ED 271 388   SO 017 444

AUTHOR   Yano, Masakazu
TITLE   Personal Income Distribution and Its Influence on
                Education in Japan.
SPONS AGENCY   Office of Educational Research and Improvement (ED),
                Washington, DC.
PUB DATE   85
NOTE   71p.; For other studies in this series on education
                in Japan, see SO 017 338 and SO 017 443-460.
PUB TYPE   Reports · Descriptive (141)

EDRS PRICE   MF01/PC03 Plus Postage.
DESCRIPTORS   Economic Factors; *Educational Mobility; *Educational
                Opportunities; *Educational Status Comparison;
                *Family Financial Resources; Foreign Countries;
                Housing; *Income; Social Indicators; *Socioeconomic
                Influences; Socioeconomic Status; Tuition
IDENTIFIERS   *Japan; United States Study of Education in Japan

ABSTRACT
        The purpose of this paper is to clarify the
characteristics and current issues of the Japanese educational system
by examining the relationship between income distribution and
education. This relationship is not simply a one-way effect of
education on income distribution, but an interaction between the two.
Thus, we must consider the reverse effect of income level and
equality on educational demand. This paper examines survey data from
studies on education's effect on income distribution. The major focus
is placed on an economic analysis of educational systems in Japan
rather than an analysis of factors determining income distribution.
The structure is as follows: the first section gives a brief
description of recent trends in the distribution of income by time
series data. The second section discusses possible factors
determining these trends and points out the characteristics of income
distribution within the framework of human capital theory. The third
section is a discussion of measuring the internal rate of return to
education and an economic analysis of educational demand. An attempt
was made to clarify the economic structure underlying Japan's high
level of education. These results were used to point out the need for
a more serious consideration of the influence of the income factor on
the educational system in addition to examining education's effect on
income. The fourth section considers the income redistribution
effects of educational finance systems and proposes criteria for
sharing the cost of education and the subsidizing of private
universities. The final section consists of a summary and
conclusions. The role of educational planning in addressing the
current debate on educational reform in Japan is discussed. Numerous
tables are provided. (BZ)

Personal Income Distribution and Its Influence on Education in Japan

Masakazu Yano*

* Associate Professor-Research Institute for Higher Education at Hiroshima
Universoty-Hiroshima, Japan.

2

Personal Income Distribution and Its Influence on Education in Japan

Masakazu Yano*

Contents

1. Introduction

2. Income Inequality in Japan

3. The Impact of Education on the
Distribution of Individual Wages

4. Economic Structure of Education
in Japan

5. The Income Redistribution
Effects of Educational Finance
Systems

6. Summary and Conclusions

* Associate Professor-Research Institute for Higher Education at
Hiroshima University-Hiroshima, Japan

Personal Income Distribution and Its Influence on Education in Japan

Masakazu YANO

1. Introduction

In comparison with most countries, Japan is considered to have both a relatively equal income distribution and a high level of education. In examining the connection between these two conditions, there is a otion that education in Japan contributes to the equalization of income. Such a relationship, however, is too simple and should be examined more carefully for the following two reasons: 1) Even though there is a high level of educational attainment in Japan, there is not enough clear evidence that Japan is a country which can absolutely claim to have equalized income. 2) Even if income were equalized this cannot be explained only in terms of education.

Education, is of course, one factor used to explain income distribution but complications arise due to the presence of a num er of other explanatory factors.

The purpose of this paper is to clarify the characteristics and current issues of the Japanese educational system by examining the

relationship between income distribution and education. This relationship is not simply a one-way effect of education on income distribution, but an interaction between the two. Thus we must consider the reverse effect of income level and equality on educational demand. In this paper we examine survey data from studies on the effect of education on income distribution. The major focus is placed on an economic analysis of educational systems in Japan rather than an analysis of factors determining income distribution. The structure is as follows:

The first section gives a brief description of recent trends in the distribution of income by time series data. The second section discusses possible factors determining these trends and points out the characteristics of income distribution within the framework of human capital theory. The third section is a discussion of measuring the internal rate of return to education and an economic analysis of educational demand. An attempt was made to clarify the economic structure underlying Japan's high level of education. These results were used to point out the need for a more serious consideration of examining the influence of the income factor on the educational system in addition to examining the effect of education on income. The fourth section considers the income redistribution effects of educational finance systems and proposes a criteria for sharing the

cost of education and subsidizing of private universities. The final section consists of a summary and conclusions. In particular the role of educational planning in addressing the current debate on educational reform in Japan was discussed.

2. Income Inequality in Japan

A Reverse Trend Towards Inequality?

The following trends appear when we summarize previous empirical studies on changes in income distribution for the post-WW II era in Japan.

1) The 50's was a time of inequality

2) The 60' was a time of rapid economic growth and equalization

3) Equalization ended early in the 70's with a levelling off or slight reversal.

However, we must use caution in observing trends in income distribution since much data is rendered unclear due to problems in defining 'income', coverage and accuracy of surveys, the measure or standard of inequality. The major available surveys on income distribution at the household level are:

1) The Annual Report on the Family Income and Expenditure Survey, (Bureau of Statistics)

2) Employment Status Survey (Bureau of Statistics)

3)National Survey of Family Income and Expenditure (Bureau of Statistics)

4)Family Savings Survey (Bureau of Statistics)

5)Farm Household Economy Survey (Ministry of Agriculture, Forestry and Fisheries)

6)Basic Survey for Health and Welfare Administration (Ministry of Welfare)

7)The Survey on the Living Conditions of the People (Ministry of Welfare)

Coverage, size, duration and accuracy differs among these surveys making comparisons rather difficult. Generally speaking, the Annual Report (1) is the most popular and is useful in following up longitudinal changes in income distribution. This particular report has the merits of being a continuous time series study and includes detailed income sources and expenditure items, but when it is used in measuring inequality of income some problems arise from missing data. Households engaged in agriculture, and one-person households are not included and there is also an underrepresentation of lower-income households. Moreover, detailed income sources are listed for the category of 'workers' but not for so called 'others' which include such important occupations as individual proprietors and professionals, entrepreneurs etc. Consequently, the Annual Report is a typical such study limited to describing the income

distribution of workers at the multi-person household level.

There are two important studies, Mizoguchi et.al. (1978) and
Kaizuka et.al. (1979) which compare income inequality using
available data. Mizoguchi's main results are as follows:
(1) The Gini coefficient based on the Employment Status Survey and
the Survey on the Living Conditions of the People was found to be
larger than the one based on the Annual Report.
(2) But longitudinal trends in the two surveys were found to be
similar.

The same results were confirmed by Kaizuka's study as well. In
considering these studies, the Annual Report may not be appropriate
in measuring the absolute level of income inequality, however, it is
the best report available for following up longitudinal trends and
for analyzing factors determining inequality.

Figure 1 shows Mizoguchi's analysis of time trends for the Gini
coefficient based on data from the Annual Report and the Survey on
the Living Conditions of the People. A comparative Gini coefficient
done by Kaizuka can be seen in figure 2. Comparing the two figures
three common characteristics of the trends mentioned at the
beginning of this section appear.

| Fig. 1 | | Fig. 2 |

In order to show related recent trends, the Gini coefficient
based on the Yearly Income Quintile Group from the Annual Report is
presented in table 1. Although the coefficient is smaller than in

| Table 1 |

figures 1 and 2, it could be said that this table well reflects recent trends considering the previous studies. The distribution of income equalized in the 60's but moved slightly tc d inequality in the middle of the 70's and has not changed appreciably since then.

Can Japan Claim Equal Income Distribution?

Since in previous studies, coverage of the lower and higher income classes was incomplete and since the degree of coverage differs according to survey, significant (2x) differences for the Gini coefficients occur even among Japanese studies; it goes without saying that inter-country comparisons of income inequality would be considerably more difficult.

OECD (1976) made some attempts at improving inter-country comparability and presented the first evaluation of the degree of inequality among 10 countries. Table 2 is one of the results from this study. As can be seen in the table, the share of the first decile is 2.9% for Japan which is the largest share among the 10 countries. The share of the tenth decile is 28.6% which is fifth on the list. The Gini coefficient is 0.335, representing the second most equal country next to Australia.

In addition to the pre-tax income, the OECD study includes a distribution of post-tax income and of post-tax income based on "standardized" household size. Table 3 shows the results of this

| Table 2 | Table 3 |

"standardization". The share of the first decile is 2.7% which is somewhat less than in table 2 and in third place below the Netherlands and Germany. Japan's Gini coefficient is 0.335 and its rank of equalization is reduced after standardization. Although smaller than the United States, (0.369) it is number 5 in terms of equality next to the Netherlands, Sweden . Norway and Spain.

Examining table 3 we see a more appropriate picture of inequality than is represented in table 2. Table 3 shows Japan as a country with a normal level of equality in comparison with the other 9 countries represented. The OECD study selected 10 countries which could be reasonably compared after consideration of the availablilty and comparability of data. The extent of reasonable comparability, however, is not so clear. Ishizaki criticized that Japanese data is not appropriate for such a comparison since it is based on the National Survey of Family Income and Expenditures which excludes agricultural households and has a very low ratio of one-person households. In addition to these faults , he pointed out that transfer and the rate of reporting property income were very understated (Ishizaki,1983).

Ishizaki provides new measures for Japanese income distribution by using revised transfers and property income based on the Employment Status Survey in order to rectify the shortcomings of the National Survey.

Table 4

These revised measures are shown in Table 4. In the distribution of pre-tax income (corresponding with Table 2) the share of the first decile decreases to only 1.2% which is at the bottom along with Canada and the United States. The share of the second decile is about average for the 10 countries. The Gini coefficient is 0.408 making Japan the most inequal country next to France.

Ishizaki originally estimated the distribution of post-income based on "standardized" household size corresponding with Table 3 and points out that there is less of a degree of equality in Japan than the average out of the 10 countries. In considering these results he arrived at the conclusion that Japan belonged to the inequal countries rather than to the equal countries where it has previously been classified.

Full comparability has not and probably cannot be achieved for numerous statistical, economic and social reasons as mentioned in the OECD report. The estimates by Ishizaki are not strictly comparable either, although they may be appropriate for measuring inequality in Japan. This revision, however, is not necessarily coincident with other countries data. Judging from the OECD and Ishizaki studies, it is not conclusive that there was a greater degree of equality in income distribution in Japan than in the advanced Western nations. As was shown in the previous section, it is difficult to measure the absolute level of inequality for only

one country due to great variance among surveys, so it is all the
more risky to make specific conclusions about international
comparisons.

3. The Impact of Education on the Distribution of Individual Wages

Factors determining the distribution of income

Mizoguchi relied on the Annual Report for data because it
provided rich information for analyzing the factors determining the
change of income distribution. His analysis focuses on three
points. 1) the changes of income resources classified by regular
wages of household heads, temporary wages of household heads(
including bonuses), wages of other household members and others 2)
the effect of social mobility on income destribution 3) the
decomposition of inequality measures by socio-economic background of
households classified by age, size of city, number of household
members, occupation, industry and size of enterprize.
The main results are as follows:
1) The principle factor determining the inequality of the 50's is
the inequality in temporary wages (including bonuses) of household
head.
2) The principle factor determining the equalization in the 60's is
the equality of regular wages of household heads. This was a time of

a shortage in the labor force and during this period income differences by age, industry and occupation were reduced by the increase in wages of younger employees and the active mobility of the labor force.

3) The slight inequalization in the 70's was influenced by the economic recession during which the wage differences by industry and occupation slightly increased.

Kaizuka et.al. attempted to analyze in detail factors determining income inequality. Even though this study was limited to age differences at the household level, income differences were shown as varying over time in a similar manner as was seen in the previous section.

Kaizuka developed an econometric model which attempted to explain income differences between age groups for six factors: number of nuclear families, number of working wives, level of educational attainment, rate of return to human capital investment, amount of social security and population dynamics. In this study a simulation model using these factors was carried out with the following results:

1) The principle factor determining the equalization of income between age groups in the 60's was a decrease of rate of return to human capital investment

2) The principle factor determining the slight trend of inequalization at the beginning of the 70's was the increase in number of working wives.

There are various approaches to analyzing factors determining income and these differ according to the interests of the researcher. These differences in approach affect how income is defined and the income unit itself. Precise definition of what consititutes money income i.e. income resources such as entreprenurial income, property income, current transfer etc., is important for indicating an accurate income distribution. Once this is done the focus of analysis is to clarify the influence of these income resources on total money income. When the household is the income unit under consideration, the income of the members making up the household is an important factor for determining change in income·distribution.

Mizoguchi's study is the most comprehensive analysis available which includes the factors of income resources and income of family members. It does not , however, include the effect of education on income distribution. Kaizuka analyzed income distribution within the framework of human capital theory; although his study was limited to differences by age group, he developed a model helpful in

-11-

explaining the effects of education and the influences of household members.

Since the main focus of this paper is on the analysis of the effect of education, it is realistic to define income in terms of wages and to set the unit of income at the individual level. For this kind of analysis, there is a longitudinal survey The Census of Wage, which includes detailed data on the relationship between individual workers wages and educational attainment. In consideration of the interests of the present paper, this relationship will be examined in detail based on The Census of Wage. However, caution must be used since these analyses are somewhat different from those dealing with the actual income distribution of whole Japanese households which are based on male workers' wages. Taking into account the fact that the Japanese labor market has large numbers of employees and female worker's jobs are almost all of a supplementary nature, (even though the labor force participation ratio is gradually increasing) this study should fairly well reflect the income distribution in Japan.

15

Age-Wage Profile and Lifelong Wages According to Education

At first, wage differences by education are shown in Figure 3 which is the age-wage profile. Higher education is related to higher wages and wages gradually increase until the 50-55 year old age range. Here, two Japanese characteristics appearing in these profiles should be taken notice of. One characteristic is that there are no wage differences among younger employees according to educational attainment levels. If the wages of the high-school educated (under 30 years old)were measured on a yardstick as 100, then those persons with up to a Jr. High School education would fall within the limits of 90-106 and those 50-55 years old would be 79. College educated persons under 30 years old would fall within only the 102-104 range but for the college educated in their 50's (50-55) this figure increases to 160.

The second characteristic is that the wage difference between the Primary-Jr. High educated and those with a secondary education is larger than the difference between the secondary educated and college educated.

```
Fig. 3
```

In addition to the average wage, lifelong wages according to education can be seen in Table 5. These lifelong wages were estimated by using the age-wage profile from the year of graduation until 65 years old using a zero discount rate. According to the 1980 data from this table, if the Primary-Jr.High educated had wages of 100 then the figure for the secondary educated would be 115, and the Jr. College educated 130 and for the college educated 155.

Longitudinal trends for lifelong wages are shown in Table 5. Table 6 shows the average growth rates divided into two stages, before and after the energy crisis.

Table 5	Table 6

The current average growth rate in wages over a seven year period from 1967 to 1973 was more than 13%. This held for all educational levels. In general higher growth rates are shown for the less highly educated. For example the Primary-Jr. High rate was 15.6% and university 13.7%. Differences in lifelong wages according to education show a tendency toward reduction. However, during the seven years after the energy crisis, the current average growth rate dropped to the 8% level even though slight differences in lifelong wages according to education could be seen e.g. for Primary-Jr. High 7.8% and University 8.1%. After the energy crisis equalization ended and there was a slight tendency towards inequality.

Such a longitudinal trend may be similar to the trends of income seen in section 2. At the same time however, this trend might be partially related to the results of the Kaizuka study where the reduction of the rate of return to investment on education was linked to the income equalization in the 60's.

In examining the Wage Census the wage differences according to size of enterprise and among industries are important as well as the educational differences. Table 7 presents lifelong wages according to size of enterprise and education. In the table higher lifelong wages are clearly seen in the case of larger enterprises, however for different educational levels there is considerable variation according to size of enterprise. The large enterprise groups are within the limits of 135-147 when compared with 100 for the small enterprise groups.

Table 7

Comparing current wage growth rates by size of enterprize and educational level there are some cases where the growth rates of small enterprise groups surpassed larger groups during the period before the energy crisis, but after the energy crisis the growth rate of the large groups surpassed the small ones at all educational levels. This data also reflects longitudinal trends moving from equalization to slight inequalization. Changes in wages for the enterprize groups are an important factor determining the income distribution as can be seen in the results of the Mizoguchi study.

Table 8 shows the wage differentials according to industry.
The difference between high and low wage industries matches the
difference between size of enterprize although in the case of size
of enterprize groups, higher wages at all educational levels are
seen for the large groups. However, examining industry according to
amount of wages, it becomes clear that higher wage industries depend
upon education. For example, the electricity-gas-water industry is
the highest for the Primary-Jr. High educated, the
financing-insurance industry is the highest for the University
educated. Unfortunately, there is no longitudinal trend analysis
for lifelong wages according to industry as yet.

Table 8

Impact of Education on Wages

In the previous data we can only see the average wage. There
is, however great variance in wages within the same educational,
enterprize and industrial groups. Since the Wage Census data is
averaged and aggregated for these groups, it is not sufficient for
analyzing factors determining the whole wage distribution.
Furthermore, panel wage data is also not available, thus the
explanatory factors of wages and the impact of education on wages
must be shown within the limits of this aggregated data.

The Wage Census provides a detailed breakdown of wage groups according to age and education. Table 9 is a sample of frequencies of the high school and college educated. On the average, higher education is related to higher wages, however there is great variance in amount of wages within the same educational level as can be seen in the table. The first quartile wages of the university educated are only 154 thousand yen which is less than the median wage for the high school educated. Inversely the third quartile wages of the high school educated are more than the median wage of the university educated.

Table 9

In addition to education there is also great variance in wages within the same age groups. The coefficient of variance indicates a larger variance for the higher age groups.

In considering this variance, the influence of education on wages could be seen as rather small. Human capital theory can help to explain this variance. Accordingly, the characteristics of the age-wage profile in Japan will be discussed within the confines of this theory.

Wage function; Chiswick and Mincer (1972), using the human capital model, attempted to theoretically and empirically clarify the variance of wages, explaining it in terms of the amounts of training investment

for schooling and post-schooling. In an empirical analysis of U.S. data he was able to explain 68% of individual differences in the log of income. The direct effect of schooling inequality was only 10%, quite small in comparison with age and employment. Even though the same analysis cannot be done in Japan due to lack of data, we will examine the Mincer type wage function by using the average aggregated w..ge and show the characteristics of the Japanese age-wage profile and the rate of return to educational investment. A study of this nature was done by Kaizuka(1979). Table 10 shows the regression analysis coefficients which explain the log of hour wage by schooling and work experience. We must use caution in that the R2 cannot explain wage difference since this function is related to the average wage. Three interesting points from these results are indicated as follows:

Table 10

1) The rate of return to education (the coefficient of education) rapidly decreased in the 60's. It was 10.7% in 1959 and 6.9% in 1970. This dramatic change is in great contrast to the U.S. for the same period in which there was no appreciable movement, furthermore the rate of return in Japan is smaller than in the U.S..

After this period, the 70's was a time with a levelling off or slight reversal of the rate of return.

2) The coefficient of t and t2 which include the rate of return to

-18-

post-schooling investment, show a decrease in the 60's and a

levelling off in the 70's as well.

3) Within the framework of human capital theory, this reduction in

the rate of return may be considered to contribute to the

equalization of wages.

The empirical formula which explains the Gini coefficient in terms

of three coefficients as shown in Table 10 is:

$$G = 0.0375 + 0.4745b_1 + 2.8761b_2 + 0.0051|b_3|$$
$$\quad\ (1.69)\quad\ (0.93)\quad\ \ (3.28)\quad\ \ \ (2.74)$$

$$\overline{R}^2 = 0.975 \quad D.W. = 1.773$$

In addition to the above three characteristics a more detailed

analysis of the rate of return to education will be shown by using

the Wage Census (1980). The wage function is as follows:

$$\ln W = 3.92 + 0.0611S + 0.0644t - 0.0011t^2$$
$$\quad\ \ (69.2)\quad\ (15.1)\quad\ \ (25.7)\quad\ \ (-22.7)$$
$$\overline{R}^2 = 0.96$$

The rate of return to education based on this function is not

marginal but average. Accordingly the marginal rate of return to

education is measured according to the following procedure:

I) $\ln W = 4.59 - 0.053S + 0.0046S^2$
$\quad\quad\ (17.4)\quad (-1.2)\quad\ (2.6)$

$\quad\quad\quad\quad + 0.067t - 0.0011t^2 \quad\ (\overline{R}^2 = 0.97)$
$\quad\quad\quad\quad\ \ (27.6)\quad\ (-24.4)$

II) $\ln W = 4.49 + 0.13SEC + 0.27HIGH1 + 0.43HIGH2$
$\quad\quad (147.8)\ (4.7)\quad\quad (9.5)\quad\quad\quad (15.5)$

$\quad\quad\quad\quad + 0.067t\ -\ 0.0011t^2 \quad (\overline{R}^2 = 0.96)$
$\quad\quad\quad\quad\ (27.2)\quad\quad (-24.0)$

(note)   SEC, HIGH1(Jr.College), HIGH2(College) : Dummy Variable

In the first procedure r (marginal rate of return)=-0.053
0.0092 S with S representing the years of schooling. The marginal
rate of return to Primary-Jr. High education is 3%, High School
5.7%, Junior College 7.6% and College 9.4%.
Even though the s coefficient is not highly significant it is
important to note that the coefficient of S2 is positive. Therefore
the rate of return to education rises with increase in the years of
schooling; hence the rate of return does not diminish.

"Increasing returns" can be shown from the second method using
dummy variables as well. But since there is no wage data for
persons without formal education we cannot estimate the marginal
rate of return to Primary-Jr.High education using this method.
"Increasing return" is one important characteristic of Japanese
higher, education. "Diminishing return" however is the rule for most
other countries including the U.S.. This characteristic is
considered to have some influence on educational demand in Japan.
This will be discussed in detail in the following section.

The wage function adding the multiplicative effects of S and t
is:

$$\ln W = 4.7 - 0.065S + 0.0047S^2 + 0.0004S \times t$$
$$(17.2) \quad (-1.46) \quad (2.71) \quad \quad (1.48)$$

$$+ 0.062t - 0.0011t^2 \quad \quad (\bar{R}^2 = 0.97)$$
$$(15.5) \quad (-24.4)$$

This contrasts with the results in the U.S: (Mincer,1974).

$$\ln Y = 4.87 + \underset{(23.4)}{0.255S} - \underset{(-7.1)}{0.029S^2} - \underset{(-31.8)}{0.0043S \times t}$$

$$+ \underset{(63.7)}{0.148t} - \underset{(-66.2)}{0.018t^2} \qquad (\overline{R}^2 = 0.309)$$

Comparing the above formulae it is very interesting to note reverse signs on the S, S2 and St coefficients. The differences in the S2 is related to whether return increases or diminishes. For Japan the coefficient of tS is positive but for the U.S. negative. Also, for Japan there is a positive multiplicative effect of the years of schooling and work experience on wages. It can be interpreted that with more schooling there is a greater amount of post-schooling investment.

Although several interesting characteristics of Japanese education have been noted, the explanatory power of human capital on the variance of the log of wage cannot be clarified without panel data.

As an alternative approach, the wage function is estimated using frequency data from Table 9 as follows:

$$\ln W = 3.68 + \underset{(11.9)}{0.069S} + \underset{(19.9)}{0.00667t} - \underset{(542)}{0.0011t^2} \quad (\overline{R}^2 = 0.469)$$

This model explains 46.9% of individual variance in the log of wage. The direct contribution of schooling, however is only 3.6%.

-21-

According to our survey of monthly income in Tokyo which included workers', individual proprietors' and others' income the explanatory power of this model was reduced to 19.4 as follows.

$$\ln Y = 9.75 + 0.051S + 0.082t - 0.001t^2 \quad (\overline{R}^2 = 0.194)$$
$$(7.18) \quad (8.61) \quad (-7.87)$$

(note) t = Age

Analysis of Variance; Another approach to analyze factors determining wage differentials is a technical method using the analysis of variance. There is a study by Tachibanaki(1975) applying this method to the analysis of wages in the Wage Census. The share of the direct effect of 6 variables; sex, occupation (manual,nonmanual), size of enterprise, education, work experience and age is presented in Table 11.

The principle factors determining wage differentials are sex, work experience and age. Sex is the main factor accounting for two-fifths of all variance. The share of education, however, is the smallest accounting for only 1-2% of the variance.

Table 11

4. Economic Structure of Education in Japan

The direct effect of education on wage equalization may be

-22-

quite small as was shown in the previous section but this is not to
say that educational choice is only slightly affected by wage
differentials based on educational attainments. On the contrary,
economic influence on educational choice may be considerable,
witnessed by the fact that the Japanese educational system is
closely related to the economic system.

The purpose of this section is to clarify the influence of
wages and employment structure on educational choice. In order to
accomplish this 3 points will be considered.

The first is the relationship between lifelong wage and educational
choice. Human capital theory proposes a model that people choose
careers which maximize their lifelong wages. The characteristics of
Japanese education will be discussed based on this model.

The second point is the relationship between education and lifelong
wage differentials according to size of enterprise and industry.
The structure of Japanese education will be examined considering the
peculiarity of the Japanese employment system which is closely
related to the lifelong wage differentials. Finally, in specifying
the factors determining educational demand, the analysis of
educational demand and policy implications will be discussed.

Educational demand based on lifelong wages

Model of Maximization: There is some difference in lifelong wages
due to educational attainment as was previously mentioned. Lifelong
wages, however, vary at large from the discount rate, thus the
lifelong wages of the college educated are not necessarily the
largest because of the discount rate. On the educational demand
side, the proposition that individuals choose the educational level
which maximizes their lifelong wage in accordance with the discount
rate seems a rational judgement. This will be examined related to
the optimum amount of educational investment.

There are clearly four possible choices at the time of
graduation from Jr. High School; 1) to get a job immediately after
graduation 2) to go on to high school 3) to plan to attend Junior
College 4) to plan to attend College.
Two questions will be posed here; 1) How are lifelong wages--related
to these four choices-- affected by the discount rate?
and 2) What is the most effecient choice at a given discount rate?
In order to examine these questions the lifelong wage according to
the discount rate for the four choices will be shown in Table 12.
It can be seen that the fourth choice (College) is the most
efficient under a low discount rate but that the ranking of

Table 12

efficiency varies with increase in the discount rate. In comparing each choice, the fourth choice would be the most efficient between a 0 and 7% discount rate. Above 8%, however, it is not the third choice (Jr. College) as would be expected, but the first choice (get a job). Furthermore if this model holds, it would not be logical to choose the second or third choice at any discount rate. Expressing this situation mathematically, there are only two "corner solutions", to get a job or to plan to attend college.

Considering that the optimal educational investment lies in these 2 choices, the relationship between the educational investment (S) and the discount rate (r) can be calculated as in Figure 4. The second best educational choice is indicated in the figure by a dotted line. Ending one's education at high school or going on to Jr. College have become almost involuntary choices from the economic standpoint.

Fig. 4

The reason for such a high level of aspiration for a college education in Japan may be rooted in our economic structure which is characterized by "the College standard". This structure has not appreciably changed during the last two decades.

The results of applying the maximization model to women's educational choice are indicated in Figure 5. Unlike men there

Fig. 5

would be a logical possibility for choosing the Jr. College at certain discount rates. This is substantiated by the fact that Japan's Jr. Colleges are almost entirely occupied by women students.

The paradox of equalization of educational opportunity

The prevailing "college standard" for males is caused by increasing returns in lifelong wages by educational attainment. Theoretically th.s contradicts the central hypothesis in human capital theory i.e. diminishing returns. This is not to say that the theory per se is wrong, because it hypothesizes diminishing returns for groups with approximately the same earning capability (ability). However,the ability variable is unknown and cannot be dealt with using only observed wage data. Human capital theory shows that the observed return would be increased when those with higher capabilities went on to college while those with less stopped their education at the high school level.

The phenomenon of increasing returns can be confirmed by examining the rates of return to education based on lifelong wages as in Table 13. This table shows the pre-tax and post-tax marginal rate of return comparing private institutions with public institutions where the direct costs (tuition, public subsidies) are different. Examining these results we see a higher rate of return

Table 13

for public institutions. For both types of institutions:

(1) The rate of return to College is highest.

(2) Jr. College is the lowest. Although the rank of Jr. College has changed slightly over the years, the 4-year college has maintained the highest position during the past two decades. For reference, the change in the pre-tax rate of return not including the direct cost can be seen in Table 14.

Table 14

G. Becker's theoretical model explains increasing returns as being due to equal opportunity for higher education. (Becker 1975). Although it is an undeniable fact that due to economic growth there are now fewer able persons being deprived of higher education because of financial barriers, we cannot simply use his theory and empirical data to prove that educational opportunity in Japan is equalized. Here, the Japanese examination system plays an important role. It might be said that economic improvements and the highly selective examination system supports the economic structure of increasing returns.

Consumers of education who are aware of the increasing return of higher education but are uncertain of their real ability to succeed, may have the illusion that they should continue their education as far as their finances permit. As long as ability remains uncertain the only reliable indicator for the consumer is average lifelong wage.

A very high level of educational aspiration and the tightening of screening for admission to higher education are key symptoms of the diploma disease. Equalization of educational opportunity and more weight on "democratic" cognitive testing make this disease more serious. It can be said here that the pathological examination hell in Japan is legitimized by the economic structure.

Hierachical Structure

The second point of view is that size of enterprize and industry influences the close relationship between educational choice and lifelong wage difference. The reason for this close relationship lies in the Japanese employment system.
If there was high mobility among enterprises there would be less significance of joining a particular company just after graduation. However, because of the lifelong employment system in Japan, there is a prevailing idea among students that employment, especially at major companies, determines lifelong wages. As can be seen in Table 15, the percentage of persons (over 25 years of age) who remain in the same company is very high and this share becomes higher in larger companies which pay better wages. Accordingly, it is most useful to be hired by a large company just after graduation in order to insure oneself a good position.

Table 15

-28-

It goes without saying that the close relationship between types of institution and employment with a prestigious firm influences educational choice. As Table 16 shows for example, the difference in job opportunity among six types of institution is obvious. Graduates of the most prestigious National I enter large companies while those graduates of the less prestigious Private II and Private III enter smaller ones.

Table 16

This difference in job opportunity according to type of institution can be analyzed by examining lifelong wage differences among size of enterprizes. Differences in the rate of return according to the size of enterprize and type of industry are estimated as shown in Table 17. This was done assuming equality for opportunity cost at each educational level.

Table 17

The rate of return to College is 7.9% on the average but it becomes 13% for large size companies such as finance and insurance. On the contrary, there are some small companies with a rate of return under 1%. These differences would certainly influence not only decisions about educational level, but also institutional choice , because these rates of return are closely related to the impact of the educational system on job opportunities.

If we consider only the rates of return according to size of enterprize (Table 17) and link these to the difference in job opportunities (Table 16), we can estimate the expected rates of

32

Table 18

return for six types of institutions (Table 18). As can be seen, there is a 2.5% difference between the rate of return for National I and Private III. Differences in rate of return by type of industry are not closely related to institutional hierarchy but rather to the choice of major. The rate of return in manufacturing, for example, was above average in 1970, but it came down to the average level in 1975. Since most engineering departments send their graduates to manufacturing, there were many applicants for engineering departments in 1970, but these decreased in 1975 along with the change in rate of return.

However, the relation between rate of return differences by industry and the choice of major is not so close as the relation between rate of return and type of institution. This is because companies tend not to be particular about the outcome of college education since they plan to develop the employee via company education programs and on the job experience.

Classifying companies according to size can be said to give a picture of the vertical differentiation of an economic system and classification by type of industry gives the horizontal differentiation. The two differentiations form two educational differentiations--the vertical (hierachial) and the horizontal (organization of major). These are reinforced by the lifelong employment system and the difference in rate of return.

In particular, the hierarchy of companies directly influences and structuralizes the hierarchial educational system. This structure becomes another reason for acceleration of the examination rat race. In this sense the "college standard" becomes the "most prestigious college (Tokyo University) standard".

Determinants of individual demand for higher education

As a final point, empirical analysis of the determinants of individuals demand for higher education in Japan will be examined using the results of my recent study (Yano,1984a).

The enrollment ratio for higher education rapidly increased from 10.3% in 1960 to 37.8% in 1975. Considering that the rate of return decreased during this time, the main reason for the continued expansion in education is probably because the share of educational cost as a household expenditure decreased at the same time. But this expansion ended after 1975 with a slight decrease or levelling off. Here we could say that the over-aspirations toward education might be cooling out with alternatives to a university education gaining popularity.

The enrollment rate, however, is not appropriate as an indicator of individuals demand. This is because the enrollment rate depends upon the amounts of educational supply and supply has

been consistantly less than demand. Since the applicant rate (ratio of high school graduates wishing to go on to higher education) would be more relevant for analyzing individual demand, a study was carried out using time series (1958-80) data for applicant rates. Naturally, this indicator is influenced by educational supply because of the number of persons deciding not to enter higher education after objectively considering their probability of success. Accordingly, the success rate was included as an explanatory factor in the analysis.

Examining the economic model of individual demand by using regression analysis, the following four main factors were made clear.

(1) ability to pay; miscellaneous expenditure in household income.

(2) price of education; tuition fee

(3) success ratio in examination; no. of entrants vs. no. of applicants

(4) dummy variable for the energy crisis; 1= 1975-78

This model explains 97-99% of educational demand in the applicant rate as shown in Table 19. From these results the following four reasons explain the non-growth of higher education after 1975.

Table 19

(1) The growth rate in miscellaneous expenditure in household income declined after the energy crises.

(2) Since tuition costs went up at a higher rate than the income growth, applicant rates were reduced. During expansion, on the other hand, the income growth rate is higher than tuition growth.

(3) At the same time, because of the limiting policy of higher education, supply did not expand and there was no increase in the ratio of the number of successful applicants against the total number of applicants. During the expansion period, supply increased and the success rate went up.

(4) Between 1975 and 1978, applicant rates were abnormally high because of the uncertain and unstable economic situation. If we take this exceptional period under consideration, the present applicant rates should not be evaluated as so low.

In addition to these four factors, 1. the unemployment rate and 2. starting salary differences by educational attainments on individuals demand were examined. Clear results, however, could not be found because of a lack of time series data. Considering that declining high school job opportunities and the increase in salary differences tend to conditionally influence individual demand, further study would be necessary after aquiring the appropriate data.

Reviewing these three points of view, we can see that educational demand and the structure of education in Japan are greatly determined by economic factors.

Educational policy should be addressed with a clear understanding of economic structure. In the conclusion section of this article policy implications will be examined.

5. The Income Redistribution Effects of Educational Finance Systems

Two redistribution effects

The purpose of this section is to examine whether higher educational finance systems are adequate or not from an economic viewpoint and to provide a criterion for cost sharing in education.

The case for public subsidies to education can be justified by reasons of both efficiency and equality. The external benefits of education is a main argument for efficiency. The equality argument is supported due to the fact that resulting lower tuition makes it easier for less affluent students to have greater access to education. Measures of the external benefits of education are very vague and evaluation of these benefits tend to change according to the social context of the times. Consequently, the decisions on subsidies to education which are based on the external benefit proposition are in actuality made according to political power

relations.

Considering the difficulty of evaluating efficiency, the
empirical analysis of redistribution effects have focused on the
equity problem i.e. whether subsidies were useful in equalizing
educational opportunity. If the subsidies to education made higher
education more profitable for high income classes rather than lower
income classes, then certainly these subsidies could not be
justified from the view point of income redistribution. This
argument for equity could be called a redistribution between income
classes.

There is also however, another important redistribution--from
the users of education to the non-users. Users can expect higher
lifelong wages after graduation than non users. If the full cost of
education were provided by the public these subsidies would become
useful•only for future higher income classes and not for non-users
who will make up the future lower income classes.

Considering this progressive effect of finance, costs
corresponding to the private return of education may be shared not
by the government but by the user. Because of higher taxation of
upper income bracket families, the total lifelong wages of users are
not shared. From the principle of cost sharing by the people who
benefit from education, the government should share costs
corresponding to the incremental tax return to education.

This redistribution between educational levels means guiding the finance system to equalize the two rates of return, social and private. If we consider incremental tax as a part of the external benefits of education, the redistribution between educational levels would become an efficient type of subsidy.

Two redistribution effects; between income classes and between educational levels could be separately examined.

Firstly, the differences of educational opportunity related to the redistribution between income classes will be discussed. As was discussed in the above section, Educational opportunity in Japan may be considered as relatively equalized from the view point of increasing returns to education. However it goes without saying that educational opportunity is not completely equalized. Although household income rapidly increased after WWII, the percent of the household budget going to education has become a heavy burden and it is an undeniable fact that inequality in household income is reflected in the differences in the enrollment ratio.

The degree of inequality of educational opportunity according to family income has been estimated by J. Kikuchi. (J. Kikuchi, 1978).

Although accurate estimates are impossible to obtain due to limited data, one sample of an estimation is shown in Table 20. The following three points could be drawn from his results.

Table 20

(1) There is not a large difference among the first 3 quintiles but the enrollment ratio in the forth and fifth quintile, especially in the fifth, is considerably high.

(2) The enrollment ratio differences by income quintiles are larger for private universities than for national universities. National universities have relatively low tuition and contribute somewhat towards equalizing educational opportunity.

(3) Enrollment ratios for all family income groups steadily rose between 1961 and 1976. Kikuchi's conclusions were as follows: "Continuous growth of enrollment ratios resulted in society steering clear of involvement in serious conflicts about educational opportunity and not getting to the root of the problem".

Kikuchi examined the between-income class redistribution effect by comparing two percentage distributions; the percentage distribution of student enrollment rates and national-local tax payments by family income class. On the average, the distribution effects of the Japanese educational system are relatively in favor of lower income groups. Although the enrollment ratio for lower income groups is at a low level, paid taxes are also at a low level and the share of paid tax by high income groups is greater than their share of students enrollment.

It is, however, recognized that there are considerable differences in educational opportunity and the Japanese scholarship

system does not necessarily cover these. As many low income class
families would go to any length to get access to higher education,
there is a necessity for intensifing the between-income-class
redistribution effect. In studying this problem there is a severe
lack of data for empirical analysis. Kikuchi admitted that his
studies reached only tentative conclusions due to the limited data
available.

Cost sharing and the rate of return

In this section I will discuss the results from a study (Yano
1984 b) related to my second point, the between-educational
level-redistribution effect. In addition, a criterion for sharing
the cost of education will be provided.

This redistribution effect can be examined via comparison of
the social and private rate of return to education. It can be seen
that even in the case where the more highly educated pay more taxes,
the social rate of return will be lower than the private one when
students pay only a part of the full cost of their education.
If the educational subsidy, however, is low and taxes are high, the
disparity shifts, resulting in the social rate being above the
private one.

In addition to these two rates, there is a third measure, the
public rate of return, which relates the cost of education borne by
the government to the benefits from incremental taxes.

In comparing the national and private sector there are not only great differences in the unit cost of education but also in the amount of government subsidation. This results in the degree of disparity among the three rates of return differing considerably according to sector. How each rate of return is affected by change in the direct cost of education is measured as shown in Figure 6. When direct unit cost is increased in increments of 100,000 yen, the social and private rate of return decreased from 0.1% to 0.2%. The public rate of return however, rapidly decreases because of the low benefits and small loss in taxes(opportunity cost). Although the curve of the private rate of return is below the curve of the social one, private becomes larger than social when student's share of educational cost is low. The amounts of the share of student's (family), government's (direct cost) and the full cost (social) is shown in Figure 6. Taxation is calculated in 2 ways, income tax only (I) and income tax plus additional taxes (II).

| Fig. 6 |

The three rates of return to University, Jr. College and Jr. High School can be seen in Table 21. In the case of the public sector, the private rate of return is larger than the social one at each educational level. This shows that public subsidies may be in favor of the users of education. In the case of the private sector the degree of disparity among rates of return is small so that the people who benefit from education share the cost of education.

| Table 21 |

Four main findings can be pointed out from these results:

(1) Even though government subsidies to private universities have decreased since 1981 (the proportion of the subsidy in the total current expenditure was 30 percent in 1981 and decreased to 21 'ᵇ percent in 1984), the level for 1980 might be considered adequate from the view point of the between-education levels redistribution effect.

(2) Considering other external benefits of education, it is better to increase the subsidation a little more, not to decrease it.

(3) The finance system of public higher education is regressive and it seems to follow that the public higher education system is an instrument for redistributing benefits from non-users to users. It is necessary to reduce the larger gap between the public and private sector for two reasons, because the public sector does not necessarily provide greater external benefits than the private sector and because less affluent students are not necessarily given priority to go on to public universities.

(4) After reconstructing the educational finance system as pointed out above, it is important to inquire into the between-income-class redistribution effect. Although often the argument arises that government subsidies should be cut and these funds transferred to scholarships, this argument is a mistaken one because it neglects the important distinction between the two redistribution effects (between-income and between-education level).

6. Summary and Conclusions

The results from examining the interaction between income distribution and education are summarized as follows:

(1) Japanese income distribution and worker's wage distribution were considerably equalized in the 60's and during this time the wage differences among occupational groups, size of enterprize and educational levels also decreased.

(2) But equalization ended early in the 70's with slight reversal or levelling off which has continued up to date. During the same time period wage differences increased among large vs. small enterprizes and the decline in wage differences according to educational levels also ended.

(3) It cannot be conclusively stated that there was a greater degree of equality in income distribution in Japan than in the advanced Western nations. Japan may in fact belong to the inequal nations depending on data and measures.

(4) Within the explanatory framework of human capital theory and using analysis of variance, the direct effect of education on income distribution is seen to be very small. Adding the post-schooling investment to schooling investment, the explanatory power of wage differences based on wage function becomes over 20%.

However, the years of work experience, considered to be important

-41-

indicators of post-schooling investment are closely related to the age factor which is reflected in the Japanese seniority system. It is impossible to distinguish between these two factors i.e. the effect of post-schooling investment and the effect of the seniority system on income differences. All things considered, it is not conclusive to say that education in Japan contributes to the equalization of income.

(5) On the other hand educational choice and the structure of the Japanese educational system can be said to be more significantly influenced by income distribution.

(6) Even though the rate of return to Japanese education is less than in the U.S., Japan has the exceptional characteristic of increasing return. Increasing return may have the function of accelerating aspiration for higher education. The democratic policy of equalizing educational oportunities and attaching importance to selection via cognitive testing may result in worsening of the diploma disease, escalation of the examination-war and selective schooling.

(7) There are significant lifelong wage differences according to size of enterprize. These differences are closely related to job opportunity inequality, based on the clearly hierarchial institutional(university) structure perpetuated by the lifelong employment system in Japan.

(8) The expansion of individual demand for higher education ended

after the energy crisis and changes in individual demand can,

generally be explained by the economic model.

(9) Educational opportunity in Japan is not fully equalized.

However, enrollment ratios for all family income groups have

steadily risen during the times of expansion which reduced serious

conflicts regarding educational opportunity. (Kikuchi, 1978).

(10) As to the between-educational level redistribution effect; if

we consider the principle of "those who benefit from education

should share its costs" then the current subsidies to private

universities may be considered as nearly adequate.

The Japanese educational system is closely linked up to the

economy through the characteristics of the Japanese employment

system, lifelong employment and the seniority system. However, in

Japan there is little work being done in the field of the economics

of education and a scarcity of empirical studies useful for making

educational policy.

The current active debates on educational reform are too

idealistic and too political with little consideration for objective

positive analysis based on thorough empirical data. Even the future

demand for higher education has not been empirically examined and

planning for this demand is not being made in accordance with

theoretical and empirical considerations. There is rather, a

tendency to avoid the economic model in planning.

Although there are only limited policy implications which can be drawn from the analysis in this paper, the usefulness of an economic analysis of education should be indicated. Finally, noteworthy policy implications from economic analyses of educational demand and the redistributional effect will be summarized as follows:

(1) Tuition reductions and student aid have relatively little influence on enrollment thus the cost of equalizing enrollment according to family income may be very high. The results show that the applicant ratios will decrease 0.2% for each 10,000 yen increase in tuition. Therefore, ideally tuition should be decreased 42,000 yen in order to increase the applicant ratio. Considering enrollment differences according to family income, the cost of equalizing it may become very high.

(2) Since the responsiveness of enrollment demand depends upon the supply situation, the latent demand on higher education may be much higher than the number of applicants. Even if the enrollment ratio remains the same, the number of students varies according to the size of the 18 year-old population. The size of the 18 year old population will increase from 1.72 million in 1983 up to 2.05 million in 1992, then it will decrease and is estimated to reach 1.51 million in the year 2000. In the process of planning for

dealing with this changing population, the problems which must be faced during the period of decrease are recognized as more difficult to handle than those in a period of increase. This is primarily because of the predicted financial crises for private universities. However, according to the analysis shown above, the success rate should go up during the period of decreasing population, causing an increase in enrollment rate. So it is necessary that planning for the post 1993 era should include study on the crisis of management and the growing enrollment rate.

(3) As shown by the analysis of the between-educational level redistribution effect, it would be preferable to slightly increase subsidies to private universities rather than having students (families) bear the full cost of schooling.

The tuition difference between national universities and private ones decreased from 1:7 in 1967 to 1:2 in 1980. There seems to be no use in maintaining this dual structure in Japanese higher education. Reforming inadequate Japanese graduate education should take priority over maintaining a dual university system.

More policy implications from the economic side are very important for Japan's future. G. Williams said that the "technocratic" age of educational planning ended in the 60's and changed to the "political" age of the 70's (G. Williams,1979). However, in Japan there was no such "technocratic" age and we still remain in an

-45-

overly "political" age. It is of great importance for Japan to
shift the balance of educational planning from "political" to
"technocratic".

Amano,I. "Selecting Function of Universities", IDE(Institute for
    Democratic Education), No.187, 1978

Becker,G.S. Human Capital(2nd ed.), NBER, 1975

Chiswick,B.R. Mincer,J."Time Series in Personal Income Inequality in
    the United States", Journal of Political Economy, 1972

Economic Planning Agency, The Salaryman's Society in the 21st
    Century, Toyokeizaishinpousha, 1985 (in Japanese)

Ishizaki,T. Distribution of Income and Wealth in Japan,
    Toyokeizaishinpousha, 1983 (in Japanese)

Kaizuka,K. et.al. Income Distribution of Worker's Household,
    Economic Planning Agency, 1979 (in Japanese)

Kikuchi,J. "Access to Education and the Income Redistribution
    Effects", in Ichikawa,S.(eds.) Allocation of Educational
    Resources in Japan, National Institute for Educational Research,
    1978 (in Japanese)

Mincer,J. Schooling, Experience and Earnings, NBER, 1974

Mizoguchi,T. et.al. "Income Distribution in Post-WWII Japan"
    Economic Research, 29.1, 1978 (in Japanese)

OECD Income Distribution in OECD Countries 1976

Tachibanaki,T. "Wage Determinations in Japanese Manufacturing
    Industries", International Economic Review, 16, 1975

Williams,G. "Educational Planning Past, Present and Future",
    Educational Policy Bulletin, Vol.7, No.2, 1979

Yano,Y. "The Determinants of Individual Demand for Higher
    Education", The Journal of Educational Sociology, No.39, the
    Japan Society of Educational Sociology, 1984a, pp216-228.
    (in Japanese)

Yano,M. "An Economic Analysis of Subsidies to Private Universities"
    Research in Higher Education, Hiroshima University, RIHE, 1984b,
    pp39-58. (in Japanese)

Figure 1   Comparison of Gini Coefficients (Mizoguchi, 1978)
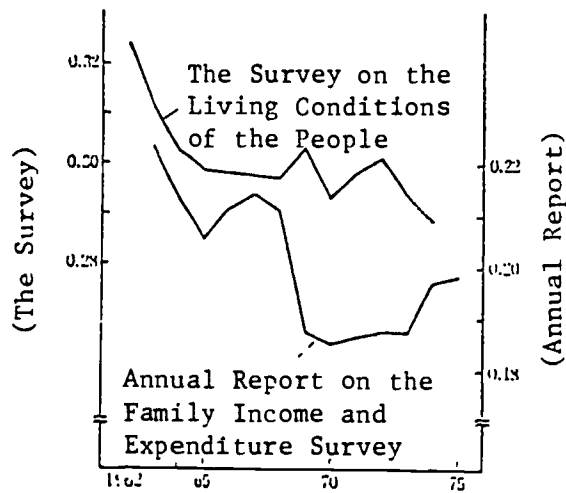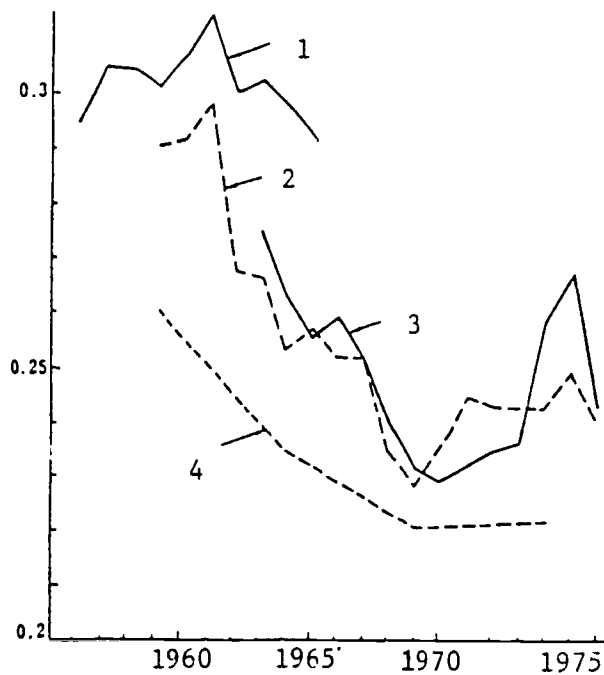

Figure 2   Comparison of Gini Coefficients for Worker's
            Household   (Kaizuka, 1979)

1. Annual Report (Monthly Income)
2. Family Saving Survey
3. Annual Report (Yearly Income)
4. National Survey of Family Income and Expenditure

-1-

Table 1

Year	Gini Coefficient
1963	0.215
64	0.206
65	0.198
66	0.202
67	0.206
68	0.193
69	0.179
70	0.179
71	0.179
72	0.180
73	0.179
74	0.188
75	0.188
76	0.186
77	0.184
78	0.188
79	0.180
80	0.183
81	0.187
82	0.187
83	0.188

Percentage Share of Income

	1963	1969	1975	1983
Lowest fifth	10.2	11.8	11.5	11.5
Secound	15.0	15.9	15.5	15.5
Third	18.6	18.9	18.8	18.7
Fourth	22.8	22.3	22.8	23.0
Highest	33.3	31.0	31.4	31.3

Table 2   Size Distribution of Pre-tax Income (OECD, 1976)

	Year	1	2	3	4	5	6	7	8	9	10	Gini
Australia	1966-67	2.1	4.5	6.2	7.3	8.3	9.5	10.9	12.5	15.1	23.8	0.313
Canada*	1969	1.2	3.1	4.6	6.3	7.9	9.4	11.1	13.1	16.2	27.1	0.382
France	1970	1.5	2.8	4.2	5.7	7.1	8.7	10.4	12.6	16.0	31.0	0.416
Germany*	1973	2.5	3.4	4.5	5.6	6.8	8.3	9.9	12.2	15.7	31.1	0.396
Japan	1969	2.9	4.7	5.8	6.8	7.7	8.6	9.7	..3	13.9	23.6	0.335
Netherlands	1967	2.3	3.6	4.9	6.0	7.3	8.5	9.9	11.7	14.7	31.1	0.385
Norway	1970	1.7	3.2	4.9	6.7	8.2	9.8	11.3	13.3	16.4	24.5	0.354
Sweden*	1972	2.0	4.0	5.3	6.1	7.9	9.5	11.2	13.1	16.1	24.4	0.346
United Kingdom*	1973	2.1	3.3	5.1	6.9	8.3	9.8	11.2	13.0	16.1	24.7	0.344
United States*	1972	1.2	2.6	4.2	5.3	7.5	9.3	11.1	13.4	16.4	23.4	0.404
Average*	..	2.0	3.5	5.0	6.3	7.7	9.1	10.7	12.6	15.6	27.3	0.366
Dispersion*	..	0.27	0.19	0.13	0.09	0.06	0.06	0.06	0.05	0.05	0.10	
Memorandum items:												
United Kingdom*	1972-73		5.8		4.8	5.9	7.5	9.2	11.0	13.1	15.8	26.9	0.373
United States* i)	1971	1.2	3.0	4.6	6.2	7.6	9.1	10.3	12.9	15.3	23.6	0.393
ii)	1971	1.5	3.4	4.7	6.1	7.5	8.9	10.6	12.7	15.6	29.0	0.386

a) Figures estimated from post-tax distributions by the author.
b) Based on *Family Expenditure Survey.*
c) Based on Bureau of the Census. *Current Population Report.*
d) Arithmetic mean.
e) Measured by coefficient of variation.
f) Based on "Blue Book" estimates.
g) Based on (i) money income concept and (ii) family income concept.
Note: For detailed sources, see Appendix I.

Table 3   Size Distribution of Post-tax Income based on
"Standardised" Household Size   (OECD, 1976)

	Year	1	2	3	4	5	6	7	8	9	10	Gini
Australia	1966-67	1.6	3.2	5.3	6.9	8.3	9.5	11.1	13.0	15.7	25.2	0.354
Canada	1972	1.6	3.6	5.2	6.3	8.3	9.7	11.2	13.0	15.8	24.7	0.348
France	1970	1.4	2.8	4.2	5.5	7.4	8.3	9.7	13.1	16.6	30.5	0.417
Germany	1973	2.8	3.7	4.6	5.7	6.7	8.2	9.3	12.1	15.7	30.6	0.386
Japan	1969	2.7	4.4	5.7	6.7	7.8	9.0	10.1	11.6	14.1	27.8	0.336
Netherlands	1967	3.2	5.9	6.3	7.7	8.3	9.2	10.4	12.1	14.5	21.3	0.264
Norway	1970	2.4	4.2	5.7	7.3	8.7	10.2	11.7	13.0	15.0	21.9	0.301
Spain	1971	1.5	2.7	4.4	5.3	7.8	9.0	11.0	13.0	16.5	28.5	0.397
Sweden	1972	2.6	4.7	6.3	7.8	9.0	10.0	11.6	13.1	16.4	18.6	0.271
United Kingdom	1973	2.4	3.7	5.3	6.9	8.5	9.9	11.1	12.9	15.4	23.9	0.327
United States	1972	1.7	3.2	4.6	6.3	7.9	9.6	11.4	13.2	16.0	26.1	0.369
Average*	..	2.2	3.8	5.3	6.7	8.1	9.4	10.8	12.7	15.6	25.4	
Dispersion*	..	0.23	0.23	0.15	0.12	0.07	0.06	0.06	0.04	0.05	0.14	

Decile shares

a) Arithmetic mean.
b) Measured by coefficient of variation.
Note: Figures have been made roughly comparable to those shown in Table 4 even when they refer to a different year.

-3-

Table 4   Revision of Japan's Income Distribution(Ishizaki, 1982)

	1	2	3	4	5	6	7	8	9	10	Gini
Size Distribution of Pre-tax income (1968)	1.2	3.5	4.9	6.0	7.2	8.5	10.2	12.0	14.6	31.9	0.408
Size Distribution Post-tax income based on "Stand-ardised" (1977)	2.7	3.8	5.2	6.4	7.4	8.7	10.3	12.5	15.7	27.3	0.361

Figure 3 Wage by Educational Level for Male Morkers (1980)

1. College Graduate
2. High School Graduate
3. Junior High School Graduate

(Growth Rate)

(Age Groupings)
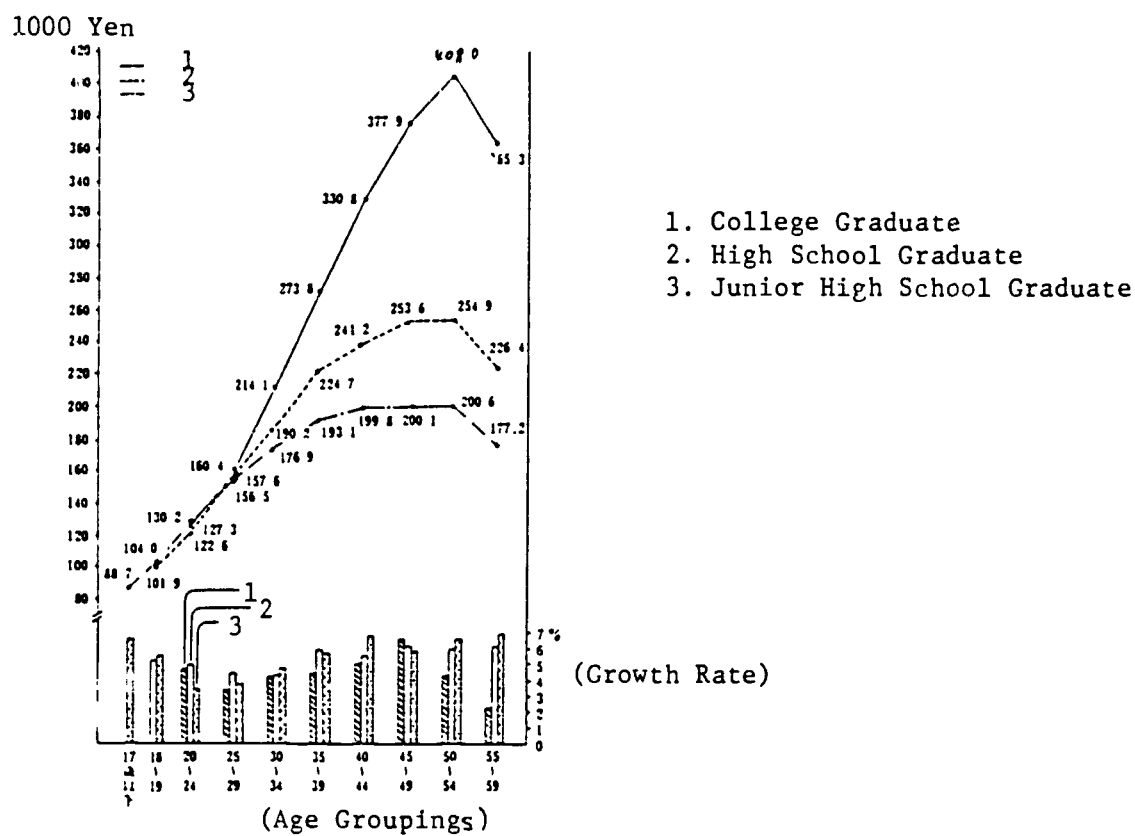
Table 5 Lifelong Wage

Year	Junior High School Graduate	High School Graduate	Junior College Graduate	College Graduate
1967	29.8 million	35.8 million	43.2 million	50.7 million yen
1968	35.6	41.4	49.5	58.7
1969	40.2	46.1	54.9	65.2
1970	47.0	53.8	66.3	76.6
1971	52.8	61.0	75.4	87.4
1972	59.6	69.0	83.9	94.5
1973	71.1	80.0	92.1	109.7
1974	88.3	100.3	115.4	134.1
1975	99.6	115.4	136.4	154.9
1976	106.2	124.5	148.3	170.7
1977	116.1	135.8	160.7	187.1
1978	122.7	143.9	166.1	197.7
1979	129.3	149.8	172.1	203.2
1980	138.9	159.5	180.1	215.4

Table 6 Current Average Growth Rate

		Average
1967–1973	Junior High School	15.6 %
	High School	14.3
	Junior College	13.4
	College	13.7
1974–1980	Junior High School	7.8
	High School	8.0
	Junior College	7.7
	College	8.1

-6-

56

Table 7   Lifelong Wage by the Size of Enterprise and Growth Rate

	Average	Major Company	Middle Level Company	Small Company
	million yen			
Junior High School	138.9	166.2	140.1	122.7
High School	159.5	188.9	158.0	136.2
Junior College	180.1	213.6	180.7	152.8
College	215.4	252.4	205.2	171.4

		Average	Major Company	Middle Level Company	Small Company
1967–1973	Junior High School	15.6 *	16.3 *	16.5 *	15.8 *
	High School	14.3	15.6	15.0	14.9
	Junior College	13.4	12.7	13.8	15.3
	College	13.7	12.3	13.4	15.6
1974–1980	Junior High School	7.8	8.6	8.0	8.4
	High School	8.0	9.0	8.0	8.0
	Junior College	7.7	9.3	8.2	7.1
	College	8.1	9.1	7.9	7.7

Table 8   Lifelong Wage by Type of Industry

	Junior High School	High School	Junior College	College
	million yen	million yen	million yen	million yen
Mining	136.8	148.2	174.7	205.0
Construction	126.1	151.7	177.5	193.8
Manufacturing	142.6	159.2	182.7	207.6
Wholesale & Retail Trade	135.6	159.7	168.1	195.9
Finance, Insurance	163.3	217.1	214.5	248.0
Real Estate	147.5	162.9	177.3	196.5
Services	129.1	149.6	179.7	233.0
Transportation &Communication	149.3	151.0	169.9	181.1
Electricity Gas, Water, Steam and Hot Water Supply	180.2	189.1	208.4	223.9

Table 9 Distribution of Workers by Income Level and Age Group

High School Graduate	Age Group Total	-17	18 -19	20 -24	25 -29	30 -34	35 -39	40 -44	45 -49	50 -54	55 -59	60 -64	65-
	684 744	-	27 347	81 806	105 840	117 603	94 449	74 205	49 023	30 818	15 993	7 054	4 590

-8-

58

Table 10 Wage Function (Kaizuka, 1979)

	$\ell_n(Y/H) = b_0 + b_1 \cdot s + b_2 \cdot t_1 + b_3 \cdot t_1^2$					
	b_0	b_1	b_2	b_3	$\bar{R}^2$	S.E
1958	−4.5348 (−41.92)	0.1054 (23.23)	0.1025 (31.59)	−0.0018 (−21.08)	0.989	0.03
1959	−4.4639 (−63.33)	0.1069 (21.51)	0.0946 (32.37)	−0.0015 (−22.25)	0.989	0.048
1960	−4.3054 (44.19)	0.0993 (20.77)	0 0910 (32.28)	−0.0014 (−22.20)	0.987	0.050
1962	−3.9485 (−67.62)	0.0970 (20.68)	0 0820 (29.43)	0.0013 (−19.83)	0.981	0 05
1963	3.8532 (−53.61)	0.0973 (16.99)	0.0818 (23.83)	−0.0012 (−16.78)	0.972	0.065
1964	−3.2370 (−59.09)	0.0816 (19.78)	0.0736 (29.68)	−0.0012 (−21.40)	0.982	0.05
1965	−2.9869 (−52.28)	0.0750 (17.47)	0.0718 (28.11)	−0.0012 (−20.84)	0.978	0 05
1966	−2 7990 (−48.82)	0.0716 (16.81)	0.0696 (27.58)	−0 0011 (−20.89)	0.975	0 05
1967	−2.5957 (−41.86)	0.0693 (15.32)	0.0675 (24.91)	−0.0011 (−19.17)	0.966	0.052
1968	−2.4504 (−39.81)	0.0701 (15.80)	0.0655 (24.42)	−0.0011 (−19.06)	0.967	0 05
1969	−2.3064 (−39.10)	0.0697 (16.75)	0.0649 (25 27)	−0 0011 (−19 95)	0.969	0 046
1970	−2.0902 (−33 52)	0 0679 (15.62)	0.0644 (24.27)	−0.0011 (−19.69)	0.950	0 057
1971	−1.8259 (−31.98)	0.0676 (17.17)	0.0627 (26.25)	−0.0011 (−21.55)	0.956	0.052
1972	−1.7449 (−32.55)	0.0693 (19.07)	0.0644 (27.13)	−0.0011 (−21.63)	0.966	0 046
1973	−1.7223 (−33.25)	0.0735 (21.28)	0.0669 (29.86)	−0.0011 (−23.19)	0.970	0 045

Y: Wage
s: Educational Level
t_1: Years of Work Experience
H: Working Hours per Month

Table 11   The Share of the Direct Effect of Explanatory Powers for
           Japanese Income Distribution   (Tachibanaki, 1975)

	1958	59	60	61	62	63	64	65	66	67	68	69	70
1	36.0	27.1	31.7	34.8	32.7	34.7	37.1	37.2	41.6	44.2	43.5	46.6	41.6
2	10.5	10.0	7.9	8.5	8.6	7.9	8.5	7.2	6.8	4.1	5.1	5.7	4.7
3	10.1	17.4	13.2	10.1	11.8	10.8	7.2	7.5	5.1	5.5	7.6	7.2	11.2
4	1.1	0.9	0.9	1.2	1.1	0.9	1.3	1.3	1.4	1.9	0.9	1.0	1.0
5	24.2	25.0	26.2	25.7	26.6	23.5	25.5	27.7	26.4	28.6	26.9	24.2	22.0
6	18.1	19.7	20.0	19.4	19.2	20.4	20.5	18.8	18.3	15.5	16.1	15.2	13.5
7	100	100	100	100	100	100	100	100	100	100	100	100	100

1. Sex
2. Occupation
3. Size of Enterprise
4. Education
5. Experience
6. Age
7. Total

-10-

Table 12   Changes in L.L. Wage According to the Discount Rate
at Various Educational Levels

	1 %	2 %	3 %	4 %	5 %	6 %	7 %	8 %	9 %	10 %	11 %	12 %
1	107.9	85.2	68.4	55.8	46.2	38.7	33.0	28.4	24.7	21.7	19.3	17.3
2	121.8	94.4	74.2	59.2	47.9	39.3	32.6	27.3	23.2	19.9	17.2	11.9
3	134.8	102.3	78.7	61.4	48.5	38.8	31.5	25.8	21.4	17.9	15.1	12.8
4	159.5	119.5	90.6	69.6	54.1	42.5	33.8	27.1	22.0	18.0	14.9	12.4

1. Junior High School Graduate
2. High School Graduate
3. Junior College Graduate
4. College Graduate

.

-11-

Figure 4   Optimum Educational Investment(Male)
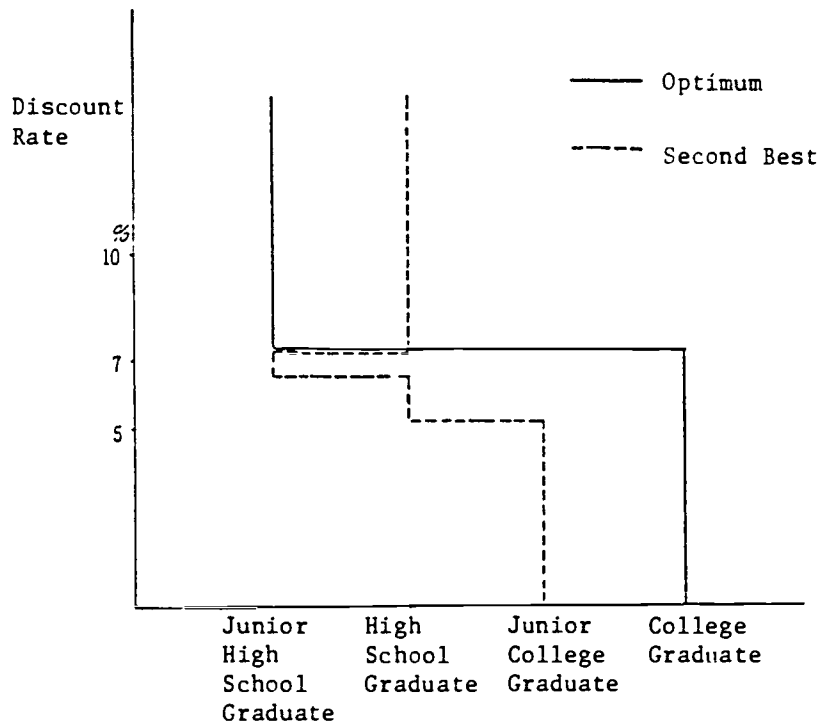
Figure 5   Optimum Educational Investment(Female)

-12-

62
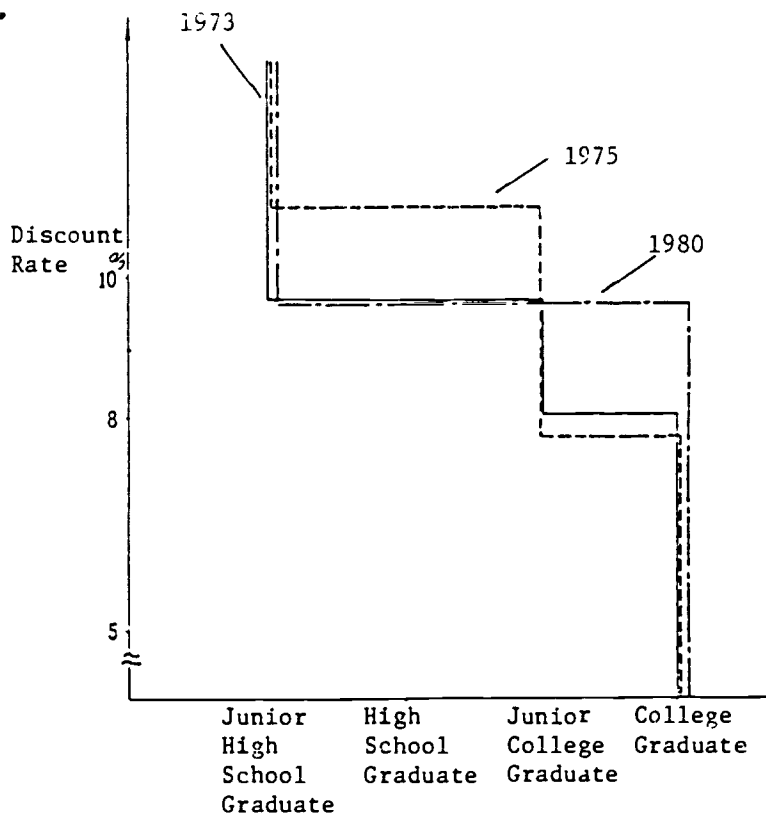
Table 13 Marginal Rate of Return

	Pre-tax Return		Post-tax Return	
	National & Public	Private	National & Public	Private
High School Graduate	6. 4	6. 0	6. 1	5. 7
Junior College Graduate	5. 4	5. 1	5. 1	4. 8
College Graduate	7. 4	7. 1	7. 1	6. 7

Table 14 Marginal Rate of Return (Opportunity Cost Only)

	High School Graduate	Junior College Graduate	College Graduate
1967	7. 6 %	9. 4 %	9. 7 %
1968	6. 7	8. 0	9. 5
1969	6. 2	8. 0	9. 3
1970	5. 9	8. 4	9. 2
1971	6. 2	8. 6	9. 3
1972	6. 4	8. 7	8. 7
1973	6. 4	6. 1	8. 0
1974	5. 7	6. 3	7. 9
1975	6. 4	7. 1	8. 0
1976	7. 2	7. 1	8. 2
1977	7. 0	7. 3	8. 2
1978	7. 2	6. 2	8. 2
1979	6. 7	6. 2	8. 0
1980	6. 6	5. 6	7. 9

-13-

Table 15 Percent of Male workers not Transferring (over 25 years old) in Manufacturing (E.P.A., 1985)

Size of Enterprise

		30~34 years old	35~39	40~44	45~49	50~54
1949-1953	1	83.3	—	—	—	—
	2	96.1	—	—	—	—
	3	84.4	—	—	—	—
	4	61.7	—	—	—	—
		(58)	—	—	—	—
1944-1948	1	83.5	75.5	—	—	—
	2	94.5	93.2	—	—	—
	3	83.9	76.0	—	—	—
	4	64.9	49.1	—	—	—
		(53)	(58)	—	—	—
1939-1943	1	79.4	69.3	64.5	—	—
	2	90.2	85.2	84.9	—	—
	3	74.0	67.4	62.4	—	—
	4	58.5	46.3	37.6	—	—
		(48)	(53)	(58)	—	—
1934-1938	1	72.9	62.7	54.4	51.8	—
	2	85.0	78.9	74.2	75.0	—
	3	71.2	56.7	51.3	50.5	—
	4	57.1	39.7	32.7	27.2	—
		(43)	(48)	(53)	(58)	—
1929-1933	1	—	51.2	54.5	42.2	38.8
	2	—	74.0	75.1	66.0	65.5
	3	—	47.1	47.9	36.7	25.1
	4	—	33.4	23.5	20.4	16.6
		—	(43)	(48)	(53)	(58)

1.Total
2.Major Company
3.Middle Level Company
4.Small Company

-14-

64

Table 16   Employment of College Graduate by Size of Company and Type of Institution (Amano, 1978)

(%)

Type of Institution	Size of Company						
	I	II	III	IV	V	VI	
National I	3.1	7.1	5.6	23.9	46.4	14 0	100
Private I	3.0	7.1	7.2	34 1	43.9	4.7	100
National II	5.8	13.1	8.4	24 9	33.5	14 3	100
National III	8.6	19 6	10.9	25 4	21.5	14.0	100
Private II	6.5	21.2	13 3	30 8	16.5	11.2	100
Private III	15.4	23.9	12.6	18.3	8.7	16.1	100

Size of Company

I   :   less than 99
II :   100—499
III :   500—999
IV :   1000—4999
V   :   more than 5000
VI :   Government employee

Type of Institution

National I   :   Old 7 imperial universities
National II :   Prestigious national universities
National III :   Less prestigious national universities
Private I   :   Waseda and Keio universities
Private II   :   Old private universities
Private III :   New private universities

-15-

Table 17 Differences in the Rate of Return

		High School Graduate Rate of Return	College Graduate Rate of Return
Total	1	6. 6%	7. 9%
	2	11. 3	10. 3
	3	5. 8	6. 5
	4	*	2. 7
Mining	1	3. 9	6. 8
	2	9. 7	8. 0
	3	4. 8	6. 4
	3	*	3. 7
Construction	1	4. 9	6. 0
	2	11. 5	8. 3
	3	6. 0	4. 9
	4	*	*
Manufacturing	1	6. 8	7. 3
	2	10. 4	9. 6
	3	5. 9	5. 6
	4	*	*
Wholesale & Retail Trade	1	5. 9	6. 3
	2	11. 2	9. 9
	3	6. 7	4. 5
	4	1. 4	1. 2
Finance, .Insurance	1	13. 9	11. 8
	2	15. 6	13. 0
	3	10. 5	7. 8
	4	7. 9	7. 1
Real Estate	1	7. 5	7. 5
	2	12. 6	11. 7
	3	8. 3	8. 1
	4	4. 9	3. 1
Service	1	4. 1	8. 7
	2	10. 1	10. 9
	3	4. 7	8. 9
	4	*	5. 5
Transportation & Communication	1	3. 8	4. 9
	2	5. 2	6. 4
	3	3. 9	4. 0
	4	*	*
Electricity Gas Water, Steam and Hot Water Supply	1	10. 0	8. 3
	2	10. 7	—
	3	8. 1	6. 6
	4	6. 0	4. 6

1. Total
2. Major Company
3. Middle Level Company
4. Small Company

Table 18 Expected Rate of Return by Type of Institution

Type of Institution		Expectated Rate of Return
National & Public	National I	9 . 5%
	National II	8 . 6
	NationalIII	8 . 2
	Total	8 . 7
Private	Private I	9 . 5
	Private II	8 . 2
	PrivateIII	7 . 0
	Total	8 . 0

Table 19   Factors Determining the Applicant Rate

	YZ-1	P-1	GO-1	OIL	R	D.W
Jr. College and College	0 2240	-0.0222	0.4981	3.554	0.992	1.85
	(15.4)	(-2.58)	(8.50)	(7.47)		
College	0.1615	-0.0239	0.3239	2.479	0.986	1.87
	(14.3)	(-3.47)	(8.42)	(6.56)		
Male College	0.2445	-0.0347	0.4875	3.440	0.986	2.81
	(17.5)	(-4.37)	(9.29)	(8.19)		
Female College	0.1201	-0.0172	0.2056	1.5103	0.970	1.83
	(10.78)	(-2.45)	(4.49)	(4.49)		
Female Junior College	0.1960	-0.0250	-0.1097	2.04	0.987	2.21
	(7.34)	(-1.51)	(-0.76)	(6.53)		

YZ-1 : Miscellaneous Expenditure (1 year time lag)
P-1 : Price of Education (1 year time lag)
GO-1 : Success Ratio (1 year time lag)
OIL : Dummy Variable for Energy Crisis : 1 = 1975-78

-18-

Table 20 Estimated University Enrollment Ratios by Family
Income Quintile Groups, 1961-1976 (Adjusted to
Age Groups of Household Head) (Kikuchi, 1978)

%

	year	1	II	III	IV	V
National Universities	1961	1.9	2.5	2.2	2.5	3 0
	1963	2.9	3 1	2 2	2.6	3 4
	1965	3.1	2 8	2.8	2.6	2.7
	1968	3 1	2.4	2 4	2 9	2.8
	1970	4 0	3 3	3 4	2 9	3 5
	1972	5 5	↗9	2.9	3.1	3.7
	1974	3 9	3.2	3 7	4 6	5 5
	1976	4.3	4 2	4.3	5 1	6 2
Private Universities	1961	1.2	1 8	2 3	4 4	1 1.3
	1963	3 0	3 6	3 6	6 0	1 4 2
	1965	2.7	3.7	4 9	7.1	1 5.9
	1968	2.3	3.3	4 9	9 5	1 8 2
	1970	4.7	5.1	9 2	1 1 0	2 1.8
	1972	9.1	1 3 7	1 0 7	1 3 4	2 5 0
	1974	6 8	7 7	1 1 1	1 6 4	3 6 0
	1976	8 2	1 1 2	1 3 0	2 2 7	3 8 2

Figure 6   The Cost = Rate of Return Curve
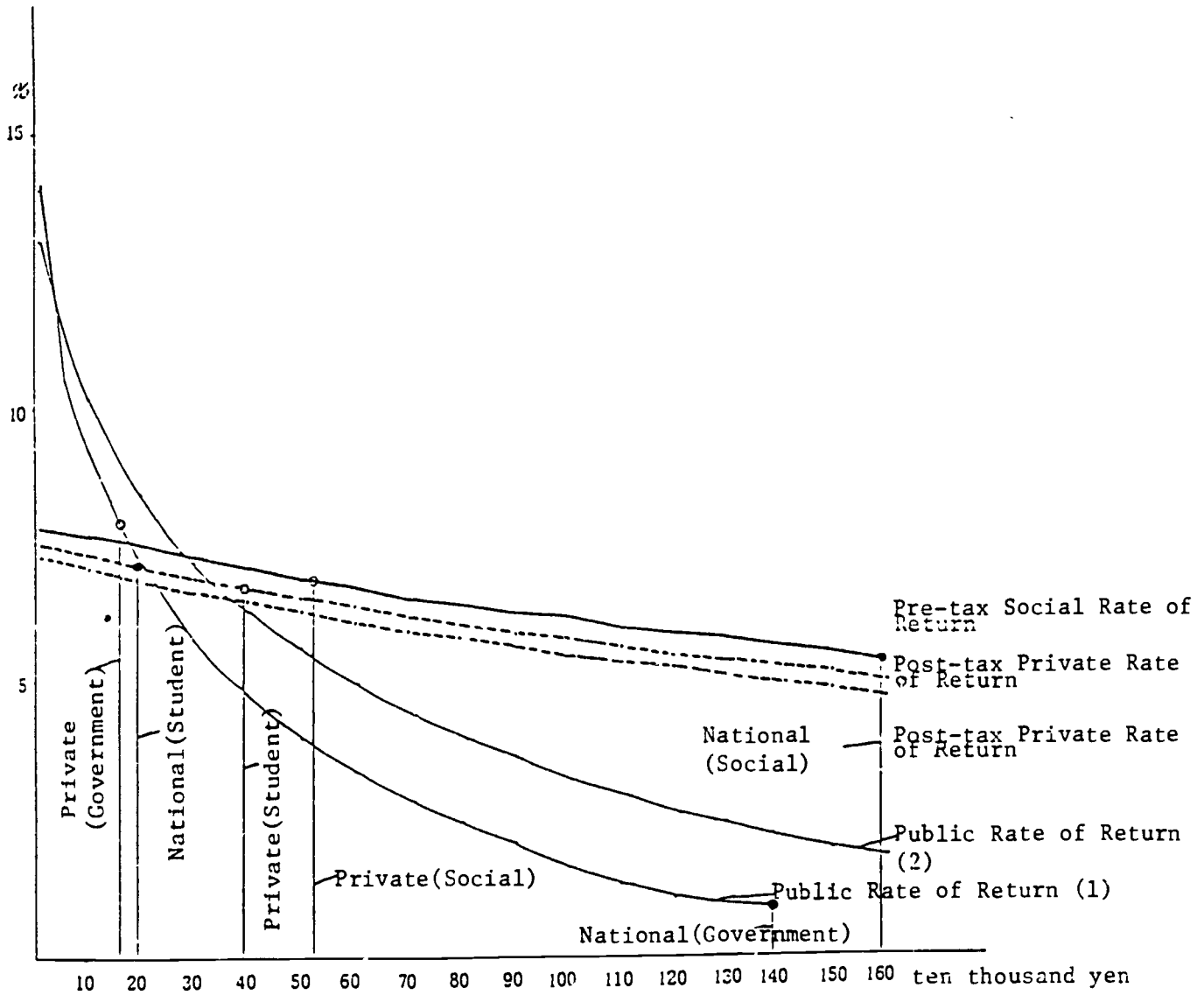

Figure 6   The Cost = Rate of Return Curve

Table 21 Social, Private, Public Rate of Return (1980)

		Social Rate of Return	Private Rate of Return		Public Rate of Return	
			I	II	I	II
High School	Public	5.5 %	6 1 %	5 9 %	1.7 %	3 4 %
	Private	5 7	5 7	5 5	5 2	6.8
Junior College	National	4 7	5 1	5 0	2.3	3 6
	Private	4 9	4 8	4 7	6 0	6 7
University	National	5 4	7.1	6 9	•	2.2
	Private	6 5	6 7	6 5	7.7	8 9

Note; I;Income Tax, II;Income Tax + Other Taxes