

The Japanese Economy in the Midst of its Demographic Change

— The First Sequel to “The Two “Lost Decades” and Thereafter” —

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1. Preface

I contributed to Number 6 of this journal a paper entitled “The Two “Lost Decades” and Thereafter — The Japanese Economy amid a Global Multi-Polar System—” (Takashima, 2012) (hereafter, indicated as “the Paper of Number 6”). I analyzed there the causes why the Japanese economy has fallen into a two-decade stagnation called the Two “Lost Decades”: at first, a “Lost Decade” of its economic recession was caused by the burst of asset bubbles in Japan after 1990 and dragged on actually for another decade until around 2010 through the Lehman Shock in the United States. Based on the analyses, I further made essential considerations mainly on the measures of making Japan’s economic structure sound with a hope of its realization during twenty years from now, almost the same period of this prolonged economic recession, as problems are related with structural factors of domestic and foreign affairs.

The Japanese economy had a continuous growth for as long as 73 months statistically from January of 2002 after the first “Lost Decade” in the 14th business cycle of the Japanese economy. The length of growth period exceeded the past longest prosperity called “IZANAGI economic expansion” (see Note, below) symbolizing the brilliant post-war economic growth. However, it was generally called as an “expansion without actual feeling” by the people in general. That feeling is proved accurate by statistical figures telling the actual state of economic situations.

Note: The sixth business cycle of the post-war Japanese economy took 74 months, including an expansion period of 57 months from a “bottom” of October of 1965 to a “hill-top” of July of 1970. This expansion period is called the “IZANAGI economic expansion”. IZANAGI is a name of a god in a Japanese myth.

The “IZANAGI expansion” of high economic growth was realized during almost five years from 1966 to 1970, and the average annual growth rate of actual GDP during that period was 11.1%, its value for nominal GDP being 17.4%. The “economic expansion” of this time has continued longer than that, being almost during six years from 2002 to 2007, but the average real growth rate was 1.8% with only 0.5% for actual value of GDP.

The economic expansion of the “IZANAGI” was realized during the period when the Japanese economy developed to be the world’s second largest economic power. It could get out of the recession after the Olympic boom and was pulled by the “3C (Color TV, Cooler, and Car) demands” called the “New Three Sacred Treasures” in the process where industries of electric machines and cars were becoming the center of manufacturing sector. Differing from it, the long-term expansion of this time has not been accompanied with such substance of economic development. This is recognized only by comparing growth rates of GDP between them and would become further clear by inspecting the movement of elements contained in the growth rate figures. Typical differences of indicators of the economic expansion of this time from those of the past economic growth period are as follows: in 2002, the first year of economic expansion of this time, GDP has shown a little positive value of growth (0.3%), and it was brought by the foreign demand, while the domestic demand negatively contributed to it. And the long-term “expansion” after that was not the growth by its own power but was maintained by the benefits from American markets being brisk with ICT and the demands from newly developing countries such as China and others.

Putting it in another way, without being blessed with such foreign demands, the Japanese economy could not have had the positive growth of GDP, though statistically small, that continued for as long as 73 months since January 2002, during which the negative and deficient economic structure at the back of the “Lost Decade” remained as it was. That deficient structure of the Japanese economy being temporally buried has been revealed again at the Lehman Shock in 2008 and its “Lost Decade” has linked with the next recession and has extended to be the Two “Lost Decades”.

When the negative structure of the Japanese economy is said to have produced the Two “Lost decades”, what does that structure mean actually? It was my former discussion described in the Paper of Number 6. There, I discussed the strength of the Japanese economy shown during the period starting from the postwar economic recovery, going through the “IZANAGI economic expansion”, and arriving to the Oil Shock which it succeeded to overcome. In that work, I examined views of some

intelligent persons who had observed strength of the Japanese economy on the basis of characteristics of Japan's social structure (e.g., E. F. Vogel, 1979; P. Kennedy, 1987). Then, their common view was indicated as follows. First of all, there exists the fundamental nature of "group-directivity attaching importance to the consensus" in the grounds of Japanese society as its fundamental racial and cultural characteristic. In this background, there are built in firms a trustworthy relationship between organizations and their members along with members' sense of belonging to their organizations. It is understood that the actual practices strongly formed in the business society are a life-time employment system, a seniority-based wage system, human resources development by in-house training and re-training, all of which cannot be found in other countries. Moreover, that social characteristic built an instructive and subordinate relationship between government and private activities which is unique to Japan, and the situation has produced strong internal organization of respective administrative offices and has created seemingly discretionary transfer customs of political affairs from political sectors to administrative offices.

These structural characteristics considered to have supported the growth of the Japanese economy has not been brought about only by the racial and cultural nature of Japan's society, but it is also true that they have been produced under the economic situations in domestic and foreign societies during the post-war growth period. For instance, a system of human resources development by in-house training along with a life-time employment custom has been taken as a strong point of Japanese firms, and it is true that this system could not have been established without a special relationship between business firms and a financial system in Japan. If there had been no special linkage between firms and banks called a "main-bank system" or if business firms had been obliged to manage typically under the stockholders' sovereignty, it would have been difficult for firms to maintain such an employment or a training system. In the world circumstances at the time, Japan remained in the condition to be able to devote itself to pursue its own benefits under the situation where Japan stayed in the system of a strong reliance on the United States politically and economically. This allowed it to work functionally for the fusion between officials and private firms to manage economic affairs under the leadership of administrative sectors.

On this reflection about the strength of the Japanese economy until around 1980 which came to be called "Japan As Number One" through the high growth after the post-war recovery, its characteristics at the back of the strength that have been

indicated by domestic and foreign intellectuals such as customs of firms and industries or relationships between private and public sectors can be said to have functioned effectively under the very international and domestic conditions where Japan was put at the time. After the war, Japanese society was left in the ruin and made efforts to make economic reconstruction in the domestic and foreign conditions given it at that time. Therefore, it is also said that, under that circumstance, the indicated characteristics of the Japanese economy had been formed for the purpose of economic recovery on the basis of the historical and racial nature of its own society.

While the Japanese economy proceeded successfully in this way, it produced the asset bubble by way of the Plaza Agreement in 1985. Then, with its burst, the economy has entered into the long-term economic recession called the Two “Lost Decades” since the early 90’s. Many economists investigated the reason and almost all of their explanations were that the long-term recession was caused by the negative effects towards economic activities by the structural and behavioral characteristics of Japanese industries, firms and governmental organs, while those characteristics had brought great positive effects towards the Japanese economy and given rise to the great development during its high growth period. That is, they imagined that those characteristics reversely changed the effects to the economy after the Japanese economy entered in a mature state.

There is a research that indicates the economic recession kept for a long time after the 90’s having its source in a decrease of productivity (Fukao and Kwon, 2006). They analyzed statistical data from 1994 to 2001 with the result that in Japan’s industries, firms remaining in the industry have lower productivity than those giving up the business and withdrawing. This made clear the fact that the Japanese industry has a characteristic of “low metabolism”. This analysis is to draw a conclusion that an insufficient function of market mechanism obstructs the effective reallocation of economic resources in Japan’s industries and that it has brought the long-term recession of the Japanese economy.

However, other studies (e.g., Ahearne and Shinada, 2005; Caballero et al, 2008) indicate that there has existed long years of practice called a “main-bank system” as a backing of such a “low metabolism” phenomenon and that the system was one of the characteristics of Japan’s industrial structure which played a role of producing the high growth of the Japanese economy continuing for a long time after the war. Japan’s industries have maintained a custom that, among a group of firms having a certain

business relationship, they have cooperated with a view to having the long-term development of a group as a whole. This custom is based on the “group-directivity attaching importance to the consensus” as a historical and racial characteristic of the Japanese society. Member firms belonging to a certain group keep a long-range cooperation with each other, maintaining mutual reliance by helping each other in case of temporal inconveniences for the sake of the purpose and benefit of the group. It was this “main-bank system” as an industrial custom that a financial relationship has been formed at the center of a specific bank as a cooperative system of a group of firms on the basis of the group-directivity characteristic.

Then, while such an industrial system proper to Japan so positively worked in its high growth period after the war that its economy was called to be “Number One”, it has not been effective for rebuilding the Japanese economy after a burst of the asset bubble since 1990 and, being anything but effective, it has become a source of the long-term recession. How can it be explained? Besides a “main-bank system”, there is room for question like this about such customs as a cross-shareholding among firms, an educational background- and seniority-based wage system in all through private firms and government offices, an in-house education and retaining system, an age limit retirement system and others.

As a fundamental view of analysis toward such questions, I propose here the changes of behavioral conditions in or to the domestic and foreign environment for the Japanese economy. For the analytical purpose, such changes are to be considered for two largely divided periods of a former period until the 1980’s including the post-war high-growth age and a latter one after the 1990’s starting with the burst of asset bubble. The basic changes which have been observed between these two periods concerning the environmental and behavioral conditions at home and abroad are

- ① changes in the total number, age structure and others in Japan’s population,
- ② a transition of economic development stages in globalization of economic activities and changes in the industrial structure of the Japanese economy,

which are considered here for the background of the following analyses.

Japan’s population is now coming in the stages where the total number decreases and its low birth rate and the aging have progressed at a speed almost unprecedented in the world. That would strongly influence not only the situation of the Two “Lost Decades” but also the future state of Japan beyond it, working as “the Substructure of the Japanese economy” (Morishima, 1999).

Referring to the result of the high growth period, it is statistically represented as a rise of per capita GDP, which has brought the today's rich daily life to the people of Japan coming to be ranked among the rich countries. That life becomes rich means that "necessary things" for people's daily life are sufficiently met and that their demands increasingly grow for services such as arts, education, information, medical care, sight-seeing and others. This led to a great cataclysm in the field of production activities while the Japanese society succeeded in joining a group of rich countries through the high economic growth. What is especially important with relation to the characteristics of the Japanese economy mentioned above is that the number of employees in the third industry centered on service industry has constantly increased, the ratio reaching 70.7% in 2011, the most recent year, compared with 35.8% in 1950 at the start of the high growth period. At the same time, the secondary industry led the economic growth of Japan with the ratio of the employees being 24.3% in 1950 and growing to 36.6% in 1973, but after that, it was almost in a decreasing trend to become 24.6% in 2011.

As far as considered in the industrial ratios of employees, Japan's economic activities have become transformed in such a way that the 70 percent of them are taken by service industry consisting of wholesale and retail, financial business and other services. This has been caused by the changes in demand structure accompanied by the growing affluence brought by the economic growth passing through the post-war high growth period until the stagnation of this time. In order to maintain and increase this affluence in the society as a whole, industrial productivity is to be considered. What is always indicated as a problem is how the service industry works on its productivity in comparison with the manufacturing industry.

Between the period when the economy reached its matured state after the high growth and that when it entered the long recession, Japan's industrial structure has greatly changed, and at the same time, the political and economic environments in the world outside Japan have greatly altered as well. As the result of extinction of the Socialist bloc with the Soviet Union as a central country, the world economy which had been divided into two separate structures after the WW II until then was substantially unified to a unique structure of market economy. Then, economic activities have come to be generally taken across the country border, regarding the world as a unified market. This is "globalization" of economic activities. And, another important environmental change has appeared along with this progress of global environmental change in world politics and economy. That is a growing weight of BRICs, newly developing countries,

which is now rapidly taking place in the world economy.

The Japanese society has kept the customs characteristic of its economy based on the group directivity such as the main-bank system among firms, the in-house seniority system and others. These customs effectively worked for building up one of the world's leading affluent societies, but these same customs have become regarded as negative factors which have brought the Japanese economy to a prolonged economic recession lasting for as long as 20 years. Why has this change taken place? That is the problem we have to tackle.

This problem is related with fundamental changes of the domestic and foreign environments and conditions in and around Japan, and then, we are required to analyze and examine this point carefully. As the first part of that work, this paper is to engage mainly in the analysis of a problem caused by the first fundamental condition presented above: how the change of population structure in the Japanese society has altered the functions of industrial characteristics and customs of its economy. Under the new inside and outside conditions, those characteristics and customs might have lost the functions that had worked effectively in the high growth period. Assuming that situation, we consider what and how we have to do for the Japanese economy and society in order to maintain the affluence that its nation built in the past and to increase it even to some degree for the future society as a whole.

2. Labor Population as a Productive Factor and Productivity of an Economy

In a macroscopic view of economic activities, the basic factors of economic growth are the actual amount of workforce and capital along with technological power in a wide sense including administrative ability which can effectively connect these productive factors to make products. The amount of workforce's productive power is determined by the physical amount of workers and also by their effective working ability actually displayed in their individual working sites. And that working ability basically depends on the level of general education supplied by the society and in-house education and training (including what is called "learning-by-doing"). As regards capital, its working ability is determined by the amount of production facilities and their productivity. The productivity of production facilities largely depends on their physical performance, which is accustomed to make progress along with technical developments as time goes by. Therefore, machines having high performance at their introduction are to become no

match for newer ones in their performance as time goes by, and are due to be replaced with the latter ones. This removal of older production facilities is capital depreciation. The performance of machines in use depends on the technological levels at the time of their introduction, and a concept clearly defining this relation is a theoretical model called “capital-embodied technical progress” (R. R. Nelson, 1964). Assuming that capital stock in use consists of K_0, K_1, \dots, K_t according time of introduction and that the rate of technical progress is λ_K , total production ability of the whole capital in use at present can be expressed to be

$$J_t = \sum_{v=0}^t K_v (1 + \lambda_K)^v \quad (1)$$

Concerning to the other productive factor, as opposed to this, it is considered that laborers as human beings can improve their skills so as not to get behind the level progressing as time goes on by always trying to acquire newer skills in the process of working irrespective of their starting year. On this account, putting progressing rate of skills in λ_L , the production ability of the present amount of employment as a whole can be written as

$$E_t = L_t e^{\lambda_L t} \quad (2)$$

This way of thinking the progress of productive factors is generally called “Dis-embodied Technical Progress” (W. B. Branson, 1989).

This concept for productivity of labor appears a simple formulation of the employment custom or the treatment of employees assumed to be a characteristic which has been taken so far in various organizations in Japan. The above formulation has been used for a long time in researches about technical progress carried out mainly by foreign economists with R. M. Solow, R. R. Nelson, E. F. Denison and others as the first researchers. In building this model, however, they did not seem to think about the customs of the Japanese economy such as in-house education and re-education or the seniority system backed by a lifetime employment custom, all of which symbolized the Japanese economy in its growth period.

In the post-war high growth period, the Japanese economy was blessed with affluent young labor and developed as a whole with manufacturing as a leading industry in the introduction of new technology. During that process, those Japanese labor customs displayed the most of their effect as formulated in the concept of “Dis-embodied Technical Progress”, which pushed Japan up so far as to be called “Japan As

Table 1 Long-term Demographic Change and Economic Growth Rates (%)

Calendar Year	55	60	65	70	75	80	85	90	95	00	05	10
Population Change (*1)	7.1	4.7	5.2	5.5	7.0	4.6	3.4	2.1	1.6	1.1	0.7	0.2
Young Population Ratio	33.4	30.2	25.7	24.0	24.3	23.5	21.5	18.2	16.0	14.6	13.8	13.2
Working Population Ratio	61.2	64.1	68.0	68.9	67.7	67.4	68.2	69.5	69.5	68.1	66.1	63.8
Elderly Population Ratio	5.3	5.7	6.3	7.1	7.9	9.1	10.3	12.1	14.6	17.4	20.2	23.0
Change Rate of W/P (*2)	10.0	9.6	11.5	6.9	5.1	4.0	4.9	4.1	1.5	-1.1	-2.4	-3.2
Economic Growth Rate (*3)	8.4	8.7	9.2	11.1	4.6	4.4	3.5	4.7	1.4	1.0	1.3	0.4

Notes: (*1) Rate of change as against 5 years before.

Source of Statistics for four headings with and after (*1) is The Statistics Bureau, Ministry of Internal Affairs and Communications: Report of National Census.

(*2) Rate of change of Working Population (aged 15 to 64) as against 5 years before each listed year.

(*3) Average annual figure of growth rate of real GDP during five years until each listed year. (The figure for the period from 1951 to 55 is an average number for three years owing to a partial lack of original statistics.)

Sources of statistics: Research Bureau, Economic Planning Agency, *Keizai Youran* (Economics Handbook); Economic and Social Research Institute, The Cabinet Office, *Kokumin Keizai Keisan* (National Account Statistics).

Number One”. The economy has entered the long-term stagnation since the 1990’s, which has been caused by a decreasing technical progress as a factor in the side of labor, that is, a fall of rate of productivity λ_L . Behind this situation is considered the influence of the demographic change of the Japanese society during the period of more than sixty years after the War, along with changes of the industrial structure after the post-war high growth period and those of the world economic environment. The problems of Japan’s long lasting economic stagnation should be analyzed in the relation of the industrial characteristics indicated above to the changes in Japan’s industrial structure and those in world economic environments. These detailed works remain to be done in the second sequel to “the Paper of Number 6” following this sequel.

Table 1 shows the actual state of Japan’s demographic change throughout the both periods of the high growth after the War and the long lasting stagnation after the 90’s as the main subject of the present work. Japan’s population structure has gradually changed in its age distribution from a normal pyramid structure to an almost perfectly

inverse pyramid structure. This is already a familiar fact in statistical materials as a figure of fully arranging the total population vertically in order of age and bilaterally for men and women. In the table here, change rates of population of three divisions by ages are shown as years proceed, along with the change rates of total population and the economic growth rates at the time.

The purpose of this paper is to analyze the cause of the Two “Lost Decades” and to examine the measures to be taken by the Japanese economy towards the future from now, and therefore, the “high growth period” is defined here to be a period from 1955 to the 1980’s as opposed to the “long lasting stagnation period” after the 1990’s. The year 1955 is just the beginning year of the historically high economic growth called “Jinmu-Keiki (boom)”, and the Japanese economy headed straight toward a high growth. An economic paper of the government for 1956 declared about the state of the Japanese economy that it is “not postwar any more”. Through the prosperous period called “Izanagi-Keiki (Izanagi boom)” from the year 66, Japan became the world’s second largest economic power next to America in terms of GDP.

With the beginning of the 80’s, Japan rapidly increased its net external assets as the fruits of the high growth period and became the world greatest creditor nation in the end of 1985. In this trend, liberalization and internationalization progressed in the financial market and the demand of offices increased especially in Tokyo area. In addition, a greatly easing policy of money was taken as one of economic stimulus measures by the financial agencies. These situations along with the measures taken by the authorities were connected to the asset bubble of land and stock prices after 1986. Putting in another way, the 1980’s following the high growth period was the stage where the Japanese economy should have linked the fruit of the economic growth to a satisfactory promotion of the welfare of the people and should have brought itself to the mature state of the society. Nevertheless, it provoked the asset bubble and proceeded to the long lasting stagnation of a deflationary economy with its burst after the 90’s. That is to say, this process was meant a transition to the Two “Lost Decades” without any economic substance. (For the details of this process, refer to, e.g., K. Ogawa, 2009 and Asahi Shimbun, a coverage crew of “Henten-Keizai (Changing Economy)”, 2009.)

The Japanese economy had a significant demographic change behind a series of periods starting from the post-war “high economic growth”, going through the transition period of the 80’s, and then leading to the “prolonged stagnation” after that. First of all, in 1955 at the entrance of the “high growth period”, the total population of Japan was

90.07 million and then in 1980, it increased to 117.06 million, which showed a continuous growth of more than 1% annually until then. As opposed to it, in 1990 at the entrance of the “prolonged stagnation” period, the growth rate became far below the half of the rate of ten years ago and Japan’s total population finally turned to a decrease in 2005 at the beginning of this century. After that, the population remained almost the same level for two years, but after 2008, the decreasing rates have grown to the present. In this way, Japan’s population reached to the greatest number of 127,768 million in 2004 and after that, turned to a decrease. According to the future forecast made by the National Institute of Population and Social Security Research, the total population is to break the 100 million mark after 2045 and to decrease to be so far as 89.93 million in 2055. Needless to say, it is considered that the forecast was made under the assumption of no drastic changes in the future in the population policies taken so far by the Japanese authorities including an immigration policy.

Next, looking at population changes in three age-groups, it is observed that the ratio of *elderly population* tends to increase in contrast with the decrease in the ratio of *young population*. This is a clear fact that expresses *a low birth rate and an aging population* as a marked characteristic of change in the age structure of Japan’s population along with the decreasing tendency of its total number. When an *aging index* (=Elderly population aged 65 and above/Young population aged 14 and below)*100) is calculated by putting together these two statistics, it becomes 174.2 in 2010, which is considered an extremely high figure among the countries having more than 40 million of population. (Based on the materials published by the United Nations and others, the Statistics Bureau of Ministry of Internal Affairs and Communications indicates for some of these countries that the country having a high figure next to Japan is Germany with 153.0, next to which is Italy with 143.7, and that America and China have respectively 64.4 and 41.2. Concerning the situation of Japan’s population change like this, a well-known English journal, “The Economist”, prepared a special number on this theme and described that “ ... Japan is heading into a demographic vortex. It is the fastest-aging history to have started shrinking rapidly from natural causes. ... ” (*The Economist*, November 20th 2010, p.3).

While the remaining ratio of *working population* shows a slight decrease after the start of this century, that changing trend is most stable among the three age divisions all through the periods from the high growth to the long lasting stagnation of the Japanese economy. But the ratio remains stable amid the decreasing trend of the total

population, and what is important for economic activities is the trend of *working population* directly related to the employment L_t as a productive factor. As seen in the Table, change rates of the actual number of population present a striking contrast to each other between the *high growth period* and the *long-lasting stagnation period*. That is, while the number of working population presented the annual increase of almost 2% for the period from 1955 to 1980, it reached its ceiling at 87.16 million in 1995 and after that, it has shown a decreasing trend with a greater negative rate annually. The decreasing working people in number have to support not only young population but also increasing elderly population. They have to bear the increasing expenses of the national finance for the elderly people. In the *high growth period*, the economy could have a high growth by being blessed with the good conditions of the increasing number of working population while the elderly population was yet small, and this situation is known as a “demographic dividend” in a demographic term. As opposed to it, the rapid increase in elderly population during the *long-lasting stagnation period* after 1990 means an increase in burden of the economic society, and it has to keep on bearing a “demographic onus”.

In this way, after the beginning of this century, the productive-age population started to decrease earlier and besides at a greater rate than the total population did. It goes without saying that this situation formed the basis of the Two “Lost Decades”. Now that this demographic change has no nature of being amended by policies for a short time, it continues to affect fundamentally the development of the Japanese economy in the future. As described above about the basic productive factors of capital and labor, capital was expressed by equation (1), assuming that capital as physical equipment consists of machines and facilities *embodying* technology at the time of introduction. And, labor was formulated in equation (2) to make a *disembodied* technical progress, as it is considered that human beings can improve their skills by in-house education and learning-by-doing after they are put in the work place. Technical progress in labor is assumed to proceed at a constant rate as time goes on. Here, in order to consider the amount of input factor and the level of technology in the production process at a time in the model of their combined form, we describe capital equipment (K_0, K_1, \dots, K_t) used at a time t in the working site as a unified body \tilde{K}_t and the average technological level of the whole capital equipment as $\tilde{\lambda}_K$. In this way, keeping the concept of *embodied technical change* for a capital factor, the mathematical expression takes the same form as that of a labor factor,

$$\tilde{J}_t = \tilde{K}_t e^{\tilde{\lambda}_K t} \quad (3)$$

However, we have to mind the difference of the actual contents of the rate of technical progress of capital $\tilde{\lambda}_K$ from that of labor λ_L .

Under the productive factors \tilde{J}_t and E_t measured in their productive capacity as described above, the production function is expressed in a general form as

$$Y_t = F(J_t, E_t) = F(\tilde{K}_t e^{\tilde{\lambda}_K t}, L_t e^{\lambda_L t}) \quad (4)$$

where we let Y_t denote the output of production (GDP).

In this way, the production in each period is determined by the joint effects of productive capacity of capital and labor used at that time, and it is connected actually to the fruits of production by the effects combined between the amount of these two productive factors used and the level or effectiveness of each factor. When the combined technological level of both factors brings a high productivity, higher production is to be realized even when these two factors are used in the same amount. In other words, it means that in that situation, the production function shifts upward at a combination of the same amounts of these two factors (\tilde{K}_t, L_t) . Technological progress is meant by such upward shifts of a production function.

It is a production function by R. M. Solow (1957) that expresses this substance most simply, shown as follows. (The input amount of capital at time t without regard to technical progress is expressed K_t in the following.)

$$Y_t = A_t \cdot F(K_t, L_t), \quad A_t = A_0 e^{\lambda t} \quad (5)$$

Differentiating in time this production function and dividing the both sides by Y_t , and then expressing the amounts of productive factors and the output of production by them in the form of change rates, we have

$$\frac{\dot{Y}_t}{Y_t} = \frac{\dot{A}_t}{A_t} + \left(\frac{\partial F_t}{\partial K_t} \cdot \frac{K_t}{F_t} \right) \frac{\dot{K}_t}{K_t} + \left(\frac{\partial F_t}{\partial L_t} \cdot \frac{L_t}{F_t} \right) \frac{\dot{L}_t}{L_t} \quad (6)$$

Letting μ_K and μ_L respectively denote elasticity of capital K_t and that of labor L_t in parentheses, we have

$$\frac{\dot{Y}_t}{Y_t} = \frac{\dot{A}_t}{A_t} + \mu_K \cdot \frac{\dot{K}_t}{K_t} + \mu_L \cdot \frac{\dot{L}_t}{L_t} \quad (7)$$

Here, we make our understanding clear about the meaning of the variables denoting input amounts of productive factors. Capital K_t and labor L_t are the amounts of physical use themselves without regard to the progress of machines performance and

human productivity as time goes on. That is, the variable for productive equipment indicates the number of mechanical facilities having a specific function and that for labor means the number of human beings engaging themselves in jobs. As opposed to those variables, J_t (and \tilde{J}_t , the same for the followings) and E_t presented above in equations (3) and (4) are the variables measured in a capacity unit taking into consideration the factors' productive capacity growing with the passage of time along with the amount of each of them actually put in productive processes. Letting a productive growth made by these factors as a whole be denoted by *technical progress* in general, the first term of the right side of equation (7) expresses the rate of technical progress of the whole production process.

Now, we try to consider a strictly simple production process that has no rise in productivity and technical progress in each of productive factors of capital and labor and also in a production process as a whole consisting of these factors. This situation is expressed in the mathematical form used so far, concerning the productive factors of capital and labor, as

$$\lambda_K = \tilde{\lambda}_K = \lambda_L = 0$$

and concerning Solow's production function shown in equation (5), it is simply described as $\lambda = 0$. In this case, the production function is described as

$$X_t = F(K_t, L_t) \quad (8)$$

which expresses the original state without any technical progress, and the rate of change of production output becomes

$$\frac{\dot{X}_t}{X_t} = \mu_K \cdot \frac{\dot{K}_t}{K_t} + \mu_L \cdot \frac{\dot{L}_t}{L_t} \quad (9)$$

That is to say, the rate of change in production is expressed as the addition of each factor's change rate of input volume multiplied by its elasticity of production regarding the input change.

We assume here that the markets of productive factors are in the state of perfect competition as a pure form of market economy model. Then, as a real wage rate w_t comes to be equal to the marginal productivity of labor, we have

$$\mu_L = \frac{\partial X_t}{\partial L_t} \cdot \frac{L_t}{X_t} = \frac{w_t L_t}{X_t} \quad (10)$$

That is, the elasticity of labor input regarding the production change μ_L becomes the

distribution rate of rewards given to the labor input in the fruit of the production activities at the time. In the same way, the elasticity of capital μ_K is equal to the distribution rate for it.

In production relations having no technical change, when the inputs of all productive factors of various sorts are changed at the same rate, the production output usually changes at the same rate. The production function of this property generally becomes a homogeneous function of degree one when expressed in a mathematical form. Assuming that the production function of equation (8) has such a property, it becomes

$$X_0 e^{\alpha t} = F(K_0 e^{\alpha t}, L_0 e^{\alpha t}) \quad (11)$$

at t , starting from the base point of time 0. The change rates of capital and labor at time t and the change rate of production under these productive factors are

$$\frac{\dot{K}_t}{K_t} = \frac{\dot{L}_t}{L_t} = \frac{\dot{X}_t}{X} = \alpha \quad (12)$$

Therefore, from equation (9), we have a relation between elasticity values of capital and labor

$$\mu_K + \mu_L = 1 \quad (13)$$

This means that, when a production function has a property being homogeneous of degree one and in addition, price setting is competitive in each market of the productive factors, the result of production activities comes to be distributed completely among those factors.

Economic growth as the growth of production can be made only by the increase in the amounts of productive factors put in the production process, but the real progress and development of economy is achieved by the growth of per capita production concerning the people taking part in the production besides the quantitative growth of the whole economic society. That is the advancement of production efficiency in the productive factors, which is called the technical progress. It is the variable A_t in equation (5) that shows the real economic growth. By this technical progress, the stable production function without any technical progress is lifted up, which brings the growth of per capita production. And, the fruits are completely distributed between the productive factors J_t and E_t evaluated by their efficiency as long as two market conditions listed above are satisfied. The productive factor having higher growth of productivity receives greater reward per unit.

We transform the production function (5) with technical progress as a shifting variable into the function expressing per capita output of labors. Attention is paid here to the assumption that those two market conditions mentioned above are satisfied about the original production function. Then, on the basis of that function's homogeneity of degree one, we have

$$\frac{Y_t}{L_t} = A_t \cdot F\left(\frac{K_t}{L_t}, 1\right) \quad (14)$$

Letting output per labor be denoted by y_t and the ratio of capital to labor concerning the input factors containing no technical progress by k_t , and replacing the above function with a new function, f , having this single variable, we have a function simply expressed as

$$y_t = A_t \cdot f(k_t) \quad (15)$$

It is the Cobb-Douglas function that is most frequently used as a function having the properties of homogeneity of degree one along with the perfect competitiveness of productive factor markets. The starting point of the present work was "the Paper of Number 6" and, in my research (Takashima, 2008) cited in the 3rd sub-section of the 3rd Section of that paper, analysis is also taken place by applying the Cobb-Douglas function to the function shown in equation (15).

What is made clear by the production function (15) is that the time passage of output per labor y_t is determined in the long run by the changes in combination between technical progress A_t mainly brought by the efficiency of productive factors, capital and labor, and the input ratio k_t of capital to labor. The mathematical form of the actual time passage is derived by solving a system of derivative equations concerning these two variables. Concerning the time-passage of output per labor, it has been made clear that it is divided into two ways, depending on the present states of those two variables and the policies taken for these productive factors in the future. One is a group of economies heading toward a growth path and another is a group gradually changing their position to the region destined to enter into a decline even when they stay in a growing region at present (Takashima, 2008).

The post-war Japan's economy took a path toward the high growth by the increasing amounts of capital and labor inputs along with technical progress in the cooperative efforts between the government and the private sector, and it is mentioned to be a good example that an actual economy took a long-term growth passage. As

opposed to this, a different process of movement might be considered for the newly rising economies which show the spectacular growth at present. If the present growth is caused by the quantitative expansion such as input of labor not used so far or usage of conventional equipment without any efficiency growth, it might be only the case of a temporally upward movement within a long-term declining region, where the economy may be accompanied with the growth of production and the rise of output per labor for a while. For the economies called rich countries so far, too, staying within the region of long-term growth paths at present in the movement of output per labor, when the input of capital and labor or productive efficiency tends to change in the future, the economy might change its own position toward a long-term declining region.

3. Preservation of Economic Welfare in Rapid Demographic Changes

The Japanese economy has not yet been in the state of completely getting out of a prolonged stagnation after the *Two Lost Decades*. Looking at this situation, we feel a probability that it might be in the process of making a transition to the area of a protracted economic downturn while we cannot recognize the fact. It might be brought by the causes which have been described so far. That is, they should be the changes of political and economic circumstances surrounding Japan and their influence to the effectiveness of the characteristics which Japan's economic society has had. The purpose of this paper is to consider these problems in the relationship with an irreversible condition of a rapid change of population structure in the Japanese society.

We saw in Table 1 the rapid demographic change of the Japanese society at present and in the future at a speed exceptional in the world. Then, in order to have the basis for analyzing its effects on the future economic results and for thinking the appropriate measures to be taken, we proposed the framework of a macro production function specifying the results of production activities of the whole economic society. The relations among variables were lastly reduced to equation (15), which makes it possible for us to have fundamentally important viewpoints of determining the movements of a country's economy.

What should be taken care of at first is that the variable y_t of the left side of equation (15) means the output for a unit of labor actually used in production activities and expresses a time path of the output brought by the changing amounts of factors put in the production. Here, as the *output* specifies the result finally produced by productive

activities of the national economy, it can be taken statistically to be *Gross Domestic Product* (GDP) or *Gross National Income* (GNI) in general. Therefore, since the movement of y_t itself shows how labor productivity changes, it is needed to transform this trends into the movements of GDP per person of the nation in order to analyze the trends of economic welfare of the nation. In connection with this, the change in the age structure of the nation along with the trend of its total population becomes a long-term element causing the change in the level of the national economy in a sense of GDP per nation people. In the use of the age division of the population statistics shown in the above section, the changes of the ratios of *young population* and *elderly population* come to fundamentally influence the level of economic welfare of the whole nation of the country. Describing further, while the change of y_t as a movement of labor productivity can be taken to be a per capita economic effect of the *Working Population* as an index of that age division, it should be understood to be the output of labor per time in actual use of production process as a strict content of the production function.

What is more important concerning the movement of y_t as a *labor* productivity is to understand its true meaning: it does not express the value of productive capacity which a single productive factor of labor has, but it includes also the growth of productivity of the other productive factor of capital. That is, the model pays attention to the result of production brought by the productivity growth of the whole productive organization including capital, namely, by the technical progress of production activities as a whole. That movement of the whole productivity is expressed by the output per labor for the sake of convenience. This is made clear by going back to the contents of the coefficient of technical progress A_t included in equation (15) as the final form of production function.

Equation (1) and (2) in the previous section included respectively the growing degrees of productive efficiency of capital and labor as time goes on. They are formulated on the basis of the view of the *Embodied* technical progress for capital and of the *Dis-embodied* one for labor. And we expressed the input of capital having technical progress in a simple form, keeping the view that technical progress at each time is embodied in the capital equipment newly introduced in the production at that time. That was equation (3). Here, using this equation instead of equation (1) and introducing the input volumes of these productive factors into a Cobb-Douglas production function, we have

$$Y_t = \beta (\tilde{K}_t e^{\tilde{\lambda}_k t})^\alpha (L_t e^{\lambda_L t})^{1-\alpha} \quad (16)$$

This is rewritten as

$$Y_t = A_t \tilde{K}_t^\alpha L_t^{1-\alpha}, \quad A_t = \beta \cdot \exp[\{\alpha\tilde{\lambda}_K + (1-\alpha)\lambda_L\}t] \quad (17)$$

The rise of effectiveness in production is brought by all the elements related to production such as advanced technology included in the newly introduced capital equipment, education and skills obtained by workers with the times, and furthermore the advancement of production system combining these evolving factors. The variable A_t can be considered to include all these elements related to production effectiveness. It is the equation (5) that indicated this substance of technical progress in a general form of a production function, and the variable A_t expressing a technological level comes to be called *Total Factor Productivity* including all these senses. The rise of Y_t , namely, the economic growth is determined depending on workings of the basic production function $F(K_t, L_t)$ brought by the inputs of capital and labor and also on how much these productive factors improve the degree of efficiency as a whole. This latter variable functions so as to shift the whole basic production function and therefore, its movements are recognized to determine the long-term growth path of a country's economy.

As seen so far, a rapid change of the population structure accompanied by the declining working population in particular becomes a great cause for concern for the long-term trends of the Japanese economy. In this basic situation impossible to be improved for a short time, we have considered since “the Paper of Number 6” the problems as to whether the Japanese society could maintain the welfare of people's life, the economic result that it achieved through the High Growth Age. The basic points of the problem seem to become clear by the considerations made from the previous section to the present in the use of production functions. That is to say, with the demographic problem that the *Working Population* decreases and the *Elderly Population* relying on the working people increases, it is needed for the economic society to continuously increase the output per labor, and this greatly depends upon the rise of its *Total Factor Productivity*.

As explained in the previous section with relation to equation (15), what must be paid attention to the variable for output per labor is that it is calculated by dividing the output including the whole result of production activities by the number of laborers used in them and thus, it does not express the productivity pertinent to a single productive factor of labor. Therefore, in order to treat statistical figures without

confusions, we use here the name of *GDP·Labor ratio* instead of *Labor Productivity* for the value of the production output GDP divided by the input amount of labor, a single productive factor.

For Japan with working population decreasing, it becomes a fundamental problem to solve how to maintain and improve the production output per person clearly expressing the economic welfare of a country's economy, namely a *GDP·Population ratio*, by raising this *GDP·Labor ratio* mainly with improvement of total factor productivity.

Generally speaking, the analyses of long-term growth paths of an economy using theoretical models intend to examine the movements of GDP per labor used in the economic activities, as indicated in equation (15) derived in the previous section. It is the same in my model analysis (Takashima, 2008) which theoretically pursued the changing paths of an economy, as its outline was shown in “the Paper of Number 6”. That is because those studies have the main purpose of analyzing the results of production activities. As opposed to them, we take it into principal consideration in this paper to analyze how the result of economic activities changing in the long run affects the economic welfare of a country's nation including those who do not join in production.

Considering the welfare given to the nation of the Japanese society by the economic activities, namely, the moving characteristics of the GDP per head of the nation in strict relation to the problem of demographic changes, the factors directly concerned are the ratio of the working population to the whole population and the production output for each laborer. This can be easily understood by a relation

$$z_t = y_t \cdot l_t \quad (18)$$

letting z_t , y_t and l_t denote GDP per person, GDP per laborer, and a ratio of the working population to the total population, respectively.

For this simple equation, we can understand its substantial meaning that the long-term sluggishness of economic results per person of the Japanese economy has been directly affected by the movement of labor productivity and the long-term trend of the proportion of working population in the demographic structure of Japan. This is more clearly understood by the following equation expressed to be a relation among the change rates of those variables in equation (18),

$$\frac{\dot{z}_t}{z_t} = \frac{\dot{y}_t}{y_t} + \frac{\dot{l}_t}{l_t} \quad (19)$$

That is to say, the movement of a *GDP·Population Ratio* (z_t) as an actual index of

national affluence is understood by being decomposed into the change in a *GDP-Labor Ratio* (y_t) expressing the growth power of the whole economy by the production output per person of working age and the change in a *Working-Population Ratio* (l_t) showing the long-term trend of labor supply accompanied with the trend of the nation's demographic structure.

The Ratio of working age (15-64 years old) population (l_t) as the *Working Population Ratio* is a factor of changes in the demographic structure and was shown in Table 1 of the previous section giving the actual state of the long-term movements in Japan. The *GDP-Labor Ratio* (y_t) is the other factor directly influencing the affluence of the whole nation, and the mechanism of producing the economic result was theoretically treated in the previous section as the movement of a macro production function. But the actual movements of those indices about the Japanese economy have not been expressed statistically so far. Here, Table 2 gives the statistical relation in which the changes in these two factors are connected to the *GDP-Population Ratio*, including statistical figures showing the actual values of this *GDP-Labor Ratio*.

The basic statistical sources for calculating annual average change rates of each variable for five years are time series data about total population, working population (here, the population of 15-64 years of age) and GDP. About the total population, its change rate for every five years is shown in Table 1, from which annual average change rates are calculated and shown in the second line of Table 2. Also, as Table 1 gives the *Change Rates of Working Population* as against that of five years before, we can obtain annual average rates of change for each period of five years using those figures. Those are the figures of the Change Rate of Production Population listed in the third line of Table 2. Attention must be paid to the difference between these two items of figures that those in Table 1 are the change rates for a period of five years while those in Table 2 are the annual average change rates for the same period. These two are the statistical materials expressing the basic movements in the demographic problem, under which the economic activities have been carried out, bringing the changes in GDP as their total result. The first line of Table 2 shows the actual figures as its annual average change rates for five years until each listed year.

Last three lines of time-series figures in Table 2 are calculated with the use of the three basic statistics mentioned above and the already cited materials in Table 1. The *Change Rate of GDP per person* (*4) shows the movement of GDP per person in the Japanese economy. The observation period includes the high growth age after the War,

Table 2 Influence of Demographic Change on Economic Output

Calendar Year	60	65	70	75	80	85	90	95	00	05	10
GDP Growth Rate (*1)	8.7	9.2	11.1	4.6	4.4	3.5	4.7	1.4	1.0	1.3	0.4
C.R. of Total Pop. (*2)	0.92	1.02	1.08	1.36	0.90	0.67	0.42	0.32	0.22	0.01	0.04
C.R. of Working P. (*3)	1.85	2.21	1.35	1.00	0.79	0.91	0.81	0.29	-0.22	-0.50	-0.73
C.R. of GDP-Pop (*4)	7.8	8.2	10.0	3.2	3.5	2.8	4.3	1.1	0.8	1.3	0.4
C.R. of GDP-Lab. (*5)	6.9	7.0	9.8	3.6	3.6	2.6	3.9	1.1	1.2	1.8	1.1
C.R. of R.W.P. (*6)	0.93	1.19	0.26	-0.35	-0.12	0.27	0.38	-0.03	-0.44	-0.63	-0.73

Notes (*1) Ratio of real GDP to that of the previous year (%). Figures are average numbers for five years until each of the years listed.

Source for original statistics: The Research Bureau, the Economic Planning Agency, *Economic Handbook (Keizai-Youran)*; The Economic and Social Research Institute, the Cabinet Office, *Account of National Economy (Kokumin Keizai Keisan)*.

(*2) Annual Change Rate of the Total Population (%). Figures are average numbers for five years until each of the years listed.

Source for original statistics: The Statistics Bureau, The Ministry of Internal Affairs and Communications, *Report of National Census (Kokusei-Chousa Houkoku)*.

(*3) Annual Change Rate of the Working age (15-64 years of age) Population (%). Figures are average numbers for five years until each of the years listed.

Source for original statistics: The same as (*2).

(*4) Annual Change Rate of GDP per person of the total Population (%). Figures are obtained by deducing the Change Rate of the Total Population (*2) from the Growth Rate of GDP (*1).

(*5) Annual Change Rate of GDP per Labor (%). Figures are obtained by deducing the Annual Change Rate of the Working age Population (*3) from the Annual Growth Rate of GDP (*1).

(*6) Annual Change Rate of the Ratio of the Working age Population to the total population (%). Figures are the average annual change rates for five years until each of the years listed (%).

Source for the ratios of the working age population to the total population: The same as (*2).

the transition period of the asset bubble and the present with the Two Lost Decades already going by. Those who have been concerned about the process are the working

people, and what ratio they have in the whole nation fundamentally determines the level of the gross domestic product per person. This has been already shown in equation (19) above. These two factors are gross domestic product per person of the working age population which is *Change Rate of GDP per Labor* (equivalent to \dot{y}_t/y_t in equation (19)), and the ratio of working age population to the total population, namely *Change Rate of Ratio of Working Population* (equivalent to \dot{l}_t/l_t in equation (19)), and these have been calculated as the time-series figures from the basic statistical materials cited before. These two indexes jointly make *Change Rate of GDP per Person* (equivalent to \dot{z}_t/z_t in equation (19)) by addition, and then, they are proved to be fundamental factors that explain the long-term movements of economic welfare for the nation. (In the theoretical equation (19) derived with differential operations, *Change Rate of GDP per Labor* and *Change Rate of Ratio of Working Population* add up exactly to *Change Rate of GDP per Person of the Nation*, but in the calculation of actual statistical figures with time division, there generally appears some slight disagreement in the equality relation among these three indices.)

Concerning the long-term trends of the Japanese economy, we have divided the whole period after the War into two as the *High Growth Period* from 1955 through 1980 and the *Long-lasting Stagnation Period* after that including the latter half of the 1980's of the bubble economy and the stagnant situation caused by the bubble burst in the early 1990's and kept to the present. Table 2 shows the movements in the whole period consisting of these two in a detail, being arranged to the five year periods. Table 2 indicates that the high growth period in a literal meaning based on the growth rates was until 1970 and the next one is the period during which the Japanese economy has been tested how well it adapts itself to the drastic changes in the world economic environment such as those in the 1970's having the Nixon Shock and the Yen revalued up followed by its changeover to the floating exchange rate system and also being attacked twice by the oil crises. Therefore, with respect to the annual average growth rates of the gross domestic product, the high growth period from the statistical point of view was 1950's to 60's after the War in the viewpoint of not only the product of the whole economy but also that for a person of the whole nation. As opposed to that, the 1970's and 80's are taken to be the period during which the Japanese economy has failed to make progress towards a normal mature state amid the changes in the international environment. It has led up to the asset bubble in the latter half of the 1980's. However, the economic growth has been so apparently weakening since the 1990's in clear

contrast with the path until the 1960's.

We are going to consider the long-term movements with relation to the trend of the total population of the Japanese society. As mentioned before, the total number of population reached the top in 2004 and, after fluctuating slightly in the following few years, it tends to decrease in and after 2009. The growth rate of the gross domestic product has kept a tendency to decrease all through the period and its growth is almost nothing after the 1990's. Behind that trend, the total population has changed from the decrease of its growth rate to the decrease of the number itself. In these two trends, the change of per capita GDP for the nation is considered to become similar to the change of GDP or a little greater than that in the future. However, when the growth rate of GDP turns minus in the long-lasting stagnation, it is well imagined that the future figures of the *Change Rate of per capita GDP* will turn minus, namely, the economic fruits for a person of the nation will decrease, even in the fall of the total population. According to "Nihon no Shourai Jinkou Suikei (*Estimation of Japan's Future Population*)" by National Institute of Population and Social Security Research, the total population of Japan is anticipated to decrease by 3.09% in 2020 and 8.93% in 2030 each compared to the year 2010, but if the causes of the recent long-lasting stagnation and the structure behind it in the Japanese economy are not to change, it is easily considered that the gross domestic product decreases to a 0.5% or 1% degree a year. In this situation, the Japanese society would be put in the declining standard of the nation's economy under the decrease in the total population.

Such a movement of GDP per person of the nation is explained by productivity and the trend of working population, and these two are the indices of the *Change Rate of GDP per Labor* and the *Change Rate of Ratio of Working Population*. Concerning the movement of the former index which is GDP per labor (working population), its change in figures of the whole time-series is slower than the change in the *Change Rate of GDP per Person* of the whole nation as the trend of the working population changes at a greater rate than that of the whole population (Change Rate of GDP per Labor = Change Rate of GDP – Change Rate of Labor). The question lies in the trend of GDP as the numerator of these indices. As considered before regarding the production function of the whole economy, it depends first of all on the productivity movement of all factors concerning production, namely, how the total factor productivity changes, along with the input volume of productive factors including labor. Leaving the detailed analysis about this problem to another occasion, we concern ourselves here the sources of the

Change Rate of Working Population Ratio in the trend of the total population. As shown in Table 2, in Japan, the ratio of the working population to the total population began to decrease earlier than the number of working age population itself. This reflects a rapid increase in the elderly population, and becomes the source of many difficult problems concerning finance, social security and others, along with the influence to the future productive activities under the low birthrate.

This downward trend of the ratio of working population proceeds at present under the influence of the increase of elderly population, and moreover, the continuing low birthrate will surely strengthen the effect on it as time goes on. Then, supposing that the Japanese society stays in the present structure and behavioral characteristics in its political and economic aspects, the trend of the *Change Rate of per Capita GDP* in Table 2 indicates that the growth of economic result which one of the Japanese people enjoys will certainly turn out to be minus without any lapse of time. This situation tells that the Japanese nation is to lose the wealth which it has built up for over 60 years after the War as time passes. In order to keep the nation from having this situation, what is needed to do at present? In such a condition for the Japanese economy in the near future as the above statistical facts clearly indicated, we consider this problem by setting a new section as follows, paying special attention to the structural and behavioral characteristics of the Japanese society on which its nation's activities have largely based and to the international environment which has been structurally transformed especially in these years.

4. Characteristics of Japanese Firms under the Changes of Demographic Conditions

As examined in the previous two sections, the long-term production activity of the Japanese economy has the contrasting results between the High Growth Period until around the year 1980 and the Protracted Stagnant Period after the 1990's in terms of national domestic product itself and the result per person as well. And, it is shown at least in a relationship with statistical figures that, at the back of the long-term stagnant situation, there is a serious long-term falling trend in the ratio of working age people to the whole population in the demographic structure along with a low birthrate and an aging population in the shift of the total population to a decline. Looking at this situation conversely, it can be said that, at the back of the Period of High Growth which

pushed Japan once up to the world's second largest economic power from the nothing after the War, Japan enjoyed the "demographic dividend" (as seen in Table 1) of a rapid growth of working population and a decline of birth rate (a young population) (see "The Japan syndrome", Leaders, The Economist, November 20th 2010, p.9). During the period of the high growth of the Japanese economy symbolized by the economic expansion of the Jimmu Keiki (the greatest scale of economic expansion realized since the ancient age) in the latter half of the 1950's and the following Iwato-Keiki (a further expansion after that) in the 1960's, as shown by the trends of demographic statistics in Table 1, the working population stayed in a low ratio in the total population and the shortage of labor was a serious problem for business activities. It was James C. Abegglen, an American scholar of management, who clearly indicated at this time the business characteristics of the Japanese companies, being based on his investigation into their actual circumstances. He showed the management characteristics of a Japanese style existing on the basis of the Japanese economic growth which looked odd internationally at that time; he indicated their contents as three employment practices of Lifetime Employment, Seniority System, and Inhouse Labor Union. These practices have been called the Sanshu-no-Jingi (three sacred treasures symbolizing the Japanese Emperor) of the Japanese management.

After that, these characteristics came out to be taken notice at home and abroad as a nature which the Japanese firms generally have in their organizations. These Japanese employment practices do not seem to have appeared as the result of a sort of rational business behavior which firms took as measures against the labor shortage during the post-war High Growth Period. Rather than that, behind them was the Group Directivity which had been historically formed as an ethnic nature in the Japanese society for a long time and, on its basis, they have come to be clearly recognized as the firms tried to adapt themselves properly to the economic environments of the High Growth Period. This is what I think to be a proper understanding of these characteristics, because it is recognized for the prewar business management too that the management had an awareness of trying to coexist with labor in mutual prosperity in a firm as a community consisting of both parties, where the employment practices indicated by Mr. Abegglen existed in general unconsciously.

The Group Directivity mentioned here is a characteristic of making much of solidarity and cooperation for the sake of the group's purpose and benefit, putting more emphasis on consensus rather than on individual's ability and behavior within the

organization of a human group, and it has been widely indicated as the characteristics of the Japanese society by both domestic and foreign socialists (e.g., Ezra F. Vogel, 1979; Kinya Abe, 1999). (In this regard, “the Paper of Number 6” deals with the related problems in some detail.) With this ethnic characteristic in the background, what is called the Japanese-type employment practices of Lifetime Employment, Seniority System, and In-house Labor Union has taken root among Japanese firms as their in-house customs. As management customs among firms, such practices as preservation of permanent relation between parent and subcontracting companies, cross-shareholding and main bank system have been indicated as business characteristics peculiar to Japan. Moreover, in the aspect of business ruling in the capitalistic system of economy too, stockholder profits should take priority on the basis of the American-type fundamental principle, but in this aspect too, Japanese firms are managed so as to give priority to the group profits centering on employees’ profits, which proves to be rather different from the dogmatically capitalistic system on the basis of shareholders’ profits. Behind this, it seems that the Group Directivity as an ethical nature works again. And, among these characteristics of the Japanese firms backed up by this Group Directivity, it is observed that there are strong mutual complementary relations as seen in the business rule of having priority of employees’ profits over stockholders’ and the employment customs such as the life-time employment system.

These Japanese-style customs, in the relations within firm organizations and among independent firms and further in the way of ruling firms, were formed and worked all through the period of its economic growth which was achieved mainly by following in American’s and European’s steps regarding its manufacturing technology. Since then, various circumstances and conditions at the back of economic activities of the Japanese economy have greatly changed, and the changing situation has still continued as an irreversible phenomenon. The fundamental changes are a change in the international environment, a change in the demographic structure, and also a change in the development stage of the Japanese economy itself. The problem is how the structural characteristics the Japanese economy has kept at its basis can smoothly adapt in the near future to those great changes of the domestic and foreign environments, and the problem is how and in what way they have to be reformed in these circumstances in order to prevent the level of economic result the nation people enjoy from reducing and to raise it even if just a little.

The Japanese economy suffered from the asset bubble burst in the early 1990’s,

and in taking measures against the economic crisis after that, the government passed the time without taking appropriate measures in an improper understanding for the whole situation. That was the main cause by which the economy has resulted in the long-term stagnation lasting over the Two “Lost Decades”. Such a political paralysis for years came to bring to the economy the above wrong effects caused by the overly market behavior producing the asset price bubble of the 1980’s. The American and the EU economies after the Lehman Shock of 2008 took the situation similar to the way Japan followed and once came to be seen as “Japanization” (or “Turning Japanese”) of the European and American economies (e.g., “Turning Japanese”, Leaders, The Economist, July 30th - August 5th 2011).

However, the long-term stagnation of the Japanese economy involves a fundamental difference from the West’s economic recession in that a deflationary structure has taken root in its long-term stagnation. And it must be taken notice that the rapidly proceeding demographic change is basically related to this fact. As already seen in Table 2, the decreasing tendency of the working population ratio to the total population reduces the growth rate of GDP per person of the total population, and, as far as the other situations are kept unchanged, it is obvious that the share (the per capita GDP) will begin to decrease before long, in view of the future forecast of the Japanese population. In order to prevent it from decreasing, we have no other ways but to keep increasing the other factor, GDP per person of the working age population, namely, labor productivity in the general sense. It requires to keep increasing total factor productivity to a degree of more than compensating for the negative effect caused by the decreasing trend of the working population. For that purpose, it is needed all the way to promote development efforts of new technology and the capital investment “embodying” it, and to raise productivity by continuous efforts for skill-up of labor as a “dis-embodied” productive factor. However, it is naturally thought that the decrease in young age population tends to work as a disadvantage against both development of new technology and labor skill-up, and it is quite difficult to imagine that it brings any advantage to these activities.

Then, the per capita GDP will inevitably tend to decrease, and the consumption of the whole nation will reduce owing to the sluggishness of wage rate and the uneasiness about the future, which will make firms refrain from making capital investment due to the decline of profits and the lack of a future outlook. On the other hand, as the supply capacity has been accumulated subsequently after the high growth period and exists so as to meet the demand structure and the total demand of that period, the potential

supply ability cannot fully meet the present demand, which causes part of the productive capacity to be out of operation. That is to say, it has brought about a structural deflation that the gap between supply and demand comes to stay in the economy. In the Japanese economy, the demographic change is beginning to affect to its undercurrent, and it seems that this effect makes the stagnation long lasting over the Two “Lost Decades” different from the West’s economic sluggishness following the Lehman Shock. Besides, deflation contains an element working to advantage of elderly people making their living on their savings without engaging in any productive activities, and, in the growing ratio of elderly population, it is sometimes indicated that the Japanese politics has a structural element of maintaining the condition working economically in favor of the elderly people (e.g., *The Economist*, “Into the unknown - A special report on Japan,” November 20 th-26th 2010, p, 8).

The following considerations deal with the conventional customs and the government policies of the Japanese society with relation to its demographic changes that we have observed so far. It may be admitted that the Japanese-style management having basically what was called the Japanese-style Employment Customs has supported the growth of the Japanese economy by forming the characteristics of its basic structure. However, what we have to consider is whether such a management style can be maintained or it will come to change qualitatively in the rapidly changing population structure, and how the traditional customs have to be altered in order to maintain and increase the economic welfare for each of all age groups in the whole nation and what measures the government should take to realize it.

With regard to the so-called Japanese-style Employment Customs of Life-time Employment, Seniority System and In-house Labor Union (or Company Union), various statistical materials and empirical analyses have clearly indicated that the situation has gradually so changed that their essence cannot be preserved. As regards the custom of Life-time Employment, analyses have been made about employed laborers in Japan with the use of the government statistics of working structure. According to them, in the comparison of average length of working years at a certain age among age groups, a younger age group of laborers shows shorter length of working years at any time of age (Okawa and Ueno, 2011). And, regarding the trend of Seniority System of wages, an analysis based on the government statistics of wage structure shows that the relation of wage increase to its addition due to age has been getting feeble in the period corresponding to the Long-term Stagnation of this paper after the year 1990 (Hamaaki,

Hori, Maeda and Murata, 2010).

Concerning the In-house Union, long-range statistics of the Estimated Rate of Joining a Union since right after the War is given in the “Roushi-Kankei Sougou-Chousa (General Research of Labor Relations)” by the Ministry of Health, Labor and Welfare. Based on it, the joining rate was the highest with 55.8% in 1949 and tended to decrease after that. It once got back to 35.4% in 1970, but it continuously decreased after that, going down to 18-something % since the year 2000 to the present. There is much less evidence that the Japanese-style company union was tried to make a structural change into the Western-style union so as for each employee of a company to become a member of an industrial union constituted independently of his or her company. That is to say, Japanese labor unions have still the central role of mediating cooperation between labor and management even in the present low organization rate and stay different from the organizational society of the class conflict over profit distribution. As mentioned above, the Japanese-style business management differs from the Anglo-American style management of giving priority to stockholders’ profit in that the former has given priority to the profit of the whole group of company members with the main interest in that of employees, and a characteristic of the In-house Union in the Japanese company system has kept a complementary relationship with such a way of management. For example, such a complementary relationship can be seen in the practice that a company talks with its in-house union about necessary employment control in case of difficulties by presenting measures at company cost without notifying dismissal directly to individual employees.

And also, since the latter half of the 1990’s, clear changes have been partly observed even in the statistics in such customs as the preservation of a permanent relation between parent and subcontracting companies, cross-shareholding, and main bank system, which were all regarded as the business characteristics specific to the relationship between Japanese firms. In particular, the long-term connection in the Main Bank System between a bank and business firms through financial relations has been symbolized by cross-shareholdings between them. This relationship gives birth to a phenomenon of Low Metabolism that companies of a low productivity have been preserved in Japan’s industrial world (Fukao and Kwon, 2006), an analysis of which was presented in my “Paper of Number 6”. This cooperative relationship between a bank and business firms had been regarded as one of the valuable sources maintained for a long time for Japan’s economic growth. How has this relationship changed since

the latter half of the 1990's? It has shown a rapid development in taking measures against the bank crisis caused by the bursting of the asset price bubble. That is, banks were forced to sell their holding shares for resources to dispose of their bad debts. At that time, if banks would have sold them from a viewpoint of financial efficiency, the long maintained Main-Bank System in Japan's industrial world should have disappeared in the course of the long-term stagnation and the internationalization, which might have led the economy to dissolve the phenomenon of Low Metabolism not doing well with the market principle.

However, a research work into the actual selling of shares by banks shows the following circumstances (Miyajima and Nitta, 2011). Main-banks have sold earlier the holdings of firms having lower dependency on them. Many of such firms are generally the so-called blue-chip companies having a lower dependency on a particular bank and can independently raise their necessary funds in the financial market. There was no need in nature for them to maintain a strong relationship with a particular bank for a long time under the Main-Bank System. Moreover, the firms whose shares are held in quantity by a bank stay in a strong financial relationship with that bank for a long time and, if it sells the holdings of those firms, they will be put in a difficult position in the financial market and fall into a critical situation. It can also result in a growth of bad debts for the bank right away. These situations stay in the background of the actual development of the Main-Bank System at present.

The custom of two regular companies holding each other their shares has been regarded as a characteristic of the Japanese industrial world showing the preservation of a long-term connection between them. But, the strength of that custom represented by the ratio of cross-shareholdings to the whole holdings is shown that, while that ratio stayed at 15-16% until the former half of the 1990's, it continued to decrease rapidly after that and dropped to around 9% in 2007. It is explained that this change was mainly caused by dissolving cross-shareholdings between a bank and business companies (Miyajima and Kuroki, 2007). The actual conditions of those cross-shareholdings are shown by the figures calculated by Daiwa Soh-Ken using data about listed companies (DIR Analytical Report on Capital Market, November 2011). According to this report, the ratio at which banks hold shares of business companies as cross-shareholdings (a ratio on a monetary basis against the whole market) stayed at around 10% from 1991 through 1996, but after 1997, it continued to fall and reached to a small extent of 2.81% in 2005. During a few years after that, a little movement of enhancing the cross-shareholdings

with banks was observed as a defensive means against being acquired in the global trend of financial activities with that ratio returning to 3-something %, but the relationship of cross-shareholdings between a bank and business companies seems to be in the stage of transition in the stock market as well. Behind this change is also the actual situation of a rapid increase in the ratio of foreigners' shareholdings in Japan's stock market (Niyajima and Nitta, 2011).

However, the dissolution was made mainly between a bank and business firms which had little necessity of keeping the relationship each other. Therefore, although the characteristic of the Main-Bank System looks statistically to have weakened in Japan's industry as the whole, the essence of organizational characteristic, that is, the actual state of the industrial society of attempting mutual safety and development by preservation of a long-term specific cooperative relationship between a bank and its related companies or among companies in general, seems not to have changed yet still now.

5. Demographic Changes and Problems for the Future

The leading article "The Japan syndrome" of the "Economist" of an English economic journal cited before gives a warning that Japan is now becoming a society growing older at the fastest speed on the earth and that unless the country acts to tackle the problem caused by skewed demography, its decline will become intractable. Three difficult problems are indicated there to be tackled; a decrease in power of economic growth due to the decreasing working-age population, a problem of social security and public finances caused by the increasing elderly population in the decreasing working-age population, and a decline in Japanese firm's willingness to invest owing to the weakening demand of the people. Japan's demographic problem and these issues have been recognized so far by the public to various degrees, even without the remark of that article, but what is important will be that the article observes Japan is "ducking" this problem. And it finds "cultural taboos" behind that, expressing the necessity of overcoming what has been kept especially in Japan's hierarchical companies.

What the Economist means "cultural taboos" almost corresponds to "group directivity" of Japanese culture mentioned in this paper, and the contents of taboos in Japanese companies are considered to be largely equivalent to the in-house Japanese Employment Practices such as lifetime employment which have been treated so far in

this paper and to the Cross Shareholding between firms or the Main-Bank System between a bank and its related business companies. These Japanese-type management characteristics are an element which has been given an unusual rating by domestic and foreign experts as a basis of the development and growth of the Japanese economy all through the High growth Period, but as far as statistics show, we have just learned that Japanese firms' behavior toward these business practices came to change to a considerable degree under the transformation in an environmental condition of the demographic change. However, these changes in practices are recognized to be the result of repeated measures temporarily taken by firms to meet changes in the environmental condition surrounding them, and therefore it seems to need further detailed analyses about how far the changes of those business practices have been taken so as to keep up with the long-term and irreversible environmental transformation of demographic change in particular.

Let's take up as an example the Main-Bank System which has been one of typical institutional practices of Japan's industrial world. Being marked by the financial crisis after the bursting of the asset price bubble, the ratio of mutual shareholdings between banks and their related companies has been declining throughout the Two "Lost Decades". From this, it appears that the long-term maintained Main-Bank System comes to face to a phase of qualitative change. If it is true, the phenomenon of Low Metabolism that low-productive companies can survive under the protection of banks will take a turn for extinction, and it will be of positive significance for Japanese economy as the behavior of corresponding to the new environmental condition represented by the progress of globalizing economic activities. From detailed observations into the decline in banks' shareholding ratio, however, the present situation is that many of the firms with which banks sold a cross-shareholdings were blue-chip companies capable of raising necessary funds by themselves and that the ratio of dissolution by banks is low in the financial relationship with the business firms they serve as main-banks. From this, it is considered that main-banks' dissolution of cross-shareholdings with their business companies throughout the two "Lost Decades" was taken for their financial needs of disposing of nonperforming loans and that it cannot be regarded as a movement of dissolution of the Main-Bank System in taking long-term and structural measures against economic environments newly developing in the world.

Concerning the employment, people have been naturally employed as regular employees by Japanese companies under the Life-time Employment as one of the

Japanese-type employment practices, but in recent years, after the 1990's in particular, employment is strongly inclined to take various forms with an increasing tendency in the ratio of non-regular employees such as part-time workers, contract employees, and commissioned staff (Ministry of Health, Labor and Welfare; Overall Investigation into the Actual Circumstances concerning Diversification of Working Patterns). That is, the Life-time Employment as an in-house practice too is making a qualitative change at this time. During the high growth period, it was needed for any company as an integrated organization to try to make progress under the cooperation of company staff as a whole in the long-lasting growth of the national economy. Japanese firms brought up the above mentioned disembodied labor to be effective management resources specific to each company through in-house training and skill acquisition by working, by which each of those companies raised its total factor productivity of a company as a whole along with new development of embodied technology of capital equipment. As seen in Table 2, those efforts rapidly raised the productivity per labor ("C.R. of GDP·Lab." in the Table) of the whole Japanese economy. But, as the macro-economics of Japan changed qualitatively into the situation having a deflationary gap caused by the reduced demand after the 1990's, to preserve the growth in productive capacity of human capital in a company as a whole became of no need anymore, but it was required to modify the employment structure so as to adapt it for the present demand structure. That resulted in the present situation that the regular employees decrease and the non-regular employees increase. However, such a diversification of employment forms did not lead to the industrial world's renouncing the traditional Japanese-type employment practice of life-time employment. That practice is not necessarily required to be renounced even in the environmental change after the high growth period, and also it is true that such a diversification of employment forms as can meet specific business contents represents a rational aspect of business activities.

Under the changes in the surroundings of the Japanese economy typically shown by the changes in demographic construction and international economic environment since the high growth period, the Japanese-type business characteristics have undergone substantial changes as seen above in the statistical evidence, but they stay unchanged in essence in some parts still now and therefore, in order to appreciate properly the present state of the traditional business practices of Japan, detailed examinations are required into each of individual problems actually observed concerning them. In the following consideration, always keeping in mind the alteration in condition

Table 3 Future Estimation of Demographic Structure

Calendar Year	2010	2020	2030	2040	2050
Total Population (1,000)	128,057	124,100	116,618	107,276	97,076
Young Population Ratio (%)	13.1	10.7	10.3	10.0	9.7
Working Population (%)	63.8	59.2	58.1	53.9	51.5
Elderly Population Ratio (%)	23.0	29.1	31.6	36.1	38.8

Source: National Institute of Population and Social Security Research, “Population Projection for Japan” (Estimation in 2012)

of the Japanese society signified by the rapid demographic change that has been the main subject of this paper, we examine some important problems, based on the analyses made so far, about what Japanese economy should modify, what it should preserve and strengthen, and what new measures should be taken, in order to maintain and improve the economic welfare of the nation under the environmental changes.

First of all, an important problem directly caused by the population change is how to deal with the decrease in labor. As seen in Table 3, since the Japanese economy cannot avoid a long-term decrease in labor force available for productive activities as a basic factor together with capital, it will be inevitable for Japanese nation’s life to deteriorate due to stagnation of its economy if it preserve the traditional employment practices of the Japanese industrial world in the same way as before. It will be required to think countermeasures against the problem in both of quantitative and qualitative aspects. It is not difficult to figure out measures for improvement in the quantitative aspect. That is because decreasing population will directly produce shortage of labor in volume providing that Japan’s employment practices are maintained in the same way as they have been used for a long time, and it is not a sort of problem in societies not having such employment practices.

The way of employment which has been taken as granted in Japanese society so far includes not only the practices such as life-time employment and seniority system which are applied to workers after being employed, but the other obstinate practices have been carried out as being based on a natural way of thinking about employment in general.

First of all, the traditional Japanese way of thinking is that men are to work in society and women are to devote themselves to housework and childcare. Next, regarding the time of regular employment, there is a general practice of the wholesale employment

Table 4 Transition of Female Working

Calendar Year	1950	1960	1970	1980	1990	2000	2010
Employees (10,000) (*1)	3,572	4,436	5,094	5,536	6,249	6,446	6,257
Female Ratio (%) (*2)	39.4	40.7	39.3	38.7	40.6	40.8	41.4
Female Housework Ratio(%) (*3)	32.8	29.8	33.8	34.0	29.2	31.1	28.0

Source: Ministry of Internal Affairs and Communications, Statistics Bureau; Annual Report of Labor Force Research

Notes: (*1) Total working population minus unemployed persons.

(*2) Ratio of female employees to total employees.

(*3) Ratio of female nonworking population within the total female population (=female working population + female nonworking population) of age which is equal to or more than 15 years of old.

of new graduates from schools and universities that they are employed at the same time of their graduation under the Japanese school system, and after employment, companies have a system of giving those employees in-house education and training and building up for a long time the human capital which is necessary for each of the companies. Japanese society has accepted this structure without any doubt, which is shown by the fact that a fundamental structure of nation's welfare such as social security including a pension system is formed in such a way as accords to the traditional social recognition.

When it is unconsciously assumed that this traditional social recognition about labor is preserved in Japanese society from now on, it leads to the problem about the quantity of labor input under the change in its population structure, and this is a sort of problem that is naturally worked out in societies not having such recognition. That is, this is a sort of problem that can be naturally solved by removing an employment barrier of the simultaneous employment of new graduates, and by expanding a range of workers recognized and utilized as central human resources of organizations to female workers, namely, by extending employment to those who possess the necessary qualities including foreigners outside of the fixed-time employment at the time of graduation in the domestic education. Therefore, expert opinions on this future problem of quantitative shortage of labor are very alike and simple; one of their suggestions to solve this problem is to make use of female labor and the other is to expand employment to foreigners.

In recent years, these employment practices too show gradual changes in the same

way as other Japan-type practices owing to the globalization of business and market activities and the transformation of industrial structure besides the demographic problem. As shown in Table 4, the ratio of female participation in labor market seems to increase and the ratio of *housekeeping* women including *full-time housewives* appears to somewhat decrease though not seen clearly. However, in the Japanese society, the traditional sense of male-based labor has not been swept away yet and, in addition, facilities and benefits for women's housekeeping and childcare remain insufficient still now, which shows the unchanged situation that almost all the burden rests upon their shoulders. To bring the female work force to labor market is one of the solutions to the quantitative problem of decreasing labor force caused by the change in population structure from now on. For that purpose, it is required for Japan's society as a whole, business society in particular, to change its traditional view about how family life should be and at the same time to prepare social facilities and systems promoting women's participation into labor market in the same way that men join in working, without any restrictions due to femininity.

Regarding the other practice of the simultaneous employment of regular workers at the time of their finish of a domestic education, it was above described that the ways of employment have been diversified with an increase in non-regular employees during the prolonged stagnation of economic activities after the bursting of the bubble economy. But, as an element of maintaining a business organization for a long time in particular, the practice of accepting workers as regular employees has been preserved and so the traditional systems such as life-time employment and seniority system is kept basically unchanged still now, in the situation of which the practice of the simultaneous employment continues for new graduates in the Japan's domestic educational system. In this situation, there has not been observed yet such a form of employment conformable to the global economic environment as timely employs necessary human resources based on their skill, experience and performance from the world labor market regardless of their country. In the future, a demand for younger labor is expected to be getting further tight in production sites, and it goes without saying that a natural solution for the quantitative demand is to admit labor immigrants from Southeast Asian countries of regional significance in particular. In the past, Japanese government restricted immigration of unskilled laborers, and after 1990, it is turning the policy toward acceptance of foreign labor with measures such as abolition of job type restriction by revision of the Immigration Control Law, deregulation of the alien training system and new introduction

of a skill practice system, but it seems difficult for cultural barriers of Japan's society including a language problem to come to be removed so as for the situation to adapt itself to the change in the population structure in Japan. But, the situation surely estimated to rapidly progress in the future is a labor shortage in working sites of manufacturing and construction industries and in medical and nursing care sectors with the increasing demands for workers owing to the rapidly aging population. In order to prepare for that labor shortage, it is certain that to encourage an open-door policy of the domestic labor market for foreigners is a matter of requiring an urgent attention.

As another way to quantitatively cope with the employment problem caused by Japan's demographic change, it is considered to make good use of increasing elderly generation. In 1994, Elderly People's Employment Stabilization Law had been revised to make it obligatory to set retirement age at 60. As Japan was entering the era when the baby-boom generation born in a few years after the end of the War reached retirement age all together, another revision of the law was carried out in 2004 "for the purpose of securing stable employment for elderly people". It prescribes for firms (business managers) to extend employment gradually up to 65 years old by any one of ways of raising the retirement age, introducing a continued employment system, and abolishing a retirement rule. This policy has strong meaning of direct measures taken against gradual raise of the age at which pension payments start under financial oppression of the pension system, but in relation to the labor market, it can be understood to be quantitative measures concerning the demographic change in Japan's society which plan to make up for the decrease of working age population by a part of elderly population. At the same time, as a purpose for the time being, that policy has a function of preventing a bad influence on Japanese economy brought about by the situation that engineers and other workers of the post-war baby-boom generation, who have supported corporate activities for a long time, are to leave from the labor market simultaneously.

The above has dealt with the present situation and measures to be taken for it from the quantitative viewpoint about the labor shortage which will become restrictions on economic activities in the future under the present changes in the population size and age structure in Japan. But, as a problem of input of labor as a productive factor, what is important is the whole productivity of labor force measured including its qualitative aspect besides only a quantitative aspect of the number of workers. As

already explained in Section 2, labor equipped with this efficiency is input in production, being combined with capital embodying technological progress at the time. This forms total factor productivity, which becomes the strength of raising the productivity of the society as a whole.

The fundamental factors influencing labor quality are the educational system of a country and the skill learning system within a production organization. With regard to Japan's education, domestic and foreign experts indicate that, while the widespread and homogeneous school education system has been a source of its economic growth, the system makes it difficult for the country to bring up excellent leadership. This respect was discussed in details in the Paper of Number 6 along with citation references.

The widespread and homogeneous school education has become a source of high productivity and competitiveness of Japanese companies so far by cooperatively working with the Japan-type employment practices like a Life-time Employment System. Employees having such homogeneous educational standards have formed an organizational cooperative relation and team-work among them in a firm or between parent and subsidiary companies, which has created high-level techniques of product. It can be certainly said that this has brought about the high growth of Japanese economy and has become a source of international competitiveness of manufacturing sectors in particular. That is to say, such Japan-type educational system has made a great contribution to raising the quality of labor as a productive factor, expanding the scale of effective labor, and increasing total factor productivity of the Japanese economy as a whole.

The post-war Japanese economy started from virtually no production basis and followed the production and product technologies of Western developed countries in the international environment which enabled Japan to devote itself to economic activities. In such circumstances as allowed Japan to take part in international markets by absorbing and improving those technologies, the combination of its educational characteristics with its specific employment practices worked very effectively. The success brought by that combination realized the High Growth Age of Japan's economy, resulting in pushing up Japan to the world's second largest economic power next to the United States. What is important, however, is to consider the actual situation that the Japanese economy has come to have the long-lasting stagnation period after the bubble burst, while it was once talked about as the "Japan As Number One".

The stagnation has one of its sources, and a basically important one at that, in the

above mentioned combination of educational characteristics which lead to the high growth with the employment practices. Although this kind of combination most strongly works for effective learning and improvement of existing techniques and skills, it has some aspects which are not suitable for creating new techniques and new products in an organization by itself. To make an innovation requires to have new ideas within an organization or to find new capable persons outside, but these are the conducts that are hard to adapt themselves to human groups in a Japanese style organization consisting of the people educated in the homogeneous school system and following mainly the social norms with emphasis on obedience, ranking, docility, and cooperation.

The Japanese firms' working form of organizational cooperation among employees having a homogeneous educational standard is an effective system in itself for accomplishment of prescribed goals. This working system has been formed throughout the long historic process of Japan's society and cannot be easily built in imitation by other nations. Therefore, while carefully maintaining this work form specific to Japanese firms, it is required for them to reform the traditional system to such a new system as can take up new ideas within an organization and as can seek widely beyond the boundary of organizations capable people having new ideas or new techniques and those backed with experiences or knowledge not obtained within their own organizations. This would make it possible for the Japanese firms to develop of their own will the total factor productivity suitable for the new age, going beyond the rise in labor productivity as pursuers during the High Growth Age, even under a seemingly unfavorable change in the population structure and an excessive globalization of the international economic environment.

We have discussed above the problem of Japan's demographic changes from the viewpoint of the influence on the future productive activities. Therefore, our interest in the structural changes has centered on the changes in the volume and the proportion of working age population. But, the changes in population of age elder and younger than the working population come to be closely related to trends of Japan's economy as a whole. To begin with, concerning the trend in younger population, its rapid decrease after the latter half of the 1980's is beginning to influence the present working population which appears to have a decreasing trend, and it has already become an established fact that the influence will grow more and more strong. Japan's rate of birth decreased consistently after the War except the temporary increases in around 1965-6 due to a social old custom, and dropped to as low as 1.26 in 2005. After that, it picked up

Table 5 Changes in Elderly People, Pensioners and Members of Pension Scheme

Fiscal Years	1990	1995	2000	2005	2010	2015	2020	2030
W-E Ratio (*1)	5.8	4.8	3.9	3.3	2.8	2.3	2.0	1.8
Members of PP (*2)	6,631	6,995	7,049	7,045	6,826	—	—	—
Pensioners of PP (*3)	n.a.	n.a.	2,858	3,287	3,796	—	—	—

Source: Figures of “Labor Population” and “Elderly Population” are based on Ministry of Internal Affairs and Communication, Report of National Census and National Institute of Population and Social Security Research, “Population Projection for Japan”. Figures concerning public pensions are from Ministry of Health, Labour and Welfare, *Fact Sheet of Pension Insurance Plan for Corporate Employees and National Pension Project*, each year’s edition.

Notes: (*1) Ratio of Working population to Elderly population. Figures in and after 2015 are based on those of the future estimation.

(*2) Number of Members of Public Pension Systems at the end of each fiscal year. Unit is 10,000 persons.

(*3) Number of Pensioners of Public Pension systems at the end of each fiscal year. Unit is 10,000 persons.

a little to become 1.39 in 2010, but that temporal recovery is observed to be contributed largely by an increase in the childbirth by the people centered around the baby boomers’ children aged the latter half of 30. The government cannot remain unconcerned about this low birthrate and takes measures against it. On the other hand, women’s addition to working population is increasingly needed as already mentioned, and Japan’s society as a whole is now confronted with difficult measures to be taken such as provision of childcare facilities and, what is more, improvement of workplace conditions and related systems, for women to do well both in their work and in childcare.

The other sort of problems is about the trends of elderly population. Its increasing ratio in the total population and also the rapidly increasing trend of its number itself are now becoming an urgent problem Japan’s society as a whole should handle on the basis of the financial measures of the government particularly in the aspect of social security having pension and medical care in its main subjects. In view of the almost definite demographic trend of Japan in 20 to 30 years from now on, Japan’s society is clearly destined to devote a very large part of the result of economic activities to the demand of goods and services for elderly people, and the situation is usually indicated

by generalized symbolic figures expressing how many laborers support one elderly person in the population structure.

The first line of Table 5 shows the figures for the periods extending to the future. This shows the interdependent relationship between two generations from a broad point of view. It shows that, during the former half of the 1990's after the high growth age, a life of one elderly person was supported by five or six people of the current working generation, but that the situation has been rapidly so changed that one aged life needs to be supported by the work of two younger persons in 10 to 20 years from now. The figures about public pensions in the second and third lines of the Table show this generally acknowledged overall situation in a more concrete aspect. Members of the pension scheme are current workers bearing the responsibility for basically supporting the pension life of elderly people and the number of those members has turned to the decrease after 2000, and it is clearly known from the estimated future population given in Table 3 as well that this decreasing trend will be continuous. And, it is certain that the number of pension recipients will increase in a reverse way to the decrease in the number of active members as long as the present system of pension policies is maintained. It is clearly known at present that this situation cannot be maintained socially and in the national finance as well, and the government has begun to revise the public pension system though lately. In connection with this government policy, the legal regulations on firms' retirement system are carried out, as already discussed above.

Concerning the social burden related to the increase in elderly population, there exists a problem of the cost of medical and health care in addition to the increasing burden of pensions. This also has the character of funds for supporting elderly people's life by the working population, and in that respect, the problem can be considered by focusing on the policy measures to be taken in the same way as the problem of pensions. In addition to that, however, it is required to take measures to improve medical facilities like hospitals and clinics and to make progress in medical technology, which is more complicated than to take measures to settle the mere problem of the burden of current working people for the medical care costs of elderly people. In this way, the issue of social burden of the costs of pension and medical and health care has many complicated elements and its overall analysis goes beyond our present study. Therefore, we only indicate here that it becomes the urgent issue for Japan's society to take policy measures toward various problems related to the social security coming out with

changes in the population structure.

6. Conclusions

The decrease in population and the changes of its structure in recent Japan are symbolized by a word of “Low birthrate and Aging population”. The problems caused by this are the future influence on the Japanese economy and the measures towards them. As discussed so far, the major problem is how to meet the social burden “swelling” along with the increase in elderly population in particular while the level of productive activities tends to fall due to the decrease in working power as a productive factor. The measures to be taken come largely to how well firms, industries and the government will correspond to the greatly changing circumstances and conditions in each position and, at the same time, to the financial problem of the government. Above all, the problems resulted from changes in a population structure have those characters strongly. From a Japan’s financial viewpoint at present, a percentage of government expenditures related to social security of fiscal 2013 amounts to 54.0% of the total outlays for financial policies, which reaches almost a prohibitive stage, and it is certain that the financial management in the future will prove to be impossible without the response to this matter in all its social aspects.

In this way, the demographic change of Japan’s society has kept on oppressing the national finance by the increasing burden of social security expenditures, and in addition to that, the financial expenditures have steadily increased because the government was required to take continuously the financial measures for the relief of financial institutions and the business stimulus for a long time after the bursting of the asset price bubble. And, at present, the national finance is in the situation that it cannot expect the adequate increase in income to be needed for the increase in the burden. The government has filled the gap between them entirely by relying on the issue of national bonds and this situation has been kept unchanged until now. Then, it naturally leads to the increase in its redemption cost year by year and the total cost of national bonds in the fiscal 2013 budget amounts to nearly a fourth of the total expenditure of the general account budget. This sort of financial management of relying on the issue of the bonds has resulted in the total sum of the government debt (national bonds and borrowing) of 977 trillion yen as of March 2013. This amount is equivalent to almost 200% of GDP, far above the debt ratio of Grecian government, the debt default problem of which became a

trigger to the Euro Crisis in 2009.

The cost of social security as the measures against the increase in elderly population is increasing, in addition to the cost of national bonds which has been in a situation of its automatic accumulation as mentioned above. This will work as a strong oppressive factor on the necessary expenses relating to the promotion of education, culture and science forming the sound structural basis of the development of Japan's society and besides that, on the policy expenditures such as costs on industrial promotion and public works. As a related fact, Japan's public expenditure for education is only 3.3% as its ratio to the GDP, which is the lowest among 31 member countries of OECD having data of comparative feasibility. (On the problem of the Japanese economy and its university education, see Takashima; 2003.)

Behind a situation like this is Japan's population problem that we have taken as the main subject in this paper, and the fundamental measures against the above mentioned issues facing the Japanese economy result completely in how it can be raising its productivity amid the population structure changing in a direction unfavorable for economic activities, that is, the so-called "population onus". In 2011, the calamity of Eastern Japan Great Disaster hit the country as though it compounded the Two Lost Decades from the 1990's on. As symbolized by the quick recovery of supply chains in industries, it seems that Japan's society has a national recovery power to such a passing disaster, but in this time, the destruction of nuclear power plants marked a shortage problem of electric power and it became an additional factor to drag further the economic stagnation.

It is well anticipated that, in addition to the population problem, a new problem needed to tackle can take place at any time in this way under great changes in environmental conditions such as globalization of economic activities, growing weight of newly developing economies, and transformation of industrial structures. In order to solve these problems, there is no way but to improve productivity under the change in fundamental conditions and to make technological progress for it. The measures taken by the present government, the so-called "Abenomics", are basically provisional from the political point of view, aiming at the recovery from the deflationary situation. The Japanese economy needs steady structural measures beyond the political view point of the day. From the consideration made in Section 2 about the basic production structure, it is indicated that necessary things for the Japanese economy from now on are to make an industrial transformation into a new structure along with technical innovation and

introduction of capital embodying new technology needed for that transformation, and to direct the workforce reducing in scale toward skill-improvement to meet the demand changing in composition. By doing so, in the changing various circumstances and conditions, the total factor productivity growth of the whole economy will be realized under the cooperation between productive factors of capital and labor, and the rise of productive achievement per labor will improve economic welfare per person. This ought to make it possible for the Japanese economy to substantially get away from the Protracted Stagnation. Leaving this problem to the theme of the Second Sequel of “Toward Twenty Years after Two Lost Decades”, I am now closing this paper.

(This is basically an English version of my paper published in the preceding No.7 of this Journal.)

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