A study for the effect of sex on choice of occupation and work location and on earnings : Comparison of on-site workers with home-based workers in the U.S.*

성별(性別)이 직업과 시장노동 장소의 선택 및 소득에 미치는 영향에 관한 연구 : 미국의 직장근무자와 재택근무자의 비교를 중심으로*

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목 차

요 약

본 연구는 미국의 직장근무자와 재택근무자의 비교를 통해, 남성과 여성의 소득차이를 살펴보고 이를 설명하는 요소들에 대해 분석하였다. 본 연구를 위해 설정된 가설은 다음과 같다: (1) 성별은 직업과 시장노동의 장소를 선택하는데 있어서 유의한 요소이다. (2) 직업 및 시장노동의 장소가 결정된 후에도 성별은 시간당 소득에 영향을 미치는 변수이다. 연구자료로는 Census of Population and Housing, 1990 [United States]: Public Use Microdata Sample: 1/10,000 Sample이 이용되었으며, 16세 이상, 65세 이하의 응답자로 일주일에 적어도 한 시간 이상 일하는 근로자를 중심으로 하여 7,272명이 연구 대상으로 고려되었다. 직업 및 시장노동의 장소에 대한 선택에서 성별의 영향을 살펴보기 위해 판별분석이 행해졌으며, 분석 결과 교육수준, 연령, 인종, 자녀의 수, 주택구조와 함께 성별이 유의한 요소임이 밝혀졌다. 직업과 시장노동의 장소가 결정된 후 성별이 시간당 소득에 미치는 영향을 알아보기 위해 전체표본과 6개

*본 연구는 박사학위 논문의 일부임.

의 직업범주에 따라 회귀분석이 실시되었다. 전체표본을 대상으로 한 회귀분석의 결과, 시간당 소득을 예측하는데 있어서 성별은 유의하지 않은 것으로 나타났으나, 6개의 직업범주에 따라 시간당 소득을 추정한 결과, 성별은 모든 직업범주에서 유의한 것으로 나타났다. 그러나 재택근무자가 되는 것은 시간당 소득을 규정하는데 있어서 유의한 변수가 아닌 것으로 나타났다. 이것은 특정 직업 내에서 시장노동의 장소보다는 성별이 재택근무자에 있어서 소득의 차이를 설명하는데 중요한 요소임을 암시하고 있다. 본 연구에서 사용된 자료는 직업 및 시장노동의 장소에 대한 결정이나 소득에 영향을 미칠 수 있는 변수들에 대한 충분한 정보를 갖고 있지 않고, 또한 재택근무자의 표본수가 너무 적었기 때문에 일부 변수들은 직업의 선택이나 소득을 예측하기 위한 요소들로 포함될 수 없었다. 따라서 후속연구에서는 이를 보완해야 할 것이며, 최근 들어 우리 나라에서도 재택근무에 대한 관심이 대두되고 있으나 아직 개념정의나 그 중요성과 가치, 그리고 실태 파악과 같은 연구가 활발히 이루어지지 못하고 있으므로 이에 대한 심층적인 연구가 행해져야 할 것이다.

I. Introduction

The picture of a traditional family in which the husband and the wife each have their own domains along sex-stereotyped lines has undergone rapid change with the entrance of women into the work force. In the United States, in 1950, women who were employed outside the home constituted 29 percent of all workers, and married women represented 52 percent of women workers. In 1986, women accounted for 45 percent of employed persons, and married women were 60 percent of women workers (Dickinson & Leming, 1990). The change in the traditional family has profoundly reconfigured the boundaries between family and work; the economic support of the family is not the sole province of the man any more, and routine domestic tasks are not the sole role of the woman any longer. One result of the change in the family is the burden of women who now work the double day, with unpaid domestic work and paid labor. One solution to the burden is to have flexibility in setting hours or stretching days in such a fashion that both unpaid and paid work can be accomplished. For some women, home-based work is seen as one way that offers that flexibility. Results of technological change and recent political actions have created a more favorable climate for home-based work. Advanced computer technology has made it possible to transport service-related work away from a centralized work site to home, to different regions of the country, or to offshore locations (Berch, 1985; Rowe, Stafford & Owen, 1992).

In spite of the increase in women' s labor force participation, it is a well-known fact that, relative to men, women receive lower wages and are employed in lower paying jobs. According to Goldin and Polachek (1987), the consensus figure for the earnings gap is about 50 to 60 percent for full-time female workers in comparison to their male counterparts. The earnings gap declined in the early 1950' s, stayed virtually constant from the mid-1950' s to 1980, and narrowed again after 1980 (Blau & Ferber, 1992; Madden, 1985). Because these unequal economic outcomes are widely dispersed in society, many analyses have focused on the subject of sex-earnings differentials. However, until now, most studies have focused on earnings differentials between sexes in on-site workers and have made efforts to find the factors explaining the sex-earnings differentials. Consequently, earnings differentials between men and women in home-based workers have been disregarded. Therefore, this study focuses on the earnings differentials according to sex among home-based workers, and to ascertain the factors explaining the differentials.

Specifically, the focus is given to the effect of sex on the simultaneous choice of occupation and location of work, and on hourly earnings after controlling for occupation and location of work.

II. Previous Research

1. Earnings differentials between men and women

As alternative theoretical explanations for the observed differences in economic outcomes between men and women, a human capital model and a model of labor market discrimination have been considered. Within the economics literature, the human capital model is related to supply-side explanations focusing on the observation that men and women may come to the labor market with different tastes and with different qualifications, such as education, and experience or other productivity-related characteristics.

The human capital model focuses particularly on the traditional division of labor by sex within the family under which women can expect shorter and more discontinuous involvement in the labor market than can men in relation to earnings differentials between men and women. Because women' s careers are usually shorter than men' s due to child rearing and family responsibilities, they have less time to reap the rewards of investments in human capital. This short career of women lowers the benefits of investments in schooling and training, rendering women less likely than men to make such investment (Ehrenberg & Smith, 1990).

On the other hand, the role of demand-side factors in producing the gender inequality in earnings is considered as labor market discrimination. Blau and Ferber (1992) explain that labor market discrimination exists "when two equally qualified individuals are treated differently solely on the basis of their gender (race, age, disability, etc.)" (p. 189). Therefore, if labor market discrimination does not exist, profit-maximizing employers in a competitive labor market will pay workers in accordance with their productivity. If labor market discrimination exists, however, it is expected to affect adversely the economic status of the group discriminated against directly by producing differences in economic outcomes between men and women that are not explained by differences in productivity-related characteristics. Economists have developed a variety of models on labor market discrimination that can be used to analyze the sex-earnings differentials. Broadly, they can be divided into three categories: (a) tastes for discrimination, (b) statistical discrimination, and (c) the overcrowding model.

In relation to the theoretical background, many studies for sex-earnings differentials have conducted. Although previous studies provide substantial evidence that there is a sex-earnings differential, there is variation in the estimates of the magnitude. The variation is probably due to differences in the source of data, samples, and time periods used, and in the measurement of factors included in the models across studies. The variables found to be significant to explain the earnings differentials according to sex are human capital aspects such as education, experience, and tenure, in addition to individual characteristics such as age, marital status, and region (Borjas, 1983; Brown, Moon, & Zoloth, 1980; Cotton, 1988; Dolton & Makepeace, 1986; Dolton & Makepeace, 1987; England, 1984; Filer, 1983; Foot & Stager, 1989; Goldin & Polachek, 1987; Gronau, 1988; Jones, 1983; Kamalich & Polachek, 1982; Neumark, 1989; Siebert & Young, 1983; Treiman & Roos, 1983; Ward & Mueller, 1985).

2. Home-based work and characteristics

There are no consistent terms and definitions regarding home-based work, although it has received increased attention in the past 10 years. Work performed away from a central work site is referred to by such terms as cottage work, work-at-home, homework, and remote work.

In the May, 1985, Current Population Survey (CPS), the Bureau of Labor Statistics asked respondents whether "as part of ... (the worker)' s regularly scheduled work, does ... (he/she) do any of (his/her) work for ... (the principal employer) at home?" (Horvath, 1986, p. 31) as its first attempt to ascertain the size of the home-based work force. For his analysis of these data, Horvath (1986) defined home-based workers as those who worked at home at least 8 hours a week at their primary job. By that definition, home-based workers included farmers and individuals who took work home to do as part of their regularly scheduled work on a primary job.

Kraut and Grambsch (1987) defined home-based workers as people who work at home as their principal place of work. On the other hand, Heck (1988) defined home-based work as "employment in which workers do not travel to their place of employment or in which the amount of travel varied" (p. 17). Christensen (1988) used home-based work "... to characterize any paid work done in the home regardless of the employment status of the worker" (p. 2).

The differences in the definitions of home-based work from study to study give rise to difficulties in comparing data collected on home-based workers. Limiting the definition to those who work at home a minimum amount of time on a primary job, as Horvath (1986) did, would exclude people with second jobs that are done at home in addition to their primary employment, and would include people whose primary workplace is not at home. For example, teachers who spend eight hours a week preparing class materials or grading papers at home would be included, whereas moonlighters and persons working at home on a second job would be excluded.

Generally, many research has focused on estimates of characteristics of home-based workers. An estimate based on the May, 1985, Current Population Survey showed that 17.3 million Americans were involved in some type or amount of home-based work in nonfarm occupations and that 8.4 million people or over 11 percent of the nonfarm labor force worked at home at least eight hours per week (Horvath, 1986). Of the 6 percent who worked at home full-time (35 hours per week), nearly 70 percent were business owners in home-based unincorporated businesses.

In Heck' s (1988) study, using the 1984 Panel Study of Income Dynamics (PSID) data, approximately 6.1 percent of 6,744 workers were identified as home-based workers. Almost two-thirds (63 percent) of home-based workers were self-employed. The mean income of home-based workers (in 1983 dollars) was $12,142, which was significantly lower than other workers ($17,017), although home-based workers worked more hours on their jobs than did their on-site counterparts.

Recently, Deming (1994) estimated the size of the home-based work force using the May 1991 Current Population Survey (CPS). He found that there were 20 million nonfarm employees, more than 18.3 percent of the employed labor force, working at home. Among them, only 30 percent worked at home for more than 8 hours per week, while only 1 in 20 worked at least 35 hours a week at home. In addition, more men than women worked for pay at home for more than 8 hours, but about 3.2 percent of all men and 3.5 percent of all

women were in this category.

Using data collected by a nine-state regional research project, Stafford, Winter, Duncan, and Genalo (1992) estimated that 1,109,284 households in the nine states had a home-based worker who met the study criteria (at least 312 hours annually, and participation for at least a year in an activity that was not production agriculture). With the same data, Rowe et al. (1992) examined the structural organization of the households of home-based workers. In their study, the largest numbers of home-based workers were living in families in which the household manager was married and children were present (60.9 percent), followed by adult-only families (household manager married, no children present; 24.5 percent); nonfamily households (household manager not married; 10.7 percent); and single-parent families (household manager not married, children present; 3.8 percent).

In the comparison of home-based business owners and wage earners, Masuo, Walker, and Furry (1992) found that business owners were older, had lived longer in their communities, were more likely to own their homes, to be involved in seasonal work, and to be part-time workers. However, the business owners were much less likely than the wage earners to be in marketing and sales occupations.

III. Analysis

1. The data

For this study, the data from Census of Population and Housing, 1990 [United States]: Public Use Microdata Sample: 1/10,000 Sample made by the Inter-university Consortium for Political and Social Research (ICPSR) are used. The data consisted of 1 percent of the cases in the second release of Census of Population and Housing, 1990 [United States]: Public Use Microdata Sample (PUMS): 1-Percent Sample (U. S. Department of Commerce, Bureau of the Census, & Inter-university Consortium for Political and Social Research, 1992).

The original sample included 25,105 respondents. For this study, only respondents who are 16 to 65 years old are included in the sample. After deletion of the respondents who are under 15 years old or over 66 years, the sample contains 9,939 respondents. For discriminant and regression analyses, among 9,939 respondents, only those who worked at least one hour per week as on-site or home-based workers in 1989 are considered; this sample contains 7,272 respondents.

2. Methods of Data Analysis

The data are analyzed using the Statistical Analysis System(SAS). As a part of the preliminary analysis of the data, frequency distributions of all the variables in this study were computed.

Discriminant analysis was used to examine factors affecting the choice of occupation and location of work and to obtain the predicted probabilities of choosing any of the occupation and location of work categories. Finally, linear regression analysis was used to estimate hourly earnings.

3. The hypotheses and variables

1) Hypotheses

For this study, it is hypothesized that: (a) sex is a significant factor in choosing simultaneously occupation and location of work, and (b) sex is a significant factor in determining hourly earnings, given the choice of occupation and location of work.

2) Dependent variables

For this study, there are two dependent variables: (a) choice of occupation and location of work, and (b) hourly earnings. There were originally 500 specific occupational categories for the employed with one additional category for the experienced unemployed and three additional categories for the Armed Forces in the census data (U. S. Department of Commerce et al., 1992). For this study, the occupational classification is arranged into 6 groups: (a) managerial and professional specialty, (b) technical, sales and administrative support, (c) service, (d) farming, forestry, and fishing, (e) precision production, craft, and repair, and (f) operators, fabricators, and laborers. This classification was developed from the 1980 Standard Occupational Classification (U. S. Department of Commerce et al., 1992).

For the location of work, the respondent was asked to report means of transportation to work. Transportation to work refers to the principal mode of travel or type of conveyance that the respondent usually used to get from home to work. If a respondent answered the question as "worked at home," he/she was regarded as a home-based worker; otherwise, the respondent was categorized as an on-site worker.

Consequently, the occupation and location of work are combined into 12 categories: (a) home-based workers who worked at managerial and professional specialty, (b) home-based workers who worked at technical, sales and administrative support, (c) home-based workers who worked at service, (d) home-based workers who worked at farming, forestry, and fishing, (e) home-based workers who worked at precision production, craft, and repair, (f) home-based workers who worked as operators, fabricators, and laborers, (g) on-site workers who worked at managerial and professional specialty, (h) on-site workers who worked at technical, sales and administrative support, (i) on-site workers who worked at service, (j) on-site workers who worked at farming, forestry, and fishing, (k) on-site workers who worked at precision production, craft, and repair, and (l) on-site workers who worked as operators, fabricators, and laborers.

<Table 1> Statistics of dependent variables for the total sample (n=7,272).

Variables	Total (n=7,272)	Males (n=3,968)	Females (n=3,304)
Occupation (%)			
Managerial and professional specialty	29.1	28.8	29.5
Technical, sales, and administrative support	30.1	20.1	42.2
Service	10.8	6.5	16.0
Farming, forestry, and fishing	2.4	3.6	1.0
Precision production, craft, and repair	12.9	21.7	2.3
Operators, fabricators, and laborers	14.6	19.2	9.1
Location of work (%)			
On-site work	96.7	97.3	95.9
Home-based work	3.3	2.7	4.1
Hourly earnings in 1989 ($)			
Mean	14.20	16.78	11.19
Median	10.48	13.06	8.33
Standard deviation	25.46	21.19	29.50

<Table 2> Statistics of dependent variables for the on-site workers (n=7,029) and home-based workers (n=243).

Variables	Total		Males		Females	
	On-site workers (n=7,092)	Home-based workers (n=243)	On-site workers (n=3,859)	Home-based workers (n=109)	On-site workers (n=3,170)	Home-based workers (n=134)
Occupation (%)						
Managerial and professional specialty	29.1	28.8	28.6	37.6	29.8	21.6
Technical, sales, and administrative support	30.4	23.0	20.3	13.8	42.6	30.6
Service	10.5	19.3	6.6	1.8	15.2	33.6
Farming, forestry, and fishing	1.8	19.8	2.8	33.0	0.7	9.0
Precision production, craft, and repair	13.2	4.1	22.2	7.3	2.3	1.5
Operators, fabricators, and laborers	14.9	4.9	19.5	6.4	9.3	3.7
Hourly earnings in 1989 ($)						
Mean	14.22	13.78	16.71	19.43	11.18	9.17
Median	10.58	7.16	13.13	10.00	8.44	4.84
Standard deviation	24.93	37.66	19.62	52.21	29.89	17.88

<Table 3> Statistics for combination of occupation and location of work for the total sample (n=7,272).

Occupation and location of work (%)	Total	Males	Females
Managerial and professional specialty and home-based workers	1.0	1.0	0.9
Technical, sales, and administrative support and home-based workers	0.8	0.4	1.2
Service and home-based workers	0.6	0.1	1.4
Farming, forestry, and fishing and home-based workers	0.7	0.9	0.4
Precision production, craft, and repair and home-based workers	0.1	0.2	0.1
Operators, fabricators, and laborers and home-based workers	0.2	0.2	0.2
Managerial and professional specialty and on-site workers	28.2	27.8	28.6
Technical, sales, and administrative support and on-site workers	29.4	19.8	40.9
Service and on-site workers	10.1	6.5	14.6
Farming, forestry, and fishing and on-site workers	1.8	2.7	6.7
Precision production, craft, and repair and on-site workers	12.8	21.5	2.2
Operators, fabricators, and laborers and on-site workers	14.4	19.0	9.0

To calculate hourly earnings, the total earnings of a worker in 1989 are divided by the product of the number of weeks worked in 1989 and the number of hours worked per week in 1989. Earnings were defined as the algebraic sum of wage or salary income and net income from farm and nonfarm self-employment. Earnings represent the amount of income received regularly before deductions for personal income taxes, Social Security, bond purchases, union dues, medicare deductions, etc. (U. S. Department of Commerce et al., 1992). Statistics of these variables for the on-site and home-based workers are given in Tables 1, 2, and 3, respectively.

3) Independent variables

In the equation predicting the first dependent variable, that is, the choice of occupation and

location of work, the independent variables are sex, age, race, educational attainment, marital status, number of children, housing tenure, housing structure, income earned by others in the family, and the estimate of correction for sample selection bias[1]. For the second dependent variable, hourly earnings, the independent variables are sex, age, race, educational attainment, region, the predicted probabilities of the choice of occupation and location of work obtained from the discriminant analysis, and the estimate of correction for sample selection bias. Statistics of these variables for the total, on-site and home-based worker are summarized in Tables 4 and 5, respectively.

4. Findings

1) Findings of discriminant analysis

For the discriminant analysis, male (sex), age, white, black, married (marital status), education beyond high school (educational attainment), number of children, owner-occupied housing (housing tenure), single family dwelling (housing structure), the natural log of income earned by others in the family, and the estimate of correction for selection bias are considered as the discriminating variables. Table 6 shows the means of the predicted probabilities for 12 categories of the choice of occupation and location of work. As shown in Table 6, the mean of the predicted probability of choosing precision production, craft, and repair, and home-based work is the lowest, whereas the mean of the predicted probability of choosing managerial, and professional specialty and on-site work is the highest. Overall, the predicted probabilities of choosing on-site work are higher than those of choosing home-based work.

A second result of the discriminant analysis, demonstrating which variables are significant in

1) One example of sample selection bias is the estimation of market wage rates for married women. If the researcher is concerned only with a woman who is employed outside of the home, observations are not available of the wage rate that a woman who is a full-time homemaker could generate in the labor market . Sample selection bias is caused by deletion of these missing observations because the factors that determine a woman' s labor supply are, for the most part, the same factors that affect the market wage she commands (Zick, 1985). If the researcher uses ordinary least squares (OLS) to estimate a regression model where large values of the dependent variable are underrepresented in a sample, the estimates of slope coefficients may be biased (Winship & Mare, 1992).

In the sample used for the discriminant and regression analyses in this study, sample selection bias is present because data on occupation, location of work, and hourly earnings are available only for those persons who worked outside the home or at home. Heckman' s estimation method is applied to correct the problem of sample selection bias for this study. The following procedure is used to conduct his method to estimate the values of the omitted variables. A dichotomous variable, Y, is defined as:

1 if a person worked in the labor force or at home
0 otherwise.

A person classified as a worker if he/she worked at least one hour in 1989.

For the OLS estimates to be unbiased, the expected value of the residual should be zero. However, when the dependent variable is dichotomous, the residual will be correlated with the independent variables in the model. In this case, the expected value of the residual is not equal to zero, and the OLS estimates are biased (Maddala, 1983). Therefore, probit analysis has been used as an estimation method (Heckman, 1979 ; Maddala, 1983).

The variables considered to affect the decision about employment are sex, age, race, educational attainment, number of children, and the natural log of income earned by others in the family. From the probit analysis, the probability that a person would be working for pay is calculated. Then, the probability density function that pertained to the portion of the sample selected or not selected according to a given criterion is attained. The selection criterion demarcates the point at which truncation occurs. The area above the point of demarcation is the probability of being in the one group, for example, the probability of a person in the sample not being employed. The area below the point of demarcation is the probability of being in the other group, for example, the probability of a person in the sample being employed. On the basis of the probability that a person is in the labor force or

<Table 4> Statistics of independent variables of the total sample (n=7,272).

Variables	Total	Males	Females
Sex (%)			
Male	54.6	100.0	–
Female	45.4	–.	100.0
Age (years)			
Mean	40.80	41.47	39.99
Median	40.00	40.00	39.00
Standard deviation	10.73	10.83	10.57
Race (%)			
White	86.6	87.9	85.0
Black	7.4	6.0	9.0
Other race	6.1	6.1	6.0
Educational attainment (%)			
Less than high school/high school graduate	47.2	46.7	47.9
Education beyond high school	52.8	53.3	52.1
Marital status (%)			
Now married	89.2	94.9	84.0
Widowed, divorced, separated, or never married	10.8	5.1	16.0
Number of children (%)			
Mean	1.13	1.19	1.05
Median	1.00	1.00	1.00
Standard deviation	1.25	1.30	1.18
Housing tenure (%)			
Owner-occupied	77.1	78.0	76.0
Renter-occupied	22.9	22.0	24.0
Housing structure (%)			
Single family dwelling	80.2	81.0	79.2
Others	19.8	19.0	20.8
Income earned by others in the family ($)			
Mean	23,393.36	16,609.44	31,540.64
Median	18,000.00	12,209.50	25,891.50
Standard deviation	25,049.52	18,494.38	29,134.17
Region (%)			
Residence outside an MSA	26.7	27.1	26.4
Residence in an MSA	73.3	72.9	73.6

distinguishing among the groups, is given in Table 7. In the table, the F statistics are regarded as a transformation of Wilks' lambda. Values of lambda near zero mean high discrimination, and values of lambda near one mean low discrimination. Because Wilks' lambda is an inverse statistic, when F statistics are used instead of Wilks' lambda, the largest values of F statistics represent high discrimination. Therefore, as shown in the table, education beyond high school is the most powerful variable in discriminating 12 categories of choice of occupation and location of work because it has the highest F statistic (F = 177.26). The second-most important discriminator is sex (F = 126.02). The

not, and the density of the probability, λ_i, the estimate of correction for sample selection bias, is calculated. Then, λ_i, is used in the discriminant and regression analyses with other variables in the analyses of the selected subsample.

<Table 5> Statistics of independent variables for the on-site workers (n=7,029) and home-based workers (n=243).

Variables	Total		Males		Females	
	On-site workers	Home-based workers	On-site workers	Home-based workers	On-site workers	Home-based workers
Sex (%)						
Male	54.9	44.9	100.0	100.0	–	–
Female	45.1	55.1	–	–	100.0	100.0
Age (years)						
Mean	40.71	43.35	41.34	46.23	39.95	41.00
Median	42.00	42.00	40.00	46.00	39.00	40.00
Standard deviation	10.73	11.13	10.79	10.98	10.56	10.72
Race (%)						
White	86.2	96.7	87.5	100.0	84.6	94.0
Black	7.6	0.8	6.2	–	9.3	1.5
Other race	6.2	2.5	6.3	–	6.1	4.5
Educational attainment (%)						
Less than highs chool/high school graduate	47.5	40.3	46.9	40.4	48.2	40.3
Education beyond high school	52.5	59.7	53.1	59.6	51.8	59.7
Marital status (%)						
Now married	89.9	92.2	95.0	90.8	83.6	93.3
Widowed, divorced, separated, or never married	10.1	7.8	0.5	9.2	16.4	6.7
Number of children (%)						
Mean	1.12	1.31	1.20	1.06	1.03	1.52
Median	1.00	1.00	1.00	1.00	1.00	1.00
Standard deviation	1.24	1.50	1.29	1.42	1.15	1.53
Housing tenure (%)						
Owner-occupied	76.9	82.3	78.0	78.9	75.6	85.1
Renter-occupied	23.1	7.7	22.0	21.1	24.4	14.9
Housing structure (%)						
Single family dwelling	79.8	89.3	80.7	89.0	78.7	89.6
Others	20.2	10.7	19.3	11.0	21.3	10.4
Income earned by others in the family ($)						
Mean	23,143.35	30,625.41	16,468.28	21,608.32	31,269.28	37,960.19
Median	18,000.00	23,600.00	12,134.00	13,224.00	25,644.50	30,931.50
Standard deviation	24,735.87	31,869.51	18,180.14	27,036.38	28,901.50	33,669.69
Region (%)						
Residence outside an MSA	26.4	37.9	26.6	42.2	26.0	34.3
Residence in an MSA	73.6	62.1	73.4	57.8	74.0	65.7

other eight variables, although significant, are much less powerful than education and sex, according to the magnitude of the values of F statistics. In particular, marital status denotes the least discrimination, as the value of the F statistic is 4.76. The estimate of correction for selection bias does not significantly affect the discrimination among the categories.

2) Findings of regression analysis

To estimate hourly earnings, seven regression equations are analyzed. The first regression is

<Table 6> The means of the predicted probability of choosing occupation and location of work (n=7,272).

Variables	Mean	Standard deviation	Minimum	Maximum
Probability 1	.0097	.0095	.00012	.11009
Probability 2	.0077	.0072	.00005	.03562
Probability 3	.0064	.0092	.00005	.10892
Probability 4	.0064	.0088	.00006	.31549
Probability 5	.0014	.0015	8.5859E-6	.01973
Probability 6	.0016	.0016	.00006	.02896
Probability 7	.2882	.1929	.01127	.60348
Probability 8	.2878	.1258	.02407	.54458
Probability 9	.1004	.0914	.02329	.62849
Probability 10	.0179	.0150	.00160	.11678
Probability 11	.1274	.1157	.00660	.48778
Probability 12	.1451	.1268	.01098	.57272

Probability 1: Managerial and professional specialty and home-based work, Probability 2: Technical, sales, and administrative support and home-based work, Probability 3: Service and home-based work, Probability 4: Farming, forestry, and fishing and home-based work, Probability 5: Precision production, craft, and repair and home-based work, Probability 6: Operators, fabricators, and laborers and home-based work, Probability 7: Managerial and professional specialty and on-site work, Probability 8: Technical, sales, and administrative support and on-site work, Probability 9: Service and on-site work, Probability 10: Farming, forestry, and fishing and on-site work, Probability 11: Precision production, craft, and repair and on-site work, Probability 12: Operators, fabricators, and laborers and on-site work

<Table 7> The results of statistics in the discriminant analysis (n=7,272).

Variables	F	Pr > F
Male	126.0190	.0001
Age	5.6514	.0001
White	14.6075	.0001
Black	13.0679	.0001
Married	4.7561	.0001
Education beyond high school	177.2634	.0001
Number of children	5.6917	.0001
Owner-occupied housing	12.3122	.0001
Single family dwelling	21.9389	.0001
Natural log of income earned by others in the family	26.4084	.0001
Estimate of correction for selection bias	.8082	.6320
Degrees of freedom	11	
Average R^2	.0480	

applied to the entire sample regardless of the occupation. The other six equations are for each of the six categories of occupation to assess the effect of the location of work on hourly earnings.

(1) Findings of regression analysis for all samples

The results of regression analysis of hourly earnings on productivity-related characteristics and the predicted probabilities of choosing occupation and location of work are shown in Table 8. The hourly earnings equation is estimated using the

<Table 8> Regression analysis of earnings on productivity-related characteristics and the predicted probabilities (n=7,272).

Variables	Beta	t-value
Male	-.0306	-.518
Age	.0868	4.533***
White	.0033	.173
Black	.0042	.207
Education beyond high school	-.2486	-3.326***
Residence in an MSA	.1634	15.493***
Probability 2	-.0807	-2.350**
Probability 3	.0279	1.071
Probability 4	.0702	2.769**
Probability 5	-.0078	-.412
Probability 6	.0278	1.239
Probability 7	1.7865	4.691***
Probability 8	.6630	2.802**
Probability 9	.4592	2.552*
Probability 10	.0146	.359
Probability 11	.9124	4.220***
Probability 12	.7055	2.874**
Estimate of correction for selection bias	.0149	1.117
Constant	-2.8190	
R^2	.2185	
Adjusted R^2	.2166	
Degrees of freedom	18, 7,253	
F-ratio	112.672	
p	.0001	

*p<.05 **p<.01 ***p<.001

Probability 2: Technical, sales, and administrative support and home-based work, Probability 3: Service and home-based work, Probability 4: Farming, forestry, and fishing and home-based work, Probability 5: Precision production, craft, and repair and home-based work, Probability 6: Operators, fabricators, and laborers and home-based work, Probability 7: Managerial and professional specialty and on-site work, Probability 8: Technical, sales, and administrative support and on-site work, Probability 9: Service and on-site work, Probability 10: Farming, forestry, and fishing and on-site work, Probability 11: Precision production, craft, and repair and on-site work, Probability 12: Operators, fabricators, and laborers and on-site work

more appropriate dependent variable, the natural log of earnings, because the original hourly earnings are skewed. The statistically significant variables are age, education beyond high school, residence in an MSA, probability of choosing technical, sales, and administrative support, and home-based work, probability of choosing farming, forestry, and fishing, and home-based work, probability of choosing managerial and professional specialty, and on-site work, probability of choosing technical, sales, and administrative support, and on-site work, probability of choosing service and on-site work, probability of choosing precision production, craft, and repair, and on-site work, and probability of choosing operators, fabricators, and laborers, and on-site work. These results imply that the worker who is older, less educated, and lives in an MSA is more likely to make higher hourly earnings than the worker who is younger, more educated, and lives outside an MSA. In addition, if a person works at home for technical, sales, and administrative support, he/she earns less money than a person who working in a managerial and professional specialty as a home-based worker. However, if the person is a home-based worker engaged in farming, forestry, and fishing, or an on-site worker with a managerial and professional specialty, in technical, sales, and administrative support, in service, in precision production, craft, and repair, or is an operator, fabricator, or laborer, he/she is more likely to have higher hourly earnings than the home-based worker for the managerial and professional specialty.

The interesting finding from the regression analysis is that sex is not a significant factor in explaining hourly earnings, when the specific occupation-location probabilities are included. That is, although sex is an important factor in predicting the choice of occupation and location of work, sex itself is not significant in predicting hourly earnings after choosing occupation and location. In addition,

the effect of education on hourly earnings is found to be opposite to results from previous studies. According to previous studies, and the human capital model, as a person is more educated, he/she makes more in earnings. However, in this study, as a person is more educated, he/she is more likely to make less money. The explanation for this finding is that the predicted probability of choosing a specific occupation and location of work for which education was the strongest predictor absorbs the large amount of positive variance between the educational attainment and hourly earnings. As a result, the remaining variance between the educational attainment and hourly earnings is negative. This finding reinforces the power of the occupation-location categories in predicting earnings.

(2) Findings of regression analyses according to six categories of occupation

To examine the effect of location of work, six separate regression analyses are conducted according to occupation categories. The results are summarized in Table 9. For managerial and professional specialty, being male, age, education beyond high school, residence in an MSA, probability of choosing managerial and professional specialty, and home-based work, and the estimate of correction for selection bias are significant in explaining hourly earnings. Male managerial and professional workers are more likely than females to make higher hourly earnings. In addition, if the worker is older, more educated, and lives in an MSA, he/she is more likely to earn more money than the worker who is younger, and less educated, and lives outside an MSA. A home-based worker makes less money than an on-site worker. It should be noted that the estimate of correction for selection bias is significant for the managerial and professional specialty. The interpretation is that, individual not working for pay would earn significantly less than professional and managerial workers.

The results of regression analysis for technical, sales, and administrative support show that male, age, white, education beyond high school, and residence in an MSA are significant. The worker who is male, older, white, more educated, and lives in an MSA is more likely to make higher hourly earnings than the worker who is female, younger, of other race, less educated, and living outside an MSA. Being a home-based worker does not affect hourly earnings for technical, sales, and administrative support.

The significant variables for hourly earnings of service workers are male, age, black, education beyond high school, and residence in an MSA. That is, if the worker is male, older, and more educated, and lives in an MSA, he is likely to make higher hourly earnings than a worker who is female, younger, and less educated, and who lives outside an MSA. However, if the worker is black, he/she earns less money than other races. Being a home-based worker does not affect hourly earnings for the service occupation.

For farming, forestry, and fishing, only male and residence in an MSA are significant variables affecting the hourly earnings. If the worker is male and lives in an MSA, he is more likely to make higher hourly earnings than the worker who is female and lives outside an MSA. The probability of being a home-based worker in farming, forestry, and fishing is not a significant factor affecting hourly earnings.

For precision production, craft, and repair, male, age, education beyond high school, and residence in an MSA are significant variables influencing the hourly earnings. The worker who is

<Table 9> Regression analyses of earnings on productivity-related characteristics and predicted probabilities for six categories of occupation.

Variables	Managerial, and professional specialty		Technical, sales, and administrative support	
	Beta	t-value	Beta	t-value
Male	.3102	15.341***	.2287	6.727***
Age	.2100	9.375***	.1013	4.391***
White	.0041	.149	.0645	2.209*
Black	-.0378	-1.392	-.0322	-1.174
Education beyond high school	.2764	12.399***	.2107	6.841***
Residence in an MSA	.1635	8.427***	.1530	7.737***
Probability 1	-.1347	-4.829***	–	–
Probability 2	–	–	-.0781	-1.890
Estimate of correction for selection bias	.0454	2.214*	.0005	.023
Constant	1.1190		1.4574	
R^2	.2170		.1650	
Adjusted R^2	.2141		.1619	
Degrees of freedom	8, 2,109		8, 2,183	
F-ratio	73.081		53.922	
p	.0001		.0001	

Variables	Service		Farming, forestry and fishing	
	Beta	t-value	Beta	t-value
Male	.2329	5.888***	.2043	2.695**
Age	.1087	3.128**	.0042	.051
White	-.0595	-1.117	.0424	.444
Black	-.1332	-2.517*	-.0826	-.871
Education beyond high school	.1210	3.512***	.0582	.759
Residence in an MSA	.1349	3.962***	.1792	2.408*
Probability 3	-.0791	-1.892	–	–
Probability 4	–	–	-.0876	-.987
Estimate of correction for selection bias	-.0124	-.373	-.0226	-.304
Constant	1.4202		1.2869	
R^2	.1436		.0879	
Adjusted R^2	.1358		.0447	
Degrees of freedom	8, 776		8, 169	
F-ratio	16.267		2.036	
p	.0001		.0450	

Variables	Precision production, craft, and repair		Operators, fabricators, and laborers	
	Beta	t-value	Beta	t-value
Male	.0928	2.815**	.2963	10.338**
Age	.1470	3.872***	.1347	4.707*
White	.0678	1.510	.1139	2.736**
Black	-.0009	-.021	.0817	1.874
Education beyond high school	.0941	2.798**	.1170	3.562***
Residence in an MSA	.1233	3.840***	.1303	4.526***
Probability 5	-.0050	-.111	–	–
Probability 6	–	–	.0354	1.025
Estimate of correction for selection bias	.0699	1.877	-.0261	-.902
Constant	1.4992		1.3004	
R^2	.0630		.1586	
Adjusted R^2	.0549		.1522	
Degrees of freedom	8, 929		8, 1,052	
F-ratio	7.805		24.784	
p	.0001		.0001	

*p<.05 **p<.01 ***p<.001

Probability 1: Managerial and professional specialty and home-based work, Probability 2: Technical, sales, and administrative support and home-based work, Probability 3: Service and home-based work, Probability 4: Farming, forestry, and fishing and home-based work, Probability 5: Precision production, craft, and repair and home-based work, Probability 6: Operators, fabricators, and laborers and home-based work

male, older, and more educated, and lives in an MSA is more likely to make higher earnings than the worker who is female, younger, and less educated, and lives outside an MSA. Whether the worker is home-based is not a significant variable affecting hourly earnings in the precision production, craft, and repair occupational category.

Male, age, white, education beyond high school, and residence in an MSA are significant variables influencing hourly earnings for the operators, fabricators, and laborers. The worker who is male, older, white, educated beyond high school, and living in an MSA, is more likely to make higher hourly earnings than the younger female worker who is of other race, less educated, and lives outside an MSA. The probability of being a home-based worker is not a significant factor in predicting the hourly earnings for operators, fabricators, and laborers.

In summary, in all six regression analyses, sex plays a significant role in hourly earnings: males are more likely to make highly earnings than females given the occupational category. Age is significant for five of six analyses: an older person earns more money than a younger person in the occupational categories of managerial, and professional specialty; technical, sales, and administrative support; service; precision production, craft, and repair; and operators, fabricators, and laborers. In farming, forestry, and fishing, age does not affect hourly earnings. With regard to race, the effect of white and black is only found in technical, sales, and administrative support; service; and operators, fabricators, and laborers. In technical, sales, and administrative support, and operators, fabricators, and laborers, white individuals are more likely to make higher earnings than other races. On the other hand, in service occupations, blacks are more likely to earn less money than are workers of other races. Education is found to have a significant impact on hourly earnings in five analyses. A person who is more educated earns more money than a person who is less educated for the categories of managerial, and professional specialty; technical, sales, and administrative support; service; precision production, craft, and repair; and operators, fabricators, and laborers. In farming, forestry, and fishing, educational attainment does not have an impact on hourly earnings. Residence in an MSA plays an important role in hourly earnings. For all occupational categories, a person who lives in an MSA is more likely to earn more money than is a person living outside an MSA. The probability of being a home-based worker is significant only in the managerial, and professional specialty: being a home-based worker for managerial, and professional specialty means that the individual is likely to make lower earnings than an on-site worker. In the other five occupational categories, the probability of being a home-based worker is not an important factor affecting hourly earnings. The estimate of correction for selection bias has an influence on earnings only for the managerial, and professional specialty. For the other five occupational categories, the estimate of correction for selection bias is not significant. From these findings, it can be said that within the occupational category, the most important factors affecting

hourly earnings are sex, educational attainment, and region. Being a home-based worker is less likely to be significant in predicting hourly earnings, given the occupation.

IV. Conclusions and Implications

One of the major findings of this study is that sex is an important factor in choosing occupation and location of work. However, sex is not significant in the prediction of hourly earnings, after controlling for choice of occupation and location of work, when all occupations and locations are considered. Within separating analyses of hourly earnings according to occupational categories, sex is found to be a significant determinant of earnings in all six categories of occupation: men are more likely to earn money than women within the same occupation. In addition, in five of six occupational categories, it is found that being a home-based worker is not an important factor determining the hourly earnings. That is, within the same occupation, sex itself plays a significant role in the sex-earnings differentials among home-based workers, rather than type of location of work. These findings imply that sex discrimination of in pay structure still exists in the labor market.

Another major finding is that there are still great differences in occupational distribution according to sex, as shown in many other previous studies (see, for example, Blau & Ferber, 1992; Brown et al., 1980): female home-based workers are concentrated in technical, sales, and administrative support, and service, whereas male home-based workers are concentrated in managerial and professional specialty, and farming, forestry, and fishing. As one reason of these differences in the occupational structure between men and women, the possibility of discrimination at the entrance to the occupation, in the form of an occupational entry barrier, cannot be ruled out.

The other major finding is that marital status and the number of children are significant predictors explaining the choice of occupation and location of work, although the contributions of each variable are not large. Although this study did not analyze separately the effect of marital status on the choice of occupation and location of work according to sex, it can be expected that dual career responsibilities of married women may greatly influence decisions about what occupation to enter and where to work. Although they are employed outside the home, women in industrial societies bear the primary responsibility for home and family chores (Rexroat & Shehan, 1987; Robinson, 1988). In this case, women who work outside the home must organize their family and work lives. Therefore, it is not a surprising finding that married women who want to have dual careers may require choosing an occupation and location of work that minimizes conflict with family responsibilities. On the other hand, married men may allocate more time to work in the market as the primary provider of the home than do nonmarried men; consequently, marital status may have an effect on the decision of occupation and location of work. In addition, the number of children may also affect the woman' s decision about occupation and location of work in that woman is the person who has the primary responsibility to take care of the children, and home-based work is regarded as one way to participate in the labor market and to look after the children simultaneously. Therefore, in the decision of occupation and location of work, there might be difference between the woman without children and the woman with children.

From the results of this study, it may be concluded that sex is a major factor in choosing

occupation and location of work. Furthermore, sex is regarded as the significant factor influencing hourly earnings within each occupation category.

On the other hand, some limitations of this study may be noted for further study. First, a consistent definition regarding home-based work is needed. As seen in the literature review, home-based work has been defined according to the purpose of the studies, and these different definitions have affected the estimate of the number of home-based workers. In this study, home-based workers were defined narrowly as people who work at home, and consequently, many home-based workers who might be included in other definitions are excluded. To compare results about home-based workers across studies, a consistent definition regarding home-based workers is urgently needed.

Second, the data used for the study did not have much information that might affect the choice of occupation and location of work, or earnings, such as work experience, or nonpecuniary costs and benefits associated with occupations, personality and tastes. For example, the data for this study did not have any direct measures of work experience or job tenure, which have been regarded as important factors in affecting the choice of occupation and earnings in many previous studies (see, for example, Jones, 1983). When there has been no direct measure of years of work experience, many studies have used potential work experience, estimated by finding the difference between current age and age the individual left school (see, for example, Beck et al., 1980; Blinder, 1976; Treiman & Roos, 1983). It is impossible to use potential work experience for this study, however, because information regarding education was not attained in detail. With educational attainment, work experience and job tenure have been regarded as indicators of human capital investments. It should be noted that the predictor variables for the selection of occupation and location of work and for earnings provide a comprehensive explanation of each and the variables included should be accurately measured in that the omission of some variables and the use of inadequate proxies might bias the results. Therefore, for further study, data containing factors such as work experience and job tenure are needed to examine choice of occupation and location of work, and earnings.

Third, because the number of home-based workers was so small, some factors could not be used as predictor variables. For example, work disability status that has been found to affect choice of occupation and earnings in some studies, could not be included as a variable in examining the choice of occupation and location of work because, for home-based workers, there were insufficient cases of persons with a disability. Therefore, for further study, the sample numbers of home-based and on-site workers should be less diverse.

Finally, it is necessary to have longitudinal data for this kind of study. Family stability and fertility are expected to affect decisions regarding occupation and location of work, or earnings. If longitudinal data could be used, it would be possible to evaluate more precisely the order of choice of occupation and choice of location of work, and earnings according to the changes that occur in the lives of individuals.

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