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The Effect of Family Background on Occupational Choice

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Abstract

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In this paper, individual data from the Keio Household Panel Survey (KHPS) are used to investigate the effect of father's occupation and parents' years of schooling on the choice of the children's occupational choice. The estimation results indicate that children tend to choose the same occupation as their father with this being especially true for males. Parents' education does not affect children's occupational choice directly, but appears to have an indirect effect on children's occupational choice through children's education.

Journal of Economic Literature Classification Numbers: J24, J62

Keywords: Occupational choice, Family background , KHPS(Keio Household Panel Survey), Multinomial logit, IIA(independence of irrelevant alternatives)

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1 Introduction

The effect of family background on the choice of employment status or occupation is one of the important topics in modern labor economics. Providing equal opportunity for every people is a preferable situation in the society. If an individual's current occupation or economic status can be explained by his/her parents' attributes, it is said that every person does not have equal opportunity. However, the declining birth rate in Japan may increase the effect of parents. It is important to analyze the factors determining current occupation in Japan.

This paper investigates whether family background influences occupational choice behavior using a very recent datasets. Throughout this paper, the meaning of family background will be limited to parental education and father's occupation.

Much of the existing researches like Ollikainen (2006) estimate the choice behavior of employment status. For occupational choice, Soopramanien and Johnes (2001) estimate the gender effects in participation and occupation choice using US data. Black et al. (2005) explains the possibility of a correlation between parents' and children's education. However, there are few papers that find an effect of parent's education on children's occupational choices.

Iannelli (2002) studies differences in the extent to which social origin affects young people's educational and occupational outcomes across twelve EU countries. Iannelli explains the observed occupational status of a person's first significant job using the parent's education and person's education. His results show that although there are some significant variations across countries, parental education affects young people's educational and early occupational attainment in all countries. In most countries, parental education appears to have an indirect effect on children's occupational status through children's education.

Constant and Zimmermann (2003) compare the occupational choice behavior of male and female Germans, and native Germans and immigrants. They estimate a multinomial logit model which includes both human capital and family background effects. The structure of a family an individual faced when he or she was growing up may affect the individual's social skills and lead to human capital investments. Sjogren (2000) also tests the effect of family background on occupational choice by considering an incentive effect using data from the Swedish Level of Living Survey. First, she estimates a Mincer-type wage function where earnings are regressed on schooling, work experience and the square of work experience for each occupation to obtain incentive variables, wage rate, wage dispersion, the return to education and the return to experience for each occupation. Then, Sjogren estimates a mixed multinomial model and compares the effects of the incentive variables on occupational choice. Sjogren finds that people with poorly educated parents are more sensitive to economic incentives, and are more risk averse in their occupational choices. When considering unfamiliar occupations, people with poorly educated parents are more sensitive to economic incentives. Though this approach is theoreti-

cally attractive, from an empirical perspective, the variation in the data is not sufficient because this model assumes that everybody faces identical incentives for each occupation. Harding et al (2005) discuss family background and occupational choice from an unequal chances perspective.

To date, there is no study in Japan investigating the effect of family background on occupational choice because of a lack of adequate data. Hori (1986) uses a multinomial logit model to investigate the impact of individual's characteristics on occupational choice. He employs aggregated data from the "Wage Census," and uses years of schooling, years of work experience, and years working in the current company as explanatory variables. Hori finds that females have a higher probability of choosing professional or sales occupations than males. For both males and females, the years of schooling have the largest effect on occupational choice. Hori also calculates the distribution of predicted choices with the distribution of actual choices, and that the predicted probability of choosing their occupations is lower than the actual probability. Therefore, if the workforce was redistributed according to the predicted probabilities, women's average wage may increase and the wage differentials between male and female would converge. Finally, Hori tests the atrophy hypothesis , namely, that an individual's earning power is eroded as a result of periods of not participating in the labor force, but does not find support for this hypothesis.

Hirata et al (2006) analyze the effects of parents' education on the annual labor income of their children in later life using data of economics graduates of three major private universities in Japan. They find that the more educated the parents are, the more children tend to excel in mathematics, and the higher their income is in their adult lives.

In this paper, individual data from the Keio Household Panel Survey (KHPS) are used to investigate the effect of father's occupation and parents' years of schooling on the choice of children's occupational choice. Since data on both men and women are collected, it is possible to examine gender differences. Unlike many papers in the literature on occupational choice, this paper explicitly tests the IIA (independence of irrelevant alternative) assumption of the multinomial logit model. Testing the IIA assumption is important because if the assumption is invalid, the results of estimating the multinomial logit model are not appropriate.

The estimation results suggest that children tend to choose same occupation as their father. This is true especially for sons. Parents' education does not affect children's occupational choice directly, but appears to have an indirect effect on children's occupational choice through the children's education.

The structure of this paper is as follows. Section 2 discusses the model to be estimated and the estimation methods. Details of the data used are summarized in Section 3. Section 4 discusses the empirical results, and Section 5 contains a brief conclusion.

2 Econometric Model

Becker (1964) argues that education is an investment that produces knowledge acquisition and increases an individual's productivity. In this context, occupational choices are influenced by an individual's productivity that is determined by investments in education or training made throughout an individual's life.

Boskin (1974) applies this human capital approach to occupational choice. In his model, the probability of a worker entering a particular occupation is a function of the relative present values of the potential post-investment lifetime earnings, training costs, foregone earnings relative to wealth, and the present value of expected income foregone due to unemployment in alternative occupations. However, in practice, individual data for these expected costs and returns are unavailable or are not reliable, In contrast, Schmidt and Strauss (1975) adopt a direct approach which just uses race, sex, educational attainment and labor market experience as variables to explain occupational choice. This paper follows and extends this approach by including data on family background and work history.

The random utility model is used as the basis for our occupational choice model (see Greene (2003)). The utility of choice j for individual i, U_{ij}, can be decomposed into a deterministic component, V_{ij}, and random part, ϵ_{ij}.

$$U_{ij} = V_{ij} + \epsilon_{ij} \quad i = 1, ..., N \; j = 0, 1, ..., J \tag{1}$$

where ϵ_{ij} is not observed and is treated as a random variable with density $f(\epsilon_{ij})$, N is the number of individuals, and the number of occupation is J+1. The joint density of the random vector $\epsilon_i = \langle \epsilon_{i0} ... \epsilon_{iJ} \rangle$ is denoted by $f(\epsilon_n)$.

Suppose an employee selects his or her occupational choice as the alternative with the highest utility, then the probability that decision maker i chooses alternative j among the $J+1$ alternatives is given by

$$\begin{aligned} P_{ij} &= Pr(U_{ij} > U_{ik} \forall j \neq k) \\ &= Pr(\epsilon_{ik} < V_{ij} - V_{ik} + \epsilon_{ij} \forall j \neq k) \\ &= \int I(\epsilon_{ik} < V_{ij} - V_{ik} + \epsilon_{ij} \forall j \neq k) f(\epsilon_i) d\epsilon_i, \end{aligned} \tag{2}$$

where $I()$ is an indicator function.

In random utility models, the expectation of the random component, $E(\epsilon_{ik})$, is assumed to be 0, so $E(U_{ik}) = V_{ik}$. Suppose that the deterministic part, V_{ij}, is a linear function of a vector of explanatory variables that do not depend on the occupation chosen, x_i, and an unknown

vector of underlying parameters β_j, so that $V_{ij} = x_i'\beta_j$. The log-likelihood function is given by

$$lnL(\beta_0, ..., \beta_k) = \sum_{i=1}^{N} \sum_{j=0}^{J} d_{ij} lnP_r(Y_i = j), \tag{3}$$

where $d_{ij} = 1$ if alternative j is chosen by individual i and 0 otherwise, and $P_r(Y_i = j)$ is the probability that alternative j is chosen by individual i. For each i, one and only one of the d_{ij} takes the value one, so $\sum_{j=0}^{J} d_{ij} = 1$.

For simplicity, it is assumed that each of the random components is distributed independently, identically as a Type 1 extreme value. The choice probability is an integral over all values of ϵ_i weighted by its density f(). Given that $V_{ik} = x_i'\beta_k$ and $\beta_0 = 0$, (2) has the closed form solution

$$P_{i1} = P(Y_i = 0|x_i) = \frac{1}{1 + \sum_{k=1}^{J} e^{\beta_k' x_i}} \quad j = 0 \tag{4}$$

$$P_{ij} = P(Y_i = j|x_i) = \frac{e^{\beta_j' x_i}}{1 + \sum_{k=1}^{J} e^{\beta_k' x_i}}. \quad j = 1, ..., J \tag{5}$$

By differentiating (4), the marginal effects of the characteristics on the probabilities are

$$\delta_j = \frac{\partial P_{ij}}{\partial x_i} = P_i \left[\beta_j - \sum_{k=0}^{J} P_i \beta_k \right] = P_i[\beta_j - \bar{\beta}], \quad j = 1, ..., J \tag{6}$$

where $\bar{\beta}$ is a linear function of all the β_k weighted by their choice probabilities. That is, each marginal effect depends on the value of β_j for every choice.

3 Keio Household Panel Data

All data are taken from the first two waves of the Keio Household Panel Study (KHPS) (see Higuchi ed (2005) for more details). Data collection for the first wave, denoted KHPS 2004 was conducted in early 2004. The survey covers Japanese men and women with the age of the respondents being restricted to lying between 20 and 69. This age group is about 70 percent of the Japanese population. This sampling across a wide age group is similar to the Panel Study of Income Dynamics. The sampling procedure aimed for a size of 4000 which would constitute a pick up rate of 1/20000. It is important to note that KHPS asks many identical questions to both respondents and their spouses for married couples. KHPS contains detailed information on schooling, work, household savings, liability, income, expenditure, and housing. Data collection for the second wave, denoted KHPS 2005, was conducted in early 2005. For KHPS 2004, the sample size is 4005 for respondents, and 6294 when spouses are included. For KHPS 2005, the sample size is 3314 for respondents, and 5783 when spouses are

included. The attrition rate for respondents between KHPS 2004 and KHPS 2005 is 17.3 %. With the exception of data on work histories and final education levels which are taken from KHPS 2004, all data is taken from KHPS 2005.

KHPS 2005 asks individuals to indicate the content of their normal job from among the following twelve occupational categories: (1) agriculture, forestry workers and fishermen; (2) miners; (3) sales workers; (4) service workers; (5) administrative or managerial workers; (6) clerical workers; (7) transport operators; (8) production and related workers ; (9) system engineers or programmers; (10) professional or technical workers (excluding (9)); (11) police officer, guard, fireman etc; (12) other[1]. For simplicity, I rename and regroup the occupational choices (denoted by wok) into the following five categories with 1968 International Standard Classification of Occupation (ISCO-1968): A. clerical (#6); B. production (#8); C. sales (#3); D. services (#4 and #7); E. professional (#9 and #10). Individuals in groups #1, 2, 5, 11 and 12 are excluded from the analysis because the sample sizes for these groups are small (about 10 percent), and the characteristics of these occupations are likely to differ from the other major occupations.

Respondents are asked to provide information about their father's occupation at 15 years old based on the same twelve initial categories. Father's occupation (denoted by fwok) is the classified into the five groups (A-E), and data for the remaining groups are dropped. The explanatory variables used to explain observed occupational choices consist of a set of human capital variables such as education level, work experience, individual specific characteristics, and family background variables such as parent's education level and father's occupation. As (4) indicates, these variables are the same for all choices, but their impact is assumed to be different for each outcome.

KHPS 2004 and KHPS 2005 when combined contain detailed information on an individual's employment and education status for every year from age 15 until the year of the survey. This work history data is used to compute the number of years of work experience. Individuals are asked to indicate which if any of the following employment statuses apply to them each year, part-time employment, full-time employment, self-employment, side-job and family worker. The last three categories are put together in an "other" category, so give three work experience categories: full-time, part-time, and other. In the preliminary analysis of the data, years of part-time and other experience are not related to occupational distribution, therefore, only years of full-time experience (denoted by exp) are used in this analysis.

In order to compute education-related variables, responses are classified into four categories, junior high school, high school, college, and university. Years of education are approximated

[1] A comparison of the occupational distribution for KHPS 2004 and KHPS 2005 suggests that attrition has had little effect on the distribution of occupational choices

by assigning nine years to junior high school, twelve years to high school, fourteen years to junior college+technical college, and sixteen years to university. In this study, an individual's detailed history of work and educational experience is used to calculate a more accurate of an individual's years of schooling (denoted by sy). Detailed information on an individual's mother's and father's education and employment histories are not available, but individuals report the final level of each parent's education which are used to approximate father's and mother's years of schooling (denoted by fsy and msy's respectively). The manipulations to data have reduced the sample size from 5,783 individuals (2,865 males and 2,918 females) to 1,621 individuals (922 males and 699 females).

Table 1 provides details of the occupational choices of respondents and their fathers. A comparison of the children and father's occupational distribution indicates that child have a larger probability of choosing professional occupations than their father, and a smaller probability of choosing a production occupation. In Table 1, the diagonal elements have the largest value in each column indicating that children have a high probability of choosing the same occupation as their father. A comparison of the distribution for males and females indicates this tendency is stronger for males. Table 2 provides a cross-tabulation of a respondent's schooling with their father's and mother's schooling. Table 2 suggests that the higher the level of schooling of the parents, the higher the level of schooling of the respondents.

Table 3 provides sample means for the work experience and the years of schooling by occupation for the total sample, and for males and females separately. As expected, males have longer full-time experience and longer years of schooling. Professional workers have the longest years of schooling, and production workers have the shortest years of schooling.

4 Empirical Results

All models are estimated by multinomial logit model using the mlogit command in STATA. In the initial model, gender dummy (mf), age, years of schooling (sy), father's years of schooling (fsy), mother's years of schooling (msy), full-time experience (exp) and four dummies for father's occupation (dfwokB, dfwokC, dfwokD, dfwokE, where dfwok j is a 0-1 dummy variable making the value with 1 when occupation j is chosen, and zero otherwise [j=B,C,D,E]) are included as explanatory variables. The dummy variable for father with a clerical occupation is excluded, so this occupation is the base group. Given the difficulty of interpreting coefficient estimates, estimates of the marginal effect of each variable are presented in Table 4. In equation 4-1 for the choice of a clerical occupation, most of the marginal effects of the father's occupational dummy variables (dfwokB, dfwokC, dfwokD and dfwokE) are significant and negative. Since clerical is the base category, if a father chooses a clerical occupation, his children have

a higher probability of choosing a clerical occupation. For the other occupations, the father's occupational dummy for the same category has generally a positive and significant effect for each occupation. Therefore, people have a high probability of choosing the same occupation as their father. The estimated marginal impact of the gender dummy indicates that females have a larger probability of choosing professional, clerical and service occupations, and a lower probability of choosing a production occupation. The choice depends on the combination of preferences and opportunities, but these effects cannot be distinguished here. Years of schooling have a positive effect on professional and clerical occupations, and a negative effect on production and service occupations. Parent's years of schooling variables are not significant, except that father's years of schooling has a significant positive effect on the choice of professional occupation, and mother's years of schooling have positive effect on service. Fulltime work experience also has a positive effect on clerical and professional occupations, and a negative effect on service and sales occupations. In most cases, people appear to make similar choices even if their parent's educational family background is different.

In Equation 4-1, most gender dummy is highly significant, so separate models are estimated for male's and female's in Equation 4-2 and Equation 4-3, respectively. Females do not have a high probability of choosing the same occupation as their father. Males have a high probability of choosing the same occupation as their fathers for only clerical, sales and services. For females, a father's years of schooling has a negative effect on the choice of production occupation,

There may be some positive correlation between a mother's and father's years of schooling, so the effect of father's years of schooling (Equations 5-1 and 5-2 in Table 5) and mother's years of schooling (Equations 5-3 and 5-4 in Table 5) are examined separately. Both the father's and mother's years of schooling has a significant negative effect on the choice of production occupations for females.

As Black et al (2005) and Iannelli (2002) suggest, the years of schooling of children and their parents may be correlated, so children's years of schooling are excluded in Table 6 for all the data (Equation 6-1), for males (Equation 6-2) and for females (Equation 6-3). Father's years of schooling has a significant positive effect on the choice of professional occupations, and a significant negative effect on the choices of production occupations. Mother's years of schooling has a significant negative effect on the choice of production occupations. There is no big difference for the effect of parents' years of schooling between males and females. The marginal effects of parents' education in Equation 4-1 in Table 4 which includes children's years of schooling are mostly smaller than in Equation 6-1 in Table 6 which excludes children's years of schooling. In total, parents' education appears to have little effect on children's occupational choices. From Iannelli (2001)'s perspective, most of the effect of family background on occupational choices is indirect through education rather than directly through genetic endowments, social connec-

tions and wealth. For a more precise analysis, a test of the causal relationship between parents' years of schooling and children's years of schooling is required. For the choice of a production occupation, both father's and mother's years of schooling has a significant negative effect for males, while father's years of schooling has a significant negative effect for females. Father's years of schooling has a significant positive effect on the choice of professional occupation for both males and females. Again, most of the parents' effect is indirectly through education.

An important and restrictive property of the multinomial logit model is its imposition of the independence of irrelevant alternatives (IIA) assumption. This property states that the odds of choosing alternative j over alternative k, P_{ij}/P_{ik}, are independent of all other alternatives, and of the number of alternatives in the choice set. There are several methods for testing IIA property. Here, the McFadden-Train-Tye (1981) (MTT) test which well performed in the Monte Carlo simulations performed by Fry and Harris (1993) is adopted. In this test, the multinomial logit model is first estimated by maximum likelihood on the full choice set C to obtain parameter estimates denoted $\hat{\delta}_C$, and a maximized log likelihood value denoted $logL(\hat{\delta}_c)$. Next, the multinomial logit model is estimated using data for a subset of choice set D to obtain parameter estimates denoted $\hat{\delta}_D$. The value of the maximized log-likelihood function for this restricted set is denoted $logL(\hat{\delta}_D)$.

The MTT test statistic is given by

$$MTT = -2[logL(\hat{\delta}_C) - logL(\hat{\delta}_D)] \tag{7}$$

Under the null hypothesis that the IIA assumption is valid, this likelihood ratio test statistic has an asymptotic χ^2 distribution with degrees of freedom equal to the dimension of $\hat{\delta}_D$. The result for the MTT test is recorded at the bottom of each table. The null hypothesis (IIA property) cannot be rejected, supporting the use of the multinomial logit model.

5 Conclusion

In this study, the effect of family background on occupational choice is estimated using data from the Keio Household Panel Survey. A father's occupational choice has effect on the occupation choice behavior of his children, especially his sons. Individuals have a high probability of choosing the same occupation as their fathers. For most occupational choices, parents' education appears to have a little direct effect on occupational choices of either male or female children. Rather, parents' education appears to have an indirect effect through children's education.

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Table 1 Distribution of Father's and Children's Occupations

		father's occupation					
		clerical	production	sales	service	professional	total
All	clerical(%)	**29.88**	16.61	16.96	18.55	17.47	18.26
	production(%)	20.12	**36.10**	20.24	21.77	18.07	28.25
	sales(%)	18.90	14.92	**35.42**	9.68	16.27	19.31
	service(%)	11.59	14.20	12.20	**37.10**	11.45	14.99
	professional(%)	19.51	18.17	15.18	12.90	**36.75**	19.19
	total(%)	100.00	100.00	100.00	100.00	100.00	100.00
	frequency	164	831	336	124	166	1621
Male	clerical(%)	**29.47**	10.11	11.22	12.12	15.38	13.02
	production(%)	30.53	**52.47**	27.32	34.85	24.18	40.56
	sales(%)	16.84	10.97	**36.59**	9.09	14.29	17.46
	service(%)	3.16	8.60	9.27	**28.79**	7.69	9.54
	professional(%)	20.00	17.85	15.61	15.15	**38.46**	19.41
	total(%)	100.00	100.00	100.00	100.00	100.00	100.00
	frequency	95	465	205	66	91	922
Female	clerical(%)	**30.43**	24.86	25.95	25.86	20.00	25.18
	production(%)	5.80	**15.30**	9.16	6.90	10.67	12.02
	sales(%)	21.74	19.95	**33.59**	10.34	18.67	21.75
	service(%)	23.19	21.31	16.79	**46.55**	16.00	22.17
	professional(%)	18.84	18.58	14.50	10.34	**34.67**	18.88
	total(%)	100.00	100.00	100.00	100.00	100.00	100.00
	frequency	69	366	131	58	75	699

Table2 Distribution of Parents and Children's Years of Schooling

		father				
		junior high	high school	college	university	total
children	junior high(%)	12.33	1.98	7.69	0.51	6.97
	high school(%)	**60.75**	**51.24**	30.77	20.51	51.88
	college(%)	11.45	15.37	30.77	18.46	14.07
	university(%)	15.47	31.40	30.77	**60.51**	27.08
	total(%)	100.00	100.00	100.00	100.00	100.00
	frequency	795	605	26	195	1621
		mother				
		junior high	high school	college	university	total
children	junior high(%)	12.35	2.99	0.00	0.00	6.97
	high school(%)	**60.36**	**49.22**	20.00	14.29	51.88
	college(%)	10.43	16.75	23.75	9.52	14.07
	university(%)	16.87	31.04	56.25	**76.19**	27.08
	total(%)	100.00	100.00	100.00	100.00	100.00
	frequency	729	770	80	42	1621

Table 3 Years of Schooling and Experience

	Schooling (years)			Experience (years)		
	male	female	total	male	female	total
clerical	15.13	14.04	14.48	18.43	11.32	14.20
production	12.72	12.70	12.72	18.91	10.37	17.34
sales	14.66	13.09	13.89	14.48	8.20	11.43
service	13.43	12.85	13.06	13.28	7.90	9.85
professional	16.07	15.12	15.67	17.64	12.19	15.33
total	14.09	13.61	13.88	17.29	9.93	14.12

Table 4 Marginal Effects from an Occupational Choice Model Including Both Parents Schooling

		4-1(all)			4-2(male)			4-3(female)		
		Marginal Effect	z		Marginal Effect	z		Marginal Effect	z	
1. clerical	mf	0.216	8.84	**						
	exp	0.009	6.61	**	0.009	5.64	**	0.011	4.83	**
	age	-0.007	-5.69	**	-0.010	-5.26	**	-0.008	-4.12	**
	sy	0.023	4.97	**	0.020	4.86	**	0.325	3.32	**
	fsy	0.002	0.41		0.003	0.45		0.002	0.17	
	msy	0.004	0.56		0.002	0.22		0.004	0.29	
	dfwokB	-0.095	-2.83	**	-0.103	-3.23	**	-0.038	-0.62	
	dfwokC	-0.074	-2.44	*	-0.071	-3.00	**	-0.026	-0.39	
	dfwokD	-0.052	-1.34		-0.064	-2.48	*	-0.006	-0.08	
	dfwokE	-0.089	-2.98	**	-0.060	-2.47	*	-0.108	-1.62	
2. production	mf	-0.328	-13.56	**						
	exp	0.000	0.05		-0.001	-0.42		-0.001	-0.62	
	age	-0.002	-1.36		-0.001	-0.50		-0.001	-0.52	
	sy	-0.053	-9.73	**	-0.081	-10.25	**	-0.017	-2.59	**
	fsy	-0.011	-1.48		-0.002	-0.14		-0.022	-2.73	**
	msy	-0.014	-1.57		-0.021	-1.50		-0.004	-0.48	
	dfwokB	0.065	1.46		0.485	0.71		0.056	1.01	
	dfwokC	-0.061	-1.33		-0.155	-2.20	*	0.029	0.42	
	dfwokD	-0.067	-1.25		-0.155	-1.63		-0.023	-0.36	
	dfwokE	-0.007	-0.12		-0.130	-1.52		0.121	1.13	
3. sales	mf	-0.012	-0.50							
	exp	-0.007	-5.58	**	-0.008	-5.08	**	-0.007	-3.41	**
	age	0.005	4.17	**	0.008	4.74	**	0.002	1.25	
	sy	-0.004	-0.76		0.013	2.40	*	-0.034	-3.69	**
	fsy	0.001	0.20		0.002	0.22		0.002	0.16	
	msy	-0.002	-0.21		0.001	0.12		-0.001	-0.02	
	dfwokB	-0.050	-1.23		-0.067	-1.33		-0.047	-0.78	
	dfwokC	0.152	3.02	**	0.147	2.29	*	0.094	1.27	
	dfwokD	-0.121	-3.09	**	-0.108	-2.34	*	-0.143	-2.67	**
	dfwokE	-0.027	-0.56		-0.040	-0.71		-0.017	-0.23	
4. service	mf	0.521	2.58	**						
	exp	-0.006	-6.13	**	-0.005	-5.03	**	-0.010	-4.17	**
	age	0.004	4.38	**	0.005	4.18	**	0.004	2.39	*
	sy	-0.020	-4.36	**	-0.004	-0.91		-0.045	-4.88	**
	fsy	-0.004	-0.73		-0.010	-1.64		0.005	0.50	
	msy	0.014	2.00	*	0.011	1.42		0.016	1.36	
	dfwokB	0.015	0.41		0.073	1.33		-0.030	-0.51	
	dfwokC	-0.007	-0.17		0.085	1.08		-0.078	-1.40	
	dfwokD	0.223	3.02	**	0.321	2.14	*	0.182	2.03	*
	dfwokE	0.000	0.00		0.111	1.03		-0.061	-0.94	
5. professional	mf	0.072	3.14	**						
	exp	0.005	3.72	**	0.004	2.16	*	0.006	3.80	**
	age	0.000	0.10		-0.002	-0.83		0.002	1.73	
	sy	0.053	12.52	**	0.051	9.79	**	0.063	6.18	**
	fsy	0.011	2.02	*	0.008	1.07		0.014	1.79	
	msy	-0.002	-0.26		0.007	0.75		-0.015	-1.53	
	dfwokB	0.066	1.87		0.049	1.07		0.060	1.19	
	dfwokC	-0.011	-0.28		-0.006	-0.12		-0.019	-0.35	
	dfwokD	0.016	0.28		0.007	0.08		-0.010	-0.13	
	dfwokE	0.123	2.17	*	0.119	1.52		0.066	0.87	
Log Likelihood		-2177.2419			-1155.1993			-987.23		
MTT tests	omitted 2	accept H0			accept H0			accept H0		
	omitted 3	accept H0			accept H0			accept H0		
	omitted 4	accept H0			accept H0			accept H0		
	omitted 5	accept H0			accept H0			accept H0		
Sample Size	total	1621			922			699		
	1. clerical	296			120			176		
	2. production	458			374			84		
	3. sales	313			161			152		
	4. services	243			88			155		
	5. professiona	311			179			132		

(1)The MTT tests of IIA assumption, test the null hypothesis
Ho: Odds(Outcome-J vs Outcome-K) are independent of other alternatives.

(2) * and ** indicate significance at the 5% and 1% levels, respectively

Table 5 Marginal Effects from an Occupational Choice Model Including Only One Parent's Schooling

		5-1(male,f)			5-2(female,f)			5-3(male,m)			5-4(female,m)		
		Marginal Effect	z		Marginal Effect	z		Marginal Effect	z		Marginal Effect	z	
1. clerical	exp	0.009	5.64	**	0.001	5.00	**	0.009	5.64	**	0.011	5.01	**
	age	-0.010	-5.41	**	-0.008	-4.26	**	-0.010	-5.30	**	-0.007	-4.12	**
	sy	0.020	4.87	**	0.033	3.38	**	0.021	5.06	**	0.033	3.36	**
	fsy	0.003	0.63		0.003	0.37							
	msy							0.003	0.47		0.004	0.40	
	dfwokB	-0.104	-3.25	**	-0.038	-0.60		-0.106	-3.38	**	-0.039	-0.63	
	dfwokC	-0.071	-3.01	**	-0.025	-0.37		-0.072	-3.08	**	-0.028	-0.43	
	dfwokD	-0.064	-2.36	*	-0.005	-0.06		-0.067	-2.64	**	-0.005	-0.06	
	dfwokE	-0.060	-2.50	*	-0.106	-1.58		-0.060	-2.45	*	-0.109	-1.65	
2. production	exp	-0.001	-0.39		-0.001	-0.60		-0.001	-0.42		-0.001	-0.64	
	age	0.000	-0.14		0.000	-0.40		-0.001	-0.51		0.000	-0.29	
	sy	-0.081	-10.34	**	-0.018	-2.72	**	-0.081	-10.46	**	-0.020	-2.82	**
	fsy	-0.009	-0.89		-0.024	-3.44	**						
	msy							-0.023	-1.79		-0.018	-2.07	*
	dfwokB	0.051	0.73		0.057	1.04		0.049	0.72		0.076	1.34	
	dfwokC	-0.160	-2.27	*	0.029	0.41		-0.157	-2.22	*	0.047	0.61	
	dfwokD	-0.156	-1.63		-0.022	-0.34		-0.165	-1.74		-0.011	-0.15	
	dfwokE	-0.135	-1.58		0.123	1.14		-0.131	-1.53		0.117	1.08	
3. sales	exp	-0.007	-5.07	**	-0.007	-3.40	**	-0.007	-5.07	**	-0.007	-3.41	**
	age	0.008	4.83	**	0.002	1.31		0.008	4.73	**	0.002	1.23	
	sy	0.013	2.41	*	-0.034	-3.76	**	0.013	2.47	*	-0.033	-3.71	**
	fsy	0.002	0.30		0.001	0.17							
	msy							0.002	0.21		0.000	0.03	
	dfwokB	-0.068	-1.34		-0.047	-0.78		-0.069	-1.40		-0.048	-0.80	
	dfwokC	0.146	2.27	*	0.094	1.27		0.143	2.24	*	0.090	1.23	
	dfwokD	-0.109	-2.38	*	-0.142	-2.64	**	-0.112	-2.50	*	-0.141	-2.66	**
	dfwokE	-0.042	-0.75		-0.016	-0.21		-0.039	-0.69		-0.018	-0.24	
4. service	exp	-0.005	-5.06	**	-0.009	-4.20	**	-0.005	-5.07	**	-0.009	-4.16	**
	age	0.004	3.97	**	0.003	2.14	*	0.005	4.51	**	0.004	2.36	*
	sy	-0.003	-0.78		-0.043	-4.74	**	-0.005	-1.20		-0.044	-4.86	**
	fsy	-0.007	-1.16		0.012	1.35							
	msy							0.005	0.77		0.019	1.80	
	dfwokB	0.073	1.32		-0.033	-0.56		0.088	1.58		-0.034	-0.58	
	dfwokC	0.091	1.13		-0.075	-1.33		0.098	1.19		-0.081	-1.48	
	dfwokD	0.324	2.16	*	0.180	2.02	*	0.350	2.31	*	0.177	2.00	*
	dfwokE	0.117	1.06		-0.058	-0.87		0.104	0.99		-0.061	-0.94	
5. professional	exp	0.004	2.15	*	0.006	3.86	**	0.004	2.20	*	0.006	3.89	**
	age	-0.002	-1.02		0.003	2.02	*	-0.002	-0.94		0.002	1.59	
	sy	0.052	9.89	**	0.062	8.49	**	0.052	10.19	**	0.064	8.82	**
	fsy	0.010	1.60		0.008	1.15							
	msy							0.012	1.40		-0.006	-0.71	
	dfwokB	0.048	1.05		0.061	1.22		0.039	0.87		0.044	0.90	
	dfwokC	-0.005	-0.10		-0.023	-0.43		-0.012	-0.24		-0.028	-0.53	
	dfwokD	0.005	0.06		-0.012	-0.17		-0.006	-0.08		-0.020	-0.29	
	dfwokE	0.121	1.53		0.058	0.78		0.124	1.58		0.071	0.94	
Log Likelihood		-1156.9777			-989.09761			-1156.9497			-992.1003		
MTT tests	omitted 2	accept H0			accept H0			accept H0			accept H0		
	omitted 3	accept H0			accept H0			accept H0			accept H0		
	omitted 4	accept H0			accept H0			accept H0			accept H0		
	omitted 5	accept H0			accept H0			accept H0			accept H0		
Sample Size		922			699			922			699		

(1)The MTT tests of IIA assumption, test the null hypothesis
Ho: Odds(Outcome-J vs Outcome-K) are independent of other alternatives.

(2) * and ** indicate significance at the 5% and 1% levels, respectively

Table 6 Marginal Effects from an Occupational Choice Model Excluding Children's Scholing

		6-1(all)			6-2(male)			6-3(female)		
		Marginal Effect	z		Marginal Effect	z		Marginal Effect	z	
1.clerical	mf	0.193	8.32	**						
	exp	0.007	5.95	**	0.007	4.55	**	0.009	4.60	**
	age	-0.007	-5.68	**	-0.007	-4.45	**	-0.008	-4.42	**
	fsy	0.006	1.15		0.008	1.36		0.005	0.47	
	msy	0.007	1.01		0.003	0.42		0.010	0.86	
	dfwokB	-0.115	-3.59	**	-0.127	-3.95	**	-0.057	-0.96	
	dfwokC	-0.080	-2.90	**	-0.083	-3.70	**	-0.032	-0.52	
	dfwokD	-0.069	-2.09	*	-0.075	-3.24	**	-0.031	-0.42	
	dfwokE	-0.093	-3.40	**	-0.068	-2.98	**	-0.105	-1.81	
2.producution	mf	-0.287	-12.36	**						
	exp	0.002	1.40		0.002	1.14		0.000	-0.23	
	age	-0.002	-1.70		-0.003	-1.36		0.000	-0.42	
	fsy	-0.024	-3.41	**	-0.024	-2.36	*	-0.024	-3.12	**
	msy	-0.022	-2.46	*	-0.030	-2.24	*	-0.008	-0.91	
	dfwokB	0.113	2.64	**	0.124	1.97	*	0.064	1.26	
	dfwokC	-0.024	-0.51		-0.084	-1.18		0.035	0.51	
	dfwokD	-0.011	-0.19		-0.065	-0.61		-0.011	-0.17	
	dfwokE	0.014	0.23		-0.088	-1.03		0.111	1.11	
3.sales	mf	0.006	0.26							
	exp	-0.006	-5.48	**	-0.007	-5.03	**	-0.006	-2.98	**
	age	0.004	3.93	**	0.005	4.33	**	0.002	1.51	
	fsy	0.000	0.01		0.004	0.54		-0.004	-0.42	
	msy	-0.003	-0.36		0.001	0.15		-0.006	-0.53	
	dfwokB	-0.050	-1.31		-0.076	-1.66		-0.024	-0.41	
	dfwokC	0.139	2.90	**	0.123	2.11	*	0.102	1.41	
	dfwokD	-0.115	-3.27	**	-0.110	-2.99	**	-0.125	-2.28	
	dfwokE	-0.033	-0.77		-0.043	-0.89		-0.027	-0.39	
4.service	mf	0.074	3.75	**						
	exp	-0.006	-5.87	**	-0.004	-4.85	**	-0.008	-3.68	**
	age	0.004	4.56	**	0.004	3.95	**	0.004	2.79	**
	fsy	-0.007	-1.37		-0.011	-1.90		-0.001	-0.15	
	msy	0.009	1.38		0.009	1.27		0.006	0.56	
	dfwokB	0.022	0.65		0.066	1.34		-0.002	-0.04	
	dfwokC	-0.002	-0.06		0.081	1.11		-0.067	-1.25	
	dfwokD	0.239	3.28	**	0.301	2.08	*	0.232	2.39	*
	dfwokE	-0.010	-0.23		0.099	1.01		-0.074	-1.21	
5.professional	mf	0.014	0.62							
	exp	0.003	2.47	*	0.002	0.98		0.005	2.85	**
	age	0.001	0.63		0.000	0.21		0.002	1.08	
	fsy	0.025	4.30	**	0.233	3.19	**	0.026	2.95	**
	msy	0.008	1.06		0.016	1.59		-0.002	-0.23	
	dfwokB	0.029	0.77		0.013	0.26		0.020	0.35	
	dfwokC	-0.033	-0.83		-0.037	-0.74		-0.035	-0.62	
	dfwokD	-0.043	-0.88		-0.051	-0.79		-0.065	-1.03	
	dfwokE	0.123	2.17	*	0.100	1.33		0.095	1.18	
Log Likelihood		-2296.7629			-1236.5743			-1040.1937		
MTT tests	omitted 2	accept H0			accept H0			accept H0		
	omitted 3	accept H0			accept H0			accept H0		
	omitted 4	accept H0			accept H0			accept H0		
	omitted 5	accept H0			accept H0			accept H0		
Sample Size		1621			922			699		

(1)The MTT tests of IIA assumption, test the null hypothesis
Ho: Odds(Outcome-J vs Outcome-K) are independent of other alternatives.

(2) * and ** indicate significance at the 5% and 1% levels, respectively