An Empirical Analysis of Employment Stability, Wages and Unemployment Rates of Japanese Labor Markets

by

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Master of Science in Economics
Massachusetts Institute of Technology, 1996

SUBMITTED TO THE DEPARTMENT OF ECONOMICS IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY
AT THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
SEPTEMBER 1999

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Submitted to the Department of economics
on July 17, 1999 in partial fulfillment of the
requirements for the Doctor of Philosophy in
Economics

ABSTRACT

This paper carries out an empirical analysis of Japanese labor markets with special attention paid on the comparison with the US labor markets.
Chapter 1 studies how employment stability changed by measuring historical five-year retention rates for male regular workers grouped by education level and firm size. It was found that the overall retention rates began to decrease at the current recession after the long period of stability. Owing to the law prohibiting the mandatory retirement before the age of 60, the retention rate from 50-54 years old to 55-59 years old increased. However, the retention rates decreased for younger workers. A comparative study of retention rates between Japan and the US is also carries out.
Chapter 2 shows how wage structure changed from 1974 to 93 by a great increase of old and more-educated male workers. Three kinds of wage differential – by age, by education level and by firm size – were examined. It was found that the young and less educated lost the ground most compared with the more educated and old. This finding is qualitatively the same with what happened in the US. The important difference is that the change of wage structure was much smaller in Japan than in the US. A simple supply-demand framework was applied to see how the wage and employment level were determined in the labor market. It was found that demand increase took place favoring senior and more educated workers and it raised the relative wage of more educated and more experienced like in the US.
Chapter 3 shows that unemployment rate has been low and stable in Japan for a long time. One reason of this is that employment fluctuation is small. The second important reason is that larger part of employment fluctuation is shared by those who move between employment and out of the labor force without experiencing unemployment compared with the US. Women, teenagers and old share larger part of employment fluctuation, and they are more prone to be discouraged workers than other demographic groups. The unemployment rate is estimated when these discouraged workers are counted as unemployed.

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Contents

Chapter.1
How Employment Stability Changed in Japanese Male Labor Markets[1]

I. Introduction

Job stability is a very important employment condition in Japanese labor markets. For a long time, male workers especially who are college graduates and working for large firms have been believed to be guaranteed almost perfect job security under the name of "lifetime employment system". Although this name is an exaggerated expression rather than an objective description of the actual long-term worker-employer attachment.

The lifetime employment system is a widely accepted custom[2] but not an official contract agreed and signed. Under this system most male workers expect that they will remain with the same employers or affiliated employers until they will reach their mandatory retirement ages[3]. Since this system reduces the risk of job loss for workers, it is considered beneficial to employees all the time and particularly during economic downturn when outside job opportunities are scarce. For employers, this system conveys different implications depending on whether they are in economic boom or slump.

Until the beginning of the current recession, employers as well as employees have appreciated the lifetime employment system positively because of its effectiveness to raise productivity. The lifetime employment system can raise productivity by 1) promoting training of employees with firms' expenses 2) developing the employees' loyalty to the company and thus stimulating the incentive for working 3) facilitating fair judgment to select good executives by taking sufficiently long time.

During any economic slump period, the demerit of this system becomes evident for employers. Under this system employers have difficulty in decreasing their

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[1] I thank Professor Steve Pischke for many helpful comments.

[2] The lifetime employment system is a custom and is not prescribed by law. However, when an employee, who is discharged without any justifiable reason, disagrees with the employer's decision and sues the employer at a court, the Japanese court, in most cases, takes the side of the employee. In this sense, the Japanese firms are not endowed authority to discharge regular workers without fair reason.

[3] Usually female workers are outside the scope of the lifetime employment system. Although the Equal Employment Opportunity Law was adopted in 1986, discrimination against women is deep-rooted in Japanese workplace.

redundant labor force. However until the current recession, it has been generally believed that merits seem to outweigh demerits in most cases. And even more, the combination of the lifetime employment system with the seniority wage system was beneficial to management under the condition of steady and high economic growth. It is not a coincidence that the combination of these two systems was established during the high economic growth period[4].

After the burst of the Japanese bubble economy came a serious recession. Amid this protracted recession, innumerable media reports have begun to document the increased job losses of middle-aged and older executives who formerly had full guarantee of lifetime employment. And the movement that middle-aged and older executives in large firms have begun to organize trade union to protect them from discharge has attracted much attention. In contrast to the uniformity of the media reports in accusing the deteriorating job security of middle-aged and older employees, the Japanese economists are divided into two different views.

One view is that the lifetime employment system is now on the brink of collapse. This claims that the middle-aged and older management have become the target as a surplus to be discharged because they are regarded as receiving more wages than their productivity under the seniority wage system[5].

The other view considers that overall job stability is not deteriorating because the average length of tenure has been increasing. As table.1.1 shows, the average length of tenure has been actually increasing for every firm size since 1974. However, judging the degree of job stability by the average length of tenure is misleading in the following sense.

The average length of tenure within the same company rises when the employees discharged are relatively with short tenure, and the number of new hire is reduced. These two actions have nothing to do with promoting job stability. In fact, firms in a declining industry reduce or stop new hire in order to reduce its labor force. This directly increases the average length of tenure. Even though this firm discharges the long-tenured employees, the effect of no recruitment might outweigh the effect of cutting

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[4] Several hypotheses coexist about when the lifetime employment system was introduced, however, it is agreed that it was established during the high growth period.

[5] Whether wage is larger than productivity before the age of retirement has been one of the focal points of the Japanese seniority wage system. Okazaki (1993) showed empirically that wage is larger than productivity for older employees.

the middle-aged and older employees. And thus, the average length of tenure becomes longer even though long-tenured employees have been discharged.

To capture the actual situation of employment stability objectively, more appropriate measure is necessary. The purpose of this paper is to measure actual job stability more precisely and see whether job stability has been deteriorating or not. I measure job stability by calculating historical five-year retention rates for male workers in the manufacturing industry mainly using the Wage Census published annually by the Ministry of Labor. In section II, I describe the procedure of estimating five-year retention rates, and adjustments required to remove the effects which bias the correct measurement of retention rates. The third section shows how stability changed over time and how stability differs according to education level and firm size. And a comparison of retention rates is carried out between the US and Japan. The fourth section focuses on the elderly workers who are around the mandatory retirement age, and test whether the legal extension of mandatory retirement age has actually increased the retention rate of elderly workers. The fifth section argues about the policy to promote employment stability of the elderly people and its implication. The sixth section offers conclusions.

II. Data and Method

2-1. Estimating Five-year Retention Rates

Five-year retention rate is a measure of the probability of continuing with the same firm for an additional five years. It is calculated from two cross-section surveys - with a breakdown by two-digit industries, firm size and five-year age groups - conducted five years apart. Ages are mostly grouped with five-year interval, like 20 to 24 years old, 25 to 29 years old, 30 to 34 years old and so on. According to this five-year interval, those who belong to a particular age group, for example 30 to 34 years old, in year t, will belong to the next age group, from 35 to 39 years old, in year t+5. Some employees who were working in year t may leave the company before year t+5. The number of employees who stayed in the same group can be obtained from the Wage Census of year t+5. Five-year retention rates are calculated by dividing the number of employees who belong to the age group 35-39 in year t+5 by the number of employees who belonged to the age group 30-34 in year t.

To this point, the possibility of people coming into a cell during the sample period

has been neglected. To get the correct measurement, this possibility should be taken into account as follows.

Let $L_{i,j,a,t}$ be the number of employees of a cell characterized by industry i, firm size j, ages between a and a+4, and in year t. Suppose the average length of tenure of this cell is $S_{i,j,a,t}$. Five years later, in year t+5, some part of $L_{i,j,a,t}$ who stayed in the same cell and the new entrants to this cell make up the total number of people who belong to industry i with firm size j and of the ages between a+5 and a+9 denoted as $L_{i,j,a+5,t+5}$. Let their average length of service be $S_{i,j,a+5,t+5}$.

Let the number of new entrants to this cell between t and t+5 be $I_{i,j,a,t}$ and the number of those who went out of this group during the same period be $O_{i,j,a,t}$. Assume that new entry occurred according to the uniform distribution, then the average length of tenure of new entrants in year t+5 is 2.5. Assume also that those who went out of this group had the same average length of service with those who stayed in the same group.

Under these assumptions, the following two equations are always satisfied.

$$L_{i,j,a+5,t+5} = L_{i,j,a,t} + I_{i,j,a,t} - O_{i,j,a,t} \qquad (1)$$

$$\{(L_{i,j,a,t} - O_{i,j,a,t})(S_{i,j,a,t}+5) + 2.5\, I_{i,j,a,t}\} / L_{i,j,a+5,t+5} = S_{i,j,a+5,t+5} \qquad (2)$$

Since these two equations include two unknowns ($I_{i,j,a,t}$ and $O_{i,j,a,t}$) and four knowns ($L_{i,j,a,t}$, $L_{i,j,a+5,t+5}$, $S_{i,j,a,t}$, $S_{i,j,a+5,t+5}$), the system is solvable without ambiguity. By substituting (1) into (2), $I_{i,j,a,t}$ and $O_{i,j,a,t}$ can be expressed only with known variables. Using the $I_{i,j,a,t}$, given by the following equation (3),

$$I_{i,j,a,t} = L_{i,j,a+5,t+5}\,(S_{i,j,a,t} + 5 - S_{i,j,a+5,t+5}) / (S_{i,j,a,t} + 2.5) \qquad (3)$$

the retention rate of employees during these five years, $R_{i,j,a,t}$ can be defined as

$$R_{i,j,a,t} = (L_{i,j,a+5,t+5} - I_{i,j,a,t}) / L_{i,j,a,t} \qquad (4)$$

The retention rates thus defined are calculated for thirteen double digit industries[6]

[6] The industries included are textile, pulp and paper, publishing and printing, chemical products, rubber products, ceramic, stone and clay products, iron and steel, non-ferrous metals, fabricated metals, general machinery, electrical machinery, transportation equipment and precision machinery.

in the manufacturing sector, for three firm sizes (the large firm sector with employees above 1000, the medium firm sector with employees between 100 and 999 and the small firm sector with employees between 10 and 99) and for seven age groups (30 to 34, 35 to 39, 40 to 44, 45 to 49, 50 to 54, 55 to 59 and above 60), from 1974-79 span to 1988-93 span.

2-2. Adjustment by Number of Firms

To this point, each cell was considered to represent a company, however, it is not true because the available data are grouped by industry and by firm size and not by an individual firm as desired. Since each cell contains the employees who belong to many different firms, the source of the change of the number of employees consists of two different parts. One is the change of the number of employees hired by each firm, and the other is the change of the number of firms which belong to the same cell. The latter factor should be excluded from the total number of change of employees to measure the retention rates correctly. Since the change of the number of employees caused by the companies entering into or leaving a cell is not available directly from the data, it must be estimated as follows.

The data of the number of firms with a breakdown by two-digit industries and firm size are available from the Manufacturing Census published annually by the Ministry of International Trade and Industry. Using these numbers, I estimate how many employees came in or went out of this cell as the employees of these firms moving into or out of a cell. The average number of employees who are working for these firms are assumed as follows.

In the large firm sector the average number of employees working for the firms which move into or out of this size category is assumed to be 1000 because such firms are likely to be marginal ones in this size category and likely to have employees just above or below 1000. Since medium-sized and small firms have both upper and lower limits, there are two possibilities for firms to go out of a cell, becoming too large or too small. Thus, the average number of employees of the firms moving out of and into this group is assumed to be the same with that of the firms which stayed in the same group.

The procedure of adjustment to the change of the number of firms is as follows. Suppose that the number of firms which belong to the industry i of firm size j, changes from $N_{i,j,t}$ in year t to $N_{i,j,t+5}$ in year t+5. Let $E_{i,j,t}$ be the average number of total employees of $N_{i,j,t}$ firms in year t. To remove the effects caused by the change of the number of firms,

$L_{i,j,a,t}$ in equation (4) should be replaced by the adjusted one $AL_{i,j,a,t}$ obtained as follows.

In the large firm sector, total number of employees change caused by the firms moving out of and into the industry i of firm size j is $1000(N_{i,j,t+5} - N_{i,j,t})$. Thus,

$$AL_{i,j,a,t} = L_{i,j,a,t} \cdot \{N_{i,j,t} \cdot E_{i,j,t} + 1000 \cdot (N_{i,j,t+5} - N_{i,j,t})\} \div (N_{i,j,t} \cdot E_{i,j,t}) \quad (5)$$

In the medium and the small firm sector, replacing the above $1000 \cdot (N_{i,j,t+5} - N_{i,j,t})$ by $E_{i,j,t} \cdot (N_{i,j,t+5} - N_{i,j,t})$ and doing the same calculation leads to the adjusted $L_{i,j,a,t}$, $AL_{i,j,a,t}$, as follows

$$AL_{i,j,a,t} = L_{i,j,a,t} \cdot N_{i,j,t+5} / N_{i,j,t} \quad (6)$$

Actually all the retention rates in this paper are calculated using $AL_{i,j,a,t}$ instead of $L_{i,j,a,t}$ in (4)

III. Five-year Retention Rates

Estimated five-year retention rates are displayed in tables and figures. Age-retention rate profiles are shown in figures.1.1 to 1.9. Age-retention rate profiles are drawn to analyze how age-effect on retention rate varies over time and also how it varies according to firm-size and educational attainment. But drawing one profile for one time span makes fifteen profiles over the sample period, and fifteen profiles are too many to be compared graphically. So fifteen time spans are divided into three periods, each containing five time spans, and the average of five time spans represents each period.

The first period is the average of five spans from 1974-79 to 1978-83, the second is the average of five spans from 1979-84 to 1983-88 and the third is the average of five spans from 1984-89 to 1988-93. One retention rate profile is drawn to represent one period. Three retention rate profiles, each of them representing one period make up one figure. Each figure shows the retention rate profile of one education level and one firm size. Three firm sizes and three education levels make nine figures from Fig.1.1 to Fig.1.9. They are the graphical display of the retention rates presented in tables.4 to 6.

3-1. Average over All Age Groups

Time Trend

Table.2 shows the average retention rates of the manufacturing industry[7] which can be compared over time from 1974~79 span to 1988~93 span. They are classified by firm size and education level. Each retention rate in this table is the weighted average of the age groups from 30 to 60+ years old for college graduates and from 25 to 60+ years old for high school and middle school graduates using the number of employees of each age group as a weight.

The large and the medium firm sectors show a similar pattern of retention rates for every education group. They are stable from 1974~79 span to 1986~91 span but decrease after that. The small firm sector shows a different pattern from the other two sectors. Retention rates take the highest values in 1974-79 span but thereafter they are stable in the small firm sector. So it can be said that the large and the medium firm sectors decreased their retention rates during this current recession but the small firm sector did not decrease them.

Marcus (1993) discovered the existence of the employer-size labor market segmentation, which is one of the causes of firm-size earnings differentials in Japanese labor markets. That is, the wages of Japanese small firms respond to the local labor market conditions while the wages of Japanese large firms show an inelastic response to them. Since how the wages are determined differs depending on firm size, it is not surprising that how retention rates are determined also differs according to firm size. There is a possibility that Japanese large firms respond to business cycle by altering retention rates while small firms do it by changing wages.

The retention rates of three education groups averaged across three firm sectors are shown in table.1.2. They are stable from 1974-79 span to 1986-91 span and thereafter decrease. This pattern is the same with that of the large and the medium firm sectors. Probably the pattern of the small firm sector was dominated by the pattern of the other larger sectors. So overall it can be said that job stability of every education group deteriorated for the current recession.

The last column of table.1.2 presents the retention rates averaged over all levels of

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[7] The retention rates were calculated for thirteen two-digit industries belonging to the manufacturing sector. What are presented in the table 1.2 are the weighted average of these thirteen industries using the number of employees as a weight.

education and all firm size categories across the manufacturing industry. They were stable from 1974-79 span to 1986-91 span and then decreased for consecutive two spans. This pattern is the same with that of the large and the medium firm sectors.

This decrease of the retention rates for the last two spans implies that job stability has been generally deteriorating for the current recession. This finding is consistent with the above-cited anecdotal facts that many middle-aged and older workers have been losing jobs. During this same period, from 1992 to 93, the average length of tenure, shown in table.1, increased in the large and the medium firm sectors and kept unchanged in the small firm sector. Maybe the average length of tenure is an inappropriate measure to capture the inter-temporal change of job stability because of the reason already explained.

To see whether business cycle or the structural change causes the current decrease of the retention rates, the unemployment rates from 1974 to 1993 are shown in table.1.3 to be compared with the movement of retention rates. The unemployment rates of 1992 and 93 are 2.2 and 2.5, and these are not greater than those of 1982 to 88. This implies that the business cycles alone cannot explain the current decrease of retention rates in the large and medium firm sectors.

Comparison among Three Sectors

Among three firm size sectors, average retention rates are the highest in the large firm sector, and the lowest in the small firm sector for most time spans as is evident from table.1.2. This finding is consistent with a common belief that larger firms guarantee greater job stability than smaller ones.

Comparison among Three Education Groups

Among three education groups, retention rates are smallest for the middle school graduates in every sector for every time span. It means that middle school graduates are characterized by least job security among three education levels. Between college and high school graduates no consistent size relationship is evident. In the large and the medium firm sectors, neither education group shows consistently higher retention rates than the other one.

This finding about college graduates seems to contradict a common and widespread view that the lifetime employment system is beneficial mostly to the college graduates working for large firms. The reason why this finding looks different from the common

view is that large firms guarantee lifetime employment to their middle-aged and older workers by securing their jobs not in their own firms but mostly in their subsidiaries and affiliated smaller firms. In other words, large firms have their discretionary power, based on their monopsonistic transactions, to transfer their redundant labor force to their subsidiaries and affiliated smaller firms. So even though college graduates working for larger firms are transferred to smaller firms with better condition than high school graduates, this differential is not reflected in retention rates.[8] And unfortunately there exists no data to verify the above possibility.

In the small firm sector, high school graduates show higher retention rates than college graduates for most time spans.

3-2. Classification by Firm Size

The retention rate profiles show quite different shapes depending on firm size. In the large and the medium firm sectors retention rates peak at the ages between 40 and 49, while in the small firm sector it peaks at older age, mostly around 50 to 54. This implies that the peak age tends to come later as firm size becomes smaller.

Comparing the maximum retention rates among three sectors by using the table.1.4 to 1.6, the large firm sector shows the largest value and the small firm sector shows the smallest value for every education group and for every period.

The minimum value of the retention rates is always obtained by the age group of 60+ for every education group in every firm size and for every period. This is simply because the mandatory retirement age is 60 for most firms. This minimum value is largest in the small firm sector and smallest in the large firm sector.[9]

In the large firm sector the retention rates are high between the ages of 30 and 54 but after that they decrease rapidly for every education group so the difference between the maximum and the minimum values is large compared with that of the other sectors. In the small firm sector the peak value of retention rates is not so large and the trough value is not so small as in the large firm sector, so the retention rate profile is flatter than in the large firm sector.

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[8] Marcus(1995) showed the importance of receiving assistance from one's preretirement employer in finding good-paid employment after mandatory retirement for male employees of large Japanese firms.

[9] This is contrary to the actual situation of the formal rule. The proportion of firms which have mandatory retirement age at or above 60 is the highest in the large firm sector and the smallest in the small firm sector. For example in 1994, more than 95% of firms in the large and the medium sectors set their mandatory retirement ages above or equal to 60, but that ratio is only 82.5% in the small firm sector.

3-3. Classification by Education Level

Differences of retention rates according to educational attainment are not so clear as those caused by the difference of firm size. The only difference which is correct regardless of firm size or of time span is that college graduates get higher retention rates than the other two education groups when they are 60+ years old. Probably this takes place because only the high-rank managers are exempt from the mandatory retirement age rule, and the possibility to get such position in the current company is highest for college graduates.

Among three education groups in the third period, the greatest maximum retention rate is obtained by college graduates of 45-49 age group (0.98) in the large firm sector, while in the medium and small firm sectors the greatest maximum retention rates are obtained by high school graduates when they are 40 to 54 years old (0.89 in the medium firm sector and 0.82 in the small firm sector).

d) Comparison with the U.S. retention rates

Diebold, F.X., D.Newmark and D.Polsky(1994) measured the U.S. retention rates using the CPS tenure supplements. Although accurate comparison is impossible because of many differences between the U.S. and the Japanese data, comparison of the retention rates between these two countries seems to be interesting. The differences of the data which make comparison difficult are as follows.

1) The U.S. retention rates are calculated based on the following question asked to individuals, " How long has --- been working continuously for his present employer (or as self-employed)?" The Japanese retention rates are calculated using the number of employees who continue to belong to the same cell which is characterized by industry and firm size. Since the Japanese retention rate counts the people who continue to belong to the same cell but not to the same company, it has a tendency of overestimation than the U.S. retention rate.

2) While the ages of the samples of the CPS are randomly chosen, the approaching ages of the Japanese sample are restricted from 30 to 60+ years old for college graduates, and from 25 to 60+ years old for high school and middle school graduates.

Since young people who may have high mobility are excluded from the Japanese sample, this might underestimate the retention rates.

3) While the samples of the CPS are randomly chosen, those of the Japanese Wage Census are regular workers employed by the firms with more than 10 employees. This will overestimate the Japanese retention rates because the part time workers and the men working for very small firms are excluded from the sample who must have high mobility. However, this former effect may be negligible because the male part time workers are exceptional in Japanese labor markets.

4) To compare the retention rates of the two countries starting at the same year, the U.S. retention rates are four-year retention rates and the Japanese retention rates are five-year retention rates. Four-year retention rate is higher than five-year retention rate if other conditions are the same.

The U.S. retention rates and the most comparable Japanese retention rates are summarized in table.1.7. In spite of the above problems, the following findings deserve attention.

1) As is shown in table.1.7, the average retention rates are higher in Japan than in the U.S.A., for both time spans whether the average is taken for male, education group or the manufacturing sector.[10] Even the retention rates of the Japanese small firm sector which shows the smallest value among the tabulated categories are higher than the U.S. male retention rates for both spans. The finding that the retention rates are significantly higher in Japan than in the U.S. is consistent with other studies.[11]

2) The average retention rates are quite stable in the U.S., but they decreased

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[10] The retention rates of Japan are calculated for male workers only in the manufacturing sector so the average of male workers represents only the manufacturing sector and not the whole industries as does the U.S. data. So the comparison of the average retention rates in two countries has only rough implication.

[11] Employment Outlook (1993) compared eight-year U.S. retention rates with ten-year Japanese retention rates and concluded that " relative to Japan far fewer workers in the United States get into long-tenure jobs" and "almost regardless of age or initial tenure, Japanese men are significantly more likely to be with the same employer ten years later".

considerably in Japan during the same period, from 1983-88 span to 1987-92 span.

3) The shape of the retention rate profiles is different between two countries. In the U.S. the retention rate keeps decreasing as employees become older with the only exception that the retention rate is higher for 66-70 years olds than for 61-65 years olds. In Japan the retention rate first increases and then takes the maximum value around the age of 40-49, and then keeps decreasing thereafter.

IV. Retention Rates of Old Workers around the Mandatory Retirement Age

4-1. Retention Rates by Age Group

All the age-retention rate profiles displayed in figure.1.1 to 1.9 show an increase in retention rates for the age group of 55~59 from the second to the third period. This might have happened because many firms prolonged their mandatory retirement ages to 60 during this sample period[12] in response to the pressure from the Ministry of Labor to postpone the legal mandatory retirement age to 60. It has already been decided that setting the mandatory retirement age under 60 will be illegal from April 1998.

In contrast to the age group of 55-59, most other age groups decreased retention rates from the second to the third period. Particularly for college graduates, retention rates decreased in every firm size. For high school and middle school graduates, most retention rates decreased in the large and the medium firm sectors. In the small firm sector no trend seems to be obvious for high school and middle school graduates.

These findings indicate the possibility that many firms in the large and the medium firm sectors reduced their employees in most age groups other than 55 to 59 in order to cancel out the effect of prolonging the mandatory retirement age to 60. The other possible cause to increase the employees aged 55 to 59 and reduce the employees aged other than 55 to 59 is the change of technical condition, however, it is quite unlikely that technological progress favored the employees aged 55 to 59. The retention rates around the age of 60 and the mandatory retirement age will be analyzed more precisely in the following.

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[12] As Fig.1.10 shows, the age of 60 has become more prevalent as the mandatory retirement age.

4-2. Mandatory Retirement Age and Retention Rates of Elderly Workers

The population has been aging rapidly in Japan. Some policy is needed to maintain the living standard of old people. The purpose of this section is to analyze the effect of setting the mandatory retirement at 60 by looking at the retention rates of old workers near mandatory retirement age.

In the first place, what is mandatory retirement age should be explained. If lifetime employment system really guarantees employment until mandatory retirement age, one minus retention rate implies the rate of voluntary quit for all the age groups. However, it is a famous fact that firms often force employees to retire even before mandatory retirement age. So a significant gap seems to exist between the officially ruled mandatory retirement age and the actual age at which the employees are forced to retire. To shed light on this gap, it is necessary to know, in the first place, at what age firms officially set their mandatory retirement age.

Of all the Japanese firms, about 90% fix their mandatory retirement age at a certain years of age and the rest of them, mostly small firms, don't specify them. The ratio of firms, which specify the retirement age, is about 99.5% for large firms, 97.9% for medium-sized firms, and 87.1% for small firms as of 1994.

As table.1.8 and figure1.10 show, the age of 60 has become more prevalent as the mandatory retirement age. In 1985, 27.1% of firms had the retirement age at or below 55, but in 1994 that ratio decreased to 8.1%. Instead, the ratio of firms who set their retirement age at 60 has increased from 51% in 1985 to 77.1% in 1994. This ratio also differs according to the firm size. As is shown in table.1.9, more than 95% of large and medium-sized firms set their mandatory retirement age above or equal to 60, but that ratio is only 82.5% for small firms in 1994.

Although this implies that small firms tend to force retirement earlier than larger firms, this implication is contrary to the fact as will be shown in the following. Table.1.10 shows the five year retention rate which indicates the probability that the employees who are above 55 years of age will be kept employed until they will become above 60 years of age in the same company. It is evident from table.1.10 that the retention rate is higher in smaller firms for every education level.

This retention rate shows fluctuations but no clear time trend, however some facts are evident from table.1.10. First, in large firms the average retention rate of high school graduates is consistently lower than that of college graduates. But there is no such

consistent relationship in medium-sized and small firms. Second, the average retention rate of middle school graduates is consistently lower than that of high school and college graduates in both medium-sized and small firms.

Although most firms set their mandatory retirement age at 60 as an official rule, it is likely that many of medium-sized and small firms tend to extend employment beyond that. To see whether the official rule about the mandatory retirement age of 60 is observed by employers or not, it is necessary to see whether most employees are kept hired until the age of 60.

Five-year retention rates, which indicate the probability that the employees of the ages between 50 and 54 are kept employed until they become between the ages of 55 and 59 in the same company, are shown in table.1.11. There seems to be an increasing trend of the retention rate in large and medium-sized firms.

The average retention rate of high school graduates is in most cases the highest than others in every firm size. As a general rule, middle school graduates have the next highest retention rate, and the retention rate of the college graduates is the lowest.

As the size of firms becomes smaller, the retention rate tends to be larger for every education level. This finding also contradicts the above noted fact that officially ruled mandatory retirement age tends to be higher for larger firms. From the above findings, it can be concluded that there is a gap between mandatory retirement age and the actual age of retirement. And there is a tendency that medium-sized and small firms are more prone to keep their senior workers employed than large firms.

Table.1.12 shows the five-year retention rates, which indicate the probability of employees of ages between 45 and 49 to become between the ages of 50 and 54 in the same firm. Although few firms set their retirement age below 54, it makes sense to compare this retention rate with that of other ages. Since it is said that large firms have begun to encourage employees to retire around the age of 45, the retention rate should be checked from around the age of 45. Table.1.12 shows no obvious time trend. In every firm size, the retention rate is smallest for college graduates, and highest for those whose final education level is high school. In most cases, the retention rate is higher in large firms than in small firms. This is contrary to the case of retention rate from the age of 55-59 to 60-64.

In this section it was found that the five-year retention rate from 50-54 to 55-59 increased in every sector, and for every education group. However, there is no such consistent movement for the retention rate of 55-59 to 60-64, and that of 45-49 to 50-54.

However, the retention rate for younger generation decreased for most groups with the exceptions of college and high school graduates in the small firm sector.

V. Policy Implications

5-1. The Existing Policies to Promote the Employment of Elderly People

Since the Japanese society has been aging much more rapidly than any other country has ever experienced, how to support the rapidly expanding elderly people is a serious problem. The Ministry of Welfare has already decided that the starting age of pension[13] payment will be postponed to the age of 65 from current starting age of 60, by postponing one year in every three years from 2001. The policy chosen by the Ministry of Labor is to try to keep the old people as labor force instead of inducing them to retire early. The actual policy already taken is to make the retirement age before 60 illegal since April 1998. This policy was announced in advance by the Ministry of Labor in 1990.

All these policies are performed under the Law Concerning Stabilization of Employment of Older Persons. The next goal of this law is to postpone the mandatory retirement age to 65. Since it has already been decided that people will be eligible for pension payment from the age of 65 in near 2013, people aged 60 to 65 should support their living by themselves.

The effect of the policy to make the mandatory retirement before 60 illegal is evident. As figure 1.10 shows, increasing number of firms are setting their mandatory retirement ages at or above 60, and now most firms (88.3% as of 1996) do so. The current situation is that the mandatory retirement age of 60 is prevalent. And the Ministry of Labor is now encouraging employers to keep their employees to the age of 65 for those who desire to work until that age. Under the Law Concerning Stabilization of Employment of Older Persons which was enacted in 1990, the firms which have the formal rule to continue employment to the age of 65 and actually holding a certain number of employees between 60 and 65 under this rule can get subsidy.

5-2. Policy Implications

I will see the effectiveness of the two kinds of policy here. First, the policy to

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[13] This is the nation-wide compulsory social insurance for all employees.

encourage firms to keep their employees until 65 is not effective so far. This policy of giving subsidy to employers who employ senior workers above 65 has begun from1990, although there appears no tendency of increasing retention rate from 55-59 to 60-64.

Second, the policy to set mandatory retirement age at or over 60 seems to be effective in two senses. One is that most firms have come to set the mandatory retirement age at 60 as is shown in Figure.1.10. The other is that the actual retention rates from 50-54 to 55 to 59 increased. However, the retention rates for younger workers decreased. This means that the employers delayed the mandatory retirement to age 60 in response to the pressure from the Ministry of Labor, but they tried to cancel out that effect by decreasing the number of employees of younger ages.

So overall, this policy does not necessarily increase the employment stability of the whole labor force. Even if it is somewhat successful to promote the employment of the elderly people, it is likely to be undertaken at the sacrifice of the employment of non-target, younger ages.

VI. Conclusion

This paper has examined the employment stability in Japanese male labor markets by estimating the historical five-year retention rates for male regular employees working in the manufacturing industry. What follow are the findings obtained.

First, the overall average of the retention rates began to decrease at the current recession after the long period of stability from 1974-79 to 1986-1991 span.

Second, the probability to become 55-59 in the same company has increased, while the retention rates approaching other ages have decreased. This might have happened because companies had to postpone their mandatory retirement ages to at least 60 years old in order to abide by the law which has made the mandatory retirement before 60 illegal since April 1998. Instead of delaying the mandatory retirement age to 60, firms might have reduced employees who are younger than 45 years old, thus reducing their retention rates.

Third, the greater the firm size, the larger the retention rate. This is consistent with the common view that jobs in larger firms are more stable. However, the retention rates of the small firm sector did not decrease at the current recession while the retention rates of the other two sectors decreased.

Fourth, the middle school graduates have the smallest retention rates, however

there is no consistent difference of retention rates between college and high school graduates.

Although measuring five-year retention rates is the major part of this chapter, they have deficiency as an indicator of employment stability. Since there is no micro data in Japan, I used the aggregated data and measured the retention rate of the same cell and not the same firm. The retention rate of the same firm is preferable, and collecting appropriate micro data is a future topic. As noted above, the employees of large firms are often transferred to smaller firms from the age of 45 to 60. This transfer is not the same as employment guarantee in the same firm, but better than simple discharge. So taking this kind of variation into account should also be a topic of future research.

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Table. 1. 1
The average legth of tenure in the same company:
regular male workers in the manufacturing industry
(years)

Large firm sector					
age	1974	1979	1987	1992	1993
average	11.8	14.3	16.5	16.7	17
25-29	6.9	8	6.3	6	6
30-34	10.8	11.6	12.2	10.1	10.3
35-39	13.5	15.6	16.8	16.2	15.9
40-44	17.4	18.4	21.1	21.4	21.6
45-49	21.6	22.4	24.4	25.7	25.5
50-54	24.7	26.4	26.9	28.9	29.4
55-59	22.9	26	28.9	30.5	31.3
60-64	12.3	12.8	16	19.5	17.8
65-	11.6	14.1	13.2	15.8	13.7
Medium firm sector					
age	1974	1979	1987	1992	1993
average	8.7	11.1	13	13.4	13.5
25-29	6	6.8	5.9	5.9	5.9
30-34	9	10.1	10.1	8.9	8.9
35-39	11.1	13.1	14.3	12.8	12.4
40-44	12.3	15.2	17.8	17.1	17.1
45-49	13.3	16.5	20.3	20.7	20.5
50-54	14.6	17.2	21.5	23	23.5
55-59	12	15.2	20.3	23.4	23.8
60-64	9	10.7	13.4	14.2	16.1
65-	10.3	11.7	13.9	13.7	13.1
Small firm sector					
age	1974	1979	1987	1992	1993
average	7.8	9.2	10.5	11.4	11.4
25-29	5.2	5.3	4.8	5.2	5.1
30-34	7.5	7.7	7.3	7.3	7.1
35-39	9.1	10	10.1	9.5	9.4
40-44	9.8	11.5	12.6	12.1	12.2
45-49	10.2	12.3	14.6	14.5	14.4
50-54	10.6	12.1	15.5	16.6	16.3
55-59	9.7	11.9	14.7	16.9	17.1
60-64	9	11.3	13.3	15	15.6
65-	10.3	12.4	14.7	15.3	15.9

Source : Wage Census (the Ministry of Labor)

Table. 1. 2 Five-year Retention Rates

	Large firm sector			Medium firm sector		
span	college	high school	middle school	college	high school	middle school
1974-79	0. 91	0. 84	0. 82	0. 86	0. 84	0. 78
1975-80	0. 89	0. 88	0. 89	0. 90	0. 88	0. 84
1976-81	0. 88	0. 84	0. 86	0. 87	0. 86	0. 81
1977-82	0. 91	0. 85	0. 82	0. 84	0. 85	0. 82
1978-83	0. 90	0. 87	0. 83	0. 91	0. 88	0. 77
1979-84	0. 89	0. 92	0. 86	0. 86	0. 81	0. 75
1980-85	0. 94	0. 95	0. 88	0. 77	0. 78	0. 70
1981-86	0. 92	0. 97	0. 88	0. 76	0. 81	0. 71
1982-87	0. 90	0. 91	0. 79	0. 88	0. 85	0. 75
1983-88	0. 92	0. 94	0. 88	0. 82	0. 81	0. 75
1984-89	0. 88	0. 89	0. 80	0. 79	0. 82	0. 71
1985-90	0. 88	0. 88	0. 77	0. 80	0. 84	0. 70
1986-91	0. 87	0. 90	0. 79	0. 82	0. 81	0. 70
1987-92	0. 83	0. 84	0. 78	0. 75	0. 73	0. 64
1988-93	0. 85	0. 80	0. 72	0. 71	0. 73	0. 67
average	0. 89	0. 89	0. 82	0. 82	0. 82	0. 74

	Small firm sector			All three sectors			Average of
span	college	high school	middle school	college	high school	middle school	all male workers
1974-79	0. 82	0. 75	0. 72	0. 88	0. 82	0. 77	0. 80
1975-80	0. 75	0. 68	0. 66	0. 88	0. 83	0. 79	0. 82
1976-81	0. 66	0. 67	0. 64	0. 84	0. 8	0. 76	0. 79
1977-82	0. 63	0. 70	0. 66	0. 84	0. 81	0. 76	0. 80
1978-83	0. 69	0. 74	0. 67	0. 87	0. 84	0. 76	0. 81
1979-84	0. 60	0. 69	0. 65	0. 83	0. 82	0. 75	0. 79
1980-85	0. 68	0. 72	0. 64	0. 83	0. 84	0. 74	0. 80
1981-86	0. 72	0. 74	0. 71	0. 83	0. 86	0. 75	0. 81
1982-87	0. 71	0. 72	0. 68	0. 86	0. 84	0. 74	0. 80
1983-88	0. 69	0. 73	0. 67	0. 85	0. 84	0. 76	0. 81
1984-89	0. 72	0. 73	0. 65	0. 82	0. 82	0. 72	0. 79
1985-90	0. 68	0. 72	0. 66	0. 82	0. 82	0. 71	0. 78
1986-91	0. 66	0. 71	0. 69	0. 82	0. 82	0. 72	0. 79
1987-92	0. 70	0. 71	0. 66	0. 78	0. 77	0. 69	0. 75
1988-93	0. 65	0. 68	0. 65	0. 77	0. 74	0. 67	0. 73
average	0. 69	0. 71	0. 67	0. 83	0. 82	0. 74	0. 79

Table. 1. 3

Unemployment rate (%)

	total population	male
1974	1.4	1.4
1975	1.9	2.0
1976	2	2.2
1977	2	2.1
1978	2.2	2.4
1979	2.1	2.2
1980	2	2.0
1981	2.2	2.3
1982	2.4	2.4
1983	2.6	2.7
1984	2.7	2.7
1985	2.6	2.6
1986	2.8	2.7
1987	2.8	2.8
1988	2.5	2.5
1989	2.3	2.2
1990	2.1	2.0
1991	2.1	2.0
1992	2.2	2.1
1993	2.5	2.4

Source : Labour Fource Survey (the Ministry of Labor)

Table. 1. 4
Five-year retention rates of the large firm sector

	1st period		2nd period		3rd period	
college						
age 25-29 to 30-34	0.93	(23.7)	0.97	(16.3)	0.88	(18.7)
30-34 to 35-39	0.91	(17.9)	0.93	(17.8)	0.89	(12.2)
35-39 to 40-44	0.95	(15.3)	0.96	(13.7)	0.94	(13.7)
40-44 to 45-49	1.00	(10.0)	1.00	(12.3)	0.98	(10.9)
45-49 to 50-54	0.76	(4.6)	0.85	(6.9)	0.85	(8.6)
50-54 to 55-59	0.33	(1.1)	0.46	(1.8)	0.54	(3.3)
55-59 to 60-	0.16	(0.2)	0.16	(0.2)	0.11	(0.3)
	1st period		2nd period		3rd period	
high school						
age 25-29 to 30-34	0.88	(20.1)	0.96	(15.9)	0.86	(10.0)
30-34 to 35-39	0.92	(16.8)	0.99	(18.2)	0.91	(13.1)
35-39 to 40-44	0.92	(13.3)	0.99	(14.7)	0.94	(17.2)
40-44 to 45-49	0.86	(7.3)	0.97	(11.7)	0.93	(12.6)
45-49 to 50-54	0.79	(3.6)	0.93	(6.3)	0.88	(10.4)
50-54 to 55-59	0.39	(1.1)	0.56	(2.2)	0.63	(4.3)
55-59 to 60-	0.07	(0.1)	0.07	(0.1)	0.05	(0.2)
	1st period		2nd period		3rd period	
middle school						
age 25-29 to 30-34	0.94	(13.3)	0.98	(7.4)	0.87	(2.7)
30-34 to 35-39	0.97	(17.8)	0.97	(15.3)	0.93	(8.5)
35-39 to 40-44	0.98	(18.8)	1	(21.0)	0.96	(18.1)
40-44 to 45-49	1	(18.1)	0.98	(22.0)	0.92	(24.5)
45-49 to 50-54	0.92	(16.0)	0.91	(18.9)	0.9	(25.7)
50-54 to 55-59	0.4	(5.8)	0.54	(10.9)	0.64	(16.5)
55-59 to 60-	0.04	(0.5)	0.04	(0.5)	0.04	(1.0)

Notes:
1st period is the average of five spans from 1974-79 to 1978-83.
2nd period is the average of five spans from 1979-84 to 1983-88.
3rd period is the average of five spans from 1984-89 to 1988-93.
Numbers in parentheses are the percentage share of employees who are aged 30-34, 35-39, 40-44, 45-49, 50-54, 55-59 and 60+ in the total male employees in the manufacturing sector for each education level and each period.

Table.1.5
Five-year retention rates of the medium firm sector

		1st period		2nd period		3rd period	
	college						
age	25-29 to 30-34	0.83	(22.6)	0.79	(19.2)	0.75	(19.2)
	30-34 to 35-39	0.93	(17.3)	0.84	(17.7)	0.81	(17.0)
	35-39 to 40-44	0.95	(11.4)	0.89	(13.5)	0.84	(15.0)
	40-44 to 45-49	0.92	(8.3)	0.91	(9.2)	0.83	(11.3)
	45-49 to 50-54	0.84	(0.4)	0.79	(5.8)	0.78	(7.0)
	50-54 to 55-59	0.59	(1.4)	0.54	(2.1)	0.61	(4.0)
	55-59 to 60-	0.32	(0.6)	0.27	(0.7)	0.22	(1.1)
		1st period		2nd period		3rd period	
	high school						
age	25-29 to 30-34	0.86	(26.4)	0.84	(13.1)	0.79	(11.4)
	30-34 to 35-39	0.94	(21.5)	0.87	(15.6)	0.84	(10.9)
	35-39 to 40-44	0.96	(18.8)	0.9	(12.4)	0.89	(14.2)
	40-44 to 45-49	0.95	(13.0)	0.9	(10.5)	0.89	(10.4)
	45-49 to 50-54	0.87	(7.1)	0.86	(6.9)	0.89	(9.2)
	50-54 to 55-59	0.56	(3.3)	0.63	(3.2)	0.75	(5.9)
	55-59 to 60-	0.2	(1.1)	0.19	(0.8)	0.2	(1.4)
		1st period		2nd period		3rd period	
	middle school						
age	25-29 to 30-34	0.83	(12.2)	0.77	(7.6)	0.66	(3.3)
	30-34 to 35-39	0.9	(15.4)	0.82	(14.0)	0.79	(8.1)
	35-39 to 40-44	0.92	(16.2)	0.88	(17.5)	0.83	(15.9)
	40-44 to 45-49	0.94	(16.7)	0.86	(18.6)	0.8	(19.3)
	45-49 to 50-54	0.92	(14.6)	0.82	(18.5)	0.82	(21.3)
	50-54 to 55-59	0.56	(8.1)	0.57	(12.1)	0.66	(18.8)
	55-59 to 60-	0.17	(3.2)	0.18	(3.0)	0.14	(5.8)

Notes: 1st period is the average of five spans from 1974-79 to 1978-83.
2nd period is the average of five spans from 1979-84 to 1983-88.
3rd period is the average of five spans from 1984-89 to 1988-93.
Numbers in parentheses are the percentage share of employees who are aged 30-34, 35-39, 40-44, 45-49, 50-54, 55-59 and 60+ in the total male employees in the manufacturing sector for each education level and each period.

Table.1.6
Five-year retention rates of the small firm sector

		1st period		2nd period		3rd period	
	college						
age	25-29 to 30-34	0.68	(22.6)	0.64	(22.6)	0.66	(18.7)
	30-34 to 35-39	0.72	(16.2)	0.71	(18.9)	0.65	(19.8)
	35-39 to 40-44	0.75	(10.1)	0.7	(12.9)	0.73	(17.1)
	40-44 to 45-49	0.75	(8.2)	0.73	(8.1)	0.72	(11.4)
	45-49 to 50-54	0.75	(4.1)	0.74	(6.4)	0.73	(7.5)
	50-54 to 55-59	0.68	(2.1)	0.65	(3.4)	0.7	(5.9)
	55-59 to 60-	0.43	(2.2)	0.38	(2.1)	0.47	(3.6)
		1st period		2nd period		3rd period	
	high school						
age	25-29 to 30-34	0.69	(17.5)	0.7	(12.4)	0.66	(11.4)
	30-34 to 35-39	0.76	(14.6)	0.75	(15.6)	0.71	(10.9)
	35-39 to 40-44	0.78	(13.8)	0.8	(12.8)	0.81	(14.9)
	40-44 to 45-49	0.78	(10.4)	0.83	(11.9)	0.82	(11.6)
	45-49 to 50-54	0.74	(6.8)	0.8	(8.9)	0.82	(11.1)
	50-54 to 55-59	0.69	(4.0)	0.71	(5.5)	0.76	(8.6)
	55-59 to 60-	0.41	(3.2)	0.34	(2.9)	0.41	(4.7)
		1st period		2nd period		3rd period	
	middle school						
age	25-29 to 30-34	0.67	(10.9)	0.63	(6.5)	0.63	(3.4)
	30-34 to 35-39	0.71	(13.9)	0.72	(12.1)	0.71	(6.6)
	35-39 to 40-44	0.74	(15.3)	0.74	(15.2)	0.74	(13.2)
	40-44 to 45-49	0.76	(15.5)	0.76	(16.9)	0.76	(16.4)
	45-49 to 50-54	0.76	(13.0)	0.77	(17.1)	0.75	(19.1)
	50-54 to 55-59	0.67	(9.9)	0.65	(13.1)	0.64	(18.4)
	55-59 to 60-	0.33	(8.6)	0.27	(8.2)	0.33	(12.9)

Notes: 1st period is the average of five spans from 1974-79 to 1978-83.
2nd period is the average of five spans from 1979-84 to 1983-88.
3rd period is the average of five spans from 1984-89 to 1988-93.
Numbers in parentheses are the percentage share of employees who are aged 30-34, 35-39, 40-44, 45-49, 50-54, 55-59 and 60+ in the total male employees in the manufacturing sector for each education level and each period.

Table.1.7 Average retention rates of the US and Japan

the U.S.A.	1983 to 87	1987 to 91
male	0.52	0.51
female	0.53	0.52
goods-producing sector	0.49	0.51
college graduates	0.58	0.59
high school graduates or dropouts	0.48	0.47
Japan	**1983 to 88**	**1987 to 92**
male	0.81	0.75
college graduates	0.85	0.78
high school graduates	0.84	0.77
middle school graduates	0.76	0.69
the large firm sector	0.92	0.82
the medium firm sector	0.79	0.71
the small firm sector	0.69	0.69

Source: the U.S.A.data from Diebold,F.X.,D.Newmark and D.Polsky (1994)

Table. 1. 8 Distribution of the mandatory retirement age, from 1985 to 1994 (all the industries included)

year	the mandatory retirement age			
	at and below 55	between 56and59	at 60	over 61
1985	27.1%	17.3%	51.0%	4.4%
1990	19.8	16.1	60.1	3.8
1992	11.7	11.7	71.4	5.1
1994	8.1	7.7	77.1	7.0

Source: Survey on Employment Management (the Ministry of Labor)

Table. 1. 9 Distribution of the mandatory retirement age in 1994 by firm size (the manufacturing industry)

firm size number of employees	mandatory retirement age			
	at and below 55	between 56and59	at 60	over 61
over 5000	0%	0%	100%	0%
1000 - 4999	1.6	1.8	95.7	0.9
300 - 999	1.5	3.3	93.8	1.5
100-299	4.0	4.9	88.9	2.3
30-99	8.1	9.4	76.2	6.4

Source: Survey on Employment Management (the Ministry of Labor)

Table. 1. 10
Five year retention rates of male employees becoming over the age of 60 in the same company

(a) Large firms (number of employees over 1000)

	final education level	
period	high school	college
1974-79	2.8%	10.1%
1975-80	4.1	7.9
1976-81	4.5	7.9
1977-82	3.2	8.5
1978-83	4.6	14.7
1979-84	3.0	11.0
1980-85	4.6	12.1
1981-86	5.1	10.4
1982-87	2.5	10.0
1983-88	3.3	7.2
1984-89	3.0	6.1
1985-90	3.7	6.1
1986-91	3.7	10.0
1987-92	4.3	10.2
1988-93	4.8	8.4
average	3.8	9.4

(b) Medium-sized firms (number of employees between 100 and 999)

	final education level		
period	middle school	high school	college
1974-79	13.9%	17.6%	23.0%
1975-80	18.5	21.8	35.5
1976-81	16.7	20.5	22.8
1977-82	17.7	19.5	23.8
1978-83	13.0	16.3	22.7
1979-84	13.8	21.5	32.2
1980-85	12.0	18.3	15.4
1981-86	11.1	18.4	24.3
1982-87	8.7	13.4	22.9
1983-88	13.3	14.1	16.3
1984-89	10.5	15.5	13.4
1985-90	10.6	14.8	20.6
1986-91	12.6	18.9	17.6
1987-92	16.1	17.7	22.0
1988-93	12.8	22.4	18.9
average	13.4	18.0	22.1

Table. 1. 10 (continued)

(c) Small firms (number of employees less than 99)

	final education level		
period	middle school	high school	college
1974-79	30.4%	41.1%	38.6%
1975-80	30.4	42.0	27.2
1976-81	34.0	37.8	38.5
1977-82	34.8	41.4	36.3
1978-83	32.2	36.3	31.0
1979-84	28.7	31.4	29.7
1980-85	27.4	38.0	32.2
1981-86	26.0	33.0	34.2
1982-87	24.8	31.9	36.9
1983-88	25.9	31.0	30.9
1984-89	26.8	35.1	36.9
1985-90	31.7	37.2	42.4
1986-91	34.2	40.0	43.3
1987-92	36.0	43.8	36.9
1988-93	33.9	41.9	46.6
average	30.5	37.5	36.1

Table. 1. 11
Five year retention rates of male employees becoming between the ages of 55 and 59 in the same company

(a) Large firms (number of employees over 1000)

	final education level	
period	high school	college
1974-79	26.5%	23.1%
1975-80	26.9	19.9
1976-81	31.0	25.6
1977-82	34.4	33.1
1978-83	39.6	35.5
1979-84	50.9	36.5
1980-85	48.1	40.8
1981-86	52.7	48.9
1982-87	54.2	40.4
1983-88	56.2	42.3
1984-89	59.1	47.8
1985-90	58.0	49.8
1986-91	65.8	49.7
1987-92	61.1	46.8
1988-93	61.9	51.2
average	48.4	39.4

(b) Medium-sized firms (number of employees between 100 and 999)

	final education level		
period	middle school	high school	college
1974-79	48.2%	49.5%	45.5%
1975-80	56.0	51.0	44.8
1976-81	57.6	51.7	43.9
1977-82	57.1	52.6	44.3
1978-83	55.6	65.5	65.6
1979-84	58.1	62.4	64.8
1980-85	54.2	56.9	51.3
1981-86	55.8	62.8	45.1
1982-87	55.1	63.6	43.9
1983-88	55.4	62.0	48.1
1984-89	60.7	71.3	54.6
1985-90	61.2	71.9	58.1
1986-91	68.3	75.1	60.3
1987-92	66.3	76.2	57.3
1988-93	66.1	70.9	54.4
average	58.4	62.9	52.1

Table. 1. 11 (continued)

(c) Small firms (number of employees less than 99)

period	final education level		
	middle school	high school	college
1974-79	69.7%	68.6%	64.9%
1975-80	63.1	56.7	57.4
1976-81	62.3	63.7	47.4
1977-82	60.3	70.8	50.0
1978-83	62.8	69.6	53.7
1979-84	63.9	64.3	53.6
1980-85	62.4	66.9	54.0
1981-86	61.5	75.7	51.5
1982-87	69.1	75.3	60.7
1983-88	63.1	69.5	67.4
1984-89	63.9	68.6	65.8
1985-90	66.1	73.2	56.6
1986-91	69.2	75.4	63.0
1987-92	66.9	81.1	71.0
1988-93	67.1	74.5	51.1
average	64.8	70.3	57.9

Table. 1. 12
Five year retention rates of male employees becoming between the ages of 50 and 54 in the same company

(a) Large firms (number of employees over 1000)

	final education level	
period	high school	college
1974-79	68. 8%	65. 1%
1975-80	79. 6	72. 7
1976-81	75. 4	69. 6
1977-82	78. 1	74. 9
1978-83	81. 3	79. 3
1979-84	90. 8	82. 7
1980-85	90. 5	81. 3
1981-86	91. 7	82. 8
1982-87	87. 1	79. 0
1983-88	88. 6	80. 4
1984-89	84. 9	80. 7
1985-90	85. 8	80. 7
1986-91	90. 7	77. 2
1987-92	84. 8	78. 5
1988-93	83. 3	83. 9
average	84. 1	77. 9

(b) Medium-sized firms (number of employees between 100 and 999)

	final education level		
period	middle school	high school	college
1974-79	84. 2%	79. 7%	68. 1%
1975-80	93. 0	89. 7	75. 8
1976-81	87. 6	78. 4	79. 0
1977-82	86. 1	78. 9	76. 2
1978-83	88. 2	86. 1	84. 2
1979-84	85. 2	83. 1	84. 1
1980-85	77. 9	82. 0	67. 8
1981-86	80. 0	81. 3	64. 8
1982-87	78. 3	86. 9	73. 8
1983-88	82. 0	87. 1	76. 4
1984-89	80. 7	84. 4	76. 8
1985-90	86. 1	92. 2	77. 2
1986-91	79. 8	88. 5	74. 6
1987-92	73. 6	79. 8	66. 8
1988-93	77. 3	83. 2	68. 9
average	82. 7	84. 1	74. 3

Table. 1. 12 (continued)

(c) Small firms (number of employees less than 99)

	final education level		
period	middle school	high school	college
1974-79	75. 7%	76. 3%	62. 8%
1975-80	68. 5	71. 7	72. 4
1976-81	73. 5	69. 3	70. 1
1977-82	72. 7	72. 6	66. 4
1978-83	77. 6	76. 2	53. 4
1979-84	72. 3	74. 5	49. 2
1980-85	72. 1	79. 2	63. 1
1981-86	78. 5	80. 7	73. 5
1982-87	80. 4	77. 4	71. 4
1983-88	78. 5	79. 8	72. 4
1984-89	75. 3	82. 4	71. 2
1985-90	75. 3	80. 3	60. 5
1986-91	77. 1	80. 8	70. 3
1987-92	73. 9	81. 4	70. 8
1988-93	74. 9	78. 9	69. 7
average	75. 1	77. 4	66. 5

Fig.1.1 college, large firm sector

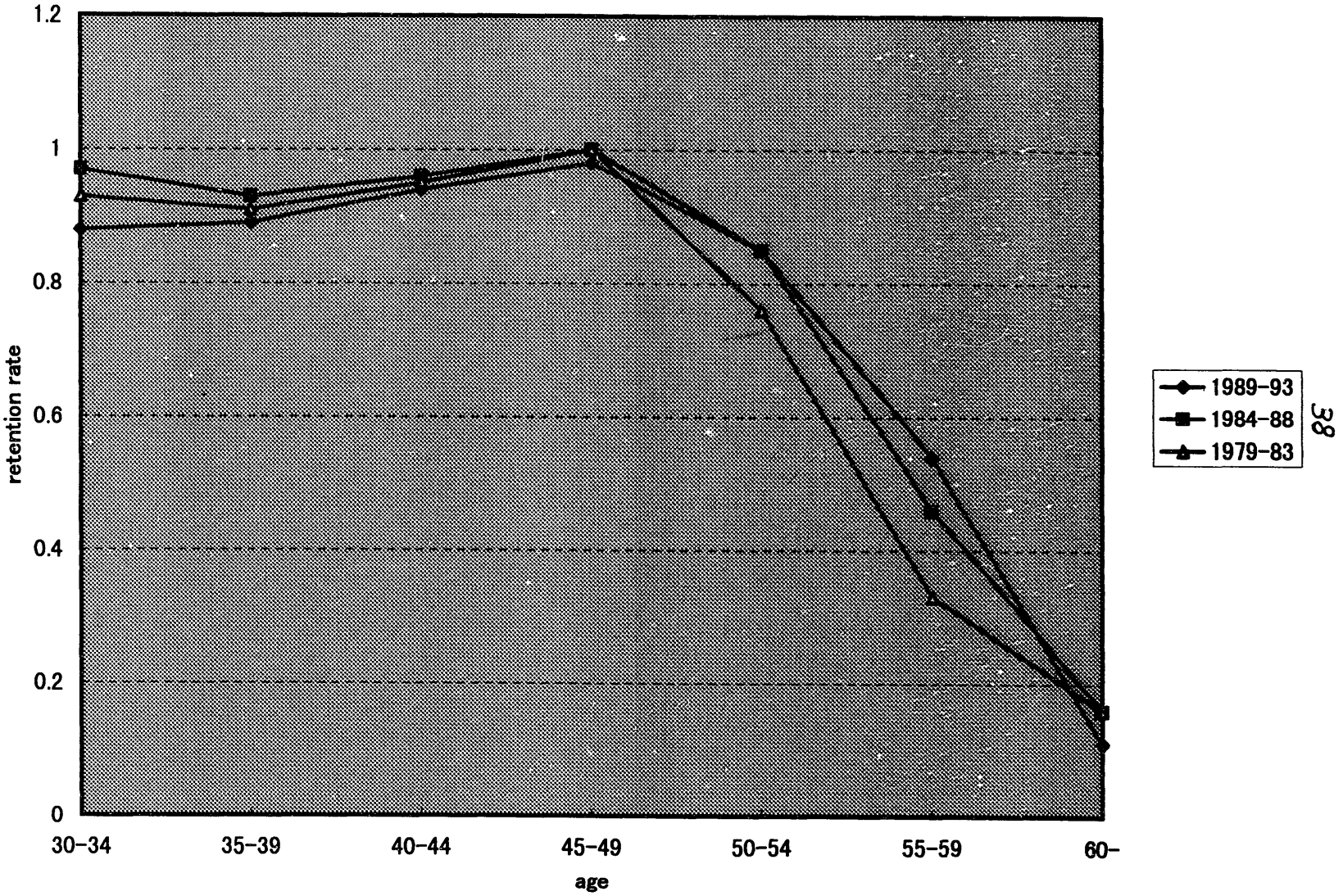


Fig.1.2 college, medium firm sector

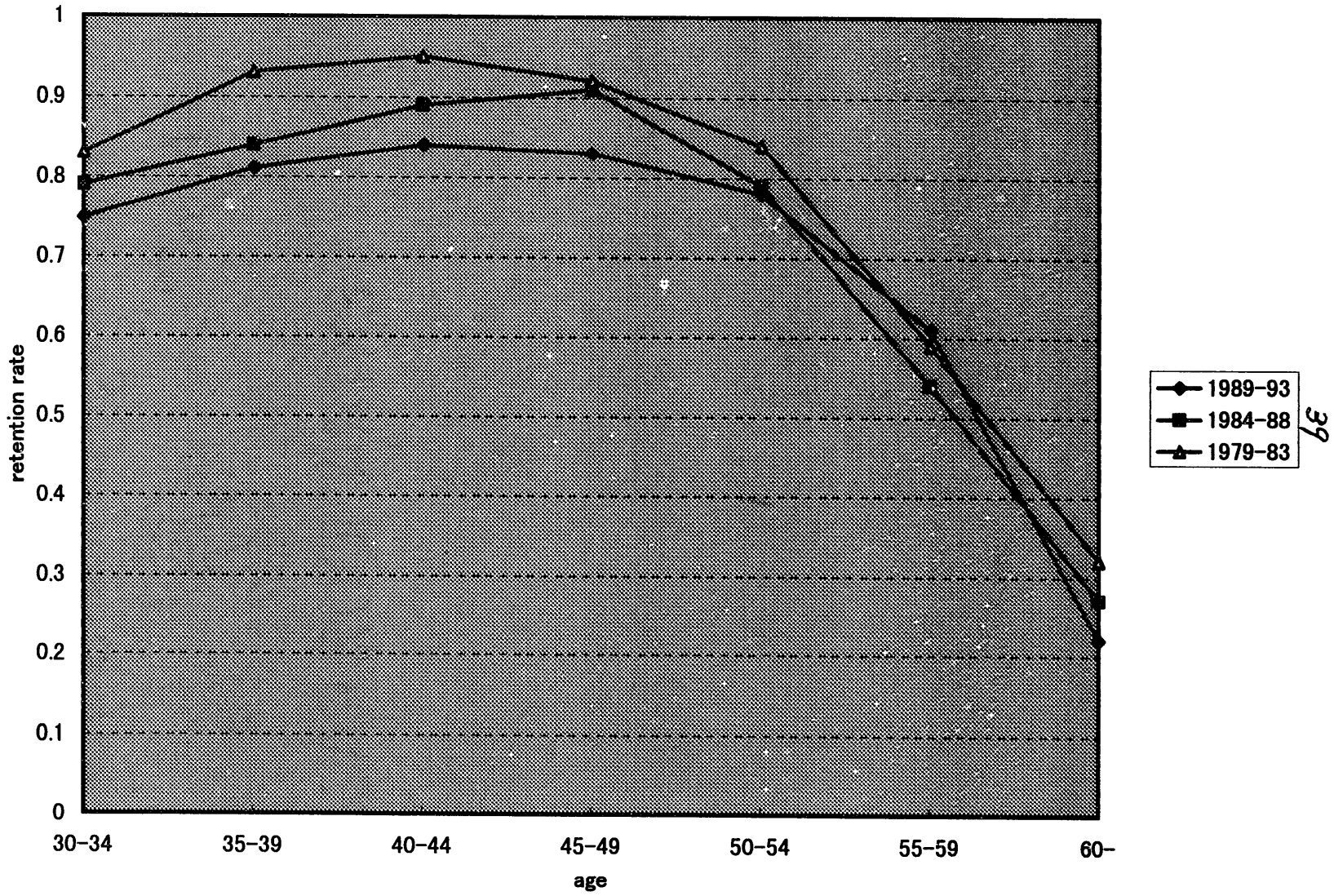
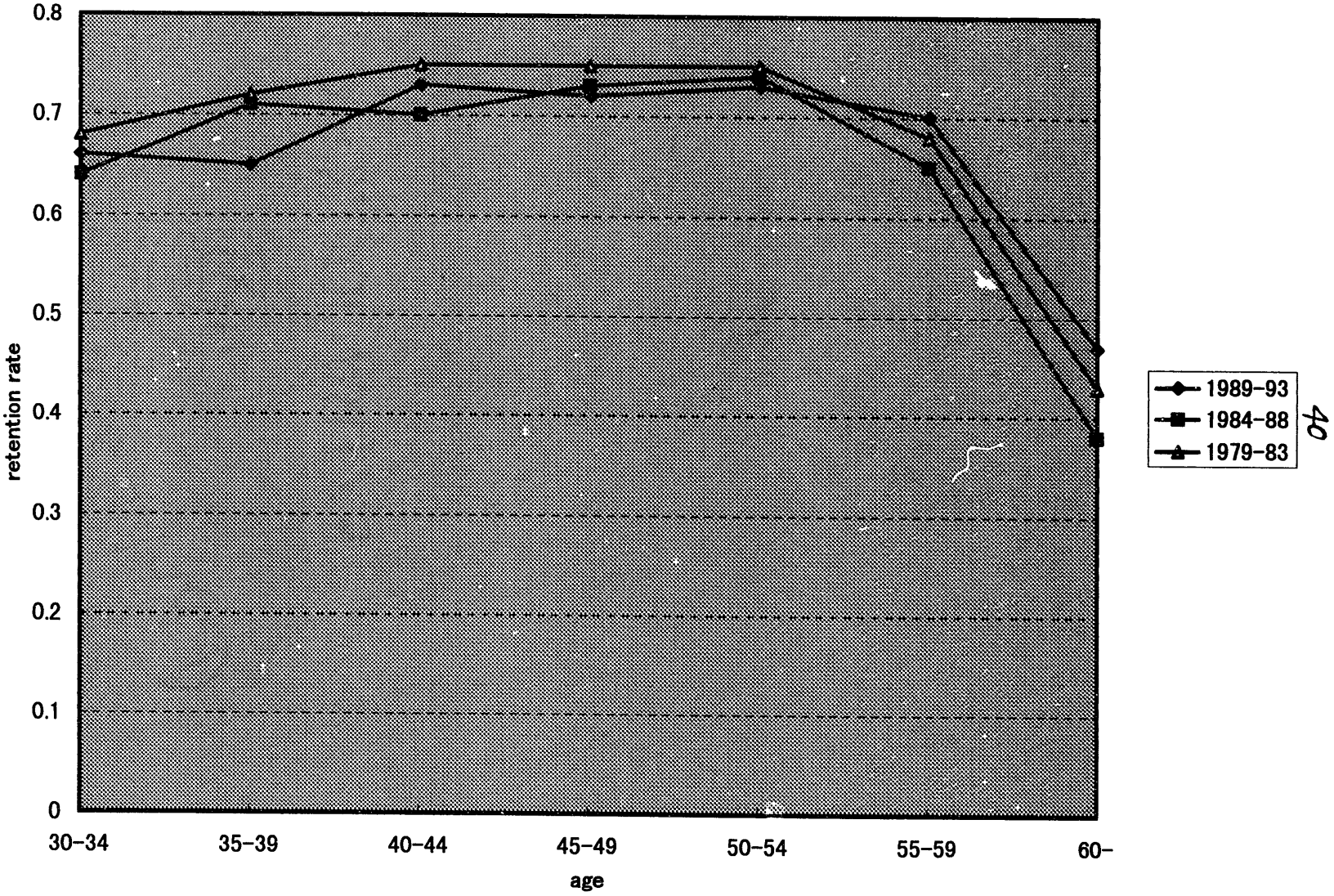


Fig.1.3 college, small firm sector



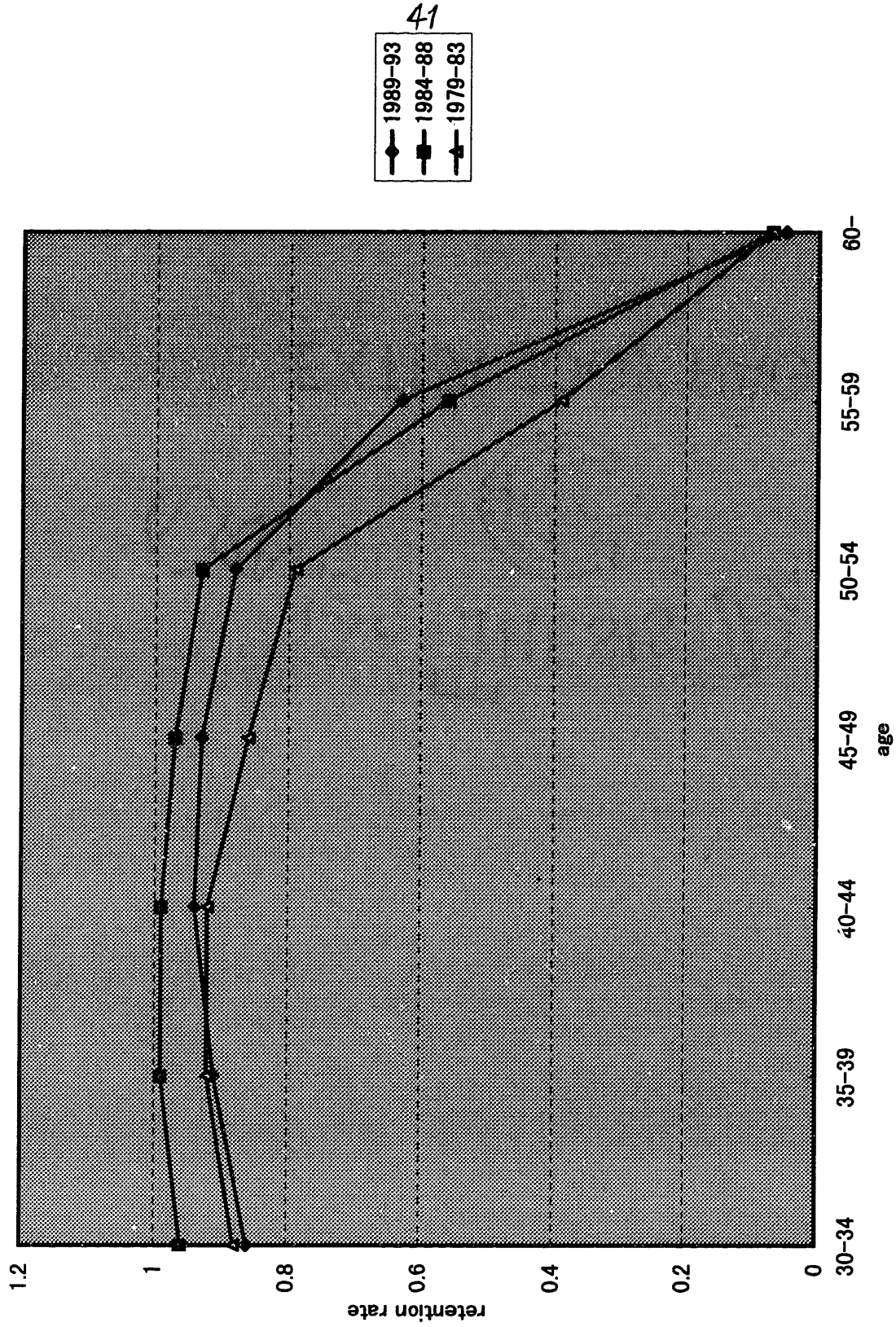


Fig.1.4 high school, large firm sector

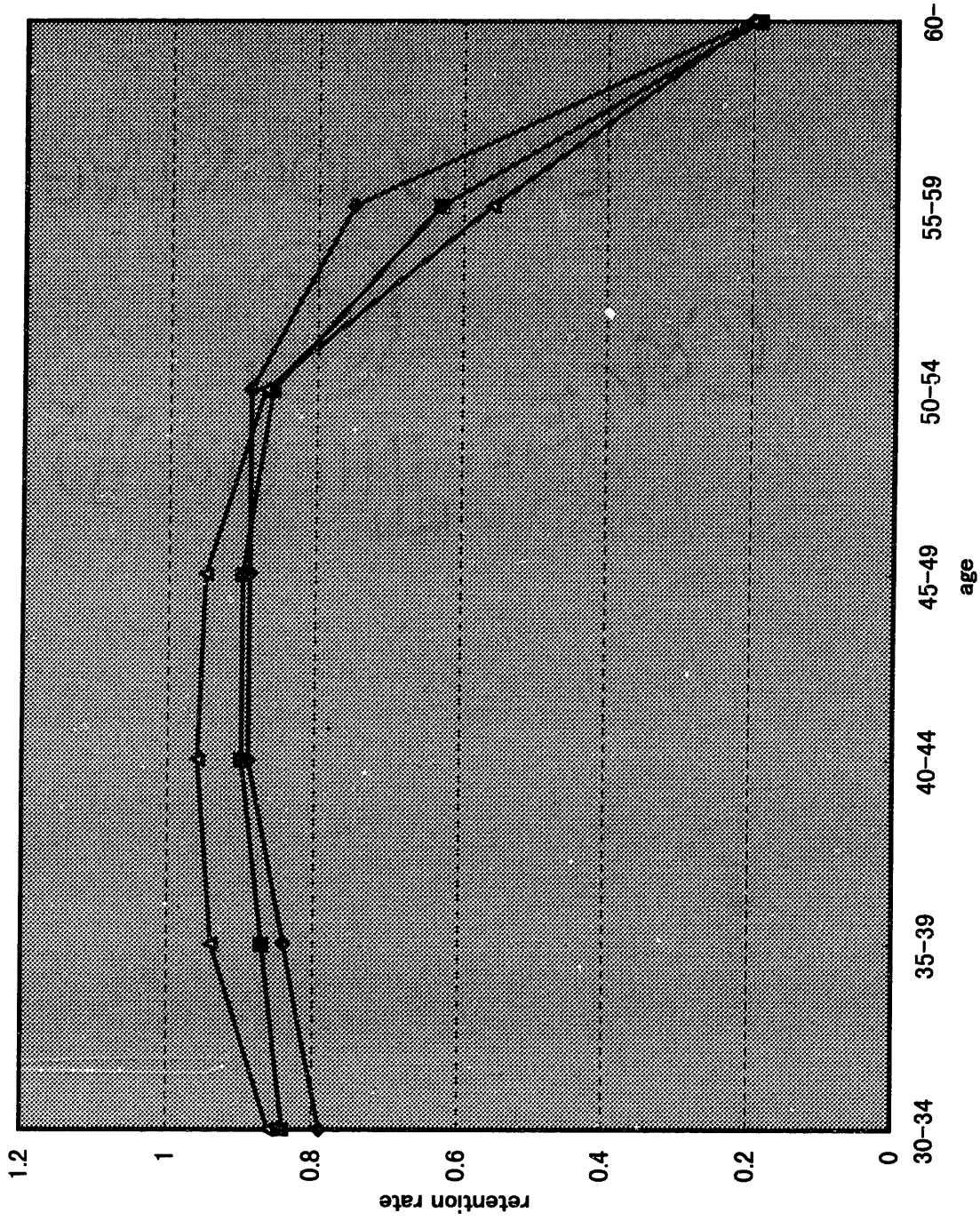


Fig.1.5 high school, medium firm sector

Fig.1.6 high school, small firm sector

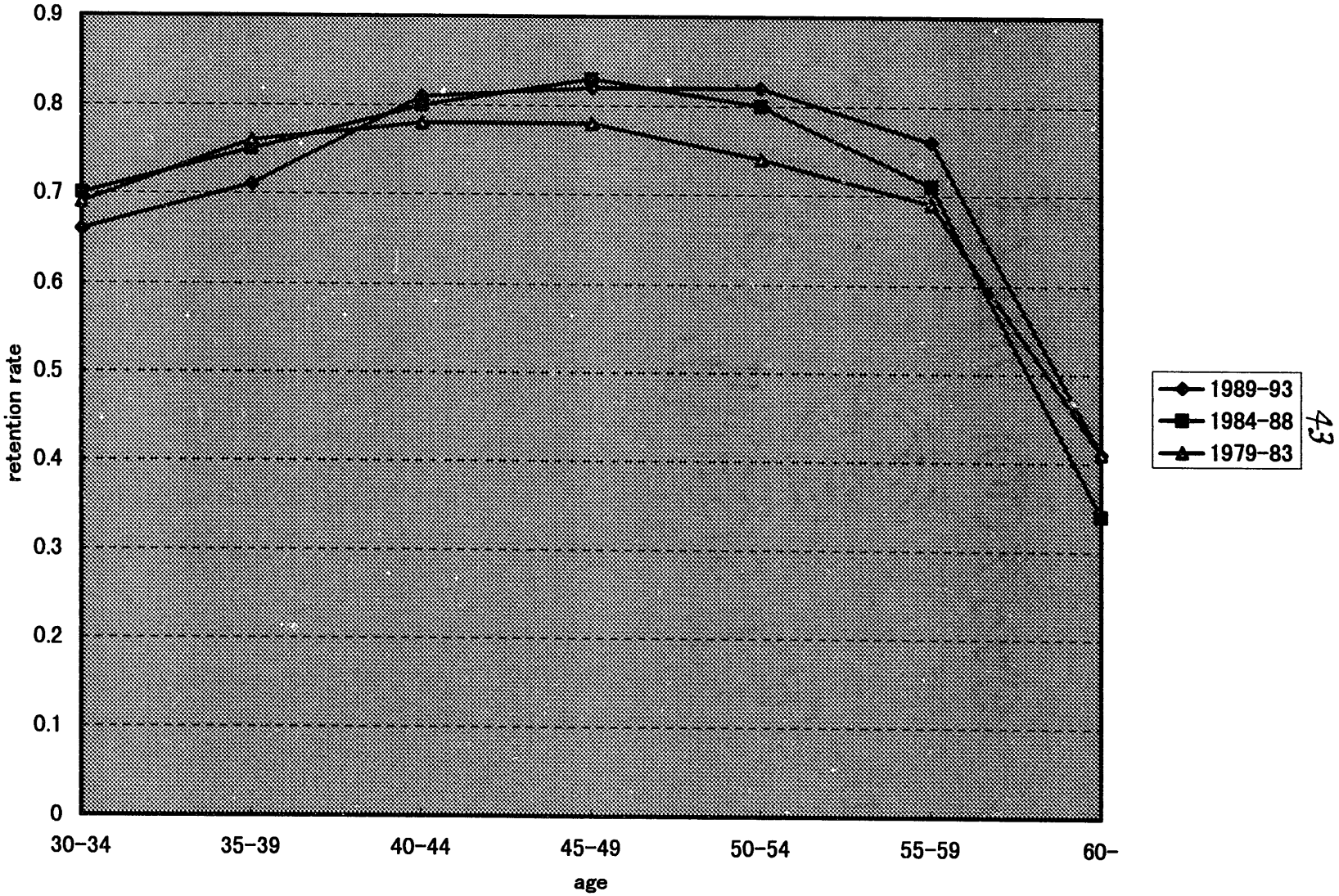


Fig.1.7 middle school, large firm sector

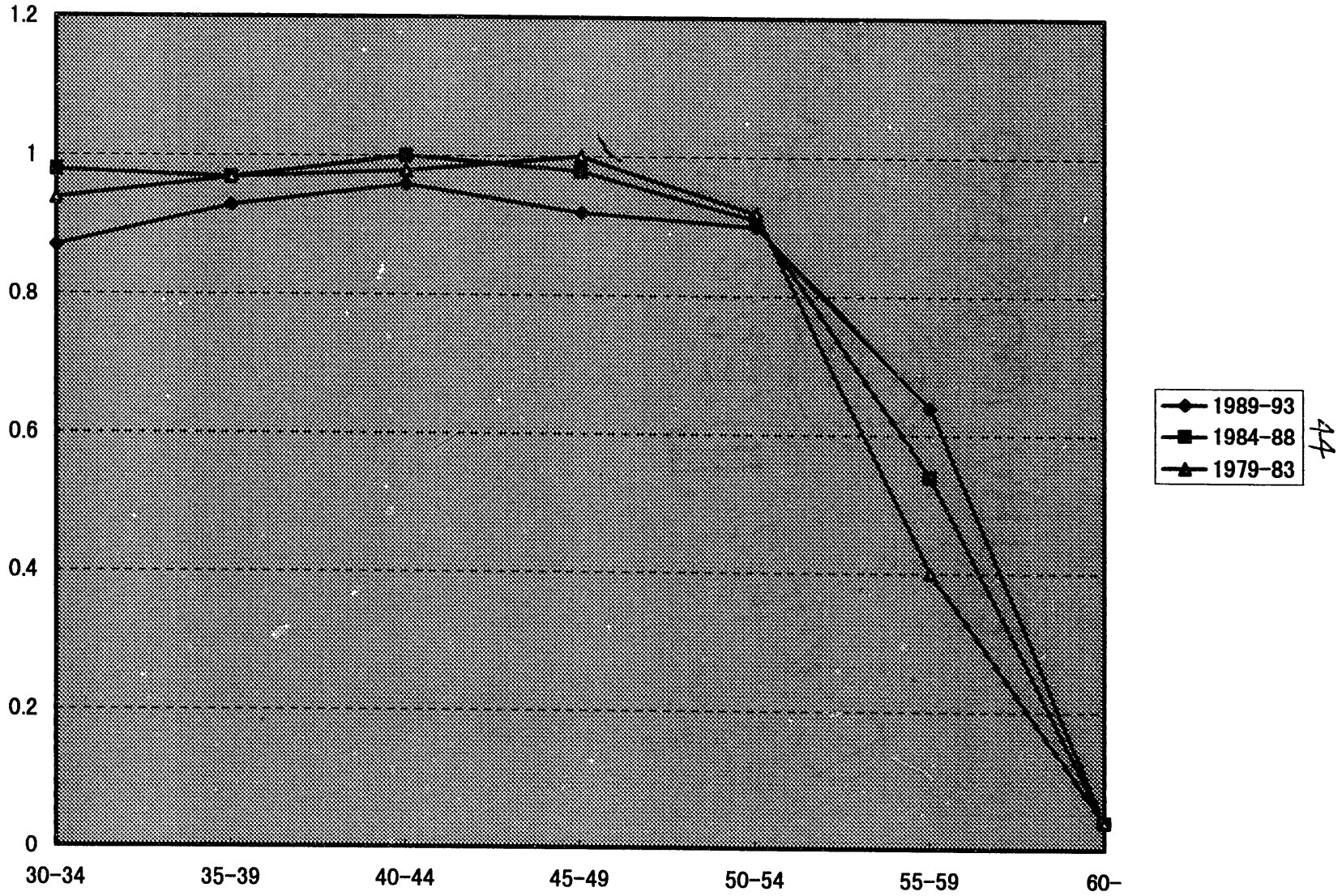
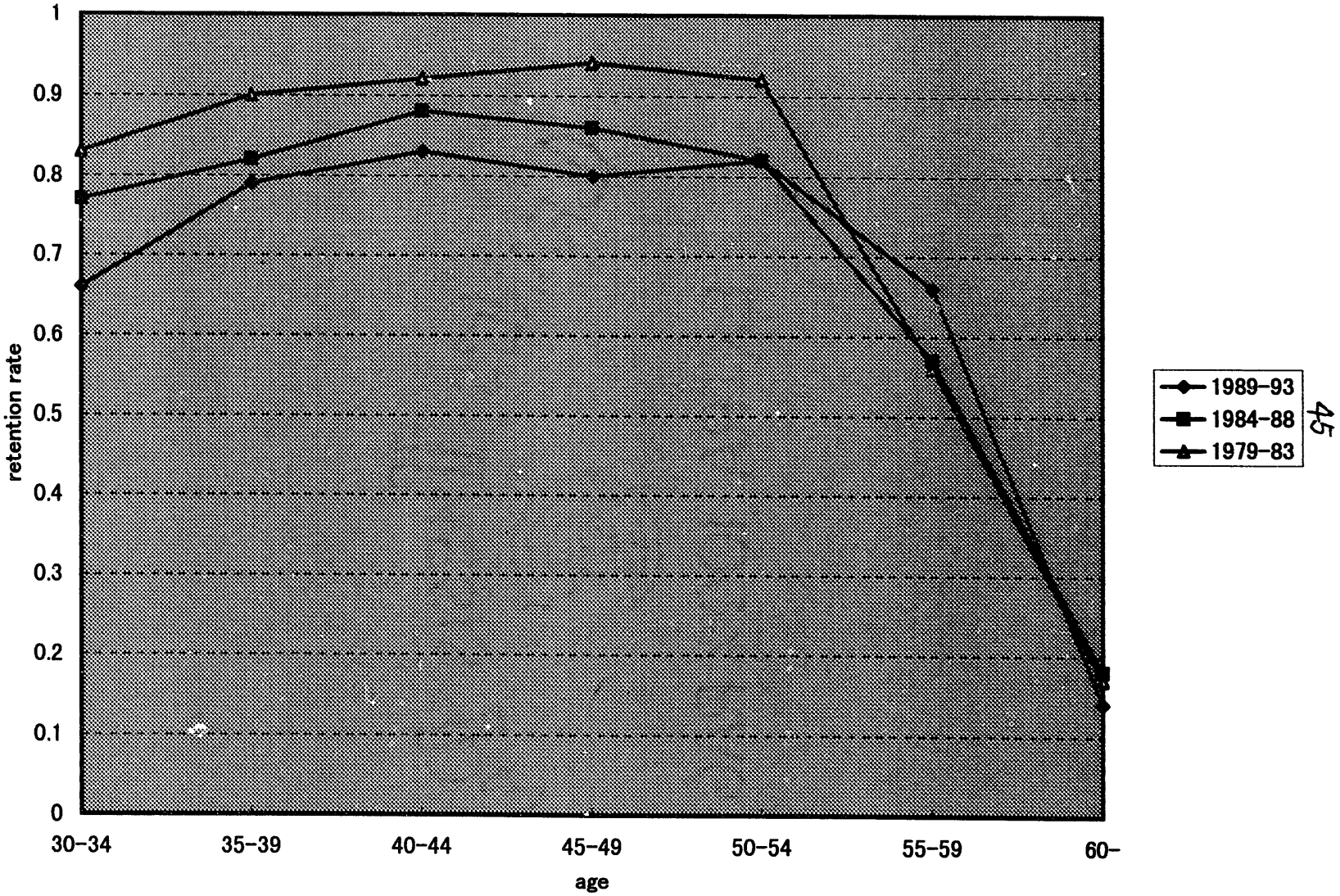


Fig.1.8 middle school, medium firm sector



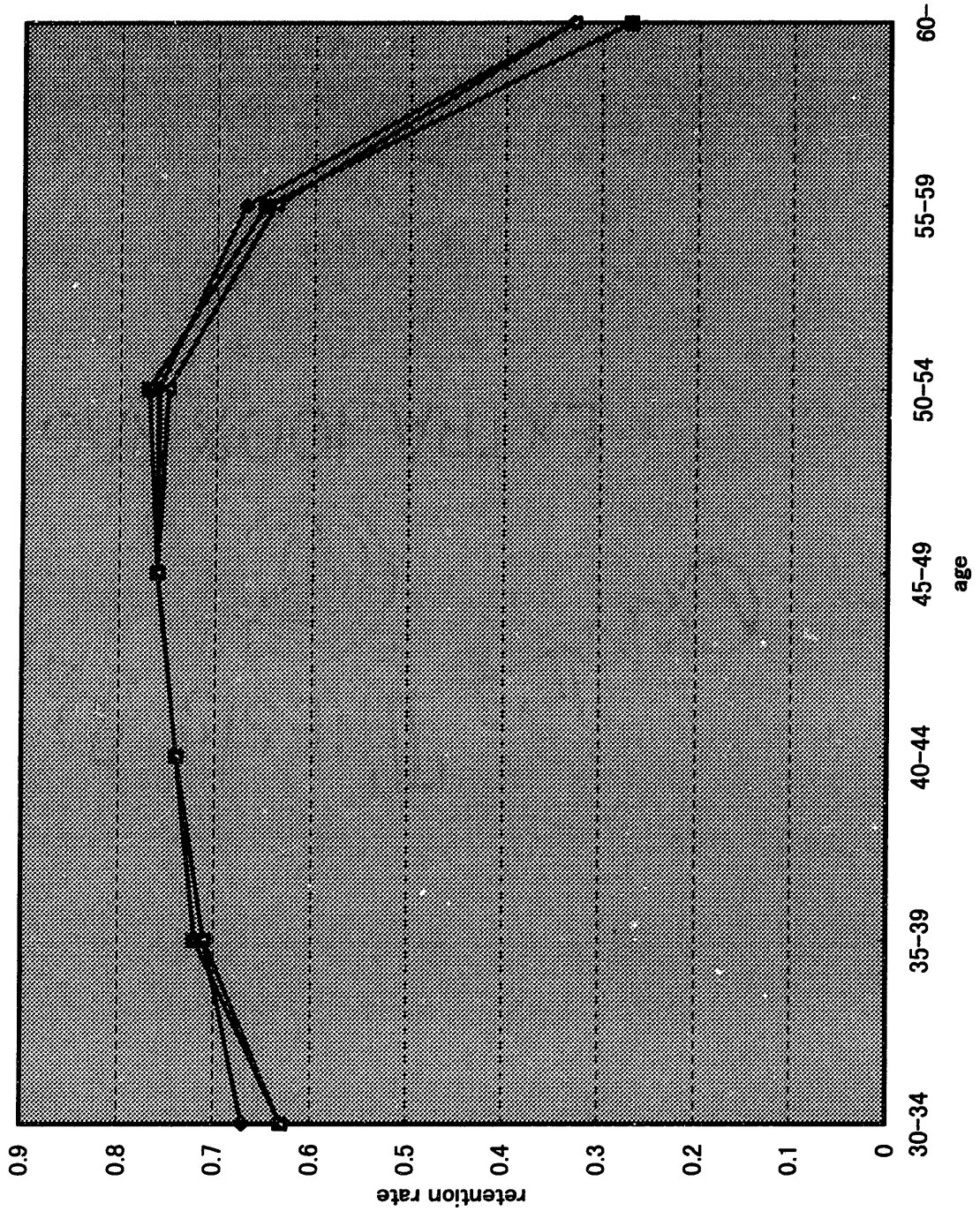


Fig.1.9 middle school, small firm sector

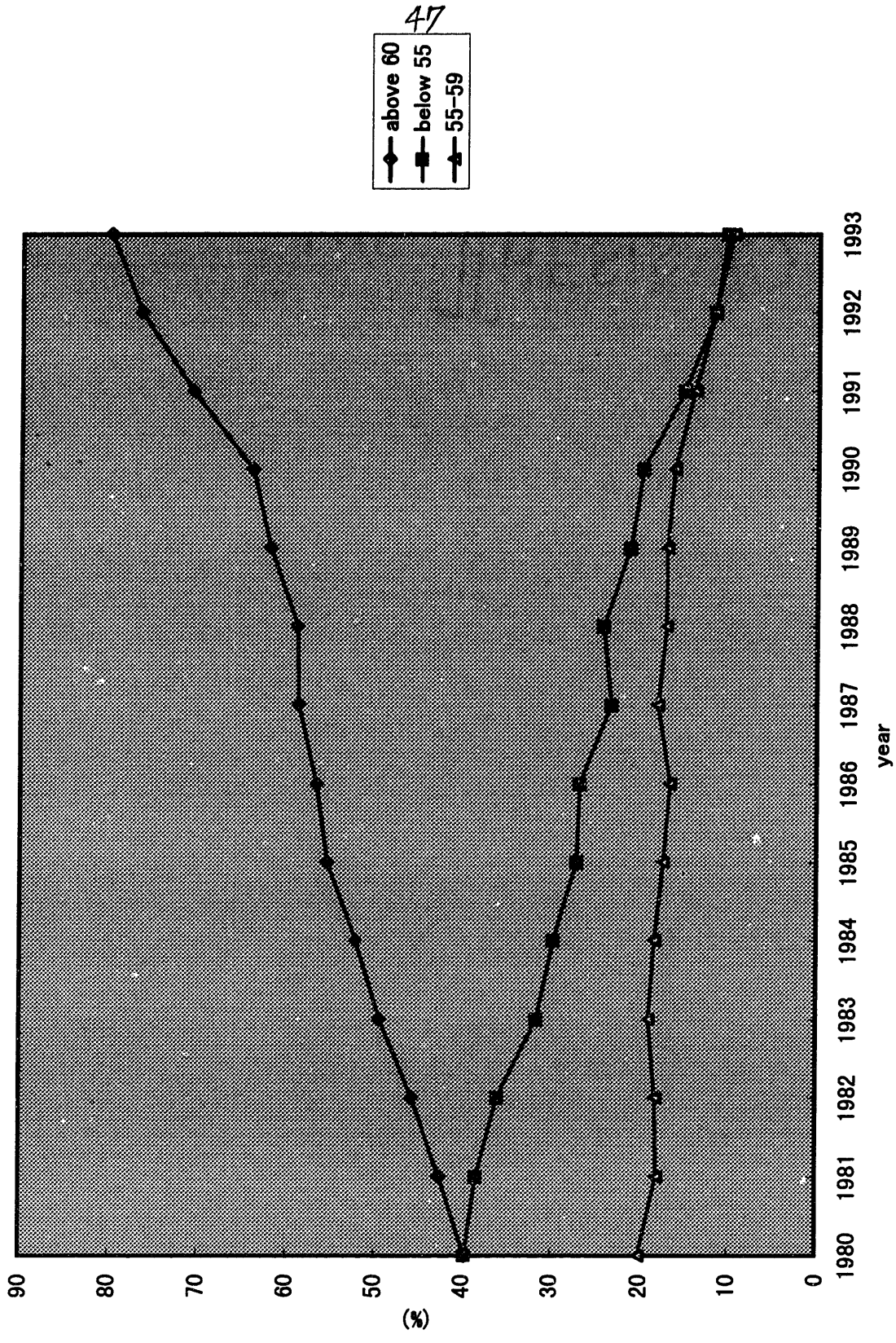


Fig 1.10 Mandatory Retirement Age

Chapter.2
Changes in the Structure of Wages[1]

I. Introduction

In Japan the labor force has been aging and also the new entrants to the labor market have become higher educated. These changes have occurred quite rapidly. The purpose of this paper is to empirically explore how the wage structure changed by aging and by upgrading of education level and to search the reason why such change has taken place. Katz and Revenga(1989) have already studied the change of relative wages in the Japanese labor market and compared it with that occurred in the US labor markets. In this chapter I use the same data with Katz and Revenga, but by taking the difference of firm size into account and by extending the sample period from 1987 to 1993, I will present the slightly different conclusion from that of Katz and Revenga. Their conclusion is that the educational wage differential expanded only slightly in Japan compared with what happened in the US, and the wage of new entrants increased relative to more experienced workers from 1979 to 1987, which is contrary to what happened in the US labor markets.

In the first half of this paper I will show that the increase of educational wage differential was very small in Japan, which is the same conclusion with Katz and Revenga, but the relative wage of young workers to old workers decreased also in Japan, which is different from the conclusion obtained by Katz and Revenga. From this evidence it can be concluded that the young and less educated lost the ground most compared with the more educated and old. This conclusion is qualitatively the same with what happened in the US. The big difference is that the relative wage changed very slightly in Japan while that changed dramatically in the US.

Why the change of relative wage was so modest in Japanese labor markets is also investigated in this chapter. In the US, Katz and Murphy(1992) found out that the great change of relative wages was caused by a big demand shift for

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[1] I thank Professor Steve Pischke for many helpful comments.

more educated and more experienced workers. To explore the reason of very small change of relative wages in Japanese labor markets, I will estimate the reduced form equations and labor supply function. From the fact that the wages of older and higher educated workers increased more than the wages of younger and less educated workers it can be inferred that demand has shifted toward more experienced and more educated also in Japan.

The remainder of this chapter is organized as follows. Section II analyzes how the rapid aging and the upgrading of education level influenced the relative wages between 1974 and 1993. Three kinds of wage differentials are analyzed; wage differentials by age, by education level and by firm size. Section III applies a supply and demand framework to the labor market of male regular workers. The reduced form equations and labor supply function are estimated.

I. Wage Differentials by Age, by Education and by Firm-size

In this chapter I focus only on the manufacturing sector because the way of grouping has changed too frequently in the service sector to be usable. Among the manufacturing industry I focus only on the male regular workers who are defined by the Wage Census[2] as those who worked more than 18 days in June which is the sample period each year, with daily regular working hours more than 5. I excluded female workers because only few female workers keep working until the mandatory retirement age, and so many female workers go out of the labor force frequently. Among the several possible ways to measure the wages, the same measure is chosen as in Katz and Revenga to make comparison possible. That is total monthly earnings: the sum of total monthly contract earnings (regular earnings plus overtime payments) and one-twelfth of annual special earnings (bonus payments). Among many kinds of data in the Wage Census, I will use the data grouped by two-digit industries, by education, by age, and by firm size. Wage Census categorizes firms into three sectors; the large firm sector with employees above 1000, the medium firm sector with

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[2] The Wage Census is published annually by the Ministry of Labor. It has another name, the Basic Survey on Wage Structure.

employees between 100 and 999, and the small firm sector with employees between 10 and 99.

In the manufacturing sector, the total number of male employees decreased by about 4% from 1974 to 1993 as is shown in table.2.1. So the manufacturing sector as a whole is a mildly declining industry. Particularly the large firm sector decreased the number of male employees by 10%. The medium firm sector increased the number of male employees by 1.6%, and the small firm sector decreased it by 1.1%. From table.2.1 it is evident that employees have become more highly educated over the period 1974 to 1993. From tables2.3 to 2.5, it is also evident that the employees of the manufacturing sector have been aging.

2-1. Wage Differentials by Age

(1) Middle school graduates

Young people became more highly educated, and as a result the number of young middle school graduates decreased rapidly. Tables.2.3 to 2.5 show the changes of age structure from 1974 to 1993. In the large firm sector, the number of male middle school graduates aged below 29 decreased to one twenty-fourths from 1974 to 1993. In the same period, that number decreased to one-ninth in the medium firm sector, and to one-fifth in the small firm sector. In 1974 every sector had about the same number of male middle school graduates aged below 29 (about 250 thousand), but in 1993 the large firm sector had about 10 thousand, the medium firm sector had 27 thousand, and the small firm sector had 53 thousand. The large firm sector decreased the number of male young middle school graduates most rapidly.

The last columns of tables2.3 to 2.5 show that the number of middle school graduates between 30 and 49 years old also decreased very rapidly from 1974 to 1993. The number of workers aged between 30 and 49 decreased by 72.6%, 66.9% and 62.5% in the large, the medium and the small firm sector respectively. But the number of middle school graduates above 50-year old decreased slightly both in the large and medium firm sectors, −6.9% and −2.8% respectively, and increased marginally, 1.1%, in the small firm sector.

In sum, for every age group the large firm sector decreased the number of male middle school graduates most and the small firm sector decreased it least.

By comparing the rates of percentage increase of average real monthly wages, which are shown in table.2.6 to 2.8 from 1974 to 1993, the large firm sector increased the real monthly wages of middle school graduates least among the three sectors. This implies that the decrease of demand for middle school graduates was largest in the large firm sector. This is consistent with the finding that wage differential according to firm size decreased for middle school graduates between 1974 and 1993 as is shown in table2.11.Although it expanded from 1974 to 1974 or from 1974 to 1987.

As a result of the rapid reduction of male young middle school graduates, the share of the old workers aged above 50 increased much and the share of younger workers particularly who are aged below 29 decreased in every sector as are shown in table2.3 to 2.5.

Table2.6 to 2.8 show the changes of the absolute and relative wages from 1974 to 1993. Wage differentials between old and young workers increased for the middle school graduates in every sector. It deserves attention that in spite of the rapid increase of the share of the old workers aged above 50 to total middle school graduate workers, their wages relative to those of young workers aged below 29 increased monotonically from 1974 to 1993. For the workers aged between 30 and 49, their wages relative to the wages of young workers aged below 29 increased except from 1987 to 1993 in the medium and the small firm sectors.

For middle school graduate workers, the old workers whose share increased had rising relative wages, and the young workers whose share decreased had falling relative wages. To interpret this fact consistently in a demand and supply framework, the demand for young middle school graduates decreased more than the reduction of its supply, and as a result, the wage of workers below 29 decreased relative to the wage of older workers.

(2) High school graduates

The high school graduate workers were also aging just like the middle school graduates. The ratio of workers aged below 29 decreased while the ratio

of the workers aged above 50 increased from 1974 to 1993 as are shown in table2.3 to 2.5. However, the speed of aging was slower than that among middle school graduates.

The number of high school graduate workers aged above 50 increased greatly from 1974 to 1993. In the large firm sector it more than quadrupled. In the medium firm sector it more than tripled, and in the small firm sector it more than doubled. The number of high school graduate workers who are aged between 30 and 49 also increased, but at a much smaller rate. From 1974 to 1993, it increased by 30.4% in the large firm sector, by 55.6% in the medium firm sector and by 68.9% in the small firm sector. The number of high school graduate workers aged below 29 increased by 7.5% in the medium firm sector and by 24.9% in the small firm sector from 1974 to 1993, however it decreased by 34.5% in the large firm sector (See table2.3 to 2.5). This difference among three sectors implies that the large firm sector began to decrease the number of high school graduate recruits the earliest.

Table2.6 to 2.8 show that the wage differentials between old and young workers increased in every sector. The average real wages of the workers of the ages between 30 and 49 relative to those of below 29-year old increased in every sector from 1974 to 1993. And the wages of the workers aged above 50 relative to the wages of the workers aged between 30 and 49 also increased with only one exception. Just like the case of middle school graduates, although the share of workers aged above 50 increased greatly as noted above, their relative wage increased. In a demand-supply framework this means that demand for old high school graduate workers increased relatively more than the increase in their supply.

(3) College graduates

College graduates as a whole has also been aging in every sector. The share of the workers aged below 29 decreased while the share of the workers who are aged above 50 increased from 1974 to 1993. The speed of aging has been more rapid in the medium and the small firm sectors than that in the large firm sector. As table2.3 shows, the large firm sector increased the number of college graduate workers aged below 29 by 52% from 1974 to 1993. It increased the

number of older employees more; by 77.5% for the workers aged between 30 and 49, and by 490.4% for those who are aged above 50.

In contrast, the number of workers who are younger than 29 years old decreased by 8.2% in the medium firm sector and decreased by 28.1% in the small firm sector from 1974 to 1993 (See table.2.4 and 2.5). The number of college graduate workers aged above 50 increased greatly similar to high school graduates of the same age. From 1974 to 1993 it more than quintupled in the large firm sector, more than quadrupled in the medium firm sector and more than doubled in the small firm sector. The number of workers aged between 30 and 49 also increased by 77.5% in the large firm sector, by 107.5% in the medium firm sector and by 116.3% in the small firm sector during the same period.

Although the number of employees aged above 30 increased monotonically and greatly from 1974 to 1993, their relative wages did not decrease monotonically during this period. Table2.6 and 2.7 show that the wage of the workers who are aged above 50 relative to those who are aged below 29 has peaked in 1987 in every sector. The wage of the workers aged between 30 and 49 relative to that of the workers aged below 29 has peaked in 1979 in every sector. The wage of the workers aged above 50 relative to the wages of those who are aged between 30 and 49 has peaked in 1987 in the large firm sector, however in the other two sectors it kept increasing until 1993.

The relative wage of those aged above 50 to the wage of those below 29 is larger in 1993 than in 1974 in every sector. The relative wage of those aged 30-49 to the wage of those below 29 is larger in only the large firm sector. In sum, it can be concluded that the relative wage of old to young workers increased during 1974 to 1993 although the employees had been aging during the same period.

Comparing between the three education groups, the wage differential between old workers aged above 50 and young workers aged below 29 increased most for middle school graduates from 1974 to 1993. It increased in every sector, increased most in the medium firm sector and least in the small firm sector.

2-2. Educational Wage Differentials

From 1974 to 1993, the number of three education levels, high school graduates, junior college graduates and college graduates, increased while the number of middle school graduates (who have 9-year schooling) decreased in every sector. Over the same period, all the three sectors decreased the number of middle school graduates by 59%, and increased the number of college graduates by 76%. Among the three sectors, the rate of change is greatest in the large firm sector. From 1974 to 1993 the large firm sector increased college graduates by 84.5% and decreased middle school graduates by 67.7%. During these twenty years there appears an obvious tendency that male workers in the manufacturing industry became more highly educated.

Table2.2 shows how the real monthly wages[3] changed over the same period in each category, which are free from the difference of age structure by averaging over lifetime. I omitted the junior college[4] category because its sample size is too small to be free from sampling error. In both the large and the medium firm sectors the wages of every education level increased by roughly the same rate. Only in the small firm sector, the wages of middle school graduates increased at a greater growth rate than for the other two education groups. However in sum, it can be concluded that the growth rate of real wage is almost the same notwithstanding a drastic change of educational attainment among workers. In other words, there is no evidence that the relative wage of college and high school graduates to that of middle school graduates changed despite the fact that the workers have become more educated. To examine why this contrast has occurred, it is necessary to see the change of relative wages broken down to age groups.

As is shown in table2.9 and 2.10, two kinds of educational wage differentials expanded for the workers aged below 29 from 1974 to 1993 in every sector. Those are the wage of high school graduates relative to that of middle school graduates and the wage of college graduates relative to high school graduates. This means that the demand for young workers shifted from less

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[3] Nominal wages are deflated by consumer price index (1990=100).

[4] Junior college means two-year college.

educated to more educated. For the workers aged between 30 and 59, the two kinds of relative wages stayed mostly unchanged or decreased. For the workers aged above 50, the relative wage of high school graduates to middle school graduates decreased in every sector. The relative wage of college to high school graduates decreased in the large firm sector and increased in the medium and small firm sectors.

It can be concluded that educational wage differential expanded for the workers below 29. The educational wage differential in favor of college graduates expanded for the workers aged above 50 in the medium and small firm sectors and decreased in the large firm sector. It decreased for the workers aged between 30 and 49 in every sector. These opposite direction movements of educational wage differential - increase for young and a part of old workers and decrease for prime-age workers - cancelled out, and consequently it appeared unchanged over lifecycle as was shown in table.2.2.

There is another interesting point concerning the educational wage differential. For the age group 30-49, the two kinds of relative wages are very stable in the large firm sector. Probably this evidence might indicate that it is more difficult for large firms to change the relative wages of prime-age workers than smaller firms because the large firms are organized more bureaucratically and have more rigid rules of wages than smaller firms.

2-3. Firm-Size Wage Differentials

As is shown in panels A and B of table2.11, the firm-size wage differentials have peaks in 1987 for the workers under 49-years old. This is exactly the same as what Rebick(1993) found. He found that the firm-size earnings differential of men aged between 20 and 49 increased from 1974 to 1987, and this was caused by the different response to the unemployment rate between large and small firms. During the sample period the unemployment rate rose, and the wages of small firms decreased but the wages of large firms were found inelastic to the unemployment rate. Rebick excluded the male workers aged above 50 from his sample.

The firm-size wage differential for workers aged above 50 shows a different

pattern from the other two age groups as is shown in table2.11. Panel C shows a peak in 1979 for middle and high school graduates, and shows a peak in 1987 for college graduates. This pattern is different from the patterns of the other two age groups.

Comparing the wage differentials between 1974 and 1993 shown in table.2.11, the wage differential shrank or stayed unchanged for middle school graduates for every age group. It expanded for high school graduates aged above 30 but did not expand for high school graduates aged below 29. For college graduates, it mostly expanded with one exception which happened for the workers aged above 50 of large firms against small firms. As a general rule, the wage differential according to firm size is larger for more-educated and older workers.

Between 1974 and 1993 the wage differentials according to firm size decreased for the middle school graduates but increased for high school and college graduates. Since the share of middle school graduates in the total labor force decreased rapidly, it can be said that the overall wage differentials according to firm size increased. Between 1974 and 1987, the wage differentials according to firm size increased for every education group. This is same with the empirical results obtained by Rebick(1993) that the firm-size wage differential increased from 1974 to 1987.

2-4. Concluding Remarks

From the above analysis two findings are particularly interesting. First, the wage differentials by age increased, that is the age of old workers gained more than that of young workers. Second, in every sector the educational wage differentials increased for the workers aged below 29, however, the educational wage differentials decreased for the other two older age groups (See table2.6 to 2.8). Combining these two findings, the male workers those who are aged below 29 and less-educated lost relatively more ground among all the groups.

The last columns of table2.6 to 2.8 show that the percentage increase of real monthly wage from 1974 to 1993 is smallest for middle school graduates aged below 29 in both the large and medium sectors. The high school graduates

aged below 29 gained the second lowest wage increase in both the large and medium sectors during the same period. In the small firm sector, the middle school graduates aged below 29 gained second least ,and the high school graduates aged below 29 gained third least wage increase during the same period.

Summing up the above findings, the young and less-educated workers gained least wage increase during this period. This finding is qualitatively the same with what happened in the U.S. labor market in 1980s as was shown in Katz and Revenga that the young and less-educated lost most. The important difference is that the relative wage did not change so greatly in Japan as in America.

III. A Simple Supply and Demand Framework

This section intends to analyze the labor market of male regular workers using a simple supply and demand framework. Male regular workers are mostly broken down into five-year interval age groups by Wage Census. The following regressions are performed using six age groups; 30-34, 35-39, 40-44, 45-49, 50-54 and 55-59 years old group. Since the mandatory retirement age has changed from 55 to 60 gradually over the sample period, from 1979 to 1993, the age group 55-59 showed qualitatively different results from the other five age groups. Five age groups from 30- to 50- show quite similar estimation results. To save place, three age groups 30-34. 40-44 and 50-54 will be reported.

One pair of labor demand and supply functions is specified for each group, which is characterized by particular education level, firm size and age. This simple demand-supply framework assumes that labor supply comes from only the same industry of the same firm size. Since mobility of male regular workers has been small in the Japanese labor markets, particularly for the manufacturing industry, this assumption seems to be permissible as a first approximation.

Specification

Let the labor supply and demand functions be

$$L_s = aw_s + b, \quad a \geq 0$$
$$L_d = cw_d + d, \quad c \leq 0$$

By setting $L_s = L_d = L$ and $w_s = w_d = w$, reduced form equations will be

$$w = \frac{d}{a-c} - \frac{b}{a-c} \qquad (1)$$

$$L = \frac{ad}{a-c} - \frac{bc}{a-c} \qquad (2)$$

In the following estimation the supply shift variable, b, will be represented by employment in the comparable cell five years ago, and the demand shift variable, d, will be represented by real value added. Other than these supply shift and demand shift variables, the variables of union density and time trend are added as explanatory variables of equation (1) and (2).

3-1. Variables and Data

1) The real wage

There are several possible ways to measure wages using the Wage Census. In this analysis the sum of regular monthly earnings and one-twelfth of annual special earnings (bonus payments) is used. To get the real wage, the nominal wage is deflated by the wholesale price index of the two-digit manufacturing industry published annually by the Bank of Japan in Overall Wholesale Price Indexes for Basic Groups by Groups. This real wage is used as the dependent variable of equation (1).

2) The number of employees

The dependent variable of equation (2) is the number of employees. This number is obtainable annually from the Wage Census grouped by firm-size, two-digit manufacturing industry, education level, sex and age (mostly grouped by 5-year interval). I will report the estimation results for the three age groups

of 30-34, 40-44 and 50-54. Those younger than 29 is excluded from the sample because the labor supply of five years ago is not obtainable for college graduates aged between 25 to 29.

3) The supply shift variable: the number of workers supplied

The Wage Census classifies workers by age in 5-year intervals. For example, the number of employees who belong to the 30-34-year old age group will belong to the 35-39-year old age group five years later. After adjusting the change of the number of firms, which belong to the same cell, the number of employees who were working in the same industry of same firm size five years ago is obtainable. This number of employees who belonged to the comparable cell five years ago is used as the labor supply to this cell.

4) The demand shift variable: real value added

In this analysis, the real value added is used as a demand shift variable. To get the real value added, the nominal value added of the two-digit manufacturing industry published annually in the Manufacturing Census (the Ministry of International Trade and Industry) is deflated by the wholesale price index which was used to get the real wage.

5) Union density

It is likely that union might have some political power to raise wages or raise the employment level of old workers by protecting them from being laid off involuntarily. Since there are no original union density statistics in Japan, I divide the number of union members published annually in the Basic Survey of Labor Union (the Ministry of Labor) by the total number of employees published in the Wage Census. To make it usable in this analysis the data is re-grouped by the same way with other variables.

6) Year

By adding this variable as an explanatory variable, any time trend to change

real wage or employment level can be detected.[5]

7) Number of observation

The sample period chosen is from 1979 to 1993. Two-digit manufacturing industries are chosen. By excluding the industries which are not usable because of the change of industrial category during the sample period, 13 industries are left. They are textile, pulp and paper, publishing and printing, chemical products, rubber products, ceramic, stone and clay products, iron and steel, non-ferrous metals, fabricated metal products, general machinery, electrical machinery, precision machinery and transportation equipment. Since I use pooled time-series cross-section data, 195 cells become available by multiplying 15 years by 13 industries for each regression.

3-2. Estimation Results of Reduced Form Equations

All the variables except year are in logs. As noted above, 195 samples are made of cross-section time-series pooled data. Since an industry specific effect such as industry size effect should be excluded before running regression, fixed effect model will be applied. The estimation results of wage equation (1) are shown in table.2.12. Those of employment equation (2) are shown in table.2.13. Since labor demand curve is assumed to be downward sloping, increase of labor supply is supposed to decrease wages and also to increase employment levels by shifting the supply curve to the right. On the other hand, Since labor supply curve is assumed to be upward sloping, increase of real value added is supposed to increase both wage and employment levels by shifting the demand curve to the right.

1) Elasticities of wages with respect to the changes in real value-added

The coefficients of log of real value-added in wage equations of reduced form are presented in table.2.12. They are the elasticities of wages with respect

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[5] Regressions with year dummies were also tried, and reuslts were found mostly the same.

to the changes in real value-added. All the coefficients are significantly positive for all three age groups. This means that the level of real wage definitely fluctuates according to output fluctuation.

Among three sectors, the wages of the small firm sector are most sensitive to the movement of real value-added for all the age groups of all the education levels. On the contrary the wages of the large firm sector are least sensitive to the movement of real value-added for all the age groups of all the education levels.

For the age groups of 30-34 and 40-44, the elasticity is largest for middle school graduates, and smallest for college graduates for those who belong to the same sector. For the age group of 50-54, no consistent size relationship exists between different education levels. In sum, for the age groups 30-34 and 40-44, the wages of college graduates in the large firm sector are least sensitive to output fluctuation, and the wages of middle school graduates in the small firm sector are most sensitive to output fluctuation.

2) Elasticities of employment levels with respect to changes in real value-added

The coefficients of log of real value-added in table.2.13 are the elasticities of employment levels with respect to changes in real value-added. Most coefficients are positive, but only part of them are significant. The groups which have significantly positive elasticity of employment level with respect to real value-added are as follows. For the age group 30-34, the middle school graduates in the medium and the small firm sectors and the high school graduates in the large and the small firm sectors have significantly positive coefficients. For the age group 40-44, only middle school graduates in all the sectors have significantly positive coefficients. For the age group 50-54, high school graduates in all the sectors and middle school graduates in the small firm sector have significantly positive coefficients.

All the college graduates in all the sectors have very small and insignificant elasticities. This means that employment level of college graduates does not respond to output fluctuation. As was evident from the estimates of

wage equations, the wages of college graduates are least sensitive to output fluctuation. Putting these two facts together, it can be said that college graduates are most protected from output fluctuation.

Since the significantly positive coefficients in table.2.13 ranges from 0.21 to 0.32, 1% increase of real value-added increases employment level from 0.2 to 0.3% for those who have significant elasticity. This number is consistent with that of existing studies. Abraham, K. G. and S. N. Houseman(1993) measured the elasticity of employment level with respect to changes of production for Japanese and the U.S. manufacturing industries. Elasticity in one month is 0.015 for total employment and 0.025 for production employment in the Japanese manufacturing industry over the period 1970 to 85.

In the Japanese manufacturing industry, about 91% of college graduates are white collars, and 66% of high school graduates and 84% of middle school graduates are blue collars as of 1993. So the difference I found between the different education level implies the difference between white and blue collars. So it can be said that output fluctuation has no effect on the employment level of white collars, while 1% output fluctuation changes the employment level of blue collars by about 0.2 – 0.3%.

The groups which have significantly positive elasticities of wages and employment levels with respect to the changes on real value-added seem to have upward sloping labor supply curve. And the rest of the groups, mostly college graduates, who have very small and insignificant elasticity of employment levels and significantly positive elasticity of wages with respect to the changes in real value-added seem to have vertical labor supply curve. This will be verified by directly estimating labor supply function in the following.

3) Elasticities of wages with respect to the changes of labor supply

The coefficients of log labor supply in table.2.12 show the elasticities of wages with respect to the changes of labor supply. Since labor demand curve is supposed to be downward sloping, an increase of labor supply should decrease wage level, thus the coefficient of log of labor supply should be negative. However, most coefficients are not significantly negative. Some of them are

significantly positive. This is because demand curve is not well identified in this model.[6]

The fact that labor supply has no influence on wage level provides an explanation that a big demographic change of labor supply had only small influence on wage structure.

4) Elasticities of employment levels with respect to changes of labor supply

The coefficients of log labor supply in table.2.13 are the elasticities of employment levels with respect to changes of labor supply. For example, they present the portion of employees who are kept employed from the age of 35-39 to the age of 40-44 in the same sector by a 1-% increase of the labor supply who are aged 35 to 39. All the coefficients are significantly positive.

For all the age groups, the elasticity is highest mostly in the large firm sector. It means that the greatest part of labor supply is absorbed in the large firm sector without any pressure on wage levels. Also in the other two sectors, significant part of increased labor supply is absorbed without any pressure on wages.

3-3. Estimates of labor supply function

Labor supply function will be estimated as follows.

Let the labor supply and demand functions be

$$L_s = aw_s + b, \qquad a \geq 0 \qquad (3)$$

$$L_d = cw_d + d, \qquad c \leq 0 \qquad (4)$$

where b is a supply shift variable, and d is a demand shift variable. d is represented by real value added, and b is represented by labor supply of five

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[6] Labor demand function was also estimated using labor supply five years ago as an instrument variable. However, it was not well identifies. Probably labor demand of Japanese manufacturing firms for male regular workers cannot be well captured by such a simple demand function as equation (4).

years ago from the same cell in the previous section. To estimate the labor supply function (3), real value added will be used as an instrument for w_s.

Along with a supply shift parameter b, which is labor supply of five years ago, union density and year effect are added as explanatory variables as was done in estimating reduced form equations. All the variables except year are in logs, and the estimation will be carried out using a fixed effect model as before. The coefficients of log of real wage and log of labor supply are presented in table.14. The coefficients of log labor supply indicate whether supply curves are upward sloping or not.

The coefficients of college graduates are all very small and insignificant. This means that labor supply curve of college graduates are close to vertical. This implication is consistent with the fact that the elasticities of employment level with respect to value added are all insignificant and close to zero for college graduates as were shown in table.2.13.

For high school and middle school graduates, most coefficients are significantly positive, and this means that supply curve is upward sloping.

IV. Conclusion

Section II showed that the male labor supply of old and more-educated increased greatly between the 1974 to 1993 period. And at the same time the relative wage of those who are old and more-educated increased slightly. The two findings that educational wage differential expanded for those under 29 years old, and age-wage differentials also expanded caused that those who lost most ground from 1974 to 1993 were the young and less-educated males. This finding is qualitatively the same with what Katz and Revenga (1989) found in the U.S. labor market from a comparison of relative wages. The important difference is that the degree of wage change is smaller in Japan than in U.S.

A demand-supply framework is applied in section III to see how the wage and employment are determined in the labor market of Japanese male workers

in the manufacturing sector. It was found out that demand increase took place favoring more senior workers and more educated workers also in Japan and it increased the relative wage of more educated and more experienced like in the US. This increase of labor demand matched the increase of labor supply and made relative wages quite stable.

Labor supply function was estimated and was found that college graduates had close to vertical supply curve while most high school and middle school graduates had upward sloping labor supply curves. Since labor supply curve was vertical for college graduates, output fluctuation had changed wage levels but had no influence on employment levels of college graduates. For high school and middle school graduates, both wage and employment levels fluctuated according to output fluctuation.

In this simple supply and demand framework, demand function was not well identified. This might be because labor demand was determined in more complex and dynamic framework because Japanese firms try to maintain the employment of prime-age male regular workers even if output level is declining. To specify the correct labor demand function should be a future topic.

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Table. 2. 1
Number of male regular workers in the manufacturing industry

firm size		1974	1979	1987	1993	%change 1974-93
Large firm sector	middle school	102939 (41. 1)	72859 (34. 5)	47783 (22. 5)	33236 (14. 8)	-67. 7
	high school	106501 (42. 5)	96203 (45. 6)	108491 (51. 1)	116908 (52. 2)	9. 8
	junior college	5786 (2. 3)	4648 (2. 2)	5976 (2. 8)	8124 (3. 6)	40. 4
	college	35538 (14. 2)	37447 (17. 7)	50252 (23. 6)	65573 (29. 3)	84. 5
	total	250763 (100)	211157 (100)	212502 (100)	223840 (100)	-10. 7
Medium firm sector	middle school	93208 (46. 5)	68576 (38. 5)	48088 (25. 4)	36731 (18. 0)	-60. 6
	high school	75906 (37. 8)	74813 (42. 0)	96535 (51. 0)	112361 (55. 1)	48. 0
	junior college	5123 (2. 6)	4670 (2. 6)	6497 (3. 4)	10770 (5. 3)	110. 2
	college	26322 (13. 1)	29869 (16. 8)	38302 (20. 2)	43922 (21. 6)	66. 9
	total	200558 (100)	177927 (100)	189422 (100)	203784 (100)	1. 6
Small firm sector	middle school	106529 (61. 2)	94622 (53. 6)	68927 (40. 4)	53787 (31. 3)	-49. 50
	high school	53912 (31. 0)	63465 (36. 0)	80387 (47. 1)	94726 (55. 1)	75. 7
	junior college	3703 (2. 1)	3980 (2. 3)	4812 (2. 8)	6648 (3. 9)	79. 5
	college	9872 (5. 7)	14433 (8. 2)	16656 (9. 8)	16836 (9. 8)	70. 5
	total	174017 (100)	176500 (100)	170782 (100)	171997 (100)	-1. 1
Total	middle school	302676 (48. 4)	236057 (41. 7)	164798 (28. 8)	123754 (20. 6)	-59. 1
	high school	236319 (37. 8)	234481 (41. 5)	285413 (49. 8)	323995 (54. 0)	37. 1
	junior college	14612 (2. 3)	13298 (2. 4)	17285 (3. 0)	25542 (4. 3)	74. 8
	college	71732 (11. 5)	81749 (14. 5)	105210 (18. 4)	126331 (21. 1)	76. 1
	total	625338 (100)	565584 (100)	572706 (100)	599621 (100)	-4. 1

(1 unit=10 men)

Source: Wage Census (The Ministry of Labor)

Table. 2. 2
Average Real Monthly Wages of Manufacturing Industry:
Male Regular Workers

		1974	1979	1987	1993
Large firm sector	middle school	249.4 (1.00)	325.4 (1.30)	354.0 (1.42)	368.9 (1.48)
	high school	294.0 (1.00)	392.7 (1.34)	408.7 (1.39)	437.3 (1.49)
	college	427.4 (1.00)	579.5 (1.36)	632.8 (1.48)	635.8 (1.49)
Medium firm sector	middle school	214.4 (1.00)	274.4 (1.28)	297.2 (1.39)	321.0 (1.50)
	high school	252.9 (1.00)	332.1 (1.31)	351.4 (1.39)	373.7 (1.48)
	college	328.5 (1.00)	452.2 (1.31)	490.9 (1.39)	515.1 (1.48)
Small firm sector	middle school	193.5 (1.00)	240.6 (1.24)	260.8 (1.35)	290.0 (1.50)
	high school	228.0 (1.00)	283.9 (1.25)	301.2 (1.32)	326.2 (1.43)
	college	297.6 (1.00)	363.8 (1.22)	389.4 (1.31)	427.3 (1.44)

Note. ratio to 1974 in parentheses
Monthly wages are the sum of total monthly contractual earnings and one-twelfth of annual special earnings (bonus payment)
Earnings are deflated by the consumer price index (1990=100)

Source: Wage Census (The Ministry of Labor)

Table. 2. 3
Number of male regular workers by age group by education:
Large firm sector of the manufacturing industry

	age	1974	1979	1987	1993	%change 1974-93
Middle school	below 29	25452 (24.7)	9589 (13.2)	1574 (3.3)	1047 (3.2)	-95.9
	30-49	60837 (59.1)	49393 (67.8)	31067 (65.0)	16691 (50.2)	-72.6
	above 50	16650 (16.2)	13938 (19.1)	15139 (31.7)	15499 (46.6)	-6.9
	total	102939 (100)	72859 (100)	47783 (100)	33236 (100)	-67.7
High school	below 29	56325 (52.9)	40393 (42.0)	32559 (30.0)	36894 (31.6)	-34.5
	30-49	46463 (43.6)	51649 (53.7)	65865 (60.7)	60587 (51.8)	30.4
	above 50	3714 (3.5)	4161 (4.3)	10067 (9.3)	19427 (16.6)	423.1
	total	106501 (100)	96203 (100)	108491 (100)	116908 (100)	9.8
College	below 29	13534 (38.1)	10109 (27.0)	16122 (32.1)	20567 (31.4)	52.0
	30-49	20565 (57.9)	25430 (67.9)	29539 (58.8)	36499 (55.7)	77.5
	above 50	1441 (4.1)	1909 (5.1)	4590 (9.1)	8508 (13.0)	490.4
	total	35538 (100)	37447 (100)	50252 (100)	65573 (100)	84.5

(1 unit = 10 men)

Source: Wage Census (The Ministry of Labor)

Table. 2. 4
Number of male regular workers by age group by education:
Medium firm sector of the manufacturing industry

	age	1974	1979	1987	1993	%change 1974-93
Middle school	below 29	25627 (27.5)	11478 (17.2)	3808 (7.9)	2735 (7.4)	-89.3
	30-49	49416 (53.0)	41403 (62.2)	28239 (58.7)	16343 (44.5)	-66.9
	above 50	18167 (19.5)	15696 (23.6)	16042 (33.4)	17654 (48.1)	-2.8
	total	93208 (100)	66576 (100)	48088 (100)	36731 (100)	-60.6
High school	below 29	37483 (49.4)	29942 (40.0)	36648 (38.0)	40292 (35.9)	7.5
	30-49	33832 (44.6)	39894 (53.3)	49168 (50.9)	52630 (46.8)	55.6
	above 50	4592 (6.0)	4976 (6.7)	10719 (11.1)	19440 (17.3)	323.3
	total	75906 (100)	74813 (100)	96535 (100)	112361 (100)	48.0
College	below 29	11968 (45.5)	10715 (35.9)	11900 (31.1)	10986 (25.0)	-8.2
	30-49	13098 (49.8)	17704 (59.3)	23096 (60.3)	27172 (61.9)	107.5
	above 50	1256 (4.8)	1451 (4.9)	3308 (8.6)	5764 (13.1)	358.9
	total	26322 (100)	29869 (100)	38302 (100)	43922 (100)	66.9

(1 unit = 10 men)

Source: Wage Census (The Ministry of Labor)

Table. 2. 5
Number of male regular workers by age group by education:
Small firm sector of the manufacturing industry

	age	1974	1979	1987	1993	%change 1974-93
Middle school	below 29	24768 (23. 3)	14124 (14. 9)	7341 (10. 7)	5195 (9. 7)	-79. 0
	30-49	53511 (50. 2)	53330 (56. 4)	34333 (49. 8)	20044 (37. 3)	-62. 5
	above 50	28251 (26. 5)	27170 (28. 7)	27253 (39. 5)	28549 (53. 1)	1. 1
	total	106529 (100)	94622 (100)	68927 (100)	53787 (100)	-49. 5
High school	below 29	19745 (36. 6)	19915 (31. 4)	24195 (30. 1)	24653 (26. 0)	24. 9
	30-49	27395 (50. 8)	35375 (55. 7)	41514 (51. 6)	46278 (48. 9)	68. 9
	above 50	6772 (12. 6)	8175 (12. 9)	14680 (18. 3)	23796 (25. 1)	251. 4
	total	53912 (100)	63465 (100)	80387 (100)	94726 (100)	75. 7
College	below 29	3521 (35. 7)	5337 (37. 0)	3881 (23. 3)	2531 (15. 0)	-28. 1
	30-49	5279 (53. 5)	7926 (54. 9)	10744 (64. 5)	11418 (67. 8)	116. 3
	above 50	1072 (10. 9)	1170 (8. 1)	2029 (12. 2)	2886 (17. 1)	169. 2
	total	9872 (100)	14433 (100)	16656 (100)	16836 (100)	70. 5

(1 unit = 10 men)

Source: Wage Census (The Ministry of Labor)

Table.2.6
Average real monthly wages of male regular workers:
Large firm sector of the manufacturing industry

	age	1974	1979	1987	1993	%change 1974-93
Middle school	below 29	175.7 (1.00)	227 (1.00)	236.9 (1.00)	230.2 (1.00)	0.31
	30-49	313.6 (1.78)	408.3 (1.80)	443.9 (1.87)	462.1 (2.01)	0.47
	above 50	259 (1.47)	341 (1.50)	381.1 (1.61)	414.5 (1.80)	0.60
High school	below 29	197.6 (1.00)	246.9 (1.00)	261.7 (1.00)	269.4 (1.00)	0.36
	30-49	343.7 (1.74)	452 (1.83)	488.3 (1.87)	506.9 (1.88)	0.48
	above 50	316.7 (1.60)	442.7 (1.79)	439.5 (1.68)	493.6 (1.83)	0.56
College	below 29	217.4 (1.00)	266.2 (1.00)	287.8 (1.00)	306 (1.00)	0.41
	30-49	436 (2.01)	584.7 (2.20)	612.8 (2.13)	640.5 (2.10)	0.47
	above 50	523.8 (2.41)	731 (2.75)	825.3 (2.87)	796.1 (2.60)	0.52

Source: Wage Census (The Ministry of Labor)

Table. 2. 7

Average real monthly wages of male regular workers:
Medium firm sector of the manufacturing industry

	age	1974	1979	1987	1993	%change 1974-93
Middle school	below 29	160. 1 (1. 00)	193. 4 (1. 00)	197. 7 (1. 00)	211. 5 (1. 00)	0. 32
	30-49	265. 1 (1. 66)	348. 9 (1. 80)	376. 6 (1. 90)	391. 4 (1. 85)	0. 48
	above 50	218. 1 (1. 36)	280. 9 (1. 45)	317. 3 (1. 60)	360. 2 (1. 70)	0. 65
High school	below 29	181. 7 (1. 00)	217. 6 (1. 00)	225. 4 (1. 00)	245 (1. 00)	0. 35
	30-49	297. 2 (1. 64)	393. 2 (1. 81)	414. 2 (1. 84)	423. 4 (1. 73)	0. 43
	above 50	262 (1. 44)	356. 8 (1. 64)	383 (1. 70)	420. 6 (1. 72)	0. 61
College	below 29	201. 4 (1. 00)	239. 3 (1. 00)	261. 8 (1. 00)	288. 7 (1. 00)	0. 43
	30-49	369. 6 (1. 84)	485. 1 (2. 03)	501. 4 (1. 92)	515. 9 (1. 79)	0. 40
	above 50	350. 9 (1. 74)	525. 8 (2. 20)	595 (2. 27)	627. 7 (2. 17)	0. 79

Source: Wage Census (The Ministry of Labor)

Table.2.8
Average real monthly wages of male regular workers:
Small firm sector of the manufacturing industry

	age	1974	1979	1987	1993	%change 1974-93
Middle school	below 29	155 (1.00)	179.5 (1.00)	184.3 (1.00)	207.2 (1.00)	0.34
	30-49	232.4 (1.50)	299.6 (1.67)	323.2 (1.75)	343 (1.66)	0.48
	above 50	193.1 (1.25)	242.6 (1.35)	275.1 (1.49)	319.9 (1.54)	0.66
High school	below 29	170.9 (1.00)	199.1 (1.00)	207.5 (1.00)	232.5 (1.00)	0.36
	30-49	267.6 (1.57)	335.1 (1.68)	348.3 (1.68)	370.9 (1.60)	0.39
	above 50	231.2 (1.35)	296.2 (1.49)	324.3 (1.56)	351.8 (1.51)	0.52
College	below 29	200 (1.00)	228.7 (1.00)	244.3 (1.00)	277.8 (1.00)	0.39
	30-49	339.3 (1.70)	411.9 (1.80)	422.3 (1.73)	449 (1.62)	0.32
	above 50	304.7 (1.52)	383.2 (1.68)	429.1 (1.76)	480.3 (1.73)	0.58

Source: Wage Census (The Ministry of Labor)

Table. 2. 9
Average real monthly wages of high school graduates relative to middle school graduates

	age	1974	1979	1987	1993
Large	below 29	1.12	1.09	1.10	1.17
firm	30-49	1.10	1.11	1.10	1.10
sector	above 50	1.22	1.30	1.15	1.19
Medium	below 29	1.13	1.13	1.14	1.16
firm	30-49	1.12	1.13	1.10	1.08
sector	above 50	1.20	1.27	1.21	1.17
Small	below 29	1.10	1.11	1.13	1.12
firm	30-49	1.15	1.12	1.08	1.08
sector	above 50	1.20	1.22	1.18	1.10

Table. 2. 10
Average real mothly wages of college graduates relative to high school graduates

	age	1974	1979	1987	1993
Large	below 29	1.10	1.08	1.10	1.14
firm	30-49	1.27	1.29	1.25	1.26
sector	above 50	1.65	1.65	1.88	1.61
Medium	below 29	1.11	1.10	1.16	1.18
firm	30-49	1.24	1.23	1.21	1.22
sector	above 50	1.34	1.47	1.55	1.49
Small	below 29	1.17	1.15	1.18	1.19
firm	30-49	1.27	1.23	1.21	1.21
sector	above 50	1.32	1.29	1.32	1.37

Source: Wage Census (The Ministry of Labor)

Table. 2. 11
Average wages of large and medium firm sector relative to small firm sector for comparable demographic groups
(Small firm sector = 1)

A) Workers under 29-year old

		1974	1979	1987	1993
Middle school	Medium	1.03	1.08	1.07	1.02
	Large	1.13	1.26	1.29	1.11
High school	Medium	1.06	1.09	1.09	1.05
	Large	1.16	1.24	1.26	1.16
College	Medium	1.01	1.05	1.07	1.04
	Large	1.09	1.16	1.18	1.10

B) Workers of the ages between 30 and 49

		1974	1979	1987	1993
Middle school	Medium	1.14	1.16	1.17	1.14
	Large	1.35	1.36	1.37	1.35
High school	Medium	1.11	1.17	1.19	1.14
	Large	1.28	1.35	1.40	1.37
College	Medium	1.09	1.18	1.19	1.15
	Large	1.29	1.42	1.45	1.43

C) Workers above 50-year old

		1974	1979	1987	1993
Middle school	Medium	1.13	1.16	1.15	1.13
	Large	1.34	1.41	1.39	1.30
High school	Medium	1.13	1.20	1.18	1.20
	Large	1.37	1.49	1.36	1.40
College	Medium	1.15	1.37	1.39	1.31
	Large	1.72	1.91	1.92	1.66

Table.2.12 Estimates of reduced form equations - (1) wage equations

age group : 30-34 years old

The coefficients of log of real value-added

	Middle school	High school	College
Large firm sector	0.39 (8.94)	0.38 (10.74)	0.32 (9.08)
Medium firm sector	0.52 (12.19)	0.48 (13.38)	0.54 (13.38)
Small firm sector	0.71 (15.25)	0.64 (17.75)	0.60 (12.47)

The coefficients of log of labor supply five years ago

	Middle school	High school	College
Large firm sector	-0.01 (-0.61)	0.004 (0.16)	0.09 (4.59)
Medium firm sector	-0.03 (-1.23)	0.16 (6.12)	0.13 (4.74)
Small firm sector	0.04 (1.35)	0.17 (7.02)	-0.07 (-2.52)

age group : 40-44 years old

The coefficients of log of real value-added

	Middle school	High school	College
Large firm sector	0.41 (10.47)	0.37 (9.37)	0.34 (8.33)
Medium firm sector	0.58 (13.39)	0.52 (13.29)	0.54 (13.52)
Small firm sector	0.74 (19.78)	0.71 (19.43)	0.66 (14.65)

The coefficients of log of labor supply five years ago

	Middle school	High school	College
Large firm sector	-0.02 (-0.74)	0.01 (0.28)	0.03 (1.05)
Medium firm sector	0.05 (1.55)	0.10 (2.88)	-0.005 (-0.16)
Small firm sector	0.07 (2.21)	0.11 (3.53)	-0.01 (-0.45)

age group : 50-54 years old

The coefficients of log of real value-added

	Middle school	High school	College
Large firm sector	0.39 (9.71)	0.36 (9.08)	0.37 (8.40)
Medium firm sector	0.58 (113.43)	0.53 (10.73)	0.57 (11.18)
Small firm sector	0.71 (16.04)	0.74 (16.82)	0.65 (9.45)

The coefficients of log of labor supply five years ago

Large firm sector	0.07 (2.83)	0.09 (3.66)	0.01 (0.19)
Medium firm sector	0.03 (0.80)	0.13 (3.37)	0.05 (2.07)
Small firm sector	-0.06 (-1.71)	-0.02 (-0.48)	0.01 (0.44)

Note : (1) t-values are in parentheses.

(2) the estimated equation is as follows:

log(wage)=a+b*log(real valu-added)+c*log(labor supply)+d*log(union density)
+e*year

Table.2.13 Estimates of reduced form equations - (2) employment equations

age group : 30-34 years old

The coefficients of log of real value-added

	Middle school	High school	College
Large firm sector	0.03 (0.25)	0.27 (3.73)	0.04 (0.47)
Medium firm sector	0.24 (2.00)	0.08 (1.03)	0.02 (0.25)
Small firm sector	0.24 (2.12)	0.24 (3.09)	0.12 (0.90)

The coefficients of log of labor supply

	Middle school	High school	College
Large firm sector	0.66 (10.28)	0.71 (12.80)	0.58 (12.09)
Medium firm sector	0.69 (9.32)	0.50 (9.13)	0.33 (5.52)
Small firm sector	0.29 (4.24)	0.40 (7.82)	0.29 (3.73)

age group : 40-44 years old

The coefficients of log of real value-added

	Middle school	High school	College
Large firm sector	0.24 (2.93)	0.02 (0.32)	0.05 (0.69)
Medium firm sector	0.25 (2.82)	0.08 (1.17)	0.11 (1.07)
Small firm sector	0.21 (2.75)	0.09 (1.13)	-0.23 (-1.75)

The coefficients of log of labor supply

	Middle school	High school	College
Large firm sector	0.58 (10.31)	0.61 (9.88)	0.33 (5.88)
Medium firm sector	0.48 (7.62)	0.33 (5.23)	0.26 (3.58)
Small firm sector	0.57 (9.55)	0.52 (7.49)	0.18 (2.16)

age group : 50-54 years old

The coefficients of log of real value-added

	Middle school	High school	College
Large firm sector	0.14 (1.89)	0.31 (4.40)	0.18 (1.60)
Medium firm sector	-0.01 (-0.16)	0.20 (2.09)	-0.04 (-0.28)
Small firm sector	0.29 (3.85)	0.32 (3.95)	0.15 (0.81)

The coefficients of log of labor supply

	Middle school	High school	College
Large firm sector	0.69 (14.28)	0.50 (4.40)	0.36 (4.77)
Medium firm sector	0.54 (0.06)	0.34 (4.77)	0.36 (5.43)
Small firm sector	0.72 (12.92)	0.43 (5.76)	0.28 (3.70)

Notes : (1) t-values are in parentheses.
(2) the estimated equation is as follows:
log(employment)=a+b*log(real value-added)+c*log(labor supply)+
d*log(union density)+e*year

Table.2.14 Estimates of labor supply function

age group : 30–34 years old

The coefficients of log of real wage

	Middle school	High school	College
Large firm sector	0.11 (0.31)	0.84 (3.52)	0.09 (0.31)
Medium firm sector	0.43 (1.63)	0.42 (2.01)	0.27 (1.33)
Small firm sector	0.43 (2.48)	0.50 (3.65)	0.41 (1.69)

The coefficients of log of labor sypply

	Middle school	High school	College
Large firm sector	0.66 (10.63)	0.72 (11.94)	0.57 (9.76)
Medium firm sector	0.70 (9.64)	0.51 (7.37)	0.40 (6.20)
Small firm sector	0.28 (4.06)	0.35 (6.42)	0.33 (1.69)

age group : 40–44 years old

The coefficients of log of real wage

	Middle school	High school	College
Large firm sector	0.82 (3.04)	0.16 (0.83)	0.16 (0.64)
Medium firm sector	0.58 (3.18)	0.33 (2.00)	0.24 (1.13)
Small firm sector	0.36 (3.37)	0.27 (2.18)	−0.09 (−0.39)

The coefficients of log of labor sypply

	Middle school	High school	College
Large firm sector	0.58 (9.02)	0.63 (9.93)	0.33 (5.25)
Medium firm sector	0.48 (7.33)	0.36 (5.03)	0.26 (3.71)
Small firm sector	0.57 (9.11)	0.54 (7.46)	0.20 (2.41)

age group : 50–54 years old

The coefficients of log of real wage

	Middle school	High school	College
Large firm sector	0.50 (2.16)	0.88 (3.49)	0.36 (0.99)
Medium firm sector	0.08 (0.53)	0.36 (1.73)	−0.1 (−0.34)
Small firm sector	0.47 (4.22)	0.47 (3.84)	0.21 (0.70)

The coefficients of log of labor sypply

	Middle school	High school	College
Large firm sector	0.66 (10.97)	0.42 (3.49)	0.37 (4.60)
Medium firm sector	0.56 (9.32)	0.3 (3.27)	0.37 (5.05)
Small firm sector	0.76 (12.72)	0.44 (5.33)	0.28 (3.70)

Notes : (1) t-values are in parentheses.
(2) log of real value-added is used as an IV.

Chapter.3
Why was Unemployment Rate Low and Stable in Japan?[1]

I. Introduction

Japanese labor markets have been famous with its low and stable unemployment rates compared with the labor markets of other industrial nations. Although unemployment rate now keeps rising, it is still relatively low. To empirically explore the reason why it has been low and stable for a long time is the purpose of this chapter. One reason is that cyclical fluctuation of employment is small in Japan. However, is it the only reason?

By the survey of OECD and the Japanese labor force statistics, it is found that Japanese labor markets hold a large number of discouraged workers. The important deficiency of this OECD's international comparison is that the definition of discouraged worker is not the same among member countries. If a lot of discouraged workers really exist in Japanese labor markets, they would contribute to lower and stabilize unemployment rates by moving between employment and non-participation without experiencing unemployment. Due to their behavior, the fluctuation of unemployment will be smaller than that of employment.

In this chapter, I will try to measure the number of those who actually move between employment and non-employment without experiencing unemployment according to business cycle, and try to measure how much unemployment rate would rise if those persons were counted as unemployed. By estimating the cyclical response of employment, unemployment and participation, I will decompose the cyclical fluctuation of employment into that of participation and of unemployment. By using these estimation results, the relative share of the fluctuation of participation in that of employment can be measured.

Since discouraged workers are supposed to be distributed unevenly among various demographic groups, the estimation will be carried out by demographic group. By comparing these estimation results between Japan

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[1] I thank Professor Steve Pischke for many helpful comments.

and the US, the following facts are found. Cyclical fluctuation of both employment and unemployment is larger in the US than in Japan, although that of participation is larger in Japan than in the US. Particularly for women, teenagers and the old, the fluctuation of participation shares the dominant part of the fluctuation of employment. Their behavior contribute to lower the level of unemployment rates and also to make the movement of unemployment rates less cyclical.

The first section surveys the movement of unemployment rates of several OECD countries since 1970. Also by comparing the cyclical response of employment and unemployment, it is assured that Japan is a country characterized by stable employment and unemployment. The third section inquires any possibility that low and stable unemployment rate of Japan is a statistical artifact caused by the particular definition of unemployment and employment. The fourth section presents the number of discouraged workers and also the number of those who are out of labor force but desire to work. The fifth section estimates the cyclical response of employment, unemployment and participation by demographic group. In this section, business cycle movement is represented by the unemployment rate of prime-age-male. The sixth section examines what will change if the index of business cycle index is changed to the movement of production. The seventh section measures the demographic contribution to cyclical variation using the estimates obtained in sections five and six. The last section presents the concluding remarks.

II. Time Series Movement of Unemployment Rates

To compare the level and stability of unemployment rates among industrial nations, average and standard deviation of unemployment rates for 13 OECD countries since 1970 are presented in table3.1. Graph.3.1 shows the time series movement of unemployment rates for 5 OECD countries. Compared with other 4 nations, Japan shows low and mildly increasing unemployment rates.

Sweden shows a jump at the beginning of 90's. To identify a jump in unemployment rate in 90's, average and standard deviation of

unemployment rates are calculated over the two time periods; 1970 to 1990 and 1970 to 1996. As is expected, a big increase in both average and standard deviation of unemployment rates seems to have taken place in '90's for Finland, Sweden, Swiss and New Zealand. Compared with these countries, Japan showed a mild increase in both average and standard deviation of unemployment rates. For the period 1970 to 1990, Japan shows the second smallest average and standard deviation. For the period 1970 to 1996, Japan shows the second smallest average and the smallest standard deviation. Even though unemployment rate kept increasing in Japan since 1990 and marked the record high in 1998, it has been small and stable compared with other OECD countries.

Whether fluctuation of unemployment rates is large or small should also be judged relative to the fluctuation of production level. In order to measure the degree of responsiveness of unemployment rate to production level, I regressed unemployment rate on log of real GDP, trend and a constant. Table.3.2 displays the estimated coefficients of log of real GDP. The estimates in column (1) mean the percentage points change in unemployment rate caused by a 1-% change of real GDP.

Four countries - Canada, France, Japan and Swiss have insignificant estimates. Other countries have significant and correct sign; unemployment rate rises when production level shrinks. The estimation result of Japan that no significant responsiveness of unemployment rate to production level is consistent with the already established notion that unemployment rates are stable in Japanese labor markets.

To judge the performance of labor markets, the fluctuation of employment level is another important factor. The elasticity of employment level on output changes is estimated by regressing log of employment on log of real GDP for the same OECD countries. The estimates of the coefficients of log of real GDP are displayed in column (3). Four countries - Austria, Japan, Netherlands and Swiss have insignificant estimates. These results ascertain that both unemployment rate and employment level are stable in Japan compared with other OECD countries.

To reduce the effect of jump in time-series data, the first difference equation of (1) and (3) are estimated; the first difference of unemployment

rate and that of log of employment are regressed on the first difference of log of real GDP. The estimates are listed in column (2) and (4).

Most countries show significant and correct sign. Among all, both employment and unemployment in Japan show less responsiveness to output fluctuation than in most other countries. With Swiss being an only exception that employment and unemployment do not respond to production fluctuation, Japan shows the lowest elasticity of unemployment rate to production. As for the elasticity of employment on production, Japan shows the third smallest value.

Table.3.3 shows the estimates of the same regression with only the sample period changed to 1970-90. Comparison of table.3.2 and.3.3 gives us insight about what happened to unemployment rates and employment levels in 90's. Finland and Sweden showed a great increase in responsiveness of both unemployment rate and employment level to real GDP. On the contrary, Swiss showed a decrease in responsiveness. Compared with these big changes, Japan showed only a modest change in responsiveness of unemployment rate and employment level to real GDP. So it can be concluded that both unemployment rate and employment level of Japan continued to be relatively stable after 90's as were before 90's.

Why is this kind of stability obtained? This question together with a question why unemployment rate is low in Japan is an unsolved puzzle. To find an answer to this question is the purpose of this chapter. As a first step, the next section will test the possibility that the stability of employment and unemployment is a statistical artifact caused by the particularity of Japanese definition.

III. Definition of Employment and Unemployment

3-1. Influence on the level of unemployment rates

Such low official unemployment rate of Japanese labor markets was first doubted that it was a statistical artifact caused by the Japanese particular definition of unemployment. Sano(1981) and Shiraishi(1982) compared the definition and concept of unemployment between Japan and

the US and concluded that there exists no significant difference of definition between these two countries. Taira(1983) presented a different conclusion from the above two studies: the Japanese jobless rate would be "nearly double the official unemployment rate" if U.S. concepts were applied. Taira selected March to represent the whole year, and added March school graduates who are waiting to start jobs within 30 days to the Japanese unemployed. March school graduates are counted as non-labor force in official Japanese statistics.

Sorrentino(1984) criticized Taira that March is the most unusual month of the year because of its highest labor mobility. March is the only month in the year that students graduate from school and wait to start their new jobs. Sorrentino considered that these new graduates are inappropriate to be counted as unemployed because their pre-determined employment contracts with companies are very firm, and the possibility for them to get unemployed is negligible. Sorrentino applied BLS standard to Japanese unemployment and recalculated the unemployment rate from 1977 to 1980. The BLS adjusted rates are only 0.1 to 0.4% higher than the official unemployment rates and much lower than the rates adjusted by Taira.

Sorrentino concluded that Japan's method of computing unemployment results in a slight understatement of Japanese unemployment under U.S. concepts. While the overall Japanese unemployment rates are changed slightly by applying BLS concepts, female unemployment rates are nearly doubled by applying BLS adjustment. Owing to the analysis of Sorretino, definitional or conceptual differences have been excluded as a reason of Japan's low overall unemployment rate hereafter.

OECD took most of the above arguments into account and made great effort to standardize unemployment rates for different countries. According to this OECD standardization, Japan shows low and relatively stable unemployment rate. (See Quarterly Labour Force Statistics, No3, 1997)

In conclusion, any standardization applied to Japanese unemployment rates, done either by BLS or OECD to conform better to the US or ILO concept of unemployment respectively, would increase the Japanese unemployment rate only slightly and not significantly alter the fact that Japan is a country of low unemployment rate. However, the important thing

left undone is that whether the change of Japanese definition of unemployment alters the responsiveness of Japanese unemployment rates to production level significantly.

3-2. Influence on the stability of unemployment rates

To inquire whether standardization of Japanese definition of unemployment would influence the stability of unemployment rates, I focused on the treatment of family workers among other points. By US definition, unpaid family workers working less than 15 hours during the survey week are defined "not employed", whereas by Japanese definition, family workers working at least 1 hour during the survey week are defined "employed".

The US Bureau of Labor Statistics has already modified this point by omitting the Japanese unpaid family workers working less than 15 hours per week from those counted as employed. This omission made the Japanese unemployment rates only slightly higher as noted above. So the next task is to explore whether the family workers working 1 to 14 hours function to smooth the movement of unemployment and employment in Japan.[2]

The numbers of those who work 1 to 14 hours per week are published annually in the Labor Force Statistics. They are categorized to three groups-family workers, self-employed workers and employees. As an annual average of 1997, 2810 thousand people in total worked 1 to 14 hours per week. They compose 4.22% of total 66.6 million employees. Among those whose weekly working time is 1 to 14 hours, 660 thousand are self-employed workers, 430 thousand are family workers, and 1720 thousand are employees. If 430 thousand family workers are all unpaid, they will be considered as "not employed" by the BLS definition. However, the information of whether they are unpaid or not is unavailable. As a first approximation, all the family

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[2] Hashimoto(1994) compared the adjustment speed of employment between Japan and the US with data standardized by BLS definition. He found out that after BLS standardization, the speed of labor adjustment is slower in Japan than in the US. But he has not analyzed the effect of BLS standardization on the statistical stability of employment and unemployment.

workers working 1 to 14 hours will be considered as unpaid hereafter.

The other table in the Labor Force Statistics gives the number of those who do job search among those who work 1 to 14 hours per week. If the BLS standard were applied, those who work 1 to 14 hours a week as (unpaid) family workers and also searching another job should be defined "unemployed", and those who are not searching job should be defined "not in the labor force".

As an annual average of 1997, 320 thousand workers are job seekers among 2810 thousand people working 1 to 14 hours per week. Their share is 11.39%. Unfortunately the number of those who do job search among family workers is unavailable. Assuming that the probability to be a job seeker is the same whether one is self-employed or a family worker or an employee, I can estimate the number of family workers who are working 1 to 14 hours per week and at the same time searching a job by multiplying 430 thousand by 0.1139. This number should be counted as unemployed by BLS definition. After adding this number to the official unemployment, and subtracting those who are family workers and working 1 to 14 hours per week from the official employment, I ran the same regression as above. The estimation results are as follows.

$$\underset{}{\text{MUR}} = \underset{(-3.01)}{-0.061}\ \log(\text{real GDP}) + \underset{(3.73)}{0.0028}\ \text{trend} + \underset{(3.07)}{0.75}$$

$$\log(\text{MEMP}) = \underset{(3.02)}{0.19}\ \log(\text{real GDP}) + \underset{(1.57)}{0.0037}\ \text{trend} + \underset{(11.00)}{8.48}$$

Where MUR is modified unemployment rate and MEMP is modified employment level.

The numbers in parentheses are t-values. Annual data are used over the period from 1972 to 1996. Before 1971 the number of job seekers is not disclosed. The estimates of the same regression with only the time period changed to 1972-1990 are presented in the last line of table.3.3. The responsiveness of unemployment rate and employment level to GDP became

smaller after 1990. This implies that the family workers who work 1 to 14 hours had the more important role as disguised unemployment before 1990.

For both sample periods, the absolute values of the coefficients of log of real GDP became larger than the original estimates and also became significant by adjusting family workers according to BLS standard. The effect is stronger for employment level than for the unemployment rate. This effect implies that some of the family workers working 1 to 14 hours per week are the disguised unemployment. Japanese definition that all the family workers working at least 1 hour are counted as employed is contributing to smooth the official employment level and unemployment rate. While the elasticity of unemployment rate on production level increased only slightly, that of employment level on production level almost doubled by modifying the definition. Using this modified definition and I calculated the first difference regression. The estimation results are presented at the bottom line of table.2.2 and 2.3.

By comparing the estimates of table2.2 and 2.3, it is evident that the effect of the above modification on changing the elasticity is stronger for the period from 1970 to 1990 than for the period from 1970 to 1996. This means that the role of family workers as disguised unemployment became smaller after 1990. Maybe this is because the share of family workers in the total employment has been shrinking.

Although employment level and unemployment rate become more responsive to GDP by modifying the Japanese definition to BLS standard, they are still less responsive to production level in Japan than in most other OECD countries.

IV. Number of Discouraged Workers

A survey by OECD presented evidence that Japanese labor markets hold relatively large amount of hidden unemployment. Since late 1980's OECD has been trying to measure the number of discouraged workers and it found that discouraged workers totaled about 3.7 million in 18 OECD countries in 1991, and two countries - Japan and the US - accounted for about half of this figure. As a ratio to the unemployed, the number of

discouraged workers varied widely in 1991, from under 1% in Spain to 90% in Japan while most countries were in the 5 to 20% range (See OECD 1993 Employment Outlook). This number does not directly express the difference of the number of discouraged workers between OECD countries because the definition of discouraged worker is not the same.[3]

In Japan the Report on the Special Survey of the Labour Force Survey annually discloses the number of those in the labor force and of those out of the labor force. Those who are categorized to be out of the labor force are asked a further question whether they desire to work or not. Those who answered yes to this question are asked the reason for not seeking a job notwithstanding they desire to work. The following five reasons are prepared for the respondents. 1) Temporary illness 2) No time to look for a job 3) No prospect of finding a job 4) Busy attending school, keeping house, etc. 5) Other. Those who chose 3) No prospect of finding a job, as a reason for not seeking a job are defined as discouraged workers.

Ono (1989) used this Report on the Special Survey of the Labour Force Survey to measure the relative share of those who desire to work and also the relative share of discouraged workers in the total number of those not in the labor force. He compared these two ratios between Japan and the U.S. in 1984 and 1985. In 1984 Japan showed each ratio was 28.8% and 7.3% respectively while the US showed 9.7% and 2.0% respectively. In 1985 Japan showed 26.5% and 10.5% and the U.S. counterparts were 9.5% and 1.9% respectively. This fact indicates that Japanese labor markets hold larger hidden unemployment than the U.S. labor markets.

The number of discouraged workers is likely to show great variation among demographic groups, and likely to change considerably by business cycle. Thus table.3.4 displays the number of discouraged workers in two periods representing boom and slump, and the number of those classified by several demographic groups. Together with the number of discouraged workers, the number of those who desire to work is displayed in the same

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[3] Definitions of discouraged workers for several OECD countries are surveyed in Employment Outlook (1987).

table. Two years 1991 and 1996 are chosen to represent the time of boom and recession respectively. Four kinds of ratio, the ratio of the number of those who desire to work and that of discouraged workers to 1) the number of those who are unemployed 2) to population are displayed.

It is evident from table.3.4 that age difference produces a great variation in these ratios. In 1996, for men aged above 65, more than six times as many men listed unemployed are out of the labor force and desire to work. For men aged between 35 and 44, only about one third of that unemployed are out of the labor force and desire to work. The ratio of the number of discouraged workers to the number of unemployed is 3.57 for those aged at and above 65, while the same ratio is 0.06 for those aged between 35 and 44. In 1991 these gaps caused by age difference were greater than in 1996.

For the male age groups of 15-,25- and 35-, the share of those who desire to work and those discouraged in total population are negligible. And this does not change whether in boom or in slump. This is because population is constant through business cycle, and also the number of discourages workers and that of those desire to work are pretty constant through business cycle for men.

Women behave differently from men. Women show larger number of those who desire to work notwithstanding they are out of the labor force and also larger number of discouraged workers. This is a general tendency in most OECD countries. Employment Outlook (1993) presents the male female share of discouraged workers for 17 OECD countries. For every country, women show a larger share of discouraged workers than men do. In Japan female share of discouraged workers is 78% as of 1991.

Both the numbers of both discouraged workers and those who desire to work are bigger for women than for men for all the age groups except the age of and over 65.

To the total female population, all the discouraged women share 5 to 6%, and all the women who desire to work share 13 to 15%. For men, these ratios are 1% and 4% respectively. Female ratios move cyclically but male ratios are constant. Also the cyclical movements of the number of discouraged workers and that of those who desire to work are bigger for women than for men.

It is interesting that the number of those who desire to work decreases in recession, while the number of discouraged workers increases in slump. This tendency is more conspicuous for women than for men. The number of those who desire to work moves pro-cyclically for both men and women. Pro-cyclical movement is more obvious for women than for men. If those who desire to work are considered as labor supply, total labor supply tends to increase in economic boom. These pro-cyclical movements of labor supply contribute to smooth the fluctuation of unemployment rates.

As noted above, Japan shows less cyclical fluctuations of unemployment rates as relative to output fluctuations compared with other countries. One possible reason for this stability might be that cyclical fluctuation of labor supply is larger in Japanese labor markets than in the labor markets of other countries. This will be the topic of next section.

V. Cyclical Response of Participation, Unemployment and Employment to Prime-age-male Unemployment Rate

The last section showed that Japanese labor markets hold a large number of discouraged workers and non-employment who desire to work. However, it is somewhat risky to get to a conclusion depending only on those statistics because all these numbers are based on self-declaration and thus quite subjective. To supplement this deficiency, the actual number of those who move between employment and non-participation will be measured in this section.

To seek the reason of the stability of unemployment rate, the cyclical fluctuation of labor supply will be analyzed. Both labor demand and supply affect how much unemployment is produced, and often labor demand and supply have opposite cyclical effects on unemployment. During economic boom, labor demand increases and this is effective in reducing unemployment, but during the same time labor supply might also increase because of larger prospect of getting a job and this increase is effective in producing more unemployment. During economic slump labor demand decreases and this tends to increase unemployment, but labor supply might

decrease because of smaller prospect of getting a job and this is effective in reducing unemployment. This is so-called discouraged worker effect.

Relatively larger number of discouraged workers in Japanese labor markets measured by OECD (1993) and that reported in the previous section suggest that discouraged worker effect might be more dominant in Japanese labor markets. Discouraged worker effect makes the movement of unemployment rate less cyclical. The great number of discouraged workers in Japan is consistent with relatively stable unemployment rate compared with other industrial nations.

The first economist who considered that Japanese low unemployment rate is due to existence of a lot of female discouraged workers was Umemura(1971). In the same line with Umemura, Tachibanaki and Sakurai(1991) estimated the labor supply function for Japanese women and figured out that female labor supply fluctuates pro-cyclically. They concluded that this is one reason for little change in the unemployment rate in Japan.

This section examines the cyclical movement of labor supply by directly estimating the cyclical variation of participation rate. Special attention will be paid to demographic difference because cyclical movements of labor supply may differ considerably according to demographic group.

As a measure of the supply of labor, participation has already been widely studied in the US. Among these studies, Summers L.H. and K. B. Clark (1990b) put special emphasis on linking participation and unemployment dynamics together to explain employment fluctuations for the U.S. labor markets from 1950 to 76. They found the importance of examining changes in participation in connection with related movements in employment and unemployment. They also found that there exists wide variation in cyclical sensitivity across demographic groups.

5-1 The Empirical Model

Adopting the same simple method used by Clark and Summers, I focus on the cyclical response of participation rates with special attention paid to the variation caused by demographic group. As a first step, the model will be described. The connections among participation, unemployment, and

employment can be expressed in the following identity:

$$\left(\frac{E}{P}\right)_i = \left(\frac{E}{L}\right)_i \left(\frac{L}{P}\right)_i \tag{1}$$

where E is employment, P is population, L is labor force, and i indexes demographic groups. The employment ratio (E/P, proportion of the population employed, hereafter called E/P ratio) is the product of the participation rate (L/P) and the employment rate (E/L, one minus the unemployment rate hereafter called E/L ratio). Fluctuation in the fraction of the population employed thus can be decomposed into the change in the rate of unemployment and that of participation. Expressing (1) in logs and differentiating yields the following basic decomposition:

$$d\ln(E/P)_i = d\ln(E/L)_i + d\ln(L/P)_i \tag{2}$$

Since persons in the labor force are either employed or unemployed it is obvious that

$$d\ln(E/P)_i = d\ln(1-UR)_i + d\ln(L/P)_i \tag{3}$$

where UR is the unemployment rate.

For each demographic group, it is assumed that unemployment and participation rates are functions of aggregate demand and time. The basic functions to be estimated are

$$\ln(PR)_{it} = \beta_0 + \delta_0 UP_t + \beta_2 T + \beta_3 T73 + v_{it} \tag{4}$$

$$\ln(1-UR)_{it} = \alpha_0 + \lambda_0 UP_t + \alpha_2 T + \alpha_3 T73 + u_{it} \tag{5}$$

where PR is the labor force participation rate and UP is the unemployment

rate of men between the ages of 30 and 39, T is the time trend, T73 is a second time trend, which begins in 1973 (the year of the first oil embargo), and i indexes demographic groups.

The unemployment rate of middle-aged (aged 30 to 39) males is used as a measure of aggregate demand.[4] The unemployment rate of middle-aged male is considered to be appropriate in representing aggregate demand because hidden unemployment seems to be smallest for middle-aged men as was shown in the last section. The identity (1) ensures that the relationship between the employment ratio and aggregate demand and time is given by

$$\ln(E/P)_{it} = \beta_0 + \alpha_0 + (\delta_0 + \lambda_0)UP_t + (\beta_2 + \alpha_2)T + (\beta_3 + \alpha_3)T73 + e_{it} \qquad (6)$$

5-2 The Estimation Results for Japanese Labor Markets

Equation (4), (5) and (6) have been estimated using quarterly data over the period 1967 to 1996 for various demographic groups[5]. The data are taken from the Monthly Report on the Labour Force Survey[6] from 1967 to 1996. These equations were estimated using OLS.[7]

Table.3.5 displays the estimates of the coefficients of ln(UP)t for equation (4),(5) and (6). Column (1) of table.3.5 presents the estimates of the elasticity of cyclical response of employment ratio (E/P ratio) which are the

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[4] The unemployment rate of other age groups were also tried to represent aggregate demand, but no significant difference was produced. In the US, men aged from 35 to 44 are chosen as prime-age male.

[5] To find out whether the results of this section heavily depends on the formulation of the equations (4)(5)(6), I tried the regression using the LHS variables without log. Although the estimates were different, I found out that the conclusion is mostly the same whether log is taken or not.

[6] The explanation about the Monthly Report on the Labour Force Survey will be in the Appendix.

[7] Summers, L.H.and K.B.Clark (1990b) estimated using maximum likelihood because they included lagged variables. of UP_t over past two years in order to take account of recognition and action lags in the response to fluctuations. I also tried the estimation including the lagged variables of UP , but lagged variable had no significant effect in most demographic cases, so finally I dropped it and estimated the equations by OLS without a lagged variable.

estimates of $\delta_0 + \lambda_0$. Column (2) presents the estimates of the elasticity of labor force participation rate (L/P) which is the estimate of δ_0. Column (3) presents the estimates of the elasticity of employment -labor force ratio (E/L ratio) which is the estimate of λ_0. As is evident from the comparison of coefficients of (4) (5) and (6), the numbers in column (1) are the sum of the estimates listed in column (2) and (3).

Several striking facts and demographic differences are evident from table.3.5. First, teenagers are very sensitive to cyclical developments. The estimates imply that a 1-% increase in the prime-age-male unemployment rate (for example from 1% to 2%, or 2% to 3%) will produce a 13.07% and 13.90% decrease in male and female teenagers' participation rate respectively. Combined with a decrease of E/L ratio (2.42% for men and 1.32% for women), this 1-% increases in the prime-age-male unemployment rate will decrease E/P ratio by 15.48% and 15.22% for male and female teenagers respectively.

Young men aged 20 to 24 also show large elasticity of E/P ratio. When the unemployment rate of prime age male increases from 1 to 2%, the proportion of men aged 20 to 24 employed decreases by 6.17%. About 84% of this reduction comes from a decrease in their participation rate.

For adult men of age groups 25-, and 35-, participation rates are unlikely to move cyclically because the estimates are insignificant. It means that prime-age male will choose to be unemployed rather than go out of the labor market when they lose jobs. The elasticity of E/L ratio is close to 1% for these age groups. For men aged 30-34, the elasticity of participation rate is very small although it is significant

For men aged 40 to 54, the participation rate decreases by 0.51% by an increase of the unemployment rate of prime-age male from 1 to 2%. Elderly men aged 55 to 64 needs particular attention, because the absolute value of their elasticity of E/L ratio (-2.47) marks the highest among all the demographic groups. This means that men aged 55 to 64 are mostly inclined to get unemployed by economic recession. This no doubt reflects that some of those who retire from the company around the age of 60 try to find their job but cannot get one. Looking from the demand side, the Japanese companies tend to use male employees aged around the mandatory retirement age 60, to

adjust employment according to business cycle. In other words, to delay actual retirement age during economic boom and induce early retirement during economic slump even though this would force retirees to get unemployed.

Men aged at and over 65- show second largest fluctuation of E/P ratio; -7.38. About 89% of this E/P fluctuation is explained by the cyclical fluctuation of participation rate. This is the highest rate of employment fluctuation explained by the fluctuation of participation rate among all the male age groups.

The major cause of this great imbalance of the elasticity of E/P ratio among different age groups is the way Japanese firms adjust the number of employees. Even when confronting a sharp decline of demand or of output, Japanese firms try not to discharge prime age males as far as possible. Instead they tend to decrease the number of new hiring and to induce early retirement to those whose age are close to mandatory retirement age. Therefore those who are at the entry to and the exit from the internal labor markets are influenced mostly by business cycle. And particularly, elderly men are more vulnerable than young men from business cycle because the Japanese wage structure tends to pay more than productivity for elderly men.[8]

Comparison of cyclical fluctuation of employment and participation between men and women gives us another interesting insight about Japanese labor markets. For total men the coefficient of participation rate is insignificant. And about 73% of the fluctuation of E/P ratio is explained by that of E/L ratio. So major part of employment fluctuation is accompanied by variation of unemployment for men.

For total women on the contrary, those who move between being employed and being out of labor force share major part of employment fluctuation. Of all the fluctuation of E/P ratio, 68% comes from the fluctuation of participation rate. For most age groups, this percentage point

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[8] Okaaki(1994) compared wage profile and productivity profile for male employees of Japanese manufacturing industry. And found that wage is larger than productivity for men close to 60 years of age.

is higher for women than for men. Particularly for women aged at and above 65, 95.4% of employment fluctuations are explained by the fluctuations of participation rate. This result is consistent with the generally held impression that women are more prone to give up job search and go out of the labor force than men are when they confront the difficulty of getting a job.

The only exception is the 20-24 age group, if the 30-34 female group is excluded because it has positive sign. For men aged 20-24, 84% of all the E/P fluctuation comes from the fluctuation of participation rate, while for women aged 20-24 that is only 22%. I conjecture that this phenomenon for 20-24 age group might reflect male-female difference in their attitudes of getting the first regular job right after they leave school. During business slump, new graduates confront a larger difficulty to get a good job than during economic boom. Young men tend to wait until economic conditions improve to get the first regular job by delaying graduation time or by entering graduate school when they cannot find a satisfactorily good job. The first good regular job seems to be more important for men than for women because men are more likely to get into a long-term employment relationship than women are. Thus the present value of getting a better job is larger for men than for women.

The other reason that women aged 20 to 24 are more unlikely to spend time waiting for a better chance of job may be that for women being young is an important necessary condition to get a good job. So waiting for labor market conditions to improve is not a good strategy for women because they lose a merit of being young while waiting. Unfortunately appropriate data to verify the above conjecture is now unavailable.

As in the case of men, female teenagers and women aged above 65 are the groups whose employment ratio and participation rate respond most sensitively to cyclical development. The estimates imply that a 1-% increase in the prime-age-male unemployment rate will produce 15.22% and 6.25% decrease in the E/P ratio for female teenagers and women aged above 65 respectively. 91.3% and 93.6% of this decrease come from a decrease in the participation rate for teenagers and women aged above 65 respectively.

For total women, the absolute value of the elasticity of E/P ratio is 2.91, and it is larger than that for total men which is 1.49. Actual E/P ratio as of 1997 is 0.75 for men and 0.49 for women. Using these actual E/P ratios,

cyclical change of participation rate and E/L will be estimated as follows. When the unemployment rate of prime-age male increased from 1 to 2%, 1.12-% of total men are supposed to change from employed to non-employed. Among 1.12-%, 0.82-% are supposed to get unemployed and 0.3% are supposed to go out of the labor force.

For women, 1.43-% of total women are supposed to become non-employed under the same situation. Among 1.43%, 0.46% are supposed to get unemployed and 0.97% are supposed to go out of the labor force. Since the population of women is only 5 % larger than that of men for those who are older than 15 years, the above numbers imply that the larger number of women move between employed and non-participation, and larger number of men get unemployed.

A large number of those women who go out of the labor force instead of getting unemployed contribute to suppress unemployment rate and also contribute to smooth the fluctuation of unemployment rate.

To know what has happened to Japanese labor markets after 1990, the same equations are regressed for the period 1967-1990, and the estimates are presented on table.3.6. Comparing the coefficients of table.3.5 and 3.6 shed light on the change of the labor markets after 1990. After 1990, the coefficients of E/L ratio seem to have increased slightly, while those of participation rate seem to have increased greatly for total population. As a result, the coefficient of E/P ratio increased 62% for total men, 33% for total women and 46% for total population. Although the difference of the estimates between the two sample periods are not so significant, this increase implies that during the latest recession, which began around 1991 after the burst of the bubble economy, more people chose to go out of the labor force rather than to become unemployed. Therefore the highest unemployment rate of these days might be still under estimation of loose labor markets.

To attenuate the effect caused by the jump of time-series data, the first difference regression is performed and their results are presented in table.3.7. Some points became different by running the first difference regression. Firstly, many estimates became insignificant, and particularly all the estimates of the elasticity of LFPR for men became insignificant.

Secondly, the elasticity for teenagers became smaller for both men and women. Thirdly, most estimates of the elasticity for men became smaller. For women the estimates for younger women became smaller, but those for older women are quite the same. Fourthly, the difference of the elasticity of E/P ratio between total men and women is larger in the first difference equation than in the original equation. The elasticity of E/P ratio for total women is more than four times larger than that for total men in the first difference equation, however in the original equation, the elasticity of E/P ratio for total women is about as twice as large as that for total men.

Notwithstanding the above differences, the following points are common to the original and the first difference equations. First, the elasticity of E/P ratio is higher for women than for men. Secondly, the larger part of E/P fluctuation is due to the fluctuation of participation rate for women than for men. In particular, the elasticity of LFPR for men is insignificant.

5-3 The Estimation Results for US Labor Markets

To compare the cyclical response of employment, participation and unemployment between Japan and the US, I estimated the same equation (4), (5) and (6) for the US labor markets with the quarterly data over the period 1965 to 1997. The estimation results are presented in table.8. Comparison of these estimation results between Japan and the US gives some insight about the difference of the labor markets of the two countries.

First of all the differences, the elasticity of E/P ratio is larger in the US than in Japan for most demographic groups. For total men, elasticity of E/P ratio is slightly larger in the US than in Japan, 1.51 vs. 1.49. However, for total women and total population it is much larger in Japan than in the US. For total population, a 1-% rise of prime-age male unemployment rate causes 1.05% reduction of E/P ratio in the US, while it causes 2.04% reduction of E/P ratio in Japan. This difference between the two countries is caused by the difference of women. By a 1-% increase of prime-age male unemployment rate, US women lose employment only by 0.33%, while Japanese women lose employment by 2.91%.

Secondly, the elasticity of participation rate is larger in Japan than in

the US. And larger part of the elasticity of E/P ratio is explained by the elasticity of participation rate in Japan than in the US. This implies that those who move between employment and non-participation share larger part of employment fluctuation in Japan than in the US. Put differently, those who move between employment and unemployment share larger part of employment fluctuation in the US than in Japan. For US total population, the elasticity of participation rate is insignificant. This makes a sharp contrast from the Japanese case where about a half of E/P fluctuation is explained by the fluctuation of participation rate.

Thirdly, the relative share of employment fluctuation between men and women is different between the two countries. In Japan, women share larger part of cyclical employment fluctuation than men do. In contrast, men share the larger burden of cyclical employment fluctuation in the US. Strikingly different from Japanese women, US women in total show the significantly positive elasticity of participation rate. However, this positive elasticity of LFPR for US women depends on what period is chosen for sample period. For example, if sample period is 1965 to 73 or 1965 to 83, the elasticity is significantly negative. If sample period is 1965 to 89, the elasticity is insignificant. If sample period is 1984 to 1998, the elasticity is significantly negative.

Fourthly, how the risk to get employed is shared among different male age groups is different between Japan and the US. In the US, the elasticity of E/L ratio diminishes as the age group becomes older for men. On the contrary in Japan, men aged 55-64 show the highest elasticity of E/L ratio. This means that in the US, a man's probability to get unemployed because of recession becomes smaller as he gets older, on the other hand in Japan, the probability to get unemployed because of recession is highest around the age of 60. This implies that job security is not guaranteed for elderly men under the so-called lifetime employment system. Or in other words, job security of Japanese men is guaranteed only when they are middle-aged.

To make all the above comparison more precise, the fact that actually the unemployment rate of prime-age-male fluctuates much more for each business cycle in the US than in Japan. I calculated the range of the movement the unemployment rates of prime-age male for each business cycle

as follows. First, I picked up the unemployment rates of prime-age male for all the business peaks and troughs over the sample period and then calculated the average range of unemployment rate from trough to peak. The average range of unemployment rate for each business cycle is 0.66% for Japan, and 2.24% for the US. Japan shows much smaller change than the US as expected.

By multiplying this rate of change of prime-age-male unemployment rate to the elasticity, the actual change of E/P, participation rate and E/L for one typical business cycle can be estimated. In Japan, the E/P ratio is supposed to change 1.35% (that is 2.04×0.66) for total population for one business cycle, while that number is 2.35% in the US. Participation rate is supposed to change 0.67% in Japan and 0.25% in the US for one business cycle. The E/L ratio is supposed to change 0.67% in Japan and 2.58% in the US. Thus even after adjusting by the actual rate of change of prime-age-male unemployment rate, the rate of change of E/P ratio and E/L ratio are larger in the US than in Japan, however the rate of change of participation rate is larger in Japan than in the US.

These results are consistent with the facts presented in section 2; cyclical fluctuation of both employment and unemployment is smaller in Japan than other countries including the US. And also consistent with the stylized fact that employment adjustment speed is smaller in Japan than in the US.

The important exception to the above description is men aged 55 to 64. In contrast to other age groups, the elasticity of E/L ratio is much larger in Japan than in the US. This age is around the mandatory retirement age. This large elasticity of unemployment rate for men aged 55-64 reflects the tendency of firms to induce early retirement in times of economic recession even though it will result in unemployment. This fact suggests that Japanese employees are not guaranteed job security for lifetime, rather they are exposed to the risk of becoming unemployed when they become the ages between 55 and 64. Japanese male employees enjoy job security when they are aged between 25 and 54.

This fact can be well explained in the context of efficiency-wage theory. Marcus Rebick (1995) found the significant influence that Japanese large

firms show on the old male workers' post-retirement career. He discovered that workers who are assisted in finding post-retirement job by their pre-retirement employers earn 20% higher wages than those who find job through other means, after controlling for individual characteristics. This implies that favorable post-retirement job placement may function as an important incentive for older workers in the large Japanese firms. Rebick showed that lower wage which occurs without any assistance of the pre-retirement employer may function as a penalty of working not hard. The high probability to be unemployed for older male may also function as a penalty for having been an unfavorable employee.

The first difference equations are estimated and the estimation results are presented in table.3.9. Some differences occurred by taking the first differences, although the major important characteristics remain the same. The absolute value of the elasticity of E/P ratio and E/L ratio became smaller for men. And the absolute value of the elasticity of E/L ratio became smaller for women. However, the following points remain the same by taking the first difference. The major part of the fluctuation of E/P ratio is explained by the fluctuation of E/L ratio. The fluctuation of participation rate shares negligible role in explaining the fluctuation of employment. The elasticity of E/P ratio is larger for men than for women. The absolute value of E/L ratio is smaller for elder age group.

V. Cyclical Response of Participation, Unemployment and Employment to Production Fluctuation

The most serious deficiency of the above empirical analysis is that the unemployment rate of prime-age-male may not an appropriate measure of aggregate demand, particularly for Japan. To supplement this deficiency, the same equations are estimated with only changing the regressor of prime-age-male unemployment rate to output fluctuation. Output fluctuation is represented by log of real GDP.

$$\ln(PR)_{it} = \beta_0 + \delta_0 \ln(GDP_t) + \beta_2 T + \beta_3 T73 + v_{it} \qquad (7)$$

$$\ln(1-UR)_{it} = \alpha_0 + \lambda_0 \ln(GDP_t) + \alpha_2 T + \alpha_3 T73 + u_{it} \qquad (8)$$

$$\ln(EN)_{it} = \beta_0 + \alpha_0 + (\delta_0 + \lambda_0)\ln(GDP_t) + (\beta_2 + \alpha_2)T + (\beta_3 + \alpha_3)T73 + e_{it} \qquad (9)$$

Table.3.10 and 3.13 demonstrate the estimates of the elasticity of cyclical response of employment, unemployment and participation for Japan and the US respectively. By changing the regressor from unemployment rate to log of real GDP, the estimates themselves became comparable.

Particularly, the coefficient of the log of real GDP in equation (8) is actually the Okun's law coefficient. It is already known that Okun's law coefficients are much smaller and unstable in Japan than in the US. According to Kurosaka and Hamada(1984)[9], the coefficient is 0.066 from1953 to 65, 0.025 from 1965 to 1973, and 0.186 from 1974 to 1980. The estimate obtained here for total population is 0.063 over the period 1967 to 1996 and 0.054 over the period 1967 to 1990, so these are close to the coefficient obtained from 1953 to 1965. For the US, the estimate is 0.391 for total population as is shown in table.13. This is about six times as large as that for Japan. The comparison of Okun's law coefficients done by IMF(1987) shows that US coefficient is about four times as large as that of Japan.

The following points appeared by changing the regressor from the unemployment rate of prime-age male to the log of real GDP.

First, relative share of employment fluctuation between men and women has changed greatly. Increase of real GDP by 1-% raises E/P ratio 0.05% for men and 0.28% for women. The female elasticity of E/P ratio is more than

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[9] Kurosaka and Hamada estimated the Okun's law coefficients by regressing the deviation of unemployment rate from the natural unemployment rate on the deviation of actual GNP from potential GNP.

five times as large as that of men.

Also in the US, the share of employment fluctuation between men and women has changed greatly as is shown in table.3.13. When the unemployment rate of prime-age male was used as regressor, men shared the larger burden of employment fluctuation, but now women share the larger part of employment fluctuation.

The above evidence implies that real GDP and the unemployment rate of prime-age male do not move in the same way. Distribution of employment among industries differs between men and women, and thus the unemployment rate of prime-age male tends to reflect the strength of demand to the industries with more men that those with more women. Since business cycle is somewhat different among industries, the male elasticity of E/P ratio becomes larger if the elasticity is measured using men's unemployment rate than when it is measured using production. The other possibility is that labor supply behavior might be different between men and women. The traditional theory suggests that women are more likely to show added-worker effect, although this effect should be analyzed using micro data.

Along with many differences, a lot of common results exist between the two ways of estimation. First, the elasticity of E/P ratio is larger in the US than in Japan. This is consistent with the result obtained when actual unemployment rate of prime-age male in Japan and the US were used. Secondly, the larger share of employment fluctuation is explained by participation in Japan than in the US. Thirdly, Japanese men aged 55 to 64 needs special attention again. The elasticity of E/L ratio is the largest among all the demographic groups. In the US for both men and women, the elasticity of E/L ratio is smaller for elder age group. There is no such order in Japan. Fourthly, the participation rate seems to have no cyclical response to real GDP for prime-aged men and women in Japan.

To see what has happened in Japan after 1991, the same equations are estimated for the sample period 1967 to 1990 and presented in table.3.11. The following points are found by comparing the estimates for the period 1967 to 1990 and those for the period 1967 to 1996. For men after 1991 the elasticity of E/P ratio became smaller while that of E/L ratio became larger.

This means that men have come to get unemployed more easily after 1991.

For women the elasticity of E/L ratio, LFPR and E/L ratio all became larger after 1991. For total population the elasticity of E/P ratio and E/L ratio became larger after 1991, but that of LFPR remains the same. When the regressor was the unemployment rate of prime-age male, the following points were found from the comparison between the estimates for the period of 1967-90 and those for the period 1967-96. The elasticity of E/P ratio, LFPR and E/L ratio became larger for total women and total population after 1991. But for total men, the elasticity of E/L ratio became slightly larger and the elasticity of E/P ratio became larger after 1991.

Therefore, it can be concluded that during the current recession, which began 1991, women are more likely to lose employment by being more prone to go out of the labor force and by being more inclined to get unemployed than they were before 1990. However, these changes are not so large and significant.

The first difference equations are estimated for the two countries and presented in table.3.12 and 3.14. Although the estimates became smaller by taking the first difference, the important characteristics for the two countries remain the same. First, the elasticity of E/P ratio and E/L ratio are larger in the US than in Japan. The larger part of the fluctuation of E/P ratio is explained by the fluctuation of E/L ratio in the US, while it is explained by the fluctuation of LFPR in Japan.

VII Demographic Contribution to Cyclical Variation

All the above estimates provided the evidence of wide variations in cyclical sensitivity across demographic groups. The purpose of this section is to calculate the relative share of employment fluctuation by each demographic group. The method used to derive the share is partly the same with that of Summers L.H. and K.B. Clark (1990b) as follows.

First thing to do is to calculate the relative percentage of employment fluctuation shared by total women and total men. This can be obtained as follows. Multiply the absolute value of the elasticity of E/P ratio shared by total men and that shared by total women, 1.49 and 2.91, by its population

share, 0.486 and 0.514. Summing up these two numbers, 0.724 and 1.496, and then divide 0.724 and 1.496 by this sum, 2.22. Then the relative burden of employment fluctuation shared by total men and total women, 32.6% and 67.4%, are obtained.

The next thing to do is to allocate these 32.6% and 67.4% among each age group. Let the population share and the estimated value of elasticity be s_i and γ_i respectively for age group i. And let a measure of each group's contribution to the change in the overall employment ratio be θ_i. The $\sum s_i\gamma_i$ means the predicted change in the overall employment ratio. So the contribution of the i th group θ_i can be presented as

$$\theta_i = (s_i\gamma_i)/(\sum s_i\gamma_i).$$

Now, $0.326\theta_i$ is the relative share of i th male group's employment fluctuation, and $0.674\theta_i$ is the relative share of i th female group's employment fluctuation. These numbers are displayed in the column (2) of table.3.15.

The above same method is repeated using the estimates obtained by using the log of real GDP as regressor. And the relative burden of employment fluctuation shared by each demographic group is displayed in the column (3) of table.3.15. It is evident from table.3.15 that employment fluctuation is not evenly shared among demographic groups.

In Japan, either in column (2) or (3), women share larger part of employment fluctuation than men do. In the US, in column (2) men share the larger part of employment fluctuation while in column (3), women share the larger part of employment fluctuation. In sum, either in column (2) or (3), Japanese women share larger part of employment fluctuation than US women do.

The pattern of employment fluctuation shared among age groups is also different between the two countries. In Japan, prime-age men and women share the smallest employment fluctuation. In column (2), men aged from 20 to 64 and women aged from 20 to 54 share smaller employment fluctuation relative to population share. And teenagers and men aged at and over 65 and

women aged at and over 55- share larger employment fluctuation relative to population share. In column (3), since imbalance of the share of employment fluctuation between men and women is larger than that in column (2), most men share smaller employment fluctuation and most women share larger employment fluctuation relative to population share. Men aged at and above 20 and women aged 30-34 share smaller employment fluctuation relative to population share.

To make direct comparison of the two countries meaningful, columns (3) will be used. Employment fluctuation is shared more equally between men and women in the US than in Japan. In Japan for both men and women the share of employment fluctuation is large for teenagers and for the old, and it is small for the prime-aged. In contrast in the US, the younger generations share the larger part of employment fluctuation.

Japanese teenagers share about 28% of cyclical employment fluctuation though their population share is about 8%. Japanese women aged 20-29 share 14% of total employment fluctuation though their population share is 9%, and Japanese women aged at and above 65 share 16% of total employment fluctuation though their population share is 11%. In the US, teenagers share about 26% though their population share is about 8%.

Prime-age men tend to share smaller burden of employment fluctuation in Japan than in the US. Japanese men in age groups of 25-29, 30-34, 35-39 and 40-54 share about 3% of employment fluctuation though their population share is about 25%. In the US men aged between 25 and 44 share 25% of employment fluctuation while their population share is 28%. Japanese prime-age male seems to be almost insulated from cyclical employment fluctuation. In order to reduce the share of employment fluctuation of prime-age male, other demographic groups such as elderly women and teenagers share disproportionately large fraction of cyclical employment fluctuation.

VII. Concluding Remarks

With all the above analysis, three kinds of unemployment rate is

calculated and reported in table.3.16. The first column shows the official unemployment rate of 1996 annual average. The column (1) is obtained by counting the discouraged workers of Feb. 1996 shown in table.4 as unemployed. The column (2) shows the unemployment rate when those who desire to work, also shown table.4 are counted as unemployed. Column (3) is calculated by counting those who move between employment and non-participation as unemployed. The number of those who move between employment and non-participation is estimated by multiplying the elasticity of participation rate by the actual change of rate of the unemployment rate of prime-age male (that is 0.66%).

Comparison among three kinds of unemployment rate gives us some interesting insights. First, for both men and women the unemployment rates in column (2) give the largest number except for teenagers and those aged at and over 65. For teenagers and those aged above 65, the numbers in column (3) are the largest. This implies that for teenagers and those aged at and above 65, more persons actually move between employed and non-participation than those who declare that they desire to work. On the contrary, the rest of all age groups include those who do not actually move between employed and non-participation although they declare that they desire to work and keep staying out of the labor force.

Secondly, for prime-age male aged between 25 and 54, all three kinds of unemployment rates show close number to the official unemployment rates. However, for women of all age groups, the unemployment rates of column (1) and (2) show considerably larger number than the official unemployment rate. This results indicate that women are more inclined to declare themselves that they desire to work even though they have no experience of being employed. The reason of this phenomenon should be a future topic.

In this chapter I investigated why unemployment rate is low and stable in Japan. One reason for this fact is that employment level is stable compared with other industrial nations. However, this is not the only reason. Participation is much more responsive to the business cycle in Japan than in the US. Particularly, teenagers, women and those aged at and above 65 are likely to move between the status of employed and being out of the labor force without experiencing the status of unemployed. Their behavior contributes

to lower and also stabilize the unemployment rates of Japan.

Why can they avoid unemployment? One possibility is by becoming family workers or to be self-employed workers instead of becoming unemployed during recession. The evidence for this possibility is presented in section III. By counting half of family workers working 1 to 14 hours per week as unemployed, I showed that the elasticity of employment to GDP became twice as large as the original value. The family workers who work 1 to 14 hours per week are defined "employed" by Japanese labor force statistics, and they are defined "not employed" by the US statistics.

The evidence shown in section III leads to the conclusion that some family workers who work 1 to 14 hours per week actually contribute to lower and stabilize overall unemployment rates. If those family workers working 1 to 14 hours per week were counted as non-employment like the US definition, the elasticity of E/P and that of E/L would become larger. Unfortunately those numbers broken down to demographic groups are not available.

The share of family workers and self-employed workers in total employees is 17.7% in Japan and 8.5% in the US. Larger share of family workers and self-employed in Japan offer the greater possibility to become disguised unemployment.

The other possibility is the system of unemployment insurance. The coverage of unemployment insurance is larger for men than for women. This is caused by the fact that part-time workers share larger part in female workers than in male workers and the coverage of UI for part-time workers is smaller than that for regular workers. It is plausible that the possibility of giving up job search when losing job is higher for those who are uncovered by UI than those who are covered by UI. So this might be a reason why women are more inclined to be discouraged workers.

The relationship between unemployment rate and UI for the aged is investigated by Rebick(1994) for Japan, Sweden and the US. He found out that the relative importance of the labor force participation for men aged 55-64 in Sweden and Japan may be due to the fact that it is easier to take public pensions in these countries and then return to work without penalty. In the US case, the early retirement pension lowers Social Security benefits for the rest of the retiree's life and will be subject to an earnings test if the

individual return to work.

Yashiro(1997) presents another view about high unemployment rate for men aged around 60. Under the Japanese UI system, those unemployed can get 60% of the last earnings as UI benefits. Under the Japanese seniority system the ordinary companies pay much higher wage than their productivity. So the retirees can get much lower wage from post-retirement job. For many retirees, UI benefits will be larger than the wage from post-retirement job, and therefore they prefer becoming unemployed to working with lower wages. Yashiro insists this that this gap raises the unemployment rate of man aged around 60. However, this view cannot explain the high cyclical responsiveness of participation rate. More evidence is necessary that the gap between UI benefit and the wage of post-retirement job moves counter-cyclically. The empirical research about the influence of UI system on the Japanese labor markets is scarce. This should be a topic of future research.

Appendix

The Management and Coordination Agency publish three kinds of report on the labor force survey.

1) Monthly Report on the Labour Force Survey
2) Annual Report on the Labour Force Survey
3) Report on the Special Survey of the Labour Force Survey

Annual Report is made from last 12 monthly reports, therefore it is qualitatively the same with monthly report.

Monthly Report on the Labour Force Survey

The main purpose of this survey is to capture the current employment status of the whole population. This survey has been conducted every month since July 1947 after an experimental period of ten months from September 1946. But not all the data are available from this time. For example, the major statistics such as unemployment rate and the number of employees for the whole population are available from 1953. The employment status by demographic group is available from 1967.

This is a sample survey, and field enumeration takes place every month for about 40 thousand households and their members who are selected to represent total population. The questions on the employment status are asked to the members 15 years and over (about 100 thousand persons in total) in those households.

The households are selected from the entire country by a stratified two stage sampling method using the Enumeration Districts of the Population Census as the first stage sampling units and dwelling units as the second stage sampling units. One fourth of the sampled EDs are replaced by other EDs every month.

The survey is conducted as of the last day each month, with one exception of December when the survey is conducted on 26th. The reference period to which questions on the employment status refer is one week ending on the last day of each month except December for which it is one week from 20th to 26th.

Within three days before the survey week, the enumerator visits all the households in the sample dwelling units and asks them to fill out the Labour Force Survey Questionnaires. Within three days after the close of the survey week, the enumerator visits the households again, and collects the questionnaires after checking the entries on the spot.

Report on the Special Survey of the Labour Force Survey

The purpose of this survey is to investigate the details on employment and unemployment status of the population and to obtain data needed for employment policy making, supplementing the monthly report. Therefore more detailed questions such as reasons for leaving the previous job and the duration of unemployment etc. are asked to the sampled persons.

The sample size and the survey method are the same with those of the monthly report. This survey is conducted once a year on February 28th. The respondents are asked to report on their employment status for the survey week (February 22 to 28).

The items investigated in the special report and not in the monthly report are as follows.

(1) For "employed persons"

Status in employment, form of employment, industry, occupation, number of persons engaged in enterprise, weekly hours of work in last week of Februrary, reason for short-time working, whether wishing to change the job, whether looking for a job, time of taking up a present job, method used to take up a present job, whether had a job previously.

(2) For "unemployed persons"

Method used to seek a job, duration of unemployment, time spent for seeking a job, kind of job desired, preference for employment as primary or secondary activity, reason for seeking a job, whether had a job previously.

(3) For "persons not in labor force"

Whether desire to work, reason for not seeking a job, whether

seeking a job, possibility of taking up a job, whether had a job previously.

(4) For "persons who had a job previously"

Time of leaving the previous job, status in employment, form of employment and industry in the previous job, reason for leaving the previous job.

(5) For "household"

Number of household members 15years old and over by sex, number of household members under 15 years old by age.

The questions used in this special report to breakdown the persons to various groups are as follows.

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Graph.3.1 Unemployment rates of 5 countries

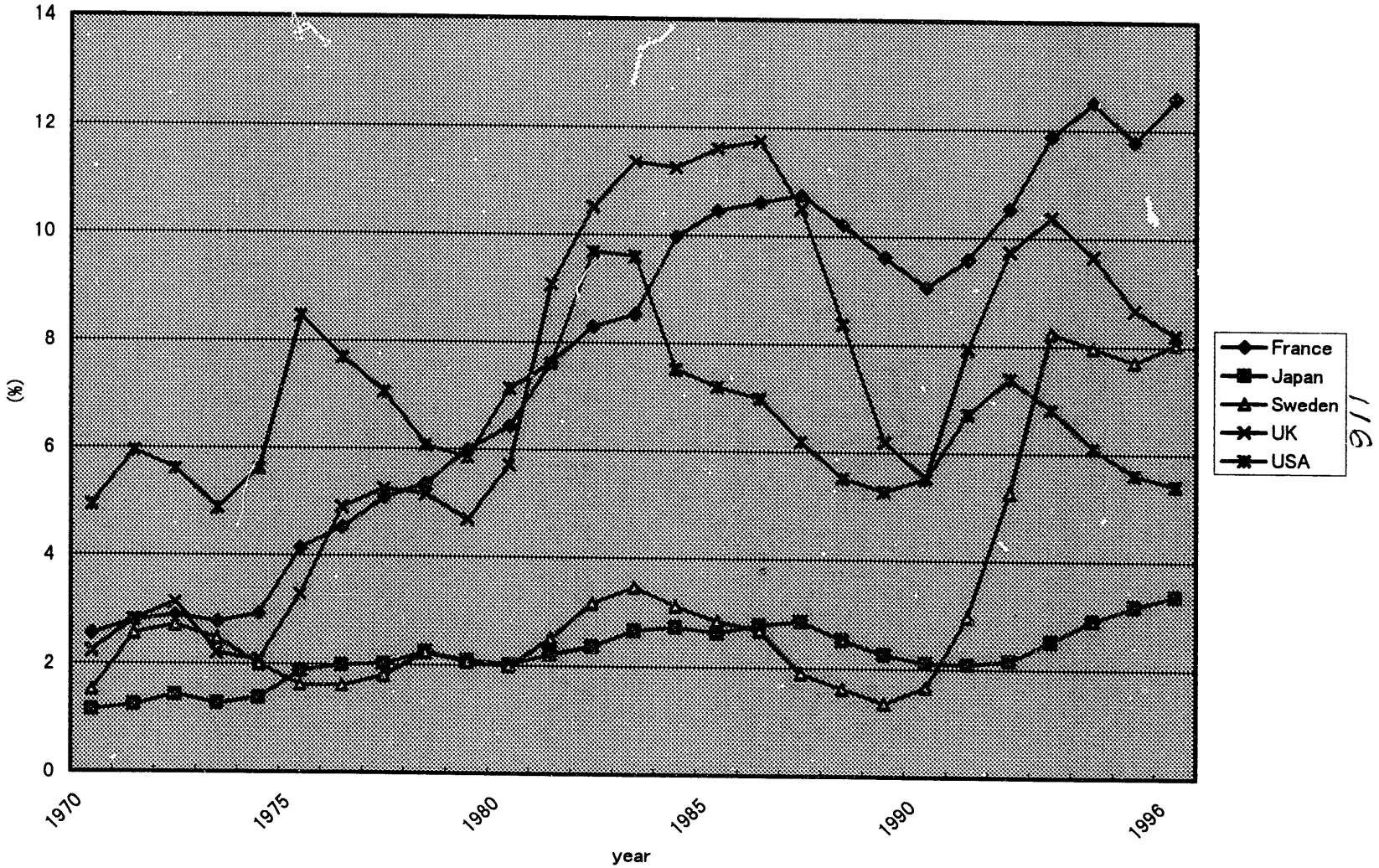

Table.3.1 Unemployment Rates of 13 OECD Countries

		average	standard deviation
Australia	1970-'90	5.78	2.40
	1970-'96	6.65	2.71
Austria	1970-'90	2.44	1.05
	1970-'94	2.65	1.08
Canada	1970-'90	8.01	1.89
	1970-'96	8.54	1.97
Finland	1970-'90	4.23	1.58
	1970-'96	6.66	5.15
France	1970-'90	6.69	3.03
	1970-'96	7.76	3.38
Japan	1970-'90	2.08	0.53
	1970-'96	2.22	0.58
Netherlands	1970-'90	6.86	3.62
	1970-'96	6.84	3.18
New Zealand	1970-'90	2.82	2.54
	1970-'96	4.07	3.37
Spain	1970-'90	11.47	7.35
	1970-'96	13.62	7.75
Sweden	1970-'90	2.23	0.60
	1970-'96	3.22	2.18
Swiss	1970-'90	0.44	0.32
	1970-'95	0.93	1.20
UK	1970-'90	6.55	3.50
	1970-'96	7.12	3.28
USA	1970-'90	6.68	1.40
	1970-'96	6.61	1.28

Source OECD Statistical Compendium 1995 (cd-rom)

Table.3.2 Responsiveness of unemployment rate and employment level to real GDP over the period 1970 to 1996

(1) regressing unemployment rate on log of real GDP, trend and a constant

(2) regressing the first difference of unemployment rate on the first difference of log of real GDP and a constant

(3) regressing log of employment level on log of real GDP, trend and a constant

(4) regressing the first difference of log of employment level on the first difference of log of real GDP and a constant

	(1)	(2)	(3)	(4)
Australia	−0.39	−0.19	0.62	0.19
	(−3.38)	(−1.63)	(2.78)	(0.97)
Austria	−0.08	−0.15	−0.43	0.36
	(−2.19)	(−1.22)	(−1.83)	(1.47)
Canada	−0.02	−0.30	0.56	0.65
	(−0.42)	(−4.62)	(8.26)	(5.42)
Finland	−0.53	−0.46	0.98	0.61
	(−12.76)	(−7.60)	(10.87)	(5.49)
France	−0.04	−0.22	0.25	0.36
	(−0.60)	(−3.50)	(2.84)	(4.04)
Japan	−0.04	−0.06	0.09	0.20
	(−1.79)	(−3.25)	(1.28)	(3.18)
Netherlands	−0.42	−0.36	0.17	−0.05
	(−2.32)	(−3.39)	(0.44)	(−0.17)
New Zealand	−0.23	−0.13	0.41	0.29
	(−3.76)	(−1.71)	(2.10)	(1.16)
Norway	−0.14	−0.19	0.96	0.66
	(−5.50)	(−3.50)	(11.32)	(3.45)
Spain	−0.54	−0.50	0.80	0.76
	(−5.11)	(−5.12)	(3.85)	(4.93)
Sweden	−0.57	−0.40	1.29	0.75
	(−10.04)	(−7.17)	(6.50)	(5.27)
Swiss	0.004	−0.002	0.03	−0.001
	(1.13)	(−0.87)	(1.90)	(−0.07)
UK	−0.48	−0.33	0.65	0.43
	(−4.06)	(−3.68)	(5.21)	(3.49)
USA	−0.45	−0.44	0.70	0.61
	(−5.22)	(−9.27)	(4.59)	(7.98)
Japan	−0.06	−0.07	0.19	0.29
	(−3.01)	(−4.13)	(3.02)	(4.99)

Source: OECD Statistical Compendium, 1995

Notes:

(1)Annual data are used over the period 1970 to 1996 for the most countries.

(2)t-values are in parentheses.

(3)The estimates in the bottom line are obtained using the BLS definition of employment and unemployment. More detailed explanation is in section 3.

Table.3.3 Responsiveness of unemployment rate and employment level to real GDP over the period 1970 to1990

(1) regressing unemployment rate on log of real GDP, trend and a constant
(2) regressing the first difference of unemployment rate on the first difference of log of real GDP and a constant
(3) regressing log of employment level on log of real GDP, trend and a constant
(4) regressing the first difference of log of employment level on the first difference of log of real GDP and a constant

	(1)	(2)	(3)	(4)
Australia	-0.35	-0.07	0.77	0.18
	(-2.46)	(-0.57)	(2.70)	(0.09)
Austria	-0.08	-0.12	-0.42	0.39
	(-2.16)	(-2.89)	(-2.12)	(1.53)
Canada	-0.11	-0.30	0.63	0.57
	(-1.10)	(-3.92)	(6.72)	(5.36)
Finland	-0.40	-0.27	0.13	0.24
	(-4.47)	(-4.01)	(1.01)	(1.68)
France	-0.20	-0.22	0.48	0.37
	(-2.42)	(-2.95)	(6.40)	(3.16)
Japan	-0.07	-0.05	0.15	0.19
	(-2.03)	(-2.02)	(1.32)	(2.29)
Netherlands	-0.28	-0.43	-0.13	-0.09
	(-1.87)	(-3.97)	(-0.34)	(-0.26)
New Zealand	-0.09	-0.02	0.31	0.20
	(-1.63)	(-0.31)	(1.21)	(0.64)
Norway	-0.14	-0.19	0.78	0.63
	(-4.02)	(-3.50)	(7.51)	(2.81)
Spain	-0.55	-0.46	0.83	0.73
	(-6.84)	(-4.68)	(4.68)	(4.37)
Sweden	-0.27	-0.20	0.12	0.28
	(-4.50)	(-3.37)	(0.81)	(2.15)
Swiss	-0.03	-0.02	0.75	0.55
	(-2.25)	(-1.57)	(10.93)	(7.65)
UK	-0.55	-0.27	0.72	0.38
	(-5.39)	(-2.46)	(5.81)	(2.50)
USA	-0.52	-0.45	0.52	0.58
	(-6.81)	(-8.65)	(4.55)	(7.08)
Japan	-0.14	-0.07	0.43	0.33
	(-4.32)	(-2.91)	(5.06)	(4.46)

Source: OECD Statistical Compendium, 1995

Notes:

(1)Annual data are used over the period 1970 to 1996 for the most countries.
(2)t-values are in parentheses.
(3)The estimates in the bottom line are obtained using the BLS definition of employment and unemployment. More detailed explanation is in section 3.

Table. 3.4 Number of discouraged workers in Japan (ten thousand)

	age	15-24	25-34	35-44	45-54	55-64	65-	total
Feb. 1991								
men	Unemployed	23	15	11	10	19	3	81
	Not in Labor Force	569	20	17	21	115	399	1141
	Desire to work	115	7	7	8	39	41	217
	Discouraged workers	17	2	0	1	16	19	55
	Ratio to unemployed							
	Desire to work	5	0.47	0.64	0.8	2.05	13.7	2.7
	Discouraged workers	0.74	0.13	0	0.1	0.84	6.33	0.68
	Ratio to population							
	Desire to work	0.12	0.01	0.01	0.01	0.05	0.07	0.04
	Discouraged workers	0.02	0.00	0.00	0.00	0.02	0.03	0.01
women	Unemployed	16	12	12	8	5	1	54
	Not in Labor Force	529	332	327	266	414	781	2649
	Desire to work	131	183	186	119	105	37	761
	Discouraged workers	25	48	81	54	42	13	263
	Ratio to unemployed							
	Desire to work	8.19	15.25	15.50	14.88	21.00	37.00	14.09
	Discouraged workers	1.56	4.00	6.75	6.75	8.40	13.00	4.87
	Ratio to population							
	Desire to work	0.14	0.23	0.19	0.14	0.14	0.04	0.15
	Discouraged workers	0.03	0.06	0.08	0.06	0.06	0.01	0.05
Feb. 1996								
men	Unemployed	31	29	16	16	34	7	133
	Not in Labor Force	497	24	18	28	122	505	1194
	Desire to work	107	9	6	10	36	45	213
	Discouraged workers	23	3	1	3	17	25	72
	Ratio to unemployed							
	Desire to work	3.45	0.31	0.38	0.63	1.06	6.43	1.60
	Discouraged workers	0.74	0.1	0.06	0.19	0.5	3.57	0.54
	Ratio to population							
	Desire to work	0.11	0.01	0.01	0.01	0.05	0.06	0.04
	Discouraged workers	0.02	0.00	0.00	0.00	0.02	0.03	0.01
women	Unemployed	28	25	14	14	10	1	92
	Not in Labor Force	488	325	295	314	437	952	2811
	Desire to work	128	174	166	129	96	35	728
	Discouraged workers	35	63	84	74	55	17	328
	Ratio to unemployed							
	Desire to work	4.57	6.96	11.86	9.21	9.60	35.00	7.91
	Discouraged workers	1.25	2.52	6.00	5.29	5.50	17.00	3.57
	Ratio to population							
	Desire to work	0.14	0.21	0.20	0.13	0.12	0.03	0.13
	Discouraged workers	0.04	0.07	0.10	0.08	0.07	0.02	0.06

Source: The Report on the Special Survey of the Labor Force Survey 1991 and 1996 (Management and Coordination Agency)

Table.3.5 regressing on unemployment rate of male aged 30 to 39 over the period 1967 to 1996

JAPAN		(1) employment / population	(2) LFPR	(3) employment / labor force
men	15–19	−15.48 (−2.84)*	−13.07 (−2.69)*	−2.42 (−7.20)*
	20–24	−6.17 (−5.69)*	−5.17 (−4.68)*	−1.00 (−7.35)*
	25–29	−1.05 (−6.63)*	−0.11 (−0.76)	−0.94 (−8.31)*
	30–34	−1.43 (−9.68)*	−0.37 (−2.60)*	−1.06 (−21.99)*
	35–39	−1.09 (−9.33)*	−0.13 (−1.17)	−0.96 (−19.54)*
	40–54	−1.34 (−10.50)*	−0.51 (−4.37)*	−0.82 (−13.93)*
	55–64	−3.75 (−7.38)*	−1.28 (−3.04)*	−2.47 (−14.71)*
	65–	−7.38 (−6.10)*	−6.55 (−5.46)*	−0.83 (−5.93)*
	total men	−1.49 (−5.63)*	−0.40 (−1.51)	−1.09 (−21.54)*
women	15–19	−15.22 (−5.82)*	−13.90 (−5.53)*	−1.32 (−3.79)*
	20–24	−1.79 (−2.81)*	−0.40 (−0.66)	−1.39 (−9.27)*
	25–29	−3.01 (−4.29)*	−1.67 (−2.51)*	−1.34 (−9.48)*
	30–34	−0.49 (−0.63)	0.66 (0.85)	−1.15 (−8.48)*
	35–39	−0.96 (−1.23)	−0.14 (−0.18)	−0.82 (−7.40)*
	40–54	−2.66 (−5.42)*	−1.93 (−3.95)*	−0.73 (−11.24)*
	55–64	−4.34 (−5.97)*	−3.49 (−4.85)*	−0.84 (−9.73)*
	65–	−6.25 (−5.20)*	−5.85 (−4.84)*	−0.40 (−2.64)*
	total women	−2.91 (−6.15)*	−1.98 (−4.28)*	−0.93 (−15.6)*
	total population	−2.04 (−7.78)*	−1.01 (−4.11)*	−1.02 (−21.79)*

Source: Monthly Report on the Labour Force Survey (Management and coordination Agency)

Notes (1) t−values are in parenthese.
(2) Seasonal dummies are used to exclude the seasonal effect from the estimates.

Table3.6 regressing on unemployment rate of male aged 30 to 39 over the period 1967 to 1990

	JAPAN	(1) employment / population	(2) LFPR	(3) employment / labor force
men	15–19	−12.93 (−3.91)*	−10.99 (−3.46)*	−1.94 (−5.01)*
	20–24	−5.46 (−4.69)*	−4.58 (−4.05)*	−0.88 (−6.11)*
	25–29	−0.83 (−3.98)*	0.04 (0.24)	−0.87 (−8.07)*
	30–34	−1.20 (−8.71)*	−0.15 (−1.17)	−1.05 (−18.44)*
	35–39	−0.99 (−7.53)*	−0.01 (−0.11)	−0.98 (−16.64)*
	40–54	−1.17 (−8.11)*	−0.36 (−3.14)*	−0.81 (−11.29)*
	55–64	−2.78 (−6.84)*	−0.49 (−1.61)	−2.28 (−10.26)*
	65–	−5.08 (−6.49)*	−4.16 (−5.46)*	−0.92 (−4.77)*
	total men	−0.92 (−4.80)*	0.10 (0.61)	−1.03 (−17.41)*
women	15–19	−13.93 (−4.32)*	−12.83 (−4.10)*	−1.10 (−2.69)*
	20–24	−1.31 (−2.20)*	−0.09 (−0.15)	−1.21 (−6.99)*
	25–29	−2.16 (−2.44)*	−1.09 (−1.29)	−1.07 (−6.41)*
	30–34	0.06 (0.06)	1.10 (1.11)	−1.04 (−6.65)*
	35–39	−0.88 (−1.20)	−0.20 (−0.28)	−0.68 (−4.77)*
	40–54	−2.15 (−3.81)*	−1.45 (−2.63)*	−0.70 (−8.30)*
	55–64	−2.69 (−3.34)*	−2.00 (−2.47)*	−0.69 (−6.20)*
	65–	−4.59 (−2.88)*	−4.19 (−2.62)*	−0.40 (−1.98)
	total women	−2.19 (−3.61)*	−1.37 (−2.30)*	−0.82 (−10.76)*
	total population	−1.40 (−4.47)*	−0.45 (−1.54)	−0.95 (−16.59)*

Source: Monthly Report on the Labour Force Survey (Management and coordination Agency)

Notes (1) t-values are in parenthese.
(2) Seasonal dummies are used to exclude the seasonal effect from the estimates.

Table.3.7 regressing the first difference of log of (1),(2) and (3) on the first difference of unemployment rate of men aged 30 to 3 , and a constant over the period 1967 to 1996
seasonal dummies are added in the RHS.

JAPAN		(1) employment / population	(2) LFPR	(3) employment / labor force
men	15–19	0.07 (0.03)	0.46 (0.21)	−0.38 (−0.73)
	20–24	0.31 (0.48)	0.4 (0.66)	−0.08 (−0.51)
	25–29	0.08 (0.41)	0.3 (1.51)	−0.22 (−1.69)
	30–34	−0.90 (−4.70)*	0.21 (1.22)	−1.11 (−12.68)*
	35–39	−0.68 (−4.15)*	0.23 (1.50)	−0.91 (−10.44)*
	40–54	−3.00 (−1.90)	−0.03 (−0.22)	−0.27 (−3.59)*
	55–64	−0.76 (−1.81)	−0.30 (−0.93)	−0.46 (−2.13)*
	65–	−1.18 (−1.42)	−1.30 (−1.64)	0.12 (0.60)
	total men	−0.39 (−2.28)*	0.07 (0.44)	−0.46 (−8.82)*
women	15–19	0.79 (0.30)	0.09 (0.04)	0.70 (1.24)
	20–24	−0.34 (−0.52)	−0.55 (−0.88)	0.21 (1.05)
	25–29	−0.63 (−0.61)	−0.39 (−0.41)	−0.24 (−1.11)
	30–34	−1.96 (−1.99)*	−1.52 (−1.57)	−0.44 (−2.15)*
	35–39	−0.46 (−0.57)	−0.31 (−0.40)	−0.14 (−0.84)
	40–54	−2.12 (−2.89)*	−1.97 (−2.71)*	−0.15 (−2.15)*
	55–64	−4.27 (−4.06)*	−3.94 (−3.68)*	−0.33 (−2.34)*
	65–	−6.82 (−3.57)*	−6.80 (−3.59)*	−0.01 (−0.05)
	total women	−1.66 (−2.81)*	−1.49 (−2.59)*	−0.17 (−2.84)*
	total population	−0.84 (−2.84)*	−0.49 (−1.75)	−0.35 (−7.68)*

Source: Monthly Report on the Labour Force Survey
(Management and coordination Agency)

Notes (1) t-values are in parentheses.
(2) Seasonal dummies are used to exclude the seasonal effect from the estimates.

Table.3.8 regressing on unemplument rate of male aged 35 to 44

	USA	(1) employment population	(2) LFPR	(3) employment labor force
men	16-19	-3.12 (-11.78)*	-0.64 (-2.49)*	-2.48 (-20.10)*
	20-24	-1.83 (-13.34)*	0.22 (1.99)*	-2.05 (-11.07)*
	25-34	-1.56 (-39.38)*	-0.07 (-2.68)*	-1.49 (-45.63)*
	35-44	-0.95 (-30.31)*	0.09 (2.78)*	-1.04 (-284.72)*
	45-54	-0.78 (-9.49)*	-0.006 (-0.14)	-0.77 (-10.30*
	55-64	-1.87 (-10.84)*	-1.08 (-6.31)*	-0.79 (-27.87)*
	65-	-3.82 (-8.68)*	-3.60 (-7.99)*	-0.21 (-3.29)*
	total men	-1.51 (-30.52)*	-0.19 (-4.71)*	-1.32 (-49.53)*
women	16-19	-2.03 (-5.59)*	-0.20 (-0.60)	-0.18 (-17.24)*
	20-24	-0.35 (-1.45)	0.81 (3.41)*	-1.15 (-18.54)*
	25-34	1.24 (3.24)*	2.16 (5.62)*	-0.92 (-22.81)*
	35-44	0.79 (2.81)*	1.50 (5.57)*	-0.71 (-20.62)*
	45-54	-0.82 (-5.39)*	-0.13 (-0.96)	-0.80 (-7.24)*
	55-64	-2.18 (-9.60)*	-1.63 (-7.13)*	-0.55 (-14.47)*
	65-	-2.75 (-6.30)*	-2.65 (-5.96)*	-0.11 (-1.95)
	total women	-0.33 (-2.06)*	0.59 (3.79)*	-0.92 (-18.30)*
	total population	-1.05 (-14.91)*	0.11 (1.70)	-1.15 (-35.98)*

Source: Current Population Survey

Notes (1) Quarterly Data are used over the period 1965 to 1997.

(2) t-values are in parentheses.

(3) Seasonal dummies are used to exclude the seasonal effect from the estimates.

Table.3.9 regressing the first difference of log of (1),(2) and (3) on the first difference of unemployment rate of men aged 35 to 44
Seasonal dummies are added in the RHS.

	USA	(1) employment population	(2) LFPR	(3) employment labor force
men	16-19	-2.33 (-3.38)*	-0.45 (-0.68)	-1.88 (-4.82)*
	20-24	-1.79 (-7.10)*	-0.08 (-0.37)	-1.72 (-10.77)*
	25-34	-1.02 (-9.86)*	-0.05 (-0.93)	-0.96 (-11.39)*
	35-44	-1.09 (-20.79)*	-0.07 (-1.21)	-1.03 (-69.66)*
	45-54	0.13 (0.45)	0.05 (0.61)	0.08 (0.28)
	55-64	-0.51 (-1.49)	-0.04 (-0.12)	-0.47 (-6.53)*
	65-	-0.31 (-0.54)	0.20 (0.38)	-0.51 (-3.74)*
	total men	-0.92 (-7.56)*	0.11 (0.91)	-1.02 (-13.64)*
women	16-19	-2.20 (-3.02)*	-0.77 (-1.19)	-1.43 (-4.26)*
	20-24	-1.17 (-3.85)*	-0.65 (-2.41)*	-0.52 (-3.19)*
	25-34	-0.67 (-2.08)*	-0.10 (-0.32)	-0.57 (-6.01)*
	35-44	-0.52 (-2.17)*	-0.01 (-0.05)	-0.51 (-6.72)*
	45-54	-0.30 (-1.25)	0.17 (0.78)	-0.74 (-1.72)
	55-64	-0.18 (-0.63)	0.05 (0.17)	-0.23 (-2.67)*
	65-	-0.47 (-0.72)	-0.36 (-0.52)	-0.23 (-1.56)
	total women	-0.60 (-3.88)*	0.03 (0.17)	-0.63 (-5.00)*
	total population	-0.77 (-7.89)*	0.07 (0.70)	-0.84 (-12.29)*

Source: Current Population Survey
Notes (1) Quarterly Data are used over the period 1965 to 1997.
(2) t-values are in parentheses.
(3) Seasonal dummies are used to exclude the seasonal effect from the estimates.

Table.3.10 regressing on log(real GDP) over the period 1967 to 1996

	JAPAN	(1) employment / population	(2) LFPR	(3) employment / labor force
men	15-19	0.939 (4.00)*	0.833 (3.82)*	0.105 (3.50)*
	20-24	0.258 (2.77)*	0.189 (2.03)*	0.069 (6.27)*
	25-29	0.090 (7.50)*	0.022 (2.00)*	0.069 (7.67)*
	30-34	0.071 (5.07)*	0.018 (1.64)*	0.053 (7.57)*
	35-39	0.055 (5.00)*	0.007 (0.78)*	0.048 (6.86)*
	40-54	0.086 (7.82)*	0.034 (3.78)*	0.051 (8.50)*
	55-64	0.156 (3.39)*	0.023 (0.68)	0.133 (7.00)*
	65-	0.227 (2.12)*	0.148 (1.41)	0.079 (7.90)*
	total men	0.051 (2.22)*	-0.014 (-0.67)	0.064 (9.14)*
women	15-19	1.113 (5.33)*	1.066 (5.38)*	0.047 (1.68)
	20-24	0.296 (6.73)*	0.207 (4.70)*	0.089 (6.85)*
	25-29	0.301 (5.79)*	0.209 (4.18)*	0.092 (7.67)*
	30-34	0.143 (2.42)*	0.053 (0.88)	0.090 (8.18)*
	35-39	0.245 (4.30)*	0.186 (3.21)*	0.059 (6.56)*
	40-54	0.260 (7.22)*	0.206 (5.72)*	0.054 (10.8)*
	55-64	0.161 (2.56)*	0.116 (1.90)	0.04 (5.00)*
	65-	0.282 (2.79)*	0.255 (2.52)*	0.027 (2.25)*
	total women	0.280 (8.24)*	0.219 (6.64)*	0.062 (10.33)*
	total population	0.141 (6.41)*	0.078 (4.11)*	0.063 (10.50)*

Source: Monthly Report on the Labour Force Survey

Notes (1) t-values are in parentheses.
(2) Seasonal dummies are used to exclude the seasonal effect from the estimates.
(3) Quarterly data are used over the period 1967 to 1996.

Table.3.11 regressing on log(real GDP) over the period 1967 to 1990

JAPAN		(1) employment / population	(2) LFPR	(3) employment / labor force
men	15-19	1.118 (4.80)*	1.012 (4.73)*	0.107 (3.69)*
	20-24	0.356 (4.24)*	0.305 (3.77)*	0.051 (4.64)*
	25-29	0.083 (6.38)*	0.033 (3.00)*	0.051 (6.38)*
	30-34	0.079 (7.90)*	0.032 (3.56)*	0.047 (6.71)*
	35-39	0.059 (5.90)*	0.015 (2.00)*	0.043 (6.14)*
	40-54	0.088 (8.80)*	0.046 (6.57)*	0.042 (6.00)*
	55-64	0.175 (5.83)*	0.054 (2.57)*	0.121 (6.37)*
	65-	0.312 (5.38)*	0.222 (3.83)*	0.090 (7.50)*
	total men	0.066 (4.71)*	0.012 (1.00)	0.054 (7.71)*
women	15-19	1.335 (6.48)*	1.280 (6.43)*	0.055 (1.83)
	20-24	0.214 (5.78)*	0.145 (3.54)*	0.068 (5.23)*
	25-29	0.230 (3.83)*	0.153 (2.64)*	0.077 (6.42)*
	30-34	0.079 (1.14)	-0.003 (-0.04)	0.082 (8.20)*
	35-39	0.158 (3.22)*	0.100 (2.00)*	0.058 (6.44)*
	40-54	0.202 (5.46)*	0.146 (3.95)*	0.055 (11.00)*
	55-64	0.097 (1.64)	0.057 (0.97)	0.040 (5.00)*
	65-	0.115 (0.98)	0.086 (0.74)	0.028 (2.00)*
	total women	0.239 (6.29)*	0.184 (4.72)*	0.056 (9.33)*
	total population	0.133 (6.65)*	0.078 (4.11)*	0.054 (9.00)*

Source: Monthly Report on the Labour Force Survey

Notes (1) t-values are in parentheses.
(2) Seasonal dummies are used to exclude the seasonal effect from the estimates.
(3) Quarterly data are used over the period 1967 to 1990.

Table.3.12 regressing the first difference of log of (1), (2) and (3) on the first difference of log of real GDP over the period 1967(1) to 1996
seasonal dummies are added in the RHS.

JAPAN		(1) employment / population	(2) LFPR	(3) employment / labor force
men	15-19	-0.212 (-0.767)	-0.254 (-0.992)	0.042 (0.685)
	20-24	-0.079 (-1.046)	-0.098 (-1.383)	0.018 (0.943)
	25-29	0.018 (0.739)	0.004 (0.162)	0.014 (0.932)
	30-34	0.069 (2.919)*	0.030 (1.513)	0.039 (2.505)*
	35-39	0.025 (1.242)	-0.011 (-0.624)	0.037 (2.649)*
	40-54	0.068 (3.864)*	0.042 (2.895)*	0.026 (2.849)*
	55-64	0.155 (3.270)*	0.132 (3.682)*	0.023 (0.911)
	65-	0.268 (2.845)*	0.216 (2.372)*	0.052 (2.267)*
	total men	0.062 (3.127)*	0.028 (1.518)	0.033 (4.574)*
women	15-19	-0.003 (-0.011)	0.142 (0.495)	-0.146 (-2.253)*
	20-24	-0.057 (-0.758)	-0.001 (-0.017)	-0.056 (-2.477)*
	25-29	0.287 (2.450)*	0.246 (2.240)*	0.041 (1.647)
	30-34	0.258 (2.262)*	0.218 (1.939)	0.041 (1.721)
	35-39	0.135 (1.441)	0.099 (1.081)	0.036 (1.824)
	40-54	0.345 (4.182)*	0.330 (4.040)*	0.015 (1.771)
	55-64	0.359 (2.825)*	0.379 (2.968)*	-0.020 (-1.199)
	65-	1.166 (5.598)*	1.166 (5.644)*	0.00 (0.001)
	total women	0.261 (3.889)*	0.252 (3.870)*	0.009 (1.261)
	total population	0.135 (4.007)*	0.111 (3.506)*	0.024 (3.874)*

Source: Monthly Report on the Labour Force Survey

Notes (1) t-values are in parentheses.
(2) Seasonal dummies are used to exclude the seasonal effect from the estimates.
(3) Quarterly data are used over the period 1967 to 1996.

Table.3.13 regressing on log(real GDP) over the period 1965 to 1997
USA

		employment / population	LFPR	employment / labor force
men	16-19	1.593 (12.25)*	0.620 (5.12)*	0.973 (10.46)*
	20-24	1.00 (16.95)*	0.199 (3.75)*	0.802 (11.79)*
	25-34	0.532 (9.67)*	0.070 (6.36)*	0.462 (8.40)*
	35-44	0.389 (13.41)*	0.061 (3.81)*	0.327 (9.08)*
	45-54	0.219 (4.38)*	0.027 (1.29)	0.192 (4.00)*
	55-64	0.066 (0.55)	-0.159 (-1.69)	0.224 (4.77)*
	65-	-0.224 (-0.81)	-0.404 (-1.47)	0.180 (6.00)*
	total men	0.491 (8.61)*	0.053 (2.52)*	0.438 (9.52)*
women	16-19	1.630 (11.48)*	0.910 (6.11)*	0.720 (9.86)*
	20-24	0.891 (9.90)*	0.459 (3.92)*	0.432 (9.60)*
	25-34	0.886 (4.82)*	0.553 (2.63)*	0.333 (9.51)*
	35-44	0.748 (5.80)*	0.466 (3.24)*	0.280 (10.77)*
	45-54	0.341 (4.32)*	0.107 (1.62)	0.280 (4.59)*
	55-64	-0.008 (-0.05)	-0.222 (-1.66)	0.214 (8.92)*
	65-	-0.202 (-0.81)	-0.294 (-1.17)	0.122 (4.36)*
	total women	0.650 (11.21)*	0.317 (4.12)*	0.332 (8.74)*
	total population	0.550 (17.19)*	0.160 (5.52)*	0.391 (9.54)*

Source: Current Population Survey
Notes (1) Quarterly Data are used over the period 1965 to 1997.
(2) t-values are in parentheses.
(3) Seasonal dummies are used to exclude the seasonal effect from the estimates.

Table.3.14 regressing the first difference of log of (1),(2) and (3) on the first difference of log of real GDP over the period 1965 to 1997 seasonal dummies are added in the RHS.

USA

		(1) employment population	(2) LFPR	(3) employment labor force
men	16-19	1.116 (3.581)*	0.322 (1.076)	0.793 (4.426)*
	20-24	0.763 (6.485)*	0.079 (0.837)	0.684 (8.574)*
	25-34	0.379 (7.222)*	0.011 (0.423)	0.368 (8.378)*
	35-44	0.22 (4.772)*	-0.02 (-0.807)	0.24 (6.646)*
	45-54	-0.037 (-0.285)	-0.007 (-0.195)	-0.030 (-0.236)
	55-64	0.047 (0.303)	-0.124 (-0.798)	0.171 (4.986)*
	65-	0.190 (0.730)	0.040 (0.165)	0.15 (2.334)*
	total men	0.327 (5.459)*	-0.035 (-0.668)	0.362 (8.441)*
women	16-19	0.981 (2.956)*	0.410 (1.388)	0.571 (3.692)*
	20-24	0.367 (2.566)*	0.029 (0.229)	0.338 (4.757)*
	25-34	0.262 (1.768)	0.045 (0.314)	0.217 (4.799)*
	35-44	0.146 (1.336)	-0.062 (-0.618)	0.208 (5.902)*
	45-54	0.022 (0.204)	-0.128 (-1.273)	0.259 (1.320)
	55-64	-0.037 (-0.277)	-0.090 (-0.686)	0.054 (1.332)
	65-	-0.049 (-0.162)	0.021 (0.066)	0.071 (1.047)
	total women	0.223 (3.120)*	-0.026 (-0.295)	0.249 (4.235)*
	total population	0.287 (5.994)*	-0.025 (-0.552)	0.311 (8.491)*

Source: Current Population Survey

Notes (1) Quarterly Data are used over the period 1965 to 1997.
(2) t-values are in parentheses.
(3) Seasonal dummies are used to exclude the seasonal effect from the estimates.

Table. 3. 15 Population shares and the shares of employment fluctuation

	Demographic group		Population share (1)	Employment ratio share (2)	Employment ratio share (3)
Japan	Men	total	0.486	0.326	0.146
		15-19	0.040	0.098	0.056
		20-24	0.048	0.047	0.018
		25-29	0.044	0.007	0.006
		30-34	0.038	0.009	0.004
		35-39	0.037	0.006	0.003
		40-54	0.133	0.028	0.017
		55-64	0.072	0.043	0.017
		65-	0.074	0.087	0.025
	Women	total	0.514	0.674	0.854
		15-19	0.038	0.179	0.227
		20-24	0.046	0.025	0.073
		25-29	0.043	0.040	0.069
		30-34	0.037	0.006	0.028
		35-39	0.036	0.011	0.047
		40-54	0.133	0.109	0.185
		55-64	0.076	0.102	0.066
		65-	0.105	0.203	0.159
USA	Men	total	0.481	0.809	0.454
		16-19	0.039	0.154	0.138
		20-24	0.043	0.100	0.096
		25-34	0.096	0.192	0.114
		35-44	0.107	0.129	0.093
		45-54	0.080	0.081	0.039
		55-64	0.051	0.122	0.007
		65-	0.066	0.032	-0.033
	Women	total	0.519	0.191	0.546
		16-19	0.037	0.045	0.119
		20-24	0.043	0.009	0.075
		25-34	0.099	-0.073	0.173
		35-44	0.109	-0.051	0.160
		45-54	0.084	0.041	0.056
		55-64	0.055	0.071	-0.001
		65-	0.091	0.149	-0.036

Notes

1. Quarterly data are used ; for Japan over the period 1967-1996.
   ; for US over the period 1965-1997.
2. Population ratio of Japan is annual average of 1996, and that of the US is annual average of 1997.
3. Column(2) is calculated using the estimates presented in table. 5 for Japan and the estimates presented in table. 8 for the US. These estimates are obtained from the regression running on the unemployment rate of prime-age male.
4. Column(3) is calculated using the estimates presented in table. 10 for Japan and the estimates presented in table. 13 for the US. These estimates are obtained from the regression running on the log of real GDP.

Table.3.16 Official unemployment rate and estimated unemployment rates

1996		official unemployment rate	estimated unemployment rates (1)	(2)	(3)
Men	15-19	10.3	17.9	45.8	65.6
	20-24	6.1	10.6	27.1	11.3
	25-29	4.0	4.4	5.2	4.4
	30-34	2.5	2.8	3.3	2.8
	35-39	2.1	2.2	2.9	1.9
	40-54	2.0	2.4	3.3	2.2
	55-64	5.1	7.7	10.5	6.4
	65-	2.1	9.6	15.5	15.4
	total men	3.4	5.2	8.8	
Women	15-19	9.1	20.5	50.7	75.2
	20-24	6.2	14.0	34.5	6.8
	25-29	5.5	19.4	43.8	6.3
	30-34	4.6	16.2	36.6	3.9
	35-39	3.0	21.0	38.6	3.2
	40-54	2.0	12.6	20.4	4.1
	55-64	2.6	16.9	27.6	7.7
	65-	0.6	2.7	21.6	30.9
	total women	3.3	15.1	29.4	
	total population	3.4			4.2

Notes 1 Discouraged workers (as shown in table 5) are counted as unemployed.
2 Those who are out of the labor force and desire to work are counted as unemployed.
3 The elasticities of participation rate presented in table.5 are used to estimate the number of those who move between employed and out of the labor force. And they are counted as unemployed.