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INTRODUCTION

In this paper, we examine the relationships of industrialization, social structure and meritocracy from the experiences of social change in post-war Japan. We do so in the belief that Japan is at present the most advanced industrial society that has developed in a non-Western country, and that the social change in post-war Japan will be the best model of industrialization. Although the history of social and economic development in pre-war times, can not be ignored, we can see the typical phases of industrialization in the social change after 1950.

The industrialization is viewed as the process of technological innovation and the social consequences of its cumulative development. It may be seen that the social change is due to the transformation of the technological paradigms.

Professor Murakami (1984) divides the social change into three phases of the industrialization. The technology of the first industrial revolution which occurred in 19th century is by the control of materials, but the focus of technology in the second industrial revolution of the 20th century is the control of energy, and the focus of technology in the third revolution which will occur in the 21th century will be the control of information.

Japan has experienced these three phases in the past 30 years. In the 1950's, it was the first phase, in the 1960's, it was the second phase, and from 1970's, it has been the third phase. For that reason, now Japan may be viewed as a post-industrial society.

It is well known that the industrialization has caused large changes in the social structure. The social structure is viewed as the interrelationships among statues as defined by the nature of their roles, including, but not limited to, social inequality. Professor Tominaga (1965) has hypothesized the relationships between the industrialization and social change in general. From his hypotheses, the following points are pertinent to our study.

The first hypothesis is related to the increasing openness and mobility of per-

sons within a society. The second hypothesis is related to the equality of the allocations of rewards in the society.

These two points are strongly related to changes in the educational system, because the educational system plays the role of supplier of qualified labor, and also it plays the role of reproduction of social inequality from one generation to the next. Taking into account these roles, we cannot ignore the problem of educational mobility across generations.

Among many scholars, claims are made that meritocratic tendencies are inherent in the highly industrialized society itself and that the postindustrial society, in its logic, is a meritocracy (Bell, 1972, 1973; Husen, 1974; Halsey, 1973; Dahrendorf, 1968). These claims are expressions of the meritocratic thesis according to which, in modern societies, a strong association between individual merit and social rewards exists primarily in order to efficiently utillize human resources.

Japan has often been singled out as the society most closely approximating the meritocratic ideal (Dore, 1975, 1976: Forbis, 1975, The Economist, 1983). Our emphsis is on "educational meritocracy" in which formal education serves as a criterion of allocating to people jobs of varying rewards. In Japan, meritocracy is discussed in the context of credentialism, i.e. Gakureki-Shugi (e.g. Hashizume, 1976, Ushiogi, 1978). In recent years there has been a considerable amount of criticism toward an allegedly increasing tendency of credentialism in the Japanese society. The term certificitis, similar in meaning to the diploma diseses (Dore 1976), has been introduced by Bowman (1970) and applied by Bowman, Ikeda and Tomoda (1981) to the discussion of educational choice and labor markets in Japan. There are also other terms, like "degree-ocracy" (Galtung, 1971), which show the importance of formal education in Japan. It is along these lines that the claim that "present-day Japan...is a remarkable meritocracy." is made. (Forbis, 1976, p. 28)

The main purpose of this paper is to investigate these problems on the basis of national surveys conducted in 1955, 1965, 1975 and 1985. These surveys are the replicated survey concerning social stratification and social mobility of Japanese male adults (age 20-69). Henceforth, we will refer to the surveys as SSM surveys.

The years of these surveys mark a period of great expansion of the educational system in terms of resources (e.g. public and private expenditures on schooling) and their utilization (e.g. the admissions of new students). The new, better educated labor force had been easily absorbed by the vigorous economy. The first decade, 1955-1965, may be indetified with the take-off era of rapid industrial growth in post-war Japan; the second decade, 1965-1975, after some prosperous years, ended with an economic recession caused by the

"oil shock." Educational expansion contributed to Japan's becoming an economic superpower (Aso and Amano, 1983); the third decade, 1975-1985, may be identified with the stable era of high level economic efficiency and social integration.

These three decades can be seem to match the three phases of industrialization. In this paper, we will first examine the problem of allocation of rewards, especially occupational status, income and education. Secondly, we examine the problem of openness and mobility in Japanese society after 1955. Thirdly, we examine the problem of intergenerational educational mobility and equality of opportunity of education.

1. INDUSTRIALIZATION AND SOCIAL INEQUALITY

In the industrial society, the basic status dimensions are occupational status, income and educational attainment (Tominaga, ed., 1979). Although these three dimensions are strongly connected, each dimension has an independent characteristic of allocation. Therefore, we treat these three dimensions independently. We measure occupational status using occupational prestige scale (Naoi, 1979). The variables of income and educational attainment are measured by both discrete and ordinal scales. Therefore, we divide these three variables into 20 grades, ranging from lower level to upper level, and plot them on a Lorenz curve (See Fig. 1, A, B. C). Also, we calculate the Gini's coefficients of these three allocations (Table 1).

The Lorenz diagrams show graphically the inequality of the allocation of material and non-material rewards under a competitive system. And Gini's coefficient is well known the index of inequality of allocation. If the allocation of rewards is completely equal, Gini's coefficient becomes zero. Two Gini's coefficient is the two times of the area which is contained between the equal line and the Lorenz curve.

Judging these figures and tables, we can see how the Japanese society has become more equal or inequal in the past 30 years. At first, concerning the allocation of occupational prestige, we find that there is almost no variation in the shape of the Lorenz curve over the years. We also see that the degree of inequality in this variable is less than that found in the other variables.

Despite the large scale changes in the occupational structure, the allocation of occupational prestige has not altered considerably. However, the Gini's coefficient has been increasing gradually from 1955 (.114) to 1985 (.150).

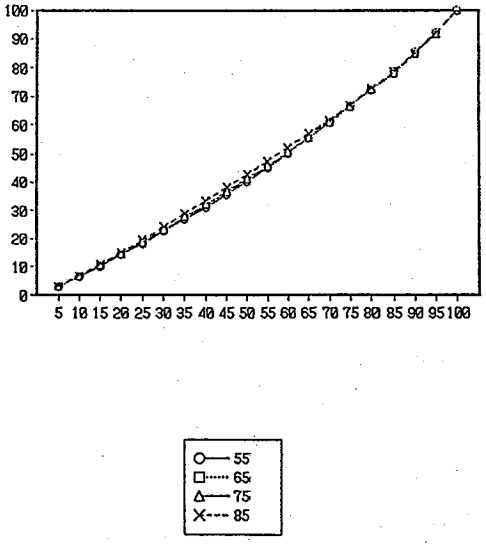
Compared to the inequality of occupational prestige, the allocation of income and educational attainment are more inequal. The inequality of income is especially large.

Table 1. Gini's coefficient

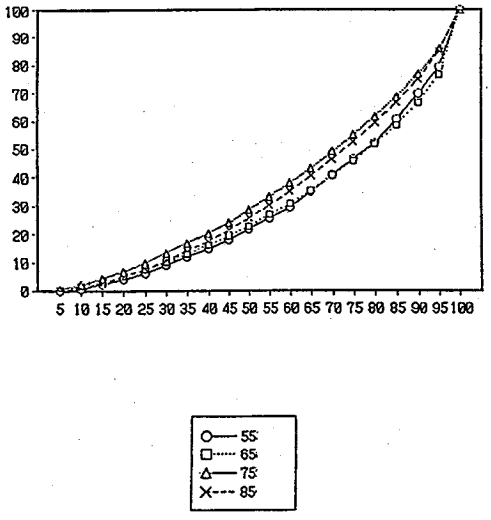
	Occupation	Income	Education
1955	.114	.422	.295
1965	.129	.417	.275
1975	.131	.312	.278
1985	.150	.353	.269

Figure 1

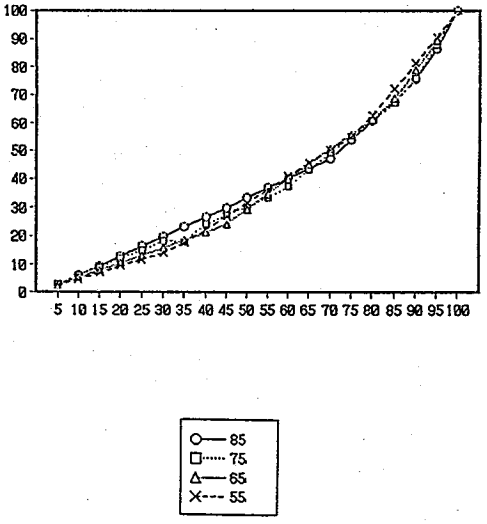
A : Lorenz curve of occupation



B : Lorenz curve of income



C : Lorenz curve of education



(Note) These figeres were presented by Prof. Takashi Noda

Looking at the past 30 years, we find that the allocation of income has become more equal between 1955 (.422) and 1975 (.312). However, in the years between 1975 and 1985 the rate is increased to point greater than that in 1975. It seems that until 1975, figure to the increasing tendency of the average income helped to decrease the inequality of allocation of income, but after 1975, the increasing of income become slower. For that reason, the inequality of income allocation becomes large again.

The inequality of educational attainment is just the reverse of income allocation, because between 1955 and 1975, the inequality of educational attainment increased gradually, but in 1985, the Gini's coefficient becomes smaller. It seems that the expansion of higher education stopped between 1975 and 1985.

Examining the shapes and degrees of inequality of occupational prestige, income and educational attainment, we cannot say that the Japanese social structure has become more equal. There are no clear tendencies of equalizing the allocation of rewards. Japan is still an inequal society.

2. INDUSTRIALIZATION AND SOCIAL MOBILITY

As mentioned before, many scholars claim that the industrialization brought with it high openness and mobility of persons in a society. Examining this hypotheses, they used the social mobility table (Naoi and Slomczynski, 1986). It presents a cross-classification of persons according to their status at the origin and at the destination. Using data on the current occupation of men and their fathers, sociologists apply various indices of intergenerational mobility to characterize, in a synthetic way, the degree of openness of a society. The coefficient of openness, introduced by Yasuda (1962, 1964) on the basis of the classic ideas of Benini (1901; cf. Yasuda, 1972; Jones, 1985a), is one of the most popular among such indices. This coefficient, known as the "Yasuda index" or the "index Y," has been much elaborated upon and discussed (e.g. Yasuda, 1971; Jones, 1975; Boudon, 1973; Bibby, 1975; Hauser et al., 1975). Major publications in the methodology of social stratification research contain references to Yasuda's original contribution to the measurement of social mobility. In empirical analyses, his index has been applied in Japan (e.g. Tominaga, 1969; Tominaga and Naoi, 1978), the United States (e.g. Featherman and Hauser, 1978) and other countries. The index has also been frequently utilized in cross-national comparisons (e.g. Yasuda, 1964; Featherman et al., 1975; Jones, 1985b).

Despite its popularity, the index Y is deficient and needs to be reformulated. In this section we (1) demonstrate the main flaw in the construction of the index, (2) propose

a modification which retains the theoretical appeal and validity of the original index, and (3) give the analysis of the index application in its corrected form.

The original formulation of the Yasuda index as follows. The matrix of observed mobility $N=(n_{ij})$ displays the frequencies of transitions of persons from origin categories i to destination categories j ($i, j=1,\ldots,k$). In our notation $n_{i.}$ denotes the number of persons in the origin category i and $n_{.j}$ denotes the number of persons in the destination category j. Consequently, $n_{..}$ is the number of persons in the sample.

For any matrix N there exists a corresponding matrix of perfect (hypothetical) mobility $F=(f_{ij})$ defined by

$$f_{ij} = n_{i.} \times n_{.j} / n_{..} \quad (i, j = 1,\ldots, k)$$

Using this notation, the original formula for the Yasuda index Y is

$$(2.1)\quad Y=\sum_{i=1}^{k} [\min(n_{i}i., n_{.i}) - n_{ii}] / \sum_{i=1}^{k} [\min(n_{i.}, n_{.j}) - f_{ii}]$$

or equivalently

$$(2.2)\quad Y=\sum_{i=1,\ i\neq j}^{k} n_{ij} - \Delta(N) / \sum_{i=1,\ i\neq j}^{k} f_{ij} - \Delta(F)$$

where $\Delta(N)=\frac{1}{2}\sum_{i=1}^{k} | n_{i.}-n_{.i} |$ and $\Delta(F)=\frac{1}{2}\sum_{i=1}^{k} | f_{j.}-f_{.i} |$

In these formula, the numerator is intended to measure the amount of pure mobility extracted form the matrix of observed mobility while the denominator refers to the amount of pure mobility in the "perfect mobility situation." Pure mobility is understood as mobility unaffected by the difference in marginal distributions, that is a net of $n_{i.}-n_{.i}$ over all i. This is apparent from Eq. 2.2 in which the index of dissimilarity Δ is used. Under the original formulation $\Delta(N)=\Delta(F)$ since $n_{i.}=f_{i.}$ and $n_{.i}=f_{.i}$.

Commenting on the index, Yasuda (1964, p.18) wrote that his "coefficient of openness...measures the degree of approximation to perfect mobility...." A similar interpretation is provided in some other publications (e.g. Boudon, 1973; Bibby, 1975; Jones, 1975). It is commonly understood that the Yasuda index is a ratio of the amount of "pure actual mobility" to the amount of "pure perfect mobility." our dispute deals with the measurement of pure mobility as such.

The conceptual foundation of the coefficient of openness is based on the distinc-

tion between pure mobility (called also circulation, exchange, individual or free mobility) and structural mobility (called also forced, excess, net or technological mobility). The first, represented here by matrix $Q=(q_{ij})$, is defined as mobility which occurs between the same number of positions in corresponding origin and destination categories, that is $q_{i.}=q_{.i}$. The second, represented here by matrix $S=(s_{ij})$, is understood as resulting from the difference in the number of positions in corresponding origin and destination categories. Both matrices contain "mobiles" only that is there are matrices with all elements on the main diagonal equal to zero;

$$q_{ij} = s_{ij}=0.$$

Let us assume that pure and structural mobility refer to a given (observed or hypothetical) mobility matrix $X=(x_{ij})$ where $x_{ij}=0$, since there are no "immobiles" in X this is a matrix of "total mobility" in the strict sense. Yasuda, like many other proponents of the classical approach to mobility tables, explicitly treats pure and structural mobility as exhausive components of strict total mobility. The equation "pure mobility= total mobility−structural mobility" (e.g. Hazelrigg, 1974; Bibby, 1975; Boudon, 1973) underlies Yasuda's construction of the index.

Within this classical framework we can state two important assumptions related to the natural postulates of the measurement of any kind of mobility (Krauze and Slomczynski, 1986). We shall specify them in terms of the measurement of the amount of pure mobility.

Assumption 1. Let $Q(X)$ be the matrix of pure mobility, extracted from matrix X. Since frequecies are nonnegative numbers we have

$$(2.3)\quad 0 \leqq q_{ij}(X) \leqq x_{ij} \quad (i, j = 1,..., k)$$

Assumption 2. If matrix $Q(X)$ is the matrix of pure mobility extracted from matrix X, the amount of pure mobility in X, denoted by $\delta(X)$, is:

$$(2.4)\quad \delta(X) = q_{..}(X)$$

These two assumptions are very natural. The first assumption says what it means for matrix Q to be a component of matrix X. The second assumption states that the amount of pure mobility in a given matrix is equal to the sum of frequencies in the corre-

sponding matrix of pure mobility. Both these assumptions are well suited for the count measure of social mobility. They do not contradict any statement either by Yasuda (1962, 1964, 1971) or the investigators who extensively discussed his index (e.g. Boudon, 1973; Jones, 1975; Bibby, 1975).

The Yasuda index is deficient because it utilizes an inadequate representation of pure mobility. Note that the amount of pure mobility implied by Eq. (2.1) is

$$(2.5) \quad Y = \sum_{i=1}^{k} [\min(n_{i.}, n_{.i}) - n_{ii}]$$

Simultaneously, the definition of pure mobility requires

$$(2.6) \quad q_{i.} = q_{.i}$$

However, Eqs. (2.5) and (2.6) are inconsistent under Assumptions 1 and 2. The simplest possible example demonstrating this fact would be a 3x3 matrix $N = (n_{ij})$ in which elements $n_{13} = n_{21} = 1$ and the remaining elements are all zero. In view of Eq. (2.5) we have $\sigma(N) = 1$. Thus, to fulfill Eq. (2.6) matrix $Q(N)$ should contain only one entry $q_{ij} = 1$ but this would contradict Assumption 1. If for the considered matrix N we determine values q_{ij} which do not violate Assumption 1, then Eq. (2.3) is incompatible with Assumption 2, i.e. $\delta(N) \neq \sigma(N)$. The classical definition of pure mobility requires homogeneity of marginal distributions (as given by Eq. (2.6)); Yasuda accepts this conceptualization in all his work and so do we. However, under the natural Assumptions 1 and 2, the above example proves that the index Y is based on an incorrect measure of the amount of pure mobility.

Within the classical framework of mobility studies pure mobility is defined as the part of total mobility which occurs between identical origin and destination distributions; all mobility transitions which result in "marginal homogeneity" are considered "pure mobility" (e.g. Capecchi, 1967; Hazelrigg, 1974; Noble 1979). Assuming that the matrix of pure mobility $Q(X) = q_{ij}(X)$ is extracted from matrix X, we require that

$$(2.7) \quad 0 \leqq q_{ij}(X) \leqq x_{ij} \qquad q_{ii} = 0$$

$$(2.8) \quad q_{i.}(X) = q_{.i}(X)$$

Eq. (2.7) expresses the fact that the matrix of pure mobility is extracted from

another matrix and refers only to mobiles; Eq. (2.8) describes the homogeneity of marginal distributions. To assure that all transitions satisfying Eq. (2.7) and (2.8) are taken into account it is necessary that

$$(2.9) \quad q_{..} \rightarrow \max$$

Thus, our definition of pure mobility is expressed in terms of linear programming, LP. Indeed, maximization of $q_{..}(X)$ according to Eq. (2.9) with constrains given by Eqs. (2.7) and (2.8) constitutes a standard LP problem which can be solved using the simplex algorithm (Dantzig, 1963). The solution provides the matrix of values q_{ij} and uniquely determines $q_{..}$, the amount of pure mobility. In our reformulation of the index Y we define two matrices of pure mobility, Q(N) and Q(F), extracted from the matrices of observed mobility N and perfect mobility F, respectively. Both according to Eqs. (2.7) to (2.9). The modified version of Y, called Y^*, is expressed by the formula;

$$(2.10) \quad Y^* = q_{..}(N) / q_{..}(F)$$

As in the original version, the index is a ratio of the amount of "pure actual mobility" to the amount of "pure perfect mobility". Unlike in Yasuda's formulation, however, both these quantities are sums of frequencies in the respective pure mobility matrices. Thus, the meaning of the original index remains unaltered while its defective operationalization of the amount of pure mobility is corrected.

In the absence of pure mobility in the matrix of actually observed mobility the index Y^* is equal to 0, its theoretical maximum exceeds 1 since, as in the original version, there may be more pure actual mobility than pure perfect mobility. As Yasuda (1964, p.18) pointed out, for real societies his index would not exceed 1; the same holds true for the modified version Y^*

We will look at the change of openness in Japanese society over the past 30 years. We will compare the results using the Yasuda Index (Y) with results obtained using modified Yasuda Index (Y^*).

We devided occupations of persons into 8 categories. 1. Professional 2. Managerial, 3. Clerical 4. Sales, 5. Skilled Worker, 6. Semiskilled Worker, 7. Unskilled Worker, and 8. Farmers. The results show that the differences between the value of the Yasuda index in the original and modified versions are substantial (cf. Table 2). Within the 36 coefficients, Y indexes are equal to Y^* in 13 cases, Y indexes are larger than Y^* indexes in 17

cases, and Y indexes are smaller than Y^* in only 6 cases. In particular, it is evident that the original version of the index overestimates the proportion of pure actual mobility and, in consequence, provides the index values which imply that Japanese society is more open that it actually is. The differences between the original and modified versions of the Yasuda index for status categories, Y_i and Y_i^* are illustrated Y/Y^* in Table 2.

Table 2. Yasuda Index and Modified Yasuda Index

	1955			1965			1975			1985		
	Y	Y^*	Y/Y^*	Y	Y^*	Y/Y^*	Y	Y^*	Y/Y^*	Y	Y^*	Y/Y^*
Professinal	0.610	0.641	0.95	0.676	0.676	1.00	0.688	0.688	1.00	0.694	0.694	1.00
Managerial	0.750	0.750	1.00	0.809	0.850	0.95	0.794	0.781	1.02	0.820	0.882	0.93
Clerical	0.818	0.818	1.00	0.811	0.811	1.00	0.859	0.859	1.00	0.778	0.776	1.00
Sales	0.713	0.648	1.10	0.704	0.439	1.60	0.796	0.602	1.32	0.740	0.489	1.51
Sikiied	0.691	0.495	1.40	0.746	0.645	1.16	0.757	0.744	1.02	0.748	0.641	1.17
Semi-skilled	0.681	0.681	1.00	0.815	0.815	1.00	0.900	0.900	1.00	0.783	0.654	1.20
Unskilled	0.750	0.750	1.00	0.879	1.000	0.88	0.938	1.000	0.94	0.898	0.769	1.17
Farmer	0.330	0.330	1.00	0.231	0.241	0.96	0.233	0.233	1.00	0.178	0.176	1.01
Total	0.585	0.541	1.08	0.660	0.591	1.12	0.713	0.673	1.06	0.792	0.633	1.25

(Source) 1955, 1965, 1975, 1985, SSM survey. All Total are standardrized to 1000.

The most substantial difference between Y index and Y^* index is the coefficient of the total (all occupations). This is the most important index of the openness of social stratification. According to the original Y index, form 1955 to 1985, the coefficient of Y index has been increasing steadily. This means that the equality of opportunity to get statues has been increasing, and coming nearer to perfect equality of opportunity. Therefore this result fits the well known hypothesis of industrialization.

However, according to the modified Y^* index, although the coefficient of the Y^* index has been increasing from 1955 to 1975, the coefficient of 1985's Y^* index has decreased below 1975's Y^* coefficient. It seems that from 1970 to 1985, there was some fundamental social change, and the equality of opportunity in Japan has leveled off.

Which index Y or Y^* is more valid? This is determined, by examining the ratio of Y index and Y^* index (Y/Y^*). The largest value is revealed in the sales category in 1985 (1.51). This ratio is also high in 1965 (1.60) and 1975 (1.32). According to the original Yasuda index, the openness of sales is fairly high. However, using the modified Yasuda index, the coefficient becomes fairly low. This difference is caused by the different method of measurements of pure actual mobility. Clearly, the Yasuda index overestimates the proportion of pure actual mobility and, in consequence, provides a higher coefficient of

openness in the sales category.

Only the professional occupation has been shown increase of openness over the past 30 years. The three manual occupations, skilled worker, semiskilled worker and unskilled worker, had been increasing from 1955 to 1975. However in 1985, all coefficients of these three occupations slightly decreased. This is due to the end of the second phase of industrialization, and the fact that the openness of these three manual occupations have become limited.

On the contrary, as to the three non-manual occupations, managerial, clerical, and sales occupations, it is very difficult to find any clear tendencies of openness.

Finally, as to the farmer, the openness of this occupation has steadily become closed.

Considering these things, we cannot say that the openness of occupational stratification has been increasing due to industrialization. The original Y index clearly overestimates the actual pure mobility. We can say that until the 2nd phase of industrialization, the openness of social structure had been increasing, but after that, this trend stopped and limited the equality of opportunity.

3. STRUCTURAL COMPONENTS OF EDUCATIONAL MOBILITY

Taking into account the previous discussion, we focus here on the specific problems: The first deals with the amount of educational mobility and the proportion of its structurally determined component. By the structurally determined componenrt we mean the part of total mobility which preserves the original disjunction between distribution of education at the origin and destination. We need to ask whether this component dominates the remaining one (free exchanges). Secondly, we examine the equality of opportunity of a son's educational attainment based upon his father's educational background.

In this paper we treat matrices of educational mobility in the same way as if they were matrices of occupational mobility. In both cases the term mobility refers to a change of position through time (Sorensen, 1976), the only difference between these cases being the dimension of that position. There are many similarities between the formal aspects of analyzing occupational and educational mobility. For example, in an analogy with intergenerational occupational mobility (cf. Duncan, 1966), the matrix of father-to-son educational mobility is justifiably interpretable only in terms of transitions from educational background to educational achievement. The reader should be aware that the classification of father's education does not convey information about a "generation of fathers" since

the sample refers only to the "genaration of sons." Thus, "educational mobility across generations" has a special, technical meaning since it involves a comparison of the educational achievement of the generation of son with the educational achievement of their fathers who do not constitute a generation.

Educational mobility across generations can be analyzed by means of cross-classifications of persons according to their own education and the education of their parents. The matrix of educational mobility $N=(n_{ij})$ displays the frequencies of transitions from origin categories i of "educational background" to destination categories j of "achieved education" (i , j = 1 ,..., k).In our notation $n_{i.}$ denotes the number of persons in the origin category i and $n_{.j}$ denotes the number of persons in the destination category j . Consequently, $n_{..}$ is the number of persons in the sample.

The origin and destination categories correspond to four levels of education: elementary school, junior-high school, high school, and college or university. For the purpose of inter-study comparability we have standardized the size of each survey sample to one thousand.

Imada (1979) has already analyzed the intergenerational educational mobility tables, and claimed that from 1955 to 1975, the average years of schooling of Japanese has been increasing, and that the equality of opportunity of sons' educational attainment has maintained fairly high level. He begins analyzing the educational mobility tables by noting that the proportion of mobiles increased form. 618 in 1955 to. 702,. 709 in 1965 and 1975. His further analysis is based on the distinction between structural mobility (called also forced, excess, net or technological mobility) and pure mobility (called also circulation, exchange, individual or free mobility). Using this distinction, we explain some fundamental difficulties involves in the traditional measurement of the amounts of these two kinds of mobility.

Stuctural mobility is understood as resulting from the discrepancy between distributions of fathers' education and sons' education, while circulation mobility refers to "true" mobility which would take place if these distributions were identical. Imada (1979), like many other proponents of the classical approach to mobility tables, explicitly treats structural and pure mobility as exhaustive and exclusive components of tatal mobility. The well-known equation "pure mobility=total mobility-structural mobility" (e.g. Hazelrigg, 1974; Bibby, 1975; Boudon, 1973) underlies his analysis. Since the number of all mobiles is directly obtainable from the data matrix, the amount of structural mobility is a critical piece of information for detemining the amount of pure mobility and indices involving it (e.g. Yasuda, 1964).

In his paper, Imada (1979) estimated the amount of structural mobility by applying the index of dissimilarity. This index measures the discrepancy between marginal distributions. However, the index of dissimilarity is not a measure of any kind of observed mobility since it does not refer to those transitions from categories i to j which are consistent with the data matrix. it has already been shown that generally, there is no correspondence between the index of dissimilarity and the appropriate measure of the amount of structural mobility. The index of dissimilarity provides a correct estimate of the amount of structural mobility only under very restrictive conditions.

Are these conditions met in the case of educational mobility in Japan? If not, to what extent are they violated? To what extent are the estimates derived from the index of dissimilarity biased? Do the new estimates alter Imada's conclusion that the structural component of educational mobility becomes less important through time? To prepare ground for answering these questions we demonstrate some inherent properties of structural mobility and show how it can be represented in matrix form.

Let $S=(s_{ij})$ denote the matrix of structural mobility; S (N) means that S is extracted from observed educational mobility N. We assume that in the case of educational mobility, the concept of structural mobility should be difined per analogism to the case of occupational mobility. Thus, relying on the work of Hutchinson (1985), Matras (1961), Blau and Duncan (1967), and others, we adopt the general definition of structural mobility. The definition reads: structural mobility is the part of total mobility preserving the difference between the origin and destination distributions; it is limited to transitions "forced" or necessitated by that difference. For that reason, we used the same modified Yasuda index as used in the intergenerational occupational mobility.

Table 3 presents the results together with Imada's estimates. In comparison with our direct counts, results based on the index of dissimilarity underestimate the proportion of structural mobility and, in consequence, overestimate the proportion of pure mobility. In the case of the amount of structural mobility, the differences in the magnitude between Imada's estimates and direct counts are substantial; all times, the modified Yasuda index exceeds the original Yasuda index, especially, in 1985 where it exceed by 20 percent.

The largest differences pertain to Yasuda's index of openness. Imada (1979) computed this index for each educational category and for the total sample, using the original formula of Yasuda. However, this formula involved the index of dissimilarity and is not based on an appropriate representation of pure mobility. As shown before, the Yasuda index can be modified by using a matrix representation of pure mobility based on linear programming. Under the proposed modification, the index is a ratio of the two amounts

Table 3. Structual Mobility and Pure Mobility in Intergenerational Mobility: 1955-1985

Total mobility and its components	1955		1965		1975		1985	
	Y	Y*	Y	Y*	Y	Y*	Y	Y*
Total mobility	61.8	61.8	70.2	70.2	70.9	70.9	74.1	74.1
Structural mobility	42.9	53.7	45.3	59.7	42.4	60.9	42.4	64.1
Pure mobility	18.9	8.1	24.9	10.5	28.5	10.0	31.7	10.0
Coefficient of openness	Y	Y*	Y	Y*	Y	Y*	Y	Y*
Elementary school	0.167	0.171	0.289	0.286	0.148	0.161	0.091	0.048
Junior high school	0.886	0.222	1.055	0.270	0.975	0.226	1.019	0.237
High school	0.821	0.519	0.746	0.594	0.847	0.478	0.938	0.434
College	0.368	0.361	0.446	0.461	0.411	0.397	0.395	0.395
Total	0.631	0.279	0.787	0.385	0.770	0.329	0.824	0.333

〔note〕 The coefficents of Y index from 1955 to 1975 are computed by Imada (1979) according to the original formula of Yasuda (1964)
Madified Yasuda Index (Y*) are standardized to 1000.

of pure mobility—that which is extracted from the matrix of observed mobility and that which is extracted from the corresponding matrix of perfect mobility. In the case of educational mobility (cf.Table 3), differences of the estimates for the original and modified versions of the index exceed 100 percent.

Seeing more details, it is evident that total mobility has been increasing steadily from 1955 to 1985. However, according to the original Yasuda index, the ratios of structural mobility gave remained almost the same, about 42%. For that reason, the ratio of pure mobility have been increasing from 1955 to 1985. The results show that the openness of total educational system has been increasing steadily in these past 30 years.

This result contradicts with the actual expansion of the educational system in postwar Japan. Therefore, this is clear evidence of a fault in the Yasuda index. According to the modified Yasuda index, the ratios of structural mobility have been increasing steadily. It reflects the expansion of educational system in Japan correctly. On the other, the ratios of pure mobility are very small, only around 10%.

As to the coefficients or openness, both Y and Y* coefficients are almost the same for elementary school and University or College. However, there is a big differnce between Y coefficient and Y* coefficient for junior high school and high school. The Y coefficients of junior high school in 1965 exceed 1.0. This reveals that in these years, there were large structural changes in the Japanese educational system. In actually after 1945, junior high school become compulsory, and in the 1970's, almost all graduates of junior high school have went on to high school. However, these changes are caused by the structural mobility, not by pure mobility. Therefore, the openness of opportunity of entering school between generations should not increase. The Yasuda index contradicts with these results.

There are drastic differences between the coefficient of openness obtained by the Yasuda index and that of obtained by the modified Yasuda index. From our consideration, we can conclude that the Yasuda index overestimates the openness of the school system, and that the Japanese school system's equailty of opportunity of education is still limited.

4. CONCLUSION

Many scholars claim that with the process of industrialization, the allocation of material and non-material rewards and the opportunity for social mobility is equalized. And more, they also claim that Japanese society is meritocratic from the view of educational meritocracy.

In reality, Japan now has entered the third phase of industrialization. The technology of this phase forcus on the control of information. We examine these hypotheses, using the longitudinal data of the SSM survery from 1955 to 1985.

However, at first we cannot find any clear tendency of equalizing the allocation of occupational prestige, income and educational attainment.

Secondly, we examine the trend of openness of Japanese society. The results using the Yasuda index show that Japanese society has become more and more open in the past 30 years. However, the Yasuda index contains critical defect. Therefore, we modified it. Using the modified Yasuda index, we find that from 1955 to 1975, the openness of Japanese society had been increasing, however, in 1985, the openness decreased.

Thirdly, we examine the structural components of intergenerational educational mobility. as with occupational mobility, the Yasuda index overestimates actual pure mobility, and underestimates the structural mobility. The result of the modified Yasuda index shows that the equality of opportunity in the educational stytem is small and has not changed in the past 30 years.

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