

Economics of Education. Part 5.

Equity, Earnings and Education of Women in Japan.

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Revolutions have characterised the twentieth century. Those marked with irreversibility appear to be revolutions reshaping social and economic structures. One of them will be the global impact of education; another will be the empowerment of women. The effects of both of these revolutions are evident in Japan. Expansion of education in the second half of the century has been explosive. Over the past 40 years, participation rates for attendance at senior high schools to the age of 18 have doubled, and quintupled for universities and colleges¹. For women over the same period increases in participation rates have been even higher (Table 1).

Demographic changes, with the population increasing from 80 million in 1950 to 126 million in 1996, have amplified the effects of educational change. The labour force has increased by 60% to 68 million, of which 27 million (40%) are women, an increase of 10 million women since 1950². Moreover the pattern of employment as well as educational attainment of women in the labour force demonstrates dramatic change. It seems appropriate, as the century ends, to review the situation with regard to the employment and remuneration of women in Japan and to seek to identify factors that are contributing to change.

Table 1. Participation in Post-Compulsory Education (Japan).

	Senior High School		Junior College		University	
	1956	1996	1956	1996	1956	1996
All Students	51%	96%	2%	13%	8%	33%
Women	48%	97%	3%	24%	2%	25%
Men	55%	95%	2%	2%	13%	42%

1. Average Earnings of Women and Men.

The increase in the labour force since 1950 has added 10 million women. Of the 12.3 million net-total of new jobs created since 1975, more than half (6.6 million) have been filled by women. Most of these have been filled by women employees. The number of women employees has risen from less than 10 million in 1965 to over 20 million now with the consequence that about 80% of both women and men in the labour force are now employees.

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Previously, a substantial number of women were employed as family workers. In 1965 they amounted to 37% of the women's labour force and their number (6.9 million) approached the number who worked as employees (9.1 million); now the number of family workers has fallen to less than 3 million and their proportion to less than 12%.

Complementary change can be seen in the type of employment³. In the 1950's, primary, secondary and tertiary industry each accommodated roughly one-third of the labour force. By 1995, employment in primary industry had shrunk to about 5% of the labour force and employment in tertiary industry – which now accounts for two-thirds of GDP – had grown to over 60%. In agriculture there have been reductions of about 3 million jobs for women and for men. And in the manufacturing, finance, and services sectors of industry the growth in employment of 15 million jobs has been shared equally by men and women; while in the wholesale and retail trades there has been creation of more jobs for women than men (Table 2). Within this growth, women and men appear to have shared employment in those areas which offer high rewards. Large increases in the number of sales jobs has provided more employment for men than for women; but in the growth of professional and technical employment, women match men numerically – and consequently exceed them proportionately; and women dominate the growth in clerical appointments.

Table 2. Number of Additional Jobs Created, 1965-1995 (Japan)

millions			
	Total	Women	Men
(a) By Nature of Employment			
Self-Employed	-1.6	-0.4	-1.2
Family Worker	-5.2	-3.7	-1.5
Employee	24.4	11.4	13
(b) By Sector of Industry			
Agriculture	-7.1	-3.9	-3.2
Construction	3.3	0.6	2.7
Manufacture	3.1	1.2	1.9
Wholesale	4.4	2.8	1.6
Services	9.1	4.8	4.3
Finance	2.6	1.3	1.3
Government	0.6	0.2	0.4
(c) By Type of Employment			
Professional & Technical	5.6	2.5	3.1
Managerial	1.1	0.2	0.9
Clerical	6.1	4.9	1.2
Sales	3.3	0.9	2.4
Protective Services	2.6	1.4	1.2

Given these substantial changes in the structure of the labour force and in society generally, it is perhaps surprising that many of the overall statistics of women's employment have changed little². The increased number of women in the labour force has been provided not by extension of the labour force but by demographic growth. The rate of participation by women in the labour force is unchanged since 1965 at 50%; and the proportion of the labour force provided by women remains at 40% (a proportion achieved in 1965 and actually lower than the 42% reported in 1955). The proportion of women excluded from labour force statistics because they are engaged in housekeeping has fallen from a high of 37% in 1975 but still remains at 30%, the same proportion it was in 1955.

The changes in structure of employment have been accompanied by increases in earnings⁴. After allowing for the effects of inflation, over the past 30 years the value of average earnings has risen by about 2.5 times, equivalent to an apparent real annual rate of increase of 3%. Moreover, the average increase for women (2.9 times, corresponding to an annual rate of 3.6%) has been significantly greater than that for men (2.4 times, 3% p.a.).

In consequence, average earnings for women relative to men have increased by 20% over this period. Even so, the increase has been only from 49% of men's average earnings in 1966 to 59% in 1996. A large part of these increases is attributable to higher productivity, itself derived from a combination of growth of new industry and a better educated labour force. But superimposed on these are statistical variations originating in social, demographic, and political decisions. In effect these render comparison of the overall averages equivalent to comparing oranges and apples. In 1966, the average age of all employees was 32 years, the normal working week was about 47 hours including about 6 hours overtime, and over half (55%) had completed formal education at junior high school. By 1996, the average age had increased to 39 years, the working week had shrunk to 41 hours, of which 3 were overtime, and 87% had completed senior high school, college or university education. Entirely similar problems afflict comparisons of the overall average earnings of women and men, where in 1996, differences in average age (3 years), experience (5 years), and hours worked (3 hours per week) are further complicated by differences in the education mix and in the sectors of employment.

Comparison of earnings, either for women over time or between the earnings of women and men, becomes informative only if it can be done on the basis of equal or equivalent work. At the same time the extent of any corrections necessary to achieve this can also indicate the scale of existing differentials. While the process does not necessarily identify differences arising from discrimination, it can indicate where and to what extent discrimination may be occurring. Some indications of the size of the contributions due to inequalities in gender, age, experience, hours worked and education in Japan are shown in Table 3. The corrections needed to provide these comparisons are discussed below.

Table 3. Relative Average Earnings^a of Women with Respect to Men.
(f-t Employees, Japan, 1996).

	Ratio of Average Earnings	Adjusted for difference between Women and Men		
		in average hours of work	in average age ^b and experience	in educational mix
Women's Earnings as Percentage of Men's	59%	62%	68%	72%

^a annual earnings are estimated from monthly contract earnings plus annual bonus payments

^b average age, 39.5 years calculated for employees over the age-range 20-59.

Conventional figures corresponding to the ratio 59% for the average earnings of women in Japan are recorded in both national⁵ and international⁶ publications. The prime virtues of these figures are that they are numerically correct. To become useful, corrections are needed to allow for the variations due to differences in average age, education mix, experience and hours worked. When this is done it allows comparison to be made between the average earnings for a woman and a man of the same age, experience and educational attainment working for the same length of time. The corrections are not trivial. Annual survey data are available relating average earnings at each age for both men and women employed in industry⁴. Recalculation of average earnings for women using the age distribution for men automatically yields the same average age. It also corrects for the dissymmetry in age distribution: the women's labour force is heavily biased towards younger, lower earning women. And because experience and hours of work are also age-related, it corrects in part for the differences in experience and hours worked⁷. Completion of the corrections - for the residual differences in experience (4 years) and scheduled time (0.5 hours per week) and overtime (2 hours per week) worked - by using average values, further increases the proportion of an average man's earnings that a woman would receive to 68%. The largest single component of these changes is provided by the difference in length of experience (5 years) which accounts for about three-quarters of the increase at the average age.

The remaining factor is that of education. The survey data provide figures for earnings categorised according to four levels of educational attainment: junior high school (JHS), senior high school (SHS), 2-year colleges and universities. The proportions of the educational levels in the women's labour force differ greatly from those for men: JHS, women 12%, men,

14%; SHS, women 55%, men 51%; College, women, 24%, men, 7%; University, women 8%, men 28%. It is a familiar observation that, on average, achievement of higher levels of education yields higher earnings⁸. In this instance, the low proportion of high-earning women university graduates provides a negative bias. The survey data allow appropriate adjustments to be made to the earnings averages to remove this bias. By combining the survey data for the populations of men of different educational level at each age with women's levels of earnings, there is obtained an estimate of the average earnings which a woman would have achieved if she had the same age distribution and educational mix as the average man. The effect of incorporating this change to the education-mix is to improve the earnings ratio to 72% (Table 3).

Table 4. Relative levels of Earnings for Women by Levels of Education ^a
(f-t employees, Japan, 1996)

Education Level	Junior High School	Senior High School	College	University
Average Age (years)	47.8	39.5	33.4	37.5
Unadjusted Ratio	52%	60%	73%	64%
Adjustment for age	1%	1%	2%	3%
Adjustment for experience	9%	10%	12%	21%
Adjustment for hours worked	1%	1%	5%	2%
Adjusted Ratio	63%	72%	92%	90%

^a Women's age, experience, hours worked adjusted to average values for men in the corresponding education category. Adjustment of average age for JHS women to that of JHS men reduces the average age; elsewhere all adjustments are increases.

Even more informatively, availability of the wage structure survey data, categorised according to educational attainment, allows similar comparisons to be made between the earnings of women and men of the same average age, experience and hours of work separately for each level of education (Table 4). It is apparent that the adjustments to the contributory factors produce substantial changes in the earnings ratios. This is particularly so for college and university graduates (UC graduates) where the average earnings approach parity.

Although it may be expected that earnings differentials will be smaller for graduates than for

high school leavers (HS leavers), caution is needed in comparing average earnings between the educational levels. Not merely do the average ages of those in the labour force from each level of education differ, but the average ages of UC graduates in the labour force – and especially of women graduates – are below those of HS leavers. While this does not affect the results qualitatively, it would be expected that age might have a large effect on the earnings ratios⁹. It is also necessary to be cautious in identifying experience as the major factor accounting for differences in women's and men's earnings. For the averages this is clearly true but, as experience is inevitably a function of age, this could be coincidental. Confirmation of the general significance of both of these points is provided by the more detailed analysis given below in Section 3.

2. Changes in relative earnings, 1976–1996.

It has already been noted that over the past half century, changes in earnings have accompanied the growth in employment and education. Increased earnings reflect both the increased general affluence due to increased productivity, which is shared generally, and also the changes in relativities accompanying changes in economic structure. It might be expected that the effects on women's earnings will have been large. Comparison across the full period since 1955 is difficult as labour statistics for women in their current form are only available for the past 25 years. However, appearance of change in labour force averages lags well behind introduction of educational change. Results of wider access to extended education for women in the 1950's and 60's would only be expected to have become apparent in the last quarter of a century. Indeed, it is over the period 1970–96 that the number of women university graduates in the population has increased from 0.5 million to 2.5 million, and of college graduates from 1.5 million to 4 million.

From 1976 to 1996, apparent average earnings for women increased by 42% in real terms (i.e. after allowing for inflation and applying the appropriate adjustments for changes in average age, experience and hours worked). This increase is substantially bigger than that achieved by men (34%). Moreover almost all of this increase occurred¹⁰ during the decade, 1986–96. It can be linked to the growth in number of skilled technical, professional and managerial jobs (120%) filled by women. Opportunities for women to be appointed to these jobs flow directly from expansion of educational access. Over this same period, the proportions of women UC graduates employed in industry rose from 9% to 33%. But one consequence of this is that when average earnings are adjusted to allow for the effect of this enrichment of the educational mix, the increase in earnings for the average woman is reduced to 25%.

This effect is confirmed by consideration of average earnings for each educational level. Over

the period 1976-96, average earnings increased for women of all educational levels but both relatively and absolutely, larger increases were achieved by UC graduates (Table 5). It is also of interest that over the same period, comparison of the earnings of women UC graduates with those of men showed relative growth of 14% and 10% respectively. Women who had only completed compulsory education (JHS leavers) suffered a relative decrease of 10% in their earnings. Moreover, with the exception of JHS leavers, while men's earnings decreased in real terms in the first half of the period (1976-86), women's earnings increased relatively and in real terms over the whole of the period¹¹.

Table 5. Average Earnings ^a for Women 1976-96 by Level of Education
(f-t employees, Japan)

Education Level	Average Age	Scheduled Pay Monthly	Scheduled Pay as % of 1976 pay		Change in Women's Pay as % Men's Pay
	years	Y million	1986	1996	1976-1996
Junior High School	49.5	0.163	91%	110%	90%
Senior High School	37.5	0.171	102%	119%	104%
College	30	0.178	104%	124%	110%
University	31	0.208	105%	128%	114%

^a Scheduled earnings (1996 yen) adjusted for inflation and for variations in age, experience, and hours worked between men and women and for changes between 1976, 1986 and 1996.

Part-time employment. The combination of duties undertaken by women has established part-time (p-t) employment as an accepted feature of their work. In the past this was largely seen in the pattern of employment in family businesses (mainly in agriculture) but now it has become a significant element in the wider labour force¹². The number of women p-t employees in industry has grown from 7% of all women employees in 1976 to 26% in 1996. The proportion of men p-t employees remains small (<3%).

The amount of labour provided by p-t employees is also substantial. On average, p-t employees work for about two-thirds of the time of full-time (f-t) employees, so in total their numbers represent about 3 million f-t equivalent workers, or 17% of the f-t equivalent of all women employees. Even so, their earnings are low. If it can be assumed that the majority of p-t employees are HS leavers, then after adjusting for differences in average ages, experience, and hours worked, rates of pay can be compared. On this basis, p-t workers are paid 70% of the hourly rate paid to women f-t SHS employees; and are on average paid less than half, 47%, of the hourly rate paid to men SHS employees.

Part-time employment is concentrated in 3 major sectors of industry: manufacturing,

services, and wholesale and retail trades¹³. Moreover, in response to domestic demand – and in accord with international experience – it is likely that the proportion of p-t workers in these sectors of industry will continue to rise. For women, p-t employment proves convenient and compatible with social needs; for employers it provides a flexible and cheap work force with minimal training requirements⁹. The combination of a growing pool of labour and large numbers of p-t employees working for relatively low pay must affect the labour market. In practice, it must be expected that one consequence will be a persistence of the earnings gap between men and women for HS leavers in those sectors of industry able to offer extensive p-t employment to women.

3. Effects of Age and Experience on Earnings.

Although comparison of average earnings of workers across all age-groups is informative, it does not provide material useful for more detailed analysis. Apart from obscuring actual levels and spreads of earnings, use of such averages is inadequate for dealing with a number of specific problems. Three such problems can be recognised:

(a) average earnings for each educational category correspond to different average ages and associated conditions so no direct comparisons are possible; in particular, the apparent influence of educational levels on earnings relativities could arise from differences in average ages;

(b) the apparent approach to equality of earnings for women UC graduates could be a consequence of the low average ages of UC graduates in employment: the statistical bias towards younger women would weight the averages towards equality whatever the earnings of older graduates; and

(c) average earnings provide no information about the mechanisms by which increase in age affects the levels and relativities of earnings.

Cross-sectional comparisons made at specific ages can provide useful information on these matters.

A comparison was made of the earnings for women in employment in industry according to each of the 4 levels of educational attainment for 3 age-ranges: 20-24 years, 30-34 years, and 40-44 years. These cover the ages of initial employment when a high proportion of women are in the labour force; a middle period when a large number has withdrawn from employment; and a steady state period when many women return to work. To show the changes that have occurred over time, data for 1976 and 1996 were used. The results are given in Table 6.

Table 6. Earnings for Women (1976, 1996) Relative to Men by Age and Level of Education^a
(f-t employees, Japan)

Education Level	Age-Range 20-24 years		Age-Range 30-34 years		Age-Range 40-44 years	
	1976	1996	1976	1996	1976	1996
Junior High School	79%	76%	63%	67%	59%	63%
Senior High School	89%	89%	70%	78%	69%	70%
College	98%	100%	75%	87%	76%	77%
University	99%	97%	83%	91%	79%	80%

^a Scheduled earnings adjusted to levels of experience and hours of work for men

It is immediately apparent that the effects of educational levels on earnings are fully confirmed. At all ages, more education does correspond to more equality of earnings between women and men. But it is also evident that age and time play substantial parts in determining the closeness of approach to equality. On initial employment in 1996, women UC graduates effectively achieved equal pay but by the time they reach the age-range 30-34 years significant differences between women and men become apparent; and these differences are wider for those aged 40-44. In this there has been surprisingly little change over the past 20 years: a similar description applied equally to the situation in 1976. Since then it is only for women UC graduates aged 30-34 that there has been any real change in their earnings relative to men; for initial employees and those in the age-range 40-44, the ratio of earnings remains unchanged. A similar description also applies to HS leavers, though for them earnings are less equal, even for those in the 20-24 age range. It follows that, after having started employment with similar levels of earnings, the decreases in ratios derive from differences in the annual increases received by women and men. In particular, for those with post-compulsory education, most of the widening gap in earnings is attributable to these differential increases.

Increase in earnings over time is a common experience. The increases are frequently identified with increase in age but they are more properly attributed to increased productivity. As a result of the acquisition of skill and experience, the value of individual workers increases over time and this raises the level of their earnings. The ability to obtain new or additional skills by training is related to educational attainment. At a basic level, literacy and numeracy are the fundamental attributes needed to acquire additional skills; for complex systems and advanced technology, higher levels of knowledge are required. Initial competence in work is

related to an achieved level of education but in addition, a capacity for learning is important in obtaining new skills. It follows that levels of earnings and increases in earnings are both greater for those with higher educational attainments.

Training, both explicit and implicit, is provided in employment in order to increase productivity. Two general categories of provision for training can be characterised. One is job-specific training, provided and paid for by the employer. This form of training is designed to meet the needs of the employer and in general may be of little value in other employment: it can be classified as “non-portable”. To recover the cost of training, the employer needs to retain staff and so rewards “length of service” or “experience”. The reward, in the form of higher earnings, provides an inducement for the worker to remain with the company. An alternative type of training provides access to more general skills. It remains advantageous to the employer to provide such training as a means of increasing productivity but the benefits may be “portable” and so also be of value to the employee and to other employers. In principle, the costs of this training will be carried, at least in part, by the employee. Payment by the employee is usually through low earnings during the period of training; the employee will expect to recover these costs over time through enhanced earnings, not necessarily from the same employer. To achieve this, the employee will expect to receive earnings that increase with age¹⁴.

Both categories of training provision lead to patterns of earnings that become institutionalised within employment and social structures. And because they both lead to earnings that increase over time, it is not always simple to identify those reflecting experience and those reflecting age. For earnings of women and men in Japan, the published data provide a matrix of earnings by age and by experience which lends itself to analysis. It is possible to extract estimates of the two components; they differ for women and men and for the different levels of education. For men, the rate of yearly increase due to experience for all levels of education is about 1%; rates attributable to age vary from 0.5 and 0.6%pa for JHS and SHS leavers to 1.1 and 2.0%pa for college and university graduates. In contrast, for women, experience provides the larger component at a yearly rate of about 1.7%. Only for women university graduates does age provide a comparable rate of growth of 1.4%pa; for women college graduates the component due to age is 0.4%pa and for HS leavers it becomes negative: JHS, -0.1%; SHS, -0.2%pa. These figures provide insights into two separate aspects of gender distinctions in employment¹⁵.

In terms of training provision, low age-based increases are expected for all HS leavers but zero or negative increases for women suggest strongly that training provided for them is restricted to job-specific, non-portable training. At the other extreme, the higher age-related increases for university graduates are in accord with expectation but again the results suggest that women receive less general, portable training than men graduates¹⁶. Such training is

frequently associated with programmes of career development.

In terms of earnings, the distinction between age-related and experience-related increases accounts for most of the differences which accrue over time. While both age and experience are time dependent, the rate of increase of experience cannot exceed the rate of increase of age. The belief in life-time employment in Japan would suggest that the two might be similar. This is not so. Even for men, experience (i.e. service with their current employer) grows at about two-thirds of the rate of age: on average, after 25 years in employment, men achieve about 18 years of experience. Women employees have less experience, although those university graduates who remain in employment approach the level for men. So the percentage increases in earnings achieved by women and men based on experience become roughly equal, the greater extent of men's experience balancing the greater rate of increase found for women. In contrast, the age-related increases for men are substantially greater than those for women.

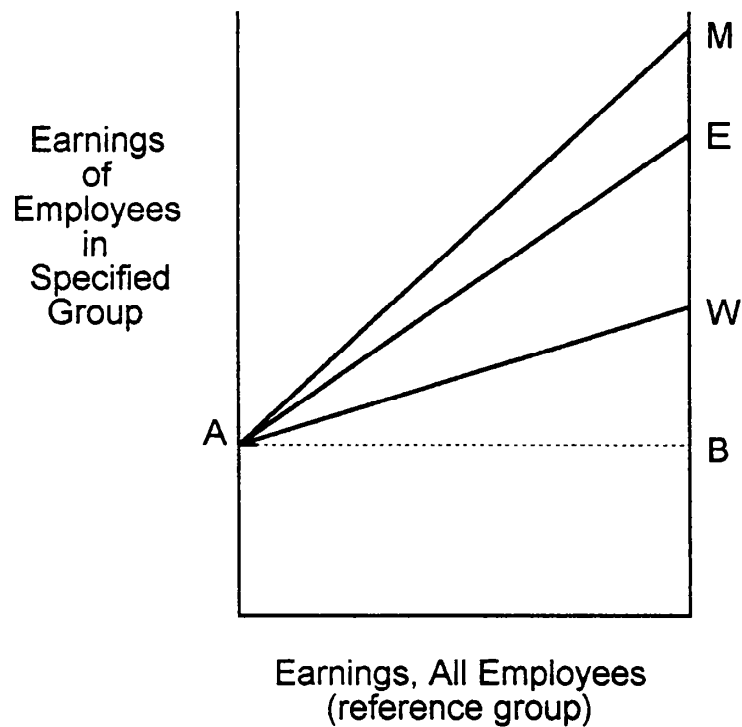
It is these increases that appear to constitute the major factor in causing the gap between women's and men's earnings to widen with age.

4. Earnings Coefficients.

The average earnings of women approach those of men most closely at the start of their employment. It is the differences in the increases they receive subsequently that generate the wider disparities in earnings. In section 3 the discussion identified improvements in productivity due to age, experience and training as the central components determining average increases. The average increases do though contain - and conceal - wide variations between the increases paid to individuals and to specific groups of employees. A number of universal factors are identifiable as contributing to these variations: gender, education, industry, and within industry, sector, size, and location. The general effects of gender and education have already been demonstrated explicitly in the previous sections (Men earn more than women; more education is good for your earnings). To establish their quantitative significance across the full diversity of employment it is necessary to establish estimates of the contributions attributable to each of them and to the industrially-based factors¹⁷.

A variety of methods is available for analysing earnings data to estimate the relative contributions of such factors¹⁸. In Japan, regularities in the structure of earnings of full-time employees permits the use of an earnings coefficient as a simple and direct measure of the increases¹⁹. The earnings coefficient measures the relative increase in earnings of a specified group (e.g. women) with respect to a reference group (e.g. all employees). A special feature of earnings in Japan is that, to a high level of precision (regression coefficient > 0.9) the increases obtained by the full range of groups identified in the Basic Survey of Wage Structure⁴ are

Figure 1. Earnings Coefficients



proportional to the average increases for all f-t employees²⁰. This is illustrated in Figure 1.

The point A marks the earnings obtained at the start of employment (i.e. in the age-range 20-24 years) by those in the reference group (All Employees) and for each specified group (e.g. all men; all women). The increased earnings obtained at each age are plotted against those for the reference group: these define good straight lines (AW, AE, AM). If AE is the line obtained for the reference group (all employees, slope, $BE/AB = 1.0$), then the lines for the specified groups (e.g. all men AM and all women AW) give the earnings coefficients as the ratios BM/BE and BW/BE . Earnings coefficients are accessible both for broad classifications (e.g. all men, 1.26; all women, 0.44: all employees, 1.0) and for discrete groupings (e.g. senior high school women employed in medium sized companies in the construction industry, 0.33) simply by correlating earnings data for the specified group against the reference group. Over 500 coefficients are in principle directly available in this way. But more immediately useful is the ability to identify coefficients corresponding to the increases due to the effects of gender, level of education, size of company and sector of industrial employment. Values of the coefficients obtained directly from the reported data for these factors are shown in Table 7. These factors may be combined with each other to give estimates for specific employment groupings (the product of the factors for "women", "senior high school", "medium", and "construction industry" gives the value 0.35 in good agreement with that obtained directly from the reported data). In general the correlation is found to be fairly good ($r, 0.84$) between coefficients obtained directly

from the available data and those calculated from the 16 basic parameters (Table 7).

Table 7. Earnings Coefficients for Employment in Japanese Industry, 1996

	Values obtained directly from earnings data		Corrected Values			
	All employees		High School Leavers		University & College Graduates	
	Women	Men	Women	Men	Women	Men
Gender Factors	0.45	1.25	0.26	0.93	0.76	1.86
Size of Company						
Large (>1000)	1.61		1.6		1.26	
Medium(100-999)	0.95		0.92		0.92	
Small (<100)	0.58		0.67		0.67	
Level of Education						
Junior High School	0.55		0.71		-	
Senior High School	0.88		1.07		-	
College	1		-		0.78	
University	2.13		-		1.52	1.07
Industry Sector						
Construction	0.94		1.12		0.88	
Manufacturing	0.9		0.54	1.12	0.88	
Manufacturing (supervision)	1.56		1.4		0.88	
Wholesale & Retail	1.16		1.12		0.88	
Finance & Insurance	1.69		2.72	1.70	1.12	
Services	0.94		1.12		1.12	
Transport & Communications	0.87		1.4	0.67	0.88	

In this form, the correlation establishes both the significance and the scale of the contributions of the 4 factors in determining increases in earnings. Quantitative expression is given to the familiar benefits obtained from education, employment in large companies, in selected sectors of industry, and from being born a man. The factors are seen to be of similar magnitude. The range of benefits from education (3.8, accounting for approximately one-third of the total range of differences in increases in earnings) appear to be slightly larger than those from gender and size (2.8, approx. one-quarter) and about twice as large as from variation of the sector of industry (1.9 approximately one-sixth).

As they stand, the precision of these "empirical" coefficients" is affected by statistical distortions. These limit their use in analysing the earnings of individual groups of employees. Three causes of distortion can be identified:

(a) the high proportion of men employees (70% overall) and their dominance in some segments of the labour force (e.g. university graduates, 88%, construction, 85%, and transport, 88%, industries) may obscure effects arising from women employees: in particular, the initial observation that gender-neutral factors can be used for education, size and industry may be flawed;

(b) the change with age in the proportions of HS leavers and UC graduates in the women's labour force affects the linearity of some earnings data and the values of the derived coefficients²¹;

(c) variation in the composition of the labour force between industries modifies relative increases of earnings without necessarily affecting the increases for individual groups of employees²².

The distortions are conveniently removed by recalculating the basic earnings coefficients from those for fourth-order groups (gender-education-size-industry) which are essentially free from these distortions. By combining them in the appropriately weighted overall average proportions, separate factors for women and men employees are generated. This procedure also allows the parameters to be expressed for the categories of HS-leavers and UC graduates. The results are shown in Table 7.

The precision with which coefficients can be estimated from the corrected and extended set of parameters is high ($r = 0.94$ for 400 coefficients). While it is to be expected that precision will be improved by an increase in the number of parameters from 16 to 52 ($4 \times 11 + 4 \times 2$), in this instance the much larger cause of improved precision lies in separating the parameters for women and men between UC graduates and HS leavers. The results confirm the utility of this division, already identified as a major factor in discussion of the origins of earnings increases in Section 3. Immediately it allows about two-thirds of the additional parameters to be seen as redundant (i.e. they do not differ significantly), indicating an absence of gender-related parameters for most education, size and industry factors. The exceptions are for university graduates and for HS leavers in the manufacturing, finance and transport sectors of industry. The effective residual set of 20 parameters (Table 7) retains the precision of the extended set ($r = 0.94$), confirming that they accommodate almost all (90%) of earnings diversity.

The basic gender and education parameters emphasise the importance to be attached to these two factors. Increases in earnings for UC men graduates are twice those for HS leavers; and for women the ratio is 3. For men, education beyond the completion of compulsory schooling yields approximately equal increases in earnings for each extra year spent in senior high school, college and university, giving the ratios JHS : SHS : College : University : 2 : 3 : 4.5 : 6. In contrast, for women the benefits derived from time spent at college is greater than that from senior high school; and from university, greater than that from college leading to the ratios 2 : 3 :

6 : 12. Amongst UC graduates, it is only for university education that there is an additional gender-related parameter. It seems likely that this should be seen as a relatively high value for women rather than a low value for men. Even so, and despite its size, it still leaves increases for university women graduates at less than 60% of those for men.

In general there is less variation due to the effects of size or sector of industry for UC graduates than for HS leavers. Such selectivity as occurs appears to favour women. While over half of men UC employees are in manufacturing (29%), and wholesale (24%) sectors of industry, a majority of UC women is employed in the higher earnings sectors of services (46%) and finance (12%), with only one-third in the manufacturing and wholesale sectors. For HS leavers, the parameters for size and sector of industry cover a wider range but also indicate a number of gender-dependent sectors. Relatively high increases are indicated for HS women in both finance and transport sectors, though the proportion of HS women employed in them is not large (8.2%, 3.9%). The transport sector is an important area of employment for men HS leavers (18%, second only to manufacturing) but provides notably low increases; the finance sector provides high earnings but offers relatively few jobs to men HS leavers (1.8%). Untypically²³ it is manufacturing industry that appears to contain a large number of “women’s jobs”: increases are very low for women, in contrast to men who obtain increases close to the average. In manufacturing industry there is a high proportion of the women JHS leavers (55% of those in employment) and they constitute a much higher proportion (29%) of the women HS leavers employed than is found in any other sector of industry. This - and a large number of part-time women employees - may well account for the relatively low earnings obtained by women HS leavers in manufacturing industry: for men the proportion of JHS leavers in manufacturing industry does not differ significantly from that for all industry.

5. Rates of Return.

In previous sections it has been shown that benefits in earnings arise from education and in particular that more benefits accrue to women university and college graduates. The benefits are not cost-free. The process of education carries costs: direct costs - notably tuition fees, and indirect costs - notably the earnings foregone by students during periods of full-time education. Despite the perception of those who pay tuition charges - usually parents - it is the indirect costs that constitute the larger component (about 70-80% of total costs in Japan). If the costs are regarded as investment, it is possible to estimate a return in terms of the additional earnings attributable to them²⁴. Conventionally this is done by considering the additional earnings obtained by those who undertake different levels of post-compulsory education in relation to the educational costs incurred. As almost all students in Japan complete senior high

school at the age of 18, the comparison is effectively restricted to assessment of the costs and financial benefits associated with higher education in universities and two-year colleges relative to completion of senior high school.

Rates of return are obtained by equating the net present value of costs and benefits according to the standard relation:

$$\{\text{Sum}\} w_n(1+r)^{-n} = \{\text{Sum}\} c_n(1+r)^{-n}$$

where w_n and c_n are the additional earnings and costs incurred in year n . When the costs are those incurred by those receiving education and the benefits are the extra earnings they subsequently obtain, iterative solution for r gives the rate of private return. Rates of private return for women from higher education relative to senior high school are given in Table 8; the rates are similar to those that have been reported previously²⁵.

Table 8. Rates of Private Return from Investment in Higher Education for Women.
(Japan, 1996)^{a, b}

Women Graduates	Universities		Colleges
	National	Private	Private
All Employment	11.1%	9.6%	9.5%
Large Companies	12.7%	11.1%	14.0%
Small Companies	7.7%	6.3%	3.5%
Men Graduates	7.7%	6.8%	3.2%

^a Net costs for women put at: National universities, Y2.1 million (18,19 years old), Y2.7 million (20,21 years old); Private universities, Y2.7 million (18,19 years old), Y3.3 million (20,21 years old); [References 1,4].

^b Assumes full employment over the period 22-60 years

While it is generally accepted that investment in human capital through higher education offers good returns²⁶, some argument remains about the appropriate values to be used for both costs and benefits. The rates shown in Table 8 are obtained on the standard basis of identifying investment with the costs of tuition and other educational charges and the net earnings foregone; and return on this investment is identified with the differences in earnings at each age between UC graduates and SHS leavers. However, some of the costs of higher education could be assigned to consumption rather than investment⁸. Participation in university and college life is regarded as an immediate benefit of higher education; and an improved quality of life enjoyed by UC graduates is generally accepted as a durable consumption benefit²⁷. To the extent that part of the expenses purchase these benefits, the amount invested is reduced. Conversely, it is regularly noted that there are additional non-educational direct costs associated with participation in higher education. Living expenses for attendance at university

and college are high: an average of Y 0.8 million is reported¹. Half of this arises from the normal costs of living, incurred irrespective of participation in higher education: this is implicitly included in the indirect cost of earnings foregone. There are though additional costs of living for those who choose to live away from home in dormitories or private accommodation. Such extra costs might well be identified as consumption but, to the extent that they enable a graduate to obtain a better paid job, they could be characterised as investment.

It is also possible to argue that the financial benefits from higher education are less than the additional earnings obtained. Indeed, it has already been indicated in Section 3 that post-employment training and experience are major factors in generating higher earnings. In this regard, higher education provides graduates, through a combination of credentials, specialised knowledge, and learning skills, with access to subsequent advancement. A number of studies has suggested that not less than two-thirds of the additional earnings are properly attributable directly to higher education²⁶.

No similar estimates exist to identify the proportion of total costs attributable to consumption. A common assumption by parents is that all the direct costs (tuition fees, living expenses) - which they provide - constitute consumption. If so, investment is limited to the indirect costs - provided by the student - and rates of private return for women UC graduates rise to 12.1% (university) and 12.6% (college). Conversely, if the direct costs are increased to include the extra costs of living away from home as well as tuition fees, the private rate falls to 10.5% (dormitories) and 9.3% (private apartments) for women graduates of national universities and 8.7% (dormitories) and 8.2% women graduates of private junior colleges. Comparison of these returns with those available from alternative investments of similar risk suggests that they are at least satisfactory even if only two-thirds is directly attributable to UC graduation. Moreover, these returns are estimated from the average earnings currently obtained at each age (1996 cross-sectional data) and consequently they provide conservative estimates of future earnings. Quasi-longitudinal data indicate that over the past 30 years general economic growth has generated additional real increases of the order of 2% - 3% p.a. If this level of growth is sustained in the future, similar increases in rates of return will need to be added to those shown in Table 8 and discussed above.

Despite their lower earnings, the relative rates of return for women are higher than those achieved by men¹⁹. A part of this arises from the lower indirect costs incurred by women as a result of the slightly lower level of earnings they forego as students; but the larger part is due to the greater advantage in the earnings of women UC graduates relative to women SHS leavers. This reflects the closer approach to pay-equality with men achieved by women UC graduates than by women SHS leavers. It is perhaps ironic that as women HS leavers

approach pay-equality with men, the relative rate of return advantage enjoyed by women UC graduates will be eroded.

Table 9. Effects of Early Retirement on Rates of Private Return from Higher Education for Women. (Japan, 1996)

Age of Retirement (years)	Universities		Junior Colleges
	National	Private	Private
60	11.1%	9.6%	9.5%
55	10.8%	9.2%	9.2%
50	10.3%	8.7%	8.7%
45	9.4%	7.7%	8.0%
40	7.9%	6.0%	6.5%
35	4.6%	2.4%	3.5%

Unlike other investments, the capital invested in education cannot be realised by selling the asset other than in the labour market; and the yield is only achieved over a prolonged period of time. The number of women UC graduates who achieve the high rates of return shown in Table 8 is small. A large majority of both college and university graduates leaves full-time employment well before the age of 60. This diminishes the rates of private return that they can achieve (Table 9) but, even for those women who withdraw from the labour force at ages down to 40 years, the rates of return remain better than those for men. Less satisfactory are the rates of social return for women university graduates. Social return measures the yield obtained from investment by the community in provision of facilities. For this purpose, the costs of providing higher education include the direct capital costs of buildings and equipment and the recurrent costs of labour and consumables; indirect costs are the loss of wealth that would have been generated by those removed from the labour force by virtue of extended education. For university graduates at their current levels of participation in the labour force, previous study²⁸ has shown that rates of social return for women are restricted to about 5.4%, below the value for men (5.9%). In contrast, social return for women college graduates is higher (6.2%) and substantially larger than that achieved by men, suggesting a continuing social advantage in provision of resources for women in junior colleges.

Until recently, this advantage appeared to be reflected in student preferences. In the past, substantially more women entered junior colleges than universities. Since 1993, numbers of women in junior colleges have declined while enrolment in universities has increased¹. By 1996 more women entered universities than junior colleges and the number of women enrolled in universities (4 year) is now more than twice the number in junior colleges (2 year). Significantly more parents²⁷ now also wish their daughters to attend university (40%) than junior college (29%). Evidence for a perception of direct economic advantage for this trend is slender and

appears to be limited to a better opportunity for women university graduates to obtain employment in popular sectors. Rates of return for women graduating from private universities are similar to those from junior colleges; and cumulative average earnings for women university graduates only exceed those for junior college graduates after the age of 33 years.

This suggests that aspiration, opportunity and equality exercise considerable influence in the preferential selection of university education. These factors may also be important in subsequent patterns of employment. Professionally and technically qualified women are more readily assimilated into existing career structures, encouraging employment for extended periods. Moreover, the established social assumption that married women seek employment only from economic necessity has diminishing relevance²⁷. Already amongst women married to salaried workers, over half of those currently in employment indicate that they choose to work for reasons of personal satisfaction or professional achievement rather than financial need.

6. Future trends.

Three aspects of the changes that have affected women during the past half century might be characterised as: participation, parity and opportunity. Progress in all three has been substantial and will undoubtedly continue. Coupled with growth, increased social, economic and legislative pressure over the next 20 years will support extension of equality of opportunity and participation in the labour force; demography may well ensure their delivery. The accompanying progress towards parity of earnings is likely to be slower. At one level it will be facilitated by structural change towards merit-based systems and wider differentials for expertise; but extension of full-time and part-time women's jobs and continuation of social payments to men are likely to impose upper limits²³.

Average earnings for women will inevitably increase over the next 20 years by virtue of an increase in the proportions of UC graduates and retirement of low-paid JHS leavers from the labour force. By the year 2016, those now in the labour force of ages 20-39 years will have become 40-59 years old. With only a conservative assumption that rates of participation in the labour force will remain as stable as they have over the past 20 years, that segment of the labour force is already established. It implies that the proportion of women UC graduates in this age-range in the labour force will increase to 39%; and the proportion of those from JHS will decrease to 5%. The numbers of women who will be of ages 20 - 39 years in the population of 2016 is also already known²; the composition of this segment of the labour force is uncertain only to the extent that participation rates and education policies change. Two models were used to simulate possible changes in educational provision. One represents a highly conservative model in which the overall proportion of women receiving higher education is held at the

present level¹ (about 40%) but allows the number of university women to increase, and of junior college students to decrease, at about 2% p.a.; the second model allows the participation rate for higher education for women to rise to 50% by means of growth in university numbers by about 4% p.a. and a decrease in junior college numbers by 2% p.a.. For both models, the rate of decrease of those entering the labour force at the end of compulsory education (JHS) was set at -2% p.a. Then, even on the unlikely assumption that labour force participation does not increase, by 2016, the proportion of UC women graduates in this segment of the labour force will rise to 37% (model 1) or 46% (model 2). Results for the whole population are in Table 10.

Table 10. Composition of the Labour Force. Women in Japan, 1990-2016^{a,b}

Labour Force	Junior High School	Senior High School	Junior College	University
1990				
Employed Women	23%	53%	17%	7%
Women Employees	20%	53%	19%	8%
1996				
Women Employees	19%	57%	19%	6%
2016				
Employed Women				
Model 1	5%	58%	22%	15%
Model 2	4%	54%	23%	20%
Women Employees				
Model 1	4%	57%	23%	16%
Model 2	4%	52%	23%	21%

^a Composition of the labour force calculated from rates of age-participation in employment and as employees from the 1990 Census and aggregated over the age-range 20-59 years. Figures for employees in 1996 taken from the Basic Survey on Wage Structure [Reference 4].

^b Average scheduled earnings calculated for each educational level at each age by using average earnings for 1996 uncorrected for hours worked and experience. Earnings were aggregated over the age-range 20-59 and combined in the proportions indicated for employees and employed women. The results showed little variation: employed women, model 1, ¥(000), 238(increase 13%); model 2, 242 (15%); employees,

Over the 20 year time span, divergence between the two models is small. Statistically, JHS leavers are replaced by UC graduates in the labour force. This change in education-mix will raise average earnings for women by 12%-14%. As JHS leavers constitute a smaller proportion of men in the labour force, and the numbers of men university graduates are likely to increase less than those of women, the average earnings of women will increase relative to

those of men. On the assumption that the existing differentials in hours of work, age and experience persist, and at 1996 levels of earnings, these changes would raise the conventional figure for international comparisons of the average earnings of women relative to men to about 70%. Increases above this level will indicate progress towards equality of opportunity, participation and earnings.

It is unlikely that changes in earnings will be restricted to these levels even if no more substantial educational innovations occur. Other fundamental changes will have important effects during the next 20 years. Contraction of the labour force² by about 8 million (14%) will more than absorb any reduction in employment from industrial and commercial restructuring; and even with devices such as delayed retirement a shortfall in the labour force will occur. Recurrence of increased demand for women employees, which accompanied economic growth in the 1960's, will inevitably again create additional opportunities for extended participation by women in the labour force.

Structural change due to loss of JHS leavers from the labour force seems unlikely to aggravate this situation as it is already being discounted in industry⁴. The largest employer of women JHS leavers has been manufacturing industry. Thirty years ago almost all women employed as production workers were JHS leavers (88%); by 1976, the proportion had fallen to three-quarters; by 1996 the proportion was less than half and, in the larger companies, less than a quarter. This has accompanied major technological change, general decline in the economic dominance of manufacturing industry³, and a reduction in the proportion of the labour force it employs (women, 1976, 41%; 1996, 30%). Conversely, growth of employment for women in services (1976, 19%; 1996, 33%) is almost entirely due to the proportions of UC graduates (1976, 19%; 1996, 45%).

Of much greater concern is the apparently irreconcilable immediate need for greater participation by women in the labour force and the long-term requirement to raise the birth-rate. These two imperatives are closely connected. Marriage and commencement of a family is seen to be in direct conflict with the immediate advantage of remaining single and in full-time employment. Even though marriage remains the social norm, it occurs at increasingly later ages⁹. Extensive evidence of the economic benefits from marriage²⁹ do not outweigh a widespread perception that marriage imposes financial and personal constraints²⁷ especially on women. Moreover, a preference²⁷ for later and smaller families on grounds of cost appears to reflect economic realities. Direct costs of child rearing have increased in nuclear families⁹ as have the opportunity costs imposed on women. While men's earnings increase on average after marriage, earnings for women decrease and for women with children they decrease further³⁰. The most promising legislative compromise may lie in a massive injection of funding for child-care facilities. Although in the short-term this might tend to extend persistence of low pay for

part-time workers, overall it might be expected to provide an effective means of resolving the conflict and actually accelerate implementation of policies on equal pay.

References and Notes

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4. Ministry of Labour, Basic Survey on Wage Structure, 1996, Ministry of Labour, Japan (1997 and other years).
5. e.g. Statistics Bureau, Management and Co-ordination Agency, Japan Statistical Yearbook 1998, Statistical Handbook of Japan, 1998, Japan Statistical Association (1998) Tokyo.
6. e.g. Statistical Yearbook, 42nd Issue, United Nations (1997) New York; Yearbook of Labour Statistics, International Labour Office (1996) Geneva; OECD, Economic Survey of Japan, 1996, OECD (1996) Paris.
7. The alternative of correcting average earnings of men to the average age for women gives an earnings ratio which is closely similar but differs slightly because it corresponds to a different average age. The apparently simple procedure of using women's average earnings at men's average age would introduce an error of averages: the average earnings of men at men's average age (Y 6.28 M) differ from the average earnings of men (Y 5.67 M)].
8. M. Blaug, An Introduction to the Economics of Education, Penguin Books (1970).
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10. It is tempting to attribute this growth to the first legislation for equal opportunities in the workplace in Japan (1986); but it seems more likely that it reflects the impact of the oil crises in the period 1976-85.
11. Ratio of women's to men's earnings 1976, JHS, 63%; SHS, 77%; College, 86%; University, 85%. Average ages in 1976 differ from those in 1996 used in Table 2, and the results are not directly comparable.
12. In 1960 p-t work was identified as entailing up to 34 hours per week; at that time an accepted full working week in industry comprised 35 - 59 hours. With these criteria, about 7% of women employees in industry worked part-time; and about 25% of all family workers worked part-time. About half of all women family workers worked between 35 and 59 hours per week at this time and the remaining quarter worked 60 hours or more per week - which

may suggest one reason for the relative attraction of work in industry (Population Census of Japan, 1960).

13. In the manufacturing and service sectors, p-t employees constitute about one-quarter of all women employees and about one-third of those women employees who are SHS leavers. In the wholesale and retail trades employment is dominated by p-t employees: 47% of all women employees are part-time; and they constitute 60% of women employees in this sector who are SHS leavers.
14. At initial employment, educational attainment produces no substantial differences in earnings for either women or men in Japan (¥ 3.0 +/- 0.3 million). This may well be a measure of the minimal differences in productivity achieved by employees initially, irrespective of educational background. But as formal education can be regarded as portable pre-employment training for which students, their parents and taxpayers carry the costs, it is more reasonable to relate this to differences in training provisions. In particular, university graduates, receiving training which in part at least will prove portable, obtain earnings similar to those of high school leavers of the same age. It is though perhaps significant that while the average annual earnings of men university graduates in the age range 20-24 years are lower than those of high school leavers, those of women graduates are higher.
15. Cross-sectional data for 1996 were used in this analysis. Generally similar results are shown by using data for 1976 cross-sectionally. It is possible to make quasi-longitudinal comparisons across the period 1976-1996. This does though require substantial correction - for conditions of employment as well as for the effects of productivity change and inflation - to permit proper comparison. A limited number of trial comparisons were made to establish that the effects appeared to be valid over time as well as cross-sectionally.
16. Earnings for p-t women employees show rates of change with age -0.3% per annum, and with experience, 1.9% per year.
17. The survey (reference 4) does not provide data in a form useful for analysis with respect to location. No attempt was made to assess this effect explicitly. It may be expected that the effects of location will be contained mainly in factors for industry and size of company.
18. e.g. R.L.Oaxaca, *International Economic Review*, 14, 693 (1973); R.L.Oaxaca and M.R. Ransom, *J.Econometrics*, 61, 5 (1994); A.S.Blinder, *J.Human Resources*, 8, 436 (1973).
19. K.J.Morgan, *Bulletin of the University of Electro-Communications*, 8, 221 (1995).
20. The equation corresponding to linear increases in earnings is $(E_n - E_0) = m(E_n - E_0)^{ref}$. In practice it is convenient to plot $E_n = E_n^{ref} + d$, where E_n are earnings at age n . The earnings coefficient, m , and the intercept, d , are related by $d = 2.84(1 - m)$. This allows the equation for increases in earnings to be rewritten with $E_0 = E_0^{ref} = 2.84$, i.e. intersecting at the point A corresponding to a common level shared by all employees at an age of about 22 years. The fit

is good ($r = 0.97$) for a high proportion of the data with the notable exceptions of anomalies discussed in note 21.

21. The coefficient obtained directly from the earnings data for “all women” employees has a value of 0.20—well removed from the value of 0.44 indicated by other data; it also demonstrates poor linearity ($r = 0.73$). The cause of the anomaly lies in the change in the education-mix : from a majority in the age range 20-29 being UC-graduates (52%) to a large majority being HS-leavers (89%) by the ages 45-59 years. From the results in Table 7 it would be expected that this change in population mix would alter the apparent coefficient from 0.53 (20-29 years) to 0.32 (45-59 years) but the line of best fit would have a lower gradient by virtue of the curvature. Similarly reduced linearity is found in data for “all women” employees in a number of industries and in the category of company size; better estimates of these coefficients are available by means of the parameters in Table 7. No similar problem occurs with men’s earnings as their education-mix remains effectively constant throughout working life. Splitting the data for women into the two categories, HS and UC removes the anomaly and increases the precision of linearity in the earnings data ($r > 0.9$ - for education parameters and most composite coefficients, correlations for women employees lie in the range 0.94 -0.99 and are similar to those for men).
22. High relative increases in average earnings may be due to an inherent advantage of gender, education, size of company, or industry: this is reflected in higher increases for individual employees and higher probability of employment for those in the advantaged groups. It also arises from the presence of more employees in higher-earning categories in particular sectors but this does not raise the increases in earnings of individual employees. In manufacturing industry, employment of a high proportion of women high-school leavers by small companies reduces the average level of earnings’ increases; conversely, high increases in average earnings in the finance sector of industry are due in part to the high proportion of men university graduates employed in large companies. These variations in populations alter the apparent relative increases of earnings but do not affect the increases for individual employees.
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教育の経済（パート5）

—— 日本における女性の教育・収入・平等性 ——

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この半世紀、労働力に占める女性の数は教育機会の拡大とともに増加し続けてきた。教育機会の増大ではなく、人口の増加が雇用に占める女性の数の増加の原因である。教育は女性労働者の増大に大きく寄与してきたし、サービス分野で顕著なように、専門的・技能的資格を備えた女性の数が増大している。女性の平均収入は増加してきたが、男性の平均の59パーセントでしかない。この数字は、男性と女性の、年齢、経験、教育、労働時間の相違を考慮にいれていないので、これらの相違を勘案すると、女性の平均収入は男性の72パーセントとなる。収入格差の主要な要因は、就職後の研修機会の相違による。一般的に、大卒者が高卒者より男女の収入格差が少ないように、教育が高ければ高いほど格差は少なくなる。女性は就職直後は、男性とほぼ同じ収入を得ているが、徐々に格差が広がってくる。収入に関わる相関係数によると、格差の主要要因は、性・教育・就労分野・企業規模である。高卒者については、製造業、金融業、輸送業の分野について性差による収入格差が顕著であるが、大卒者については顕著な差は見られなかった。分析によると、男性より女性の方が、大卒資格の有無による差違が大きい。女性にとって高等教育による経済的利便性は、多くの大卒女性が労働市場から早々に撤退してしまうことを斟酌しても、収入の高さに反映される。将来においては、人口統計学的要請により、社会的・経済的要因が女性の教育機会の増大及び参加をもたらすであろうが、子育てを援助する社会の受け皿といった政治的要求への論争もひき起こすであろう。

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