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OCCUPATIONAL EARNINGS DIFFERENTIALS IN FINLAND*

Empirical evidence from a cross section of individuals

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ABSTRACT: The primary purpose of the present paper is to analyse the importance of occupational status in explaining earnings dispersion in Finland. This is done in two steps. First, human capital earnings functions supplemented with occupation controls are estimated in order to exhibit the effect of occupation on the general level of earnings and the interaction between human capital and occupation. The crucial question raised by the coefficients estimated for the occupation indicator variables then is to what extent they reflect an indirect earnings effect of formal schooling arising from the influence of especially vocationally differentiated education on the individuals' occupational attainment. In the second step, this question is addressed by estimating occupation-specific earnings functions, whereby correction for the potential effects of selection bias arising from occupational choice is done by adding information obtained from estimating occupational attainment functions of the multinomial logit form.

The empirical findings suggest that the effect of formal education on earnings is not necessarily weakened by the role that occupation plays. Instead, a notable part of the earnings effect of education seems to be mediated by the employee's position in the occupational hierarchy. The strong indirect earnings effect of schooling points, in turn, to a fairly rigid occupational earnings structure, especially among male employees. A cautious generalization of the results implies that the inclusion of both educational and occupational controls in the earnings equation might provide useful insight about the functioning of the Finnish labour market.

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TIIVISTELMÄ: Tutkimuksessa tarkastellaan vaiheittain palkansaajien ammattiasemaa palkkaerojen selittäjänä Suomessa. Aluksi estimoidaan inhimillisen pääoman teoriaan perustuvia palkkayhtälöitä erikseen naisille ja miehille. Liittämällä palkkayhtälöihin ammattiasemaa kuvaavia muuttujia analysoidaan toisaalta ammattiaseman vaikutusta yleiseen palkkatasoon ja toisaalta inhimillisen pääoman ja ammatin välisiä vuorovaikutuksia. Keskeiseksi kysymykseksi nousee missä määrin ammattiasema-muuttujille estimoidut kertoimet heijastavat koulutuksen epäsuoraa eli ammattiaseman kautta välittyvää vaikutusta palkkatasoon. Kysymystä tutkitaan estimoimalla palkkayhtälöt neljälle laajalle ammattiryhmälle. Näitä ammattiryhmäkohtaisia palkkayhtälöitä korjataan ammattivalinnan mahdollisesti aiheuttaman valikoituvuusharhan suhteen estimoimalla palkkayhtälöt yhdessä ammattiasemayhtälöiden kanssa.

Tutkimustulokset osoittavat, että ammattiaseman huomioonottaminen palkkayhtälöissä ei välttämättä heikennä koulutuksen palkkavaikutuksia vaikka koulutusmuuttujien merkitys palkkayhtälössä väheneekin. Näin on siksi, että huomattava osa koulutuksen vaikutuksesta välittyy siten, että koulutettu saa paremman ammattiaseman. Tämä koulutuksen suhteellisen voimakas epäsuora vaikutus palkkoihin viittaa varsin jäykkään ammattiasema-palkkarakenteeseen, etenkin miesten keskuudessa. Tutkimustulokset viittaavat siihen, että sekä koulutuksen että ammattiaseman huomioonottaminen palkkayhtälöissä saattaa tuottaa hyödyllistä tietoa siitä, miten Suomen työmarkkinat toimivat.

1. INTRODUCTION

The usual approach within the human capital framework mostly overlooks the potential role of occupation in explaining observed interpersonal earnings differentials; the pay in an occupation is thought to be determined primarily by the investment in human capital that an individual has to make to enter it. Drawing on the work of Willis (1986), de Beyer & Knight (1989) derive and test a theory of occupation-specific productivity and earnings which is seen to be consistent with the competitive framework of the human capital theory. In particular, their theoretical model interprets occupational attainment as the outcome of a nexus of relationships among occupation, ability, education, training and productivity. These interactions are shown to generate a positive hierarchial sorting of individuals into jobs even under the assumption of perfectly competitive factor markets.

However, the inclusion of a set of occupation controls into the earnings function treats the occupational status of an individual as given or, using the terminology of Brown et al. (1980), as in some sense justified. If the allocation of employees to different occupational categories can be expected to be the outcome of a selection process rather than a random drawing, then the omission of any potential factors influencing the individual's choice of or access to a given occupation may give rise to problems of selectivity bias in the estimations.

One way of approaching the obvious endogeneity of occupational attachment would be to drop the occupation controls and consider a reduced form earnings equation which combines determinants of occupational attainment and of earnings. More information is, however, gained if the two processes are kept separate, i.e. if the estimation of occupation-specific earnings equations is combined with the estimation of occupational attainment equations in order to correct for the potential presence of selectivity bias arising from occupational choice. This latter approach, which has recently been used by Reilly (1991), is preferred also in the present study. The selection bias problem is addressed by implementing a general technique for the estimation of multivariate choice models proposed by Lee (1983) and first applied by Trost & Lee (1984).

The adopted approach can, however, be criticized for overlooking the fact that the relation between occupational choice and earnings determination is necessarily simultaneous; the choice of occupation affects lifetime earnings and expected future earnings influence occupational choice (e.g. Dolton et al., 1989). Because the available data only comprise information on a single cross section of individuals, the obvious simultaneity of decisions cannot be accounted for in the analysis.

Nevertheless, the estimation results obtained from estimating both occupational attachment and earnings equations offer a possibility to examine in more detail the role of occupation in the determination of earnings. Following de Beyer & Knight (1989), an exercise is undertaken, where the direct and indirect (through occupational attainment) earnings effects of education are calculated and compared with the earnings effects estimated for schooling in earnings equations omitting occupation.

The paper is organized as follows. Section 2 presents the empirical specifications of the estimated earnings functions, the estimation methods employed and the data used. Section 3 reports the estimated effects of occupation on the overall level of male and female earnings, while Section 4 analyses the influence of human capital on earnings within occupational categories and the interaction between formal education and occupational status. Concluding remarks are given in Section 5.

2. MODEL SPECIFICATIONS AND DATA

The empirical analysis is based on an extended version of the conventional human capital earnings function postulated by Mincer (1974). In particular, the natural logarithm of earnings of the ith individual ($\ln EARN_i$) is explained in terms of a vector (X_i) containing human capital-related as well as other relevant personal and job characteristics:

$$(1)\quad \ln EARN_i = X_i\alpha + \varepsilon_i, \qquad \varepsilon_i \sim N(0,\sigma^2) \quad i = 1,\ldots,N$$

where α is a vector of parameters to be estimated and ϵ_i is a disturbance term.

Under the usual least squares assumptions, the disturbance term in the earnings model in (1) is randomly distributed among the population, with an expected value equal to zero. However, in the survey data used in the present study, the sample individuals recorded as being in employment are not randomly selected from the entire population. Instead they represent persons who were employed during the week of the questionnaire, excluding all individuals who, for one reason or the other, were not in employment at that particular time. Given that this produces a non-negligible sample selection bias, estimation of earnings equations for employees using ordinary least squares techniques results in inconsistent parameter estimates (e.g. Maddala, 1983).

Adjustment for potential sample selectivity bias influencing the estimation results is done by estimating the earnings function in (1) in combination with a selection function of the probit type explaining the probability of the ith sample individual being employed. The selection criterion in the resulting two-equation model, classified as a "Type 2" Tobit model by Amemiya (1984), has the following general form

$$(2)\quad W_i^* = Y_i\beta + \mu_i$$

where Y_i is a vector of explanatory variables, β is a vector of unknown parameters, and μ_i is a disturbance term that in the case of selectivity bias correlates with the residual (ϵ_i) in the earnings equation. The dependent variable (W_i^*) in the selection equation is unobservable, but it has a dichotomous observable realization W_i (employed or not) which is related to W_i^* as follows:

$$W_i = 1 \qquad iff \quad W_i^* > 0$$
$$W_i = 0 \qquad otherwise$$

Accordingly, the dependent variable ($\ln EARN_i$) in the earnings regression is not observed unless $W_i^* > 0$, implying that the observed sample of EARN is censored. The conditional expectation of the earnings equation may then be written

$$(3) \quad E(\ln EARN_i | W_i = 1) = X_i\alpha + E(\varepsilon_i | W_i = 1) = X_i\alpha + E(\varepsilon_i | \mu_i < Y_i\beta)$$

By assuming that ϵ_i and μ_i follow a bivariate normal distribution $N(0,0,\sigma_\epsilon^2,\sigma_\mu^2,\rho_{\epsilon\mu})$ with zero means, variances σ_ϵ^2 and σ_μ^2, and correlation coefficient $\rho_{\epsilon\mu}$, a standard sample selectivity bias correction of the earnings equation can be done

$$(4) \quad E(\ln EARN_i | W_i = 1) = X_i\alpha - \rho_{\varepsilon\mu}\sigma_\varepsilon \frac{\phi(Y_i\beta)}{\Phi(Y_i\beta)} = X_i\alpha + \rho_{\varepsilon\mu}\sigma_\varepsilon\lambda$$

where σ_ϵ is the standard deviation of the disturbance term in the earnings equation and $\phi(\cdot)$ and $\Phi(\cdot)$ are, respectively, the density function and the distribution function of the standard normal. Various empirical specifications of the earnings equation in (4) are estimated within the LIMDEP framework using maximum likelihood estimation of the procedure discussed in Heckman (1979) and Greene (1981). More exactly, in order to obtain both consistent and efficient estimates, equations (1) and (2) are estimated jointly, whereby the final values from the two-stage Heckman procedure are used as starting-values for the maximum likelihood method of estimating α, β, σ_ϵ and $\rho_{\epsilon\mu}$.

The probability of being employed is explained in terms of a set of personal characteristics containing age and indicators for educational level, marital status, family size, and location of residence. The observed earnings variance among male and female employees, in turn, is assumed to be dependent on the employees' formal education, years of labour market experience, marital status, family size, location of residence, employment status, working conditions, union membership, and industry affiliation. Apart from these explanatory variables, the earnings model is further supplemented with a set of occupation indicators in order to examine the interaction effects of the individuals' position in the occupational structure.

It may, though, be questioned whether it is appropriate to treat the occupational status of an individual as exogenously given, i.e. to ignore any potential factors that may influence the individual's choice of or access to a given occupation.[1] One way of approaching this endogeneity problem would be to drop the occupation controls and consider a reduced form earnings equation which combines determinants of occupational attachment and of earnings or, more formally, replaces the occupation controls by their determinants in occupational attainment equations.

However, this approach disregards the fact that occupational differences may occur not only in the level of earnings but also in the returns to human capital as well as to other individual characteristics. More information is thus gained by keeping the two processes separate; that is, earnings functions are estimated for relevant occupational categories, whereby the potential presence of selection bias arising from occupational choice is addressed by supplementing the occupation-specific earnings functions with the estimation of occupational attainment functions.

Following Lee (1983), this alternative approach, involving multiple choice and censored dependent variables, can be formulated in terms of a polychotomous choice model with J mutually exclusive occupational categories and J earnings equations:

$$(5)\quad \ln EARN_{ij} = Z_{ij}\gamma_j + \zeta_{ij}, \qquad \zeta_{ij} \sim N(0,\sigma_j^2)$$

$$(6)\quad OCC^*_{ij} = V_i\theta_j + \eta_{ij}, \qquad i = 1,\ldots,N \quad j = 1,\ldots,J$$

where Z_{ij} and V_i are vectors of explanatory variables, γ_j and θ_j are vectors of unknown parameters, and ζ_{ij} and η_{ij} are disturbance terms. The occupational earnings function in (5) will be affected by selectivity bias if the disturbances in (5) and (6) are correlated.

The dependent variable ($\ln EARN_{ij}$) in the occupation-specific earnings equation is observed only if occupational category j is chosen. This choice is assumed to be the outcome of an optimization process where the individual compares the maximum utility attainable given each occupational alternative and selects that alternative which provides the highest present value of net benefits. The utility maximization process is thought to be captured by the occupational indicator function

$$(7)\quad OCC_i = j \quad iff \quad OCC^*_{ij} > \max OCC^*_{ik}, \qquad k = 1,\ldots,J \quad k \neq j$$

Following Lee (1983), the choice of the jth alternative in (7) can be reformulated as a binary decision, i.e.

$$(8)\quad OCC_i = j \quad iff \quad V_i\theta_j > \psi_{ij}$$

where ψ_{ij} is the residual for each individual and occupational category and is defined as

$$(9)\quad \psi_{ij} = \max OCC^*_{ik} - \eta_{ij}, \qquad k = 1,\ldots,J \quad k \neq j$$

Assuming that the residuals (η_{ij}) of the utility function in (6) are independently and identically Gumbel distributed, the probability that the occupational category j will be chosen can be represented by a multinomial logit model[2]

$$(10)\quad Prob(\psi_{ij} < V_i\theta_j) = Prob(OCC_i = j) = \frac{\exp(V_i\theta_j)}{1 + \sum_{k=1}^{J}\exp(V_i\theta_k)}$$

Only the parameters of the J-1 of the investigated occupational categories can be identified, which requires a normalization $\Sigma\theta_j=0$ to be imposed in the estimations.[3] The earnings equation conditional on category j being chosen may then be written

$$(11)\quad E(\ln EARN_{ij}|OCC_i = j) = Z_{ij}\gamma_j + E(\zeta_{ij}|OCC_i = j)$$
$$= Z_{ij}\gamma_j + E(\zeta_{ij}|\psi_{ij} < V_i\theta_j)$$

Given that ζ_{ij} and ψ_{ij} follow a bivariate normal distribution, a two-step estimation procedure similar to that postulated by Heckman (1979) can be used in order to correct the occupation-specific earnings functions for the potential effects of selectivity bias arising from occupational choice. Following Lee (1983), the ψ_{ij}s are transformed into standard normal random variables and a modified earnings equation conditional on occupation category j being chosen is derived

$$(12)\quad E(\ln EARN_{ij}|OCC_i = j) = Z_{ij}\gamma_j - \rho_j\sigma_j\frac{\phi[F_j(V_i\theta_j)]}{\Phi[F_j(V_i\theta_j)]} = Z_{ij}\gamma_j + \rho_j\sigma_j\lambda_j$$

where $F(\cdot)$ denotes the probability distribution function and the other terms are defined in line with their counterparts in equation (4) above. Various empirical specifications of the occupational earnings equation in (12) are estimated within the LIMDEP framework using the multinomial logit-OLS two-stage estimator of Lee (1983). More exactly, the multinomial probability function in (10) is estimated by maximum likelihood and the obtained information is used to compute λ_j, i.e. the term controlling for the potential effects of selectivity bias. Consistent estimates of γ_j and $\Omega_j=\rho_j\sigma_j$ are then obtained by ordinary least squares regression of $\ln EARN_{ij}$ on Z_{ij} and $\hat{\lambda}_j$:

$$(13)\quad \ln EARN_{ij} = Z_{ij}\gamma_j + \Omega_j\hat{\lambda}_j + \tau_{ij}$$

where $E(\tau_{ij}|OCC_i=j) = 0$. The standard errors are corrected using the heteroscedasticity consistent estimator suggested by White (1980).

The probability of a given occupational attachment is taken to depend on the individual's accumulated human capital, family responsibilities, employment and working condition preferences as well as on regional variations in occupational structures. Following Gyourko & Tracy (1988), age is not included as an explanatory variable, the underlying assumption being that there are no systematic shifts of employees between occupational social status categories as they grow older. Lack of data, in turn, unables the inclusion of social background variables, which have generally been found also to affect the individual's choice of occupation (e.g. Gabriel et al., 1990). The earnings within each occupational social status category are explained in terms of the same broad set of variables used in explaining overall earnings variance.

The earnings models outlined above are estimated using cross-sectional micro data from the labour force survey for 1987 conducted by the Central Statistical Office of Finland. A strong advantage of the data set is that it comprises information of vital importance in human capital earnings analysis. Less satisfactory is the fact that it does not provide panel data; the survey sample varies from one year to another. The labour force survey covers a sample of some 9000 persons, representing the entire population aged 15-64 years as stratified according to sex, age and region. When the data are restricted to employed wage and salary earners at the age 16 to 64 and sorted out with respect to missing or incomplete information on crucial variables, the sample of employees retained in the actual estimating data shrinks to covering a total of 3895 individuals.

The dependent variable is chosen to be average before-tax hourly earnings in order to allow for interpersonal differences in months and weekly hours worked and to make the earnings of full-time and part-time employees comparable. The earnings data used comprise most types of compensation, including overtime and vacation pay and fringe benefits.[4]

Ideally, earnings differentials should be related to the actual schooling differences which generate them. The employed data set does not allow this, however; the available register data on formal schooling merely show the highest single education completed by each individual. There is a total of eight levels of education, which are represented in the estimations by both linear and non-linear schooling variables. A noteworthy advantage of the data set is that it comprises information on the person's total years of work experience and his or her years with the current employer, i.e. seniority (tenure). Thus the estimation results are based on actual (self-reported) and not on potential labour market experience.

The occupational classification of individuals is according to the standard Finnish classification of socio-economic groups of 1983 (CSO, 1983). In brief, individuals in paid-employment are classified into three broad social status categories: upper-level salaried employees, lower-level salaried employees, and manual workers. Each of the two categories of non-manuals is further divided into four subgroups depending on, inter alia, the level of responsibility and independency associated with the working tasks performed. The category of manual workers is also divided into four subgroups, but primarily according to occupational group and industrial sector.

A summary of definitions of the variables employed in the subsequent empirical analysis is given in Table A of Appendix. The male and female employees in the estimating data are described in terms of these variables in Tables B and C of Appendix. A detailed presentation of the underlying data and definitions of crucial variables is given in Asplund (1992a).

3. EARNINGS EFFECTS OF OCCUPATIONAL SOCIAL STATUS

The regression results obtained from estimating gender-specific human capital earnings functions exclusive and inclusive of occupational social status controls are displayed in Table 1. The corresponding probit estimates are reported in Table D of Appendix. The earnings effects estimated for the various explanatory variables included in the analysis are discussed at length in Asplund (1992b) and are therefore commented on only briefly below.

The parameter estimates[5] of the education level indicators suggest that the effect of education on earnings is on average increasing with the level of education. But the growth rate of earnings varies quite substantially depending on the level of education concerned. Also, it differs markedly between the two genders at the lower end of the educational scale where, moreover, a major part of the labour force is situated. These overall trends mostly persist when controlling for the occupational social status of employees (columns 2 and 4 in Table 1); although the inclusion of occupation indicators reduces significantly the absolute size of the schooling coefficients, the estimates still point to highly varying economic incentives to continue in formal education.

Further, despite a considerable narrowing of the differences in educational returns across genders[6], the estimated returns to graduation from lower vocational and professional education stand out as an important exception. Specifically, women with completed lower vocational education tend to have no relative income advantage over women with basic education only. For men, graduation at this particular educational level has a marginal product amounting to some 10-11 per cent on average. On the whole then, the estimation results suggest that differences in the jobs and occupations which men and women typically hold offer only part of an explanation for the different rates of return to education between genders. Accordingly other explanations such as wage discrimination cannot be ruled out.

The parameter estimates on the experience variables are mostly highly significant and have the a priori expected signs, thereby

Table 1. Estimation results for extended human capital earnings equations estimated by gender[1]. The dependent variable is log hourly earnings inclusive of fringe benefits. (Occupation controls are included in columns 2 and 4.)

Variable	Female employees (1)	Female employees (2)	Male employees (3)	Male employees (4)
CONSTANT	3.3114** (.0681)	3.3816** (.0804)	3.3539** (.0549)	3.4083** (.0679)
LOWER VOCATIONAL	0.0073 (.0227)	-0.0022 (.0222)	0.1055** (.0204)	0.0915** (.0197)
UPPER VOCATIONAL	0.1758** (.0248)	0.1160** (.0244)	0.2728** (.0227)	0.1569** (.0239)
SHORT NON-UNIV	0.3670** (.0353)	0.2188** (.0370)	0.4875** (.0339)	0.2619** (.0382)
UNDER-GRADUATE	0.5168** (.0478)	0.2830** (.0532)	0.4714** (.0667)	0.2135** (.0685)
GRADUATE	0.6038** (.0430)	0.3643** (.0466)	0.6416** (.0370)	0.3991** (.0370)
EXP	0.0129** (.0036)	0.0097** (.0036)	0.0193** (.0033)	0.0142** (.0034)
$EXP^2/1000$	-0.1654* (.0926)	-0.1094 (.0935)	-0.2898** (.0845)	-0.1999* (.0873)
MARRIED	-0.0182 (.0196)	-0.0209 (.0195)	0.0590** (.0230)	0.0397* (.0222)
$CHILD^{0-6}$	0.0299 (.0183)	0.0248 (.0185)	-0.0109 (.0207)	-0.0105 (.0196)
$CHILD^{7-17}$	0.0014 (.0189)	0.0080 (.0190)	0.0546** (.0185)	0.0464** (.0179)
CAPITAL	0.0873** (.0194)	0.0854** (.0192)	0.1304** (.0170)	0.1218** (.0167)
TEMPEMPL	0.0625** (.0205)	0.0380* (.0202)	-0.0709** (.0248)	-0.0774** (.0228)
PART-TIME	0.2812** (.0206)	0.2889** (.0207)	0.1977** (.0389)	0.1818** (.0367)
PIECE-RATE	0.0120 (.0346)	0.0362 (.0328)	0.0909** (.0242)	0.1017** (.0235)
NODAYWORK	0.1306** (.0176)	0.1598** (.0180)	0.0179 (.0203)	0.0533** (.0190)
UNEMPL	-0.0268 (.0226)	-0.0068 (.0226)	-0.0722** (.0229)	-0.0563** (.0212)

Table 1. (cont.)

Variable	Female employees (1)	(2)	Male employees (3)	(4)
UNION	-0.0335*	-0.0159	-0.0112	0.0154
	(.0188)	(.0189)	(.0163)	(.0161)
Industry sector indicators:				
INDU11	0.0372	0.0501	-0.1315**	-0.0874
(agriculture)	(.0989)	(.1185)	(.0430)	(.0765)
INDU31	-0.0233	-0.0057	-0.0257	0.0047
(food manuf.)	(.0644)	(.0660)	(.0429)	(.0411)
INDU32	-0.0468	-0.0289	0.0405	0.0425
(textile)	(.0591)	(.0562)	(.1022)	(.0910)
INDU33	-0.0124	-0.0207	-0.1190**	-0.1143*
(wood prod.)	(.0948)	(.0886)	(.0501)	(.0491)
INDU34	0.1627**	0.1395*	0.2106**	0.2116**
(paper prod.)	(.0656)	(.0701)	(.0347)	(.0346)
INDU35	0.0328	0.0201	0.1036**	0.1067**
(chemicals)	(.1008)	(.1021)	(.0429)	(.0413)
INDU36	-0.0322	-0.0108	-0.0093	0.0122
(non-metallic)	(.2251)	(.2487)	(.0535)	(.0505)
INDU37***	-	-	0.1678*	0.1926*
(basic metal)			(.0948)	(.0939)
INDU20/39****	0.2372	0.0996	0.1094	0.0759
(oth. manuf.)	(.1734)	(.2167)	(.1005)	(.1014)
INDU40	0.0324	-0.0126	0.0893	0.0959
(electricity)	(.2337)	(.3247)	(.0620)	(.0610)
INDU50	0.0301	0.0178	0.0282	0.0518*
(construction)	(.0873)	(.0938)	(.0309)	(.0292)
INDU61	0.0796	0.0271	0.0531	0.0265
(wholesale)	(.0660)	(.0764)	(.0346)	(.0371)
INDU62	-0.0551	-0.1413*	-0.0873**	-0.0294
(retail trade)	(.0503)	(.0630)	(.0334)	(.0388)
INDU63	0.0134	0.0094	-0.0347	-0.0143
(restaurants)	(.0575)	(.0695)	(.1059)	(.0861)
INDU71	0.1046*	0.0623	-0.0191	0.0499
(transport)	(.0590)	(.0692)	(.0389)	(.0432)
INDU72	0.1041	0.0751	0.0091	0.0897
(communication)	(.0835)	(.0935)	(.0582)	(.0590)
INDU81	0.2015**	0.1530*	0.2525**	0.2064**
(financing)	(.0535)	(.0670)	(.0607)	(.0561)

Table 1. (cont.)

Variable	Female employees (1)	(2)	Male employees (3)	(4)
INDU82 (insurance)	0.1537 (.0957)	0.1028 (.0981)	0.1576 (.2184)	0.2101 (.1456)
INDU83 (real estate)	0.0378 (.0556)	-0.0075 (.0674)	0.0331 (.0446)	0.0199 (.0455)
INDU91 (public adm.)	0.0711 (.0613)	0.0373 (.0719)	-0.0137 (.0389)	0.0158 (.0410)
INDU92 (sanitary)	-0.0477 (.0660)	-0.0149 (.0777)	-0.2019** (.0748)	-0.1678** (.0714)
INDU93 (social)	0.0310 (.0472)	-0.0141 (.0618)	-0.0350 (.0351)	-0.0185 (.0414)
INDU94 (cultural)	0.1030* (.0570)	0.0583 (.0682)	0.0286 (.0580)	-0.0148 (.0622)
INDU95 (personal)	-0.0440 (.1022)	-0.0239 (.1152)	-0.1647* (.0947)	-0.0781 (.0857)
Occupational status indicators:				
OCC31 (management)		0.3616** (.0854)		0.3926** (.0452)
OCC32 (research)		0.0982 (.0663)		0.2190** (.0521)
OCC33 (education)		0.3482** (.0449)		0.2608** (.0517)
OCC34 (oth. seniors)		0.1678** (.0375)		0.1560** (.0465)
OCC41 (supervisors)		0.0852* (.0498)		0.0892* (.0483)
OCC42 (indep. (clericals)		0.0439 (.0303)		-0.0556 (.0499)
OCC43 (routine (clericals)		0.0490 (.0382)		-0.0063 (.0690)
OCC51 (agriculture)		-0.1522 (.1193)		-0.0493 (.0874)
OCC52 (manu-facturing)		-0.1030* (.0563)		-0.0219 (.0465)
OCC53 (oth. prod.)		-0.1198** (.0420)		-0.0971* (.0485)
OCC54 (service)		-0.1037** (.0270)		-0.1082* (.0470)

Table 1. (cont.)

Variable	Female employees (1)	(2)	Male employees (3)	(4)
SIGMA(ϵ)	0.3042**	0.2927**	0.2929**	0.2758**
	(.0033)	(.0028)	(.0034)	(.0030)
RHO(ϵ,μ)	-0.0877	-0.0574	0.0925	0.0429
	(.1011)	(.1076)	(.1324)	(.1400)
Log-Likelihood	-2039.8	-1965.8	-1488.0	-1375.3
Number of obs.	1987	1987	1908	1908

[1] Standard errors are given in parentheses below the estimates. The omitted educational level variable is BASIC = primary education (about 9 years or less), the left out industry sector is INDU38 = employment in manufacturing of metal products, and the reference occupational status category is OCC44 = other lower-level employees with administrative and clerical occupations.
Maximum likelihood estimates corrected for sample selectivity bias, where SIGMA(ϵ) is the standard error of the disturbance term in the earnings equation and RHO(ϵ,μ) measures the correlation between the error term (ϵ) in the earnings equation and the error term (μ) in the selection (probit) equation. The probit estimates are reported in Table D of Appendix.
A simple Chow test based on estimation results obtained using the Heckman estimator suggests that the hypothesis of the parameter estimates being equal for males and females can be rejected at a 0.1 % risk level.
* Denotes significant estimate at a 5 % risk level.
** Denotes significant estimate at a 1 % risk level.
*** The four observations on females employed in basic metal industries are included in the reference category INDU38.
**** Includes employment in mining and quarrying.

pointing to an upward-sloping concave experience-earnings profile for both genders. Assuming that the cross-sectional coefficients for experience capture the dynamics of changes in earnings over the individual's life cycle, the magnitudes of the estimates indicate that earnings growth starts, when first entering the labour market, from some 1.9 per cent for the typical male employee and from roughly 1.3 per cent for the typical female employee, decreases thereafter continuously, reaches zero only after more than three decades in the labour market, and turns thereafter negative until retirement.

More exactly, a maximum of about 38 per cent cumulative growth[7] in male hourly earnings is reached after some 33 years of work experience, while the cumulative growth in female hourly earnings peaks at roughly 29 per cent after 39 years in the labour market. The addition of occupation controls results in a negligible drop in the absolute value of the experience coefficients. Obviously this outcome is partly due to the overall weak earnings effect estimated for labour market experience.

A large majority of the parameter estimates on the various personal and job-related variables are significant and of the expected signs. Thus the estimation results suggest that family responsibilities (MARRIED,CHILD) generally have a positive effect on male earnings. Not surprisingly, residence within the capital region (CAPITAL) implies a higher hourly earnings level for both genders. The results also point to a significant income advantage of male employees in jobs covered by some other compensation system than wages/salaries paid on a monthly, weekly or hourly basis (PIECE-RATE) and of female employees in jobs that entail inconvenient hours of work (NODAYWORK). The regression results further indicate that periods of temporary unemployment or layoffs (UNEMPL) typically implied a negative earnings effect for males only. In other words, male employees who had been temporarily unemployed or laid off during the survey year had lower hourly earnings compared with male employees who had been in full employment during the whole year.

The almost negligible influence on earnings of union membership (UNION) is evidently mainly due to the broad coverage of central wage agreements in Finland. A most plausible explanation for the strong relative income advantage obtained for part-time employees (PART-TIME) and females in temporary employment (TEMPEMPL) is the distinct distribution of these two employee categories across occupations and industries (see Asplund, 1992a). Controlling for the employees' occupational social status leaves the coefficients of the various personal and job-related indicator variables roughly unchanged. From this it may be concluded that the distribution of employees with respect to these characteristics is fairly similar in the 12 occupational categories considered.

The addition of two-digit industry sector controls has a negligible impact on the estimated coefficients of the other explanatory variables accounted for in the estimations. In fact, when controlling for a broad set of personal and job-related characteristics, a major part of the observed variance in average hourly earnings across industries vanishes. The most conspicuous remaining wage premia are obtained for males in manufacturing of paper products (INDU34) and chemicals (INDU35), in basic metal industries (INDU37), and in financing (INDU81). Also females tend to receive a wage premium in manufacturing of paper products and in financing. A relatively weak earnings position is, in turn, obtained for males in manufacturing of wood products (INDU33) and in sanitary services (INDU92). The important question of inter-industry earnings differentials will be addressed in more detail in a later paper.

A closer analysis of the magnitudes and significance levels of the estimated parameters on the occupational indicators reveals certain interesting patterns of earnings variance across occupational social status categories and genders. Thus the results in Table 1 indicate that there are small or negligible earnings differentials between lower-level salaried employees (OCC41-44). The only notable exception is the category of supervisors (OCC41), who in 1987 had on average some 9 per cent higher hourly earnings compared with other lower-level employees.

As is also to be expected, the average hourly earnings level is typically higher for upper-level salaried employees and lower for manual workers as compared with the average earnings of lower-level salaried employees. But there are distinct exceptions from this general pattern, as well. For male upper-level non-manuals, shifts into higher-level occupational positions, other things unchanged, tend to be associated with a fairly moderate growth in hourly earnings up to the second highest social status category (OCC32), followed by a striking jump upwards in the average earnings level resulting from the substantially higher hourly earnings received by senior officials and upper management (OCC31).

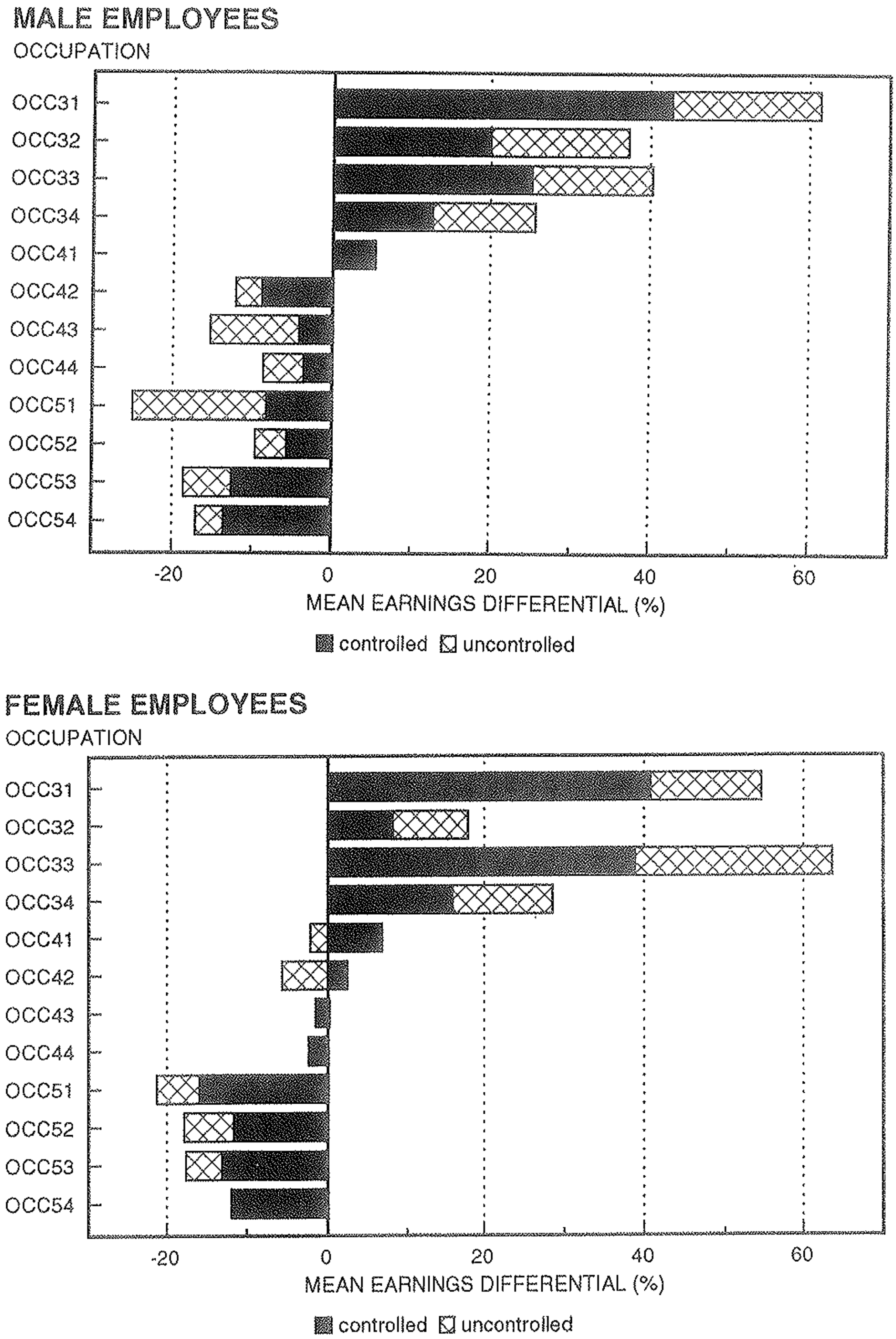
The general trend in the average earnings of female upper-level non-manuals, on the other hand, is dominated by a very strong earnings position of female senior officials and employees in education and training (OCC33) and a fairly weak earnings standard of female senior officials and employees in research and planning (OCC32) not only when compared with that of other female upper-level salaried employees but also when related to the earnings position of their male counterparts. This latter finding is explained mainly by the fact that women generally work in less-paid research and planning occupations (e.g. as research assistants).

Finally, the parameter estimates on the occupational indicators for the four manual worker categories point to almost negligible variation in average hourly earnings both across genders and within each gender. The most conspicuous exception is the insignificant earnings differential between male employees in manufacturing (OCC52) and in lower-level non-manual occupations. Compared with the other manual worker categories the average earnings level of male manufacturing workers was some 10 to 13 per cent higher in 1987.

These general trends stand out more clearly in Figure 1, which shows the mean percentage deviation of each occupational category from the employment weighted average hourly earnings level for all categories after having controlled for various background factors (dark areas). As also illustrated in the figure, the controlled mean differentials in hourly earnings between occupational social status categories differ notably from the commonly used uncontrolled earnings differentials (dark plus crosshatched areas).

The estimated coefficients for the selectivity variable (RHO) point to no significant sample selection bias in the estimations. Accordingly, ordinary least squares techniques would give consistent parameter estimates. These are reported in Table E of Appendix.

Figure 1. Employment weighted mean differentials in hourly earnings levels between 12 occupational social status categories before (total bar) and after (dark area) having controlled for crucial background factors



Source: Calculations based on the gender-specific occupation coefficients reported in Table 1.

4. OCCUPATION-SPECIFIC EARNINGS

The estimation results in Table 1 show that the employees' occupational social status has an important effect on the level of earnings in Finland. Moreover, the introduction of occupation controls into the earnings equation reduces the absolute size of the educational coefficients by almost a half or more, except for graduation from lower vocational and professional education.

There are several hypothetical explanations to this significant drop in the direct earnings effect of schooling (e.g. de Beyer & Knight, 1989). First, the effect of education may be weakened by the role that occupation plays; that is, the occupational structure defines a hierarchy of positions existing independently of the persons filling the positions. Second, a major part of the earnings effects captured by occupation controls may reflect an indirect effect of schooling arising from the influence of especially vocationally differentiated education on the individuals' occupational attainment. Third, occupation may simply act as a proxy for unmeasured ability, implying that it has no independent role in the determination of earnings. Finally, depending on the standard of the available occupational data in general and the definition of occupational categories in particular, the education and occupation indicators may reflect much the same effects. The data used in the present study do reveal some but, as it seems, no serious degree of collinearity between educational level and occupational social status (cf. Table F of Appendix).

In order to address this type of questions, occupation-specific earnings equations are estimated for each gender. The earnings equations are corrected for potential selection bias arising from occupational choice as outlined in Section 2. Since the estimation results displayed in Table 1 suggest that the sample selection bias associated with the person being recorded as an employee is negligible, no correction in the estimations is done in that respect.[8]

In the previous section, a distinction was made between no less than 12 occupational social status categories. Below a less disaggregated classification is adopted, dictated in part by the occupation estimates reported in Table 1, and in part by the need to have a sufficient number of employees in all the categories to be considered. More exactly, in terms of the dependent polychotomous occupation variable (OCC^*_{ij}) four fairly broad categories are distinguished: upper-level salaried employees (OCC31-34), lower-level salaried employees (OCC41-44), manufacturing workers (OCC52), and other production, distribution and service workers (OCC53-54).[9] A finer classification of non-manuals is prevented by too few females or males in some of the non-manual categories. Sample means for the four categories are given in Tables B and C of Appendix.

The regression results obtained for female and male employees using a heteroscedasticity-consistent estimator of the occupation-specific earnings equation in (13) are reported for selected variables in Tables 2 and 3. A full tabulation of the estimation results is given in Tables G and H of Appendix. The gender-specific maximum likelihood estimates for the multinomial logit model in (10) are displayed in Tables I and J of Appendix.

With a few exceptions, the estimated coefficients of the human capital variables for separate occupational categories show the same general pattern as the estimates obtained for all female and male employees. In particular, the return to an additional year in above-primary education (S) decreases, less for men than for women, when moving down the occupational social status scale. Indeed, the estimated coefficients indicate that, except for males in manufacturing jobs, the returns to postcompulsory schooling for manual workers are not statistically different from zero. But on the other hand, this outcome may also simply be the result of small variation in completed formal education in these categories (cf. Tables B and C of Appendix).

Generally speaking, the schooling coefficients point to small, if any, differences in the estimated rates of return to above-primary education among the broad categories of non-manuals and manuals but to significant differences between these two employee groups. This holds for both genders. Conspicuous gender gaps in estimated educational returns within occupational categories occur for the female-dominated category of lower-level non-manuals and the male-dominated category of manufacturing workers.

Table 2. Female occupational earnings equations corrected for selectivity bias.[1] The dependent variable is log average hourly earnings inclusive of fringe benefits. (The estimation results are fully reported in Table F of Appendix.)

Variable	All female employees	Upper-level non-manuals	Lower-level non-manuals	Manufacturing workers	Other manual workers
CONSTANT	3.3369**	3.6359**	3.2742**	3.2410**	2.9305**
	(.0759)	(.2316)	(.0585)	(.1164)	(.1724)
S	0.0426**	0.0639*	0.0449**	-0.0003	-0.0128
	(.0054)	(.0290)	(.0078)	(.0204)	(.0184)
EXP	0.0061*	0.0096	0.0077*	0.0161**	0.0036
	(.0037)	(.0073)	(.0043)	(.0067)	(.0064)
EXP^2 /1000	-0.0755	-0.1265	-0.1786*	-0.1991	-0.0368
	(.0964)	(.1911)	(.0971)	(.1593)	(.1227)
SEN	0.0057**	0.0067*	0.0093**	-0.0035	0.0038*
	(.0017)	(.0033)	(.0012)	(.0033)	(.0019)
OJT	0.0233	-0.0096	0.0194	0.1794**	-0.0158
	(.0196)	(.0361)	(.0179)	(.0487)	(.0311)
UNION	-0.0218	0.0051	-0.0137	-0.1536**	-0.0323
	(.0196)	(.0526)	(.0285)	(.0488)	(.0515)
LAMBDA	–[1]	0.0153	0.0778	0.0769	0.3097**
		(.0848)	(.0554)	(.0685)	(.1019)
R^2 adj.	–[1]	0.2257	0.2145	0.1560	0.1998
No. of obs.	1974	269	1106	210	374

[1] Standard errors are in parentheses below the estimates and are adjusted for heteroscedasticity according to White (1980) in the occupation-specific earnings equations (columns 2-5). The corresponding multinomial logit estimates are reported in Table I of Appendix. The earnings equation for all female employees (column 1) comprises the same control variables as the earnings equations estimated in Section 3 and is adjusted for sample selectivity bias using ML-estimation. RHO(ϵ,μ) = -0.0425 with a standard error of 0.1012. Log-Likelihood = -1958.8.

* Denotes significant estimate at a 5 % risk level.

** Denotes significant estimate at a 1 % risk level.

Table 3. Male occupational earnings equations corrected for selectivity bias.[1] The dependent variable is log average hourly earnings inclusive of fringe benefits. (The estimation results are fully reported in Table G of Appendix.)

Variable	All male employees	Upper-level non-manuals	Lower-level non-manuals	Manufacturing workers	Other manual workers
CONSTANT	3.3985**	3.5948**	3.2828**	3.4358**	3.3973**
	(.0625)	(.1752)	(.0949)	(.0531)	(.0718)
S	0.0468**	0.0710**	0.0634**	0.0391**	0.0194
	(.0050)	(.0197)	(.0142)	(.0112)	(.0136)
EXP	0.0117**	0.0185*	0.0241**	0.0136**	0.0062
	(.0033)	(.0082)	(.0052)	(.0040)	(.0049)
EXP^2 /1000	-0.1758*	-0.1002	-0.3778**	-0.2655**	-0.0926
	(.0863)	(.2055)	(.1104)	(.0901)	(.0989)
SEN	0.0030**	-0.0031	0.0011	0.0041*	0.0057**
	(.0012)	(.0031)	(.0025)	(.0019)	(.0017)
OJT	0.0809**	0.1003**	0.0824**	0.0450*	0.0838**
	(.0174)	(.0352)	(.0282)	(.0218)	(.0264)
UNION	0.0007	-0.0843*	0.0034	0.0412	-0.0059
	(.0164)	(.0408)	(.0345)	(.0341)	(.0376)
LAMBDA	-[1]	0.0491	0.0356	-0.1215**	-0.0122
		(.0661)	(.0446)	(.0426)	(.0402)
R^2 adj.	-[1]	0.2510	0.3541	0.2581	0.1502
No. of obs.	1873	376	400	600	447

[1] Standard errors are in parentheses below the estimates and are adjusted for heteroscedasticity according to White (1980) in the occupation-specific earnings equations (columns 2-5). The corresponding multinomial logit estimates are reported in Table J of Appendix. The earnings equation for all male employees (column 1) comprises the same control variables as the earnings equations estimated in Section 3 and is adjusted for sample selectivity bias using ML-estimation. RHO(ϵ,μ) = -0.0265 with a standard error of 0.1337. Log-Likelihood = -1348.0.

* Denotes significant estimate at a 5 % risk level.

** Denotes significant estimate at a 1 % risk level.

This pattern of occupation-specific educational returns within and across genders is largely reproduced by the estimated earnings effects of general experience (EXP). Thus male employees in non-manual or manufacturing jobs tend to receive a significantly higher increase in occupational earnings not only from each year of above-primary schooling but also from their general labour market experience. For the category of other male manual workers, the estimated earnings effects of these two human capital variables are not significantly different from zero. Instead a major part of the increase in earnings of non-manufacturing male workers seems to originate in the length of the present employer-employee relationship, i.e. seniority (SEN).[10] Possibly this outcome is explained by the large number of public sector employees situated in this particular occupational category.

Among female employees, on the other hand, the estimated earnings effects of both general experience and seniority reveal almost negligible differences across the occupational social status categories considered. The only noteworthy exception is females in manufacturing jobs for whom the experience-imputed earnings effects resemble those of male employees rather than those of their female colleagues in other occupations (i.e. a much stronger effect of general experience than of seniority).

Comparison of occupational earnings effects of work experience across genders suggests that the return to general experience is significantly higher for male employees among lower-level non-manuals only. Yet, even similar percentage increases in earnings may result in substantial absolute differences if earnings levels differ. Another notable difference between genders is the moderate but still more important role of seniority in the determination of female earnings in non-manual jobs.

The estimation results further point to a notable variability in the impact of formal on-the-job training courses (OJT) on both male and female earnings. Except for females in manufacturing works, all occupational categories display a small, if any, relative income advantage from OJT. For male employees, on the other hand, growth in productivity with general experience tends to be the dominant explanation for the overall effect of experience on earnings, accompanied with a strong, positive effect of participation in formal training programmes.

Again union membership is found to have no significant effect on earnings. There are two notable exceptions, though. Somewhat confusing is the wage premium obtained for non-union females in manufacturing jobs. A closer analysis of these non-union females reveals that they are on average younger and, as a consequence, have less labour market experience than their unionized counterparts. Further, almost three fourths of them work in food manufacturing or textile industries, and mostly in fairly skill-intensive occupations. Obviously this also explains their slightly higher average hourly earnings level (FIM 36.05 compared with FIM 32.72 for unionized sample females in manufacturing jobs). Nonetheless, because of their small relative share in the category, the estimate should be interpreted with caution.

Less surprising is the finding that unionized males in upper-level non-manual occupations earn some 9 per cent less than their non-union counterparts. A most plausible explanation to this is a much lower degree of unionization among highly-paid officials. Most likely a major reason why the same result is not obtained for the corresponding category of female employees is the combined effect of a higher unionization degree among female upper-level non-manuals and fewer females in highly-paid non-manual positions.

Finally, the selectivity bias terms do provide evidence on some degree of nonrandomness in the allocation of employees across occupational social status categories. Among female employees, a strong selectivity effect is obtained for the occupational category of other manual workers. Evaluated at the mean value of LAMBDA, the selection coefficient indicates that females entering this particular occupational category earn on average some 45 per cent less than an individual with identical observable characteristics drawn at random from the labour force would be expected to earn in that category. Reilly (1991), for example, argues that such selection effects on earnings may reflect a situation where especially young employees share the costs of their training with the employer, as suggested by human capital theory. But the poor position of females in other manual works may also be explained by relatively low starting wages in typical female jobs in the distribution and service sectors. Possibly the category can also be argued to comprise jobs to which access is relatively easy especially for less-skilled females.

For male employees, a strong selectivity effect is recorded for manufacturing jobs. In particular, the selection coefficient suggests that, on average, males in this occupational category have about 10 per cent higher hourly earnings than a randomly selected male with average characteristics would earn in a manufacturing job. This finding seems reasonable in view of the expansion years in the late 1980s and the wage bidding evoked by increasing shortages of skilled manpower, e.g. engineers and adb-personnel, in the manufacturing sector (cf. Asplund, 1991).

What then do the regression results for the earnings equations and the occupational attachment equations indicate about the role of occupation in the determination of earnings in Finland? At the one extreme is the hypothesis that the occupational structure has an independent effect on earnings. However, if a full explanation is to be provided in terms of the existing hierarchy of positions, then it would also have to account for the largely differing returns to human capital acquisition among occupational social status categories displayed in Tables 2 and 3. At the other extreme is the hypothesis that occupation has no independent effect on earnings; it merely acts as a proxy for unmeasured ability. But for this to hold, the estimated occupation coefficients and the occupation-specific relationships between earnings and human capital proxies would have to be given a plausible explanation in terms of ability only.

Although no conclusive tests can be undertaken, the estimation results clearly indicate that these extreme hypotheses can provide no more than part of an explanation. The strong influence of formal education on both occupational attainment (indirect effect) and the earnings received within an occupation (direct effect) rather points to a notable interaction between education and occupational status. In an earnings equation omitting occupation, the schooling variable measures these combined effects. The question then arises how much of the observed drop in the schooling coefficients caused by the inclusion of occupation controls is attributable to the indirect earnings effect of schooling.

Following de Beyer & Knight (1989), an attempt is made to decompose the estimated earnings effects of upper vocational and professional education into a direct and an indirect effect on potential earnings. The direct effect is given by the coefficient on this particular educational level in the overall earnings equation comprising occupation indicators. The indirect effect, in turn, results from the impact of upper vocational education on occupational chances.

The estimation results in Table 1 (columns 1 and 3) suggest that graduation from upper vocational and professional education, other things unchanged, raises the average hourly earnings of both male and female employees by some 18 per cent, the reference group being lower vocational and professional education. When occupation controls are added to the gender-specific earnings equations (columns 2 and 4 in Table 1), the direct pecuniary gain from acquiring an upper rather than a lower vocational degree declines to some 12½ per cent for women and to about 7 per cent for men.

The indirect earnings effects are estimated from the multinomial logit estimates (Tables I and J of Appendix) in the following way. For a representative female/male employee having the mean values of the explanatory variables (other than education) for all sample female/male employees, the probability of being in occupation j is predicted given that the employee has a lower vocational degree, $Prob(OCC^L=j)$, or, alternatively, an upper vocational degree, $Prob(OCC^U=j)$. The gender-specific earnings equations in Table 1 are re-estimated in order to obtain occupation coefficients (α_j) for the four occupational social status categories distinguished in the occupation-specific analysis. The sum of these occupation estimates weighted by the predicted probabilities of lower vocational graduates of being in the different occupational categories is then subtracted from the sum of coefficients weighted by the corresponding predicted probabilities for upper vocational graduates, that is, $\Sigma\alpha_j Prob(OCC^U=j) - \Sigma\alpha_j Prob(OCC^L=j)$. This net term indicates the growth in expected earnings resulting from the acquisition of an upper vocational degree and the consequent improvement of occupational chances.

Table 4 shows that this indirect effect arising through occupational attainment is roughly half the direct effect for females but almost twice the direct effect for males. Yet, for both genders the indirect effect roughly makes up for the reduction in the coefficient of upper vocational education caused by the introduction of occupation controls in the estimations.[11] A cautious generalization of the results would thus imply that occupational social status does not necessarily weaken the earnings effect of formal education. Instead, a major part of the earnings effects captured by occupational controls seems to reflect the impact of education on occupational choices and thereby also on earnings.

Table 4. Decomposition of the earnings effect of upper vocational and professional education

	Probability of being in occupational social status category j, Prob(OCC=j)							
	Female with lower vocational educ.		Female with upper vocational educ.		Male with lower vocational educ.		Male with upper vocational educ.	
	Actual	Predicted	Actual	Predicted	Actual	Predicted	Actual	Predicted
Upper-level non-manuals	0.055	0.054	0.324	0.228	0.047	0.036	0.322	0.290
Lower-level non-manuals	0.268	0.536	0.461	0.683	0.214	0.199	0.537	0.559
Manufacturing workers	0.323	0.194	0.082	0.030	0.408	0.459	0.052	0.068
Other manual workers	0.353	0.216	0.133	0.060	0.331	0.306	0.089	0.082

	Earnings effect for females		Earnings effect for males	
	Change in lnEARN	%-change[1]	Change in lnEARN	%-change[1]
Coefficient				
- without OCC-terms	0.1685	18.4	0.1673	18.2
- with OCC-terms (direct effect)	0.1182	12.5	0.0654	6.8
Effect through occupational attainment (indirect effect)	0.0755	7.8	0.1182	12.5
Combined direct and indirect effect	0.1937	21.4	0.1836	20.2

[1] The percentage change in earnings is given by the antilog of the parameter estimate.

5. CONCLUDING REMARKS

The paper reports an attempt to exhibit the importance of occupational social status in explaning earnings dispersion in Finland with special attention being paid to the interactions between occupation and formal education. The results for the overall earnings equations estimated by gender point to notable occupational differences in mean earnings levels. The varying returns to human capital among occupational categories indicate, in turn, that occupation has a notable influence also on the sensitivity of the employee's earnings to changes in crucial personal characteristics.

The addition of occupational controls to the overall earnings equations results in a substantial reduction in the estimated return to formal education, while the parameter estimates of the other explanatory variables remain roughly unchanged. Simultaneously the results obtained from estimating occupational attainment equations imply that formal schooling has a strong indirect impact on earnings through the improvement of occupational chances. In fact, calculations for upper-level vocational and professional graduates suggest that the earnings effect of formal education is not necessarily weakened by the role that occupation plays. Instead, the greater part of that effect seems to arise from the influence that education has on occupational attainment. This is also to be expected for countries where formal education contains a large amount of occupation-specific skills and the possession of a given educational degree is a prerequisite to certain occupations.

Of special interest is the finding that the earnings effects of formal education mediated by the employee's position in the occupational hierarchy tend to be much larger for males than for females. This points to a more rigid occupational structure of male earnings. Because of these varying interactions between education and occupational status, educational expansion can be expected to affect very differently the labour market situation for men and women in general and the returns to education in particular. Therefore, re-estimation of the earnings functions for some other year might provide useful insight about the functioning of the Finnish labour market.

Footnotes:

1. The obvious endogeneity of some of the other explanatory variables included in the earnings model, especially educational attainment and union membership, is of necessity ignored in this context; the available data do not allow consistent estimation in these respects.

2. The multinomial logit model is preferred to the unordered multinomial probit model because it is less difficult to estimate and to the ordered probit model because it does not require a sequential ranking of occupations which may involve arbitrary judgements. Moreover, the ordered probit model has been found to predict less well than the multinomial logit model (cf. de Beyer & Knight (1989) and Reilly (1991)).

3. Specifically, the probability of employment in occupation j, $Prob(OCC_i=j)$, is estimated in relation to the occupation, say, k chosen for the purpose of normalization. This implies estimation of J-1 functions of the form

$$(i)\quad \ln\left[\frac{Prob(OCC_i=j)}{Prob(OCC_i=k)}\right] = \delta_j + \theta_j V_i + \eta_{ij}, \qquad j=1,\ldots,J \quad j\neq k$$

where $Prob(OCC_i=j)/Prob(OCC_i=k)$ is the ratio of the probability of being in occupation j to that of being in occupation k, and δ is a constant term. A comparison of any occupations j and m can then be derived as

$$(ii)\quad \ln\left[\frac{Prob(OCC_i=j}{Prob(OCC_i=m)}\right] = \ln\left[\frac{Prob(OCC_i=j)}{Prob(OCC_i=k)}\right] - \ln\left[\frac{Prob(OCC_i=m)}{Prob(OCC_i=k)}\right]$$
$$= (\delta_j-\delta_m) + (\theta_j-\theta_m)V_i + (\eta_{ij}-\eta_{im})$$

4. A simple t-test indicates that the estimation results obtained when including fringe benefits in the earnings data do not differ significantly from the results obtained when fringe benefits are omitted (cf. the results reported in Asplund (1992b)). However, this does not necessarily imply that fringe benefits play a minor role in Finland. Obviously the outcome is partly due to the fact that the tax rolls merely provide information on the tax value of fringe benefits subject to taxation. Hence, the data both understate the actual pecuniary value of taxable fringe benefits and totally disregard tax-exempt fringe benefits.

5. Only if the percentage change is small enough will the estimated coefficient measure the actual percentage change in earnings from having/aquiring the characteristic for which the variable stands, other things being unchanged. In the case of a larger percentage change, the actual earnings effect is given by the antilog of the parameter estimate, $(e^{\alpha}-1)*100$. Moreover,

Halvorsen & Palmquist (1980) suggest that the percentage differential for indicator variables is always calculated as the antilog of the given coefficient for semilogarithmic equations. In the present paper, the estimated log effects on earnings are throughout re-interpreted in this way.

6. The inclusion of occupation controls reduces the average rate of return to an additional year of schooling beyond completed basic education from 9 to 5 per cent for men and from 8 to 4 per cent for women. A simple t-test indicates that the gender gap in the average return to above-primary education remains significant (at a 5 % risk level) also when controlling for occupational social status.

7. The cumulative earnings effect of labour market experience (EXP) measures total percentage additions to earnings due to experience from zero experience to given years of experience and is calculated as the antilog of ($\alpha_1 EXP - \alpha_2 EXP^2$).

8. A tractable model specification maintaining the labour force participation decision for the sample individuals is obtained if the multinomial logit model is supplemented with the probit (participation) criterion in eq. (2) in the text, and if it is further assumed that the error terms in the two selection equations are independent. Cf. Dolton et al. (1989).

9. The category of manual workers in agriculture, forestry and commercial fishing (OCC51) is omitted because of the small number of observations and the difficulty of integrating them with some of the other manual worker categories.

10. The estimated coefficients of the quadratic seniority term were throughout insignificant, and the variable was therefore abandoned in the regressions.

11. As noted by de Beyer & Knight (1989), the slight overestimation of the total earnings effect of education using the direct-indirect method is most likely explained by some degree of collinearity between the educational indicators and the other explanatory variables included in the occupational attainment equations.

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APPENDIX

Table A. Summary of definitions of included variables

Variable	Definition
EARN	Average hourly earnings (in FIM) calculated from the before-tax annual wage/salary income (incl. fringe benefits) recorded in the tax rolls and an estimated amount of annual normal working hours.
ln EARN	Natural logarithm of EARN.
SCHOOL	Years of formal schooling evaluated from register information on the highest single education completed using the Finnish standard classification of education.
S	Years of formal schooling with basic education (9 years of schooling) set equal to zero.
BASIC	Indicator for persons with basic education only (about 9 years or less).
LOWER VOCATIONAL	Indicator for persons with completed lower-level of upper secondary education (about 10-11 years).
UPPER VOCATIONAL	Indicator for persons with completed upper-level of upper secondary education (about 12 years).
SHORT NON-UNIV	Indicator for persons with completed lowest level of higher education (about 13-14 years).
UNDERGRADUATE	Indicator for persons with completed undergraduate university education (about 15 years), i.e. BA-level.
GRADUATE	Indicator for persons with completed graduate university education (more than 16 years), i.e. MA-level or above.
EXP	Self-reported total years of labour market experience.
SEN	Seniority, i.e. self-reported years with the present employer.
WOM	Indicator for gender.
AGE	Physical age of the individual.
MARRIED	Indicator for married persons and singles living together.
$CHILD^{0-6}$	Indicator for children aged 0 to 6 living at home.
$CHILD^{7-17}$	Indicator for children aged 7 to 17 living at home.
$CHILD^{0-17}$	Indicator for children aged 0 to 17 living at home.
CAPITAL	Indicator for residence within the capital region (the region of Helsinki).
UUSIMAA	Indicator for residence in the province of Uusimaa but outside the capital region.

OTHER SOUTH	Indicator for residence in the southern parts of Finland other than Uusimaa.
SOUTH	Indicator for residence in the southern parts of Finland.
MIDDLE	Indicator for residence in the middle parts of Finland.
NORTH	Indicator for residence in the northern parts of Finland.
PUBLIC	Indicator for employment in the public sector.
TEMPEMPL	Indicator for persons who self-reportedly are in temporary employment.
PART-TIME	Indicator for persons who self-reportedly are in part-time employment.
PIECE-RATE	Indicator for persons who are not being paid on an hourly, weekly or monthly basis.
NODAYWORK	Indicator for persons who are not in regular day-time work.
UNEMPL	Indicator for persons who have been temporarily unemployed or laid off during the survey year.
UNION	Indicator for unionized employees.
OJT	Indicator for persons who self-reportedly have received employer-sponsored formal on-the-job-training during the survey year.
INDU11	Indicator for employment in agriculture.
INDU12	Indicator for employment in forestry.
INDU13	Indicator for employment in fishing.
INDU20	Indicator for employment in mining.
INDU31	Indicator for employment in food manufact.
INDU32	Indicator for employment in textile.
INDU33	Indicator for employment in manufacturing of wood products.
INDU34	Indicator for employment in manufacturing of paper products.
INDU35	Indicator for employment in manufacturing of chemicals.
INDU36	Indicator for employment in manufacturing of non-metallic products.
INDU37	Indicator for employment in basic metal industries.
INDU38	Indicator for employment in manufacturing of metal products.
INDU39	Indicator for employment in other manufact.
INDU40	Indicator for employment in electricity.
INDU50	Indicator for employment in construction.
INDU61	Indicator for employment in wholesale trade.
INDU62	Indicator for employment in retail trade.
INDU63	Indicator for employment in restaurants.
INDU71	Indicator for employment in transport.
INDU72	Indicator for employment in communications.
INDU81	Indicator for employment in financing.
INDU82	Indicator for employment in insurance.
INDU83	Indicator for employment in real estate.
INDU91	Indicator for employment in public administration.

INDU92	Indicator for employment in sanitary services.
INDU93	Indicator for employment in social services.
INDU94	Indicator for employment in recreational and cultural services.
INDU95	Indicator for employment in personal and household services.
OCC31	Indicator for senior officials and employees in upper management.
OCC32	Indicator for senior officials and employees in research and planning.
OCC33	Indicator for senior officials and employees in education and training.
OCC34	Indicator for other senior officials and employees.
OCC41	Indicator for supervisors.
OCC42	Indicator for clerical and sales workers, independent work.
OCC43	Indicator for clerical and sales workers, routine work.
OCC44	Indicator for other lower-level employees with administrative and clerical occupations.
OCC51	Indicator for workers in agriculture, forestry and commercial fishing.
OCC52	Indicator for manufacturing workers.
OCC53	Indicator for other production workers.
OCC54	Indicator for distribution and service workers.

Table B. Sample mean characteristics of all female employees retained in the actual estimating data and separately for the occupational social status categories considered

Variable	All female employees	Upper-level non-manuals (OCC31-34)	Lower-level non-manuals (OCC41-44)	Manufacturing workers (OCC52)	Other manual workers (OCC53-54)
EARN	41.09	57.09	40.66	33.00	35.69
ln EARN	3.63	3.99	3.63	3.45	3.49
SCHOOL	10.99	13.78	10.86	9.89	10.03
BASIC (1,0)	0.3674	0.0669	0.3409	0.5952	0.5321
LOWER VOCATIONAL (1,0)	0.2823	0.0595	0.2884	0.3476	0.3797
UPPER VOCATIONAL (1,0)	0.2174	0.2082	0.2966	0.0524	0.0856
SHORT NON-UNIV (1,0)	0.0604	0.2119	0.0552	-	0.0027
UNDERGRADUATE (1,0)	0.0352	0.2119	0.0118	-	-
GRADUATE (1,0)	0.0372	0.2416	0.0072	0.0048	-
EXP	16.14	14.74	15.92	16.89	17.48
SEN	8.60	8.04	8.88	8.43	8.48
MARRIED (1,0)	0.7313	0.7026	0.7378	0.7762	0.7112
$CHILD^{0-6}$ (1,0)	0.2094	0.2565	0.2188	0.2143	0.1471
$CHILD^{7-17}$ (1,0)	0.3694	0.3123	0.3951	0.3857	0.3342
CAPITAL (1,0)	0.2074	0.2416	0.2450	0.0810	0.1524
TEMPEMPL (1,0)	0.1188	0.1970	0.1139	0.0476	0.1177
PART-TIME (1,0)	0.0609	0.0595	0.0515	0.0048	0.1150
PIECE-RATE (1,0)	0.0649	0.0112	0.0127	0.4238	0.0588
NODAYWORK (1,0)	0.2486	0.0966	0.2278	0.2762	0.3824
UNEMPL (1,0)	0.0981	0.0046	0.0461	0.0172	0.0289
UNION (1,0)	0.7957	0.7770	0.7957	0.9143	0.7781
OJT (1,0)	0.3770	0.6171	0.4349	0.0952	0.2112
OCC31 (1,0)	0.0106	0.0706			
OCC32 (1,0)	0.0156	0.1115			
OCC33 (1,0)	0.0478	0.3532			
OCC34 (1,0)	0.0629	0.4647			
OCC41 (1,0)	0.0423		0.0750		
OCC42 (1,0)	0.2058		0.3671		
OCC43 (1,0)	0.1309		0.2351		
OCC44 (1,0)	0.1802		0.3228		
OCC51 (1,0)	0.0075				
OCC52 (1,0)	0.1057			1.000	
OCC53 (1,0)	0.0554				0.2914
OCC54 (1,0)	0.1354				0.7086

Table B. (cont.)

Variable	All female employees	Upper-level non-manuals (OCC31-34)	Lower-level non-manuals (OCC41-44)	Manufacturing workers (OCC52)	Other manual workers (OCC53-54)
INDU11-13 (1,0)	0.0096	↑	↑		↑
INDU31 (1,0)	0.0357	|	|	0.1810	|
INDU32 (1,0)	0.0433	|	|	0.3524	|
INDU33 (1,0)	0.0161	|	|	0.0810	|
INDU34 (1,0)	0.0367	0.0929	0.1004	0.1000	0.1203
INDU35 (1,0)	0.0116	|	|	0.0333	|
INDU36 (1,0)	0.0035	|	|	0.0190	|
INDU37 (1,0)	0.0020	|	|		|
INDU38 (1,0)	0.0393	|	|	0.2095	|
INDU20/39 (1,0)	0.0025	↓	↓		↓
INDU40 (1,0)	0.0055		0.0072		0.0080
INDU50 (1,0)	0.0146		0.0172	0.0238	0.0134
INDU61 (1,0)	0.0287	↑	↑		↑
INDU62 (1,0)	0.0946	0.0669	0.2025		0.2112
INDU63 (1,0)	0.0393	↓	↓		↓
INDU71 (1,0)	0.0272	/0.0149\	/0.0615\		/0.0668\
INDU72 (1,0)	0.0226	\ /	\ /		\ /
INDU81 (1,0)	0.0589	↑	↑		↑
INDU82 (1,0)	0.0086	0.1115	0.1438		0.0562
INDU83 (1,0)	0.0398	↓	↓		↓
INDU91 (1,0)	0.0694	↑	↑		↑
INDU92 (1,0)	0.0121	|	|		|
INDU93 (1,0)	0.3468	0.7138	0.4674		0.5241
INDU94 (1,0)	0.0242	|	|		|
INDU95 (1,0)	0.0080	↓	↓		↓
Number of obs.	1987	269	1106	210	374

Table C. Sample mean characteristics of all male employees retained in the actual estimating data and separately for the occupational social status categories considered

Variable	All male employees	Upper-level non-manuals (OCC31-34)	Lower-level non-manuals (OCC41-44)	Manufacturing workers (OCC52)	Other manual workers (OCC53-54)
EARN	49.56	72.91	48.82	44.13	39.70
ln EARN	3.82	4.21	3.83	3.74	3.64
SCHOOL	11.01	13.54	11.22	10.15	10.06
BASIC (1,0)	0.3532	0.0878	0.2275	0.4500	0.5123
LOWER VOCATIONAL (1,0)	0.3354	0.0585	0.2650	0.5050	0.4094
UPPER VOCATIONAL (1,0)	0.1819	0.2686	0.4475	0.0433	0.0738
SHORT NON-UNIV (1,0)	0.0524	0.2207	0.0350	0.0017	0.0045
UNDERGRADUATE (1,0)	0.0157	0.0771	0.0025	-	-
GRADUATE (1,0)	0.0613	0.2872	0.0225	-	-
EXP	17.46	17.34	17.06	17.44	17.81
SEN	9.26	9.54	9.64	8.77	9.47
MARRIED (1,0)	0.7421	0.8723	0.7750	0.6950	0.6868
$CHILD^{0-6}$ (1,0)	0.2584	0.2872	0.2825	0.2433	0.2304
$CHILD^{7-17}$ (1,0)	0.3297	0.4388	0.3375	0.3150	0.2573
CAPITAL (1,0)	0.1813	0.3032	0.2100	0.0917	0.1991
TEMPEMPL (1,0)	0.0749	0.0851	0.0575	0.0833	0.0671
PART-TIME (1,0)	0.0121	0.0160	0.0200	-	0.0201
PIECE-RATE (1,0)	0.1164	0.0293	0.0500	0.2200	0.0716
NODAYWORK (1,0)	0.2311	0.0745	0.1875	0.2617	0.3311
UNEMPL (1,0)	0.1074	0.0048	0.0124	0.0619	0.0253
UNION (1,0)	0.7296	0.6676	0.6800	0.8417	0.7383
OJT (1,0)	0.3569	0.6383	0.5150	0.1633	0.2640
OCC31 (1,0)	0.0639	0.3165			
OCC32 (1,0)	0.0529	0.2686			
OCC33 (1,0)	0.0388	0.1942			
OCC34 (1,0)	0.0440	0.2207			
OCC41 (1,0)	0.1064		0.5075		
OCC42 (1,0)	0.0587		0.2800		
OCC43 (1,0)	0.0084		0.0375		
OCC44 (1,0)	0.0377		0.1750		
OCC51 (1,0)	0.0262				
OCC52 (1,0)	0.3229			1.0000	
OCC53 (1,0)	0.0970				0.4049
OCC54 (1,0)	0.1431				0.5951

Table C. (cont.)

Variable	All male employees	Upper-level non-manuals (OCC31-34)	Lower-level non-manuals (OCC41-44)	Manufacturing workers (OCC52)	Other manual workers (OCC53-54)
INDU11-13 (1,0)	0.0351	↑	↑		↑
INDU31 (1,0)	0.0299			0.0484	
INDU32 (1,0)	0.0105			0.0200	
INDU33 (1,0)	0.0341			0.0767	
INDU34 (1,0)	0.0655	0.2127	0.2525	0.1267	0.1433
INDU35 (1,0)	0.0288			0.0533	
INDU36 (1,0)	0.0168			0.0400	
INDU37 (1,0)	0.0131			0.0250	
INDU38 (1,0)	0.1221			0.2433	
INDU20/39 (1,0)	0.0052	↓	↓	0.0100	↓
INDU40 (1,0)	0.0210	0.0133	0.0175	0.0383	0.0089
INDU50 (1,0)	0.1441	0.0319	0.1075	0.3183	0.0514
INDU61 (1,0)	0.0451	↑	↑		↑
INDU62 (1,0)	0.0576	0.1170	0.2300		0.1678
INDU63 (1,0)	0.0094	↓	↓		↓
INDU71 (1,0)	0.0818	⟨0.0293⟩	⟨0.0925⟩		⟨0.3669⟩
INDU72 (1,0)	0.0314				
INDU81 (1,0)	0.0126	↑	↑		↑
INDU82 (1,0)	0.0079	0.1729	0.0800		0.0492
INDU83 (1,0)	0.0430	↓	↓		↓
INDU91 (1,0)	0.0582	↑	↑		↑
INDU92 (1,0)	0.0084				
INDU93 (1,0)	0.0901	0.4229	0.2200		0.2125
INDU94 (1,0)	0.0110				
INDU95 (1,0)	0.0173	↓	↓		↓
Number of obs.	1908	376	400	600	447

Table D. Maximum likelihood estimates of the selection (probit) equation explaining the probability of females and males being employed[1]

Variable	Females Coeff.	Mean	Males Coeff.	Mean
CONSTANT	-5.4340** (.7625)	1.000	-6.7155** (.8319)	1.000
AGE	0.3349** (.0652)	38.42	0.4733** (.0723)	37.25
AGE^2	-0.0043** (.0017)	1662.4	-0.0086** (.0019)	1572.7
AGE^3 /1000	0.0005 (.0142)	78637	0.0376* (.0162)	73038
MARRIED	0.0840 (.0654)	0.6630	0.5640** (.0795)	0.6368
$CHILD^{0-17}$	-0.1842** (.0687)	0.3946	0.3419** (.0929)	0.3488
SOUTH	0.3985** (.0526)	0.6257	0.3532** (.0612)	0.6046
BASIC	-0.3269** (.0574)	0.4641	-0.2931** (.0649)	0.4506
No. of obs.	3193		2825	
Prob(W=1), %***	88.5		89.2	

[1] Standard errors are given in parentheses below the estimates.
* Denotes significant estimate at a 1 % risk level.
** Denotes significant estimate at a 1 % risk level.
*** Percentage share of correctly predicted (probit) employment.

Table E. Regression results for extended human capital earnings equations estimated by gender using OLS.[1] The dependent variable is log hourly earnings inclusive of fringe benefits. Columns 2 and 4 comprise occupation controls.

Variable	Female employees (1)	Female employees (2)	Male employees (3)	Male employees (4)
CONSTANT	3.2825** (.0498)	3.3641** (.0572)	3.3805** (.0345)	3.4193** (.0489)
LOWER VOCATIONAL	0.0121 (.0186)	0.0007 (.0182)	0.1027** (.0172)	0.0903** (.0162)
UPPER VOCATIONAL	0.1818** (.0243)	0.1194** (.0265)	0.2692** (.0232)	0.1554** (.0254)
SHORT NON-UNIV	0.3714** (.0326)	0.2211** (.0380)	0.4843** (.0363)	0.2606** (.0430)
UNDER-GRADUATE	0.5239** (.0359)	0.2870** (.0422)	0.4676** (.0550)	0.2116** (.0599)
GRADUATE	0.6117** (.0408)	0.3686** (.0498)	0.6384** (.0359)	0.3978** (.0469)
EXP	0.0145** (.0030)	0.0107** (.0030)	0.0177** (.0030)	0.0134** (.0029)
EXP^2 /1000	-0.2071** (.0682)	-0.1353* (.0665)	-0.2452** (.0703)	-0.1804** (.0658)
MARRIED	-0.0162 (.0158)	-0.0197 (.0153)	0.0517** (.0192)	0.0365* (.0183)
$CHILD^{0-6}$	0.0299 (.0207)	0.0248 (.0200)	-0.0125 (.0158)	-0.0112 (.0151)
$CHILD^{7-17}$	0.0026 (.0137)	0.0088 (.0132)	0.0536** (.0165)	0.0460** (.0156)
CAPITAL	0.0900** (.0189)	0.0870** (.0183)	0.1290** (.0226)	0.1213** (.0217)
TEMPEMPL	0.0622* (.0318)	0.0377 (.0314)	-0.0708* (.0373)	-0.0773* (.0372)
PART-TIME	0.2784** (.0499)	0.2873** (.0483)	0.2037 (.1314)	0.1845 (.1368)
PIECE-RATE	0.0129 (.0328)	0.0370 (.0356)	0.0901** (.0214)	0.1014** (.0206)
NODAYWORK	0.1302** (.0189)	0.1596** (.0187)	0.0177 (.0172)	0.0533** (.0171)
UNEMPL	-0.0267 (.0311)	-0.0065 (.0306)	-0.0717** (.0278)	-0.0560* (.0275)
UNION	-0.0325 (.0226)	-0.0152 (.0222)	-0.0115 (.0191)	0.0153 (.0177)
Industry sector indicators:				
INDU11 (agriculture)	0.0375 (.0628)	0.0510 (.0677)	-0.1304** (.0413)	-0.0869* (.0467)
INDU31 (food manuf.)	-0.0224 (.0392)	-0.0050 (.0387)	-0.0256 (.0466)	0.0048 (.0451)

Table E. (cont.)

Variable	Female employees (1)	(2)	Male employees (3)	(4)
INDU32 (textile)	-0.0477 (.0417)	-0.0294 (.0417)	0.0394 (.0477)	0.0420 (.0474)
INDU33 (wood prod.)	-0.0112 (.0441)	-0.0199 (.0439)	-0.1182** (.0346)	-0.1140** (.0316)
INDU34 (paper prod.)	0.1640** (.0389)	0.1402** (.0370)	0.2107** (.0341)	0.2116** (.0308)
INDU35 (chemicals)	0.0326 (.0529)	0.0196 (.0498)	0.1035* (.0502)	0.1067* (.0487)
INDU36 (non-metallic)	-0.0340 (.0665)	-0.0119 (.0576)	-0.0103 (.0616)	0.0118 (.0618)
INDU37*** (basic metal)			0.1678** (.0421)	0.1926** (.0382)
INDU20/39**** (metal prod.)	0.2322* (.1184)	0.0964 (.0900)	0.1094 (.0900)	0.0759 (.0801)
INDU40 (electricity)	0.0294 (.0473)	-0.0148 (.0375)	0.0888* (.0412)	0.0957** (.0377)
INDU50 (construction)	0.0308 (.0516)	0.0183 (.0483)	0.0286 (.0246)	0.0520* (.0241)
INDU61 (wholesale)	0.0802* (.0467)	0.0272 (.0447)	0.0523 (.0449)	0.0260 (.0420)
INDU62 (retail trade)	-0.0553 (.0390)	-0.1418** (.0395)	-0.0867* (.0388)	-0.0290 (.0417)
INDU63 (restaurants)	0.0129 (.0449)	0.0091 (.0440)	-0.0340 (.0512)	-0.0141 (.0591)
INDU71 (transport)	0.1049* (.0537)	0.0622 (.0522)	-0.0193 (.0269)	0.0496 (.0307)
INDU72 (communication)	0.1020** (.0410)	0.0737* (.0394)	0.0103 (.0328)	0.0901** (.0342)
INDU81 (financing)	0.2005** (.0400)	0.1522** (.0396)	0.2534** (.0693)	0.2067** (.0726)
INDU82 (insurance)	0.1538* (.0718)	0.1027 (.0730)	0.1572** (.0348)	0.2100** (.0474)
INDU83 (real estate)	0.0373 (.0474)	-0.0080 (.0440)	0.0333 (.0352)	0.0199 (.0347)
INDU91 (public adm.)	0.0707* (.0328)	0.0368 (.0311)	-0.0130 (.0329)	0.0162 (.0333)
INDU92 (sanitary)	-0.0475 (.0897)	-0.0149 (.0878)	-0.2041** (.0802)	-0.1688* (.0881)
INDU93 (social)	0.0304 (.0318)	-0.0147 (.0313)	-0.0338 (.0327)	-0.0182 (.0389)
INDU94 (cultural)	0.1011 (.0719)	0.0568 (.0722)	0.0283 (.0820)	-0.0150 (.0740)
INDU95 (personal)	-0.0421 (.0697)	-0.0224 (.0623)	-0.1646** (.0330)	-0.0782* (.0389)

Table E. (cont.)

Occupational status indicators:				
OCC31 (management)		0.3620** (.0609)		0.3936** (.0552)
OCC32 (research)		0.0988* (.0603)		0.2192** (.0543)
OCC33 (education)		0.3481** (.0419)		0.2620** (.0669)
OCC34 (oth. seniors)		0.1685** (.0367)		0.1566** (.0538)
OCC41 (supervisors)		0.0856** (.0325)		0.0899** (.0383)
OCC42 (indep. (clericals)		0.0440 (.0302)		-0.0552 (.0484)
OCC43 (routine (clericals)		0.0047 (.0285)		-0.0063 (.1052)
OCC51 (agriculture)		-0.1547* (.0756)		-0.0487 (.0648)
OCC52 (manu-facturing)		-0.1038** (.0348)		-0.0213 (.0401)
OCC53 (oth. prod.)		-0.1205** (.0313)		-0.0963** (.0405)
OCC54 (service)		-0.1045** (.0316)		-0.1072** (.0386)
R^2 adj.	0.3048	0.3513	0.3916	0.4561
SEE	0.3069	0.2964	0.2958	0.2796
F-statistic	22.77	22.09	30.93	31.75
Number of obs.	1987	1987	1908	1908

[1] Standard errors are given in parentheses below the estimates and are adjusted for heteroscedasticity according to White (1980). The omitted educational level variable is BASIC = primary education (about 9 years or less), the left out industry sector is INDU38 = employment in manufacturing of metal products, and the reference occupational status category is OCC44 = other lower-level employees with administrative and clerical occupations.
A simple Chow test suggests that the hypothesis of the parameter estimates being equal for males and females can be rejected at a 0.1 % risk level.

* Denotes significant estimate at a 5 % risk level.

** Denotes significant estimate at a 1 % risk level.

*** The four observations on females employed in basic metal industries are included in the reference category INDU38.

**** Includes employment in mining and quarrying.

Table F. Correlation matrix for schooling and occupational category variables by gender

Females:

	S	BASIC	LOWER VOCATIONAL	UPPER VOCATIONAL	SHORT NON-UNIV	UNDER-GRADUATE	GRADUATE
OCC31	0.07923	-0.05834	-0.03202	0.06484	-0.00554	0.06034	0.03165
OCC32	0.16833	-0.08751	-0.05190	0.04194	0.00218	0.13014	0.12537
OCC33	0.42856	-0.16587	-0.13007	-0.08380	0.22044	0.32821	0.31717
OCC34	0.31156	-0.13726	-0.12107	0.01419	0.16925	0.15287	0.24460
OCC41	-0.00688	-0.00965	0.00158	0.01660	0.04123	-0.02658	-0.04132
OCC42	-0.05318	0.03547	-0.08704	0.13000	-0.06637	-0.02301	-0.06069
OCC43	-0.09397	0.03863	-0.03782	0.11748	-0.09837	-0.06605	-0.07631
OCC44	0.04659	-0.14810	0.13941	0.03862	0.10103	-0.08958	-0.07837
OCC51	-0.04168	0.01796	0.04863	-0.04597	-0.02211	-0.01667	-0.01715
OCC52	-0.19642	0.16247	0.04986	-0.13754	-0.08715	-0.06569	-0.05897
OCC53	-0.09334	0.03920	0.08284	-0.06357	-0.05214	-0.04626	-0.04761
OCC54	-0.21641	0.16530	0.06553	-0.13724	-0.10032	-0.07561	-0.07783

Males:

	S	BASIC	LOWER VOCATIONAL	UPPER VOCATIONAL	SHORT NON-UNIV	UNDER-GRADUATE	GRADUATE
OCC31	0.18466	-0.09007	-0.14031	0.14891	0.08273	0.03585	0.12071
OCC32	0.36829	-0.16003	-0.14813	-0.00224	0.35404	0.02657	0.27130
OCC33	0.37813	-0.14277	-0.13696	-0.04545	0.20855	0.34555	0.25414
OCC34	0.24634	-0.12118	-0.10917	0.09751	0.04124	0.07556	0.22201
OCC41	0.03290	-0.09143	-0.07593	0.28679	-0.04301	-0.04361	-0.06694
OCC42	0.00688	-0.01662	-0.06407	0.13081	-0.01871	-0.01364	-0.02665
OCC43	0.04598	-0.05594	-0.00447	0.06094	0.02995	-0.01162	0.00045
OCC44	0.02832	-0.09456	0.04572	0.09915	-0.00955	-0.02503	-0.03915
OCC51	-0.10316	0.09841	-0.00536	-0.06033	-0.03858	-0.02073	-0.04193
OCC52	-0.30156	0.14633	0.23830	-0.24419	-0.15736	-0.08727	-0.17648
OCC53	-0.14411	0.08022	0.08233	-0.09021	-0.07706	-0.04141	-0.08375
OCC54	-0.20679	0.16460	0.03306	-0.11505	-0.08267	-0.05165	-0.10444

Table G. Female occupational earnings equations corrected for selectivity bias.[1] The dependent variable is log average hourly earnings inclusive of fringe benefits.

Variable	Upper-level non-manuals	Lower-level non-manuals	Manufacturing workers	Oth.manual workers
CONSTANT	3.6359**	3.2742**	3.2410**	2.9305**
	(.2316)	(.0585)	(.1164)	(.1724)
S	0.0639*	0.0449**	-0.0003	-0.0128
	(.0290)	(.0078)	(.0204)	(.0184)
EXP	0.0096	0.0077*	0.0161**	0.0036
	(.0073)	(.0043)	(.0067)	(.0064)
EXP^2 /1000	-0.1265	-0.1786*	-0.1991	-0.0368
	(.1911)	(.0971)	(.1593)	(.1227)
SEN	0.0067*	0.0093**	-0.0035	0.0038*
	(.0033)	(.0012)	(.0033)	(.0019)
OJT	-0.0096	0.0194	0.1794**	-0.0158
	(.0361)	(.0179)	(.0487)	(.0311)
MARRIED	-0.0803*	-0.0073	0.0725*	-0.0243
	(.0385)	(.0209)	(.0336)	(.0327)
CAPITAL	-0.0210	0.1438**	-0.0434	0.0877
	(.0432)	(.0233)	(.0599)	(.0546)
TEMEMPL	0.1145*	0.0108	0.1274	0.1238
	(.0523)	(.0444)	(.1089)	(.0840)
PART-TIME	0.3466**	0.3747**		0.3422**
	(.1014)	(.0775)		(.0813)
PIECE-RATE		-0.0315	0.0119	0.2522**
		(.1142)	(.0409)	(.0767)
NODAYWORK	0.1075	0.1583**	0.0865*	0.2196**
	(.0887)	(.0270)	(.0468)	(.0395)
UNEMPL		-0.0007	-0.0430	0.0322
		(.0439)	(.0637)	(.0600)
UNION	0.0051	-0.0137	-0.1536**	-0.0323
	(.0526)	(.0285)	(.0488)	(.0515)
INDU11-39	0	0		0
INDU40		-0.0204		-0.1623*
		(.0360)		(.0908)
INDU50		0.0034	0.0455	0.0264
		(.0618)	(.0692)	(.0624)
INDU61-63	-0.1145	-0.0884**		-0.0547
	(.0881)	(.0327)		(.0540)
INDU71-72	-0.4066**	0.0709*		0.1091
	(.1366)	(.0389)		(.0689)

Table G. (cont.)

Variable	Upper-level non-manuals	Lower-level non-manuals	Manufacturing workers	Oth.manual workers
INDU81-83	-0.0493 (.0779)	0.1108** (.0307)		-0.2257** (.0757)
INDU91-95	-0.1280* (.0569)	-0.0169 (.0286)		0.0262 (.0483)
INDU31			-0.0416 (.0609)	
INDU32			-0.0545 (.0517)	
INDU33			-0.0110 (.0678)	
INDU34			0.1656* (.0723)	
INDU35			-0.0406 (.0761)	
INDU36			-0.0820 (.0990)	
INDU38			0	
LAMBDA	0.0153 (.0848)	0.0778 (.0554)	0.0769 (.0685)	0.3097** (.1019)
R^2 adj.	0.2257	0.2145	0.1611	0.1998
SEE	0.2832	0.3025	0.2511	0.3072
F-statistic	5.88	16.09	3.01	5.66
No. of obs.	269	1106	210	374

[1] Standard errors are in parentheses below the estimates and are adjusted for heteroscedasticity according to White (1980). The corresponding multinomial logit estimates are reported in Table I below.

* Denotes significant estimate at a 5 % risk level.

** Denotes significant estimate at a 1 % risk level.

Table H. Male occupational earnings equations corrected for selectivity bias.[1] The dependent variable is log average hourly earnings inclusive of fringe benefits.

Variable	Upper-level non-manuals	Lower-level non-manuals	Manufacturing workers	Oth.manual workers
CONSTANT	3.5948** (.1752)	3.2828** (.0949)	3.4358** (.0531)	3.3973** (.0718)
S	0.0710** (.0197)	0.0634** (.0142)	0.0391** (.0112)	0.0194 (.0136)
EXP	0.0185* (.0082)	0.0241** (.0052)	0.0136** (.0040)	0.0062 (.0049)
EXP^2 /1000	-0.1002 (.2055)	-0.3778** (.1104)	-0.2655** (.0901)	-0.0926 (.0989)
SEN	-0.0031 (.0031)	0.0011 (.0025)	0.0041* (.0019)	0.0057** (.0017)
OJT	0.1003** (.0352)	0.0824** (.0282)	0.0450* (.0218)	0.0838** (.0264)
MARRIED	0.0148 (.0534)	0.0904** (.0341)	0.0640* (.0276)	0.0383 (.0260)
CAPITAL	0.0882* (.0416)	0.1307** (.0361)	0.2058** (.0585)	0.1291** (.0379)
TEMEMPL	-0.1483* (.0739)	-0.1209 (.1153)	-0.0282 (.0536)	0.0935 (.0912)
PART-TIME	-0.0659 (.1309)	0.5811* (.0250)		0.0113 (.2044)
PIECE-RATE	0.2792** (.0877)	0.1100 (.0741)	0.0743** (.0241)	0.0774 (.0517)
NODAYWORK	-0.1372 (.0868)	0.0293 (.0404)	0.1004** (.0250)	0.0855** (.0263)
UNEMPL		-0.0415 (.0994)	-0.0864** (.0362)	-0.0610 (.0655)
UNION	-0.0843* (.0408)	0.0034 (.0345)	0.0412 (.0341)	-0.0059 (.0376)
INDU11-39	0	0		0
INDU40	-0.1318 (.1181)	0.2059** (.0658)	0.1419** (.0498)	-0.0588 (.1065)
INDU50	0.0550 (.1506)	-0.0221 (.0451)	0.1055** (.0297)	0.0258 (.0543)
INDU61-63	0.0702 (.0670)	-0.1935** (.0440)		0.0269 (.0446)
INDU71-72	-0.0690 (.1117)	-0.0131 (.0512)		0.0268 (.0388)

Table H. (cont.)

Variable	Upper-level non-manuals	Lower-level non-manuals	Manufacturing workers	Oth.manual workers
INDU81-83	0.0110 (.0513)	0.0198 (.0538)		0.0124 (.0512)
INDU91-95	-0.0634 (.0488)	-0.0934* (.0459)		-0.0351 (.0427)
INDU31			0.0339 (.0693)	
INDU32			0.1037* (.0618)	
INDU33			-0.0930** (.0372)	
INDU34			0.1643** (.0342)	
INDU35			0.1349* (.0701)	
INDU36			-0.0105 (.0487)	
INDU37			0.1110** (.0353)	
INDU38			0	
INDU39			-0.0288 (.0774)	
LAMBDA	0.0491 (.0661)	0.0356 (.0446)	-0.1215** (.0426)	-0.0122 (.0402)
R^2 adj.	0.2510	0.3541	0.2581	0.1502
SEE	0.3247	0.2748	0.2582	0.2479
F-statistic	7.61	11.94	10.06	4.94
No. of obs.	376	400	600	447

[1] Standard errors are in parentheses below the estimates and are adjusted for heteroscedasticity according to White (1980). The corresponding multinomial logit estimates are reported in Table J below.

* Denotes significant estimate at a 5 % risk level.

** Denotes significant estimate at a 1 % risk level.

Table I. Multinomial logit estimates for occupational choice equations, female employees[1]

Variable	Upper-level non-manuals	Manufacturing workers	Other manual workers
CONSTANT	-3.72458** (.40818)	-1.39394** (.35353)	-1.15095** (.24114)
LOWER VOCATIONAL	0.38907 (.35834)	-0.34012* (.19381)	-0.22260 (.14662)
UPPER VOCATIONAL	1.58004** (.30739)	-2.46816** (.35089)	-1.74525** (.22155)
SHORT NON-UNIV	3.30884** (.33285)	-	-3.51825** (1.01642)
UNDER-GRADUATE	4.87645** (.42315)	-	-
GRADUATE	5.55610** (.48242)	-	-
EXP	0.02589** (.01042)	-0.02174* (.00973)	-0.00376 (.00701)
MARRIED	0.22356 (.23378)	0.07407 (.22569)	-0.05600 (.16323)
MARRIED·CHILD$^{0-6}$	0.00905 (.23720)	-0.06332 (.23378)	-0.51437** (.19433)
MARRIED·CHILD$^{7-17}$	-0.56058** (.22019)	-0.14514 (.19449)	-0.25319* (.15111)
PART-TIME	0.04010 (.41755)	-2.90800** (1.02174)	0.77572** (.23159)
NODAYWORK	-0.79757** (.26068)	0.21063 (.19238)	0.69416** (.13602)
PUBLIC	-0.09523 (.19528)	-	0.11204 (.13053)
UUSIMAA	0.87352** (.32798)	1.68158** (.37544)	0.56086* (.27246)
OTHER SOUTH	0.00018 (.24664)	1.38645** (.28935)	0.60342** (.18327)
MIDDLE	0.09339 (.30170)	1.58666** (.33887)	0.51690* (.22584)
NORTH	0.60690* (.28757)	1.75038** (.33291)	0.72101** (.21895)

Log-Likelihood = -1647.3 Pred.[2] = 63.2%
Chi-square (48) = 1248.8 No. of obs. = 1972

[1] Standard errors are in parentheses below the estimates. The reference group is lower-level salaried employees OCC41-44.
[2] Percentage of correctly predicted occupational attainment.
* Denotes significant estimate at a 5 % risk level.
** Denotes significant estimate at a 1 % risk level.

Table J. Multinomial logit estimates for occupational choice equations, male employees[1]

Variable	Upper-level non-manuals	Manufacturing workers	Other manual workers
CONSTANT	-1.43756** (.39920)	1.39352** (.31251)	1.69844** (.30335)
LOWER VOCATIONAL	-0.32912 (.31990)	-0.22183 (.18449)	-0.62703** (.19115)
UPPER VOCATIONAL	0.71664** (.26776)	-3.15939** (.26416)	-2.97573** (.25472)
SHORT NON-UNIV	3.10459** (.38147)	-3.82779** (1.05710)	-3.13757** (.77632)
UNDER-GRADUATE	4.83503** (1.06255)	-	-
GRADUATE	3.83825** (.43922)	-	-
EXP	0.02085* (.01048)	-0.02200** (.00839)	-0.02464** (.00860)
MARRIED	0.41637 (.28889)	-0.42543* (.21614)	-0.34918 (.21980)
MARRIED·CHILD$^{0-6}$	-0.11322 (.22600)	-0.12633 (.19024)	-0.06712 (.19808)
MARRIED·CHILD$^{7-17}$	0.20592 (.19827)	-0.11060 (.17391)	-0.39217* (.18248)
PART-TIME	0.94469 (.64973)	-	-0.89945 (.62813)
NODAYWORK	-0.72137** (.27787)	0.50730** (.18185)	0.69768** (.18087)
PUBLIC	-0.33466 (.21190)	-1.54414** (.21127)	0.39015* (.17157)
UUSIMAA	-0.59093 (.36283)	1.15263** (.31683)	0.00434 (.32343)
OTHER SOUTH	-0.44008* (.22845)	0.82168** (.22547)	-0.24368 (.21448)
MIDDLE	-0.45267 (.31372)	1.00447** (.27359)	0.17286 (.26118)
NORTH	-0.58836* (.28236)	0.70264** (.25939)	0.02959 (.24412)

Log-Likelihood = -1779.7 Pred.[2] = 59.7%
Chi-square (48) = 1522.6 No. of obs. = 1858

[1] Standard errors are in parentheses below the estimates. The reference group is lower-level salaried employees OCC41-44.
[2] Percentage of correctly predicted occupational attainment.
* Denotes significant estimate at a 5 % risk level.
** Denotes significant estimate at a 1 % risk level.

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