Occupational Gender Segregation and Discrimination in Western Europe

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March 2006

Paper prepared for EPUNet Conference 2006, May 8-9, Barcelona, Spain. Research was done during the International Master in Social Policy Analysis (IMPALLA) programme at CEPS/INSTEAD and KU Leuven in spring 2005. I am grateful to CEPS/INSTEAD for making this research possible.

Abstract

This study explores the role of labour market discrimination in determining occupational distributions of men and women in Europe. Using data from the eighth wave (2001) of the European Community Household Panel (ECHP), the paper documents the degree of occupational segregation in a sample of three Western European countries with different occupational sex segregation regimes, Denmark, Germany and the United Kingdom (UK). The paper then presents a simple model of occupational attainment with gender, education, age, main activity of the employer, and the number of children in the household as predictors. The effects of gender on the probability of working in an occupation, controlling for other personal characteristics, are estimated and compared across categories and across countries. Finally, to determine the role of labour market discrimination in assigning men and women to different occupations the "Blinder-Oaxaca" decomposition technique is applied to the determinants of the probability of working in an occupation.

Labour market discrimination appears to play the largest role in Germany, though the overall degree of discrimination does not vary substantially across the three countries. The levels of discrimination differ across occupations, however. Of the three studied countries, Germany shows the highest levels of discrimination in managerial occupations, sales/services, plant and machine operators, and elementary occupations, whereas the UK does in professional occupations, "technicians and associate professionals", and crafts/trades workers, while Denmark does in clerical occupations. Thus, it appears that in a country with a substantive commitment to gender equality (Denmark), men and women tend to be employed in separate occupational categories, but the differences in the probabilities of working in these occupations are largely due to the differences in personal characteristics, with the exception of managerial and clerical categories, where discrimination levels are higher. In the traditional family-centred country (Germany), on the other hand, women and men are treated very differently on the labour market, while the degree of segregation is lower than that in the substantively-egalitarian country. Yet, this is not to suggest that in heavily segregated labour markets men and women are separate but equal. On the contrary, highly female-dominated clerical occupations and male-dominated plant/machine operators have high discrimination levels in all three countries.

Introduction

While female labour force participation rates in industrialised countries have increased in the past several decades, women still tend to be concentrated in a narrow range of occupations, which often are worse paid than the predominantly male ones. Gender-based occupational segregation is one of the most durable aspects of labour markets around the world; as such, it increasingly attracts the attention of policy-makers and researchers. As long as nearly one-half of the labour force is excluded from an array of occupations, human talent is wasted and the labour markets stay fairly rigid and inefficient. Moreover, occupational gender segregation adversely affects women's status, income, and expected returns on human capital investment, perpetuating gender inequality into future generations (Anker 1997).

According to cross-national research conducted by the Organisation for Economic Co-operation and Development (OECD), European labour markets are still heavily segmented by gender, despite women's continued progress on the labour market (OECD 2002). Thus, women are concentrated in clerical, sales, service and teaching professions, while men are over-represented in managerial and administration employment, at the higher end of occupational hierarchy, and in production jobs, at its lower end. The OECD also documented that the extent of occupational segregation appeared to be positively associated with female labour force participation rates.

Most of the occupational gender segregation research focuses on the effects of segregation on female labour force participation rates or gender wage inequality. While segregation by gender influences wage differentials, the processes that lead to over-representation of women in some occupations also deserve investigation. However, the ways in which women gravitate towards lower-paying occupations because of "gender biases in hiring and promotion" are very hard to document and measure (de Ruijter and Huffman 2003). Thus, the present study investigates the micro-level determinants of the occupational distributions of men and women in three Western European countries (Denmark, Germany and the UK), separating the effects of personal and household-level characteristics on the likelihood of working in a certain non-agricultural occupational category from the effects of labour market discrimination.

Literature review

Occupational gender segregation refers to "the tendency for men and women to work in different occupations" (Anker 1998: 403). However, some confusion exists over the difference between *segregation* and *concentration*, with the terms sometimes used interchangeably. Segregation indicates the separation of women from men across all occupations, while concentration denotes the over-representation of one sex in an occupation (Blackburn and Jarman 2005: 2).

Further conceptualization of occupational segregation helps distinguish between its two main dimensions: vertical and horizontal. Though the distinction is not always clear and often depends on the degree of aggregation of the occupational groups, *vertical* segregation refers to either the distribution between hierarchically ordered occupations (inter-occupational segregation) or to the separation of men and women on the career ladder in the same occupation (intra-occupational segregation), whereas *horizontal* segregation entails the distribution across occupational groups or occupations with similar skill requirements (Fortin and Huberman 2002). This paper focuses on inter-occupational vertical gender segregation across highly aggregated occupational categories.

Though gender segregation research gained popularity with the implementation of equal employment opportunity legislation in the US in the early 1960's and a decade later in Europe, the approach to the topic remained largely descriptive, as most studies focused on measuring segregation rather than studying its underlying causes (Hakim 1992: 127). A lot of researchers were relying on the "index of dissimilarity," initially developed for capturing racial segregation in the US, or its modifications (e.g. Karmel and Maclachlan 1988), while others developed their own segregation indices (e.g. Charles and Grusky 1995) to measure the degree of occupational segregation in the economy. On the other hand, a lot of research on gender wage inequality involved occupational gender segregation as one of the determinants of the wage gap, without exploring occupational segregation in-depth (e.g. Blau and Kahn 2000; de Ruijter and Huffman 2003).

Another trend in occupational segregation research involved cross-national comparisons of its patterns and levels, primarily relying on segregation indices. Dolado, Felgueroso and Jimeno compared the distributions of female employment between the US and the EU in 1999, and concluded that European women were concentrated in social services, while the US women were overrepresented in the private service sector, with less occupational segregation among younger and more educated cohorts in both regions (2001). In a wider international perspective, on the other hand, Anker found the highest degree of segregation in the Middle East/North Africa, average levels in OECD countries, and the lowest levels in the Asia/Pacific region (1998: 175). Within the OECD region, though, Scandinavian countries had the highest levels of gender segregation (1998: 185).

Meanwhile, some scholars looked at the relationship between the level of occupational segregation and various macroeconomic factors. For instance, Bettio found a positive association between the index of dissimilarity and female employment rate, as well as between the index and the share of female employment in the public sector (2002). Furthermore, Dolado *et al* found a strong positive correlation between occupational gender segregation and the share of part-time jobs in the economy, since they were largely female-dominated (2003).

The causes of occupational gender segregation, on the other hand, have been explored to a lesser extent than its levels or patterns. Deeply rooted gender role attitudes that make it difficult for women to enter male-dominated occupations have been commonly cited as the source of horizontal occupational sex segregation (e.g. Fortin and Huberman 2002). Likewise, "social attitudes and cultural biases" discriminate against women and keep them from reaching high-level occupations typically occupied by men, resulting in vertical segregation (OECD 2002: 95). Furthermore, women who succeed in entering typically male occupations are often penalized through harassment from their male colleagues and superiors, facing severe obstacles to career advancement (Bergmann 2005).

The influence of labour market discrimination on observed occupational gender segregation in industrialised countries has been suggested (see Bergmann 2005), though no conclusive evidence of a causal link exists so far. It has been argued that both employees' preferences and labour market discrimination may determine gender differences in occupational distributions, but it is hard to distinguish between the two empirically (Blau and Kahn 2000: 17). The present study offers insights into the role that labour market discrimination plays in determining occupational distributions of men and women in Western European countries.

Theoretical background

Theories of occupational gender segregation

Neo-classical/human capital theories, labour market segmentation theories, and gender (feminist) theories have contributed to the understanding of occupational segregation by sex but none has yet offered a conclusive explanation of why it persists in industrialised countries (Anker 1998). In spite of widespread criticism, neo-classical theories have been very influential in economic literature, focusing on both demand and supply side factors.

For instance, Polachek (1981) showed that as long as occupations differ in their intrinsic atrophy[1] rates, women opt for the lower atrophy occupations if they expect a longer non-activity time. Adjusting for the male-female differences in lifetime labour force participation, Polachek found that if women had zero "home time," female occupational distribution would closer approximate the male distribution, especially in professional and managerial occupations. This theory would explain why women are over-represented in low-atrophy clerical and service occupations, but it depends too heavily on the assumption of individual rational choice.

Similarly, Becker (1985) argued that because of the energy spent on household activities, women either stay out of the labour force or opt for less demanding occupations than men. Therefore, the occupations with higher female concentration tend to be the ones which are most compatible with the domestic responsibilities of women. A major problem with the main assumption of this theory, as with most other neo-classical theories, is that household demands on women in developed countries decreased substantially with the fall in fertility and the increase in the use of household appliances (Anker 1998: 16).

Non-economic (e.g. feminist) theories, on the other hand, emphasized the role of gender stereotypes held by employers and societies at large in affecting differential occupational attainment of men and women. These theories predict that women would gravitate towards occupations that are most consistent with their "female" characteristics (e.g. caring nature). Anker confirmed this in his study of occupational segregation in 41 countries as he found that female-dominated occupations closely reflected typical gender stereotypes about women (1998: 276). This paper broadly draws on the discussed theories in formulating research questions and hypotheses.

Cross-national variation in occupational gender segregation: sex segregation regimes theory

While the above theories help explain individual occupational attainment, they do not predict cross-national differences in the levels of gender segregation. Cross-national differences are associated with the variation in the welfare states, because the industrialised nations employ different strategies promoting female labour force participation, which affect the labour market structure and the behaviour of its participants (Nermo 2000). However, Esping-Andersen's influential welfare regime theory, which is often used to explain class-based stratification, does not apply to the systems of gender-stratification well (O'Connor 1993). Therefore, this paper relies on a more recent theory of sex segregation regimes.

[1] Defined as "the loss in earnings potential when skills are not continuously used" (Polachek 1980: 62)

The sex segregation regime theory is based on the assumption that states and institutional arrangements play a role in "mediating the effects of market and family relations on women's economic status" (Chang 2000: 8). The state can intervene in two major ways: by ensuring gender *equality of access* to all occupations through anti-discrimination legislation and affirmative action, and by providing *substantive benefits* to working mothers to alleviate work-family conflict. Four distinct sex segregation regimes may be based on these two dimensions: "formal egalitarianism,' "substantive egalitarianism," "traditional family-centered," and "economy-centred."

The *formally egalitarian* regime is committed to gender equality in the labour market, guaranteeing women the equality of access to the whole range of occupations. However, treating women as individuals and ignoring their family responsibilities, the state does not help them cope with work-family conflict. The US is the archetypal example of this regime, with strong legal prohibition of gender discrimination in employment and various forms of affirmative action but with few substantive benefits. Though not overtly mentioned by Chang, the United Kingdom would also belong to this regime because of its emphasis on equal pay and anti-discrimination legislation but less commitment to substantive benefits.

In the *substantively egalitarian* regime, besides the formal adherence to gender equality the state supports working mothers with guaranteed parental leaves, affordable child-care, and benefits for part-time workers. Nordic countries are listed as the prime examples of this regime. In the *traditional family-centred* system, however, neither the formal equality is emphasised nor are the substantive benefits provided on a large scale. On the contrary, the cultural values stress the role of women as the main care-takers, and the institutional entitlements (e.g. pensions) encourage married women to stay at home. This regime includes countries like Germany, Austria and Portugal (Chang 2000). In the *economy-centred* regime, on the other hand, female employment may be supported with substantive benefits but without the formal commitment to gender equality. The "socialist" and the "third world" countries largely belong to this regime, where occupational distributions are determined by the demands of the economy.

In this study the sex segregation regime typology served as the basis for the choice of countries. Denmark represents the substantively egalitarian regime, Germany stands for the traditional family-centred cluster, while the UK represents the formally egalitarian regime.

Research objectives

First, the study compares the levels of occupational segregation in the selected countries. Then it determines which observed worker characteristics affect the probabilities of working in an occupation and how their effects differ between men and women. Cross-country differences in the results are examined. Finally, the paper contrasts the actual occupational distributions of men and women with the hypothetical distributions in the absence of "labour market discrimination" to elucidate the role of the observed worker characteristics and the role of discrimination in determining the probabilities of men and women to work in certain occupations. Based on these findings, the paper considers in which country labour market discrimination plays the largest role in influencing occupational attainment of women.

Hypotheses

In light of the above theories and existing research on occupational gender segregation in industrialised countries, this paper proposes the following hypotheses.

H1: The UK has the lowest level of overall occupational segregation, while Denmark has the highest degree of occupational segregation among the studied countries.

Formal commitment to equality of opportunity opens women's access to the full range of occupations, thus reducing occupational segregation in a formally egalitarian regime. Meanwhile, the substantively egalitarian regime has a large service sector which offers the most work-family compatible conditions to women and becomes highly female-dominated, thus increasing the overall degree of segregation in the economy.

H2: The number of children in the household is most important in Germany and least important in Denmark.

In the family-centred regime, household and child-care should influence women's occupational opportunities to a large extent because the state does not alleviate these responsibilities. Conversely, in the substantive egalitarian regime women are rather shielded from work-family conflict.

H3: Labour market discrimination determines gender occupational distributions in Germany to a higher degree than in the other countries.

To the extent that labour market discrimination is determined by broader societal discrimination and embedded gender role stereotypes, the family-centred regime with its pronounced gender role divisions should entail the most unequal labour market treatment of men and women with similar personal characteristics.

Methodology

Data

The study analyses a dataset constructed from the eighth wave of the ECHP (2001) in Denmark, Germany, and the UK. The unit of analysis in the constructed dataset is an individual above the age of 17, working with an employer in paid employment for more than 30 hours a week.

Methods

Descriptive analysis

The prevailing method of measuring occupational segregation relies on constructing segregation indices which denote the extent of deviation from a proportional representation of different subpopulations (e.g. men and women) across occupations. Though a large variety of such measures exists, the Index of Dissimilarity (Duncan and Duncan 1955) has been very popular in the occupational gender segregation research:

$$ID = \sum_{j=1}^{J} \left| (F_j/F) - (M_j/M) \right| * (1/2), \qquad (1)$$

where J is the number of occupational categories in the economy, F_j and M_j stand for the number of women and men in the *j*th occupation, respectively, while F and M refer to the total numbers of women and men in the labour force.

ID takes on the value of zero if the occupational distributions of men and women are identical. If, however, men and women are working in perfect isolation from each other ID would equal unity. The value of ID can be interpreted as the percentage of men or women who would have to switch occupations in order to achieve a proportional representation of the sexes in each occupation relative to the whole labour force. However, given that an occupational category contains overwhelmingly men or women, the larger (smaller) is the size of this category, *ceteris paribus*, the larger (smaller) will be the value of *ID* (Gibbs 1965). Therefore, ID is not invariant to the *occupational structure* of the labour force. If the relative sizes of the occupations change over time or across regions, ID becomes inappropriate for measuring temporal or cross-regional trends, respectively (Watts 1998).

To correct for the dependence of *ID* on the occupational structure, the index can be size-standardised (Gibbs 1965). However, this transformation brings about a different form of marginal dependence, making the index sensitive to the changes in the sex composition of the labour force (Charles and Grusky 1995, Watts 1998). Yet, the standardised index is appropriate for the present study because the female shares of the labour force are rather close across the researched countries, while the occupational structures differ across the countries to a large extent. The standardised ID_s can be defined as:

$$ID_s = \sum_{j=1}^{J} \left| \left[(F_j/T_j) / \sum (F_j/T_j) \right] - \left[(M_j / T_j) / \sum (M_j/ T_j) \right] \right| * (1/2) , \qquad (2)$$

where T_j stands for the total number of workers in the *j*th occupation. While all occupations are calibrated to the same size, the proportions of men and women within the occupations remain the same as the actual ones.

Furthermore, to correct for the forms of marginal dependence affecting the above two indices, Charles and Grusky (1995) proposed an alternative measure, a logarithmic "sex ratio" index *A*:

$$A = \exp \left\{ 1/J * \sum \left[\ln(F_j / M_j) - \left(1/J * \sum \ln(F_j / M_j) \right) \right]^2 \right\}^{1/2} , \qquad (3)$$

where, J, F_j M_j are defined as in (1). This index equals unity if the sex ratio is the same across all occupations and is undefined in a perfectly segregated labour force.

Though A is invariant with respect to both the occupational structure and the gender composition of the labour force, it is sensitive to the level of disaggregation of the occupational categories, and due to its logarithmic nature the index is undefined if an occupation is completely segregated, i.e. contains zero males or zero females (Watts, 1998). This measure is appropriate for the present study of eight major occupational categories, since none of them is completely segregated.

The "sex ratio" index can be understood as the factor by which women are "disproportionately represented in the average occupation" in a specific region (Charles 1992: 489). However, *A* needs to be interpreted with caution because it is a measure of concentration rather than segregation. This study uses the three indices described above and compares the results.

Explanatory analysis

Though the descriptive analysis illustrates whether men and women tend to be concentrated in different occupational categories, other personal characteristics may also influence occupational attainment. To estimate the effects of various personal characteristics on the conditional probabilities of working in an occupation, a logistic regression model with the eight-category occupation as the dependent variable has to be specified. The logit model is chosen for the present study because the response variable is qualitative and takes on discrete and mutually exclusive values (Gabriel, Williams, Schmitz 1990).

The model of occupational choice can be based on the following logistic conditional probability function:

$$P_{ij} \mid \mathbf{X}_i = e^{\mathbf{X}_i\beta_j} / \Sigma_j e^{\mathbf{X}_i\beta_j} \qquad (4)$$

Where,

i = 1,….n (individual)
j = 1,….J (occupational category)
$\mathbf{X}_i$ = vector of explanatory variables
$\boldsymbol{\beta}_j$ = vector of parameters to be estimated.

Alternatively, this can be expressed in terms of log odds ratios:

$$\mathrm{Ln}(P_{ij}/P_{iJ}) = \ln(e^{\mathbf{X}_i\beta_j} / e^{\mathbf{X}_i\beta_J}) = \mathbf{X}_i\mathbf{B}_j, \quad \text{for } i = 1, \ldots n \text{ and } j = 1, \ldots\ldots J \qquad (5)$$

Thus, P_{ij}/P_{iJ} is the odds ratio for the individual *i* of being employed in an occupation *j* as opposed to the baseline occupation *J,* and the estimated coefficients $\boldsymbol{\beta}_j$ express the effects of the explanatory variable on the respective log odds of working in the *j*th occupational category.

Of theoretically important explanatory variables, only those which showed statistical significance at the level of $\alpha = 0.05$ in at least one of the countries were included in the final model. For comparison purposes, the same model was estimated in each country, even though it fitted the data in some countries worse than in others. The reference category of the response variable is "elementary occupations".

Oaxaca-Blinder decomposition

To measure the effects of the labour market discrimination on the likelihood of working in an occupation, the study applies the "Blinder-Oaxaca" method which is commonly used to decompose the female-male wage gaps. To use the method in the present study it is assumed that in the absence of discrimination the female distribution would closely resemble the male distribution across occupations if women shared the same characteristics with men. Thus, decomposition allows interpreting "the effect of discrimination" only with respect to the explanatory variables included in the model, so the "discrimination" component of the difference between the estimated male and female probabilities of working in an occupation may also include the effects of other unobserved factors.

This study uses the decomposition method in two somewhat different ways. The first approach is rather novel, while the second one has previously been applied to the female-male occupational attainment differentials (e.g. Brown, Pagan, Rodriguez-Oreggia, 1999). Both techniques require estimating the coefficients from the previously specified multinomial logit model separately for

men and women to obtain male ($\boldsymbol{\beta}_{mj}$) and female ($\boldsymbol{\beta}_{fj}$) coefficients of the explanatory variables.

According to the less conventional method, the predicted logits are calculated for a "typical" man and a "typical" woman applying their respective estimated coefficients at the means of the explanatory variables, $\mathbf{X}_{fi}$ and $\mathbf{X}_{mi}$, for each of the *j* occupational categories. This allows calculating the "actual" gender differences in the logged odds of working in an occupation *j* as opposed to the baseline occupation *J* as well as the differences in the predicted probabilities of working in each of the occupations:

$$\text{Ln}\,(P_{fj}/P_{fJ}) - \ln(P_{mj}/P_{mJ}) = \mathbf{X}_{fi}\boldsymbol{\beta}_{fj} - \mathbf{X}_{mi}\boldsymbol{\beta}_{mj} \quad (6)$$

The "male" estimated coefficients are then applied to the female means of the explanatory variables to obtain the hypothetical logged odds and the predicted probabilities for a woman treated as a "typical" man, i.e. without discrimination (7). Therefore, the remaining difference between the "hypothetical" woman and the "typical" man is due solely to the differences in the personal characteristics, and the percentage reduction in the differential may be attributed to certain unobserved societal or organisational discriminatory processes.

$$\text{Ln}\,(P_{Fj}/P_{FJ}) - \ln(P_{mj}/P_{mJ}) = \mathbf{X}_{fi}\boldsymbol{\beta}_{mj} - \mathbf{X}_{mi}\boldsymbol{\beta}_{mj}\,. \quad (7)$$

Finally, calculating the percentage reduction in female-male differences in the predicted probabilities for each occupational category allows comparing the levels of gender discrimination across categories and across countries.

According to the more traditional method, on the other hand, the "occupational probability density function" is generated for each woman in the sample as in (8):

$$P_{fij} = e^{\mathbf{X}_{fi}\boldsymbol{\beta}_{mj}} / \Sigma_j e^{\mathbf{X}_{fi}\boldsymbol{\beta}_{mj}}\,. \quad (8)$$

Next, a hypothetical "discrimination-free" female occupational distribution is calculated by summing (8) across all female workers to obtain the expected number of women (E_{fj}) in each occupation j:

$$E_{fj} = \Sigma_j P_{fij}\,. \quad (9)$$

To determine the presence and extent of discrimination, ID' is calculated for the actual male and the hypothetical female distributions (10), which is then compared to the original ID as in (1). The non-standardised index is used because it is invariant to the sex composition of the labour force.

$$ID' = \Sigma \left| (E_{fj}/E) - (M_j/M) \right| * (1/2)\,, \quad (10)$$

where E is the expected number of women in the labour force.[2] The percentage reduction in the ID is then used to compare the levels of "discrimination" across countries.

The two methods are expected to produce mutually reinforcing results, since the former allows comparing the levels of discrimination across

[2] The expected number of female workers is slightly different from their actual number in the cross tabulation of occupation by gender because the variables used to generate the former have different numbers of missing values than the occupational variables.

occupational categories, while the latter gives the overall "level of discrimination" in a country.

Variables

Dependent variables

Since more detailed occupational categories might stand for different occupations in various countries, this study reports only the results based on the most aggregated occupational variable in the ECHP to make the cross-country comparisons easier. Originally based on the major International Standard Classification of Occupations (ISCO) groups, in the analysis this variable has only eight categories because the groups "skilled agricultural and fishery workers" and the "armed forces" have been eliminated due to their low frequencies in all countries. Thus the dependent variable comprises the following categories: 1) Legislators, senior officials and managers; 2) Professionals; 3) Technicians and associate professionals; 4) Clerks; 5) Services workers and shop assistants; 6) Craft and related trades workers; 7) Plant and machine operators; 8) Elementary occupations.

Explanatory Variables

Based on the offered hypotheses, gender, education, age, number of children under 12 in the household, and the main activity of the employer are included in the analysis. The categorical variables are coded as follows:

Gender dummy (1 - woman; 0 - man);

Two age dummies ("46 years old and above" as the reference group):

Young age (1-"17-25 years old"; 0 – otherwise)

Prime age (1 - "26-45 years old"; 0 – otherwise);

Two education level dummies ("less than secondary level of education" as the reference group):

Higher education (1 – "third level of education or above"; 0 – otherwise)

Low education (1 – "secondary level education"; 0 – otherwise);

"Main activity of the employer" dummy (1- industry; 0 – services).

Results from the descriptive analysis of occupational distributions in Denmark, Germany and the UK

In each of the studied countries, a cross tabulation of the eight-category occupation variable by gender shows a lack of conditional independence in the population at the conventional statistical level, indicating that men and women tend to work in different broad occupational categories (Table 1).

Table 1: The distribution of workers across eight major occupational groups (2001)

	Denmark				Germany				United Kingdom			
	Men %	Women %	female share %	Row N	Men %	Women %	female share %	Row N	Men %	Women %	female share %	Row N
Legislators, senior officials and managers	10	4	25	*139*	5	4	29	*178*	20	17	37	*672*
Professionals	22	19	43	*389*	15	12	31	*535*	14	14	40	*492*
Technicians and associate professionals	19	32	59	*465*	15	30	53	*791*	11	18	52	*482*
Clerks	7	21	73	*247*	7	20	62	*441*	10	27	65	*604*
Services workers and shop and market assistants	5	16	72	*193*	4	16	66	*325*	8	15	57	*388*
Craft and related trades workers	18	1	5	*192*	32	7	10	*877*	20	2	7	*443*
Plant and machine operators	11	4	21	*147*	15	6	18	*451*	13	3	15	*312*
Elementary occupations	8	4	33	*115*	7	6	30	*253*	5	4	32	*168*
N	1016	871	46	*1887*	2478	1373	36	*3851*	2117	1444	41	*3561*
Chi square (p value)	355.832 (0.000)				692.428 (0.000)				517.440 (0.000)			
ID	0.372				**0.401**				0.310			
ID_s	**0.441**				0.396				0.327			
A	**3.470**				2.522				2.733			

Source: ECHP 2001

As expected, in all three countries large proportions of full-time female workers are employed as "technicians and associate professionals", clerks and "services workers and shop and market assistance" (sales/services), while the lowest proportions of the female labour force are in "crafts and related trades workers" (crafts/trades) and "plant and machine operators" occupations. While similar proportions of women work in sales/services across the studied countries (16 per cent), a higher proportion of women work as clerks in the UK (27 per cent) than in Denmark (21 per cent) or Germany (20 per cent). On the other hand, a higher proportion of women are in heavily male-dominated crafts/trades in Germany (seven per cent) than the UK (two per cent) or Denmark (one per cent).

Some cross-national variation in female occupational distributions surfaces at the higher end of the ISCO hierarchy as well. Thus, only four per cent of women are in the "legislators, senior officials and mangers" category in Denmark and Germany, compared to 17 per cent of women in the UK. A higher proportion of women work in professional occupations in Denmark (19 per cent) than in the UK (14 per cent) and in Germany (12 per cent). At the same time, similar shares of the female labour force are in the associate professionals category in Denmark

(32 per cent) and Germany (30 per cent), compared to only 18 per cent in the UK. Thus, in the UK women are more uniformly distributed across the first three major ISCO categories, while in Germany and in Denmark much smaller proportions of women work in the managerial category than in the professional or associate professional occupations.

To compare the overall levels of occupational segregation based on the crude Index of Dissimilarity (ID), Germany has the highest degree of occupational segregation, followed by Denmark and the UK (Table 1). According to the size-standardised index (ID_s), however, Denmark shows the highest level of segregation, followed by Germany and the UK (Table 1). Since the ID_s value for Denmark is higher than the crude ID value, the occupational structure of the Danish labour market appears to suppress the extent of occupational segregation. Standardising the index makes very little difference for Germany and the UK, however. Thus, if all occupations were the same size, with the current proportions of the sexes in each, about 44 per cent of men or women in Denmark would have to change occupations in order to achieve a proportional distribution of the sexes, while in Germany and the UK it would have to be 40 per cent and 33 per cent, respectively. According to the "sex ratio" index, Denmark has the highest segregation level, followed by the UK and Germany. Thus, men or women are overrepresented in an average Danish occupation by the factor of 3.47.

Based on the standardised index ID_s, these results largely confirm the hypothesis that the substantive egalitarian regime country would have the most segregated labour market, while it would be least segregated in the formally-egalitarian country. As "sex ratio" measures concentration rather than overall segregation (Blackburn and Jarman 2005: 2), ID_s is a more appropriate index for this study. Not surprisingly, the authors of the "sex ratio" index also found that the three indices yield different rankings in their cross national-study (Charles and Grusky 1995).

Results from the explanatory analysis of occupational segregation in Denmark, Germany and the UK

The effect of personal characteristics on the occupational choice

The model specified in the equation 5 (methodology chapter) was estimated for each country separately with the following explanatory variables: gender, education level, age group, the main business activity of the employer, the number of children below age 12 in the household and an interaction term between gender and the number of children. Tables 2a, 2b and 2c show the coefficients and standard errors from the model separately by country.

Table 2a Effects of personal characteristics on occupational attainment – logit coefficients and standard errors – Denmark

Variable	Ln(P1/P8)	Ln(P2/P8)	Ln(P3/P8)	Ln(P4/P8)	Ln(P5/P8)	Ln(P6/P8)	Ln(P7/P8)
Intercept	-0.784	-1.747*	-0.815*	-0.675	0.271	-2.402	-0.001
(S.E)	(0.467)	(0.647)	(0.390)	(0.382)	(0.381)	(0.500)	(0.363)
Woman	-0.589	0.061	0.816*	1.440*	1.145*	-2.661*	-0.419
(S.E)	(0.398)	(0.350)	(0.326)	(0.343)	(0.361)	(0.580)	(0.378)
Age-young	-1.557*	-1.779*	-1.782*	-1.077*	-0.245	-0.300	-0.585
(S.E)	(0.702)	(0.635)	(0.530)	(0.475)	(0.448)	(0.535)	(0.493)
Age-prime	-0.262	-0.536	0.090	0.230	0.004	0.327	0.004
(S.E)	(0.346)	(0.318)	(0.300)	(0.316)	(0.335)	(0.348)	(0.342)
Edu-hi	3.974*	6.273*	4.183*	1.734*	1.010	1.698	-0.829
(S.E)	(0.611)	(0.757)	(0.551)	(0.568)	(0.589)	(0.686)	(0.770)
Edu-lo	1.248*	2.484*	1.958*	1.416*	0.815*	2.312	-.037
(S.E)	(0.446)	(0.635)	(0.346)	(0.321)	(0.320)	(0.400)	(0.296)
Industry	-.429	-1.256*	-0.624*	-0.981*	-3.318*	2.493	1.290
(S.E)	(0.321)	(0.313)	(0.271)	(0.299)	(0.625)	(0.338)	(0.294)
Children	-0.120	0.067	-0.044	-0.301	0.003	-0.355*	-0.135
(S.E)	(0.179)	(0.165)	(0.155)	(0.192)	(0.186)	(0.169)	(0.168)
Children * woman	0.052	-0.013	-.026	0.069	0.095	0.409	-0.421
(S.E)	(0.301)	(0.254)	(0.237)	(0.264)	(0.261)	(0.404)	(0.350)
Chi-Square Δ-2 log L	1516.909*						
Pseudo R-Square	0.627						

Source: ECHP 2001
(*) – statistically significant at the level of p<0.05

Table 2 b Effects of personal characteristics on occupational attainment – logit coefficients and standard errors – Germany

Variable	Ln(P1/P8)	Ln(P2/P8)	Ln(P3/P8)	Ln(P4/P8)	Ln(P5/P8)	Ln(P6/P8)	Ln(P7/P8)
Intercept	-2.572*	-3.704*	-1.157*	-1.684	-1.014*	-1.073*	-0.108
(S.E)	(0.476)	(0.740)	(0.260)	(0.285)	(0.287)	(0.237)	(0.232)
Woman	0.284	0.431	1.085*	1.394	1.363*	-1.179*	-0.717*
(S.E)	(0.269)	(0.234)	(0.206)	(0.220)	(0.236)	(0.229)	(0.235)
Age-young	0.157	0.148	1.109*	0.991	1.141*	1.675*	0.682
(S.E)	(0.585)	(0.539)	(0.374)	(0.389)	(0.398)	(0.376)	(0.399)
Age-prime	0.113	0.319	0.316	0.341	0.440*	0.569*	0.056
(S.E)	(0.233)	(0.201)	(0.183)	(0.198)	(0.214)	(0.183)	(0.193)
Edu-hi	4.585*	7.121*	3.796	2.507*	1.727*	1.448*	-0.204
(S.E)	(0.512)	(0.765)	(0.335)	(0.365)	(0.372)	(0.322)	(0.372)
Edu-lo	2.112*	3.325*	2.055	2.010*	1.149*	1.269*	0.346
(S.E)	(0.453)	(0.731)	(0.224)	(0.240)	(0.237)	(0.186)	(0.186)
Industry	-0.047	-0.471*	-0.506	-0.257	-2.744*	2.046*	1.154*
(S.E)	(0.222)	(0.195)	(0.172)	(0.184)	(0.340)	(0.174)	(0.177)
Children	-0.324*	-0.180	-0.164	-0.205	-0.147	-0.133	0.011
(S.E)	(0.139)	(0.110)	(0.102)	(0.121)	(0.134)	(0.093)	(0.098)
Children * woman	-0.348	-0.274	-0.082	-0.006	0.142	0.143	0.344
(S.E)	(0.365)	(0.263)	(0.230)	(0.244)	(0.250)	(0.266)	(0.252)
Chi-Square Δ-2 log L	3081.260*						
Pseudo R-Square	0.572						

Source: ECHP 2001
(*) – statistically significant at the level of p<0.05

Note: 1. Legislators, senior officials and managers 2. Professionals 3. Technicians and associate professionals 4. Clerks 5. Services workers and shop assistants 6. Craft and related trades workers 7. Plant and machine operators 8. Elementary occupations

Table 2 c Effects of personal characteristics on occupational attainment – logit coefficients and standard errors – United Kingdom

Variable	Ln(P1/P8)	Ln(P2/P8)	Ln(P3/P8)	Ln(P4/P8)	Ln(P5/P8)	Ln(P6/P8)	Ln(P7/P8)
Intercept	0.693*	-0.735*	-0.134	0.532*	0.491	-0.057	0.379
(S.E)	(0.229)	(0.289)	(0.254)	(0.234)	(0.247)	(0.251)	(0.247)
Woman	0.521*	0.366	0.896*	1.421*	0.931*	-1.632*	-0.766*
(S.E)	(0.241)	(0.251)	(0.249)	(0.243)	(0.254)	(0.327)	(0.300)
Age-young	-0.731*	-0.451	-0.133	0.319	0.271	0.126	-0.938*
(S.E)	(0.276)	(0.293)	(0.283)	(0.269)	(0.282)	(0.287)	(0.331)
Age-prime	0.169	0.429	0.376	0.470*	0.173	0.446	0.298
(S.E)	(0.225)	(0.237)	(0.237)	(0.233)	(0.246)	(0.243)	(0.247)
Edu-hi	1.526*	2.950*	1.813*	0.260	0.669*	0.582*	0.133
(S.E)	(0.221)	(0.277)	(0.239)	(0.222)	(0.235)	(0.234)	(0.240)
Edu-lo	0.800*	1.497*	1.066*	0.390	0.580*	0.667*	0.194
(S.E)	(0.251)	(0.316)	(0.270)	(0.243)	(0.262)	(0.254)	(0.266)
Industry	-0.560*	-0.866*	-0.988*	-0.910*	-2.856*	1.299*	0.703*
(S.E)	(0.195)	(0.213)	(0.214)	(0.203)	(0.339)	(0.204)	(0.208)
Children	-0.048	-0.299*	-0.198	-0.077	-0.078	-0.106	-0.022
(S.E)	(0.111)	(0.122)	(0.124)	(0.121)	(0.128)	(0.113)	(0.117)
Children * woman	-0.359	0.128	0.002	-0.183	-0.100	0.145	-0.094
(S.E)	(0.223)	(0.229)	(0.225)	(0.217)	(0.229)	(0.295)	(0.277)
Chi-Square Δ-2 log L	1636.670*						
Pseudo R-Square	0.392						

Source: ECHP 2001

(*) – statistically significant at the level of p<0.05

Note: 1. Legislators, senior officials and managers 2. Professionals 3. Technicians and associate professionals 4. Clerks 5. Services workers and shop assistants 6. Craft and related trades workers 7. Plant and machine operators 8. Elementary occupations

Among those with no children in the household, in Denmark women are less likely than men to work in managerial occupations as opposed to managerial occupations (B= -0.589), controlling for other variables in the model, but the difference is not statistically significant (Table 2a). In Germany women are about as likely as men to work in managerial occupations, but having an additional child in the household significantly reduces the odds by 28 per cent[3] (B= -0.324) for men and by 49 per cent (B= -0.672) for women (Tables 2b). In the UK, on the other hand, women without children are significantly more likely to work in managerial occupations than men without children (B= 0.521), while the negative effects of having an additional child do not differ significantly between men and women (Table 2c).

In all three countries, women without children are significantly more likely to work in "technicians and associate professionals" occupations than child-free men, other personal characteristics held equal. The effect is of the largest magnitude in Germany: the odds for women are about 3 times higher[4] (B= 1.085), and having children has no significant effect on this difference.

Everything else equal, women are more than four times more likely than men to work in clerical occupations in all three countries, with having children not affecting this difference. Similarly, in all three countries women have significantly higher chances of being employed in sales/services than men, other characteristics being equal, with the number of children having no significant effect on this difference.

[3] 1 – antilog (-0.324)

[4] Antilog (1.085)

As expected, women are significantly less likely to work in crafts/trades than men in all three countries. Having children has a significant negative effect on the odds for men in Denmark only. For Danish women though, having an additional child has no significant effect on the odds. In Germany and the UK, men are about twice as likely as women to be employed in the "plant and machine operators" category, while in Denmark the difference is smaller and not significant.

With respect to gender these results confirm the findings of the descriptive analysis, while the only unexpected insight is that in the UK child-free women are more likely to work in managerial occupations than child-free men. Having children in the household, on the other hand, has almost no effect in Denmark, as expected, but contrary to the initial hypothesis, it also has very little effect in Germany, except in managerial occupations. The effects of other variables in the models are not discussed here, though most of the coefficients are of the expected signs.

The effect of labour market discrimination on occupational attainment

Since men and women with similar personal characteristics have demonstrably different chances of working in most occupational categories, it may be that women are treated differently on the labour market than men. To isolate the effect of unobserved factors from the effects of the personal characteristics, the female-male differences in the probabilities of working in an occupation are decomposed in line with the "Oaxaca-Blinder" method. The coefficients estimated from the model specified in equation 5 separately by country and by gender are presented in Tables A2a – A3b in the Appendix.

Table 3: "Oaxaca-Blinder" decomposition of predicted response probabilities

Category / Country		$\mathbf{X}_m\boldsymbol{\beta}_{mj}$	$\mathbf{X}_f\boldsymbol{\beta}_{fj}$	$\mathbf{X}_f\boldsymbol{\beta}_{mj}$	P_{mj} (1)	P_{fj} (2)	P_{Fj} (3)	P_{fj} - P_{mj} (2) - (1)	P_{Fj} - P_{mj} (3) - (1)	% Δ
1	DK	0.913	0.383	1.072	0.186	0.057	0.191	-0.129	0.005	-1.040
	DE	-0.282	0.189	-0.347	0.054	0.046	0.055	-0.008	0.002	**-1.217**
	UK	1.386	1.867	1.412	0.224	0.207	0.215	-0.017	-0.009	-0.470
2	DK	-0.871	1.336	-0.160	0.031	0.149	0.056	0.118	0.025	-0.791
	DE	0.166	0.428	0.206	0.084	0.058	0.096	-0.026	0.012	-1.475
	UK	0.869	1.222	1.032	0.133	0.109	0.147	-0.025	0.013	**-1.544**
3	DK	1.522	2.335	1.696	0.342	0.404	0.357	0.062	0.015	-0.762
	DE	1.021	2.370	1.155	0.198	0.406	0.249	0.208	0.051	-0.755
	UK	0.803	1.777	0.959	0.125	0.190	0.137	0.065	0.012	**-0.818**
4	DK	0.136	1.840	0.469	0.086	0.246	0.105	0.161	0.019	**-0.881**
	DE	0.185	1.858	0.358	0.086	0.244	0.112	0.158	0.026	-0.833
	UK	0.633	2.236	0.905	0.105	0.300	0.129	0.194	0.024	-0.877
5	DK	-0.367	0.975	0.347	0.052	0.104	0.093	0.052	0.041	-0.214
	DE	-1.430	1.402	-0.387	0.017	0.154	0.053	0.137	0.036	**-0.736**
	UK	0.002	1.482	0.664	0.056	0.141	0.102	0.085	0.046	-0.462
6	DK	0.434	-9.163	-0.174	0.115	0.000	0.055	-0.115	-0.060	-0.477
	DE	1.555	-0.304	1.051	0.337	0.028	0.225	-0.309	-0.113	-0.635
	UK	1.109	-0.891	0.796	0.170	0.013	0.116	-0.157	-0.054	**-0.657**
7	DK	0.412	-9.737	0.174	0.113	0.000	0.078	-0.113	-0.035	-0.691
	DE	0.762	-0.388	0.510	0.153	0.026	0.131	-0.127	-0.022	**-0.826**
	UK	0.847	-1.323	0.663	0.131	0.009	0.102	-0.122	-0.029	-0.763
8	DK	0	0	0	0.075	0.039	0.065	-0.036	-0.009	-0.741
	DE	0	0	0	0.071	0.038	0.078	-0.033	0.007	**-1.216**
	UK	0	0	0	0.056	0.032	0.052	-0.024	-0.004	-0.849

Source: ECHP 2001

Highest absolute percentage difference in each occupational category is shaded

Note: 1. Legislators, senior officials and managers 2. Professionals 3. Technicians and associate professionals 4. Clerks 5. Services workers and shop assistants 6. Craft and related trades workers 7. Plant and machine operators 8. Elementary occupations

Table 3 presents the predicted log odds of working in each of the eight categories for a "typical" man ($\mathbf{X}_m\boldsymbol{\beta}_{mj}$), a "typical" woman ($\mathbf{X}_f\boldsymbol{\beta}_{fj}$) and a hypothetical woman treated as a man on the labour market ($\mathbf{X}_f\boldsymbol{\beta}_{mj}$). The corresponding predicted probabilities are P_{mj}, P_{fj} and P_{Fj}. The difference between columns (2) and (1) shows the actual gender difference in predicted probabilities of working in an occupational category. The discrepancy between (3) and (1), however, shows the difference in the probabilities due solely to the difference in personal characteristics, i.e. free of "discrimination." The last column shows the percentage change in the actual differences if women are treated like men, i.e. the proportion due to "discrimination."

For instance, in Denmark, the predicted probability of working in managerial occupations for a "typical" man is 0.186, compared to 0.057 for a "typical" woman. Once the male effects are applied to the female characteristics, the predicted probability rises to 0.191. Thus, the predicted probability is 12.9 percentage points higher for a "typical" man than a "typical" woman (P_{fj} -P_{mj}), but is 0.05 percentage points lower than for a woman treated as a man (P_{Fj} -P_{mj}). Therefore, eliminating the effect of labour market discrimination reduces the difference between male and female probabilities of working in managerial occupations by 104 per cent, which means that in the absence of discrimination women would be even more likely to work in this category than men, given their personal characteristics.

Thus, according to the last column of Table 3, Germany exhibits the highest level of discrimination in the managerial category, while the UK does in the professionals category. Denmark has the highest level of discrimination in clerical occupations and Germany does in sales/services, while the UK does in the "technicians associate professionals" category. Among blue-collar occupations, the crafts category is the most women-unfriendly in the UK across the three countries, while Germany shows the highest level of discrimination in operative and in elementary occupations.

Furthermore, in Denmark the most female-unfriendly category is the managerial category, while in both Germany and the UK it is the "professionals" category. Sales/services is the least discriminating category in Denmark, where only 21 per cent of the gender difference is not explained by personal characteristics. In Germany it is the crafts category (64 per cent), and in the UK it is sales/services (46 per cent) and managerial occupations (47 per cent).

Interestingly, occupations where the degree of discrimination is high are not always heavily segregated by gender. For example, in the UK, professional occupations are fairly gender-integrated (40 per cent female), but women's chances of working in this category would be 150 per cent higher in the absence of discrimination. On the other hand, sales/services are female-dominated in all three countries, but in Denmark and the UK this is also the category with lower levels of discrimination. Yet, discrimination levels are uniformly high in male-dominated crafts/trades and "plant and machine operators".

Overall, Germany appears to have the most "discriminatory" labour market, since in each of the eight categories the proportion of unexplained differences is above 64 per cent and in three categories it is more than 100 per cent (Table 3). This confirms the initial hypothesis that the traditional family centred regime country would have the highest level of discrimination, though the

results are only suggestive rather than conclusive, due to various limitations of the method.[5]

Table 4: Predicted and actual occupational distributions of male and female Workers

	ID	ID'	% Δ	ID_s	ID_s'	% Δ
Denmark	0.372	0.113	-0.700	0.441	0.137	-0.690
Germany	0.401	0.112	-0.720	0.396	0.104	-0.738
Great Britain	0.310	0.105	-0.662	0.327	0.104	-0.683

Source: ECHP 2001

Finally, comparing the hypothetical "discrimination-free" female occupational distribution with the actual male distribution using the segregation index ID' shows that in all three countries women are treated differently than men on the labour market, with the largest absolute percentage difference in Germany (Table 4). Thus, the discrepancy between the male and female occupational distributions in Germany is reduced by 72 per cent if women get the same returns on their personal characteristics as men, according to the discrimination-free ID' measure. The corresponding percentage reduction is only slightly lower in Denmark (70 per cent) and in the UK (66 per cent). This ranking persists if the standardised ID_s is used. Thus, in Germany the discrimination-free ID_s' is about 74 per cent lower than the actual ID_s in the sample, while the corresponding difference is 69 per cent in Denmark and 68 per cent in the UK. However, using both ID and ID_s measures, discrimination-free indices become almost similar in the studied countries. This suggests that the three countries have similar overall levels of "discrimination" with noticeable cross-occupational variation.

Conclusion

This paper described the differences between male and female occupational distributions in three Western European countries, explored the differences in the micro-level determinants of occupational attainment and separated the effects of personal worker characteristics from the effects of labour market discrimination. The study found the highest degree of inter-occupational vertical gender segregation in Denmark, as predicted by the sex segregation regime theory. The segregation levels in the UK and Germany were similar, however. In the UK a higher proportion of the female labour force worked in managerial occupations than in the other two countries, while in Germany and Denmark about one-third of women working full-time were employed in "technicians and associate professionals" occupations. The proportions of women in the male-dominated blue-collar occupations have been uniformly low, as expected. Among the female-dominated occupations, higher proportions of women were employed in clerical occupations than sales/services in all three countries.

Labour market discrimination appears to play the largest role in Germany, as predicted. However, while the levels of discrimination specific to broad occupational groups differ across the three countries, the overall degrees of discrimination in each country are fairly similar. Of the three studied countries, Germany shows the highest levels of discrimination in managerial occupations, sales/services, plant and machine operators, and elementary occupations, whereas

[5] For instance, the effects of labour market discrimination are likely to be overestimated because the model did not allow for unobserved heterogeneity.

the UK does in professional occupations, "technicians and associate professionals", and crafts/trades workers, while Denmark does in clerical occupations.

Thus, it appears that in a country with a substantive commitment to gender equality (Denmark), men and women tend to be employed in separate occupational categories, but the differences in the probabilities of working in these occupations are largely due to the differences in personal characteristics, with the exception of managerial and clerical categories, where discrimination levels are higher. In the traditional family-centred country (Germany), on the other hand, women and men are treated very differently on the labour market, while the degree of segregation is lower than that in the substantively-egalitarian country. Yet, this is not to suggest that in heavily segregated labour markets men and women are separate but equal. On the contrary, highly female-dominated clerical occupations and male-dominated plant/machine operators have high discrimination levels in all three countries.

These results, however, should be interpreted with caution, since only one country from each sex segregation regime has been included in the analysis. Moreover, the differences in the male and female probabilities of working in an occupation may also be due to unobserved differences in individual preferences and the effects of other variables not included in the model. Therefore, the "discrimination" component gauged with the Oaxaca decomposition technique may well be overestimated. Further analysis would require allowing for unobserved heterogeneity due to the differences in men's and women's preferences.

9. Bibliography

Anker, Richard. 1997. "Theories of Occupational Segregation by Sex: An Overview." *International Labour Review* 136 (3).

Anker, Richard. 1998. *Gender and Jobs: Sex Segregation of Occupations in the World*. Geneva: ILO.

Becker, Gary S. 1985. "Human Capital, Effort, and the Sexual Division of Labor." *Journal of Labor Economics* 3 (1): S33-S58.

Bergmann, Barbara R. 2005. *The Economic Emergence of Women*. 2nd ed. New York: Palgrave Macmillan.

Bettio, Francesca. 2002. "The Pros and Cons of Occupational Gender Segregation in Europe." *Canadian Public Policy* 28 (1): S65-S84

Blackburn, Robert and Jarman, Jennifer. 2005. "Gendered Occupations: Exploring the Relationship Between Gender Segregation and Inequality." GeNet Working Paper 5. ESRC Gender Equality Network, University of Cambridge at http://www.genet.ac.uk/workpapers/GeNet2005p5.pdf

Blau, Francine and Kahn, Lawrence. 2000. "Gender Differences in Pay." NBER Working Paper 7732 at http://www.nber.org/papers/w7732

Blau, Francine, Simpson, Patricia and Anderson, Deborah. 1998. "Occupational Progress? Trends in Occupational Segregation in the United States Over the 1970s and 1980s." NBER Working Paper 6716 at http://www.nber.org/papers/w6716

Brown, Cynthia J, Pagan, Jose and Rodriguez-Oreggia, Eduardo. 1999. "Occupational Attainment and Gender Earnings Differential in Mexico." *Industrial and Labour Relations Review* 53 (1): 123-135.

Chang, Mariko Lin. 2000. "The Evolution of Sex Segregation Regimes." *American Journal of Sociology.* 105 (6): 1658-1701

Charles, Maria. 1992. "Cross-National Variation in Occupational Sex Segregation." American Sociological Review 57 (4): 483-502.

Charles, Maria and Grusky, David B. 1995. "Models for Describing the Underlying Structure of Sex Segregation." *The American Journal of Sociology* 100 (4): 931-937.

Dolado, Juan J, Felgueroso, Florentino, and Jimeno, Juan F. 2001. "Female Employment and Occupational Changes in the 1990s: How is the EU performing relative to the US?" *European Economic Review* 45: 875: 889

Dolado, Juan J, Felgueroso, Florentino, and Jimeno, Juan F. 2003. "Where Do Women Work?: Analyzing Patterns In Occupational Segregation by Gender." Universidad Carlos III de Madrid at http://www.eco.uc3m.es/temp/annales03.pdf

Duncan, Otis Dudley and Duncan, Beverly. 1955. "A Methodological Analysis of Segregation Indices." *American Sociological Review* 20 (2): 210-217.

Fortin, Nicole and Huberman, Michael. 2002. "Occupational Gender Segregation and Women's Wages in Canada: An Historical Perspective." *Canadian Public Policy* 28 (1): S11-S39

Gabriel, Paul E., Williams, Donald R. and Schmitz, Susanne. 1990. "The Relative Occupational Attainment of Young Blacks, Whites, Hispanics." *Southern Economic Journal* 57 (1): 35-46

Gibbs, Jack P. 1965. "Occupational Differentiation of Negros and Whites in the United States." *Social Forces* 44 (2): 159-160.

Hakim, Catherine. 1992. “Explaining Trends in Occupational Segregation: The Measurement, Causes, and Consequences of the Sexual Division of Labour.” *European Sociological Review* 8 (2): 127-152.
Karmel, T. and Maclachlan, M. 1988. “Occupational Sex Segregation—Increasing or Decreasing.” *Economic Record 64*: 187-195.
Nermo, Magnus. 2000. “Models of Cross-National Variation in Occupational Sex Segregation.” *European Societies* 2 (3): 295 – 333.
O’Connor, Julia. 1993. “Gender, Class and Citizenship in the Comparative Analysis of Welfare State Regimes: Theoretical and Methodological Issues.” *The British Journal of Sociology* 44 (3): 501-518.
OECD.2002. *Employment Outlook*. Paris: OECD.
Polachek, Solomon W. 1981. “Occupational Self-Selection: A Human Capital Approach to Sex Differences in Occupational Structure.” *Review of Economics and Statistics* 63 (1): 60-69.
de Ruijter, Judith and Huffman, Matt. 2003. “Gender Composition Effects in the Netherlands: A Multilevel Analysis of Occupational Wage Inequality.” *Social Science Research* 32: 312-334.
Watts, Martin. 1998. “Occupational Gender Segregation: Index Measurement and Econometric Modeling.” *Demography* 35 (4): 489-496.

10. Appendix

Table A1a Logit Coefficients and Standard Errors – Women, Denmark

Variable	Ln(P1/P8)	Ln(P2/P8)	Ln(P3/P8)	Ln(P4/P8)	Ln(P5/P8)	Ln(P6/P8)	Ln(P7/P8)
Intercept	-1.330	-0.687	-0.174	0.560	1.147*	-3.408*	-2.694*
(S.E)	(0.825)	(0.701)	(0.563)	(0.477)	(0.452)	(1.293)	(1.127)
Age-young	-1.457	-2.039*	-2.044	-1.458*	-0.827	0.456	0.440
(S.E)	(1.208)	(1.001)	(0.753)	(0.683)	(0.669)	(1.141)	(1.049)
Age-prime	-0.445	-1.289*	-0.624	-0.313	-0.302	-1.552	0.445
(S.E)	(0.646)	(0.541)	(0.505)	(0.504)	(0.525)	(1.244)	(0.716)
Edu-hi	3.780*	5.387*	4.446	1.937*	0.165	-16.999	-18.656
(S.E)	(1.004)	(0.898)	(0.790)	(0.756)	(0.798)	(0.000)	(5751.07)
Edu-lo	1.513	1.769*	2.724	2.075*	0.904*	1.457	-0.634
(S.E)	(0.861)	(0.739)	(0.573)	(0.484)	(0.457)	(1.166)	(0.650)
Industry	-1.072	-2.009*	-1.409	-1.255*	-4.238*	1.718	4.096
(S.E)	(0.639)	(0.576)	(0.453)	(0.447)	(1.073)	(0.931)	(1.109)
Children	-0.012	0.250	0.110	-0.098	0.185	0.620	-0.661*
(S.E)	(0.300)	(0.246)	(0.227)	(0.229)	(0.233)	(0.496)	(0.378)
Chi-Square Δ-2 log L	539.670*						
Pseudo R-Square	0.534						

Source: ECHP 2001

(*) – statistically significant at the level of p<0.05

Note: 1. Legislators, senior officials and managers 2. Professionals 3. Technicians and associate professionals 4. Clerks 5. Services workers and shop assistants 6. Craft and related trades workers 7. Plant and machine operators 8. Elementary occupations

Table A1b Logit Coefficients and Standard Errors – Men, Denmark

Variable	Ln(P1/P8)	Ln(P2/P8)	Ln(P3/P8)	Ln(P4/P8)	Ln(P5/P8)	Ln(P6/P8)	Ln(P7/P8)
Intercept	-0.900	-18.297*	-0.756	-0.119	-1.416*	-2.720*	0.211
(S.E)	(0.543)	(0.330)	(0.477)	(0.469)	(0.693)	(0.546)	(0.404)
Age-young	-1.548	-1.604	-0.124*	-0.854	0.368	-0.432*	-0.693
(S.E)	(0.869)	(0.831)	(0.161)	(0.755)	(0.631)	(0.618)	(0.594)
Age-prime	-0.109	-1.146	-1.850	0.502	-0.043	0.623	0.084
(S.E)	(0.419)	(0.399)	(0.857)	(0.441)	(0.478)	(0.397)	(0.402)
Edu-hi	4.354*	22.980*	0.524*	1.321	3.174*	2.408*	-0.131
(S.E)	(0.862)	(0.750)	(0.383)	(0.919)	(1.016)	(0.893)	(0.957)
Edu-lo	1.190*	18.903	4.246*	0.574	1.830*	2.411*	-0.060
(S.E)	(0.529)	(0.000)	(0.818)	(0.443)	(0.674)	(0.443)	(0.355)
Industry	-.186	-0.925*	1.508	-1.173*	-2.552*	2.645*	0.931*
(S.E)	(0.383)	(0.382)	(0.443)	(0.459)	(0.776)	(0.384)	(0.346)
Children	-0.144	-0.013	-0.201	-0.324	0.012	-0.407	-0.131
(S.E)	(0.185)	(0.170)	(0.345)	(0.200)	(0.197)	(0.174)	(0.172)
Chi-Square Δ-2 log L	736.310*						
Pseudo R-Square	0.590						

Source: ECHP 2001

(*) – statistically significant at the level of p<0.05

Note: 1. Legislators, senior officials and managers 2. Professionals 3. Technicians and associate professionals 4. Clerks 5. Services workers and shop assistants 6. Craft and related trades workers 7. Plant and machine operators 8. Elementary occupations

Table A2a Logit Coefficients and Standard Errors – Women, Germany

Variable	Ln(P1/P8)	Ln(P2/P8)	Ln(P3/P8)	Ln(P4/P8)	Ln(P5/P8)	Ln(P6/P8)	Ln(P7/P8)
Intercept	-2.577*	-3.125*	-0.222	-0.714	0.204	-2.083*	-1.229*
(S.E)	(0.783)	(1.043)	(0.345)	(0.372)	(0.342)	(0.449)	(0.414)
Age-young	0.658	-0.466	1.306*	1.129*	1.324*	1.016	0.405
(S.E)	(0.795)	(0.935)	(0.580)	(0.589)	(0.594)	(0.694)	(0.711)
Age-prime	0.422	0.407	0.330	0.334	0.327	0.633	-0.419
(S.E)	(0.440)	(0.374)	(0.326)	(0.333)	(0.344)	(0.402)	(0.413)
Edu-hi	5.071*	7.602*	4.526*	3.393*	2.412*	0.846	0.571
(S.E)	(1.046)	(1.244)	(0.766)	(0.793)	(0.784)	(0.964)	(0.959)
Edu-lo	2.689*	3.208*	2.347*	2.582*	1.462*	0.896*	0.357
(S.E)	(0.777)	(1.053)	(0.337)	(0.360)	(0.331)	(0.367)	(0.363)
Industry	-0.882	-1.352*	-0.975*	-0.446	-2.630*	2.198*	1.857*
(S.E)	(0.466)	(0.410)	(0.311)	(0.312)	(0.448)	(0.395)	(0.386)
Children	-0.741*	-0.538*	-0.274	-0.220	0.001	-0.026	0.555*
(S.E)	(0.363)	(0.267)	(0.229)	(0.235)	(0.232)	(0.280)	(0.273)
Chi-Square Δ-2 log L	887.051*						
Pseudo R-Square	0.497						

Source: ECHP 2001

(*) – statistically significant at the level of p<0.05

Note: 1. Legislators, senior officials and managers 2. Professionals 3. Technicians and associate professionals 4. Clerks 5. Services workers and shop assistants 6. Craft and related trades workers 7. Plant and machine operators 8. Elementary occupations

Table A2b Logit Coefficients and Standard Errors – Men, Germany

Variable	Ln(P1/P8)	Ln(P2/P8)	Ln(P3/P8)	Ln(P4/P8)	Ln(P5/P8)	Ln(P6/P8)	Ln(P7/P8)
Intercept	-2.327*	-3.806*	-0.894*	-0.916*	-0.897*	-1.161*	-0.049
(S.E)	(0.568)	(1.031)	(0.334)	(0.354)	(0.416)	(0.271)	(0.266)
Age-young	-0.681	0.709	0.789	0.664	0.662	1.817*	0.766
(S.E)	(1.109)	(0.666)	(0.515)	(0.570)	(0.633)	(0.470)	(0.496)
Age-prime	-0.025	0.272	0.287	0.294	0.617*	0.578*	0.159
(S.E)	(0.277)	(0.239)	(0.224)	(0.258)	(0.297)	(0.211)	(0.223)
Edu-hi	4.277*	7.022	3.337*	1.711*	1.479*	1.527*	-0.294
(S.E)	(0.605)	(1.052)	(0.405)	(0.447)	(0.512)	(0.355)	(0.409)
Edu-lo	1.700*	3.417	1.751*	1.205*	0.934*	1.333*	0.333
(S.E)	(0.557)	(1.026)	(0.308)	(0.321)	(0.381)	(0.222)	(0.223)
Industry	0.207	-0.192	-0.280	-0.277	-3.212*	2.066*	1.019*
(S.E)	(0.259)	(0.225)	(0.208)	(0.240)	(0.610)	(0.199)	(0.204)
Children	-0.309*	-0.178	-0.169	-0.206	-0.183	-0.130	-0.004
(S.E)	(0.142)	(0.112)	(0.104)	(0.123)	(0.138)	(0.095)	(0.099)
Chi-Square Δ-2 log L	1,561.549*						
Pseudo R-Square	0.489						

Source: ECHP 2001

(*) – statistically significant at the level of p<0.05

Note: 1. Legislators, senior officials and managers 2. Professionals 3. Technicians and associate professionals 4. Clerks 5. Services workers and shop assistants 6. Craft and related trades workers 7. Plant and machine operators 8. Elementary occupations

Table A3a Logit Coefficients and Standard Errors – Women, United Kingdom

Variable	Ln(P1/P8)	Ln(P2/P8)	Ln(P3/P8)	Ln(P4/P8)	Ln(P5/P8)	Ln(P6/P8)	Ln(P7/P8)
Intercept	1.341*	-0.732	0.548	2.004*	1.52*	-1.782*	-1.383*
(S.E)	(0.343)	(0.481)	(0.371)	(0.326)	(0.344)	(0.625)	(0.556)
Age-young	-0.373	-0.415	0.078	0.321	0.150	-0.421	-0.916
(S.E)	(0.473)	(0.497)	(0.477)	(0.450)	(0.471)	(0.873)	(0.719)
Age-prime	0.396	0.341	0.601	0.464	0.091	1.117	0.293
(S.E)	(0.404)	(0.420)	(0.413)	(0.394)	(0.414)	(0.646)	(0.543)
Edu-hi	1.157*	3.464*	2.031*	0.201	0.562	0.290	-0.550
(S.E)	(0.394)	(0.512)	(0.411)	(0.381)	(0.402)	(0.589)	(0.608)
Edu-lo	0.642	1.631*	0.953*	0.283	0.711	0.418	0.377
(S.E)	(0.437)	(0.579)	(0.460)	(0.414)	(0.436)	(0.624)	(0.558)
Industry	-0.912*	-1.292*	-1.658*	-0.835*	-3.190*	1.273*	2.32*7
(S.E)	(0.369)	(0.418)	(0.408)	(0.346)	(0.597)	(0.502)	(0.524)
Children	-0.439*	-0.152	-0.219	-0.268	-0.191	-0.088	-0.131
(S.E)	(0.206)	(0.209)	(0.202)	(0.193)	(0.203)	(0.296)	(0.293)
Chi-Square Δ-2 log L	488.793*						
Pseudo R-Square	0.305						

Source: ECHP 2001

(*) – statistically significant at the level of p<0.05

Note: 1. Legislators, senior officials and managers 2. Professionals 3. Technicians and associate professionals 4. Clerks 5. Services workers and shop assistants 6. Craft and related trades workers 7. Plant and machine operators 8. Elementary occupations

Table A3b Logit Coefficients and Standard Errors – Men, United Kingdom

Variable	Ln(P1/P8)	Ln(P2/P8)	Ln(P3/P8)	Ln(P4/P8)	Ln(P5/P8)	Ln(P6/P8)	Ln(P7/P8)
Intercept	0.579*	-0.533	0.086	0.454	0.337	-0.096	0.480
(S.E)	(0.267)	(0.331)	(0.297)	(0.286)	(0.301)	(0.274)	(0.269)
Age-young	-0.950*	-0.454	-0.294	0.412	0.547	0.157	-0.971*
(S.E)	(0.351)	(0.372)	(0.363)	(0.359)	(0.370)	(0.328)	(0.384)
Age-prime	0.062	0.513	0.197	0.581	0.355	0.356	0.284
(S.E)	(0.271)	(0.288)	(0.295)	(0.308)	(0.322)	(0.278)	(0.285)
Edu-hi	1.742*	2.610*	1.498*	0.299	0.778*	0.674*	0.255
(S.E)	(0.272)	(0.330)	(0.300)	(0.289)	(0.302)	(0.267)	(0.274)
Edu-lo	0.894*	1.385*	1.095*	0.473	0.320	0.757*	0.211
(S.E)	(0.313)	(0.377)	(0.337)	(0.315)	(0.348)	(0.292)	(0.309)
Industry	-0.440	-0.728*	-0.681*	-1.091*	-2.664*	1.329*	0.473*
(S.E)	(0.230)	(0.248)	(0.254)	(0.264)	(0.414)	(0.232)	(0.237)
Children	-0.040	-0.303*	-0.171	-0.084	-0.090	-0.094	-0.023
(S.E)	(0.113)	(0.124)	(0.126)	(0.123)	(0.131)	(0.114)	(0.118)
Chi-Square Δ-2 log L	698.980						
Pseudo R-Square	0.303						

Source: ECHP 2001

(*) – statistically significant at the level of p<0.05

Note: 1. Legislators, senior officials and managers 2. Professionals 3. Technicians and associate professionals 4. Clerks 5. Services workers and shop assistants 6. Craft and related trades workers 7. Plant and machine operators 8. Elementary occupations