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THE LABOR SUPPLY MECHANISM OF EMPLOYEE HOUSEHOLDS

by

Yoshio Higuchi

Introduction

This paper examines factors affecting the decision by the non-principal earners of a household to participate in the labor force. The model is designed to use micro data obtained from the 1974 Employment Status Survey (Shūgyo Kōzō Kihon Chōsa) and the 1974 National Survey of Family Income and Expenditure (Zenkoku Shōhi Zittai Chōsa).

In the United States, the labor supply analysis using micro data has been promoted by many scholars since the 1960s with increasing sophistication both in terms of theoretical and econometrics analysis. (For more details refer to another of the author's paper.¹⁾) In Japan, however, only a few similar analyses have been carried out due to various institutional restrictions on the use of micro data. This inavailability of household level data has been one of the reasons for the backwardness of the nation's labor supply analysis. It was fortunate in this case that the analysis of the above micro data was authorized. Still, there were various limitations regarding the data because these two surveys which examined employment status and consumption structure do not provide detailed information on the hourly wage rate and on the working hours for individuals. Under these limitations, I will analyze first, as a basis for future research, factors affecting the decision of non-principal earners to work and the interdependency of family members by comparing and observing household behavior.

In this paper I will carry out a comparative analysis from the following two points of view: the first is concerned with economic factors such as the income of heads of households (principal earners) and asset holding, and the second is concerned with characteristics of households, and the individual members of the households such as the size of municipality where they live, the structure of the household and the family relationship.

The negative relationship between the earnings of principal earners and the labor force participation ratio for non-principal earners has been confirmed by

1) See Higuchi [6].

the work of many scholars including C. D. Long²⁾ since P. H. Douglas posed it in his pioneering work in 1934.³⁾ Also in Japan, this has become one of the reliable empirical findings confirmed in many studies since H. Arisawa confirmed it in 1956.⁴⁾ The observations of Douglas and his followers are summarized as follows:

(1) The decision of family members to participate in the labor force is made only after considering their relationship to others in the social unit known as the household. It is instructive to think of a household, rather than the individual, as the behavioral unit within which family members decide to enter into market.

(2) There is one principal earner in a household. The labor force participation ratio for non-principal earners varies depending on the income of the principal earner in a negative fashion. This means that when primary earners get higher income, the labor force participation ratio for their wives or children become lower. Here we call the above finding the first law of the participation laws as Kōtarū Tsujimura did in 1959.⁵⁾

First, I will set up the theoretical framework which explains fluctuations in the labor force participation ratios along the lines of the findings of Keiichirō Obi (1962⁶⁾ and 1969⁷⁾). Second, the first law of the participation laws will be examined by a statistical method applied to the most recent data, and I will give further support to the empirical finding using the theoretical framework established. Third, I will discuss the influence of characteristics of households and family members, and asset holding on the labor participation ratio for non-principal earners. When any significant gap of influence between these factors is proved, I will analyze structural factors behind it by examining results of statistical tests within the theoretical framework.

Section 1. Theoretical Framework to Determine the Job Participation Ratio

In this section, I will discuss theoretical framework for the determination of the job participation ratio.

The job participation ratio is defined as the ratio of the number of persons

2) See Long [9].

3) See Douglas [3].

4) See Arisawa [1].

5) In Japan, we called the negative relation between principal earners' income and the job participation ratio for non-principal earners the first law of the participation laws in comparison with the second law that the job participation ratio for households in the same income bracket will rise as the wage rate for non-principal earners increases. I could not test the second law in this paper due to the lack of information about the wage rate in the Employment Status Survey used. See Tsujimura, Sasaki, Nakamura [13].

6) See Obi and Ozaki [11].

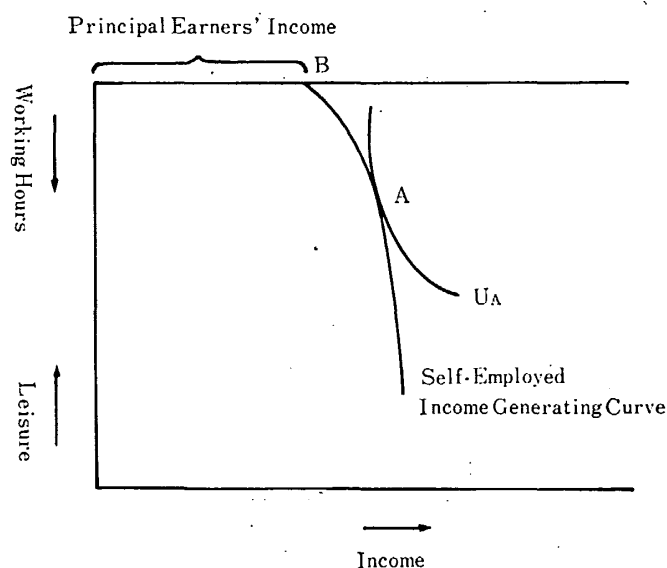
7) See Obi [12].

with job to the number of entire persons in the group. Here I classify people with a job into two categories; the first is hired labors and the second includes self-employed workers, family workers, and homehandikraft workers. We cannot deal with the mechanism of job participation for the two groups of workers within the same framework, because the former decides on whether or not they will accept employment depending on working hours and wage rates offered by employers, whereas the latter can select working hours according to their own will. The households I will discuss in this paper are employee households (wage-earning households) whose principal earners are hired laborers. I will examine which one of the following forms the non-principal earners will select: 1) to work as hired laborer, 2) to work in a family business, and 3) not to participate in labor force. I will explain the reasons for their selections based on a preference index which has income and leisure time as its explanatory variables.

Unlike in the case of hired workers, the income and leisure time for self-employed home industry workers, who can select optimal working hours, are determined at the maximizing point of preference index on the self-employed income generating curve, which is the intersection of the self-employed income generating curve and the indifference curve in Figure 1. The self-employed income generating curve indicates the relationship between income of home industry laborers and working hours. This curve, with a given production function, shifts with the potential capital stock available to self-employed home industry workers.

On the other hand, hired workers must accept the entire employment package of wage rates and working hours assigned by enterprises. Given this framework, non-principal potential earner either accepts or rejects the entire employment package of wage and assigned hours of work. This means that her hours

Figure 1. Self-employed Income Generating Curve and Self-employment



of work will either be the fixed number given in the offer of employment or zero. Let the assigned hours work be \bar{h} and the hourly wage rate be \bar{w} , the preference index is indicated as the curve U_c passing through point C in Figure 2.

As indicated in Figures 3, 4 and 5, the choice of non-principal earners among working in family business, working outside, and non-participation, is determined by the relative position of preference index on the indifference curve passing through points A (showing family business), C (showing employment outside), and B (showing non-participation). The relative position varies depending on the shape of the indifference curve of households, the available amount of capital for self-employed income generating, prices of products, assigned hours of

Figure 2. Employment Conditions Offered and Hired Employment

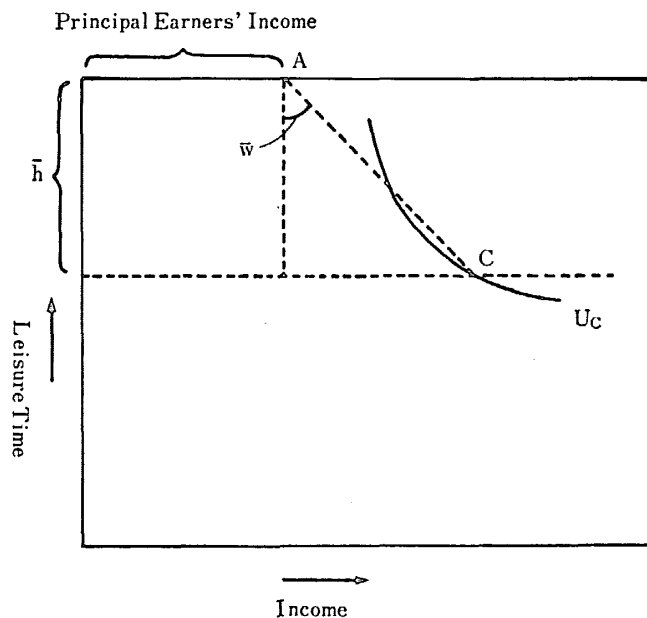


Figure 3. Households with Employed Non-principal Earners

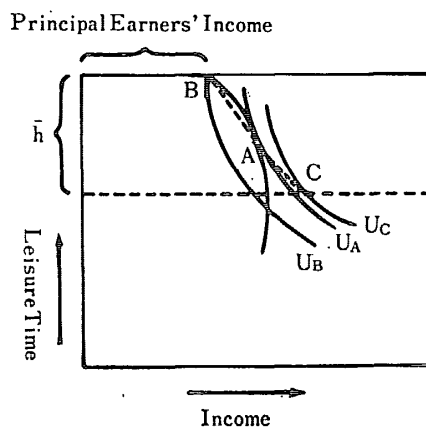


Figure 4. Households with Self-Employed Non-principal Earners

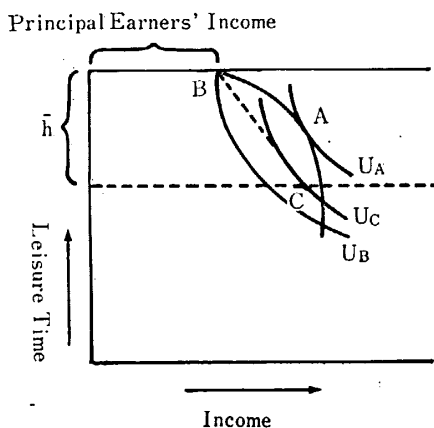
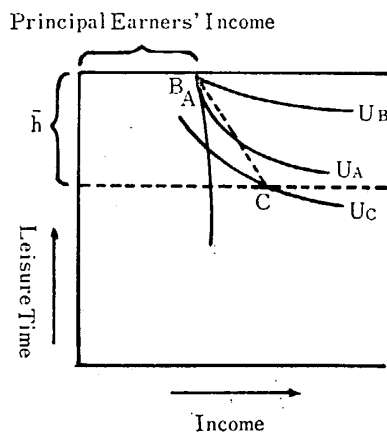


Figure 5. Households with Non-Working Non-Principal Earners



work, wage rates and the principal earners' income.

To study the employee participation ratio (the ratio of hired employees to population in each group), we should take into account the characteristics of the potential employers. Here I call such hourly wage rates that make the preference level for accepting the employment equal to that for rejecting it when the given working hours are assigned from the firm the reservation wage rate, W_r , as Keiichirō Obi did in 1962. So, if the preference level associated with working in a family job is higher than that which is given on not working, the reservation wage rate is such a wage that will give an equal preference level with the level associated with working in a family job. And if the preference level on not working is higher than that on working in a family job, the reservation wage is such one that will give an equal level with that on not working. The preference field is generally considered to be affected by characteristics of decision such

as the structure of household F_e , the number of infants N_e , relations of non-principal earners to the principal earner C_n (wife, daughter, etc.), age A , and educational background C_e . (These factors will be examined by statistical data in the following sections.) Since other factors such as principal earners' income, I , available capital stock for self-employed income generation, K , and non-earned income, N_e , affect the reservation wage rate through the preference level at which job offer was rejected, the following equation should hold:

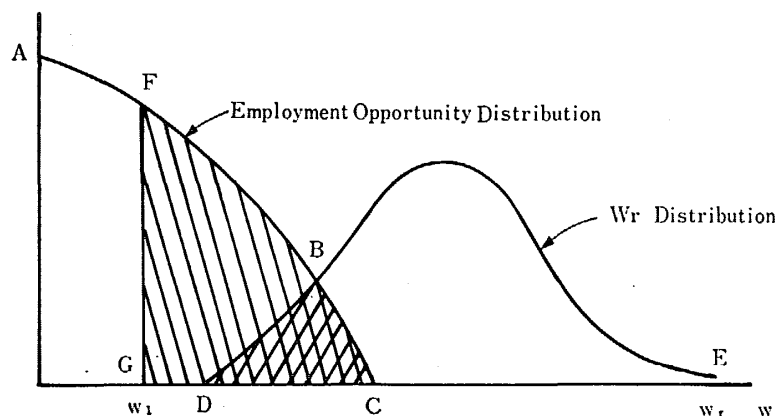
$$W_r = f(\bar{h}, F_e, N_e, C_n, A, C_e, I, K, N_e)$$

When we examine a group of N households for where the characteristics described above are equal, they will have a similar reservation wage rate. Accordingly, if the assigned working hours is \bar{h} , and the number of employment opportunities n , which offer the wage rate W ($W > W_r$), is larger than N , the employee participation ratio μ is one, and $\mu = n/N$ when n is smaller than N .

When we examine a group of households, some of their characteristics determining W_r are different, their reservation wage rates have a statistical distribution. Let us take households with different educational backgrounds for example. Assuming that higher education means higher W_r , W_r is distributed according to the distribution of C_e as in Figure 6. As supposed before, the area below the curve DBE is N . Let us examine the distribution wage rates which we have designed "potential employment opportunities" (curve ABC). The area FGC in Figure 6 shows the size of employment opportunities which offer wages higher than W_1 . If we examine employment opportunities and wage rates with understanding that people with better educational backgrounds are employed with higher wage rates, it proves clear that out of N non-principal earners, m non-principal earners, (the area BCD), conclude a employment contract. Hence, the employee participation rate, μ , is m/N .

If the first law of the participation laws is also true with the employee participation ratio for the group of households with increased principal earners'

Figure 6. Reservation Wage Rate Distribution and Employment Opportunity Distribution



income, the distribution of the reservation wage moves rightward as shown in Figure 7. This implies that the employee participation ratio declines as the principal earners' incomes rise when other factors are equal. In contrast, if employment opportunities increase as in Figure 8, the employment opportunity curve shifts from ABC to A'B'C', raising the employee participation ratio as indicated in the increase of area from BCD to B'C'D. As I have confirmed so far, we should note that the employee participation ratio is affected by factors on the part of employers.

Figure 7. Principal Earners' Income and the Employee Participation Ratio

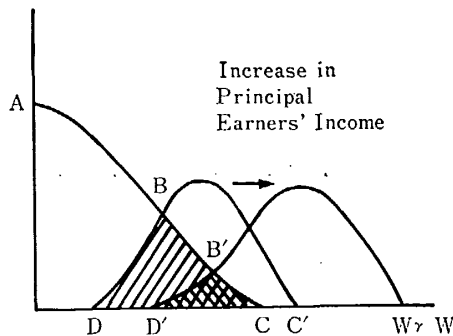
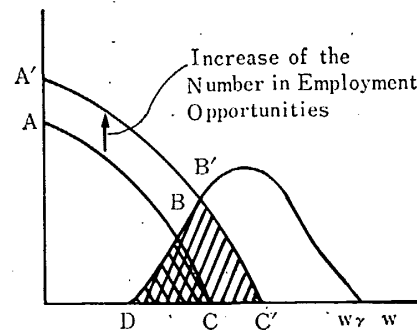


Figure 8. Employment Opportunities and the Employee Participation Ratio



Section 2. The Method for Analysis

In the case of regression analysis, there are several aspects to be considered before undertaking it: the problem of specification, that is which one of the linear or non-linear regression equations should be adopted, estimation problems such as multi-collinearity, and the size of the sample.

Then, the purpose of this analysis is to obtain information to build a proper theoretical framework as a first step for a future analysis. I selected households for where the characteristics influencing the labor supply of their members are most similar among the households in the 1974 Employment Status Survey and 1974 National Survey of Family Income and Expenditure. I will test how each factor influences the labor supply of household members by examining the participation rates for households for whom all but one of the above factors are equal.

In this analysis, I will conduct tests of significance by the following four statistical methods. The first method analyzes the influence of principal earners' income and financial assets on the decision of non-principal earners to work. Sample households whose characteristics are equal, satisfying the norms to be described later, are tabulated as Table 1.

Table 1. Table for Testing

Principal earners' income class	I	II	III	IV	V	VI	VII	Total
The number of working non-principal earners	E_1	E_2	E_3	E_4	E_5	E_6	E_7	E
The number of non-working non-principal earners	U_1	U_2	U_3	U_4	U_5	U_6	U_7	U
The number of samples	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N
Average income of principal earners	I_1	I_2	I_3	I_4	I_5	I_6	I_7	\bar{I}

Concerning the table, the following equations are established:

$$P_{i1} = E_i/N \quad (i=1, \dots, n)$$

$$P_{i2} = U_i/N \quad (i=1, \dots, n)$$

$$P_{i\cdot} = N_i/N \quad (i=1, \dots, n)$$

$$P_{\cdot 1} = E/N, \quad P_{\cdot 2} = U/N$$

Let population parameters corresponding to P_{ij} , $P_{i\cdot}$, $P_{\cdot j}$ be p_{ij} , $p_{i\cdot}$, $p_{\cdot j}$ respectively, and the hypothesis H_0 and the alternative hypothesis H_1 stand as follows:

$$H_0 ; p_{ij} = p_{\cdot j} p_{i\cdot} \quad (i=1, \dots, n, j=1,2)$$

$$H_1 ; p_{ij} \neq p_{\cdot j} p_{i\cdot}$$

If H_0 is strictly true with selected samples, the equations should hold $P_{i1} = E_i/N = (E_i/N_i) (N_i/N)$ and $P_{\cdot 1} P_{i\cdot} = (E/N) (N_i/N)$. Hence, if $P_{i1} = P_{\cdot 1} P_{i\cdot}$ is true, then $E_i/N_i = E/N$. This means that the employment participation ratio is equal among each class of households.

The independence between principal earners' income or financial assets of households and the job participation ratio will be examined by a χ^2 . Let us define the statistic W as follow: $W = \sum \{ (E_i - EN_i/N)^2 / EN_i/N + (U_i - UN_i/N)^2 / UN_i/N \}$. If H_0 is true, W is asymptotically distributed as a χ^2 with the degree of freedom is equal to $n-1$ where the sample size is large. I will test independence by using this χ^2 test.

By the second method, I will conduct significance tests for the correlation coefficients to ascertain whether the correlation between principal earners' income or financial assets and the job participation ratio for non-principal earners are positive or negative. For example, let the correlation coefficient for the average income of principal earners in households in Table 1, I_i ($i=1, \dots, n$) and the job participation ratio for wives, E_i/N_i (i), be r . When the sample correlation coefficient, r , is positive (ρ shows the true correlation coefficient), let the hypothesis H_0 , and the alternative hypothesis H_1 , be as follows: $H_0; \rho=0$, $H_1; \rho>0$. When r is negative, we set up H_0 and H_1 as follows: $H_0; \rho=0$, $H_1; \rho<0$. When I define statistic t as $t=r\sqrt{(n-2)/(1-r^2)}$, t obeys that t distribution with the degree of freedom, $(n-2)$, when H_0 is true. I will test above

hypotheses referring to such a statistic.

The third method is to examine the difference in the job participation ratio influenced by characteristics of households and their individual members including the size of municipality where they live, the structure of households and the relationship of family members to the head of the household. Take the family relationship as an example. Let us sample households for whom the factors influencing the rate of participation for their non-principal earners are equal except for the relationship of the non-principal earners to the heads of households. Table 2 compares the job participation rate for wives with that for daughters in households by heads' income class. We will examine, for instance, a group of type C households in one of the four largest cities, consisting of husband, wife and children, whose wives or daughters are in the age group between 25 and 39. In this comparison, the observation in the following section that principal earners' income reduces significantly the job participation ratio for non-principal earners will be used.

Let the population's participation ratio for wives and that for daughters in households of heads' income class i be l_{i1} , and l_{i2} respectively. Assuming that $H_0; l_{i1} = l_{i2}$ ($i = 1, 2, \dots, 7$) and $H_1; l_{i1} \neq l_{i2}$ should be tested, and let us define statistic W as follows: $W = \sum (L_{i1} - L_{i2})^2 / \{L_{i1}(1 - L_{i1})/N_{i1} + L_{i2}(1 - L_{i2})/N_{i2}\}$. If H_0 is true, as N_{i1} and N_{i2} grow bigger, the distribution of W obeys asymptotically the χ^2 distribution with seven degrees of freedom. Hence, H_0 can be tested by the χ^2 test.

By the fourth method, I will examine whether or not home ownership, or plans to purchase a house affect the job participation ratio for wives. I select a sample of households whose characteristic affecting the wives' decision to work are equal. Then I divide these households into two groups; a group of households that own their home which we call "home-owners" and a group of households that rent their home which we call "renters". Let the job participation ratio for the former sample and that for the latter be L_1 , and L_2 respectively, and the num-

Table 2. The Effect of Family Relations on the Job Participation Ratio

Household head income class		I	II	III	IV	V	VI	VII
Relation to household head; wife	The number of samples	N_{11}	N_{21}	N_{31}	N_{41}	N_{51}	N_{61}	N_{71}
	The number of working wives	E_{11}	E_{21}	E_{31}	E_{41}	E_{51}	E_{61}	E_{71}
	Job participation ratio	L_{11}	L_{21}	L_{31}	L_{41}	L_{51}	L_{61}	L_{71}
Relation to household head; daughter	The number of samples	N_{12}	N_{22}	N_{32}	N_{42}	N_{52}	N_{62}	N_{72}
	The number of working daughters	E_{12}	E_{22}	E_{32}	E_{42}	E_{52}	E_{62}	E_{72}
	Job participation ratio	L_{12}	L_{22}	L_{32}	L_{42}	L_{52}	L_{62}	L_{72}

ber in each sample be N_1 , and N_2 respectively. Also let the job participation ratio for the population of home-owners and renters be l_1 and l_2 . Let us establish the hypothesis H_0 and the alternative one H_1 as follows: $H_0 ; l_1=l_2$, $H_1 ; l_1>l_2$. I will test the difference of significance between L_1 and L_2 in the population by taking advantage of the fact that the difference, L_1-L_2 , obeys approximately the normal distribution, $N(l_1-l_2, l_{11}(1-l_1)/N_1+l_1(1-l_2)/N_2)$.

I have described four statistical methods by which I will test influence of economic factors and household characteristics on the non-principal earners' decision to work.

Table 3 shows the norms for division of each variable for the 1974 Employment Status Survey and National Survey of Family Income and Expenditure.

Section 3. Principal Earners' Income and the Job Participation Ratio for Non-Principal Earners

In this section, I will determine whether the so-called first law of participation laws, that increases in principal earners' (heads of families) income reduces the job participation ratio for wives or daughters, is true with a group of households, their and their members' given characters being equal, by the first and second methods described in the previous section.

I select wives, daughters or parents of principal earners from micro data obtained by the 1974 Employment Status Survey for whom affecting the job participation ratio such as the type of households, children, the size of municipality where they live, the income of wives or daughters and their age are equal on the basis of the norms given in Table 3. The job participation ratio for given non-principal earners in each group of households will be studied by tabulating the available data as in Table 1. Let us take as an example wives in type C households in one of the four largest cities whose children did not worked or earned an annual income of less than 500 thousand yen and who do not have any children under five years of age. The job participation ratio for wives in each group of households can be obtained from a table such as Table 1. The number of tables available is 168 ($2 \times 7 \times 2 \times 3 \times 2$) which is the multiplication of the numbers of classifications for each factor. Of 168, those whose sample size is less than 20 in any income class were excluded because their job participation ratio becomes unreliable. As a result, the remainder is 56. The data used here micro data obtained from the 1974 Employment Status Survey, which selected by random sampling 74,956 households.

The results of the test on 56 tables by the first method of investigating whether principal earners' income and the job participation ratio are independent of each other are shown in column 7 of Table 4. In 31 out of 56 tables, the hypothesis that the job participation ratio for non-principal earner is equal in each group which is divided by the norm of principal earner's income is rejected at a significance level of at least five percent. Furthermore, a comparison of

Employment Status Survey		National Survey of Family Income and Expenditure	
Relation to principal earners	Wife, unmarried daughter, parents of principal earners	The number of household members	2, 3 & 4, 5 to 7
Annual earned income of wives or daughters	More than or less than 500 thousand yen (including non-working wives or daughters)	Type of house tenure	Owned house, rental house
		House purchase plan	Planning or not planning
		Financial assets	Class 1 less than 200 thousand yen Class 2 between 200 & 600 thousand yen Class 3 between 600 thousand & one million yen Class 4 between one & 1.5 million yen Class 5 between 1.5 & 2 million yen Class 6 between 2 & 3 million yen Class 7 between 3 & 5 million yen Class 8 more than 5 million yen

wives and daughters confirmed the following points:

(1) It is clear that principal earners' income and the job participation ratio for daughters are not independent of each other when wives don't work or their income are low, but when wives' income are high, there are many cases in which either the degree of significance declines or the independency is not rejected.

(2) It was not always observed that the significance of the job participation ratio for wives differs depending on income of children.

Behind these phenomena might be the fact that unlike the obvious influence of wives' income on the job participation ratio for daughters, the difference in the ratio for wives and that for daughters in the same households reflects the difference in influence of each others' income on each others' job participation ratio.

When I test significance by age of wives, although there are many cases in which the independence of principal earners' income and the job participation ratio for wives in the age group below 54 is obviously rejected, the significance for wives over 55 years of age declines markedly, and most those cases do not reject the independency.

Next, we will discuss whether there is a negative causal relationship between the principal earners' income and the job participation ratio for wives or daughters based on the second method in the previous section testing the significance of the correlation coefficients. It is clear from the previous test of independency that both are not independent of each other, but it is not confirmed whether their relationship is positive or negative. Columns 8, 9 and 10 in Table 4 indicate the correlation coefficients and their statistical significance. The first row in the table shows the correlation coefficient r , and the t -value of the average income of principal earners and the job participation ratio for daughters in age group 15-19 in type C households in one of the four largest cities with wives' income of less than 500 thousand yen per year. It can be seen from the table that 50 out of 56 tables show negative correlation coefficients, 30 of them reject the hypothesis that the correlation coefficient is zero at a significance level of at least 5.0 percent. This test also confirmed that the influence of wives' income on the job participation ratio for daughters is different from that of the children's income on the same ratio for wives. Likewise, it was observed that the negative effect of principal earners' income varies with the age of non-principal earners.

Test of job participation ratio for the non-principal earners sampled, other factors affecting their labor supply being equal, thus confirmed that the first law of participation laws that principal earners' incomes have a negative influence on the labor supply of non-principal earners.

Table 4. Results of a Test on the Relationship between Principal Earners' Income and the Job Participation Ratio for Non-Principal Earners

Size of municipality where households locate	Type of households	Age	Relation of non-principal earners to principal earners	Income level of wife or children	Independency test		Correlation coefficient test		
					W	Significance	r	t	Significance
The four largest cities	Type C	15-19	Daughters	Low	56.3218	0.5%	-.84994	-3.60715	1.25%
			High	10.9711	-.82892				
		20-24	Daughters	Low	77.2640	0.5	-.89837	-4.57344	0.5
			High	13.3041	-.70963				
		25-39	Daughters	Low	27.4737	0.5	-.75449	-2.57058	5.0
			Wives	6.2967	-.32380				
		40-49	Wives	Low	52.7513	0.5	-.94636	-6.54929	0.5
			High	25.7019	-.84055				
	50-54	Wives	Low	31.3277	0.5	-.70683	-2.23430	5.0	
		High	35.6409	-.66105					-1.97000
	55-59	Wives	Low	8.3718	0.5	-.46690	-1.18061	0.5	
		High	6.1812	-.63816					-1.85344
	60	Wives	Low	5.5967	2.5	-.00630	-0.01408	0.5	
		High	14.8455	-.00637					-0.01423
	Type P	15-19	Daughters	Low	14.5267	2.5	-.90571	-4.77766	0.5
			Low	19.0752	-.94037				
20-24		Daughters	Low	13.0426	5.0	-.48596	-1.24333	5.0	
		Wives	7.5183	-.67094					-2.02328
25-39		Wives	Low	24.5787	0.5	-.88053	-4.15385	0.5	
		High	26.8996	-.47946					-1.22167
40-49		Wives	Low	17.6190	1.0	-.67033	-2.01989	5.0	
		High	13.4013	-.67238					-2.03119
50-54	Wives	High	7.6418	5.0	-.08957	-0.20109	5.0		
	High	7.5331	-.27232					-0.63284	5.0
55-59	Wives	High	4.7883	5.0	-.38700	-0.93849	5.0		
	Parents	High	4.7883					-.38700	-0.93849

Size of municipality where households locate	Type of households	Age	Relation of non-principal earners to principal earners	Income level of wife or children	Independency test		Correlation coefficient test		
					W	Significance	r	t	Significance
The other areas	Type C	15-19	Daughters	Low	37.6452	0.5%	-0.76143	-2.62652	2.5%
				High	5.0067		-0.81901	-3.19177	1.25
		20-24	Daughters	Low	42.4517	0.5	-0.85085	-3.62109	1.25
				High	4.8648		-0.15505	-0.35094	
		25-39	Daughters	Low	33.0121	0.5	-0.87621	-4.06545	0.5
				High	1.0822		-0.28668	-0.66913	
		40-49	Wives	Low	6.9228		-0.40194	-0.98155	
				High	157.8732	0.5	-0.72098	-2.32651	5.0
		50-54	Wives	Low	50.3040	0.5	-0.54392	-1.44941	
				High	89.2574	0.5	-0.81044	-3.09341	2.5
	55-59	Wives	Low	17.9868	1.0	-0.43454	1.07883		
			High	26.2698	0.5	-0.4050	0.09064		
	60-	Wives	Low	9.3481		-0.80479	-3.03178	2.5	
			High	5.0732		-0.05943	-0.13314		
	Type P	15-19	Daughters	Low	6.1234		-0.83588	-3.40509	1.25
				High	4.2108		-0.88419	4.23252	
		20-24	Daughters	Low	10.0868		-0.84454	-3.52664	1.25
				High	14.0254	5.0	-0.87148	-3.97337	1.25
		25-39	Daughters	Low	17.8636	1.0	-0.74898	-2.52757	5.0
				High	8.9077		-0.24675	0.56935	
40-49		Wives	Low	23.3174	0.5	-0.63463	-1.83625		
			High	95.5325	0.5	-0.81739	-3.17266	1.25	
50-54		Wives	Low	40.8063	0.5	-0.85781	-3.73191	1.25	
			High	13.2292	5.0	-0.66872	-2.01112		
55-59	Wives	Low	10.3941		-0.03229	0.07224			
		High	10.7906		-0.87606	-4.06242	0.5		
60-	Parents	Low	3.1012		-0.73770	-2.44331	5.0		
		High	16.6157	2.5	-0.29313	-0.68558			
			Wives	High	12.4271		-0.88686	-4.29200	0.5
				Low	11.2231		-0.30580	-0.71818	

Note: In column 5, when the participation ratio for wives should be analyzed, "low" shows the households where the annual income for children is less than 500 thousand yen, and "high" shows their annual income is more than 500 thousand yen. And when that for daughters should be analyzed, "low" shows the households where annual income of wives is less than 500 thousand yen.

Section 4. The Effect of Characteristic of Households and Their Members on the Job Participation Ratio for Non-Principal Earners

This section will discuss the influence of characteristics of households and family members on the job participation ratio and employee participation ratio. Among those characters are the size of municipality where the households locate, relationship of family members to principal earners, i.e., whether wife or daughter, type of households, and the income of wives, daughters or parents. I shall then discuss, on the basis of the results determined above, structural factors such as the shape of indifference curve in the theoretical framework observed in Section 1, the effect of the available capital stock on the self-employed income generating curve, and the effect of local demand for labor. The previous third statistical method will be applied in determining factors affecting above ratios.

After sampling from the previous 1974 survey households whose characteristics are equal except the size of municipality where they locate, I will compare the calculated job participation ratio and employee participation ratio for the four largest cities with those for smaller cities. In doing so, I will exclude cases with fewer than 20 in the sample in view of the possible unreliability data.

4-1. Size of Municipality Where Households Locate.

Among the factors described in Section 1, the size distribution of employment opportunities (see Fig. 8) and capital stock, such as farms available for generation of self-employed income differ depending on whether the households locate in the four largest cities or in smaller cities. Accordingly, these factors seem to cause a difference in income generating curve (see Fig. 1). As evident in the vacancy rate (the rate of number of job offers to that job seekers) and the unemployment rate, employment opportunities are relatively abundant in the four largest cities. In smaller cities, in contrast, there are many employee households with arable land, and amount of arable land area is large. It goes without saying that households in small cities, asset holding in monetary terms being constant, can afford to engage in family businesses such as farming because even after subtracting capital for generating of self-employed income, they have a higher capital stock including the land value than those in the four largest cities. It is predicted that the abundance of asset holding and the scarcity of employment opportunities jointly increase the rate of participation in a family business in the smaller cities.

Here I will test the difference of the job participation ratio between households in the four largest cities and those in smaller cities by the previously stated statistical method. Of the 56 pairs of households considered, 25 had more than 20 household in the sample satisfying the condition of analysis as in Table 5. Many such samples rejected the hypothesis that the job participation ratio is not affected by the size of municipality where households locate, showing a higher

Table 5. The Effect of Size of Municipality Where Households Locate on the Job Participation Ratio

Test item	Type of household	Age	Relation of non-principal earners to the principal earners	Income of wives or children	Significance test		Comparison of the job participation ratio
					W	Significance (%)	
Size of municipality	Type C	15-19	Daughters	Low	7.0436		
				High	0.6451		
		20-24	Daughters	Low	5.1402		
				High	4.8271		
		25-39	Daughters	Low	8.7152		
			Wives	Low	9.0309		
		40-49	Wives	Low	88.3454	0.5	smaller cities > the four largest cities
				High	35.9252	0.5	smaller cities > the four largest cities
		50-54	Wives	Low	80.9963	0.5	smaller cities > the four largest cities
				High	70.1040	0.5	smaller cities > the four largest cities
		55-59	Wives	Low	33.9613	0.5	smaller cities > the four largest cities
				High	34.1344	0.5	smaller cities > the four largest cities
		60-	Wives	Low	25.7208	0.5	smaller cities > the four largest cities
				High	11.1231		
	Type P	15-19	Daughters	Low	4.2147		
		20-24	Daughters	Low	6.7046		
		25-39	Daughters	Low	35.1972	0.5	smaller cities > the four largest cities
				High	16.5432	2.5	smaller cities > the four largest cities
		40-49	Wives	Low	104.6500	0.5	smaller cities > the four largest cities
			Wives	Low	73.1490	0.5	smaller cities > the four largest cities
		50-54	Wives	High	30.8845	0.5	smaller cities > the four largest cities
				Low	31.9463	0.5	smaller cities > the four largest cities
		55-59	Wives	High	24.1707	0.5	smaller cities > the four largest cities
				High	31.5566	0.5	smaller cities > the four largest cities
		60-	Parents	High	24.6624	0.5	smaller cities > the four largest cities

ratio in smaller cities than in the four largest cities.

An interesting phenomenon found here is that the size of the municipality differently affects the job participation ratio for wives and that for daughters. Significance is seen in most cases for wives, whereas there is little significance in daughters' cases. Furthermore, in all pairs which showed significance, the job participation ratio is overwhelmingly higher in smaller cities.

On the employee participation ratio obtained by subtracting the self-employment ratio from the job participation ratio, the number of cases which showed significance is far smaller than that in the participation ratio as shown in Table 6. This is especially so with wives in type C households. In all the three pairs of daughters aged between 25 and 39, the employee participation ratio for such daughters, as the job participation ratio did, showed significance according to

Table 6. The Effect of Size of Municipality Where Households Locate on the Employee Participation Ratio

Test item	Type of household	Age	Relation of non-principal earners to the principal earners	Income of wives or children	Significance test		
					W	Significance (%)	
Size of municipality	Type C	15-19	Daughters	Low	5.7726	2.5	
				High	0.4988		
		20-24	Daughters	Low	4.2843		
				High	4.0431		
		25-39	Daughters	Low	17.1597		
				Wives	9.9232		
		40-49	Wives	Low	25.4885		0.5
				High	9.5726		
		50-54	Wives	Low	10.1052		
				High	33.2849		
		55-59	Wives	Low	4.5367		
				High	10.7650		
	60-	Wives	Low	8.8530			
			High	6.4372			
	Type P	15-19	Daughters	Low	4.5774	2.5	
				Low	9.6708		
		20-24	Daughters	Low	16.3502		
				High	19.0460		1.0
25-39		Daughters	Low	18.5631	1.0		
			High	14.7737	5.0		
40-49		Wives	Low	11.8255			
			High	9.2677			
50-54		Wives	Low	19.2088	1.0		
			High	19.4412	1.0		
55-59	Wives	Low	5.4955				
		High					
60-	Parents	Low					
		High					

the size of municipality. Unlike the job participation ratio, however, the ratio of employee participation in the four largest cities was higher than that in smaller cities.

We have drawn following inferences from above observations:

(1) The amount of capital stock available for self-employment is an important factor behind the non-principal earners' decision to work.

(2) Such a background has more influence on wives's decision to work than on daughters'.

(3) Above inferences reflect the difference in income-leisure preference between wives and daughters. Wives' preference toward leisure is remarkable because the time spent for household affairs is included in leisure time, and the slope of the indifference curve for wives is not steep as shown in Fig. 9-1. In contrast, the slope of that for daughters aged between 25 and 39 is steep as in Fig. 9-2, which indicates that their preference toward leisure time is relatively low. If their preferences toward income, self-income generating curve, wage rate, assigned working hours are the same, wives are apt to select self-employment for which working hours they can select according to their own will, while daughters are inclined to get employment in which case they are assigned working hours.

(4) The abundance of employment opportunities, a factor on the part of employers, affects the job participation ratio for daughters more greatly than for wives.

4-2. Relation of Non-principal Earners to Principal Earners

As a result of selecting pairs of households whose factors such as age are

Figure 9-1. Income-Leisure Preference for Wives

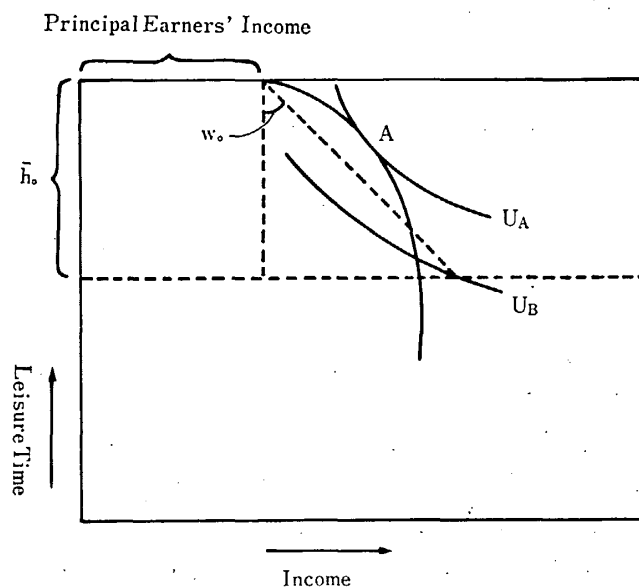
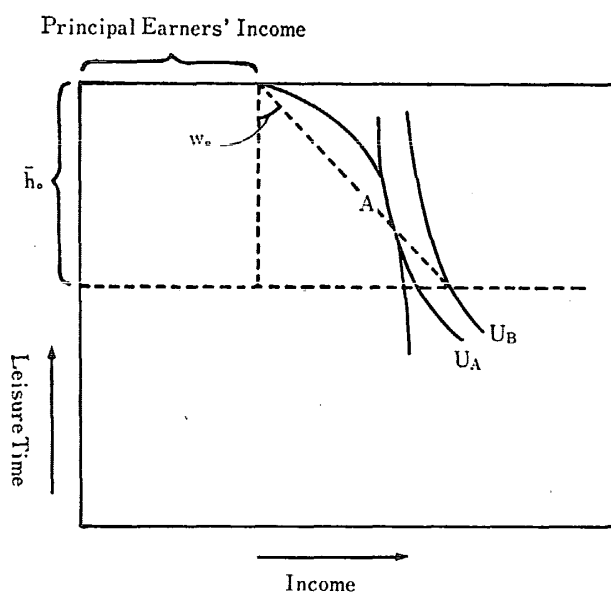


Figure 9-2. Income-Leisure Preference for Daughters



equal to examine the difference in the job participation ratio between wives and daughters, only four pairs with wives or daughters aged between 25 and 39 were testable. Such a wide range of ages considered might result in a difference in the ratio between wives and daughters through the possible concentration of daughters in the younger age bracket. However, in view of the scarcity of available pairs of households, I tested the available samples in the age group 25-39 eliminating other factors as a second best method.

Table 7 shows the difference in the job participation ratio between wives and daughters examined by previous statistical methods. Fig. 10 details an example: pairs of households in a small city with wives or daughters aged 25 to 39, their children's or mothers' earning less than 500 thousand yen per annum by type of household. The following points are clear from the examination:

(1) The job participation ratio for wives and daughters differ according to the type of household.

(2) In households of type C making up two generations, the job participation ratio for daughters markedly outnumbers that for wives.

(3) In households of type of P consisting of three generations, there was not a major difference in the job participation ratio between wives and daughters.

The above results agree with those of the study on the employee participation ratio as shown in Table 8.

(4) The big difference of both job participation ratio and employee participation ratio between wives and daughters in type C households is attributed to the difference of income-leisure preference between the two. Since there were no members to take care of household affairs in place in wives in households of type C, wives' preferences toward leisure time including housework time were

Table 7. The Effect of the Relation of Non-Principal Earners to Principal Earners

Test item	Size of municipality where household locate	Type of household	Age	Income of wives or children	Significance test		Comparison of job participation ratio
					W	Significance (%)	
Relation of non-principal earners to principal earners	The four largest cities	Type C	25-39	Low	19.6560	0.5	Daughters > Wives
	The other areas	Type C	25-39	Low	46.6858	0.5	Daughters > Wives
	The four largest cities	Type P	25-39	Low	12.7634		
	The other areas	Type P	25-39	Low	12.4051		

Table 8. The Effect of Family Relations on the Employee Participation Ratio

Test item	Size of municipality where household locate	Type of household	Age	Income of wives or children	Significance test		Comparison of job participation ratio
					W	Significance (%)	
Relation of non-principal earners to principal earners	The four largest cities	Type C	25-39	Low	192.6371	0.5	Daughter > Wives
	The other areas	Type C	25-39	Low	80.9846	0.5	Daughter > Wives
	The four largest cities	Type P	25-39	Low	11.7581		
	The other areas	Type P	25-39	Low	20.1199	1.0	

Figure 10. The Difference between the Job Participation Ratio of Daughters and that of Wives

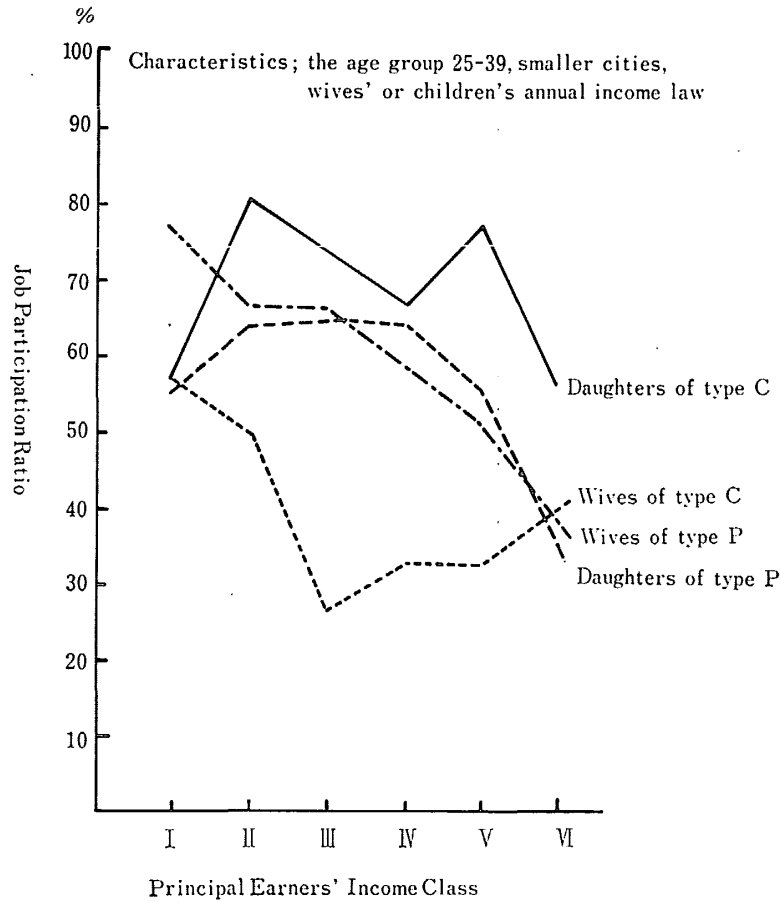
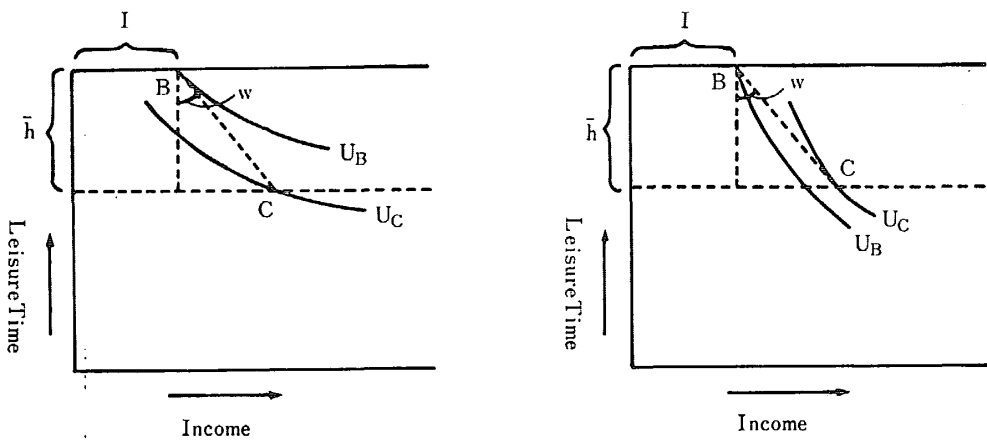


Figure 11. Income-Leisure Preference for Wives by Type of Households
 Fig. 11-1. Type C Households Fig. 11-2. Type P Households



high. As in Fig. 11-1, the slope of the indifference curve for wives is gentle, and there is high probability that the utility index for non-employed wives, U_B ,

places above that for employed wives, U_c . In contrast, daughters showed low preferences toward leisure, making the slope of their indifference curve steep. Accordingly, the distribution of reservation wage rate (W_r) for wives is different from that for daughters.

(5) In type P households with principal earners' parents living together, wives' preference toward leisure was not so high as that in type C households because parents help wives with housework. Thus the indifference curve for wives in type P households is as steep as that for daughters.

4-3. Type of Households

I will discuss the above observations in more detail. After excluding groups of households with less than 20 in the sample from the analysis as before, I could obtain 21 pairs of groups of households whose factors being equal except the type of households. If I test them by the third statistical method, the hypothesis that there is no difference in the job participation ratio and employee participation ratio between type C and type P households was rejected by four pairs at a 0.5 percent significant level, by two pairs at 2.5 percent and by one pair at 5.0 percent. When we compared the level for wives at which the hypothesis was rejected with that for daughters, no major difference was observed: two out of 14 pairs rejected the hypothesis at a 0.5 percent level, one pair at 1.0 percent and three pairs at 2.5 percent for wives, while two out of seven pairs rejected it at a 0.5 percent level, one pair at 1.0 percent and one pair at 5.0 percent for daughters.

If we look at each case in which the hypothesis was rejected more carefully, interesting phenomena arise as shown in Fig. 12-1, and Fig. 12-2:

(1) In all cases in which the hypothesis was rejected, the job participation ratio and employee participation ratio for wives in type P households are higher than those in type C households.

(2) In the same cases for daughters, on the contrary, both ratios in type C households are higher than in type P households.

The following inference is possible from the above observations:

(3) In case of wives, the difference of the preference function between type P and type C households, confirmed in Fig. 11 in the previous sub-section, was caused by the existence of persons in the former households to help or replace wives to do housework.

Then how can we explain the phenomenon that both ratios for daughters in type C households are higher than those in type P households?

In the case of daughters, the factor of housework means nothing if wives in both households do housework. Thus, the difference of daughters' preference toward leisure should be explained by another factor, which may be the influence of the income of principal earners' parent.

The income of the household heads' parents, especially of male parents, has an effect on the daughters' decision to work, similar to that confirmed by the

Figure 12-1. Job Participation Ratio for Daughters by Type of Households

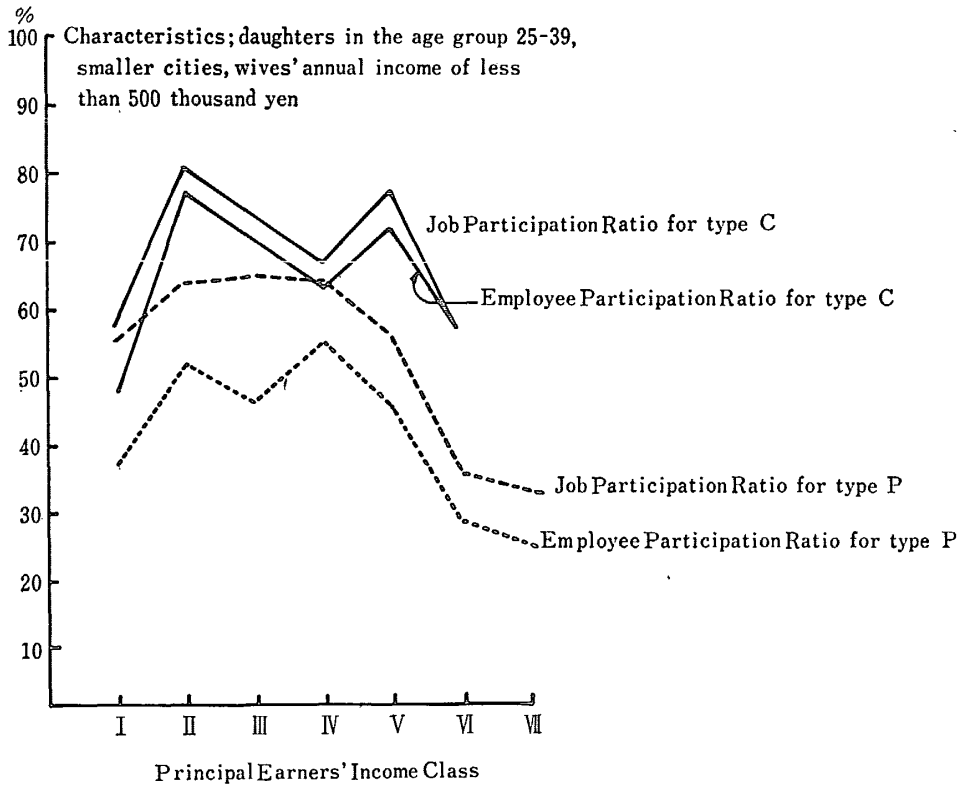
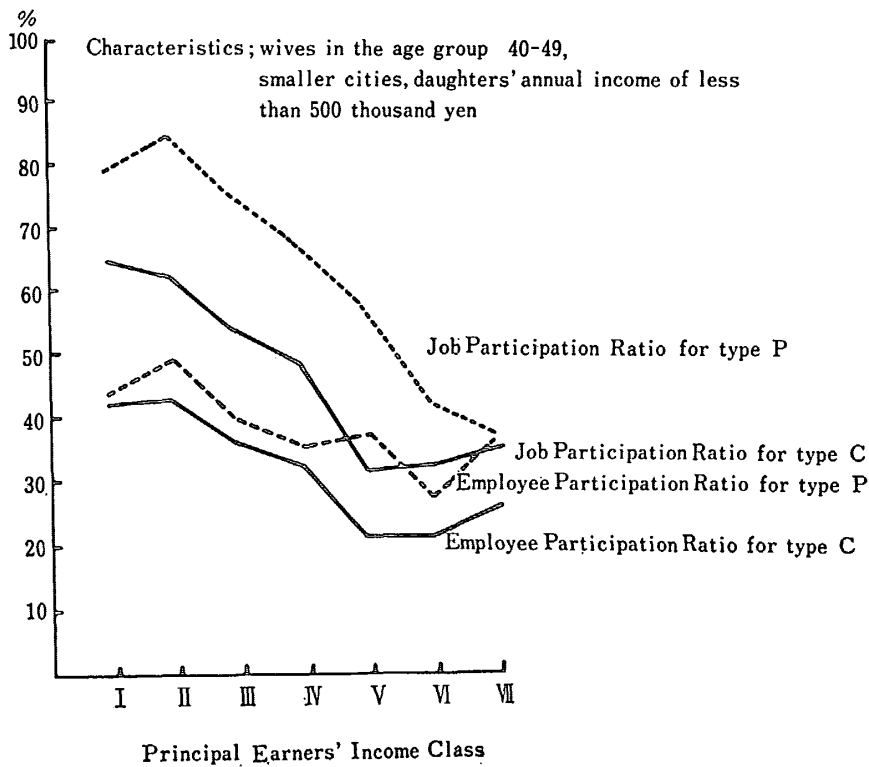


Figure 12-2. Job Participation Ratio for Wives by Type of Households



participation law that the labor supply of non-principal earners is greatly affected by the income of principal earners, both showing inverse correlation each other. Hence I could conclude as follows:

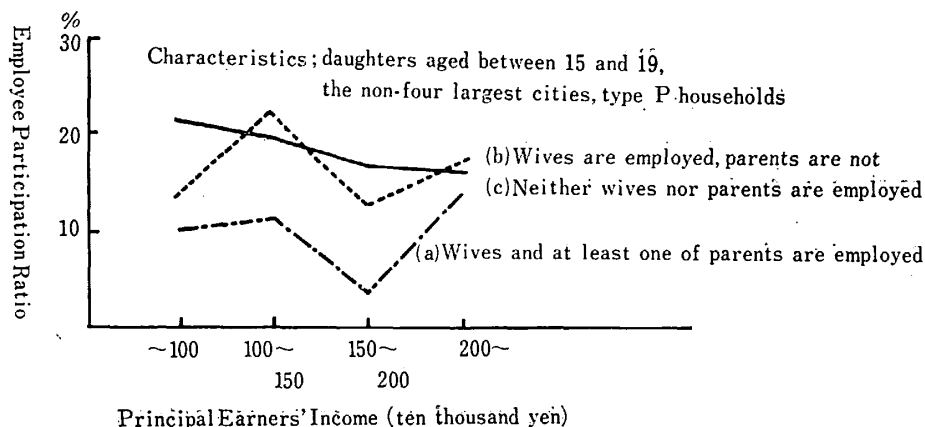
(4) The effect of grandfathers' income on the daughters' decision is similar to that of principal earners': the higher the grandfathers' income is, the lower the job participation ratio and employee participation for daughters is. Let the sum of principal earners' and their fathers' income be principal income, the principal income of type P households is higher than that of type C household by a margin of grandfathers' income. The phenomenon that both ratios for daughters in type C households are higher than those in type P households might be partly attributed to such difference in the principal income.

Now, we will clarify the influence of grandparents' income on the employee participation ratio for daughters. Attention will be paid to type P households having the largest total of 823 samples in the smaller cities with daughters aged between 15 and 19. We will compare sample households whose grandparents are employed with those having non-working grandparents to investigate the effect of their income on the job participation ratio for daughters. After controlling for the wives' income, the selected samples are classified into the four categories below:

- (a) wives and at least one of parents are employed 91 households
- (b) wives are employed, parents are not 398 households
- (c) neither wives nor parents are employed 216 households
- (d) parents are employed, wives are not 18 households

Figure 13 shows the employee participation ratio for daughters in the above cases, (a), (b) and (c) by income class of principal earners. When we compare the ratio in case (a) with that in case (b), the latter is higher than the former. Compared in terms of grandparents' income, we see that the ratio is low in households with employed grandparents having higher income. This result

Figure 13. The Effect of Employed Grandparents on the Employee Participation Ratio for Daughters



agrees with the previous conclusion, (4).

Hence more correctly, we should attribute the phenomenon that the job participation ratio and employee participation ratio for wives in type P households are higher than those in type C households to the fact that the effect of grandparents, bringing about increased job participation ratio for wives through decreased wives' preferences toward leisure, by helping or replacing wives do housework, is stronger than that of grandparents' income, resulting in decreased ratio for wives.

4-4. Income of Wives, Children and Parents of Principal Earners

Here, I will discuss the effect of childrens' income on the job participation ratio for wives and also how the job participation ratio for daughters is affected by wives' income. First, I sample households whose characteristics and their members' characteristics are equal. After dividing them into two groups, one with wives'/children's annual income of less than 500 thousand yen and another with their annual income of more than 500 thousand yen, I will compare the job participation ratio and employee participation ratio for daughters/wives between two groups.

For daughters, among households whose characteristics other than wives' income are equal, nine pairs are available with more than 20 samples in each principal earners' income class. Of nine, two pairs rejected the hypothesis that the job participation ratio for wives equals that for daughters, irrespectively of their income, at a 0.5 percent level, and another two pairs rejected the hypothesis at a five percent level.

In contrast, of 13 pairs, one pair rejected the hypothesis that wives' job participation ratio does not vary according to income of children at a 0.5 percent level, one at one percent and one at five percent. It appears that daughters rejected hypothesis, H_0 , to a greater extent than their mothers, but this is not clear. The same can be said with the employee participation ratio.

If we examine the sample pairs which rejected the hypothesis, it seems that wives' and child's income have a reverse effect on each other's decision to work. Let us look at Fig. 14-1 and Fig. 14-2 in this light:

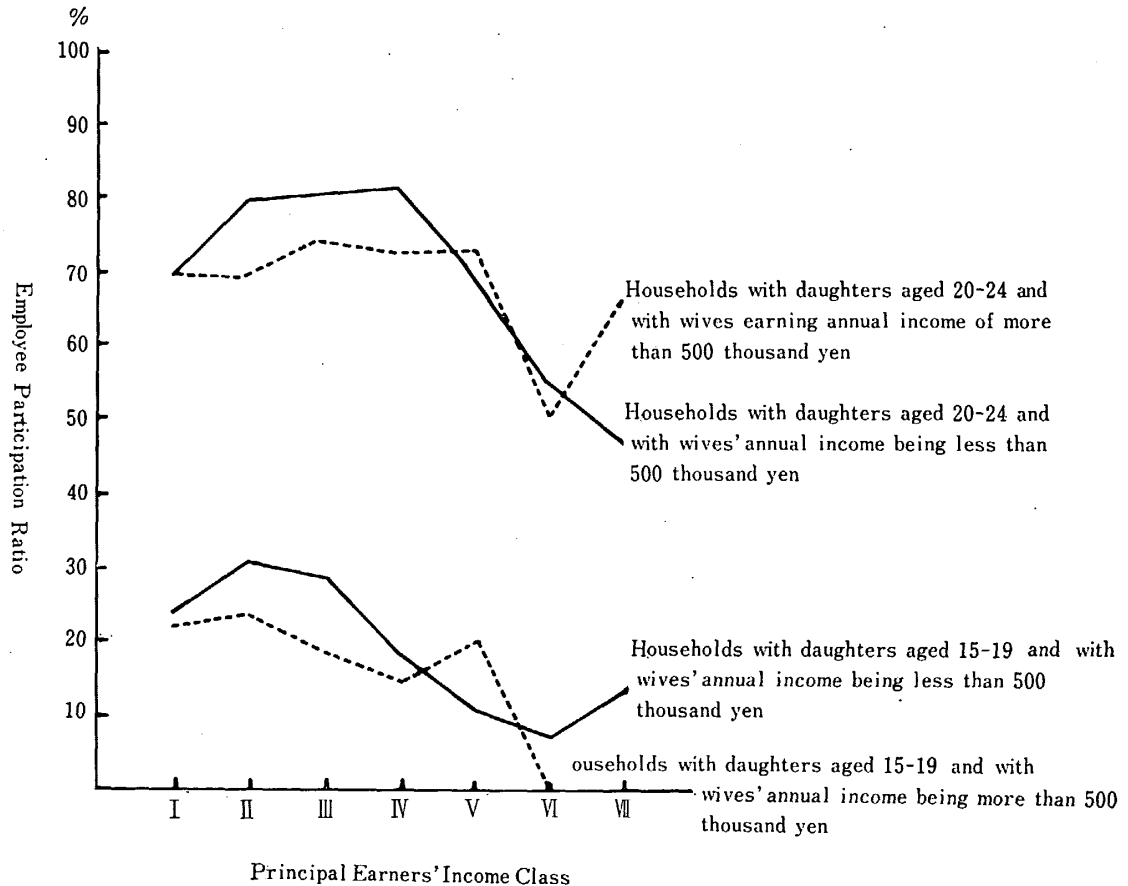
- (1) The employee participation ratio for daughters is low in the households with higher wives' income as in Fig. 14-1.
- (2) The employee participation for wives, to the contrary, is high in the households with higher income of children.

Similar trend was observed in other pairs, and above observations might be summarized as follows:

- (3) Wives' income has a tendency to decrease the job participation ratio for daughters, although to a lesser degree than principal earners' income does.

This agrees with the result of the analysis of the effect of principal earners' income conducted in the previous section (see Table 4). It could not clearly prove any negative correlation between job and employee participation ratios for

Figure 14-1. The Effect of Wives' Income on the Employee Participation Ratio for Daughters in Type C Households in Non-Four Large Cities



daughters and principal earners' income in households with high income of wives. This might be because the lower principal earners' income and higher wives' income offset each other and made the job participation ratio for daughters level off.

In contrast, the phenomenon that the job participation ratio for wives is high when income of children is high suggests the following:

(4) The probability is high that wives are already employed when daughters decide to work. This would be a more correct interpretation rather than to attribute an increased job participation ratio for wives to the high income of children. We can at least say from the above observations that incomes of children as semi-principal income of households do not reduce the job participation ratio for wives. Other factors such as the age of wives or daughters might affect wives' decision to work, so further study would be necessary in this respect.

Finally let us examine wives and parents of principal earners as labor force. After selecting type P households whose size of municipality where they locate

Figure 14-2. The Effect of Daughters' Income on the Employee Participation Ratio for Wives in Type C Households in the Four Largest Cities

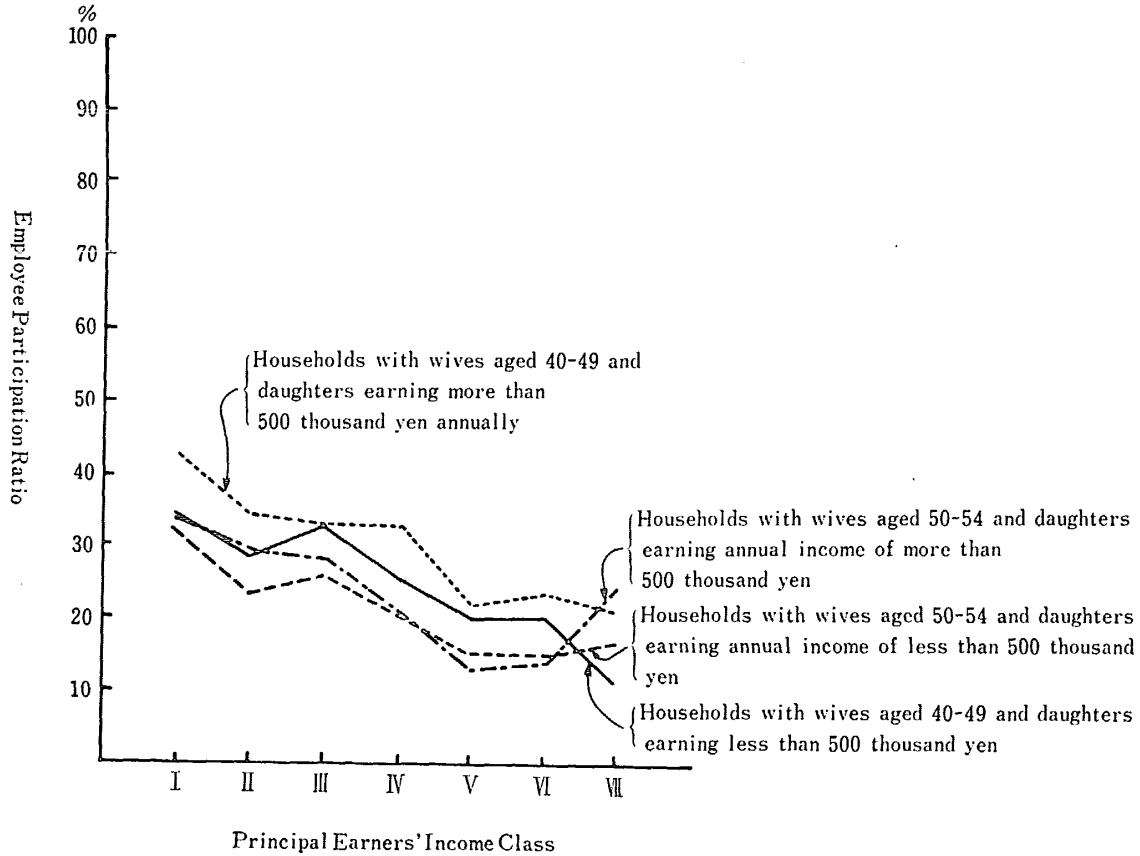


Table 9. The Sample Size of the Households by the Labor Force Status of Wives and Parents

Size of municipality where households locate	Daughters' age	1) Non-working wives & parents	2) Non-working wives & working parents	3) Working wives & non-working parents	4) Working wives & parents
The four largest cities	15-19	168	11	115	36
The four largest cities	20-24	213	4	103	25
The four largest cities	25-39	57	3	30	8
The other areas	15-19	216	18	398	91
The other areas	20-24	175	14	278	40
The other areas	25-39	52	4	52	5

and the age of daughters are equal, I classified them into four categories by the above factors as follows: 1) wives and parents without job, 2) wives without job and parents with job, 3) wives with job and parents without job, 4) wives and parents with job. Table 9 shows the number of group of households classified.

The number of households in category 2) (column 4, Table 9) is far smaller than that in category 3) (column 5). Observing households with working parents, we see more cases in which wives are also working than those otherwise (see column 4 and 6). Although the above observations seem to be caused not only by factors on the part of labor supplier but by the different distribution of employment opportunities, however we cannot determine which is more significant.

Section 5. Asset Holding and the Job Participation Ratio for Married Women

In the present section, I will discuss the effect of asset holdings on the job participation ratio for married women using the micro data obtained from the 1974 National Survey of Family Income and Expenditure.

As the 1974 Employment Status Survey, which I used to examine other factors in preceding sections, lacked in such data as those on non-earned income and assets, we cannot analyze the effects of these variables for the job participation ratio from this survey. Then I use the information about the employee households from the National Survey of Family Income and Expenditure. There were three problems involved in the economic analysis on the basis of the National Survey of Family Income and Expenditure. The first one concerns the September-November period covered by the survey. Since the survey period did not include the months in which bonuses are provided which are large percent of earned income in Japan, it is possible that the survey underestimated actual earned incomes. Also argued is that the only rare payments of deposit interests during the above period in Japan made it difficult for us to know exactly about the income from financial assets. Second, although the survey provided information on working members of households, it did not cover information on working hours. Third, it is hard to evaluate in monetary terms the real asset holdings of the surveyed households.

With such defects in available data, I adopted an analytical method so as not to be affected by above defects within the realm of the present statistic data.

5-1. Purpose of this Section

The quantitative study of the relation between financial and real assets and the labor supply has come into being with analysing the effects of the negative income tax program as a stimulus. Previous studies were based mainly on the theoretical view that the difference of holding assets between labors and employers resulted in different bargaining positions among them. Their findings

include the view that laborers with less assets were obliged to accept low wages and other bad employment conditions offered by employers with more assets, and thus it was natural that the bargaining position was unfavorable to the laborers.⁸⁾

In contrast to the theoretical approach, the discussion on the negative income tax rapidly opened the path for the quantitative study of the relation between assets and the labor supply. Under conventional government measures for income maintenance and livelihood protection designed to satisfying the minimum subsistence level, it was possible that people under protection would not be willing to work for fear of being unable to receive allowances. The negative income tax system was suggested in a bid to cope with this possibility (See Hildebrand⁹⁾). Many active discussions have clarified the relation between income by source and the labor supply ever since.

Among subjects of the discussions is the effect of the non-earned income from financial assets. It is estimated that the effect of income from financial asset interests and dividends will increase leisure time and decrease labor supply when leisure is not inferior goods. (Previous quantitative analysis confirmed that the income effect raised leisure time.) On the basis of the estimation, the hypothesis was established that households with large financial assets, other factors being equal, should have much income from these assets and therefore show lower job participation ratios. Similar discussions on real assets are possible; home-owning households are considered to have more available income than renters as the former need not pay rents. If this is correct, the hypothesis should hold that the labor supply of the former is smaller than the latter when other factors are equal. In this context, analyses conducted in the United States (Cain and Watts¹⁰⁾ and Masters and Garfinkel¹¹⁾) cannot necessarily succeed to obtain estimated results required to accept the above hypotheses. The result of the regression analysis using working hours or the job participation ratio as a measure of labor supply showed a few cases in which asset and asset income parameters had significant negative value, however, there were many cases in which these parameters significant positive values.

In this section, I will examine financial assets and home ownership in relation with the job participation ratio for wives. If the above hypotheses proves unacceptable as in the United States, I will determine the analytic framework to clarify the relation between financial assets and the labor supply of wives. The reasons for focusing our attention on married women are as follows: 1) past analysis confirmed that income and other economic factors do not largely affect principal earners' decision to work and that the principal earners cannot fix their working hours by themselves which are assigned from firm, 2) analyses

8) See Tsujimura [14] for details.

9) See Hildebrand [7].

10) See Cain and Watts [2].

11) See Masters and Garfinkel [10].

made in previous sections found that in employee households whose heads are wage earners, wives' decision to work overwhelmingly depends on the economic factors such as the income of principal earners.

5-2. Financial Assets and the Job Participation Ratio for Wives

The sampling method used will be explained first. The sample size in the 1974 National Survey of Family Income and Expenditure was some 53,000. Of the 53,000, employee households in places other than Hokkaido, Tohoku, Shikoku and Kyushu were chosen as the subject of the analysis. I obtained a total of 17,430 households as the subject of analysis. I then classified selected households into eight groups by financial assets.¹²⁾

Table 10 shows the job participation ratio and employee participation ratio¹³⁾ for wives for each group. Both ratios have upward trends in the first six groups

Table 10. The Job Participation Ratio for Wives by Financial Asset Group

Financial asset group	Number of households	Number of households with working wives	Labor force participation ratio for wives	Number of households with households having self-employed wives being subtracted	Number of households with employed wives	Employee participation ratio for wives
I 0-200 thousand yen	822	276	33.6%	706	160	22.7%
II 200-600 thousand yen	2673	948	35.5	2263	538	23.8
III 600 thousand-one million yen	2799	1048	37.4	2354	603	25.6
IV 1-1.5 million yen	2848	1162	40.8	2348	662	28.2
V 1.5-2 million yen	1936	809	41.8	1591	464	29.2
VI 2-3 million yen	2552	1086	42.6	2143	677	31.6
VII 3-5 million yen	2164	890	41.1	1800	526	29.2
VIII more than five million yen	1636	662	40.5	1370	396	28.9
Total	17430	6881	39.5	14575	4026	27.6

12) Financial assets are a sum, at the beginning of the period, of postal savings, ordinary savings, bank or trust bank deposit, life insurance pension, trust debentures, stock investment and intra-company deposits. I observed a similar result from the analysis of the net financial assets which are the difference between financial assets and debts in hand.

13) The employee participation ratio for wives used in this section was obtained by dividing the number of households with wage earning wives by the number of the remaining households after subtracting those with wives working at home from the entire households.

with financial assets from zero to three million yen, and downward trends in the last two groups with more financial assets. When illustrated in figures, they will draw mountain-shaped curves with a long gentle slope on the left side of the central peak.

Since various factors affect wives' decision to work in the households considered, we should not totally attribute the above observed phenomenon to the effect of financial assets. For instance, it is confirmed that household heads' income adversely affects wives' participation in labor force. Assuming that there is a positive correlation between principal earners' income and financial assets, difference in the job participation ratio for wives in households whose principal earners' income are equal, might be greater among groups with less financial asset groups than when principal earners' income was not controlled as shown in Table 10. Also, the decrease in the labor force participation ratio for wives observed in more financial asset groups might differ if the principal earners' income was controlled. A similar inference is true with the age of wives and the size of municipality where households locate.

I will sample households whose principal earners' income, wives' age, and the size of municipality where households locate are considered equal based on the norms in Table 3, and examine the employee participation ratio¹⁴⁾ for wives in these households. Here I will use statistical methods employed when I analysed the effect of principal earners' income; I will conduct a test of independence of financial assets and the job participation ratio for wives, and a test of correlation coefficients between average financial assets and the job participation ratio for wives in every financial asset class.

The results of above tests covering pairs of households with more than 20 samples are given in columns 4 through 7 in Table 11. Columns 1 through 3 show households heads' income per month, age of wives and the size of municipality where households locate respectively. Looking at the results of the χ^2 test on independency of financial assets and the employee participation ratio for wives, the hypothesis that the employee participation ratio for wives is equal in each class of financial assets was rejected by 8 out of 20 pairs at significance level of more than five percent. (The vacancies in the column of the significance level mean that the hypothesis was not rejected at a more strictly significant level than five percent). When I examine the correlation coefficient between financial assets and the employee participation ratio for wives, 16 out of 20 pairs showed a positive correlation between them. Of 16, eleven pairs rejected the hypothesis that the true correlation coefficient is zero, but accepted the alternative hypothesis that the coefficient is positive. The rest of the four pairs showed a

14) We focussed on the employee participation ratio in comparison with the self-employed participation ratio considering the different effects of financial assets on both ratios as observed in a theoretical framework established in Section 1. As a result, it was confirmed that findings on the employee participation ratio are correct with the job participation ratio as a whole.

Table 11. Tests of Independency and Correlation Coefficient between Financial Assets and The Employee Participation Ratio

Principal earners' income	Wives' age	Size of municipality where households locate	χ ² test		Correlation coefficient		* χ ² test		* Correlation coefficient	
			W	Significant level (%)	r	Significant level (%)	w	Significant level (%)	r	Significant level (%)
less than 90 thousand yen	40-50	The other areas	6.287		-0.186		4.092		0.046	
	50-60	The four largest cities	9.085		-0.347		12.326	5	-0.201	
90-120 thousand yen		The other areas	2.582		-0.199		3.428		-0.417	
	20-30	The four largest cities	16.670	1	0.819	2.5	4.401		0.271	
		The other areas	17.209	0.5	0.738	5	8.153		0.555	
	30-40	The four largest cities	7.008		-0.488		8.815		-0.564	
120-150 thousand yen		The other areas	46.097	0.5	0.925	0.5	20.028	0.5	0.901	1.25
	40-50	The other areas	2.826		0.226		1.636		0.141	
	20-30	The four largest cities	19.350	0.5	0.778	5	7.578		0.612	
		The other areas	8.021		0.764	5	10.550		0.545	
	30-40	The four largest cities	8.830		0.958	0.5	4.676		0.983	
		The other areas	34.535	0.5	0.930	0.5	22.903	0.5	0.856	2.5
150-190 thousand yen	40-50	The four largest cities	3.085		0.681		3.733		-0.240	
		The other areas	4.256		0.707		1.697		0.497	
	20-30	The four largest cities	7.296		0.811	5	1.749		0.568	
	30-40	The four largest cities	18.077	0.5	0.778	5	11.289	5	0.659	
		The other areas	31.976	0.5	0.951	0.5	12.914	2.5	0.863	2.5
	40-50	The four largest cities	17.236	0.5	0.759	5	10.072		0.640	
190-240 thousand yen		The other areas	10.405		0.656		8.018		0.412	
	30-40	The four largest cities	4.208		0.458		1.580		-0.072	

* For house-owning households without a house purchase plan, whose principal earners' income, wives' age and size of municipality where households locate being equal.

negative correlation with lower correlation coefficients.

We may therefore say from the results of the test that there is a positive correlation between financial assets and the job participation ratio for wives.

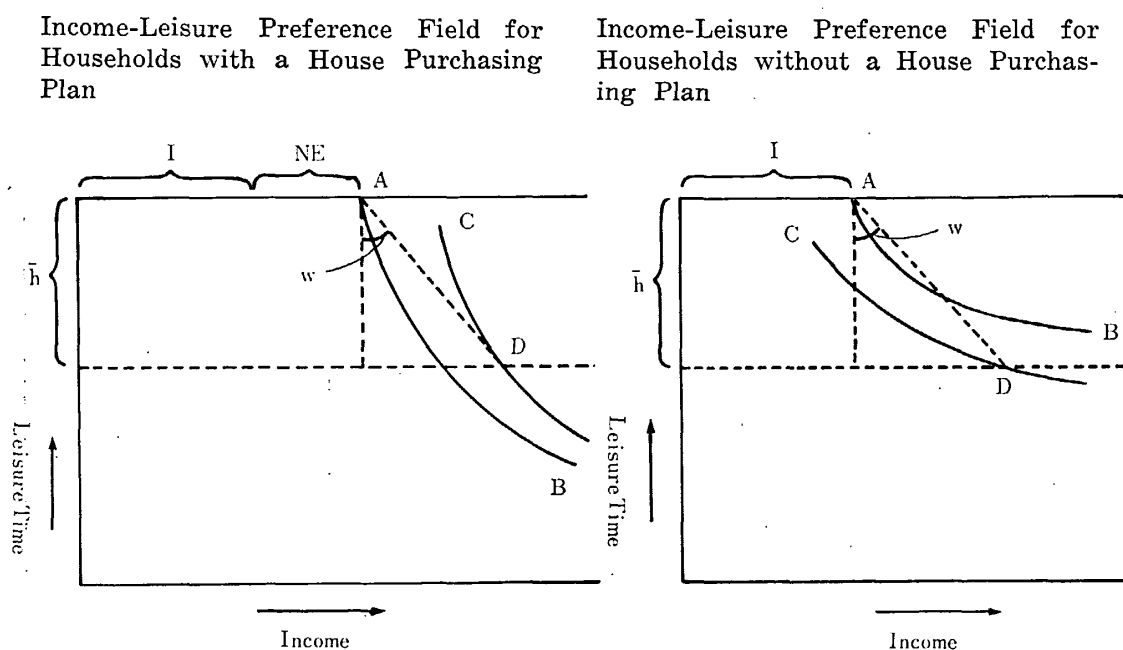
If we regard the volume of financial assets as a substitutable variable of the financial asset income, it means that as the quantitative analysis made in the United States, the above analysis failed to confirm the hypothesis, established on the basis of the income effect, that the financial asset income including interest and dividend from financial assets affect negatively the wives' decision to work. It is clear from this fact that we can not sufficiently clarify effects of financial assets in the same theoretical framework as that worked out in Section 1, and used to confirm the effect of principal earners' income in Section 3. In this light, it deserves attention that most households which showed a negative correlation coefficient are in a lower income bracket in terms of principal earners' income.

How can we set up a theoretical framework to analyse the relation between financial assets and the labor supply of wives? We estimated through the income effect that financial asset income decreases the employee participation ratio for wives when other factors are equal. Which factor was not included in the "other factors" then? Individual needs for savings and financial asset holdings which are an important decisive factor for raising the savings ratio, may have a significant effect on wives' decision to work as Tetsuo Ihara referred to.¹⁵⁾ For example, it is pointed out that households which plan to purchase a house have relatively high preferences toward financial assets, and the savings ratio for these households, disposable income being constant, is also considerably high. Ihara's finding that a house purchase plan largely affects the savings ratio reflects the nation's housing shortage problem which is extremely serious compared with other countries. If we apply above observation to the labor supply mechanism, it is possible to consider that the employee participation ratio for wives varies, not with financial assets, but with households' need for savings. In households with a house purchasing plan, the wives' preference toward financial assets is high, which results in a high preference toward income. Such mechanism changes the shape of the income-leisure indifference curve, an indicator of the labor supply: as in Fig. 15, house purchase plan brings about increased financial asset income (NE) making the indifference curve steep, and possibly results in increased job participation ratio for wives.

In studying the independence of financial assets and the employee participation ratio for wives, I selected home owning households without a house purchasing plan from among above sample households whose heads' income, wives' age and the size of municipality where they locate are equal. As a result, the number of samples decreased only by about 20 percent. Columns 8 through 11 in Table 11 show the results of this study. Compared with the results of the

15) See Ihara [8].

Figure 15



study on households whose house purchasing plan was not controlled indicated in columns 4 through 7, the number of cases which rejected the hypothesis that the employee participation for wives are affected by financial assets declined overwhelmingly both in terms of independence and the correlation coefficients. And in most cases including those which did not reject the hypothesis, the positive correlation coefficient decreased. It is thus proved that the previously observed positive correlation between financial assets and the employee participation ratio for wives was not obvious when we controlled a plan to buy a house in the coming four years. Also possible is that if we control other factors affecting households' preferences toward financial assets, the correlation may turn negative. Similar results with employee participation ratio were obtained from a study of the relation between financial assets and the job participation ratio for wives.

5-3. House Purchase Plans and the Job Participation Ratio for Wives

I can estimate from the observation in the latter half of the preceding sub-section that households' preference toward financial assets might be a factor behind the positive correlation between financial assets and the job participation ratio for wives. In this present sub-section, we will discuss how a house purchasing plan will affect the labor supply behavior of wives comparing it with the effects of the type of house tenure (owned-house or rental-house households).

Table 12 shows the job participation ratio and the employee participation ratio for wives: 1) in households with a house purchasing plan, 2) in households without the plan, 3) in home-owning households and 4) in home-renting household. It seems that the effect of the house purchasing plan is smaller than

Table 12. House Purchasing Plan, Type of House Tenure in Relation with the Job Participation and Employee Participation Ratio

	Number of households	Number of households with working wives	Job participation ratio (%)	Number of Households after subtracting those with self-employed wives	Number of households with employed wives	Employee participation ratio for wives (%)
Households with a house purchasing plan	2686	1121	41.7	2256	691	30.6
Households without a house purchasing plan	10091	3723	36.9	8458	2090	24.7
Home-owning households	9085	3714	40.9	7450	2079	27.9
Home-renting households	3714	1130	30.6	3264	702	21.5

that of the type of house tenure: the difference of the job participation ratio for wives between 1) and 2) was about five percent and that of the employee participation ratio about six percent while the difference of the former between 3) and 4) was about ten percent and that of the latter about six percent. However, we can not totally attribute these differences to above two factors because the differences are a product of combined effects of additional factors along with above factors.

In order to study the effect of the house purchasing plan, I selected a sample of households whose previously confirmed characteristics behind the wives' decision to work are equal on the basis of the norms in Table 3, and divided them into two groups, one with the house purchasing plan and the other without the plan. Here I will conduct a significance test using the fourth statistical method explained in Section 2. It is difficult to sample households, all factors being equal, because such sampling will result in the reduction of the number of samples in both groups (N_1 and N_2) and thus the less in the reliability of the job participation ratio. I therefore chose five variables for the purpose of the test, and examined households in both groups, N_1 and N_2 being more than 20 each, and the selected factors being equal.

Table 13 shows the results of the test. The first row of the table indicates that we tested 79 pairs of households with more than 20 samples having the selected characteristics in common, namely, principal earners' income, the age of wives, the size of the municipality where households locate, the type of households and house purchase plans. Of 79, 39 pairs showed that the employee participation ratio for home-owning households was higher than that for home-renting households while 40 pairs showed the reverse results.

Here are the results of the significant test on each pair: of 39, 4 pairs

Table 13. The Influence of House Purchasing Plan and House Tenure Type on the Employee Participation Ratio for Wives

Test item	Controlled variables	Average employee participation ratio for ownedhouse households (%)	Average employee participation ratio for home-renting households (%)	Which type of households shows larger participation ratio?	Total number of pairs of households	Significant level					
						10%	5%	2.5%	1.25%	0.5%	0.25%
Types of house tenure	Principal earners' income, wives' age, size of municipality where households locate, type of households, house purchase plan	28.6	27.1	Home-owning > Home-renting households	39	4	4	2	1	1	1
				Home-owning < Home-renting households		3	2	2	1	0	2
	Principal earners' income, financial assets in surplus, wives' age, size of municipality where households locate, infants	24.2	20.8	Home-owning > Home-renting households	82	7	2	1	1	0	1
				Home-owning < Home-renting households		4	3	5	1	1	0
	Principal earners' income, wives' age, size of municipality where households locate, infants	33.2	30.5	Home-owning > Home-renting households	44	5	2	1	1	1	7
				Home-owning < Home-renting households		0	3	0	3	0	0

Test item	Controlled variables	Average employee participation ratio for households with a house purchasing plan (%)	Average employee participation ratio for households without a house purchasing plan (%)	Which type of households shows larger participation ratio?	Total number of pairs of households	Significant level					
						10%	5%	2.5%	1.25%	0.5%	0.25%
House purchasing plan	Principal earners' income, wives' age, size of municipality where households locate, type of households, type of house tenure	35.0	27.0	Households with a house purchasing plan > without the plan	86	11	6	5	4	0	4
				Households with a house purchasing plan < without the plan	21	1	0	0	1	0	0
	Principal earners' income, financial assets in surplus, wives' age, size of municipality where households locate, infants	30.9	25.6	Households with a house purchasing plan > without the plan	74	10	9	2	2	0	0
				Households with a house purchasing plan < without the plan	50	3	2	1	1	0	0
	Principal earners' income, wives' age, size of municipality where households locate, infants	38.6	28.8	Households with a house purchasing plan > without the plan	59	8	7	5	1	1	4
				Households with a house purchasing plan < without the plan	13	1	0	0	0	0	0

Test item	Controlled variables	Average employee participation ratio for households with infants (%)	Average employee participation ratio for households without infants (%)	Which type of households shows larger participation ratio?	Total number of pairs of households	Significant level					
						10%	5%	2.5%	1.25%	0.5%	0.25%
Infants	Principal earners' income, wives' age, size of municipality where households locate, type of households, type of house tenure	27.5	45.9	Households with infants > Households without infants	10	0	0	1	0	0	0
				Households with infants < Households without infants	74	7	7	5	2	2	27
Type of households	Principal earners' income, wives' age, size of municipality where households locate, type of house tenure, house purchasing plan	25.4	38.5	Type C households > Type P households	15	3	1	0	0	0	0
				Type C households < Type P households	69	10	7	9	6	2	15

rejected the hypothesis that the employee participation ratio for home-owning households is equal to that for home-renting households at a ten percent level, 4 at 5 percent, 2 at 2.5 percent, 1 at 1.25 percent, 1 at 0.5 percent and 1 at 0.25 percent, thus these pairs adopted the alternative hypothesis that the employee participation ratio for the former is higher than that for the latter. Columns 3 and 4 show the average employee participation ratio for each pair of households.

When we compare Table 13 with Table 12 in which each factor was not controlled, there is a difference of the effect of the type of house tenure and the house purchase plan: in the latter, the type of house tenure had more effects than the house purchase plan while in the latter a reverse result was observed. This is because the difference in the job participation ratio for wives between home-owning and home-renting households, which seemed to have been caused by the sole factor, type of house tenure, in Table 12, is due to other controlled factors considered in Table 13. For instance, the ratio of home-owning households to entire households and the job participation ratio for wives differ depending on the type of households. As a result, when the type of households is not controlled, there is a big difference of the job participation ratio for wives between home-owning and home-renting households. The home owning ratio for type C households made up of a couple and their children is 71 percent compared with 94 percent for type P households comprising a couple, their parents and their children. Also, the job participation ratio and employee participation ratio for wives in type C households are 37 percent and 25 percent respectively, while those in type P households are 54 percent and 39 percent respectively. (see the average job participation ratio in the bottom of Table 13.) Thus combined effects of plural factors, offsetting or multiplying each other, brought about the results in Table 12.

Next, let us examine the effect of each controlled variable. The results of the significance test show that although the employee participation ratio for wives varies with controlled variables, the number of cases which accepted the alternative hypothesis that the ratio for home-owning households is higher than that for home-renting households is not largely different from that of the cases which accepted the reverse alternative hypothesis. Also, the difference of the average labor force participation ratio is insignificant: home-owning households have the ratio one to five percent higher than home-renting households do.

On the effect of the house purchase plans, the difference of the ratio between households with a plan and those without a plan in Table 12 became larger when other variables were controlled as shown in Table 13. Significance tests show that most pairs of households rejected the hypothesis that the job participation ratio and employee participation ratio are equal regardless of the house purchase plan accepted the alternative hypothesis that both ratios are higher in households with a plan than in those without a plan. There were only a small number of pairs which accepted the hypothesis that ratios for the latter is higher than

those for the former. We observed a similar result in the average employee participation ratio for wives: the ratio in households with the house purchase plan was five to ten percent higher than that in households without a plan.

Our observations may be summarized as follows:

(1) There is a much difference in the job participation ratio and employee participation ratio for wives between households with and without a house purchase plan, other factors being equal: both ratios for the former are higher than those for the latter. According to Ihara's analysis, it is clear that a house purchase plan influences the needs for financial assets. And if it is true, my observations show that the difference between the actual financial assets and the needed value for these influences the decision to work or not.

(2) The difference in both ratios between home-owning and home-renting households, other factors being equal, is not so large as that in (1) above.

Above phenomenon means that the house purchase plan and the different preferences toward financial assets resulted in different income-leisure preferences among households considered. If observation (1) is true when the distribution of employment opportunities and assigned working hours discussed in Section 1 are equal, the distribution of the reservation wage rates in households with a house purchase plan will be placed in a relatively low position. As shown in Fig. 15, in households with a house purchase plan, income preferences are relatively high and the indifference curve has a steep slope. It is considered that the difference offset by the difference in asset income brought about the positive correlation between the financial assets and the job participation ratio for wives described in the previous sub-section. It may also be said that the negative correlation between these two in households whose principal earners' incomes are in lower classes, as observed in Table 11, resulted from the small difference in financial asset preferences in households in lower income brackets. This matter should be determined by factors behind the existence of a house purchase plan.

Conclusion

I have examined factors behind non-principal earners in employee households entering the labor market by statistical methods using micro data obtained from the 1974 Employment Status Survey and the 1974 National Survey of Family Income and Expenditure. Among these factors were economic factors such as principal earners' income, asset holdings and preferences toward assets, and characteristics of households and their members including the size of municipality they locate, family relations, and the type of households. The structural factors behind our observations have been confirmed on the basis of a theoretical framework which I set up to explain the job participation ratio for non-principal earners.

The results may be summarized as follows:

(1) Principal earners' income decreases the job participation ratio for

non-principal earners.

(2) Reflecting the difference in the self-employed income generating curve between the four largest and other areas, the job participation ratio for non-principal earners, especially for wives, is higher in the smaller cities than in the four largest cities.

(3) The affluence of employment opportunities raises the employee participation ratio for daughters in the four largest cities.

(4) There is a significant difference in both job participation and employee participation ratios for wives between households with principal earners' parents living together and those without them, the former being higher than the latter when the former had people to help wives with their housework.

(5) Both ratios for daughters in households with principal earners' parents living together are lower than those in households consisting a couple and their children, reflecting parents' income.

(6) Among the two-generation households, principal earners' income being equal, the job participation ratio for daughters in households with high wives' income is low, but it is not observed that the ratio for wives in households with high income of children was low.

(7) It is not observed that the more financial assets households has, the lower job participation or employee participation ratio for wives becomes.

(8) In examining effects of financial assets on the wives' decision to work, we should consider the house purchase plan and other factors affecting households' preferences toward financial assets.

Appendix: Wives' Participation in the Labor Force: Savings and Consumption Structure

Previous observations in this paper lead us to consider that households with house purchase plan show a high savings ratio and a high job participation ratio for wives. The former was already clarified empirically (see Ihara's study [8]) and the latter was confirmed in this paper. In this appendix, I will discuss the difference in income allocation, namely, savings and consumption expenditure between households with working wives and those with non-working wives.

Before going into details, I refer to the limitation of data used in this analysis. As mentioned before, the consumption structure survey covering three months from September through November did not include months when bonuses are provided. When we examine principal earners' bonuses in Family Income and Expenditure Survey (Kakei Chōsa) conducted in 1976, they accounted for 20.6 percent of principal earners' income and 17.4 percent of households net incomes. In addition, the rate of consumption in the summer time bonuses was only 16.3 percent while that in the year-end bonuses was 31.2 percent, so the remaining 83.7 percent and 68.8 percent respectively were saved. In contrast, the annual consumption rate averaged 77.6 percent. It might be unreasonable to discuss the

average income allocation on the basis of the three-month survey which have such drawbacks, however, I will show the results of my analysis for reference.

Past analyses confirmed that the distribution of savings and consumption was affected by disposable income, age, the number of family members, the size of municipality where households locate and the type of house tenure. Here I select households, above factors being equal on the basis of previous norms, and compare average savings and consumption expenditures in households having working wives with those in households with non-working wives. The households will be divided into the following six classes by the disposable income per month: below 90 thousand yen in Class 1, 90-120 thousand yen in Class 2, 120-150 thousand yen in Class 3, 150-190 thousand yen in Class 4, 190-240 thousand yen in Class 5 and more than 240 thousand yen in Class 6.

The statistical method to be used here is the Welch's approach (B. L. Welch¹⁶⁾) which enables a test without referring to the difference between variances in the population distributions. Of the households, factors being equal, let the average consumption expenditure of the population with working wives be x_A and that with non-working wives be x_B . And, let the consumption expenditure of samples belonging to the former and latter households be X_{Ai} and X_{Bi} respectively. Further, let the average consumption expenditure of samples for the former and for the latter be \bar{X}_A , and \bar{X}_B respectively, and the number of samples for the former and for the latter be N_A and N_B respectively. I establish the following hypothesis and alternative hypothesis:

$$H_0; x_A = x_B \quad \text{where } \bar{X}_A > \bar{X}_B, \quad H_0; x_A = x_B \quad \text{where } \bar{X}_A < \bar{X}_B$$

$$H_1; x_A > x_B \quad \quad \quad H_1; x_A < x_B$$

then, test statistic $t = (\bar{X}_A - \bar{X}_B) / \sqrt{(V_A/N_A + V_B/N_B)}$

But, if $V_A = \sum_i (X_{Ai} - \bar{X}_A)^2 / (N_A - 1)$, $V_B = \sum_i (X_{Bi} - \bar{X}_B)^2 / (N_B - 1)$, the statistic t obeys the t distribution of ϕ , and following equations should hold:

$$1/\phi = C^2/(N_A - 1) + (1 - C)^2/(N - 1), \quad C = V_A/N_A / (V_A/N_A + V_B/N_B)$$

I will test the hypothesis by the statistic t . In this test, cases whose sample number, N_A and N_B , are less than ten were excluded from the test subject.

The results of the test are shown in the first two row of Table 14.

Of the 119 pairs having more than ten samples, the average consumption expenditure in households with working wives, \bar{X}_A , outnumbered that in households with non-working wives, \bar{X}_B , in 49 pairs while the latter exceeded the former in 70 pairs. Welch's test conducted on each pair showed that of the 49 cases where $\bar{X}_A > \bar{X}_B$, nine cases rejected the hypothesis that the average population consumption expenditures are equal at a 12.5 percent significant level and one at 2.5 percent. In contrast, of the 70 cases where $\bar{X}_A < \bar{X}_B$, 29 cases rejected the hypothesis at a more strictly significant level than 12.5 percent. The first line of columns 9 and 10 shows the average consumption expenditures of house-

16) See Welch [15].

Table 14. Significance Test of Income Allocation in Households with Working/Non-Working Wives

Test item		Number of total pairs of households	Significant level, 12.5%	5%	2.5%	1.25%	0.5%	Households with working wives: average consumption expenditure(yen)	Households with non-working wives: average consumption expenditure(yen)	The difference between 25 and 24(yen)
Consumption expenses	Households with working wives > Households with non-working wives	49	9	0	1	0	0	147,734	151,591	-3,857
	Households with working wives < Households with non-working wives	70	14	6	3	2	4			
	Households with working wives > Households with non-working wives	78	11	7	3	3	7	21,635	16,531	5,104
	Households with working wives < Households with non-working wives	41	7	1	0	0	1			
Item of expenditure										
Food expenses	Households with working wives > Households with non-working wives	22	2	0	0	0	0	45,634	48,356	-2,722
	Households with working wives < Households with non-working wives	97	21	10	10	5	12			
Cereals	Households with working wives > Households with non-working wives	39	5	2	1	0	0	5,654	6,094	-440
	Households with working wives < Households with non-working wives	80	12	14	3	7	7			
Fish, Meat, Vegetables, etc.	Households with working wives > Households with non-working wives	11	0	0	0	0	0	24,615	27,170	-2,550
	Households with working wives < Households with non-working wives	108	12	10	14	5	29			

Test item		Number of total pairs of households	Significant level, 12.5%	5%	2.5%	1.25%	0.5%	Households with working wives: average consumption expenditure	Households with non-working wives: average consumption expenditure	The difference between 25 and 24
Beverages	Households with working wives > Households with non-working wives	41	3	3	0	0	0	10,034	10,367	-333
	Households with working wives < Households with non-working wives	78	11	7	3	1	3			
Food away from home	Households with working wives > Households with non-working wives	68	7	6	3	2	5	4,364	3,964	400
	Households with working wives < Households with non-working wives	51	8	3	1	3	0			
Housing expenses	Households with working wives > Households with non-working wives	57	3	5	1	0	1	15,142	14,945	197
	Households with working wives < Households with non-working wives	62	10	4	1	2	1			
Public utility charges	Households with working wives > Households with non-working wives	36	6	1	0	0	0	4,776	5,082	-306
	Households with working wives < Households with non-working wives	83	22	3	2	5	4			
Clothing expenses	Households with working wives > Households with non-working wives	66	13	3	3	2	1	16,083	15,514	569
	Households with working wives < Households with non-working wives	53	7	2	0	0	0			
Miscellaneous expenses	Households with working wives > Households with non-working wives	54	14	2	2	0	0	66,098	67,693	-1,595
	Households with working wives < Households with non-working wives	65	12	1	5	1	4			

Test item		Number of total pairs of households	Significant level, 12.5%	5%	2.5%	1.25%	0.5%	Households with working wives: average	Households with non-working wives: average	The difference between 25 and 24
Net increase in savings	Households with working wives > Households with non-working wives	76	19	5	3	6	3	2,047	-1,783	3,830
	Households with working wives < Households with non-working wives	43	3	2	1	0	0			
Insurance expenses	Households with working wives > Households with non-working wives	59	7	2	3	0	0	7,925	8,067	-142
	Households with working wives < Households with non-working wives	60	14	1	2	0	0			
Debt repayment	Households with working wives > Households with non-working wives	54	5	4	0	2	0	5,452	5,863	-411
	Households with working wives < Households with non-working wives	65	11	2	5	5	4			
Credit purchase payment	Households with working wives > Households with non-working wives	76	14	5	2	0	2	2,257	1,068	1,189
	Households with working wives < Households with non-working wives	43	5	2	0	0	0			
Net increase in securities	Households with working wives > Households with non-working wives	39	5	2	0	0	0	431	814	-383
	Households with working wives < Households with non-working wives	72	21	5	2	1	2			
Net increase in physical assets	Households with working wives > Households with non-working wives	33	5	0	0	0	0	3,868	2,215	1,653
	Households with working wives < Households with non-working wives	31	5	2	0	0	0			

Test item		Number of total pairs of households	Significant level, 12.5%	5%	2.5%	1.25%	0.5%	Households with working wives: average	Households with non-working wives: average	The difference between 25 and 24
Housing loan repayment	Households with working wives > Households with non-working wives	52	7	3	1	0	0	3,259	3,702	-443
	Households with working wives < Households with non-working wives	66	13	6	5	4	1			

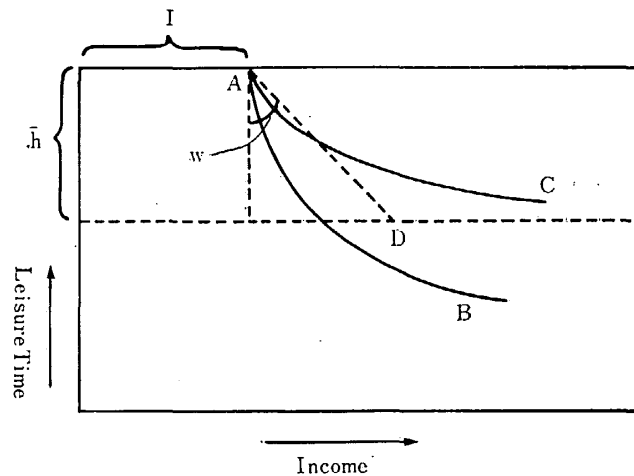
holds with working wives and non-working wives respectively. As obvious in the figures, the latter is higher than the former by 3,857 yen. On the contrary, savings in the former are more than those in the latter. This was confirmed also by the Welch's test: the difference was 5,104 yen, or about 3.4 point, or 39 percent.¹⁷⁾ When we add the variable (financial assets/disposable income), as factors for savings fluctuations in controlled variable, the two types of households will make a greater difference: non-working-wife households had 6,498 yen more average consumption expenditures and 5,798 yen less savings than working-wife households. I thus observed that with disposable income being equal, the savings ratio was higher in working-wife households than in non-working-wife households and that the consumption propensity was lower in the former than in the latter. What are the factors behind this phenomenon then? If we consider wives' income to be temporary and fluctuating, the permanent income of households with non-working wives counts high in a given current disposable income, so above phenomenon may be explained by the permanent income hypothesis on consumption. (See Friedman's work in 1957.¹⁸⁾)

And if we consider this issue from the other viewpoint, namely that concerning with labor supply mechanism, what explanation will be possible? As observed before, in households with a house purchase plan the preferences toward financial assets were high, and members of these households were income-oriented in the income-leisure preference field. In contrast, as observed here, a relatively high portion of household incomes are saved in households with working wives. Such a phenomenon does not contradict but supports the previous observation on the slope of the indifference curve which I made to clarify the relation between financial assets and the labor supply. In Section 5, I regarded the house purchase plan and the subsequent preferences toward financial assets as among structural factors affecting the labor supply of wives: Households with a house purchase plan showed a strong preference toward financial assets, which resulted in increased preference toward income. My previous observation confirmed that the rate of labor supply of wives in households with a house purchase plan was higher than that in others as seen in Fig. 16: the indifference curve, AB, for households with a house purchase plan has a steep slope, and the income preference of point D when wives gained employment opportunities is often placed higher than that of point A when they rejected them. My observation in this Appendix also proved that in households, wives' age, number of family members, size of municipality where house-

17) Since the disposable income is a sum of consumption expenditure and savings, the difference, in terms of absolute value, of consumption expenditures among households whose disposable incomes are equal, should theoretically equal to that of savings. Practically, however, it is not true partly because all figures are averages of test cases in which each variable was controlled, and partly because the disposable income while being equal according to previous norms, is not always equal in a strict sense.

18) See Friedman [18] for details.

Figure 16. House Purchase Plan and the Income-Leisure Preference Field



holds locate and type of house tenure being equal, with working wives which have a steep indifference curve AB in the income-leisure preference field, a relatively high portion of their incomes are saved. Those are higher are income-oriented in the income-leisure-field. Taking this finding and the inference of the previous section into account, it is considered that the difference of the income-leisure indifference curve, as a factor explaining wives' decision to work, resulted not only from the different preferences toward consumption but also from the different income preferences through the different preferences toward financial assets.

I compared expenditures and savings by item in working-wife households with those in non-working-wife households as indicated from the third row and on in Table 14. On food expenses, non-working-wife households spent more, especially for fish, meat, vegetables, etc., than working-wife households. However, the reverse tendency of the expenses for food away from home draws our attention to the difference of wives' leisure-income preferences through different time for houseworks. (See the author's study in 1978.)

By item of savings, there was much difference in the net increase in savings between the two types of households: the net increase in working-wife households was 2,047 yen compared with the drawings of 1,783 yen in non-working-wife households. The net increase in physical assets was likely to concentrate in either type of households if the sample size was small because only a small number of households sold or purchased property during the survey period while the value per households being high. If one of either type of households sold or purchased its property during the survey period, the significance test with variables being controlled on households made a significant difference in average values. If we examine for reference the average value of test cases, working-wife households obtained much more net increase in property than non-working-wife

households, the difference being 1,653 yen. Similar results were observed when we compared households with employed wives with those having non-working-wives by testing with different variables.

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