen, bankrupt on 30th August 1995 (Lee Jogsoo 1997).

In Hyogo Bank's case, a newly formed Midori Bank, with 80 billion Yen of share capital, was established by the private financial institutions and local industrial enterprises, which provided support to Hyogo bank. Hyogo Bank faced two major problems when it defaulted. The first was its aggressive real estate lending during the bubble period and heavy 'bicycle business' (loans to defaulting customer) since 1992. The second problem was its 20 affiliated non-banks²³. On the day Hyogo bank was closed its bad loan was estimated around 55% of total loans. The Bank of Japan provided 10 billion Yen of subordinated loans in accordance with the Article 25 of the Bank of Japan Law to reinforce Midori bank's capital base. The bank also provided Article 25 liquidity support to Hyogo Bank until its business was transferred to Midori Bank in January 1996. In both Cosmo and Hyogo cases the liquidity support by the Central Bank was fully repaid using the funds provided by the DIC in the form of financial assistance.

In 1997, there were successive failures of Sanyo securities, Hokkaido Takushoku Bank, Yamaichi Securities and Tokuyo City Bank. Major financial institution collapsed on weekly basis in the month of November 1997. Financial system trembled again, in 1998, with the emergence of crisis at Long Term Credit Bank of Japan, an internationally active bank.

²³ Non banks are like institution offering financial services but do not engage in banking business in typical sense. There were around 350 such institutions in Japan.

Table10: Number of Failures of Financial Institution; 1990-2000

Fiscal Years	1981-85	1986-90	1991-95	1996	1997	1998	1999	2000
Total Failure	0	0	14	5	17	30	44	14
Bank	0 (157)	0	3 (154)	1	3	5	5	0 (136)
Shinkin-Bank	0 (461)	0	2 (451)	0	0	0	10	2 (371)
Credit Cooperative	0 (475)	0	9 (407)	4	14	25	29	12 (240)

Sources: Cited in Miyakoshi Tatsuyoshi and Yoshihiko Tsukuda (2004)

This case was the largest failure that the authorities encountered. The LTCB was one of the three long-term credit banks and possessed assets of 26 trillion Yen. It had been actively engaged in derivatives and had an outstanding 50 trillion Yen of contracts (Nakaso Hiroshi 2001). The table 10 summarises the number of failures of financial institution during 1981-1985. The table reveals that it began to occur in the early 1990s band the number of failure rapidly increased to several tens in the late 1990s.

***Jusen* Failure**

The *Jusen*, or housing loan corporations, were non-bank financial institutions that were founded by banks and other financial institutions in the 1970s to complement the housing loans offered by banks. In 1980s, the *Jusen* companies shifted their lending towards real estate developers; but this strategy proved to be a spectacular blunder, because they had little expertise in the commercial lending. According to an official Ministry of finance estimate released on 14th November 1995, bad loans held by 23 major Japanese banks totalled 37.4 trillion Yen, that is, approximately \$ 367. The *Jusen* had at least 6.41 trillion Yen, that is, 63 billion dollar in irrecoverable loans as a result of bad loans made to real-estate projects during the bubble period. There were a total of eight *Jusen*. Out of these, one belonged to the agricultural sector and is still afloat, while other seven were dissolved in March 1997. The *Jusen* problem was the first case in which tax payer's money was used directly to deal with financial instability in Japan. The government's actions led to the public resentment. Thus, *Jusen* had become a leading symbol of Japan's bad loan problem, although their bad loan accounted for less than 1/6 of the total bad loans. The *Jusen* failure had all elements that characterize the crises such as irresponsible lending, regulatory lapses, fraud, poor regulatory oversight, 'favour banking' among financial

institutions that belong to the same networks, and clear responsibility between lenders, owners and parent firms. As explained by Bank of Japan:

“The explosive growth in bank lending during the bubble economy under the easy monetary policy of the 1980s mainly occurred without adequate credit analysis and risk management as banks’ credit analysis section was dominated by the loan promotions section and as a result, its monitoring function was weekend” (Lee Jongsoo, 1997:57-83).

Under these circumstances, banks paid little heed to the monitoring of funds usage and the analysis of borrower repayment ability, since they would sanction loans mainly on the basis of ‘collateral such as land and stocks which were overoptimistically valued’ during the asset market boom, and money lender agent frequently accepted overvalued land as loans collateral without asking for detailed information on the concerned land. Thus, in order to provide large scale loans and to secure greater market share in the bubbly economy of those days, financial institution came to be known as ‘Yes Banks’ for their eagerness to provide huge loans against spurious collateral (Ibid, 1997). However, the Bank of Japan played its role in the crisis management as the lender of last resort on an unprecedented scale. The Bank provided fund on two occasions: first, it provided 100 billion Yen towards the capital of the Housing Loan Administration Corporation (HLAC), which was a newly established body to assume bad loans of the Jusen companies; and the second was its provision of another 100 billion Yen to the New Financial Stabilization Fund (NFSF). The fund was to invest mainly in Japanese government bonds (JGBs) to generate returns that would be transferred back to the government to reduce taxpayers’ initial burden of 680 billion Yen. In the both cases bank provided risk capital. However, these measures provided liquidity support. The bank acted as it did in response to a request from the government, and against the background that a mishandling of the Jusen problem could ultimately threaten the stability of the already fragile Japanese financial system (Nakoso Hiroshi 2001).

Another factor, which added an extra dimension of uncertainty to Japanese banks’ lending practices during 1980s, is called as Bank of International Settlement (BIS) capital requirement. As mentioned above, the new restrictions regulating capital/asset ratios reflected a decision made by the 12 leading central bankers at a 1988 meeting of the BIS. Japanese banks traditionally worked with lower capital

ratios, as they could gather deposits easily from domestic households with high saving rates. The bone of contention for Japan's major banks in this requirement as it applies to Japan was that Japanese banks were allowed to count 45% of their unrealized stock gains towards their tier-2 capital (Lee Jongsoo 1997). In other words, when bubble expanded in the late 1980s, the BIS regulation did not act as an effective restraint, they, instead, promoted the exact asset inflation it was meant to constrain.

Causes of Crisis

Japan's banking difficulties, which have persisted since early 1990s, developed for a considerable period of time, with a number of forces at work. Four causes are particularly important, and among them the second one is the primary cause as identified by Hugh Peter (1999). They are as follows:

1. Failure to create traditional regulatory system: It is argued that deregulation took place without the creation of an efficient system of prudential regulation and supervisions to swap the post-war system of regulated interest rates, convoys, and constrained competition, which provided safety to the system. Deregulation generates competitions. Banks lost their guaranteed profits, market niches, and the value of deposit collecting broadened. This created a situation of moral hazard, in which banks took a greater risk in the expectation that if they suffered losses the ministry of Finance (MOF) could bail them out. This was true, especially, in case of big banks that were assumed to be too large to be allowed to fail.

2. Bursting of bubbles and macroeconomic policy mistakes: Creation and then bursting of bubble of real estate and stock market in 1990s is attributed to macroeconomic policy mismanagement. Between 1980 and 1998 the Japanese government (MOF) made five major macroeconomic policy mistakes, while both fiscal and monetary policy instruments were involved, the BOJ was compliant too. There are two dimensions to these policy mistakes. One is the size, timing and degree of commitment. The second was imbalance between fiscal and monetary policies. The first macroeconomic mistake was the monetary stimulus after shock by lowering interest rate and increasing money supply. This in turn created stock and real estate bubble of 1988-90. The second mistake was in not easing monetary and fiscal policies in the early 1990. The third mistake was to rely excessively on easy Monetary Policy

in the mid 1990s, so that interest rates since 1995 had been at incredibly and undesirably low levels. This extreme imbalance between fiscal and monetary policies has virtually shocked latter, making it very difficult to stimulate demand. Fourth macro policy mistake had been, in a way, a stimulus through supplementary budget in the mid-1990s was applied. The fifth macroeconomic policy mistake was the government decision in late 1996, beguiled for 1999 and beyond; to shift its top policy priority 180 degrees from sustaining economic recovery to taking the long run structural problem of budget deficit reduction. Thus, Japanese economy has been the victim of these macroeconomic policy errors throughout the 1990s (Hugh and Patrick 1999).

3. *Financial technology innovation:* It induced a wide range of sophisticated high-tech derivatives, complex trading technology, and changes in scale and organisation for the efficient management of financial services. Japan's banks have been organisationally and institutionally unable to learn, absorb and implement many of these new technologies sufficiently to be rapidly able to compete in such markets with foreign institutions. These technologies require specialists, not generalists, so the traditional Japanese management system of job rotation and seniority based wages undermined the development and retention of specialists.

4. *Effect of globalization:* As Japanese banks insurance companies and other financial institutions actively engaged in foreign exchange, risks and the Yen appreciated; the cumulative losses were huge, almost on the same order of magnitude as the financial system's domestic and loans closes. Secondly, the flourish by a free global capital market- Euro market provided Japanese large credit-worthy companies with in expensive bond and equity alternatives to loans from Japanese banks (Ibid, 1999).

Conclusion

After analysing the process of the bubble boom, its subsequent burst and characteristics of the bubble economy of Japan, it can be said that the neoclassical model of creation of the bubble, which is based on the standard neoclassical axiom of rationality, is capable to explain the process of boom and burst of Japanese bubble economy. However, the argument based on excessive monetary liquidity in the financial tends also provides an alternative explanation of the process. The role of

monetary policy has been found to be instrumental in the entire process of boom and burst. First monetary policy was eased drastically in response of appreciation of Yen in 1985 and this, in turn, resulted in availability of cheap finance through banks and other financial intermediaries to speculators and other economic agents. This fund was invested into assets (stock and real estate) and other speculative activities (Zaitech etc.) and created biggest economic bubble in the history of Japan. In order to curb such speculative activities, government responded by tightening monetary policy through increasing discount rate five times up to 6% between 1989 and 1990. After these increases, market collapsed. Most of the banks and other financial institution were engaged in financing projects in real estate and stock market, and granted loans against collateral of inflated price ridden assets particularly land, when the bubble burst the value of land again came back at their original prices. As a result of this, many banks faced problem of bad debts due to non-payment of their loans by their borrowers. However, this is not the whole story; there were various problems that Japan had to face due to inefficiency of Japanese banking system. These problems have been analysed critically in detail in the next chapter.

Chapter 4

Problems Associated with the Crisis and Other Changes of 1990s

Introduction

The problems of the 'lost decade' of twentieth century are the direct consequence of the speculative bubble in the stock market and real estate market. The negative effects of collapse of bubble economy lasted more than ten years. The problems of contemporary Japan can be linked to a large extent the effects of the collapse of the bubble in the early years of 1990s through inefficiency and malfunctioning of the banking system and resultant problem of bad debt, problem of weak and debt ridden firms, problem of credit crunch etc. These problems were not mutually exclusive, but were interlinked with the collapse of bubble and subsequent crisis. Apart from these problems, Japan had also experienced two important changes which were equally affecting the productivity of its economy at macro level. Out of these changes, one was the cause of slowdown and the other was the cause of revival of TFP growth in late 1990s. First change is observed as slowdown in productivity (TFP) growth of manufacturing sector and the second change is high investment in IT goods and services sector, in terms of both use and production causing rise in TFP in IT manufacturing as well as using sectors such as communication equipment, computers, other electrical machinery, precision instruments, electronic component, finance and insurance etc., in turn, reviving TFP at macro level. Therefore, the purpose of this chapter is two fold; first is to shed light on the problems associated with the crisis and the adverse change, and second is to explain the change that caused revival of TFP growth.

Problem of Bad Loans or Non-Performing Loans

Since the collapse of asset (stock and land) price bubble in the beginning of the 1990s Japan's economy has struggled to achieve sustained economic growth. Failure of banks one by one due to non-payment of their lending created huge amount of bad loan problem in Japan. At the same time the banking sector suffered low profitability. The collapse of largest banks and other housing loan companies in late 1990s were seen as a key cause of long downturn. As the Director General of EPA (Economic and Planning Agency) research bureau put it, while he introduced the

Annual Economic White Paper on 17th July, “we took too much time to realize that there will be no real recovery until we dispose of problem loans and reform financial system”(Barr Alistran 1992). This quote is enough to explain the severity of bad loan problem.

Magnitude of Bad debt or Non-performing loans (NPLs): In mid-January the Ministry of Finance shocked the financial markets by announcing that the total value of problem loans at Japanese banks at end of September was a staggering 77 trillion Yen or 15% of GDP. The Federations of Banks’ Associations of Japan (Known as *Zenginko*) had previously estimated that problem loans at Japanese banks at the end of September totalled just 21.7 trillion Yen. On 17th July the financial supervisory agency published an update of Ministry of Finance’s January estimate of the scale of the banking sector loans that totalled 72 trillion (14% of GDP) in March financial year of 1998 (Barr 1993). So there are different estimates of bad loans problem, which may be due to the difference in definition adopted by different agencies in calculation of bad debt.

However, it is said that the sharp fall in asset prices, especially, the land prices is one of the main causes of NPLs. This view is consistent with the concentration of bad loans in some specific industries. Risk management loans²⁴ are heavily concentrated in real estate related industries, that is, in construction and real estate as well as among retailers and wholesalers. The magnitude of bad loan problem among these industries is shown in upper section of figure in *appendix 8* (Nobueo Inaba et al. 2004). It is said that during the bubble era of the late 1980s, firms in these industries were aggressive in their purchases of real estate properties including country forests in order to develop there lucrative resort area such as golf courses (see lower section of the figure in *appendix 8*). The collapse of land prices after the burst of bubble badly impaired their balance sheets and made many of them bankrupt.

According to the official definition of bad loans, which consists of non-accrual loans and due loans in past with restructured loans, and also consistent with Prompt

²⁴ Risk management loan referred to loans to borrowers in legal bankruptcy and past due loan arrears by six months or more. But this definition was revised in FY1995-1996 and new definition covers interest reduced loans and loans arrears by three months.

Corrective Action (PCA) system of regulation, which, in turn, classifies all loans into four categories: healthy loans (class 1), which require careful risk management (class 2), loans about which banks have serious ultimate collection concerns (class 3) and loans which banks judge to be non-collectable or of non-value (class 4). A self assessment of loans accounted 19.5 million Yen for the top 19 and regional banks in 1998; while the problem of loans based on the self assessment totalled 71.8 trillion Yen. Ueda (1998) summarizes bad loans and related information for major segments of the banking industry in the table given below. In row 3 of the total problem loans is depicted. The table reveals that the ratio of problem loans to total loans is highest for credit cooperatives. Necessary amounts of loss provisions are shown in row of 5 of the table. It is based on data from its part inspection the BOJ (1997) reports that the probabilities of problem loans becoming non-recoverable within three years are 16.7% for category II and 75.3% for category III.

Table: 11 Bad Loans Problem as of March 1998

	Top 20	Regional	<i>Shinkin</i> Banks	Credit
Number Of Banks	20	128	401	351
Total Assets	747	265	111	23
Problem Loans ²⁵	50.2	21.6	10.1	2.5
As a Percentage of Loans	11.1	11.0	13.6	16.6
Required Loss ²⁶	11.2	4.3	1.9	0.6
Hidden reserves	2.7	2.6	0.6	0
Capital	13.6	9.4	5.1	0.5
Operating Profits ²⁷	3.6	1.9	0.8	0.2

Sources: Ueda Kazuo (1998)

Such loss provisions are usually made out of hidden revenues on banks securities portfolio (row 6) own capital (row 7) and operating profits (row 8). The sum of the three rows exceeds row 5 for all segments of the industry (Ueda Kazuo 1998).

Characteristics of NPLs: There are three characteristics associated with NPLs as identified by government of Japan.

1. Persistence of increase in Non-performing loans until 2002: The outstanding balance of non-performing loans held by Japanese banks, as measured by the outstanding balance of risk management loans of all banks, had been increased since

²⁵ Category II+III loans by self assessment

²⁶ 16.7% of Category II loans+75.3% of category III loans

²⁷ In fiscal 1997.

the fiscal year 1993. The amount of non-performing had remained high level of around 30 trillion and later reached up to about 32.5 trillion in March 2001. During this period the proportion of non-performing loans (risk management loans / total loans) has also been increasing and hit 6.6% in the year ending in the March 2001. The total risk management loans of “deposit taking institutions including *Shinkin* banks²⁸ and credit cooperative; amounted to 43.4 billion in the year ending in the March 2001. However situation has changed dramatically after 2002 the NPLs has decreased significantly.

Among the factor that led to rise in the NPLs are as follows:

In the late 1990s, after a careful investigation, it was found that rise in non performing loans was primarily due to expansion of the definition of risk management loans, which referred only to loans to borrowed in legal bankruptcy; further it was pointed out that it was partly due to loans in assess by six months or more. But the adoption and use of the new definition (in FY 1995-1996) led to the inclusion also of interest-reduced loans; and after FY 1997, they also referred to loans in arrears by three months or more and restrained loans. It is, however, obvious enough that there has been no increase in NPLs, which might have been caused by the change in the definition of risk management loans. The banks' strategies, such as carrying out final disposal of considerable amount of non-performing loans, did not work out; thereby balance of NPLs did not decrease. It might be wise to suggest that it was due to accumulation of equal amount of new non-performing loans. The balance of NPLs can be had by subtracting the final disposal loans and adding the amount of new loan performing loans. Figure in *appendix 8a* shows the amount of finally disposed non-performing loans. The final disposal amount is the total of (i) direct write of costs, (ii) recovery at the time of disposal, such as through the sale of land put up as collateral, (iii) and the amount of bad loan provision withdrawn down. It is evident from the figure that around 45 trillion Yen of NPLs finally disposed of in 4 years. It amounted to a total of 38 trillion Yen in four years ((1997-2000). In short, the bank made final disposal slightly more than 10 trillion Yen of non-performing loans yearly for the last four years, but they incurred almost same amount of new NPLs annually, ensuing in

²⁸ Credit associations

the total amount of non-performing loans staying at a high level of about 30 trillion Yen (AREPF 2000-2001).

2. Disposal of NPLs led to Low Profitability of Banks: The Bank of Japan (BoJ), in 2001, stated that ‘the net profits made by banks had been minuscule or lethargic after the collapse of the bubble economy. They had to bear a net loss in fiscal year 1995, 1997 and 1998’. It might be argued that in the late 1990s banks were unable to cover the costs for the amount of disposal of the non-performing loans with net business profits for some conclusive year from financial year 1994. In terms of their profitability, they were in the ‘red’, that is, the amount of disposal of non-performing loans was higher than their net profits in the business.

3. Accumulation of Non-performing loans in Other Industries: According to the data evidences, NPLs began, apart from the real estate, construction, whole-sale and retail etc., in other industries too, whereas risk management loans outstanding in financial year 2001 accounted for only 9%. Later on it recorded an increment of about 30% a year. Corporate failures in manufacturing and other industries were increased in the second half of 1990s. Since loans to bankrupt companies²⁹ are part of non-performing loans, the increase in the number of bankrupt companies in industries other than the three industries (real estate, construction, whole-sale and retail) suggests that bank’s non-performing loans have been expanding to other industries as depicted in figure in appendix 8b (ARPF 2001).

To sum up, it has been cleared that the problem of bad loan largely concentrated in industries such as real estate, wholesale, construction, retail. Further, this bad loan problem is the mother of all other problems that Japan had to face in 1990s, for instance, the problem of credit crunch, problem of inefficient and debt-ridden firms.

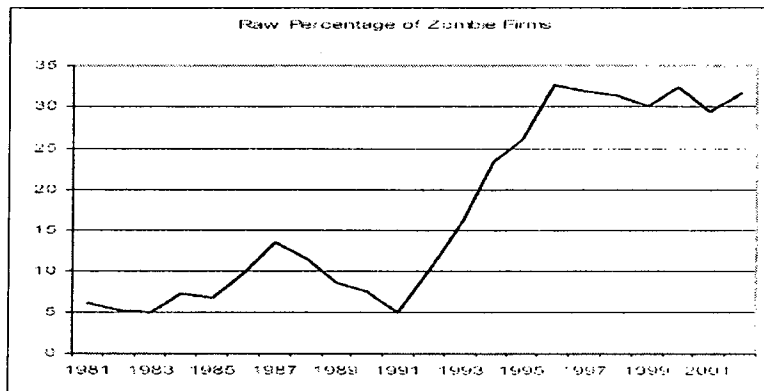
Problem of Inefficient Debt ridden Firms

During 1990s banks continued to provide loans to those firms which were highly inefficient and unproductive. According to some economist, one factor contributing to Japan's economic growth weakness in the last decade is ever greening

²⁹ Loans to borrower in legal bankruptcy.

of loans by banks to inefficient and low TFP growth firms. The lending to insolvent borrowers, even when probabilities for being repaid were extremely doubtful, has been termed as ever greening in Japan. The simple measure of ever-greening is shown in the figure 7. This figure shows the percentage of bank customers that were receiving subsidized bank credit. The firms in the figure are all publicly traded manufacturing, construction, retail, wholesale and service sector firms. The upper section of the figure shows roughly 30% of these firms were on life support from the banks. The lower section, which shows comparable asset weighted figures, suggests that about 15% of assets reside in these firms.

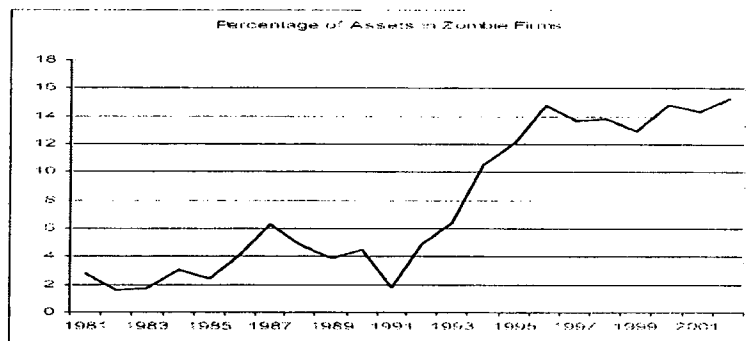
Figure 7: Upper section: Prevalence of Firms Receiving Subsidized Loans



Sources: Caballero et al. (2003:3)

As these figure showing the percentages were much lower in the 1980s and early 1990s. But percentage of both, the Zombies and their assets holding, started rising after 1990 (Caballero et al, 2003). The practice of ever greening became even more pervasive in the late 1990s and early 2000s. Previous researchers have found that bank loans to poor performing firms or the Zombies had increased between 1993 and 1999.

Figure 7: Lower section : Percentage of Assets in Zombie Firms



Sources: Caballero et al. (2003:3)

The Zombie firms are those firms which are characterized as highly inefficient and debt-ridden. Productivity growth in these firms had been very low in 1990s and this, in turn, put significant drag on the productivity performance of the Japanese economy at macro level. During the 1990s inefficient firms were being sustained, in large part, by financial support from Japanese banks. This misallocation of fund prevents banks from financing to the healthier enterprises. Therefore, presence of economically unviable Zombie firms hampers growth by reducing overall productivity and clogging up markets that would be better served by more dynamic firms. In other words, declining stock market, extension of new credit to troubled companies and banks' losses interacted in a kind of vicious circle that prevented healthier (efficient) companies from obtaining the credit they required for their expansion. The continued presence of such 'corporate cadavers' on life support of banks in the market, hampered output growth by denying the "stronger firms space to breathe". The percentage of the Zombie firms soared between 5% and 15% until 1993, and then it rose sharply over the mid-1990s resulting in the Zombie percentage above 25% for every year after 1994 (Landsberg Baskett 2003). The percentage of Zombie firms increased in the late 1990s in every industry, though the problem was more serious for non-manufacturing than manufacturing firms.

However, theoretically there are two channels through which the Zombie firms can contribute to the low aggregate productivity (ATF), which, in turn, hampers economic growth or output growth of a nation. Firstly, the Zombie firms themselves exhibit low or even negative rates of firm level productivity growth. In part, some of these poor firm level productivity performances reflect falling rates of input utilizations. Secondly, the Zombie firms prevent more productive companies from gaining market share, strangling a potentially important source of productivity gains for over all economy.

The second channel is based on the notion of 'creative destruction' developed by Schumpeterian. Creative destruction stipulates the development of new products, and adoption of more efficient production process requires the destruction of old products and outdated production techniques. For example, profit maximizing banks and other financial intermediates will not provide credit to loss making firms, instead they put pressure on such firms to improve efficiency or close down. Credit in such

condition would be reallocated towards more innovative firms or to potentially productive start-up companies (Ahearne Alan G. and Naoki Shinada 2004).

Most of the analysts believe that banks inadequately provisioned against the losses in ever greening of loans to the Zombies; and if bank denies loans to such firms, much of banks' capital would be wiped out, resulting in negative consequences for bank share holders and management. Therefore, most of banks continuously remained engaged in forbearance lending. But by continuing to provide financial support to troubled borrowers, in a way, banks were hindering the proper functioning of creative destruction process. In order to investigate causes of low economic growth, which, in turn, explained by low productivity growth (TFP), economist like Alan or Ahearne, Naoki Shinada and Caballero et al. have empirically tested the Zombie hypothesis. It states that in order to conceal their bad loan, Japanese banks have been keeping alive money-losing large borrower by ever greening loans and discounting lending rates, although the chance that these borrowers will recover is lean (Caballero et. al 2003).

As mentioned earlier, Japanese banks' bad loans were mostly concentrated in industries, such as real estates construction, commerce, and services etc. In short, it was non-manufacturing sector. This was because after the bubble burst these sectors were badly hit by the aftermath of crisis of the bubble burst. For example, according to findings of Caballero et al. (2003), who estimated the Zombie index for each industry from 1981 to 2002, provide two important facts. First, the individual panels of the figure show that the proportion of zombie firms increased in the late 1990s in every industry. Averaging across all industries, the zombie index increased from around 3.73% (1981-1993) to 14.28% (1996-2002). The fact is that the zombie problem was more serious for non-manufacturing firms than for manufacturing firms. In manufacturing, the Zombie index rose only from 2.66% (1981-1993) to 9.89% (1996-2002 average); whereas in construction industry, the index increased from 3.48% (1981-1993 average) to 20.08% (1996-2002 average). Similarly, large increase occurred for the wholesale and retail, services and real estate industries. It may be pertinent to point out that TFP slowdown mainly occurred in some specific industries of non-manufacturing sector, and can be attributed to slowdown in growth of aggregate total factor productivity (see figure of appendix 9).

However economists provide two reasons for this cross sectional differences. Firstly, Japanese manufacturing firms faced world competition, and, thus, were not easily protected without huge subsidies. Secondly, the nature of shock hit the different sectors, such as construction and real estate industries, and forced them to deal with the huge run-up and subsequent collapse of land prices. There are many empirical evidences of forbearance lending or lending to zombies that establish direct relation between low TFP growth in such firms and TFP growth at macro level.

Empirical Evidences:

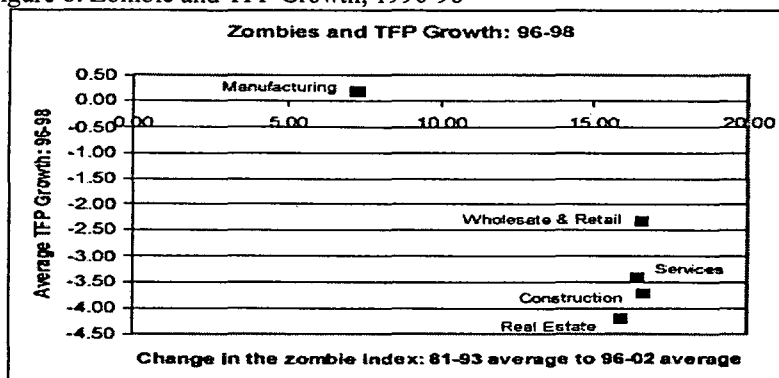
There is plethora of empirical evidence put forward by various studies in support of the Zombie hypothesis³⁰. By using database of Development Bank of Japan, Shinada and Alan (2005) find total factor productivity (TFP) growth held up well, or even increased, in the 1990s in traded goods sector, while growth in non-traded goods sectors was generally sluggish and often declined. As it is evident from the table, roughly 0.5% rate of annual average declined in TFP over 1990s. In the civil engineering sub-sector of the construction industry, roughly half resulted from falling productivity within firms (See table of appendices 10a, b and c). The residual resulted from gains in market-share by less productive firms at the expense of firms with higher productivity growth in other then construction sectors, and contribution from productivity growth within firms showed from 2.5% points in 1980 to ¾% point in 1990's. In addition, contribution from reallocation of market share turned from a positive rate about ¼% point in 1980 to negative contribution of ½% point in 1990s. According to Shinada and Alan, reason for perverse reallocation of market share is that banks continued to make loans to inefficient, loss making firms. The above example of construction sector, corroborated by the empirical evidence of Shinada and Alan, is consistent with the Zombie firm hypothesis. This tends to suggest that during 1990s inefficient Zombie firms in Japan's non-traded goods sector appeared to have prevented more productive companies from gaining market share, which, in turn, further reduced profitable investment opportunity and GDP growth through sustaining less productive firms in the economy.

³⁰ Zombie Hypothesis states that that in order to conceal their bad loan Japanese banks have been keeping alive money losing large borrowers by “ever greening loans and discounting lending rates. Given the fact that chances of recovering such loans are less.

There are also evidences of misallocation of credit, which further strengthen the argument of the prevalence of zombie firms. According to Shinada and Ahearne's empirical finding, there is existence of misallocation of credit by banks in Japan. They have found out a strong correlation between changes in market share and changes in the share of outstanding loans from banks. For example, in the chemical industry, their empirical evidence proves a strong positive correlation (0.75) over the period of 1980-1990, meaning thereby firms gained market share over this period also tended to increase their share of total bank loans to the chemical industry (See table of appendix 11).

To sum up, tables given in appendices 10a, b and c suggest that relatively less efficient firms gained market share in non-traded goods sector during the 1990s and this process was facilitated by these firms gaining a rising share of bank lending. The Zombie firms affect ATF directly by continuing to operate, and indirectly by deterring entry of more productive firms; they bring down the average productivity of the industry. There is another significant empirical finding, which asserts the existence of Zombies and their low TFP affecting aggregate TFP. The Caballero et al. (2003), they have summarized their empirical results of productivity distortion caused by the interest rate subsidies in the given figure. The figure plot average growth of total factor productivity from 1996 to 1998 against the change in the Zombie index, showing that the TFP was low and negative for the industries that suffered most from Zombies. This contrasts to small but positive TFP growth in the manufacturing industry.

Figure 8: Zombie and TFP Growth; 1996-98



Sources: Caballero et al. (2003:27)

Thus, the Zombie firms gained market share through misallocation of credit by banks, which led to the slowdown of productivity at micro as well as at

macro level and regulator may have failed to recognize the large cost of allowing Zombies to continue operating during the 1990s. For example, capital injections given to Japanese banks in the late 1990s didn't recapitalize the banks adequately, so that they no longer had an incentive to evergreen. The forgone benefits, which would have been large enough to justify a very generous permission policy package to the displaced workers, would have been released if the Zombies were shuttered (Caballero et al. 2003).

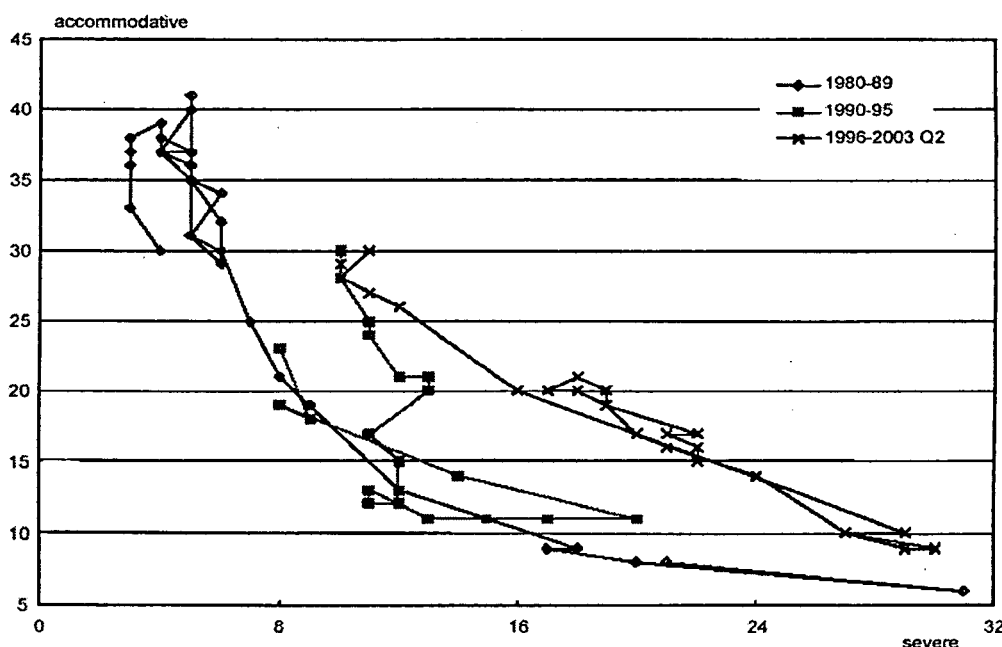
The case in question is that why all major banks continued ever greening of loans to such Zombies. In order to identify the conditions that led the banks to engage in forbearance lending, several models have been developed by economists. These models to a large extent are capable in answering the question why ever greening of loans prevailed in Japanese economy during 1990s. Kobayashi and Kato Krugman maintain that a change in banks' risk preferences makes them softer about providing additional loans. Once a bank increases its exposure to a firm, the banks becomes risk-loving and begins to control that firm as if it were a dominant shareholder. Sakuragwa puts forward a model in which a bank without sufficient loan loss provisioning has an incentive to disguise its true balance sheet so as to satisfy the minimum capital requirement. Baba (2001) emphasises on uncertainties associated with write-off of NPLs, for instance, the reinvestment return from freeing up funds by write-off, the liquidation loss, and the possible implementation of government subsidy scheme etc. Combination of these factor induced banks to delay writing off NPLs. Another reason behind the continuing of loans to inefficient firms is BIS rule governing bank's minimum level of capital known as Basel Capital Standards. This means that when banks want to call in a non-performing loan, they are likely to write off existing capital, which, in turn, pushes them up against the minimum capital levels. The fear of falling below the capital standards has led many banks to continue to roll over loans to insolvent borrowers, gambling that somehow these firms will recover or that the government will bail them out.

Evidence of Misallocation of fund from Tankan Survey:

The figure 9 gives evidence from the Tankan's diffusion index of lending attitude at financial institutions. The horizontal axis shows the share of firms implying that lending attitudes are 'severe', while the vertical axis gives the share of firms

implying that they are accommodative. Under normal circumstance, the trade off between the two shares to trace out a curve running from southeast to northwest. The weakening financial intermediation is revealed in the curve from northward shift of the curve, since the share of firms replying 'severe' would not decline even in the face of monetary easing. In an analogy with the Beveridge curve for the labour market, an outward shift of the curve implies less efficient financial intermediations (Inaba Noubu et al, 2004). In fact, there was an apparent northward shift in the curve during the early 1990s. Since then, the curve has not shifted back. This indicates a weakening of financial intermediation around the middle of 1990s.

Figure 9: Tankan Survey on Lending Attitude of Financial Institutions



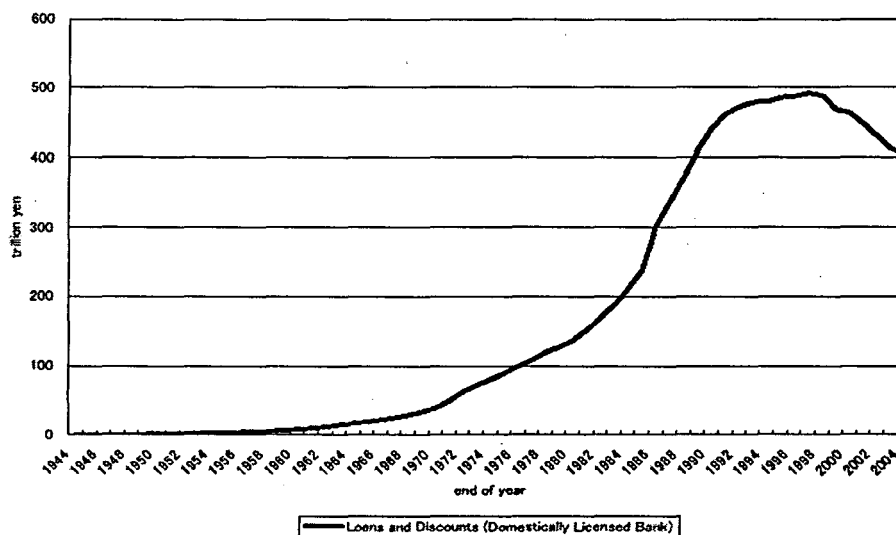
Sources: Bank of Japan Tankan Short term Economic Survey of enterprises in Japan

Problem of Credit Crunch: Was output growth constrained by the Credit Crunch?

It is natural to correlate and translate credit crunch to output slump throughout 1990s. A genuine credit crunch occurs when banks refuse to lend to companies at a ratio of interest, which would provide a reasonable rate of return after taking into account the genuine risk of default, simply because they are short of capital. Japanese loan market has been in severe slump since 1990s, which is really a historical event. Figure 10 given on the next page, shows the amount of loans advanced by domestically licensed banks since 1944. It is evident from the figure 10, the trend of

loans and discounts has been steady throughout four decades since post-war period, but it suddenly started declining as it reached to decade of 1990s. It is shown in the figure that apparently 1990s was the first time in the post-war Japan that the amount of stopped loan increased and then decreased significantly. Figure 10 reveals that loan became stagnant around 1993, but it still increased until around 1998, then it began to decrease. This trend of bank's lending attitude is consistent with argument of credit crunch which is further supported by empirical testing of credit crunch hypothesis.

Figure 10: Loans and Discounts (Domestically Licensed Banks)



Sources: (Ishikawa Tsutsui 2005:38)

There is a widespread view that decline in bank loans, in Japan, was a credit crunch and this, in turn, depressed output by constraining investment. Actually it is a hypothesis of credit crunch or Bank's Kashi-Shiburi on investment:

"It states that for one reason or for another, there is a limit on the amount a firm can borrow. If bank loans and other means of investment finance are not perfect substitutes, an exogenous decrease in the loan limit constrains investment and hence depresses output" (Hayashi and Prescott 2002:18-19).

Generally, investment declines, because it is either caused by the change in economic condition of borrowing firms or a change in bank's lending attitude. In this way, the credit crunch defines shortage of supply of credit, arising from the reluctance of banks to lend that is not reflected in higher lending rates. This may originate from increased regulatory oversight, or as reaction to deterioration in asset value and profitability, or both. Many economists believe that a fall in stock prices in 1990s decreased bank's asset, which, in turn, decreased their capital base and therefore their

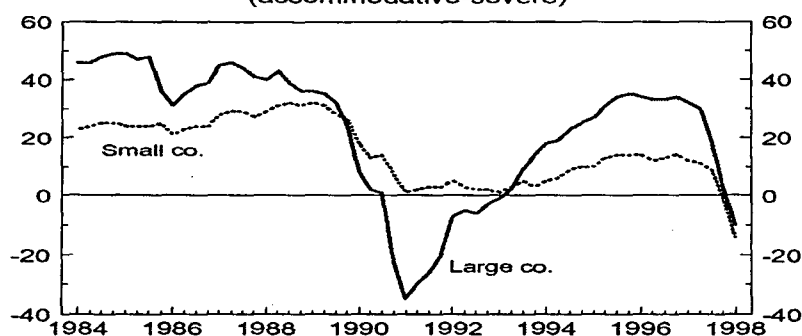
own capital ratio, so that they were compelled to compress loans in order to clear the BIS regulation. According to this school of thought, fall in the land prices may be another cause, because it decreased the value of collateral, so that banks suffered losses from bankruptcy of their borrowed firms. Thus, Japan fell into a vicious circle of depression. In other words, an increase in the bankruptcy of firms, together with fall of the land price, increased non-performing loans, which further caused banks to reduce their loans to firms, that is, the credit crunch. In reverse, the credit crunch increased bankruptcy of borrowed firms, particularly small firms which heavily depended on bank loans, and affected the productivity of Japanese economy by constraining supply of investment fund (Ishikawa and Yoshiro 2005). Thus, credit crunch constrained investment fund demand, this, in turn, constrained output of the economy as a whole.

On the part of the banks, 1990s burdened with heavy loads of bad debts, banks had also fallen into what is called as 'capital crunch'. When their equity capital declines, their solvency comes under doubt. This makes it necessary for them to improve the safety level of their assets. Banks, thus, were forced to reduce their lending to corporations. This is another source of credit crunch. This attitude of banks explains their 'selective lending policy'. Indeed, bank lending has been very weak for most of the last five years in second half of the 1990s. This falling bank lending is sometimes cited as a conclusive proof that a 'credit crunch' is occurring and growth is constrained by its occurrence. Tankan survey provides evidence on tighter bank lending conditions. The figure 11 given on next page shows the Japanese aggregate lending-total from July 1994 to July 1998. It is evident from the figure that the aggregate lending was falling and it had become negative in 1998. The lending conditions for small and medium sized enterprises are clearly very tight by historical standards, but at first sight lending conditions appear to be little worse for large companies than they were in 1990 and 1991; they usually tend to move broadly in line with official interest rates, but official discount rate in 1990 was 6%. So after adjusting for the level of official interest rates, lending condition was much tighter than they were in 1990-91. However, small firms were the worst in terms of credit availability since 1974-1975. The Financial Service Agency's (FSA) survey of non-performing loans shows that financial institutions which specialize in lending to small businesses have the highest levels of non-performing loans. Almost 17% of the loan

portfolios of credit cooperatives are non-performing, whilst 14% of the loan portfolio of Shinkin banks is non-performing loans (Ovualahy Sunday 1999).

By contrast, the average proportion of non-performing loans in the entire banking sector was 11%. Thus, small firms were particularly vulnerable because they had less access to capital markets and other financial intermediaries. It is said that heyday of the bubble era, unlisted SMEs relied heavily on banks for loans, with a large percentage of the additional loans Bank lending to non-real estate. SMEs rose by 5% between 1984 and 1995 (Inaba Nouba et al. 2004).

Figure 11: Lending Attitudes for Small and Large Firms
(accommodative-severe)



Sources: Bank of Japan's Quarterly Tankan Survey

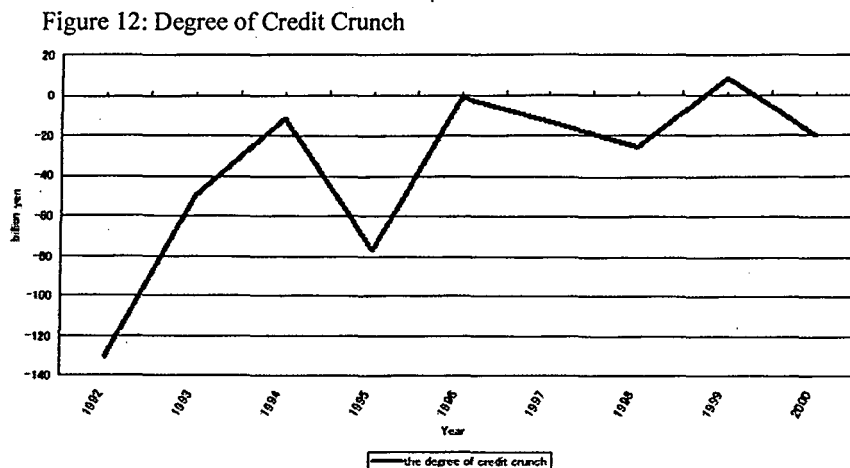
But in the wake of the deterioration in their loan assets, the banks had been forced to cut back on their lending in order to boost interest rates and profit margins. Concurrently, the collapse of the bubble economy initially had a dampening effect on the demand for bank credits as firms embarked up on cost reduction and rationalized measure. The inability of many SMEs to service their loans has left both private and public financial institutions with a backlog of bad land non-performing assets. On account of this stagnant situation, banks started reducing their lending to such borrowers (Ovualahy Sunday 1999).

One striking fact, which is often pointed out regarding credit crunch, is that large firms were able to generate finance not only from banks but also from capital market. According to Hoshi and Kashyap (1999), 'this is due to the liberalization of capital markets, when large Japanese firms scaled back their bank borrowing and started to rely more heavily on open-market funding, and the shift away from bank loans is complete by 1990. Whereas small enterprises relied only on bank loans for their external funding, in a way, small firms were not able to find substitute for their

external fund, therefore they faced severe credit shortage in their business after bubble burst'. In support of the argument, Hoshi and Kashyap Scharfstein (1991) studied financing constraints for Japanese firms. They found that large industrial group, or Keiretsu, as a sorting device. Keiretsu firms are supposed to have access to external financing through the groups of 'main bank'. As a consequence, cash flow should have a smaller effect on investment for Keiretsu firms than on non-Keiretsu firms. So the credit crunch argument is significant if we look at it from the point of view timing of occurrence of collapse of bank loans and output slump. Both occurred in the same period.

Empirical Evidences:

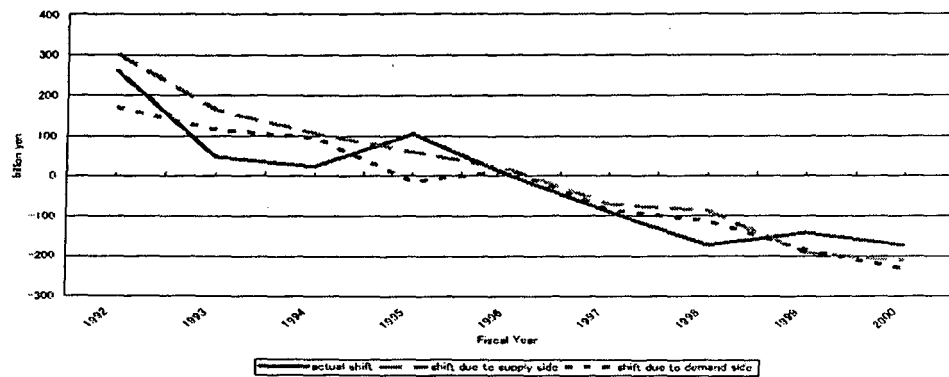
There are other evidences apart from falling bank lending that assert prevalence of credit crunch. Daisuke Ishikawa and Yoshiro Tsutsui (2005) analyse the problem of credit crunch from the view point of supply side. In their work, they have calculated the magnitude of shift of the supply and demand functions assuming market equilibrium. According to them, the amount of loans continued to increase until 1996, and its speed slowed down remarkably as compared with the speed in 1980s (see figure 12). In the given figure 13 evidence of absence of credit crunch before 1995 are shown. Figure 13 indicates that increase in loans in this period was induced by an increase in supply of loans rather than an increase in demand of loans. The stagnant loan market was caused by stagnant loan demand.



Notes: The degree of credit crunch is calculated as the differences between supply and demand shifts (demand shift – supply shift) and take average over all prefectures. As for the definition of the supply and demand shift, see Figure 3.

Sources: Ishikawa Tsutsui (2005:41)

Figure13: Shift in Loan Supply and Demand Function



Sources: Ishikawa Tsutsui (2005:41)

This tends to suggest that the prevalence of credit crunch in this period, in the given figure, reveals two facts. One is that the degree of the credit crunch grows during the period from 1992 to 2000, implying that the credit crunch became severe in the late 1990s. It suggests that the credit crunch was not the case at all before 1996, except for 1994, but it has been thereafter. The second fact is that credit crunch was greatly eased in 1995 (Ibid, 2005). Their findings suggest that until 1996 supply function shifted more towards right from demand function indicating that the stagnation in the loan markets in this period can not be explained by supply side. But after 1996 when the amount of loans decreased, the loan supply shifted leftwards³¹ as the loan demand implying that the contribution of supply contributed partly to decrease of the actual loans.

However, for analysing the impact of credit crunch the magnitude of credit crunch is very significant. According to findings of Taizo and Yoshikawa (1999), based on estimated investment equations, credit crunch lowered the growth rate of real GDP by 1.6% for 1998. They concluded that credit crunch did not really explain the long stagnation of investment throughout the 1990s, but it had major negative effect on aggregate investment during 1997-1998. In this way, they also support the credit crunch hypothesis and its impact on the real economy. Whereas Hayashi and Prescott (2002) maintain that there is significant association between output and bank loans for 1996-98 but not for other periods. According to them, the credit crunch

³¹ If the supply function shifted towards left more than the demand function, it means borrowers would have faced strict attitude of banks, which means existence of credit crunch.

hypothesis might be relevant for sometime or months from late 1997 to early 1998, but it cannot account for the decade-long stagnation.

Thus, evidences from different empirical research have also confirmed that the investment was constrained by the changed lending attitude of banks during the decade, though for short period. If not throughout 1990s, but certainly in late 1990s, it is consistent with the falling growth of capital input, especially, in the second half of the 1990s. Further, in addition to this, credit crunch not only affected output growth directly by constraining investment growth but it also affected the TFP growth, though indirectly. This is because, as discussed in previous section of the chapter, most of the banks were engaged in ever-greening of loans to Zombies; and those firms, which were more productive and had high TFP growth, had to face the crisis of credit (due to forbearance lending) and they experienced shortage of fund for buying capital equipments and introducing new technology, as a result aggregate TFP growth hampered substantially.

Causes of Credit Crunch

The apparent change in lending behaviour of Japanese banks in 1997 can be categorised into the following factors, as put forward by Woo David, such as increased distress of financial system, increased regulatory pressure and increased market scrutiny. It is believed that the combination of these events altered the lending behaviour of the banks, which, in turn, caused credit crunch.

Increase in anguish of financial system: The year 1997 saw a stream of closures and disclosures of distress of a number of high-profit financial institutions, such as Nissan Life Insurance, Sony securities Hokkaido Tokushoku Bank (City Bank), Yamaichi securities etc. These all adverse developments changed lending behaviour of the banks in two ways. First, increased failures among financial institutions would have lowered the value of liquidation value of all institutions, and, thus, increased their bankruptcy cost. This, in turn, probably caused surviving institutions to behave more conservatively. Second, the failures of these institutions to the extent that they reflected a decision by the government to allow them to fail, considerably halted the moral hazard problem in the system by signaling a fundamental shift in the strategy of the government in dealing with ailing institutions.

To the extent that weak banks were forced to reckon with the possibility that they would suffer the same fate as the closed banks if they did not quickly restore soundness, it is likely that they might have become more cautious in making their lending decisions.

Increase in regulatory pressure: In 1997 Japanese authorities introduced the Prompt Corrective Action (PCA) law to ensure the soundness of financial institutions. The PCA was implemented in 1998 and has two main components. First, it introduced a self assessment process that holds the banks themselves responsible for valuing their assets on a prudent and realistic basis according to well defined guidelines. Second, PCA also specifies the capital thresholds under which regulation can order the banks to take remedial actions. These remedial actions range from reduction of branches to reduction of dividends and liquidation. In case of insolvency also, in 1997, the authorities announced the creation of Financial Service Agency (FSA) to take over the role of banking supervision from the Ministry of Finance. It started its operation in 1998. The creation of these two, PCA and FSA, caused the weakly capitalised banks to take the capital adequacy requirement more seriously. This changed behaviour of banks, decreased availability of credit in the economy and became one of the causes of credit crunch.

Increase in withdrawal of Fund: Bank failures provoked a wave of deposits withdrawals from banks, in spite of the deposit insurance guarantee and of inflows of funds to the postal saving scheme. This pattern steadily increased in 1997. Further, despite the lax disclosure rules, the market differentiation of strong and weak banks grew rapidly. This placed additional pressure on weakly capitalised banks to increase their capital ratio, and because they were ever less unlikely than the stronger banks to raise capital in the market. It might not be awkward to assume that they cut bank more sharply in their lending (Woo David 2003).

Other Changes of 1990s in Japan

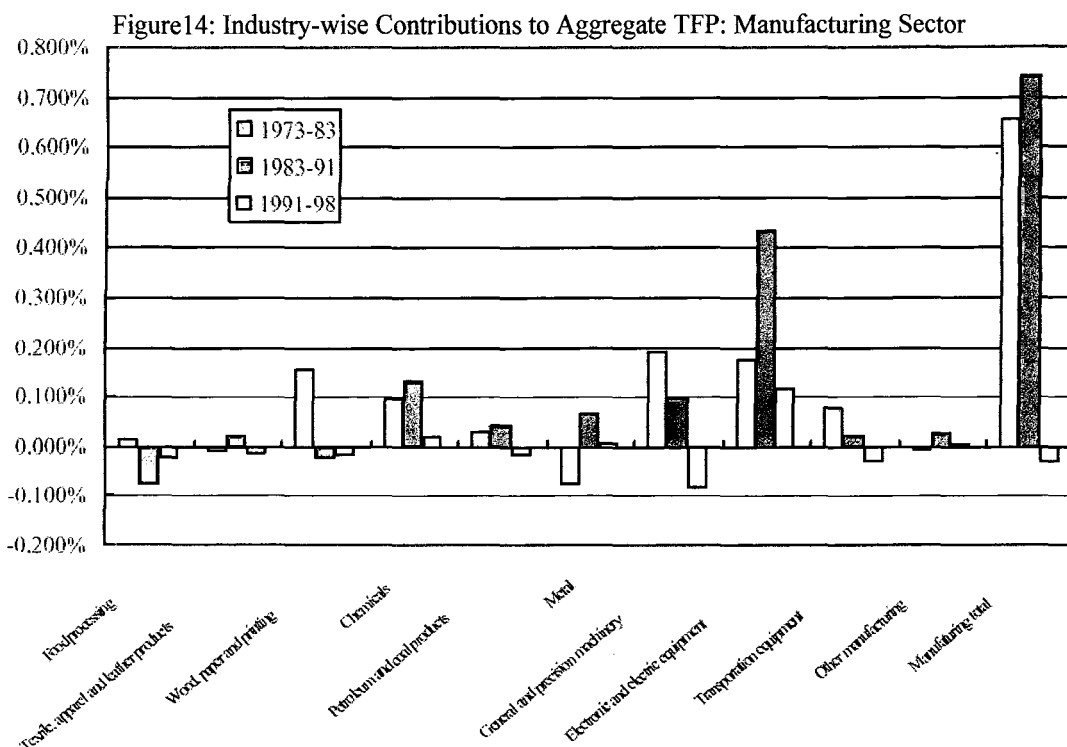
Change in Sectoral Level Productivity Performance till 1990s: Low TFP growth in Manufacturing Sector

Growth of a country results from the growth of its major sectors. This comes from growth of its industries. In this way, productivity growth of a country is

ultimately attributed to the productivity growth at sectoral level productivity growth. Thus, aggregated fluctuation of TFP is contributed from the performance of each sector. There are many empirical evidences that assert the view that aggregate productivity growth is affected by fluctuations in sectoral level productivity growth. According to the majority of recent studies, the slowdown of TFP growth, in the 1990's, in Japan was more pronounced for manufacturing sector. Kigyo Katsudo Kihon Chosa (2002), Fukao and Kwon (2003 and 2005) have proved empirically this issue. According to Kyoji Fukao et al., the slowdown in TFP growth mainly occurred in manufacturing sector during 1990s. Kyoji and Fukao estimated TFP growth, over the last three decades from 1970-1998, by using the equation of growth accounting given below for 84 sectors (see tables of appendix 12 and 12a).

$$d\ln A_{j,t} - d\ln Q_{j,t} = (\bar{s}_{K,j,t} d\ln Z_{j,t} K_{j,t} + \bar{s}_{L,j,t} d\ln L_{j,t} + \bar{s}_{M,j,t} d\ln M_{j,t})$$

Where $d\ln A_{j,t}$ stands for TFP growth rate from time t-1 to t in sector j, while $d\ln Q_{j,t}$ denotes growth rate of real gross output. $K_{j,t}$, $L_{j,t}$, and $M_{j,t}$ denote the capital, labour, and real intermediate input in sector j at time t. $M_{j,t}$ is a composite index of 84 commodities and services. $Z_{j,t}$ denotes the capacity utilization rate. s_{Kt} , s_{Lt} , and s_{Mt} with upper bars denote the average of cost share of the capital, labour, and intermediate input in sector j at time t-1 and time t.



Sources: Fukao et al. (2003)

Their findings suggest that the manufacturing sectors³² contribution to macro TFP growth declined from 0.74% points in 1983-91 to -0.03% points in 1991-98. This is shown in the figure 14. The vertical axis of the figure measures contribution to aggregate TFP of manufacturing sector, and horizontal axis shows the different industries in manufacturing industries.

Causes of decline of TFP growth in Manufacturing Sector

The slowdown in TFP growth of manufacturing sector in 1990s, the following factors have contributed as explained by Fukao et al. (2003 and 2005). They decomposed the manufacturing sector's TFP growth of the 1994-2001 periods into following five factors as follows:

$$\text{Within effect: } \sum_{f \in S} \theta_{f,t-\tau} \Delta \ln TFP_{f,t}.$$

$$\text{Between effect: } \sum_{f \in X} \Delta \theta_{f,t} (\ln TFP_{f,t-\tau} - \overline{\ln TFP_{t-\tau}}).$$

$$\text{Covariance effect: } \sum_{f \in X} \Delta \theta_{f,t} \Delta \ln TFP_{f,t}.$$

$$\text{Entry effect: } \sum_{f \in N} \theta_{f,t} (\ln TFP_{f,t} - \overline{\ln TFP_{t-\tau}}) \text{ and}$$

$$\text{Exit effect: } \sum_{f \in X} \theta_{f,t-\tau} (\overline{\ln TFP_{t-\tau}} - \ln TFP_{f,t-\tau}).$$

Where S is the set of firms that stayed in that industry from year τ to year t, N is the set of newly entered firms and X is the set of exited firms. TFP with an upper bar denotes the industry average TFP level. They divided the manufacturing firm data into 58 sets of different industries and evaluated each firm's relative TFP level in relation to industry average. The exit effect of the whole manufacturing sector in 1994-2001 was negative and substantially contributed to the decline in TFP growths in the manufacturing sector. They have put forwarded the following observations:

Both the Exit Effect (excluding the 'Switch Out' effect)-Switch-in and switch-out effect denote contribution of the firm's which moved from one industry to another industry to the industry average of TFP level-and the Switch out Effect for the

³² However, there is another school of thought, which has view that TFP slowdown mainly occurred in non-manufacturing sector. It is true up to some extent, because some industries of the sector really have experienced very low TFP growth. It is a matter of debate among the economists, and it is beyond the scope of the research to look into. Further, the grim fact is that TFP growth has slowed down at macro level, therefore a balanced view can be maintained in this regard that low TFP growth at macro level was jointly caused by low TFP growth of two of the sectors. But TFP slowdown in manufacturing sector is more widely pronounced.

manufacturing sector as a whole from 1994 to 2001 was negative and substantially contributed to the decline in TFP growth in manufacturing sector as shown in the given table. (see table 12).

Table12: Decomposition of Annual TFP growth in Manufacturing Sector; 1994-2001

Period	TFP Growth A=B+C+F	Within Effect B	Redistribution Effect C=D+E	Between Effect D	Covariance Effect E	NetEntry Effect Sub Total F=G+H	Entry Effect G ³³	Exit Effect H ³⁴	Switch In Effect I	Switch Out Effect J
1994-95	0.024	0.024	0.000	-0.002	0.002	0.005	0.006	-0.003	0.006	-0.003
1995-96	0.011	0.008	0.001	0.000	0.002	0.002	0.001	-0.002	0.005	-0.005
1996-97	-0.007	-0.002	0.003	0.001	0.002	-0.003	0.001	-0.004	0.004	-0.004
1997-98	0.0111	-0.008	.0001	0.000	0.002	0.000	0.003	-0.003	0.002	-0.001
1998-99	0.011	0.010	.000	-0.00	0.002	0.001	0.003	-0.003	0.002	-0.002
1999-00	0.017	0.013	.003	-0.001	0.002	0.001	0.003	-0.004	0.002	-0.001
2000-01	-0.005	-0.008	.003	0.000	0.004	-0.001	0.003	-0.004	0.003	-0.003

Sources: Fukao et al.(2005)

The negative Exit Effect means that average TFP level of existing firms was higher than that of staying firms. Both entry effect (Excluding the Switch in effect) and Switch in effect was positive in almost all industries as depicted in Table. Moreover, the entry effect (including the Switch in Effect) was positive in both the upturn and downturn period. The within (effect of TFP growth with in the staying firms), was the largest factor among all the effects). Besides, this effect changed procyclically (Fukao et al. 2005).

The redistribution effect, that is, the between effect and covariance effect was positive 0.33%. Thus, limited new entries, negative exit effect and high TFP of those firms (which are exiting) are instrumental in lowering down TFP of manufacturing sector in the mid-1990s. Thus, in case of manufacturing sector in the 1990s, TFP was affected by limited new entries; exit effect was negative and small reallocation effect-share effect and covariance effect. This noted slowdown in manufacturing sector certainly affected TFP growth at macro level.

Inter Firm differences in TFP growth in manufacturing sector:

It has been argued, in print media and business community, of Japan that differences between firms in terms of their business performances have increased

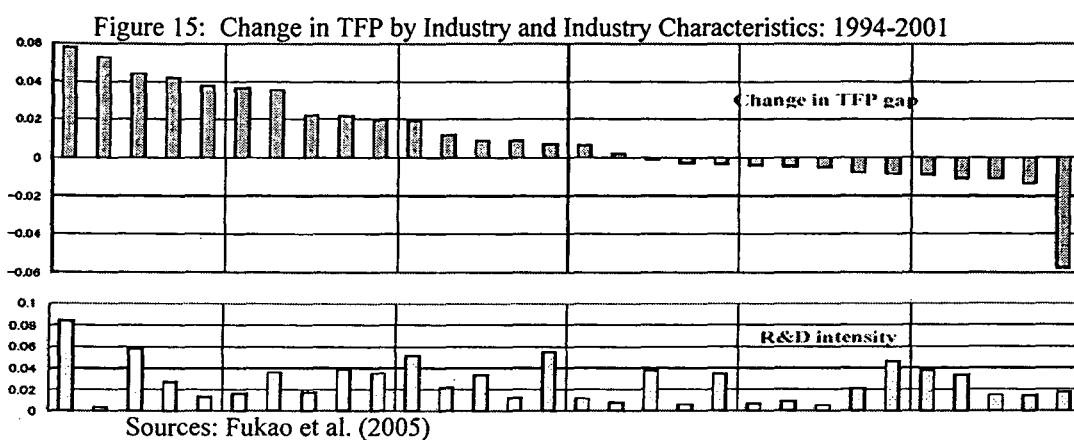
³³ Excluding Switch-In effect.

³⁴ Excluding Switch-In effect

substantially since 2002. In the case of the manufacturing sector, while large and internationalized firms considerably managed to improve their performance, the performance of small and less internationalised firms continued to stagnate. There is a group of firms that has been excluded from recent innovations and their stagnation hampers TFP growth in the manufacturing sector. Fukao Kyoji et al., 2005, by using micro-data of the METI survey, measured the gap in the TFP level between a group of high-TFP firms and a group of low-TFP firms and compare the characteristics of these two groups. Table in appendix 13 shows how the TFP level gap (in natural logarithm) between the 75 percentile firm and the 25 percentile firm changed over time in each industry in the period 1994-2001. In the table, those industries have been placed in which the gap grew by a large margin at the top of the table, and those in which it declined by a large margin at the bottom. The widening of the gap was particularly noticeable in drugs and medicine, petroleum and coal products, and electronic data processing machines and electronic equipments. Since the gap widened in large-sized industries, such as electronic data processing machines and automobiles, the average gap of all the manufacturing industries, which is shown at the bottom of table also increased. In the case of the average gap for the whole manufacturing sector, the widening occurred after 1997, the year of Japan's financial crisis.

Common Characteristic small and less internationalised the industries where the TFP gap expanded:

They compared characteristics of several industries which are expected to have a close relationship with the productivity of firms. Figure 15 given below, shows that the TFP gap widened mainly in industries with a high R & D intensity, and where the internationalization of firms was more advanced.



The internationalization of firms includes outward direct investment, the introduction of foreign capital, and procurements from abroad. The findings of Fukao et al. (2005) reveal the recent widening of the TFP gap among manufacturing firms. In the 1990s, many Japanese firms, especially, large firms in high-tech and globalised industries, further pressed ahead with internationalization and intensified R & D efforts in order to improve their productivity. In such industries, the reorganization of relationships among firms also proceeded through merger and acquisition (M & As). On the other hand, some firms, mainly relatively small and borrowed-up firms, could not follow this innovation process and were left behind in their productivity. It would be important to note that the causality behind these relationships could be the reverse. In other words, the relationship may result not from the fact that characteristics such as a high R & D intensity and a high degree of internationalization enhances firms' productivity, but rather that only high-productivity firms are able to conduct intensive R & D and internationalize and are targeted in mergers and acquisitions as it is pointed out by Fukao et al. According to them, greater R & D intensity and internationalization have a positive effect on firms' TFP growth. They also found that larger firms, firms owned by another domestic firm, firms with a higher percentage of non-production workers in total workers and a lower liability-asset ratio have higher TFP growth. These findings seem to support the view that a new divide caused by R & D, internationalization, and reorganizations of relationships among firms through M & As is emerging and growing in Japan's manufacturing industry. Thus, new divide, in turn, caused slowdown in TFP growth in manufacturing sector. To put it another way, inter-firm differences in TFP growth can also be a contributing factor to slowdown in TFP growth at macro level.

Change in Pattern of Investment and its Impact on Growth: Role of IT revolution in revival of TFP and Output growth.

The growth rate of Japanese economy declined drastically in the last decade of 20th century, but started reviving moderately during the second half of the decade. It is often said that the advent of the information technology revolution thrust Japan abruptly into a new stage of growth that intensively employed IT³⁵ and intellectual

³⁵ These days a new term "Information and Communication Technology" (ICT) has been used by different scholars to refer IT revolution as ICT revolution. However it also include use as well as production of IT capital goods and services

capital. Indeed in the second half of 1990, share of the Japanese Gross Domestic Product devoted to investment in computers, telecommunications equipment, software and other IT related services rose sharply and the rate of total factor productivity growth increased. This tends to suggest that production and use have significant impact on growth of productivity of economy at macro level. The stylized fact, which is often cited by economists to explain outlook of Japanese economy due to declining birth rate in Japan, is that labour contribution to the GDP growth rate is expected to be negative in long period, although government has implemented some policy measures to deal with the situation. In such condition, productivity growth is the only driving force of Japanese economy. As the role of information technology in economic growth becomes larger and larger, promoting IT investments and facilitating effective use of IT systems are crucial for the long term macro economic growth of factor inputs. Thus, information technology (IT) has proven to be the key to achieve economic growth for Japan (Jorgenson and Motohashi 2003).

The mechanisms by which advances in information technology affects economic growth and productivity are three fold. First, investment in IT contributes to capital deepening helps raising labour productivity. As IT investment expands and renews the existing capital stock and enables new technologies to enter the production process, this, in turn, raises labour productivity. In fact, since last few years IT has typically been the most dynamic area of investment. Second, rapid technological progress in the production of IT goods and services may contribute to growth in the efficiency of capital and labour or TFP in IT producing sector. Third, greater use of IT throughout the economy increases firm's overall efficiency, thus, raising TFP. Last but not the least; greater use of IT may contribute to lower transaction costs and more rapid innovation which also improve TFP. Thus, use of IT in production process enhances productivity and derives innovation in sectors such as manufacturing, financial services and mining agriculture. They are also transforming the delivery of key government services, including health and education. In the late 1990s, and in the first decade of 21st century, the revival of TFP growth accounted for the modest resurgence of the Japanese economy. It is often argued that major Japanese burgeoning levels of IT investment by businesses, during the last half of 1990s, did contribute substantially to increase labour productivity and total factor productivity of economy as a whole.

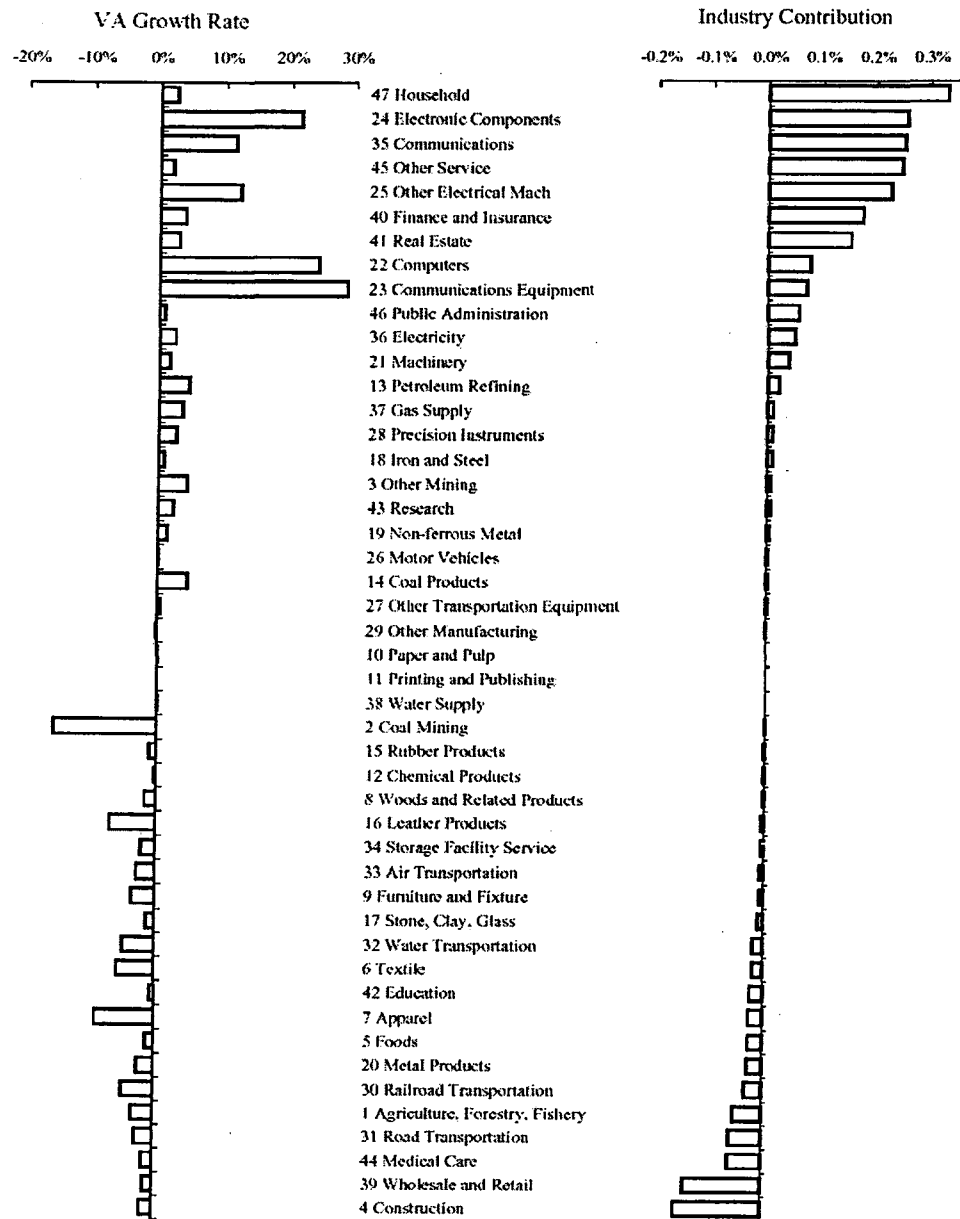
Contribution of IT Investment to Productivity growth:

In the late 1990 Japanese economy struggled through unprecedented low economic growth, while the US economy enjoyed long run prosperity. The difference in economic performances of Japan and US is primarily due to the economic effects of IT investment. Japanese government started policy measures to stimulate IT investment in late 1990s. These policies included accelerated depreciation of computers, subsidies to IT education and construction of an optical fiber network. In 1975, Japan IT investment was only 708 billion Yen, but it increased rapidly at 14.9% per year and was 17 trillion Yen in 1998. The ratio of IT investment to GDP also increased from 0.3% in 1980 to 3.8% in 1998. There were two IT investment booms in the late 1980s and early 1990s. In 1998, IT investment reached 19% of total investment (Miyazawa Tustumo 2002). The pattern of IT investment is very dynamic in 1990s. After increment in many industries in 1980s, it increased more in the banking and insurance, transportation and telecommunication service industries than in other industries. The pattern of IT investment is depicted in the table in *appendix 14*. The differences in IT investment patterns affected the individual industry's accumulation of IT capital stock. Until 1990, IT capital stock had been accumulated faster in manufacturing industry than in non-manufacturing industry, which accounted for a dominant 84% of total IT stock. IT capital stock in wholesale and retail, transportation and telecommunications and services dominated 74% of total IT capital stock.

However, there are empirical studies, which highlight the role of investment in IT in revitalizing the Japanese economy. According to Jorgenson and Nomura (2006), economic growth and productivity growth are dominated by investment in information communication and technology, both for individual industry and the economy as a whole. They have analysed contribution of IT to productivity growth by dividing productivity growth between IT and non-IT sectors, and allocate capital accumulation between IT and non-IT capital. Since bursting of the bubble, economy's value added growth (GDP) declined sharply. It is evident from the contribution of IT manufacturing industries, such as computer communication equipments and electronic components accounted only 0.15% during 1990-1995, while it was 0.31% in 1973-90. However, since 1995 IT manufacturing has contributed 0.41% to aggregate value added.

In the second half of 1990, IT manufacturing revived relative to other industries due to high investment, so that almost 1/3 of the growth in aggregate value added is generated by the growth of IT manufacturing in the late 1990s. Figure 16 A and B (Fig. B given on the next page), show the well performing three IT manufacturing industries after industries. Figure A shows that the value added growth and the industry's contribution to aggregate value added for five years from 1995 to 2000.

Figure 16A: Three well performing IT Manufacturing Industries: Value added growth and Industry Contribution during 1995-2005



Sources: Jorgenson and Nomura (2006)

The left hand side of vertical axis of the figure is showing value added in different industries of the Japanese economy while right hand side of the vertical axis of the figure 16 A is measuring industry's contribution to value added growth.

It is evident from the figure A that three IT manufacturing industries have the highest growth of value added. Communication equipment, particularly, shows the largest improvement almost 30% of value added growth. Further, the growth of the computer industry improves by more than 20%. While the impact of IT on total factor productivity (TFP) growth, in the second half of 1990s, provides an optimistic picture, though aggregate TFP turned in to negative in early 1990s and remained almost negligible in the entire decade of 1990s. The figure 16 B shows the difference between growth rate and industry's contribution from early 1990s to late 1990s.

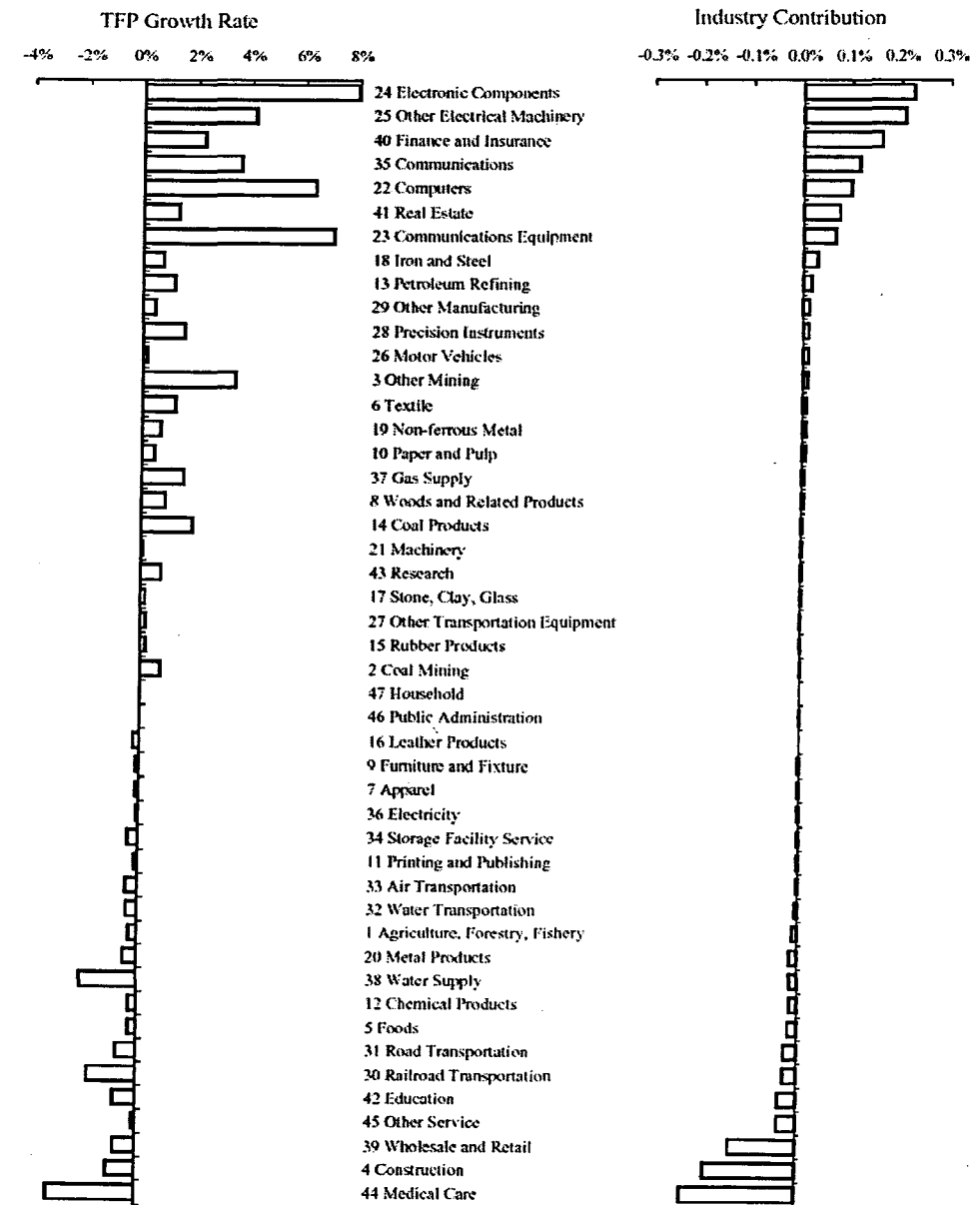
Figure 16B: Recovery of Industry value added: Difference from 1990-1995-1995-2000



Sources: Jorgenson and Nomura's Findings, 2006

According to findings of Jorgenson and Nomura (2006), IT manufacturing industry revived after 1995. It has led the annual growth rates of value added (in the three IT manufacturing industries) to exceed by 20%. This is shown in the figure 17. It depicts industry-wise contribution to aggregate (ATF) and TFP growth in late 1990s. The growth rate of TFP is 6.38%, for computers it is 7.07% and for communication equipment and for electronic components 7.96%, respectively. The contribution of TFP growth in IT manufacturing to economic growth at economy wide level is 0.39 % (see figure 17).

Figure 17: Industry wise contribution to ATF and Its Growth; 1995-2000



Sources: Jorgenson and Nomura's Findings, 2006

A decomposition analysis of sources of TFP growth suggests TFP growth in IT sector, has also contributed significantly to overall TFP growth. It is shown in table 13. In Japan, TFP growth in the IT sector accounts for more than 40% of overall TFP growth since the late 1990s. In particular, the contribution of TFP growth in the computer producing sector is the dominant (0.27%) source of TFP growth at macro level. However, TFP growth in the non-IT sector has been declining in recent years. It was 1.38 in 1985-90 and has fallen up to 0.51 in 2000-2004. (Takahito and Motohashi 2007).

Table 13: Contributions to TFP growth

1985-90 1990-95 1995-00 2000-04

Information Technology	0.36	0.25	0.30	0.99
Computers	0.19	0.16	0.17	0.27
Software	0.01	0.03	0.00	0.09
Communications Equipment	0.16	0.06	0.12	0.12
Non-IT Technology	1.38	0.62	0.36	0.51
Aggregate TFP growth	1.74	0.87	0.66	0.99

Sources: REITI (2006)

IT investment and Labour Productivity growth:

There are empirical evidences, which suggest that labour productivity in IT capital intensive industries, such as IT manufacturing industries, communications and finance and insurance industry are higher than the TFP growth in the second half of 1990s. However, some labour intensive industries have experienced decreased labour productivity growth. The construction industry and wholesale and retail industries have experienced negative growth in labour productivity in the late 1990s. Labour productivity increases through capital deepening, and it is measured by a larger capital labour ratio. Labour productivity growth can be analysed through two channels of contribution of growth in the non-IT capital/labour ratio and the contribution of growth in the IT capital labour ratio. Table 14 given on the next page, clearly shows the contribution of IT capital stock to labour productivity growth from 1980-1998. It shows that labour productivity growth decreased gradually in 1980 to 1998 from 4.6% to 1.4%. But striking point is that intra-sectoral capital deepening has been major factor in recent labour productivity growth. The contribution of IT capital deepening

to labour productivity growth has increased from 20.7% in the early 1980s to 28.5% in 1990s. Another channel, which is often cited for IT contribution to growth via labour productivity, is IT production; it adds to economy a wide productivity through efficiency gains in the production of IT goods. This type of contribution is also depicted in the table 14. The efficiency effects of capital deepening have not contributed to labour productivity growth since late 1990. The sluggish efficiency effects of capital deepening tend to suggest that financial intermediaries have not contributed to an efficient allocation of investment funds.

Table 14: Contribution of IT capital stock to Labour productivity: 1980-1998

Years	1980-85	1985-90	1990-95	1995-98
Labour Productivity	2.9	4.6	2.2	1.4
Intra-Sectoral Capital Deepening	2.2	2.4	1.8	1.5
IT Capital Deepening	0.5	0.6	0.1	0.4
Efficiency effect of Capital	0.6	1.2	0.6	0.0
IT Capital Deepening	-0.1	-0.1	0	0
Efficiency effects of Labour Shifts	0.4	0.4	0.2	-0.1
Intra-Sectoral TFP growth	-0.3	0.6	-0.3	0.0

Sources: JCER Discussion paper, 75.

As for IT capital, there were minor contributions. The efficiency effects of labour shift have decreased since 1990s. The effect also caused labour productivity growth to decrease. As given in the table, the effect is divided into three parts, the most influential to decrease in late 1990s being the reallocation effects of labour shifts from lower capital deepening sectors to higher capital deepening sectors. The given table-14 also provides an important indicator which present contribution of IT capital stock to labour productivity growth. This is intra-sectoral TFP. Intra-sectoral TFP growth dominated 35% labour productivity growth. It implies that Japanese technological progress is that much low.

There is also some spill over effects, which have been observed recently from efficiency gains arising from greater use of IT technology, in the economy, especially, in the service sector, that is, business to business. By using panel database, Miyazawa et al. tried to capture these two types of spill over effects: intra-industry spill over effects and inter-industry spill over effects divided into two types through transmission route: industry increases through purchase of intermediate goods; and second type is transmitted from the output side, whereby productivity in specific

industry affected through the demand for products of the industry. The effects imply that network effects work in the same industry. They reached to the conclusion that intra-industry spill over effects exist in all industries. In addition, the inter-industry spill over effects has been found by them from input side in the estimation of the manufacturing sector in the late 1990s. However, their research does not find a robust result of intra-industry spill over effects from the output side. The estimation result shows that intra-industry spill over effects have worked in the IT producing industries. Thus, enhanced role of investment in IT has been conspicuous feature of Japanese economy in the second half of 1990s, and growth revival is also underway in many important IT using industries. Further, it is hard to escape the conclusion that despite the catching-up in IT diffusion experienced by Japan in recent years, information technologies have so far delivered little aggregate productivity gains in Japan. (Miyazawa Tsutomu et al. 2002).

Present Status of Japanese Economy

Japan is saying *Sayonara*-good bye- to its lost decade. In 2001, Japan's real GDP was growing at an anemic rate of 0.4% per year, and few were optimistic about its growth prospects. In contrast, it achieved 2.3% real GDP growth, followed by 2.8% growth in 2005. This growth rate is vastly eclipsed by the much faster rates logged during the past booms, 11%-12% during the *Izanagi* boom and about 5% during the Heisei bubble boom of the late 1980s. There have been clear indications that Japan's longstanding economic problems have eased. The rate of unemployment has fallen from 5.5 in January 2003 to 4.2 % in June 2005. Non-performing loans (NPLs) of major banks had also declined to from 4.7% in September 2004 to 2.9% in March 2005. Another indicator of good performance is Japanese stock market over the past five years. The Nikkei 225 has arisen over 100% from the 7,900, registered low in April 2003, to the close of 16,105.98 registered in August 18, 2006 (Focus News Letter 2007).

Japan's Gross Domestic Product began to recover in fiscal 2002. From fiscal 2003 onwards, moreover, the expansion accelerated as depicted in the table given in appendix 15. As it can be seen from the table, the annual GDP growth was in the vicinity of 2% in fiscal 2003 and 2004, and the rate jumped up to 3.2% in fiscal 2005 (Osamu Narai 2006). The real estate industry, which represents over 10% of GDP,

also contributed significantly to recent productivity growth. TFP growth in the real estate industry has been recorded to an average of 0.5% during 2002-2004. But much remains to be done on the part of realising productivity gains at macro level.

Conclusion

Thus, the financial crisis of the after burst of the bubble compounded the problem and it resulted in to huge bad debt. This was partly caused by ever greening³⁶ of loans to inefficient firms. This further revealed inefficiency of banking sector in allocating the investment fund during the 1980s. Other effects of crisis emerged in the form of credit crunch. This was also partly caused by the changed lending policy of banks towards small and medium enterprises and also towards large firms due to capital crunch on the part of banks and due to huge bad debts. Japan has also experienced a sharp slowdown in TFP growth in manufacturing sector due to exit of high TFP growth firms (negative exit effect) and continuation of low TFP growth firms in the economy.

³⁶ Loans at subsidised to insolvent, inefficient borrowers on regular basis.

Chapter 5

Theoretical Basis, Methodology, Data Source, Key Findings and Discussion of Results

Introduction

This chapter has been broadly divided into two sections. The first section is designed to provide the theoretical basis of the research, data description and methodology adopted in calculating the variables. The second section of the chapter discusses the empirical finding of the research.

The idea of growth accounting is to account for the contribution to the growth of output/GDP made by the growth of factor inputs (capital and labour), and to associate any growth unaccounted for technological progress. It is known as total factor productivity growth. Total factor productivity growth captures the impact of intangible aspects of human progress that allow both labour and capital to increase their productivity. It is calculated as residually. Thus, contribution of each factor of production, such as capital input, labour input and technological progress can be analysed through the model of growth accounting based on aggregate production function. Thus, contribution of each factor of production, for instance, capital input, labour input and TFP can be analysed through the model of growth accounting³⁷ which is based on aggregate production function. In the research, growth accounting framework has been used; and on the basis of the findings, research attempts to account last fifteen years of Japan, which include chronic slump of 1990s and subsequent recovery.

Theoretical Basis

Robert M. Solow (1957) theorised this method of growth accounting and defined the total factor productivity as measure of technological change. This method is based on aggregate production function to estimate contribution of factor inputs and

³⁷ Solow's method of measuring TFP growth is known as "Solow growth accounting model". See "Technical change and aggregate production Function" for more detailed discussion on growth accounting model based on aggregate production function.

TFP to GDP growth. Aggregate production³⁸ function links output or real GDP in period t to two inputs capital and labour as well as total factor productivity (TFP), and it enables to decompose observed growth rates in to contributions from capital, labour and total factor productivity. The growth rate of TFP is usually estimated under the following assumptions.

Assumptions of the Model

Specific assumption need to be made at the beginning which support theoretical basis of the research. These are as follows:

First, the factor markets are perfectly competitive that factors of production namely capital and labour are paid according to their marginal products. The second assumption is the production function based on constant return to scale. In other words, it is linearly homogeneous of degree one. Thus, growth accounting approach estimating sources of or contribution to economic growth requires above mentioned assumption to form the underlying aggregate production function.

$$Y(t) = [K(t)]^\alpha [L(t).A(t)]^{1-\alpha}$$

Where:

Y (t) represents the Gross value added in Japanese economy (the GDP) in some year.

K (t) is Capital Input³⁹.

L (t) is Labour Input.

A (t) represents Total Factor Productivity; TFP (often generalized as ‘technology’⁴⁰).

α : stands for Elasticity of Output with respect to Capital. In other words it is the share of total income spent by Japanese economy on payment to capital and it is often called Capital share.

³⁸ Aggregate production function approach is an analytical simplification that makes possible to summarize detailed information of complex process of growth with in a simple unified framework

³⁹ Research has used capital and labour services as capital and labour inputs respectively. See EUKLEMS’ *Growth and Productivity Accounts Version 1.0 Part I Methodology March 2007*” for more detailed discussion on construction of series of capital and labour service inputs.

⁴⁰ TFP can change due to increase in knowledge about production methods, education and government regulation. In Solow’s original paper TFP is defined as some shifts of aggregate production function. In this research TFP is interpreted as the ratio of aggregated output to aggregated input. This is based on the identity of accounting and it is preferable from a theoretical generality. In this way TFP captures anything that changes the relation between measured inputs and measured output.

1- α : stands for Elasticity of Output with respect to Labour. In other words it is the share of total income spent by the economy on payment to labour and it is called Labour share. Thus, above production function indicates output increases not only because of labour and capital but also because of an increase in total factor productivity.

Derivation of the Model:⁴¹

In order to measure the change in output within this model, the equation above is differentiated in time (t), giving a formula in partial derivatives of the relationships: labour-to-output, capital-to-output, and productivity-to-output, as shown:

$$\frac{\partial Y}{\partial t} = \frac{\partial Y}{\partial K} \frac{\partial K}{\partial t} + \frac{\partial Y}{\partial L} \frac{\partial L}{\partial t} + \frac{\partial Y}{\partial A} \frac{\partial A}{\partial t}$$

Observe:

$$\frac{\partial Y}{\partial K} = \alpha [K(t)]^{\alpha-1} \cdot [L(t) \cdot A(t)]^{1-\alpha} = \frac{\alpha Y}{[K(t)]}$$

Similarly:

$$\frac{\partial Y}{\partial L} = \frac{(1-\alpha)Y}{[L(t)]} \quad \text{And} \quad \frac{\partial Y}{\partial A} = \frac{(1-\alpha)Y}{[A(t)]}$$

Therefore:

$$\frac{\partial Y}{\partial t} = \frac{\alpha Y}{[K(t)]} \frac{\partial K}{\partial t} + \frac{(1-\alpha)Y}{[L(t)]} \frac{\partial L}{\partial t} + \frac{(1-\alpha)Y}{[A(t)]} \frac{\partial A}{\partial t}$$

The growth factor in the economy is a proportion of the output last year, which is given (assuming small changes year-on-year) by dividing both sides of this equation by the output, Y:

$$\frac{\frac{\partial Y}{\partial t}}{Y} = (\alpha) \frac{\frac{\partial K}{\partial t}}{K(t)} + (1-\alpha) \frac{\frac{\partial L}{\partial t}}{L(t)} + (1-\alpha) \frac{\frac{\partial A}{\partial t}}{A(t)}$$

⁴¹ Derivation of the Model has been borrowed from online encyclopedia known as wikipedia and Output has been taken up as a measure of GDP in the derivation.

The first two terms on the right hand side of this equation are the proportional changes in labour and capital year-on-year, and the left hand side is the proportional output change. The remaining term on the right, giving the effect of productivity improvements on GDP is defined as the total factor productivity (TFP) or Solow residual:

$$SR(t) = \frac{\frac{\partial Y}{\partial t}}{Y} - \left((\alpha) \frac{\frac{\partial K}{\partial t}}{K(t)} + (1 - \alpha) \frac{\frac{\partial L}{\partial t}}{L(t)} \right)$$

The residual, SR (t) is nothing but TFP and it is that part of growth that is not measured by weighted growth rates of real factor inputs.

Methodology and Data Source

Standard methodology has been adopted in the research to decompose Gross Domestic Product (GDP) growth into its contributing factors. Following are the steps which explain the methodology:

Firstly, research calculated the yearly value of alpha and (1- alpha). These values have been worked out by dividing the each year value of compensation paid to capital and labour to Gross value added in that year respectively. The yearly computed values of α (alpha) and $1 - \alpha$ have been shown at the end of this chapter (see table A).

Secondly, research has calculated yearly growth rate of outputs and inputs. Output growth rate has been calculated using absolute values in millions of Yens. But due to unavailability of absolute data on Labour Inputs and Capital Inputs, research has used indices of Labour and Capital Inputs which do not alter either requirement of growth accounting equation or any empirical inferences (see table B). There is no difference in TFP figure either estimated by using nominal or indices value, and it can be seen from the following mathematical identity:

$$\Delta K/K = (K_2 - K_1)/K_1 \quad : \text{ If absolute values are taken. }^{42}$$

$$\Delta L/L = (L_2 - L_1)/L_1$$

⁴² Absolute values are the nominal values given in millions or billions of Yens.

If we assume K_0 and L_0 as some base year's absolute value of capital and labour inputs. Then, the same calculation is yielded using indices values for the variables of the model:

$$\Delta K/K = (K_2/K_0 - K_1/K_0) / (K_1/K_0) = (K_2 - K_1)/K_0 / (K_1/K_0) = (K_2 - K_1)/K_1$$

$$\Delta L/L = (L_2/L_0 - L_1/L_0) / (L_1/L_0) = ((L_2 - L_1)/L_0) / (L_1/L_0) = (L_2 - L_1)/L_1$$

Thirdly, weighted indices of factor inputs, namely, Capital and Labour are computed by multiplying the value of α (alpha) and $1 - \alpha$ to each factor input respectively. Finally, research decomposes the GDP growth in to growth of capital, growth of labour inputs and growth of Total Factor Productivity (TFP). TFP has been calculated by subtracting value of each factor input from output. It is that part of growth which is not explained by growth in capital and labour. It is shown in table at the end of this chapter (see table C). All growth rates are measured in linear growth rates in the research with the help of Microsoft Excel software.

Data Description

Research uses EU-KLEMS' database. This database was constructed for a research project, financed by the European Commission, to analyse productivity in the European Union at industry level and covers period from 1972 to 2004. The EUKLEMS database constructed on the basis of data from National Statistical Institute (NSI's). This database is prepared with the help of statistics from the National Accounts and follows the ESA95 framework in all respects. Following methodology has been used in construction of various data series in the EUKLEMS' database.

Computation of Capital Input:

Capital input has been measured as capital service input in EUKLEMS database. This database includes both IT and non-IT capital. Importantly, capital input has been measured as capital services rather than stocks. The rationale of using capital services, as capital input, is preferable and has been recommended in OECD's two productivity manuals. According to the two manuals, entitled as 'Measuring Capital

and Measuring Productivity'⁴³ (2001), the volume indices of capital services are the appropriate measure of capital input. Further real investment series by asset type and by industry type are used to derive capital stock through accumulation of investment in to stock estimates using Perpetual Inventory Method (PIM) and application of geometric depreciation rates. Then, capital service input is derived by weighting the growth of stocks by share of each asset's compensation in total capital compensation. The following methodology has been adopted in calculating capital service input at 1995 prices:

$$\Delta \ln K_t = \sum_k \bar{v}_{k,t} \Delta \ln S_{k,t}$$

Where $\Delta \ln S_{k,t}$ indicates the growth of the stock of asset k and weight are given by the average shares of each asset in the values of total capital compensation. In this way, aggregation takes into account the widely different marginal products from the heterogeneous stock of assets. The weights are related to the user cost of each asset (Timmer Marcelet et al.2007).

Computation of Labour Input:

In order to capture the difference in productivity of various types of labour input, for instance, low versus high skilled labour, the value of labour service input has been measured in standardized way by distinguishing labour types on the basis of gender, age and educational attainment to avoid heterogeneity of labour. This is because conventional measure of labour input, such as numbers employed or hours worked, does not take into account heterogeneity of labour. Therefore, one needs measures of labour input which consider such difference. These measures are known as labour services. It is assumed that in construction of EUKLEMS' database, the flow for each type labour is proportional to hours worked, and workers are paid according to their marginal productivities (Ibid, 2007). Therefore, following

⁴³ See *OECD's Productivity Manual (2001)* for more detailed discussion on concept and measurement of Capital service Input. Capital services measures are based on the economic theory of production. The concept relates back to the work of Jorgenson and Griliches(1967)with further development mainly in the productivity literature such as Jorgensen(1995),Hulten(1990),Triplett(1966,1998),Hill (2000) and Diewert (2001).

methodology has been adopted in calculating index of labour service input at 1995 prices⁴⁴:

$$\Delta \ln L_t = \sum_l \bar{v}_{l,t} \Delta \ln H_{l,t}$$

Where $\Delta \ln H_{l,t}$ indicates the growth of hours worked by labour type l and weights average share of each type of labour compensation. Where weights are given by average share of each type in the value of labour compensation:

$$\bar{v}_{l,t} = \frac{1}{2}[v_{l,t} + v_{l,t-1}] \text{ and } v_{l,t} = \left(\sum_l P_{l,t}^L H_{l,t} \right)^{-1} P_{l,t}^L H_{l,t} \text{ with } P_{l,t}^L$$

With $P_{l,t}$ as price of one hour worked in of labour type l . In this way, it takes into account changing composition of labour force.

Gross Value Added at 1995 prices:

The data series on gross value added (GVA) at 1995 prices has been taken from the above mentioned source. Since GVA is a measure of Gross Domestic Product through production method of national income estimation, and the advantage of using GVA as measure of gross output, is that it avoid double counting while calculating national income.

The nominal values of labour compensation and capital compensation have been used in calculating the value of alpha and 1-alpha. Labour compensation has been derived by applying the ratio of hours worked by total number of person engaged to hours worked by employees to compensation. Whereas capital compensation has been computed residually, it is derived as valued added minus labour compensation. In research's estimation the average value of alpha comes out 0.39 and 1-alpha 0.61 for 1990-2004. But in order to make empirical results more reliable and to avoid approximation, yearly values of alpha and 1-alpha have been used to calculate the weighted growth of labour and capital. This is because the period under study has experienced many cyclic fluctuations; therefore, yearly computation gives the true picture rather than just approximation.

⁴⁴ See "Growth and Productivity Accounts Version 1.0 Part I Methodology March 2007" for more detailed discussion on construction of series of capital and labour service inputs.

EUKLEMS database covers 71 industries of Japanese economy, and these industries have been classified according to their area of economic activities. This classification is based on NACE revision 1 classification. This classification is very close to the International Standard Classification (ISIC revision 3)⁴⁵. The list of classification is given in *appendix 16*. In order to ensure minimal level of industry detail, so called minimum lists of industries have been used.

Key Findings of the Research: Growth Picture; 1990-2004

After decomposing the GDP growth rate in to its contributing factors, following facts are emerged and have been summarized in the table give below:

The average annual growth rate of GDP of Japanese economy is 1.37% from 1991 to 2000. It is really very less growth and declined by 2.8 percentage point. It was around 4.2% in 1980s (See table 15).

The Contribution of Capital is 1.49%, of Labour is – (0.035) % and of TFP is 0.09%. It is clearly visible from the statistics that the contribution of Capital is relatively higher than the other two variables. Thus, it can be pointed out that capital has greater role in explaining 1.37% growth of GDP throughout last decade of twentieth century.

Table 15: Growth Accounting Summary (%)		
Average Contributions	1990s: Lost Decade (1991-2000)	Recovery: End of Lost Decade (2002-2004)
Contribution of Labour	-0.03	0.15
Contribution of Capital	1.49	0.49
Contribution of TFP	0.09	0.28
Real GDP Growth	1.37	0.91

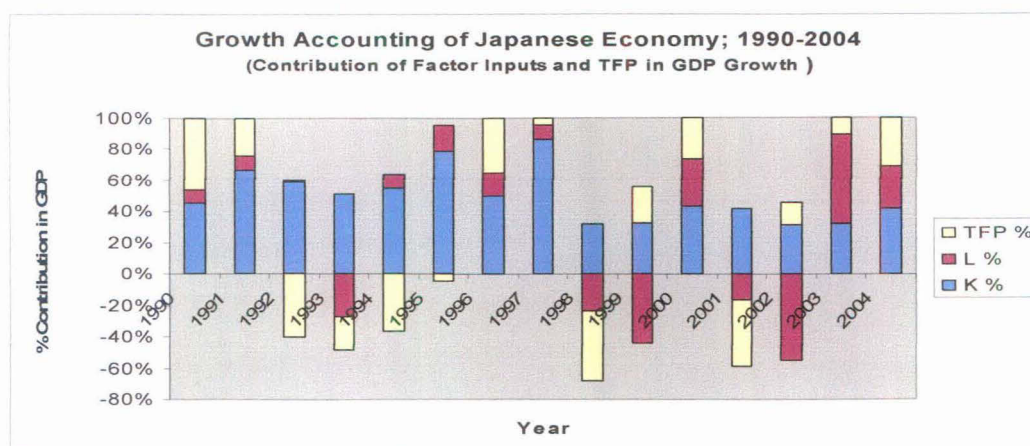
Sources: Research Estimates.

The share of each variable in GDP growth of 0.91% is 0.49%, 0.15% and 0.28% between 2002 and 2004 respectively. This period has been marked up as end of the lost decade.

⁴⁵ See “*Growth and Productivity Accounts Version 1.0 Part I Methodology March 2007*” for more detailed discussion on coverage and classification of industries under EUKLEMS data base.

The Key findings of growth accounting are also explained with the help of following bar diagram. Vertical axis of the diagram measures the contribution of factor inputs and TFP to GDP growth in percentage. Horizontal axis is depicting year from 1990 to 2004. Each bar on diagram is equivalent to GDP growth in that year and has been divided according to share of each contributing factor. The contribution of capital, labour and TFP was 40%, 7% and 63% respectively in 1990. But in 1992 and the following years, contribution of labour and TFP started declining.

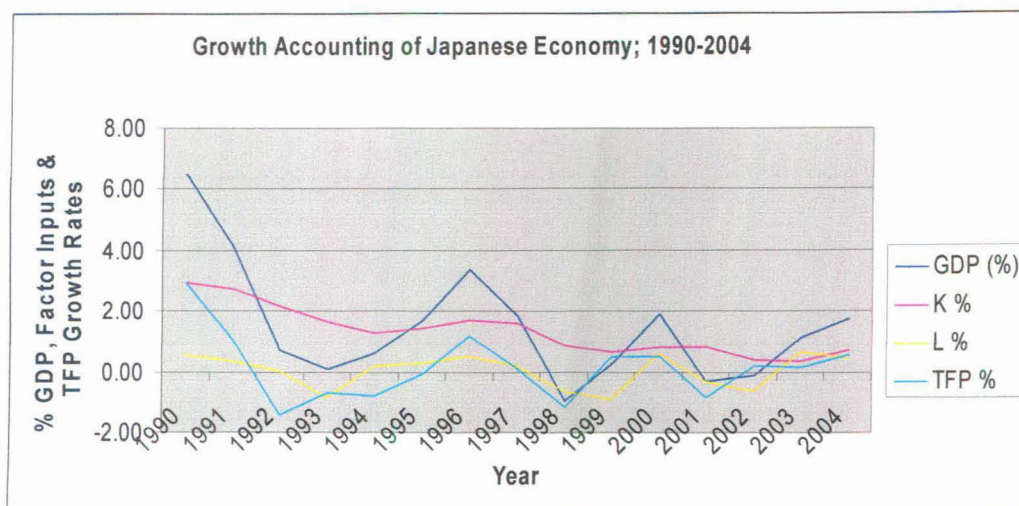
Figure 18: Growth Accounting of Japanese Economy



Sources: Research Estimates

It is evident from the diagram that the share of capital has been positive throughout 1990-2004 and share of TFP of growth has shown a very fluctuating trend. It was positive in 1990 to 1992 but turned negative in 1993 and remained negative till 1996. After showing positive for two years, TFP contribution again became negative in 1998. This is because, Japan had experienced financial crisis in FY 1998, as a result of which economic activities slowed down and hampered GDP growth as well productivity growth. The figure 19, given below shows the trends of GDP, factor inputs and TFP growth from 1990-2004. One important point can be observed from the above figure about the labour input growth, which was positive till 1992, now has become negative in 1993 and again in 1998 and it kept on fluctuating throughout the decade. But after 2002, growth of labour input has become stable since 2003. The causes of such trend of labour input are discussed in the next section of this chapter.

Figure 19: Trends of GDP growth, Factor Inputs and TFP growth



Sources: Research Estimates

However, the first hypothesis is strongly supported by the empirical findings of the research. The contribution of capital has certainly played a greater role in explaining the growth of Japan during 1990-2004. It is evident from the larger contribution of capital (1.49%) than that of labour and TFP. It may be pertinent to point out that on an average capital has played a significant role in sustaining Japan's growth and has proved to be 'life support system' for Japanese economy.

But the second hypothesis is weakly supported by the research's findings for 'lost decade'; nevertheless, it is being strongly supported after 2002. Instead of increasing TFP, it has shown a downward trend. It was 1.0% in 1980s and has come down to 0.09% in 1990s. But it has started showing increasing trend after 2002. This is because of a rise in investment in IT sector in second half of 1990s (See table 15).

The given table shows the declining growth trends of factor inputs and total factor productivity. These trends are plain enough, and these combined effects are prime suspects in the search for explanation of low real GDP growth in the observation period.

Table16: Growth Trends of Output, Factor Inputs and TFP in Japanese economy; 1999-2004 (%)⁴⁶

Year	Growth rate of Output	Growth rate of Capital Input	Growth rate of Labour Input	Growth rate of TFP
1990	6.464211	7.210875	0.953913	2.97
1991	4.099524	6.776953	0.584489	1.00
1992	0.720152	5.372528	0.024789	-1.45
1993	0.108451	4.187594	-1.41401	-0.69
1994	0.620524	3.260449	0.300815	-0.82
1995	1.687365	3.838883	0.504553	-0.09
1996	3.364879	4.345599	0.799689	1.19
1997	1.84233	4.103181	0.268017	0.09
1998	-0.9401	2.215897	-1.02103	-1.17
1999	0.249317	1.751188	-1.47552	0.48
2000	1.926422	2.174471	0.943309	0.51
2001	-0.33339	2.144531	-0.51473	-0.83
2002	-0.11577	0.974652	-1.07934	0.17
2003	1.118787	0.927647	1.040522	0.12
2004	1.732295	1.818467	0.785182	0.53

Sources: EUKLEM's database and Research's Estimation.* Growth rate of Capital and Labour Inputs are not weighted growth rates. Growth rate of TFP has been derived with the help of growth accounting model.

It is evident from the table that the growth of output was around 6% in 1990. While, the growth of capital input, labour input, TFP were around 7%, 0.95% and 2.97% in the same period respectively. The growth of capital input is higher than the growth of labour input, TFP and growth of output. The reason behind such a high growth rate of capital input may, arguably, be high rate of capital investment in asset (stock and real estate) market and other economic activities to reap the benefit from the bubble economy. But growth of capital input slowed down subsequently. This might be due to falling share of private investment from 27.6% to 24.3 in the two periods such as 1984-90 and 1994-2000. Most of the decline in investment occurred in the domestic investment component, not in the current account, the output share of domestic investment declined by 3 percentage points, from 24.6 % to 21.7 % (Hayashi and Prescott 2002: 9).

⁴⁶ These growth rates have been depicted for the purpose of comparative trend analysis .However TFP growth has been derived through growth accounting equation and growth of capital input and labour input are just linear un-weighted growth rates (not multiplied by their respective shares) and are not part of growth accounting equation. This is the reason growth of capital input is come out greater than growth of output.

One important point is that growth of capital input has declined, but never became negative throughout the decade, whereas the other two factors in the table such as labour input and TFP growth, had become negative in different years. It would not be wrong to point out that capital has been emerged as an engine of growth in 1990s. However, during the period the economy appeared to recover from time to time as it is revealed from the table. But these recoveries were not sustainable. In particular, recoveries in 1996-1997 and 2000 were short-lived to be followed by negative GDP growth. There are several factors, apart from institutional factors, which are responsible for such fluctuation in GDP growth. For example, economy recovered in 1996-97 due to appreciation of Yen in 1995 and supported by investment in plant and equipment as well as by a boost in consumption tax from 3% to 5% in April 1997, whereas recovery of 2000 can be attributed to IT sector and recovery of other Asian countries, which, in turn, led to export led growth in Japan. Investment in plant and equipment showed a steady increase while consumption became solid.

Analysis and Discussion of Results

The research has worked out contribution of capital input, labour input and TFP to GDP growth year by year for 1990-2004, and it is depicted in table C at the end of this chapter. The values given in summary table 15 of growth accounting are in percentage. This table shows two phases of Japanese economic growth. First is the lost decade of 1990s and second is recovery phase starting from 2002. The real GDP growth rate in the period (1991-2000) was around 1.0%. This is much smaller than the 3.3% growth registered in 1970s and 4.2% in 1980s respectively. Now the question is why Japan experienced such a less growth. The answer of this question lies in the behaviour of contributing factors to GDP growth. All the three contributing factors to GDP growth were smaller in 1990s as compare to 1980s' estimates. The decline of GDP growth 2.83%, from 4.2% to 1.37% has been decomposed for the sake of analysis, into slowdown growth of following factors: slowdown in growth of labour input, slowdown in growth of capital input and slowdown in growth of total factor productivity (TFP). All the above adverse changes are responsible or contributed to the decline in Japan's economic growth in the period 1991-2000.

The research analysis starts with contribution of capital. From the table of summary of growth accounting, one can find that the weighted growth of capital input

has been positive throughout 1990-2004; and for the entire decade of 1990s, it has positively contributed to GDP by nearly 1.49% as shown in table 15. Although capital contribution has been showing declining trend, but at diminishing rate as compare to 1980s, it was 2.8% in 1980s as shown in the given table. Historically, the contribution of capital has been very high to any other contributing factor since post-war period. It was 6.9% in 1960s, a decade of take-off, and it was 3.8% in the decade of two oil shocks in which Japan experienced its first recession since the Second World War.

Table 17: Comparison of Lost Decade with Previous Decades

Variable	1960s	1970s	1980s	1990s*
Capital Contribution	6.9	3.8	2.8	1.49
Labour Contribution	0.4	1.0	0.4	-0.03
TFP Contribution	3.7	0.7	1.0	0.09
GDP Growth	11.1	4.5	4.2	1.37

Sources: *Research estimates, Estimates of 1960s, 1970s and 1980s published in MITI's, Japan, White paper, 1998.

The reason behind such a high contribution of capital input is high rate of household saving and high rate of private investment in tandem with capital accumulation rate in the period. The percentage of investment to GDP in 1960s and 1970s was 38.4% and 35.7% respectively (see table17). But contribution of capital in decade of 1990s has declined substantially. This downtrend can be attributed to the following facts: first, the growth of capital stock has slowed down, as business community have refrained from business investment due to a decline in the expected growth rate; second, this downtrend of capital input is consistent with the law diminishing return to capital. This confirms the fact that capital has been used intensively while contribution of labour to output growth turned negative.

As depicted in figure 2a and 2b of chapter two, capital output ratio has increased in 1990s, that is, capital has been deepened. Associated with this capital deepening, return on investment or rate of profit has also fallen substantially as shown in figure 2b. The capital output ratio increased nearly by 30% from 1.86% in early 1990s to 2.39%; and return on capital fall from 6.1% in late 1980s to 4.2% in the late 1990s. This high capital output ratio indicating falling productivity of capital, because according to theory of Marginal Productivity of Capital (MPK), as more and more

capital is used (or accumulates) in the economy, productivity of capital goes diminishing.

Theoretically, neo-classical growth model assumes that the decline in TFP growth will also reduce the equilibrium growth rate of the real capital stock (capital input) in balanced growth.⁴⁷ This can be another possible reason for diminishing contribution of capital, because TFP growth has declined by 1 percentage point in the period.

To put it differently, contribution of capital input has been declining, but at diminishing rate it suggests that output growth over the period is supported by high capital-output ratio under falling rate of return on capital.⁴⁸ It may be pertinent to point out that capital deepening has been proved 'life support system' for Japan's economic growth in 1990s subject to pessimistic trend of all other variables.

Slowdown in weighted growth of labour input or contribution of labour from 0.4% in 1980s to - (0.0.3) % in 1990s can be attributed to the following structural changes such as change in working hours and change in demographic trend. As discussed in chapter two of the research, working hours have declined substantially due to revision of Labour Standards Law (LSL), which stipulates reduction of working hours from 48 to 40 hours in a week. Before revision of LSL, working hour were 48 until 1988. Referring to table 8 of the chapter 2, it is evident from the data that the total working hours have been declining yearly from 1995 to 2005. They were 159.2 in 1995 and have fallen up to 150.2 in 2005. These falling working hours adversely affected labour input and become one of the factors for declined labour input contribution to GDP over the period.

Another factor which can be attributed to declined or negative contribution of labour input is Japan's decreasing working-age population since eighties due to

⁴⁷ As suggested by Kyoji Fukao et al. (2003). This is because in neo-classical growth model, the growth of capital depends on Saving rate, Population growth, Output growth, TFP and Depreciation rate. Thus growth of capital has been defined by the equation $K^* = S \times \Delta Y + (N^* + G^* - \delta) \times K$. (* indicates growth).

⁴⁸ There is a School of Thought, according to them, Japan was trapped in to deflation in the 1990s and demand-side factors like unemployment and stagnation of private investment contributed to slowdown in growth and slow down in growth of capital input was caused by demand-side factors.

ageing population⁴⁹. The labour force growth has declined from 2% per annum during 1960-70 to 1.1% in 1985-1990, and declined further to take negative values -0.3% per annum between 1995 and 2000. It is shown in the figure 3a of chapter 2. In the given figure, growth of labour force has been shown. It is clearly visible from the figure 3a that decline of the labour force share of aged 15-24 has occurred in Japan. It is around 65.2% in 2000. There is a sign of increasing median age population in Japan, which has increased by nearly 10 years from 34.3 years in 1960 up to 43.9 years in 2000 (See figure 3b,3c). The share of aged 55 plus in the labour force started to increase in Japan from 1960s onwards. The share of aged 55 plus was 24% in 2000. Logically, this rapid ageing process brings about not only a sharp increase in the dependency ratio, but also a sharp decline in the working-age population.

Consequently, contribution of labour input to economic growth gets decreased. However, aggregate labour supply has also declined in last few decades. According to population census (2000) of Japan, total labour supply was around 66.1 million and it is lower than that of 1995 figure by 1 million. This is the first time in last 40 years that aggregate labour supply has declined after being caused by deceleration in labour force growth and long stagnation.

Another possible impact of demographic change can be understood in terms of technological advancement. It is often said that young people are good in accepting and learning new technologies efficiently. However, with young labour force decreasing due to the declining birth rate and aging population, there is a point of concern that rate of adopting new technologies will be affected. As young people (labour force) may find it difficult to show creativity and positive attitude in an economy. Moreover, if the role of labour-intensive industries, such as medical and care services, increases in the economy, it would become necessary to increase the input of the scarce labour force, and then growth of productivity at macro level may decline (AREPF 2003). Thus, it has been clear from the above facts and figures that the structural factors, for instance, changing demographic trend, decreased labour supply and drop in working hours have been responsible for change in contribution of labour input to GDP growth.

⁴⁹ It is closely followed by lower fertility rate, preceded by a lower mortality rate and a higher life expectancy.

Slowdown of total factor productivity (TFP) growth contribution to GDP growth can be explained by lending to Zombies, credit crunch, and change in sectoral TFP growth equally affecting TFP growth at macro level. Firstly, according to the Zombie hypothesis, 'Banks in order to conceal their bad loan from the Japanese banks have been keeping alive money, losing large borrower by ever greening loans⁵⁰ and discounting lending rates, although the chance that these borrowers will recover is slim'. The percentage of firms which were receiving subsidized bank credit was around 30% but the percentage of such firms had increased in 1993-1999. The percentage of Zombie firms hovered between 5% and 15% until 1993, and then rose sharply over the mid-1990s leading the Zombie percentage above 25% for every year after 1994. The percentage of zombie firms increased in the late 1990s in every industry, though the problem was more serious for non-manufacturing than manufacturing firms. To reiterate, there are two possible channels through which Zombie firms⁵¹ can contribute to low aggregate total factor productivity, which, in turn, hampers economic growth of Japan. First, the Zombie firms themselves exhibit low or even negative rates of firm level productivity growth. In part, some of this poor firm level productivity performance likely reflects falling rates of input utilization. And the Zombie firms also prevent more productive companies from gaining market share, constraining a potentially important source of productivity gains for the overall economy.

Second is the view of creative destruction coined by Schumpeterian. It stipulates the development of new products, and adoption of more efficient production process requires the destruction of old products and outdated production techniques. For instance profit maximizing banks will not provide credit to loss making inefficient firms, instead they will pressurise them to close down. Credit in such condition would be reallocated towards more innovative firms of potentially productive forms. Japanese banks' bad loans are concentrated in non-manufacturing sectors, such as real estate, construction, commerce, and services. Referring to findings of Ahearne and Shinada, discussed in chapter 4, since the major cause of bad loan accumulation is burst of land price bubble, the share of total assets held by Zombie firms in total

⁵⁰ Bank's credit allocation to firms at subsidized or discounted rate of interest rate even they are exhibiting low profitability

⁵¹ Zombie firms are highly inefficient and debt-ridden companies which have low TFP growth.

assets held by publicly traded firms was around 10% in manufacturing sector, while it was around 30% in real estate and service and 20% in construction and retail whole sale. Because of the existence of such zombies, the entry and growth of more productive firms impeded and TFP growth slowed in industries infested by the Zombies. This, in turn, substantially affects the aggregate TFP growth.

The absolute productivity (TFP) distortion, caused by existence of Zombie firms (which emerged due to interest rate subsidies), for different industries in 1996-98 are as follows: for real estate (-4.25%), construction (-3.75%), services (-3.50%) and wholesale and retail (-2.25%) respectively (see figure 8 of chapter 4). One can easily notice that the real estate industry accounted highest productivity distortion and it is closely followed by construction industry. This is because these two sectors were vehemently hit by the collapse of real estate bubble and bad loans mostly concentrated in the two industries. Thus, productivity distortion in all the above industries contributed to slowdown in TFP growth at macro level.

There are also empirical evidences which point out massive misallocation of credit by banks. Correlation between changes in market share and changes in the outstanding loans from banks, for example, in the chemical industry; empirical evidences prove a strong positive correlation of 0.75% over the period of 1980-1990. It tends to suggest that those firms gained market share in 1980-1990 were also able to secure their share of total bank loans to the chemical industry. Thus, the Zombie firm hypothesis or forbearance lending to inefficient firms is one reason which explains the slowdown in TFP at macro level. In a way, this reason is a synthesis of two views, namely, Hayashi and Prescott (2002) and Caballero et al. (2003).

Secondly, change in sectoral level TFP also affected aggregate TFP significantly. It is often said that the growth of a country results from the growth of its sectors, which, in turn, comes from the growth of the industries. In this way, TFP growth of its sectors is ultimately attributed to the TFP growth of industry. Aggregated fluctuations in TFP 1990s were caused by the performance of manufacturing sector. There are empirical evidences which confirm decline in TFP growth in manufacturing sector. The manufacturing sector's contribution to macro TFP growth declined from 0.74% points in 1983-91 to -0.03 percentage points in 1991-98. These figures clearly indicate poor performance of manufacturing sector

through out 1990s. The following factors have contributed to the low level of TFP growth in the sector as explained by Kwon and Kyoji. First is the negative entry effect, that is, average TFP level of exiting firms was higher than the staying firm in the economy in 1990s. The second is limited entry of new firms which have potentially high TFP level. The third is small reallocation effect (see table 12 of chapter 4). However, there are also evidences of inter-firm differences of TFP growth in manufacturing firms of Japan. This was mainly caused by the exclusion of small and medium firms in innovation process, and their stagnation hinders TFP growth in manufacturing sector as a whole. However, large and internationalized firms considerably managed to improve their performance, but the performance of small and less internationalized firms continued to stagnate. TFP gap mainly widened with a high R & D intensity and wherever the internationalization of firms is more advanced.

Thirdly, economists often correlate credit crunch to output slump in 1990s caused by unavailability of investment fund. There is a prevalent view that decline in bank loans was a credit crunch, and this, in turn, depressed productive capacity (output) of Japanese economy; hence TFP growth slowed down through investment channel. Actually it is a hypothesis of credit crunch or bank's Kashi-Shiburi on investment. To reiterate, it states that 'for one reason or another, there is a limit on the amount a firm can borrow. If bank loans and other means of investment finance are not perfect substitutes, an exogenous decrease in the loan limit constrains investment to efficient firms (usually high TFP growth firms), and hence depresses output growth'. Credit crunch defines shortage in supply of credit, arising from the reluctance of banks to lend that is not reflected in higher lending rates. This may originate from increased regulatory oversight, or as reaction to deterioration in asset value and profitability, or both. While on the part of banks during 1990s burdened with heavy loads of bad debts, banks had also fallen into what is called capital crunch. When their equity capital declines, their solvency comes under doubt. This makes it necessary for them to improve the safety level of their assets. Banks, thus, were forced to reduce their lending to corporations. Indeed bank lending has been weak for almost last five years of 1990s. This falling bank lending is characterised as conclusive proof that a credit crunch is occurring and output growth is constrained by its occurrence. The lending conditions for small and medium-sized enterprises are clearly very tight by past standards, but at first sight lending conditions appear to be

little worse for large companies than they were in 1990 and 1991. It is evident from the figure aggregate lending is falling and has become negative in 1998. Usually lending conditions tend to move broadly in line with official interest rates, but official discount rate in 1990 was 6% (see figure 11 of chapter 4). Therefore, after adjusting for the level of official interest rates, lending conditions were much tighter in late 1990s than they were in 1990-91. However, small firms had been the worst hit since 1974-1975. The Financial Service Agency's (FSA) survey of non-performing loans shows that financial institutions which specialize in lending to small businesses have the highest levels of non-performing loans. Almost 17% of the loan portfolios of credit cooperatives were non-performing, whilst 14% of the loan portfolio of Shinkin⁵² banks was non-performing loans. By contrast, the average proportion of non-performing loans in the banking sector was 11%.

Nonetheless, the magnitude of credit crunch is very significant in analyzing the impact of credit crunch. Referring to findings of Taizo and Yoshikawa (1999) discussed in chapter 4, it had been estimated that credit crunch lowered the growth rate of real GDP by 1.6% in 1998. They further concluded that credit crunch had major negative effect on aggregate investment during 1997-1998. In this way, they also support the credit crunch hypothesis and its impact on real economy. Thus, evidences from different empirical research have also confirmed that investment was constrained by the changed lending attitude of banks during the decade, though for a short period of time. It may be convincing to point out that productivity had declined due to unavailability of credit (credit crunch) to efficient firms (high TFP growth) and at the same time banks were engaged in forbearance lending by supporting inefficient firms (low TFP growth firm). This lending attitude of the banks affected adversely productive capacity of the economy (through unavailability of investment fund), therefore to productivity growth at macro level. Thus, combination of these factors can be attributed to decline or slowdown in TFP growth in Japanese economy at macro level in 1990s.

Although TFP has started showing sign of improvement since 2002, the dominating factor is change in the pattern of investment in second half of the 1990s.

⁵² Corporation Banks

Referring to chapter 4 of the research, investment in IT manufacturing is contributing in the revival of growth. From the contribution of IT manufacturing industries, for instance, computer communication equipments and electronic components accounted only 0.15% during 1990-1995, while it was 0.31% in 1973-90. However, since 1995 IT manufacturing has contributed 0.41% to aggregate value added. In the late 1990s IT manufacturing revived relatively to other industries due to high investment, so that almost one third of the growth in aggregate value added is generated by the growth of IT manufacturing in the late 1990s (see figure16A).

Similarly, industry wise contribution to aggregate (ATF) in the late 1990s shows that the growth rate of TFP is 6.38%, for computers it is 7.07% and for communication equipment and 7.96% for electronic components respectively. The contribution of TFP growth in IT manufacturing to economic growth at economy wide level is 0.39 %. A decomposition of sources of TFP growth also suggests TFP growth in IT sector has contributed significantly to overall TFP growth. In Japan, TFP growth in the IT sector accounts for more than 40% of overall TFP growth since the late 1990s. In particular, the contribution of TFP growth in the computer producing sector is dominant (0.27%) source of TFP growth. If effect of IT revolution is viewed in terms of uses of IT goods and services, then some empirical evidences suggesting that labour productivity in IT capital intensive industries, for example, IT manufacturing industries, communications and finance and insurance industry, are higher in the second half of 1990s.

However, overall all labour productivity has decreased from 4.6% to 1.4% between 1980 and 1998, but intra-sectoral capital deepening has been major factor in recent labour productivity growth. The contribution of IT capital deepening to labour productivity growth has increased by 7.8% from 20.7% in the early 1980s to 28.5 in 1990s (see table 14 of chapter 4).

However, the critical point is that this rise in productivity growth (TFP) in some sector of the economy is offset by low productivity growth in other sectors. In fact, the diffusion of IT revolution crucially hinges on the extent to which productivity gains in IT goods and services (using and producing) industries extend to other industries or sector of the economy. If such gains remains confined to the few sectors or industries, then economy will not be able to achieve full-fledged recovery.

Concluding Remarks

It has been noted in the work of Hayashi and Prescott (2002) that TFP growth in 1990s is capable to account well the lost decade of Japan. The research is also of the view that decline in TFP growth is dominant factor to explain stagnation of Japanese economy. However, one might say that slowdown has been noticed in almost each factor input in 1990s, and slowdown in Japan's economic growth is jointly caused by slowdown of capital, labour and TFP. But slowdown in TFP is more pronounced and capable to account the lost decade well. This is because contribution of labour was already nearly zero before the lost decade, whereas contribution of capital has been declined but at diminishing rate. The only factor which has shown a sudden strange picture in 1990s is contribution of total factor productivity (TFP). Its contribution has fallen from 1.0% in 1980s to 0.09% in 1990s. It may be pertinent to point out that slow down in TFP is more explanatory to account for slow down in growth of output (GDP). To restore potential growth, Japan will have to rely less on production factors such as labour and capital and more on TFP growth under new era globalisation and information and technology.

Table A : Computation Of Labour Share And Capital Share					
Formula Used		Labour Share= Labour Compensation(Millions of Yen)/Gross Value Added (GDP) Capital Share= Capital Compensation(Millions of Yen)/Gross Value Added (GDP)			
Year	Labour Compensation	Capital Compensation	Gross value Added Output	Labour Share	Capital Share
1989	-	-	405,313,500	-	-
1990	259,495,798	177836386.8	437,332,185	0.593360853	0.406639147
1991	278170829.4	189726057.9	467,896,887	0.594513101	0.405486899
1992	286,991,314	192687651.4	479,678,965	0.598298726	0.401701274
1993	292,573,777	190,498,438	483,072,216	0.605652256	0.394347744
1994	299,009,232	187,669,611	486,678,843	0.61438716	0.38561284
1995	304,704,280	187194221.9	491,898,502	0.619445432	0.380554568
1996	309,500,931	195,678,863	505,179,794	0.612655008	0.387344992
1997	316,405,311	200,289,452	516,694,763	0.612364076	0.387635924
1998	313,266,857	197,873,068	511,139,925	0.612878865	0.387121135
1999	309,346,776	194,856,528	504,203,304	0.613535796	0.386464204
2000	311,425,593	193,479,858	504,905,452	0.616799824	0.383200176
2001	307,311,978	188,898,898	496,210,876	0.619317296	0.380682704
2002	300,810,841	188,819,660	489,630,501	0.614362955	0.385637045
2003	300,918,294	185,892,135	486,810,430	0.618142661	0.381857339
2004	292,322,145	194,761,247	487,083,392	0.600148044	0.399851956
	Average			0.609724137	0.390275863
	$\alpha + (1 - \alpha)$		Capital Share + Labour Share	1	

Sources:

- Data on Capital Compensation, Labour Compensation and Gross value added Collected from EU KLEMS Database version 2007 available at www.euklems.net
- Capital share α , and Labour share $(1 - \alpha)$ are calculated for growth accounting.

Table B :Computation Of Annual Growth Rates of Output and Factor Inputs

Year	Gross value added(100=1995)	Labour Input	Capital Input	$\Delta Y/Y$	$\Delta L/L$	$\Delta K/K$
1989	87.4595	99.0679	74.2072			
1990	93.1131	100.0129	79.5582	0.06464211	0.00953913	0.07210875
1991	96.9302	100.5974	84.9498	0.04099524	0.00584489	0.06776953
1992	97.6283	100.6224	89.5138	0.00720152	0.00024789	0.05372528
1993	97.7342	99.1996	93.2623	0.00108451	-0.01414007	0.04187594
1994	98.3406	99.4980	96.3030	0.00620524	0.00300815	0.03260449
1995	100.0000	100.0000	100.0000	0.01687365	0.00504553	0.03838883
1996	103.3649	100.7997	104.3456	0.03364879	0.00799689	0.04345599
1997	105.2692	101.0698	108.6271	0.01842330	0.00268017	0.04103181
1998	104.2796	100.0379	111.0342	-0.00940104	-0.01021035	0.02215897
1999	104.5395	98.5618	112.9786	0.00249317	-0.01475523	0.01751188
2000	106.5534	99.4916	115.4353	0.01926422	0.00943309	0.02174471
2001	106.1982	98.9794	117.9108	-0.00333393	-0.00514728	0.02144531
2002	106.0752	97.9111	119.0600	-0.00115773	-0.01079342	0.00974652
2003	107.2620	98.9299	120.1645	0.01118787	0.01040522	0.00927647
2004	109.1201	99.7067	122.3496	0.01732295	0.00785182	0.01818467

Sources:

- Data on Gross value Added, Labour Input, and Capital Input Collected from EU KLEMS Database version March 2007 available at www.euklems.net
- Growth rate indices of output and factor inputs calculated for growth accounting.

Table C : Growth Accounting of Japanese Economy; 1990-2004						
Year	Sources of Growth					
	Output Growth	Capital	Labour	Total Factor Productivity	TFP Growth	
	$\Delta Y/Y$	$\alpha \Delta K/K$	$(1-\alpha)\Delta L/L$	$\Delta A/A$	% age	
1990	0.064642115	0.029322241	0.005660149	0.029659725	2.97	
1991	0.040995241	0.027479657	0.003474862	0.010040722	1.00	
1992	0.007201521	0.021581513	0.000148314	-0.014528306	-1.45	
1993	0.001084508	0.016513682	-0.008563964	-0.00686521	-0.69	
1994	0.006205237	0.012572711	0.001848169	-0.008215644	-0.82	
1995	0.016873648	0.014609045	0.00312543	-0.000860827	-0.09	
1996	0.033648786	0.016832458	0.004899333	0.011916994	1.19	
1997	0.018423299	0.015905405	0.001641241	0.000876653	0.09	
1998	-0.009401038	0.008578205	-0.006257705	-0.011721538	-1.17	
1999	0.00249317	0.006767714	-0.009052861	0.004778317	0.48	
2000	0.019264223	0.008332575	0.00581833	0.005113318	0.51	
2001	-0.003333928	0.00816386	-0.003187799	-0.008309988	-0.83	
2002	-0.001157726	0.003758618	-0.006631079	0.001714735	0.17	
2003	0.011187869	0.00354229	0.006431908	0.001213671	0.12	
2004	0.01732295	0.007271175	0.004712256	0.005339518	0.53	

Sources: Research Estimates.

Chapter 6

Conclusion

Japan's defeat in World War II enabled the Japanese people to develop a new economy since every thing they had built during the years was destroyed from the war. Therefore, decade of 1950s has been the period of series of reform policies introduced under U.S occupation. However, the recovery of Japanese economy during post-war was achieved through the implementation of Dodge Plan (1949) and the effect it had from the Korean War. In fact, the Korean War boom caused rapid increase in production and marked the beginning of the economic miracle. These factors can be characterised as America's contribution in Japan's recovery. Besides these factors, there were some political factors contributing to growth, such as Ikeda's Income Doubling Plan and policies adopted by Prime Minister Yoshida Shigeru (that is, Yoshida Doctrine).

However, the MITI's⁵³ (now METI- Ministry of Economy, Trade and Industry) approach was one of providing encouragement and guidance to the initiatives of private business, such as creating a suitable environment for business activities, provide financial assistance and to distribute technology to companies and in targeted industries, for instance, steel, ship-building, chemicals and machinery etc. During 1960s, Japan's economy grew at a rapid pace, more than 10% per annum throughout the decade. One of the factors that dominated (which underpinned the economic growth of Japan) on other factors for growth was practical use of technology and technological know-how that had been imported from foreign countries. Therefore, the share of TFP, has been very high in 1960s. The contribution of TFP to GDP growth reached around 26% in 1960-65 as depicted in table six of third chapter. However, a number of studies have investigated the extent to which rapid output growth in post-war Japan resulted from increases in capital input, labour input, and total factor productivity. The relative importance of each component varies across studies due to methodology and data source. For example, Dension and Chung (1976) found that 22%, 20%, and 59% of the Japanese real output growth, during 1953-71, was attributable to real capital input, real labour input, and TFP, respectively; whereas Nishimizu and Hulten (1978) found these contributions to be 58%, 17%, and 25%

⁵³ Ministry of International Trade and Industry.

respectively. Most of the studies have found, however, that TFP and Capital input were the two most important factors contributing to post-war economic growth in Japan.

However, data evidence on saving and investment as share of GDP suggest that rapid growth of the two decades was largely financed by the endogenous sources. In 1960-1970, the national saving was nearly 25% of GDP. This high rate of saving made available to private sector as investment fund through different channel, and led further expansion of economy. The oil crisis of 1973 had an enormous effect on the growing Japanese economy; it made Japan's rising growth curve kinked growth curve. However, Japan was able to minimize the adverse effect of second oil crisis and succeeded in achieving economic recovery. Thenceforward, economy moved on steady growth path until 1991.

However during the 1970s and 1980s some adverse development, such as high capital output ratio, revision of Labour Standards Law (falling working hours from 48 to 40 hours in a week) and changing demographic trend, had taken place in the economy and adversely affected the real economy from supply side.

During 1980s the Japanese economy experienced various fluctuations, such as appreciation of Yen and speculative activities in real estate sector, in stock market etc. which led to the rise of bubble economy. It collapsed in the early 1991. The rise of bubble economy was fuelled by flood of liquidity unleashed by a policy of low interest rates, which bank of Japan (BOJ) implemented after the Plaza Accord of 1985. Thereafter, it became clear to the authorities (at the BOJ and the MOF), that asset price inflation had gone too far, therefore the BOJ decided to 'smash the bubble' by implementing a sharp rise of discount rates. Consequently economy faced its longest recession since post-war period. The Japanese economic problems in 1990s, no doubt, started with bursting of bubble. But the problem of less growth and its persistence for more than twelve year had been further compounded by banking crisis during 1990s. Japan had experienced failure of major financial institutions after the bubble burst. Therefore, decade of 1990s is known as lost decade in terms of less or stagnant economic growth, which has been around 1% during the period.

During 1980s Japanese firms aggressively increased their borrowing from banks to expand the investment in land and stocks towards the end of 1980s, when asset prices were soaring. Many of these bank loans became non-performing when asset prices collapsed in the early 1990s. This is because in 1980s land and other assets had been used extensively as collateral in granting loans by banks. When the economic bubble collapsed the stock prices lost roughly 80% of their value from the 1989 through mid- 2003, and commercial land prices had also fallen by roughly 60% since their peak (see appendix 17). These adverse shocks impaired collateral values sufficiently, which had been used by banks to grant loans and non-payment of such loans by companies, created a huge amount of bad loans. The continue increase in NPLs or bad loans distorted real economic performance via malfunctioning of the banking sector and resulted in to problems such as ever-greening of loans to inefficient firms and credit crunch.

Turning towards policy implications, a close analysis of the process of boom and burst in chapter 3 suggest that the economic policies of Japanese government in 1980s, and also in post-bubble period, by and large appeared to be misguided. For example, monetary policy should have been tightened sooner during the bubble period to prevent such a pronounced bubble. Yet, the monetary policy should have been loosened sooner, more fiscal stimulus should have been injected into the economy and the government should have acted little sooner with viable policy measures to resolve the financial crisis and the non-performing loans problem during post-bubble period.

But in contrast, Japanese policy makers and governmental agencies, such as Ministry of Finance (MOF), Economic Planning Agency etc. adopted wait and watch approach, and assumed that the ashes emerged out of the bubble collapse will be wiped out soon and economy will be back on track as it was before the collapse of bubble. As a result of this policy, economy kept on experiencing sporadic failures of banks. Further, in order to bailout failed financial institutions, government used tax payers' money which squarely invited criticism. However, this policy failed miserably, and money channeled through it went into the waste bin. Alternatively, this money should have been invested in some other more profitable activities.

Major findings of the research can be summarised as follows:

After in-depth analysis of Japanese economy during pre- and post-bubble periods and decomposing of sources of growth rate of GDP in to share of capital, share of labour and total factor productivity, following point can, arguably, be put forward:

- The average annual growth rate of GDP of Japanese economy was 1.37% from 1991 to 2000. It is really very less growth, which declined by 2.8 percentage point. It was around 4.2% in 1980s. Why did Japan experience such a less growth? In order to explain slowdown of growth in comparison to growth of 1980s and 1970s, total factor productivity plays a crucial role. This is because TFP has almost disappeared as source of economic growth in Japan and decline in TFP has long-term effects on economy. As TFP declines it affects economic growth of a nation not only because it reduces output growth by itself but also because it diminishes the rate of return on capital and discourages further investment.
- The decomposition analysis of GDP reveals that contribution of capital is 1.49%, of labour it is -0.035% and of TFP is 0.09%. It is clearly visible from the statistics that the contribution of capital is relatively higher than other two variables. Thus, it can be pointed out that capital has a greater role in explaining 1.37% growth of GDP throughout 1990s.
- To reiterate, contribution of capital input has declined but at diminishing rate due to high capital-output ratio, which, in turn, points out to falling marginal product of capital. While the contribution of labour input has also declined, which can be attributed to structural changes, such as drop in working hours (notably decline in hours work per week from 44 hours to 40 hours between 1988 and 1993), brought about by revision of labour standards laws. Another structural change is current demographic trend: ageing population causing further reduction in working-population declined growth of labour force, and reduced supply of labour over the period. However, abundant supply of labour due to high population growth rate and large movement of agricultural labour towards manufacturing sector has been a conspicuous feature of last three decades of 19th century. However this demographic trend has changed drastically due to ageing of population over the

period and declining working-age population. Thus, the factors, which have been instrumental in past growth, gradually ceased to work and economy was adversely affected from supply side over the period in Japan.

- The research has demonstrated contribution of capital input, labour input and TFP growth to GDP growth and found contribution of TFP growth falling significantly. The research believes slowdown in TFP growth from 1.0% in 1980s to 0.0% in 1990s is the important cause of a decade-long stagnation, but at the same time it is also a dominant factor in recent recovery of growth. By using new and advanced database in measuring TFP growth in Japan, research has reinforced previously held views suggesting slowdown in TFP growth as a major cause of decade-long stagnation; it has also given an alternative explanation by putting forward causes of TFP slowdown. Following points can be outlined as causes of TFP growth slow down based on Japan's experience in 1990s:
- First important point has been identified in the chapter 4, during banking crisis, banks continued to provide loans to those firms which were highly inefficient and unproductive and experiencing in low TFP growth. These firms were largely concentrated in real estate, construction, and retail, wholesale and service sector. And commerce around 30% of these firms was receiving bank's subsidised credit. The sustainability of such companies or firms is attributed to banking sector of Japan and its malfunctioning in credit allocation at discounted rate. These firms were under-performing and continued supply of fund to such firms that affected other firms and economy's productivity negatively by two ways. Firstly, it restricts entry of potentially high TFP growth firms in the market. Secondly, through unavailability of investment fund due to misallocation of fund. To put it differently, inefficient firms affect Aggregate TFP directly by continuing its activities and indirectly by deterring entry of more productive firms. It is found that total factor productivity (TFP) growth held up well, or even increased in the 1990s, in traded goods sector, while growth in non-traded goods sectors generally was sluggish and often decline to a roughly 0.5% rate of annual average. The decline in TFP over 1990s in the civil engineering sub-sector of the construction industry roughly half of which resulted from falling productivity with in firms (See table in appendix 10a,b,c). The residual resulted from gains in market-share

by less productive firms at the expense of firms with higher or more rapidly growing level of productivity in other construction sectors and contribution from productivity growth within firms showing from 2.5 percentage points in 1980 to $\frac{3}{4}$ percentage point in 1990's. In addition, contribution from reallocation of market share turned from a positive rate about $\frac{1}{4}$ % point in 1980 to negative contribution of $\frac{1}{2}$ % point in 1990s. To reiterate, there are also evidences of misallocation of credit which further strengthen the argument of forbearance lending and low TFP growth in Zombie firms. The existence of misallocation of credit by banks in Japan is substantiated by a strong correlation between changes in market share and changes in the share of outstanding loans from banks. A strong correlation between changes in market share and changes in the share of outstanding loans from banks is found. For example, in the chemical industry, their empirical evidence proved a strong positive correlation (0.75) over the period of 1980-1990, which means that those firms gained market share over this period and tended to increase their share of total bank's loans. Thus, due to existence of Zombie firms' growth of productive and profit-making firms impeded and total factor productivity (TFP) slowed down in industries infested by Zombies. This slowdown in TFP in Zombie infested firms affects aggregate TFP at macro level.⁵⁴

The reason behind ever-greening⁵⁵ of loans to Zombies are changing risk preference of banks, in turn making them softer about providing additional loans. Bank of International Settlement (BIS) rule governing bank's minimum level of capital so called Basel Capital Standards which stipulates banks should call in all its non-performing loans which in turn pushes them up against minimum capital levels. This fear of falling below the capital standards has led many banks to continue to loans to such inefficient firms. Thus, banks in a sense concealed their loans due to this fear.

- Second relevant point is found as a negative outcome of banking crisis is the problem of credit crunch. The reluctance in lending by banks is characterized as credit crunch and this further depresses productive capacity of efficient firms

⁵⁴In a sense, the cause of slowdown of TFP growth in Zombies and its effect at macro level TFP growth has flavour of Hayashi, Prescott and Caballero et al. arguments respectively.

⁵⁵ A practice of continuing loans to inefficient firms with low TFP growth.

(high TFP firms). Banks engaged in 'reluctance to lend' (credit crunch) practice during the banking-crisis period of 1996-97, because the recession and the concomitant collapse of asset prices had reduced bank's capital. Further, banks had to reduce their lending to satisfy the newly introduced BIS regulations on the capital adequacy of banks, because banks had to find some way of securing the funds needed to engage in 'forbearance lending' or ever greening of loans to less efficient (low TFP) firms. And this 'forcible withdrawal of funds' or 'reluctance to lend' acted against firms of intermediate efficiency and high TFP growth. It forced many of them to exit. This, in turn, affected TFP growth at macro level significantly. It is also found that condition of small firms were more vulnerable than that of large firms during credit crunch. This is partly because large firms were able to find other sources of finance partly because of large amount of bad debts were concentrated in small and medium enterprises (SMEs), which resulted in SMEs facing tight lending condition. However, high capital output ratio is a clear sign of availability of credit (investment fund) in the early 1990s, but as most of the studies substantiate the fact that credit crunch was more severe in the second half of 1990s, and was also consistent with diminishing growth rate of capital input. As lending condition had been tightening, the availability of credit was also shrinking. Further, leading the slowdown in growth capital input as a whole, if not the entire decade, at least, in second half of the decade.

- To reiterate, it is said that the growth of a country results from the growth of its sectors, which, in turn, is an outcome of the growth of its industries. In this way, productivity growth (TFP) of its sectors, ultimately, attributed to the productivity growth of concerned industries. Thus, third credible point, which comes out from the analysis, is the under-performance of sectoral level productivity, which contributed negatively also to aggregate TFP growth, which, in turn, hampered the growth of output at macro level in 1990s. As mentioned earlier, manufacturing sector's contribution to macro TFP growth declined from 0.74 percentage points in 1983-91 to -0.03 percentage points in 1991-98. The factors which have contributed to the low level of TFP growth have been identified as first, negative entry effect, that is, an average TFP level of exiting (leaving the market) firms was higher than the staying firm in the economy in 1990s. In other words, the average TFP level of leaving firms is higher than those of staying firms. Second factor is

the limited entry of new firms which have potentially high TFP level, or efficient firms; and third is, small reallocation effects or small reallocation of resources from less efficient firms to more efficient one. Another point has been observed regarding manufacturing sector is inter-firm difference in TFP.

Thus, productivity slowdown is induced not only by slowdown of technological progress but also by misallocation of fund and malfunctioning of intermediation system. The resultant problems, for instance, the Zombie lending and credit crunch are the perfect example of it. Therefore, research put forward factors like Zombie lending, credit crunch, and sectoral level TFP as an alternative explanation which caused slowdown in TFP at macro level in the light of Japan's experiences in last twelve years. The observed slowdown in TFP, in turn, slowed down the output growth or GDP growth of Japanese economy in 1990s.

One striking point is that contribution of capital and labour as well as TFP have shown optimistic picture for 2002-2004 in research's estimates (See table 15). The share of each of them in GDP growth of 0.91% is 0.49%, 0.15% and 0.28% respectively. This period has been marked up as the end of the lost decade. Research further finds that recent revival of output/GDP growth, TFP growth and positive contribution of labour input after 2002 are some signs of recovery and can be attributed to increasing investment in IT using and manufacturing sectors in Japan in late 1990s. Indeed in the second half of 1990s, share of the Japanese Gross Domestic Product devoted to investment in computers, telecommunications equipment, and software rose sharply and positive effect of such a high investment began to be visible after some time. The rate of total factor productivity growth has increased in IT goods and services manufacturing as well as using industries.

The point of concern is that recent improvement in TFP growth is attributable to productivity growth of IT using and manufacturing sectors and this improvement is largely offset by low TFP growth in other sectors of the economy. That is why economy is not able to achieve a full-fledged recovery. Hence, there is an urgent need to adopt specific measures to raise the TFP at macro level.

Policy Prescription:

However, the Japanese economy has many problems from the view point of supply side, but it still has the competence for steady growth. Following comprehensive policy prescriptions are put forwarded by the research, based on detailed analysis of Japanese economy in 1990-2005.

1. Japan's priority in the days to come should be to restore health of banks and other financial intermediaries to put its economy back on good and sustainable track. However, recent performance in the sector is satisfactory, but still a new strategy to cope with new challenges arising out of globalisation need to be adopted. Many economists like Hoshi and Kashyap, and Fukao, in their respective studies highlight the importance of rigorous supervision and regulation, together with rigorous implementation by the financial services agency (FSA) to restore financial institution balance sheets and to create the right incentives. Further to make banking sector and stock market more efficient new innovations are the key to further improvement.
2. To a certain extent, the way to cancel out decrease in labour force by removal of structural impediments that restrict the movement of labour between firms and discouraging women from participating to a greater extent. Another possibility that has received scant attention until now is to promote immigration to Japan.⁵⁶ labour shortage can be eased and TFP can be increased by shifting labour intensive production to developing countries which have abundant supply of labour at low wage. Further, promoting the transfer of domestic labour to knowledge and technology intensive fields.⁵⁷
3. Japan must increase its productivity (TFP) at macro level by introducing innovation in non-IT manufacturing industries as well as manufacturing sector as a whole. Japan should set clear goals to develop a nation-wide campaign of improvement in productivity.
4. Due to radical change in demographic trend it is most critical for Japan to enhance the abilities of every worker and achieve improvement of productivity. It has

⁵⁶ As suggested by Ono and Rebick (2002).

⁵⁷ As suggested in AREPF (2002)

become the need of the day for educational institution, industries and regional administrators to cooperate and collaborate in nurturing human resources. To this end extensive use of IT goods and services, reduction of work loads and investment in the latest equipments would be required. However, recent steps taken by the government under different administration, such as Structural Reforms with philosophy of ‘no growth without reform’ adopted in 2001, New Economic Strategy (2006) formulated by METI emphasizing more on innovations, Information Technology Council (2000) aimed to overtake and surpass the US economy in IT field, adoption of Zero Interest Rate Policy and Quantitative Easing Policy (2000) committed to liquidity supply at zero rate of interest, lifted in 2006, are some appreciable policy measures and have been instrumental somewhere in recent growth revival in their targeted areas.

Thus, this research concludes with an inquiry about causes of decade-long growth stagnation and subsequent recovery. There are several explanation of decade long less growth as, aforementioned, such as inadequate macroeconomic polices, the lost competitiveness and the ‘hollowing-out’ phenomenon, and deflation due to liquidity trap. But in accordance with the findings of the research, one thing is certain that unless TFP growth increases across the economy less GDP growth will persist and economy will not be able achieve full-fledged recovery or 5% (approx.) as it had enjoyed in 1980s. To quote Hayashi and Prescott (2002:18):

“Future growth of Japan will crucially depend up on the value of exogenous variable (TFP). If the TFP growth rate increases to historical norms of the industrial leader Japan will not fall further behind the leader- rather, it will maintain its position relative to the industrial leader. If, on the other hand, TFP growth is more rapid than the leader, Japan will catch back up.”

Hence, it would not be wrong to say TFP growth is similar to *Manna from Heaven* for Japanese economy. Therefore, all efforts of government of Japan should be squarely directed towards the policies to raise total factor productivity of the economy.

APPENDICES

Appendix: 1

Table: Ikeda's Income Doubling Plan and Results Achieved

	Goal *	Actual	Goal %	Actual%
Total Population(10,000s)	10222	10,372	0.9	1.0
Number Employed(10,,000)	4,689	5,094	1.2	1.5
Numberof employees(10,000)	1,924	3,309	4.1	4.3
GrossNational product(Trillion Yen)	26.0	40.6	8.8	11.6
PerCapitaNational Income(10,000yen)	20.8	31.8	6.9	10.4
Mining &Mfg. Output	431.7	539.4	11.9	13.9
EnergyDemand(100\$millions of ton)	3.0	5.7	7.8	12.0
Export\$100millions	80.8	202.5	10.0	16.8
Import\$100millions	98.9	195.3	9.3	15.5

Sources: Kosai Yutaka, 1986.

Appendix: 2

Table 4: Post War Economic Plans under different Administration in Japan

Nick Name	Date & Tenure	Planning Horizon & Survival
Five Yrs Independence Plan	Dec.23 1955, Hatoyama	FY1956-1960 FY1961 and FY1962
New Long term economic Plan	Dec.17, 1957, Kishi	FY1958-1962 FY1963, 1964, 1965.
Doubling Income Plan	Dec.27,1960, Ikeda	FY1961-1970 FY1961,1962,1963
Middle- term Economic Plan	Jan. 22,1965, Sato	FY194-1968 FY1964,1965,1966
Economic and social development Plan	March13, 1967 ,Sato	FY1967-1971 FY 1967,1968,1969
New economic and social development Plan	May1 1970 Sato,	FY 1970-1975 FY 1970,1971,1972
Economic and Social Basic Plan	Feb.13,1973	FY1973-1977 FY1973,1974,1975
First half of Showa 50s economic Plan	May14,1976 , Miki	FY1976-1980 FY1976,1977,1978
New economic and social seven Year Plan	August 10,1979, Ohira	FY1979-1985 FY1979,1980,1981,1982
Outlook and Guide for the Economy and Society in the 1980s.	August12,1983, Nakasone	FY1983-1990 FY1983,1984,1985,1986,1987
Japan Together with the world-Five-Year Economic	May 27,1988 Takeshita	FY1988-1993 FY1988,1989,1990

Sources: Cited in Ito Takatoshi (1992)

Appendix: 3

Income Type	Income Tax	Average Saving Rate	% of Saving
Labour Income	.525	.140	41
Capital Income	.237	.374	42
Transfer Income	.031a;16;1b	1.000*; 0	0

Table: Composition of Household Saving in Japan, 1979-81

Sources: Sato (1987) a, b are observed values and * are conjectural values.

Appendix: 4

Table: Improvement in Labour Productivity in Iron and Steel industry (Hours)

	Blast furnace (iron)	Open hearth furnace (steel)	Revolving furnace (steel)
1951	1.77	3.01	—
1952	1.71	2.93	—
1953	1.45	2.68	—
1954	1.36	2.46	—
1955	1.25	2.12	—
1956	1.07	2.00	—
1957	0.98	1.85	—
1958	0.91	1.83	—
1959	0.75	1.69	—
1960	0.66	1.54	0.75
1961	0.53	1.46	0.69
1962	0.48	1.57	0.68
1963	0.44	1.56	0.58
1964	0.38	1.36	0.48
1965	0.35	1.60	0.48
1966	0.30	1.62	0.42
1967	0.25	1.52	0.38
1968	0.21	1.72	0.38
1969	0.17	1.60	0.34
1970	0.16	1.87	0.34

Sources: Ministry of Labour, Report on Labour Productivity, 1971. Cited in Yoshi Kawa Hiroshi, 2000.

Appendix: 4a

Table: Declining Net Return on Capital from 1980-1999

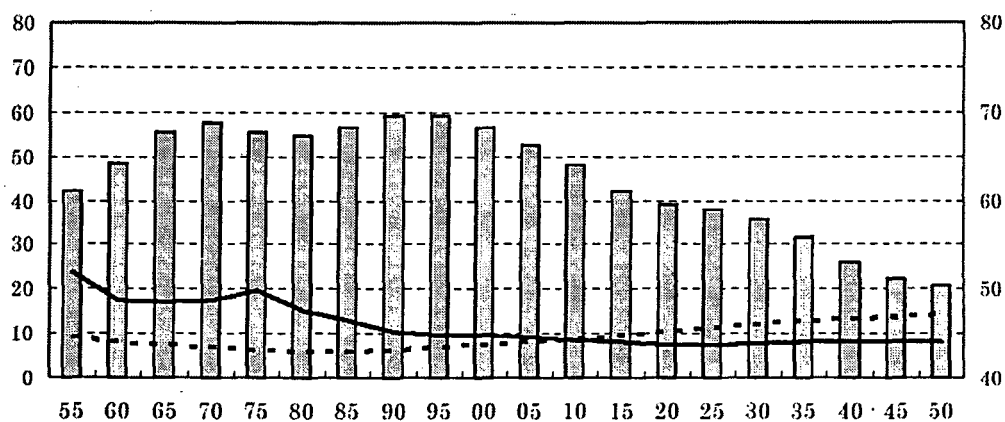
	Before-tax net returns among the entire industries (1990 prices, trillion yen)	Physical stocks held by all private corporations (1990 prices, trillion yen)	Net returns on gross stocks (%)
1980	20,990	272,022	7.72
1985	23,182	393,555	5.89
1990	40,996	574,600	7.13
1995	24,835	759,806	3.27
1999	13,609	914,895	1.49

Sources: Economic and Social Research Institute Japan, 2003

Appendix: 5a

Figure: Birth rate, Mortality and Working Population Ratio in Japan

No. Birth rate & Death rate /1000 Proportion of aged 15-64 in Total population. (%)



Sources: Population Division of the Department of economic and social affairs of the United Nations secretariat, world Population Prospects: The 2002 Revision and world urbanization Prospects: The 2001 Revision.

Appendix: 5b

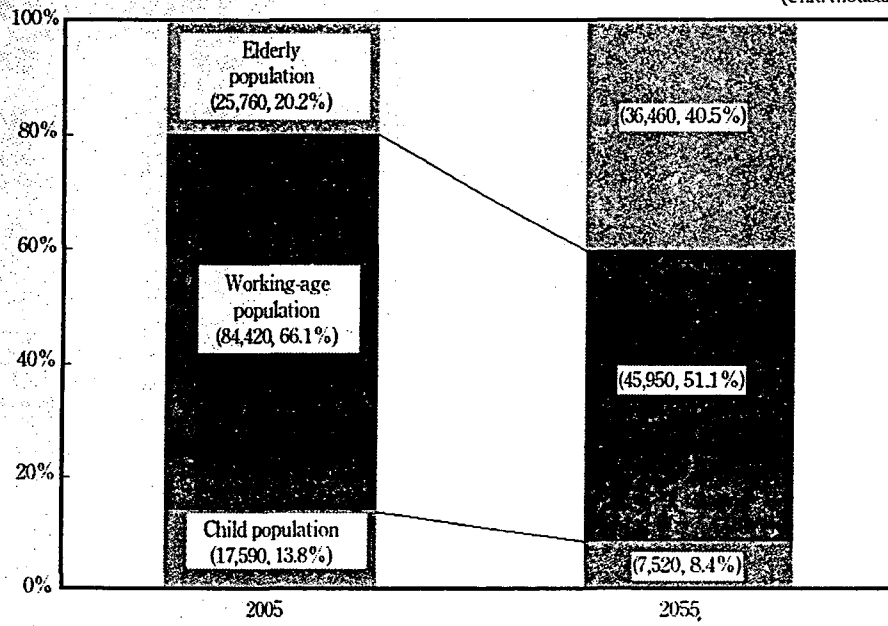
Table: Ageing Population in Japan

	Population (thousands)	Share of age group (%)		
		Age 0-14	15-64	65 and over
2000	126,892	14.7	68.1	17.2
2010	127,623	14.3	63.6	22.0
2020	124,133	13.7	59.5	26.9
2030	117,149	12.7	59.3	28.0
2040	108,964	12.9	56.1	31.0
2050	100,496	13.1	54.6	32.3

Appendix: 6

Chart: Change in Composition of Population by Age Group: Present and Future

(Unit: thousand people)



Sources: MERI'S Monthly Circular, April 2007.

Appendix: 7a

Revision of Labour Standards Law, 1947

CHAPTER IV

WORKING HOURS, REST PERIODS, REST DAYS, AND ANNUAL LEAVE WITH PAY

(Working Hours)

Article 32. An employer shall not have a worker work more than 40 hours per week, excluding rest periods.

2. An employer shall not have a worker work more than 8 hours per day for each day of the week, excluding rest periods.

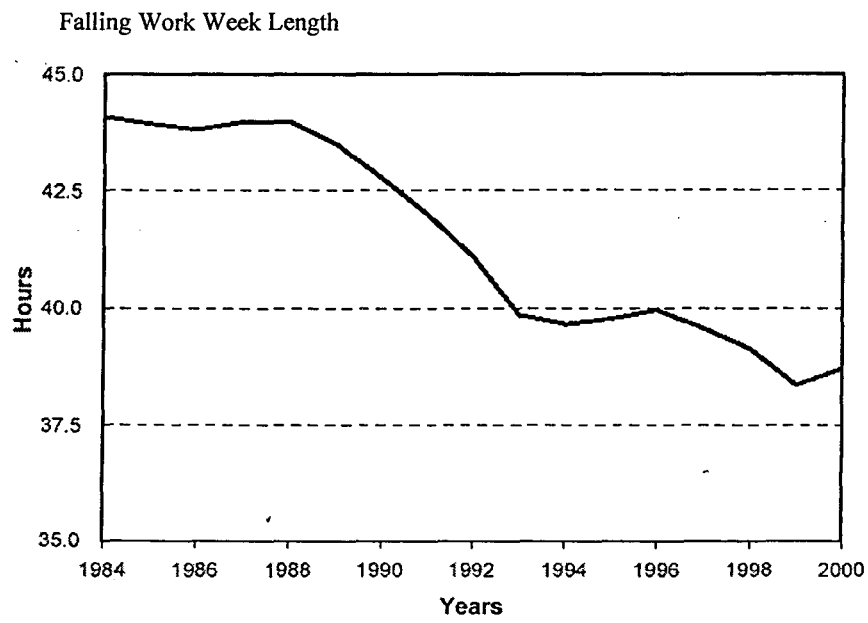
(Monthly working hours averaging system)

Article 32-2. In the event that an employer has stipulated, pursuant to a written agreement with a trade union organized by a majority of the workers at the workplace concerned where such a union exists, or with a person representing a majority of the workers where no such union exists, or pursuant to rules of employment or the equivalent thereof, that the average working hours per week over the course of a fixed period of no more than one month will not exceed the working hours set forth in paragraph 1 of the preceding Article, the employer may, in accordance with such stipulation and regardless of the provisions of the preceding Article, have a worker work in excess of the working hours set forth in paragraph 1 of the preceding Article in a specified week or weeks and may have a worker work in excess of the working hours set forth in paragraph 2 of the preceding Article in a specified day or days.

2. The employer shall submit the agreement stipulated in the preceding paragraph to the administrative office, as provided for by Ordinance of the Ministry of Health, Labour & Welfare.

Sources: Ministry of Health, Labour and Welfare, Japan.

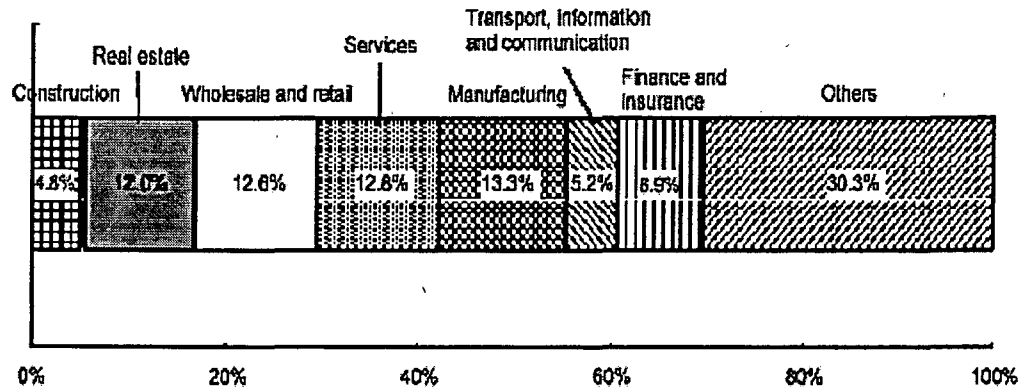
Appendix: 7b



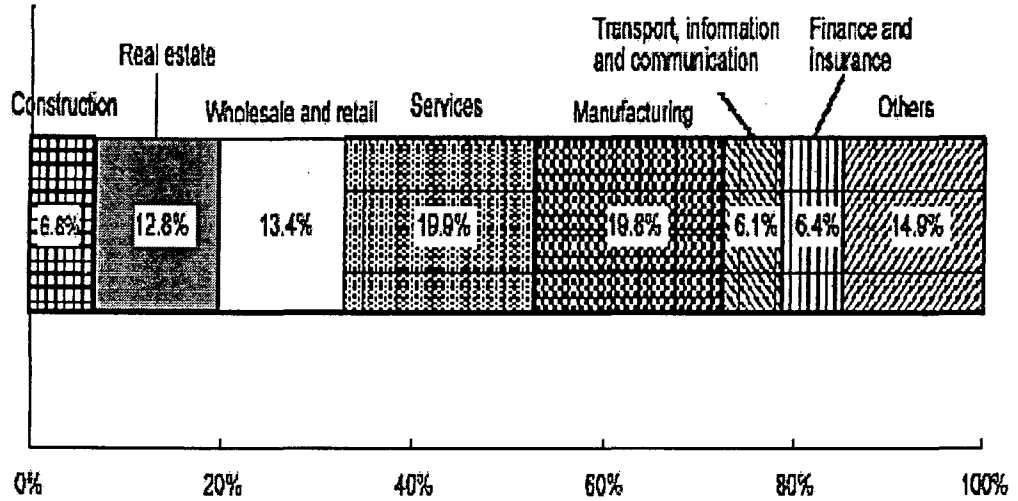
Sources: Cited in Hayashi and Prescott, 2002.

Appendix: 8

Upper section: Overall Loans and Discounts Outstanding



Lower section: Gross Domestic Product (GDP)



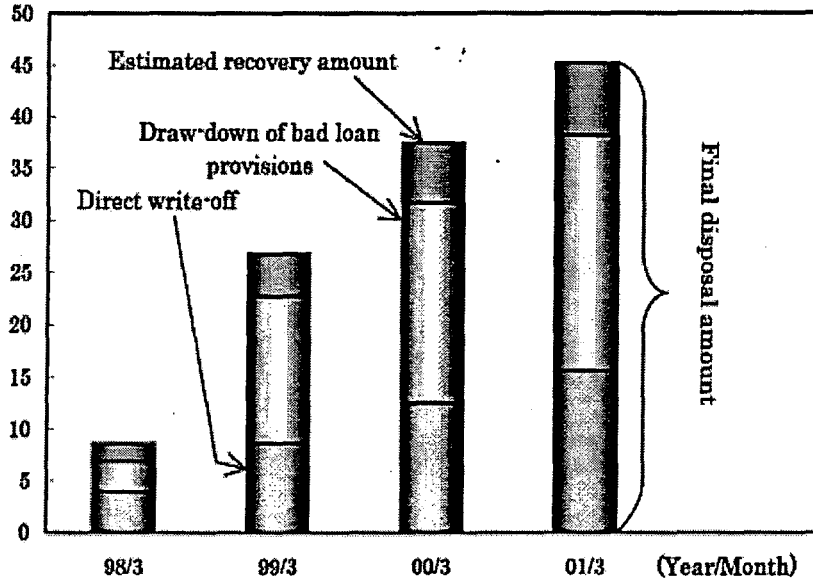
Sources: Nobueo Inaba et al.

Appendix: 8a

Figure: Amount of Finally Disposed NPLs; 1993-2003

¥45 trillion of non-performing loans finally disposed of in 4 years

(In ¥1 trillion) (Accumulated amount from March 1998)

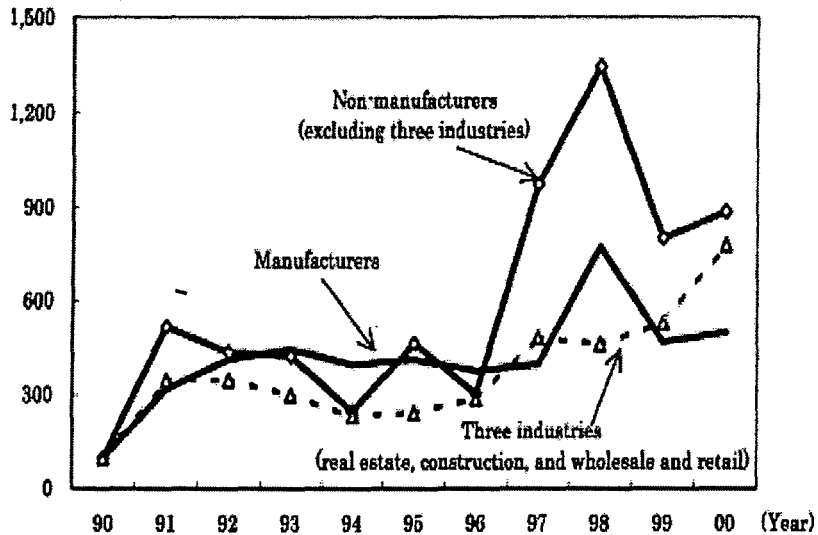


Sources: Status of Risk management Loans, FSA (2002).

Appendix: 8b

Figure: NPLs increasing also in Manufacturing Industries

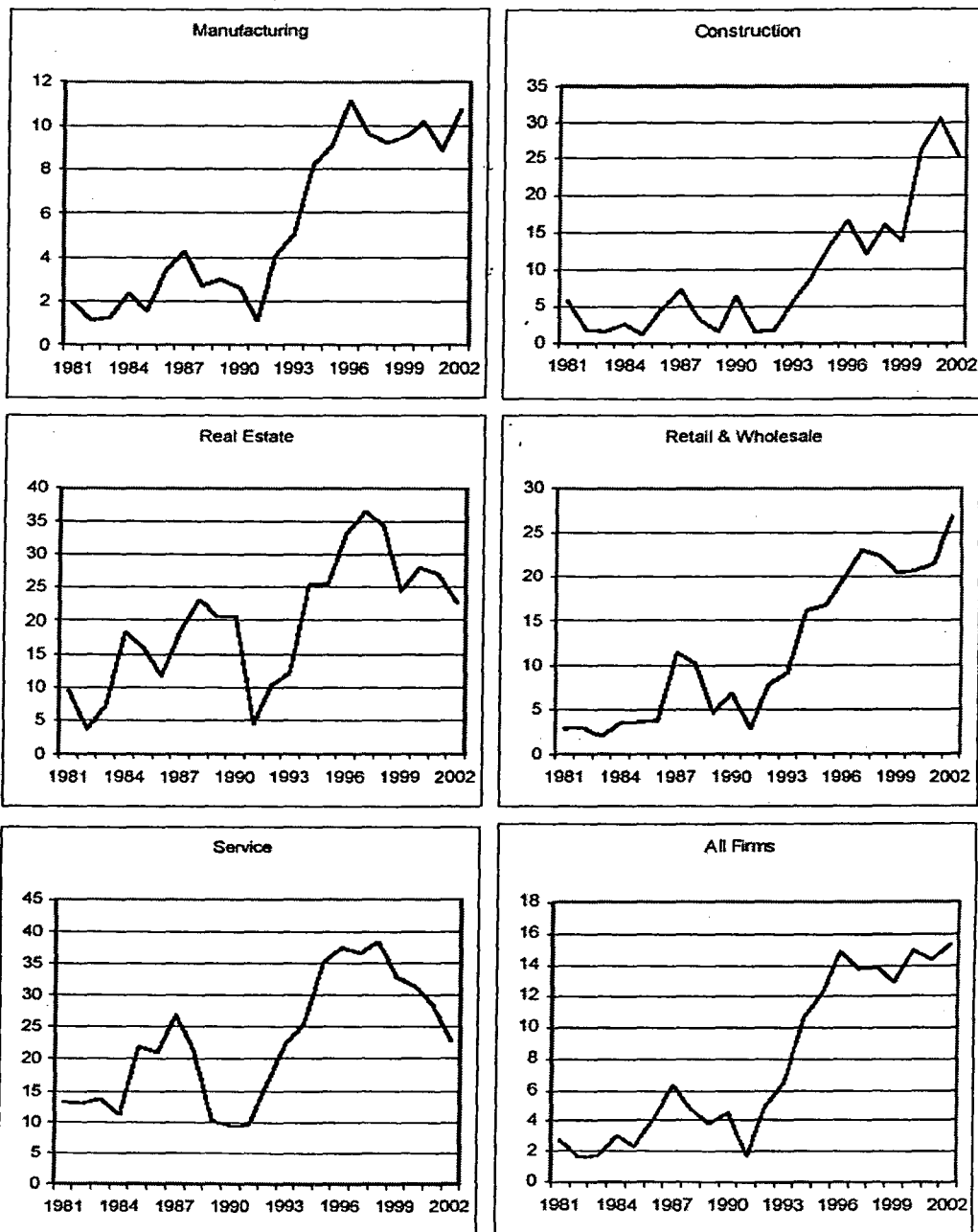
(Liabilities, 1990 = 100)



Sources: Monthly Bankruptcy Report, White Paper, 2000-01, Japan

Appendix: 9

Incidence of Zombies across Industries



Sources: Caballero et al. (2003)

Appendix: 10a

Table: Result of Decomposition of TFP Growth in Traded and Non-Traded Goods Sector

a. Chemicals	Average annual % change	
	1981-1990	1991-2001
1. Multifactor productivity	2.8	2.2
<i>Contribution (percentage points):</i>		
2. "Within" component	2.0	1.4
3. "Between" component	0.1	0.0
4. "Covariance" component	0.7	0.8

b. Transport Equipment	Average annual % change	
	1981-1990	1991-2001
1. Multifactor productivity	1.8	3.9
<i>Contribution (percentage points):</i>		
2. "Within" component	1.5	3.3
3. "Between" component	0.1	0.2
4. "Covariance" component	0.2	0.4

c. Electrical Machinery	Average annual % change	
	1981-1990	1991-2001
1. Multifactor productivity	4.1	4.3
<i>Contribution (percentage points):</i>		
2. "Within" component	3.5	3.7
3. "Between" component	0.1	0.1
4. "Covariance" component	0.5	0.5

d. Precision Machinery	Average annual % change	
	1981-1990	1991-2001
1. Multifactor productivity	-0.7	2.0
<i>Contribution (percentage points):</i>		
2. "Within" component	-0.6	1.6
3. "Between" component	-0.2	0.0
4. "Covariance" component	0.1	0.4

Sources: Ahearne and Naoki Shinada (2004)

Appendix: 10b

Continued...

c. Food Products	Average annual % change	
	1981-1990	1991-2001
1. Multifactor productivity	-0.5	-0.3
<i>Contribution (percentage points):</i>		
2. "Within" component	-0.6	-0.5
3. "Between" component	0.0	0.0
4. "Covariance" component	0.1	0.2

f. Textiles	Average annual % change	
	1981-1990	1991-2001
1. Multifactor productivity	2.1	-0.4
<i>Contribution (percentage points):</i>		
2. "Within" component	2.2	-0.4
3. "Between" component	0.0	0.0
4. "Covariance" component	-0.1	0.0

g. Iron and Steel	Average annual % change	
	1981-1990	1991-2001
1. Multifactor productivity	1.3	-1.8
<i>Contribution (percentage points):</i>		
2. "Within" component	1.1	-1.7
3. "Between" component	0.1	0.1
4. "Covariance" component	0.1	-0.2

h. Construction (Civil Engineering)	Average annual % change	
	1981-1990	1991-2001
1. Multifactor productivity	3.2	-0.4
<i>Contribution (percentage points):</i>		
2. "Within" component	2.2	-0.2
3. "Between" component	0.3	-0.1
4. "Covariance" component	0.7	-0.1

Sources: Ahearne and Naoki Shinada (2004)

Appendix: 10c

Continued.....

i. Construction (Other)	Average annual % change	
	1981-1990	1991-2001
1. Multifactor productivity	2.9	0.2
<i>Contribution (percentage points):</i>		
2. "Within" component	2.6	0.7
3. "Between" component	0.0	-0.3
4. "Covariance" component	0.3	-0.2

j. Retail Trade	Average annual % change	
	1981-1990	1991-2001
1. Multifactor productivity	0.3	0.1
<i>Contribution (percentage points):</i>		
2. "Within" component	0.2	0.3
3. "Between" component	0.0	0.0
4. "Covariance" component	0.1	-0.2

k. Wholesale Trade	Average annual % change	
	1981-1990	1991-2001
1. Multifactor productivity	1.7	1.4
<i>Contribution (percentage points):</i>		
2. "Within" component	1.6	1.5
3. "Between" component	0.1	0.0
4. "Covariance" component	0.0	-0.1

l. Cargo Road Transport	Average annual % change	
	1981-1990	1991-2001
1. Multifactor productivity	0.2	-0.2
<i>Contribution (percentage points):</i>		
2. "Within" component	0.0	0.1
3. "Between" component	0.1	0.1
4. "Covariance" component	0.1	-0.4

Sources: Ahearne and Naoki Shinada (2004)

Appendix: 11

Table: Correlation between changes in Market share and Change in Outstanding Share of Bank Loans.

Industry	1980-1990	1991-2001
Chemicals	0.75	0.08
Transport Equipment	0.17	-0.45
Electrical Machinery	0.66	-0.59
Precision Machinery	0.63	-0.51
Food Products	-0.08	-0.05
Textiles	-0.61	-0.87
Iron and Steel	-0.13	-0.25
Construction (Civil Engineering)	-0.85	0.18
Construction (Other)	0.10	0.27
Retail Trade	0.43	0.29
Wholesale Trade	0.61	0.33
Cargo Road Transport	0.88	-0.51

Sources: Ahearne and Naoki Shinada (2004)

Appendix: 12

Sources of TFP Growth by Industry, 1970-98

JIP Industry Code	JIP industry name	Industry name (two digit classification)	TFP Growth			Industry contributions to macro TFP growth		
			%			(Danzon weight) ^a		
			1973-83	1983-91	1991-98	1973-83	1983-91	1991-98
1	Rice, wheat production	Agriculture, forestry, and fishery	-3.570%	-1.418%	-3.034%	-0.070%	-0.200%	-0.020%
2	Other cultivation and seed planting	Agriculture, forestry, and fishery	0.869%	-2.267%	-0.122%	0.016%	-0.034%	-0.019%
3	Livestock, poultry	Agriculture, forestry, and fishery	2.068%	1.850%	0.821%	0.030%	0.019%	0.007%
4	Veterinary, farming services	Agriculture, forestry, and fishery	-1.974%	-0.497%	-1.821%	-0.004%	-0.001%	-0.002%
5	Forestry	Agriculture, forestry, and fishery	-0.422%	-0.931%	2.369%	-0.008%	-0.004%	0.009%
6	Marine products	Agriculture, forestry, and fishery	0.728%	0.136%	0.379%	0.006%	-0.001%	0.003%
7	Coal, lignite mining	Mining	-5.699%	-1.211%	-3.425%	-0.009%	-0.002%	-0.015%
8	Metal mining	Mining	-0.489%	7.249%	-9.659%	0.000%	0.002%	0.005%
9	Crude oil, natural gas exploration	Mining	-6.924%	4.206%	-4.385%	-0.007%	0.001%	-0.003%
10	Quarry, gravel extraction, other mining	Mining	1.806%	0.116%	0.046%	0.015%	0.000%	0.000%
11	Livestock products	Food processing	-0.452%	0.142%	0.112%	-0.009%	0.000%	0.001%
12	Processed marine products	Food processing	3.407%	-0.024%	0.014%	0.040%	-0.001%	0.000%
13	Rice polishing, flour milling	Food processing	-1.073%	-2.787%	1.073%	-0.022%	-0.020%	0.011%
14	Other foods	Food processing	0.090%	0.003%	-0.356%	0.009%	-0.003%	-0.011%
15	Beverages	Food processing	-0.503%	-0.012%	-0.113%	-0.007%	-0.002%	-0.001%
16	Tobacco	Food processing	0.905%	6.678%	-6.131%	0.007%	0.021%	-0.019%
17	Silk	Textile, apparel and leather products	3.053%	0.106%	0.084%	0.024%	0.000%	0.000%
18	Spinning	Textile, apparel and leather products	1.638%	0.782%	-1.529%	0.004%	0.001%	-0.001%
19	Fabrics and other textile products	Textile, apparel and leather products	0.732%	-1.267%	-0.263%	0.016%	-0.024%	-0.003%
20	Apparel and accessories	Textile, apparel and leather products	-2.063%	2.339%	-0.439%	-0.053%	0.043%	-0.007%
21	Lumber and wood products	Wood, paper and printing	4.068%	-0.865%	-0.07%	0.114%	-0.010%	0.000%
22	Furniture	Wood, paper and printing	1.122%	-0.133%	-0.859%	0.014%	-0.001%	-0.008%
23	Pulp, paper, paper products	Wood, paper and printing	0.362%	0.503%	0.253%	0.009%	0.013%	0.005%
24	Publishing and printing	Wood, paper and printing	0.683%	-0.819%	-0.573%	0.020%	-0.022%	-0.013%
25	Leather and leather products	Textile, apparel and leather products	0.683%	0.766%	-0.154%	0.002%	0.008%	-0.001%
26	Rubber products	Chemicals	0.137%	2.856%	-1.582%	0.001%	0.028%	-0.012%
27	Basic chemicals	Chemicals	0.447%	1.023%	0.874%	0.017%	0.039%	0.024%
28	Chemical fibers	Chemicals	3.343%	0.250%	-0.103%	0.014%	0.000%	0.000%
29	Other chemicals	Chemicals	1.972%	2.250%	0.256%	0.067%	0.071%	0.008%
30	Petroleum products	Petroleum and coal products	-0.053%	2.061%	-1.326%	0.021%	0.039%	-0.012%
31	Coal products	Petroleum and coal products	0.494%	0.707%	-1.351%	0.009%	0.003%	-0.003%
32	Stone, clay & glass products	Other manufacturing	0.239%	0.577%	0.689%	0.004%	0.019%	0.015%
33	Steel manufacturing	Metal	-0.368%	2.926%	0.548%	-0.001%	0.061%	0.003%
34	Other steel	Metal	-1.133%	0.437%	-0.299%	-0.116%	0.019%	-0.010%
35	Non-ferrous metals	Metal	0.834%	0.643%	1.301%	0.014%	0.017%	0.017%
36	Metal products	Metal	1.068%	-0.844%	-0.222%	0.030%	-0.032%	-0.066%
37	General machinery equipment	General and precision machinery	1.767%	0.778%	-0.897%	0.167%	0.075%	-0.081%
38	Electrical machinery	Electronic and electric equipment	0.091%	-0.229%	0.190%	0.009%	-0.003%	0.001%
39	Equipment and supplies for household use	Electronic and electric equipment	1.730%	3.233%	-0.334%	0.070%	0.132%	-0.014%
40	Other electrical machinery	Electronic and electric equipment	3.079%	4.427%	1.714%	0.109%	0.304%	0.130%
41	Motor vehicles	Transportation equipment	0.624%	0.104%	-0.170%	0.052%	0.009%	-0.013%
42	Ships	Transportation equipment	0.481%	1.828%	-2.512%	0.018%	0.018%	-0.007%
43	Other transportation equipment	Transportation equipment	0.637%	-0.538%	-0.789%	0.008%	-0.009%	-0.006%
44	Precision machinery & equipment	General and precision machinery	1.788%	1.787%	-0.169%	0.024%	0.021%	-0.004%
45	Other manufacturing	Other manufacturing	-0.095%	0.273%	-0.302%	-0.009%	0.010%	-0.011%

Appendix: 12a

Continued.....

46 Construction	Construction and civil engineering	-1.691%	0.899%	-1.999%	-0.248%	0.110%	-0.221%
47 Civil engineering	Construction and civil engineering	0.046%	0.885%	-0.814%	0.013%	0.061%	-0.667%
48 Electricity	Electric, gas, and water supply	-1.824%	1.399%	-0.136%	-0.060%	0.041%	-0.033%
49 Gas, heat supply	Electric, gas, and water supply	-0.619%	2.706%	0.991%	-0.002%	0.012%	0.005%
50 Waterworks	Electric, gas, and water supply	-1.329%	0.719%	-1.841%	-0.010%	0.003%	-0.011%
51 Water supply for industrial use	Electric, gas, and water supply	-1.346%	-0.209%	-1.850%	0.000%	0.000%	-0.001%
52 Waste disposal	Electric, gas, and water supply	-9.904%	0.178%	-4.630%	-0.038%	0.003%	-0.019%
53 Wholesale	Wholesale and retail	3.091%	-3.450%	3.137%	0.360%	-0.426%	0.390%
54 Retail	Wholesale and retail	-1.737%	-0.147%	0.069%	-0.160%	-0.028%	0.007%
55 Finance	Finance, insurance, and real estate	-0.684%	3.129%	0.015%	-0.028%	0.173%	0.008%
56 Insurance	Finance, insurance, and real estate	3.123%	2.361%	3.574%	0.054%	0.055%	0.065%
57 Real estate	Finance, insurance, and real estate	-3.923%	-4.634%	-0.472%	-0.120%	-0.155%	-0.017%
58 Housing	Input-output housing rent	-3.621%	0.434%	1.599%	-0.260%	0.031%	0.139%
59 Railway	Transport	-0.137%	-0.134%	-4.053%	-0.008%	-0.006%	-0.055%
60 Road transportation	Transport	-0.382%	-0.633%	-1.631%	-0.015%	-0.027%	-0.088%
61 Water transportation	Transport	-2.079%	-1.198%	-1.125%	-0.057%	-0.013%	-0.014%
62 Air transportation	Transport	-2.257%	1.112%	1.804%	-0.010%	0.007%	0.010%
63 Other transportation, packing	Transport	0.260%	-0.882%	-2.003%	0.001%	-0.010%	-0.010%
64 Telegraph, telephone	Communication and broadcasting	-0.723%	3.465%	6.481%	-0.016%	0.062%	0.137%
65 Mail	Communication and broadcasting	-5.717%	5.370%	-2.633%	-0.021%	0.021%	-0.015%
66 Education (private, non-profit)	Public services, general government, and miscellaneous sectors	-1.489%	1.146%	1.570%	-0.014%	0.014%	0.021%
67 Research	Public services, general government, and miscellaneous sectors	3.861%	2.027%	3.762%	0.006%	0.005%	0.010%
68 Medical, hygiene (private)	Public services, general government, and miscellaneous sectors	3.004%	-1.563%	-1.851%	0.099%	-0.066%	-0.074%
69 Other public services	Public services, general government, and miscellaneous sectors	-2.582%	0.711%	-0.588%	-0.020%	-0.013%	-0.025%
70 Advertising	Business services	3.001%	0.783%	-2.361%	0.029%	0.011%	-0.030%
71 Rental of office equipment and goods	Business services	2.080%	-11.240%	1.367%	0.023%	-0.183%	0.035%
72 Other services for businesses	Business services	-4.500%	3.091%	-0.390%	-0.175%	0.169%	-0.031%
73 Entertainment	Private services	-2.826%	-1.170%	-1.681%	-0.061%	-0.036%	-0.045%
74 Broadcasting	Communication and broadcasting	-0.126%	-2.800%	0.284%	-0.002%	-0.014%	0.001%
75 Restaurants	Private services	0.197%	-0.673%	1.136%	0.010%	-0.033%	0.057%
76 Inns	Private services	-0.512%	-2.686%	1.992%	-0.008%	-0.038%	0.027%
77 Laundry, hair-cutting, public bath	Private services	-3.787%	2.719%	-0.489%	-0.036%	0.031%	-0.054%
78 Other services for individuals	Private services	-1.658%	4.421%	-0.733%	-0.015%	0.047%	-0.093%
79 Education (public)	Public services, general government, and miscellaneous sectors	-3.203%	1.076%	-0.259%	-0.119%	0.040%	-0.010%
80 Medical, hygiene (public)	Public services, general government, and miscellaneous sectors	2.197%	-1.891%	-0.156%	0.025%	-0.022%	-0.065%
81 Public administration	Public services, general government, and miscellaneous sectors	-1.900%	-1.574%	0.440%	-0.073%	-0.107%	0.034%
82 Medical, hygiene (non-profit)	Public services, general government, and miscellaneous sectors	2.179%	-0.652%	-1.156%	0.017%	-0.007%	-0.016%
83 Others (non-profit)	Public services, general government, and miscellaneous sectors	0.911%	-1.449%	2.314%	0.010%	-0.018%	0.031%
84 Activities not elsewhere classified	Public services, general government, and miscellaneous sectors	n.a.	n.a.	n.a.	0.000%	0.000%	0.000%
Manufacturing subtotal	Manufacturing subtotal				0.655%	0.743%	-0.028%
Total	Total				-0.307%	0.403%	0.197%

Sources: Kyoji Fukao et al.'s Findings 2003.

Appendix: 13

Table: TFP Level Gap between the 5 Percentile Firm and the 25 percentile Firm Industry and
By Gap.

Industry	1994	1995	1996	1997	1998	1999	2000	2001	Change of dispersion: 1994-2001	Average market share of each industry: 1994-2001
Drugs and medicine	0.158	0.165	0.180	0.201	0.197	0.207	0.227	0.216	0.058	0.021
Petroleum and coal products	0.123	0.121	0.142	0.197	0.164	0.155	0.193	0.176	0.053	0.030
Electronic data processing machines and electronic equipment	0.164	0.182	0.180	0.178	0.181	0.189	0.193	0.208	0.044	0.060
Electronic parts and devices	0.149	0.150	0.150	0.153	0.151	0.168	0.167	0.190	0.042	0.055
Miscellaneous transportation equipment	0.104	0.103	0.107	0.117	0.193	0.151	0.108	0.142	0.038	0.014
Other manufacturing	0.119	0.127	0.128	0.128	0.131	0.139	0.153	0.155	0.036	0.018
Oils and paints	0.094	0.088	0.098	0.092	0.101	0.101	0.145	0.129	0.035	0.010
Non-ferrous metals and products	0.100	0.085	0.096	0.093	0.097	0.104	0.117	0.122	0.022	0.024
Miscellaneous electrical machinery and supplies	0.132	0.120	0.115	0.127	0.117	0.141	0.138	0.134	0.022	0.013
Motor vehicles	0.100	0.099	0.101	0.103	0.106	0.114	0.114	0.120	0.020	0.135
Communication equipment and related products	0.167	0.183	0.156	0.154	0.181	0.156	0.166	0.186	0.019	0.037
Household electric appliances	0.124	0.116	0.114	0.110	0.128	0.142	0.153	0.136	0.012	0.008
Rubber products	0.122	0.121	0.124	0.122	0.115	0.128	0.138	0.131	0.009	0.010
Plastic products	0.106	0.096	0.109	0.100	0.105	0.111	0.115	0.115	0.009	0.027
Office, service industry and household machines	0.130	0.147	0.135	0.119	0.125	0.133	0.131	0.137	0.007	0.018
Fabricated metal products	0.123	0.119	0.112	0.107	0.116	0.129	0.129	0.129	0.006	0.053
Textiles	0.186	0.189	0.201	0.196	0.199	0.199	0.193	0.188	0.002	0.024
Industrial chemicals and chemical fibers	0.115	0.100	0.106	0.108	0.111	0.109	0.104	0.114	-0.001	0.042
Wood and furniture	0.112	0.099	0.099	0.097	0.095	0.094	0.110	0.109	-0.003	0.014
Special industrial machinery	0.120	0.124	0.112	0.111	0.106	0.117	0.135	0.117	-0.003	0.024
Pulp and paper	0.102	0.090	0.089	0.087	0.097	0.097	0.105	0.098	-0.004	0.025
Food	0.132	0.122	0.118	0.111	0.116	0.113	0.117	0.128	-0.004	0.119
Printing and publishing	0.157	0.141	0.145	0.137	0.136	0.141	0.153	0.151	-0.005	0.039
Miscellaneous machinery and machine parts	0.127	0.113	0.111	0.119	0.119	0.138	0.125	0.119	-0.008	0.043
Industrial electric apparatus	0.139	0.136	0.140	0.124	0.139	0.146	0.155	0.130	-0.009	0.030
Other chemical products	0.136	0.123	0.124	0.138	0.132	0.138	0.129	0.117	-0.009	0.017
Precision instruments	0.160	0.137	0.152	0.133	0.149	0.148	0.143	0.149	-0.011	0.016
Iron and steel	0.118	0.089	0.088	0.083	0.117	0.112	0.097	0.106	-0.011	0.038
Ceramics	0.140	0.123	0.132	0.123	0.123	0.114	0.124	0.126	-0.014	0.026
Metal working machinery	0.185	0.130	0.112	0.101	0.139	0.139	0.149	0.128	-0.057	0.009
Weighted average of all the industries	0.130	0.125	0.125	0.125	0.130	0.134	0.137	0.141	0.011	1.000

Sources: Fukao Kyoji et al., 2005

Appendix: 14

Table: Pattern of IT investment by Industry

	1975-80	1980-85	1985-90	1990-98
Agriculture	-0.4	16.6	17.4	-2.7
Mining	-42.1	50.8	29.8	3.4
Food and beverages	22.2	36.0	25.3	-1.2
Textiles	53.2	-15.4	29.4	-2.7
Pulp and paper	-12.4	51.6	27.0	0.1
Chemical products	3.6	40.1	22.1	3.9
Petroleum and coal products	15.3	35.4	16.0	2.1
Clay, stone and glass products	26.3	28.1	22.3	4.3
Basic metal products	0.9	51.2	15.2	1.1
Fabricated metal products	43.0	25.8	46.7	-9.7
General machinery	-11.7	63.2	12.3	2.0
Electric machinery	-2.7	70.9	14.9	2.4
Transportation machinery	6.7	42.9	18.4	0.3
Precision instruments	27.6	42.3	12.1	2.4
Other manufacturing products	7.1	53.3	14.4	7.1
Construction and buildings	-13.5	49.1	22.8	6.6
Electric power, water and gas supply	0.4	15.2	29.1	4.4
Wholesale and retail	53.1	14.6	7.2	4.6
Banking and insurance	-19.5	73.2	-5.5	11.1
Real estate	-22.3	58.6	14.1	-6.6
Transportation and telecommunication service	17.2	51.2	16.8	11.4
Service	13.7	19.6	17.9	9.2

Sources: JCER Discussion paper, No.75

Appendix: 15

Table: GDP Growth, Fiscal 2001-2005

	2001	2002	2003	2004	2005
Real growth:	-0.8	1.1	2.3	1.7	3.2
Domestic demand:		0.4	1.5	1.2	2.7
External growth:	-0.2	0.7	0.8	0.5	0.5
	-0.5				
Nominal growth:	-2.1	-0.7	1.0	0.5	1.8
Domestic demand:	-1.6	-1.2	0.4	0.6	2.3
External demand:	-0.5	0.5	0.6	-0.1	-0.5

Sources: Cabinet office, Japan, quarterly Estimate of GDP, April-June 2006

Appendix: 16

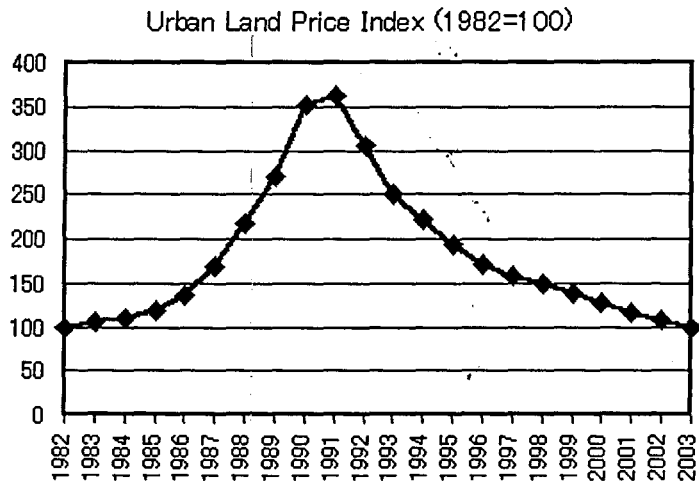
List of EU-KLEMS DataBase Coverage; 71 Industries.

Description	Code
TOTAL INDUSTRIES	TOT
MARKET ECONOMY	MARKT
ELECTRICAL MACHINERY, POST AND COMMUNICATION SERVICES	ELECOM
Electrical and optical equipment	30t33
Post and telecommunications	64
GOODS PRODUCING, EXCLUDING ELECTRICAL MACHINERY	GOODS
TOTAL MANUFACTURING, EXCLUDING ELECTRICAL	MexElec
Consumer manufacturing	Mcons
<i>Food products, beverages and tobacco</i>	15t16
<i>Textiles, textile products, leather and footwear</i>	17t19
<i>Manufacturing nec: recycling</i>	36t37
Intermediate manufacturing	Minter
<i>Wood and products of wood and cork</i>	20
<i>Pulp, paper, paper products, printing and publishing</i>	21t22
<i>Coke, refined petroleum products and nuclear fuel</i>	23
<i>Chemicals and chemical products</i>	24
<i>Rubber and plastics products</i>	25
<i>Other non-metallic mineral products</i>	26
<i>Basic metals and fabricated metal products</i>	27t28
Investment goods, excluding hightech	Minves
<i>Machinery, nec</i>	29
<i>Transport equipment</i>	34t35
OTHER PRODUCTION	OtherG
Mining and quarrying	C
Electricity, gas and water supply	E
Construction	F
Agriculture, hunting, forestry and fishing	AtB
MARKET SERVICES, EXCLUDING POST AND TELECOMMUNICATIONS	MSERV
DISTRIBUTION	DISTR
Trade	50t52
<i>Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel</i>	50
<i>Wholesale trade and commission trade, except of motor vehicles and motorcycles</i>	51
<i>Retail trade, except of motor vehicles and motorcycles; repair of household goods</i>	52
Transport and storage	60t63
FINANCE AND BUSINESS, EXCEPT REAL ESTATE	FINBU
Financial intermediation	J
Renting of m&eq and other business activities	71t74
PERSONAL SERVICES	PERS
Hotels and restaurants	H
Other community, social and personal services	O
Private households with employed persons	P
NON-MARKET SERVICES	NONMAR
Public admin, education and health	LiN
<i>Public admin and defence; compulsory social security</i>	L
<i>Education</i>	M
<i>Health and social work</i>	N
Real estate activities	70

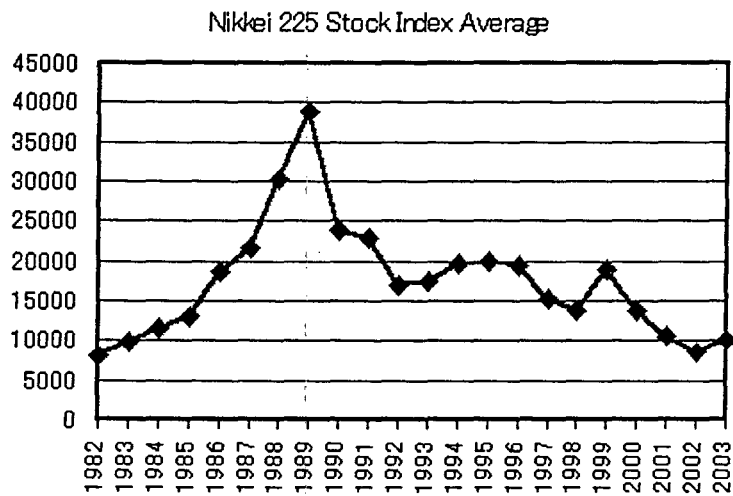
Sources: EUKLEMS , Productivity Manual.

Appendix: 17

Table: Land Prices and Stock Prices Have come Back to their FY1981-82 Prices.



Sources: Ohno Kinichi, 2002.



Sources: OhnoKinichi, 2002.

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