Gender Wage Differentials and Discrimination in the UK and Europe

Ph.D. Thesis Submitted by Michael Brookes

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Abstract

Gender wage differentials and discrimination are issues of primary significance both in terms of equity and efficiency. Current policy debate emphasises the importance of labour market efficiency with various HM Treasury reports highlighting productivity as the key determinant of economic growth. Consequently a deeper understanding of where the labour market allocates its scare human resource inefficiently, as a result of discrimination, is always desirable.

The vast majority of the existing literature is based upon single country studies using cross-sectional data. This has led to weaknesses in our understanding of the inter-temporal processes generating changes to the wage gap, as well as the impact of national differences to relative cross-country gender differentials. Using the UK as the major focus, and other European countries for comparison, this thesis improves upon both of these. Paying particular attention to the roles played by inequality and sample selection.

Blau and Kahn (1992) initially highlighted the importance of wage inequality to cross-country wage gaps. This is built upon by applying the techniques they pioneered and making use of the higher levels of comparability and compatibility inherent within the Panel Comparability Project (PACO) and European Community Household Panel (ECHP) data sets. With the analysis revealing that the gender wage gap would be narrower in the UK if the level of inequality was reduced to those in the rest of Europe. Thus supporting the view that a compression of the overall wage distribution leads to smaller gender wage gaps.

The issue of sample selection is always present when empirical work is based upon earnings functions. Since Heckman (1979) it has become the norm to correct for possible bias using his two-stage procedure. However this is generally treated as a technical exercise and rarely warrants any meaningful discussion. Unfortunately selectivity is not merely a source of potential bias it also reflects relationships that have a significant effect upon the gender wage gap, most importantly its inter-temporal path. Consequently there is a clear need for a deeper understanding of this issue. It is revealed to be important, especially in the UK, where changes to the skill levels of those employed, relative to the overall population, are shown to be crucial to the narrowing of the wage gap. With this improvement resulting from more favourable skill endowments for those women entering or re-entering paid employment. This indicates that policies addressing human capital accumulation prior to labour market entry have already been successful in narrowing the differential. However there is still evidence that women are receiving inequitable returns from their human capital, hence more effective legislation addressing this is a matter of priority.

Chapter 1

Introduction

1.1. Introduction

The issues of gender wage differentials and discrimination have been of concern for many years for economists and policy makers alike. Initially the focus of the debate related predominantly to equity with the policy response in the UK being the Equal Pay Act (1970) and the Sex Discrimination Act (1975), as well as their many subsequent amendments. However it has long since been established that wage discrimination is a potential source of market failure, as the economy will be failing to fully utilise its scarce human capital resource. So clearly, whenever the presence of discrimination can be detected, there is a role for policy makers to remove or at least reduce the extent of discrimination purely on efficiency grounds. Therefore it is not surprising that in more recent times the debate has changed its emphasis to address more specifically the issue of labour market efficiency.

Labour productivity is the major determinant of economic growth (HM Treasury 1999), therefore future productivity gains are likely to have a major impact upon future wealth. Demographic changes, with decreased fertility rates and increased life expectancy, has forced employers to look to under utilised groups (Kingsmill 2003). Since women are an obviously under used resource within the labour market this is one potential source for future productivity gains. A number of researchers concur in the view that closing the gender wage gap will raise the value of work carried out predominantly by women. Generating higher levels of investment in training and education in these sectors, leading to the productivity gains required to drive economic growth (Grimshaw and Rubery 2001, Walby and Olsen 2002, Kingsmill 2003). As a consequence narrowing the gender wage gap is of primary importance from an economic policy perspective.

The current policy debate has presented a range of measures likely to have a positive impact upon the gender wage differential, with all of these falling into one of two broad categories. Firstly, there are those that seek to promote female participation in the labour market, enabling women to close the skills and experience gap. Government initiatives in this area are, the National Childcare Strategy to help mothers of young children remain in the labour market, the New Deal to give access to training for those returning to the labour market and finally promoting the Work-Life Balance campaign to encourage greater flexibility in the workplace. Secondly there are those policies seeking to reduce the extent of discrimination in the labour market, with the promotion of employment and pay reviews (Kingsmill 2003) to develop transparency in these processes at the forefront.

In terms of discrimination it is unfortunate, as the subsequent chapters will reveal, that highlighting the existence of wage discrimination and estimating its true extent is fraught with many empirical difficulties. However, even if it is troublesome identifying the presence and impact of wage discrimination, there is still sufficient justification for policy makers to focus upon narrowing the gender wage gap as an objective, particularly as outlined above on the grounds of efficiency. According to Kingsmill (2003) the size of the UK gender wage gap and its persistence is largely due to failures in human capital management, with the labour market failing to make the best use of the full range of available human capital. Suggesting that women either have insufficient levels of human capital or else they are unable to put their human capital to its most efficient use. If this is indeed the case any policies enabling women to acquire more human capital and/or make better use of their current endowment will have a positive effect upon economic growth. This link between labour market efficiency and economic growth being emphasised in recent years with the British government pinpointing productivity as the largest single component of economic growth (HM Treasury 1999). As a result the benefits of making more effective use of the scarce labour resource are clear.

The empirical analysis of these issues can be traced back to the seminal work by Becker (1957), where individuals or employers have a taste for discrimination. However the real expansion of work in this area followed the introduction of the decomposition technique pioneered independently by Blinder (1973) and Oaxaca (1973). This technique recognises that any wage differential is made up of a combination of differences in labour market characteristics, or skills, and the treatment received by different groups. With the decomposition separating the wage gap into that portion explained by relative characteristics and that remaining unexplained.

The vast majority of gender differential studies in the UK have used this type of decomposition technique or some of its many subsequent derivations. With some of the earliest analysts, for example Chiplin and Sloane (1976) and Greenhalgh (1980), using the same decompositions as originally prescribed by Blinder and Oaxaca. However as the study of wage differentials developed decomposition techniques evolved to take account of a number of additional factors. For example Cotton (1988), Neumark (1988) among others, highlighted that the original decomposition technique made unrealistic assumptions about the wage structure in the absence of discrimination. Consequently they recommended their own alternative decomposition techniques, these gave rise to a number of additional studies within the UK, Harkness (1996) and Joshi and Paci (1998) being the most notable ones. Similarly Juhn et al (1991) pointed out that comparisons of means was too simplistic, they argued that consideration needed to be given to the overall wage distribution. Consequently they developed a further technique where the position of women within the male wage distribution was a key component of the decomposition, with Blau and Kahn (1992) making use of this advance and producing estimates for the UK and other countries.

The body of literature for the UK is predominantly based upon decomposition techniques of varying forms and can be very loosely summarised as follows. Sloane (1990) estimated UK gender wage differentials for most of the 20th century, finding that the wage gap was remarkable static until the mid-1970's when there was a significant narrowing, largely due to the implementation of equal opportunities legislation. The latter finding supporting the conclusions reached in an earlier work by Greenhalgh (1980). After this the gender wage gap was again fairly static throughout the remainder of the 1970's and the early 1980's, followed by a steady narrowing throughout the late 1980's and early 1990's (Harkness 1996 and Blackaby et al 1997).

One of the most recent studies, (Kingsmill 2003), estimated the average earnings of full-time women at 82% of the average male full-time wage. So although the gender wage gap has narrowed, it is clearly still a concern in Britain. Especially as most of the remaining differential is unexplained by differences in characteristics, implying the continued presence of discrimination.

There is now a vast literature world-wide relating to gender wage differentials and discrimination, these predominantly use decomposition techniques and are mainly derived from cross-sectional data, with the UK being no different. The major shortcomings within the literature are that we possess only a limited understanding of, firstly, the causes of gender differential changes over time, and secondly, cross-country wage gap differences. Both of these are of importance from a policy perspective, since the purpose of any policy initiative is to reduce the extent of discrimination in the future. Hence a deeper understanding of both of these issues will enable this to be done more effectively. Clearly knowing why the wage gap has changed over a certain period and the types of policy that are proven to be more, or less, successful in other countries will enable policy prescription to be carried out more effectively.

Existing inter-temporal analysis relies upon comparing cross-sectional estimates at different points in time. These techniques are limited in their ability to explain the causes of gender wage gap changes, since the cause of any observed change over time is subject to speculation and sensitive to the assumptions made. Similarly existing cross-country analysis is weakened by issues of comparability within the data. To date researchers have had to reach conclusions based upon different data sets for each of the countries considered. On occasions when the same data set has been available for a number of countries the analysis has suffered as a result of differing variable definitions across the countries. Consequently studies of this type potentially reveal more about differences in data collection, sampling methods and data recording than they do about actual events.

This thesis seeks to contribute to the debate relating to gender earnings in the UK, as well as other countries, by addressing two important research questions. Firstly, what are the major reasons behind changes to the UK gender wage gap over the period considered? And, secondly, what are the features within the UK labour market that cause its gender differential to be wider, or narrower, than other countries. With the thesis being able to make a major contribution by overcoming the shortcomings outlined in the previous paragraph. Firstly, undertaking more meaningful inter-temporal analysis, by taking advantage of the panel structure of the Panel Comparability Project (PACO) data set. Then by being able to reach more meaningful cross-country conclusions as a result of using the standardised variables inherent within the PACO and European Community Household Panel (ECHP) data sets.

The empirical analysis is undertaken using predominantly decomposition techniques. This type of approach lies firmly within the domain of neo-classical economics, since it assumes that wages respond to changes in labour supply and labour demand. Clearly it is relatively straightforward to question the validity of the neo-classical assumptions. Institutionalists point out that wages may not be as responsive, to supply and demand factors, as the neo-classical model would predict. The institutional arrangements within firms, as well as monopoly power in the product market and trade union power in the labour market, all act to reduce the level of flexibility below that predicted by the neo-classical competitive model. As a result this thesis makes use of decomposition analysis since it is the most appropriate currently available method of analysing gender wage differentials. Whilst at the same time using the institutionalist critique to qualify and analyse the outcomes of the empirical analysis, ensuring that they lead to more robust findings. These findings can then be used to more appropriately inform the continuing policy debate relating to gender wage differentials

In order to add clarity to this continuing policy debate existing policy recommendations are placed into one of four broad categories. Firstly, those influencing factors prior to entering the labour market, policies such as more equitable educational provision. Secondly those promoting female participation, for example subsidised childcare provision. Thirdly, attempts to ensure fairer treatment within the labour market, i.e. equal opportunities in employment or equal pay legislation. And finally, policies designed to narrow the wage distribution. Blau and Kahn (1992) identified an inverse relationship between the level of wage inequality and the gender wage gap, hence if the wage distribution is compacted the differential should fall. The empirical findings are then aligned to the different policy categories so that the most fruitful areas for future wage gap narrowing within the UK can be identified.

The remainder of the thesis is set out as follows. Firstly, the existing literature is reviewed in Chapters 2, 3 and 4. With the first focusing upon theories seeking to explain the presence of gender wage discrimination, the second reviewing the relevant decomposition techniques and the last the empirical evidence relating to gender differentials and discrimination. These chapters confirming the aforementioned weaknesses of existing inter-temporal and cross-country analysis.

The empirical analysis commences in Chapter 5 with the PACO data being used to estimate earnings functions and apply a number of different decomposition techniques. The UK and Germany are analysed in isolation and in comparison with one another. Germany being chosen as the comparator country since it is identified within the literature as being distinctly different from the UK in terms of its labour market institutions and practices (Traxler 1996). The two countries are compared to highlight the importance of firstly, differences in the relative endowments of labour market characteristics and, secondly, the level of wage inequality to their respective gender wage gaps. Inter-temporal decompositions are then applied to both countries, indicating the major determinants of wage gap changes over the period considered. From a policy perspective this reveals the importance of gender skills gaps, as well as the impact of any inequitable returns to those skills, to the wage differential. Thus indicating the major target for potential future legislation. In addition the cross-country element highlights the effects of different bargaining regimes to the gender differential, pointing to the regime most conducive to gender equity.

One of the key findings of Chapter 5 is that when wage gaps are analysed inter-temporally sample selection changes become important. This can occur either as a result of those in employment becoming more highly skilled in comparison to the overall population, or else women have become more effective in translating their skills into higher earnings. In Chapter 6 this is explored in greater depth, with a combination of decomposition and earnings mobility analysis, separating the impact of those in employment throughout and those entering, or leaving, employment. This being crucial to policy makers since the policies targeted at existing participants, i.e. equality in promotion procedures, allocation of in-work training places, etc., are very different from those targeted at labour market entrants, i.e. equity in educational provision, re-training schemes, etc. As a result the analysis of this chapter, revealing the types of policy most likely to assist future wage gap narrowing, is of particular significance.

Finally, the importance of wage inequality to the UK gender wage gap is a recurring conclusion from both Chapters 5 and 6. The last empirical chapter seeks to place this in a much broader context by including ten other EU countries, this being done by making use of the ECHP data set. This much broader analysis being important since it allows for more detailed analysis of the UK against a larger number of distinct labour markets. It also highlights the extent of the UK wage penalty, in comparison to other countries, for those with below average labour market skills. This is then used to indicate the possible impact of any wage inequality reduction policies upon the gender wage gap. The final chapter then concludes the thesis.

Chapter 2

Estimating Discrimination

2.1 Introduction

The stated purpose of this thesis is to achieve a deeper understanding of why gender wage differentials differ across countries as well as changing over time, with this chapter explaining and reviewing the existing techniques that are able to assist in this process. At its most fundamental level the empirical challenge is to separate the wage gap into that portion resulting from discrimination and the portion resulting from justifiable factors. The critical importance of being able to identify the presence of wage discrimination, as well as being able to establish its extent, has been highlighted in the first chapter. Its presence being the result of market failure and the extent implying the potential costs of that failure. The most effective tool currently available for researchers seeking to establish both the presence and extent of wage discrimination is the widely used decomposition technique. The following sections outline the basic decomposition technique, as well as its major subsequent developments, highlighting the benefits and limitations of this type of analysis.

As pointed out in the introduction the decomposition approach lies firmly within the neo-classical school of economics. The technique being underpinned by the neo-classical view of market primacy, hence the only important institution is the market since this operates to effectively allocate resources. Consequently within the labour market this implies that individual wages are determined by demand relative to supply for any given type of labour.

On the contrary the institutionalist view is that the market is just one of a large number of institutions all carrying out a role in the allocation of resources. With particular reference to the labour market this suggests that other institutions, such as firms, trade unions, the state and even informal institutions, such as the presence of social conventions, can have an influence upon an individual's wages. Furthermore the institutionalist critique makes more specific rejections of the neo-classical view in that it refuses to accept self-seeking as the only motivator for human behaviour. Thus suggesting that the labour market is not simply made up of firms seeking to maximise profit and individuals seeking to maximise their income and leisure opportunities. Similarly, it also rejects the individual as the primary decision making unit, recognising that large numbers of decisions are arrived at on a household, or even larger basis. Clearly neither of the two conflicting viewpoints is entirely accurate, although there is merit in each. As a result the empirical analysis will adopt the convention and take the neo-classical decomposition analysis as the starting point and then use the institutionalist critique to inform and qualify the resultant findings.

When comparing the average wages of two separate groups within any labour market, it is highly unlikely that their wages will be the same, hence a wage differential will always exist. The issue being that some of the differential will be justified by differences in characteristics or skills and some of which will not. Consequently it is impossible to separate the study of wage discrimination from the study of wage differentials. Any attempt to establish, firstly, the presence of any wage discrimination, and secondly, its extent, requires the identification of that portion of the differential that is justified by the groups' relative characteristics and that which is not. Since it seeks to do exactly this, the standard tool for researchers undertaking this type of analysis has for the last 30 years been the decomposition technique pioneered by Blinder and Oaxaca (Blinder 1973 and Oaxaca 1973). In its simplest form the Blinder/Oaxaca technique estimates wage discrimination as outlined below.

Firstly Mincerian earnings functions (Mincer 1974) of the following form are estimated separately for each of the two groups, in this case men and women; $\ln W_i = Z_i'\beta + u_i$ with the dependent variable being the natural log of the individual wage, Z′ being the vector of labour market characteristics, β their estimated coefficients and u a normally distributed error term. The log wage differential can then be decomposed into the portion explained by the model and its unexplained part, which can be interpreted as the upper limit of discrimination (Oaxaca 1973), using the following methods:

$$\ln \overline{W}_m - \ln \overline{W}_f = (\overline{Z}_m - \overline{Z}_f)\beta_m + \overline{Z}_f(\beta_m - \beta_f)$$

or $\ln \overline{W}_m - \ln \overline{W}_f = (\overline{Z}_m - \overline{Z}_f)\beta_f + \overline{Z}_m(\beta_m - \beta_f)$.

The subscripts m and f are to represent males and females. There are two alternative methods, since it cannot be known if the existing male or female wage structure would prevail in the absence of discrimination. The first method assumes the male structure prevails and the second the female, in both cases the first term represents the explained portion, i.e. that which results from differences in the explanatory variables, with the second term being unexplained.

The simple nature of the estimation process has undoubtedly been a factor in the popularity of the Blinder/Oaxaca method, however there are a number of problems or limitations inherent within the technique. Obviously the institutionalist critique, already mentioned, of ignoring the impact of institutions other than the market upon the individual wage is valid. Also at the most fundamental level the entire decomposition technique is based upon the rather stringent assumption of symmetry across the genders. This being that men and women with the same labour market characteristics should behave in the same fashion in terms of their labour market decisions. Even if the neo-classical assumptions are accepted in their entirety there still remains a number of limitations inherent within the technique. These can be separated into issues relating to the earnings functions and those relating to the decomposition. Any decomposition, however valid, would be rendered worthless if the earnings functions from which it is extracted gave biased estimates or are poorly defined, consequently earnings function issues will be discussed first.

2.2 Earnings Function Issues

Clearly, as the earnings functions are the basis upon which the decomposition results are extracted, any analysis of this type can only ever be as good as its estimated wage equations. There are a whole host of specific issues relating to chosen variables, model specification and data in previous studies, but these are beyond the scope of this chapter, and will be dealt with in Chapter 4. However there is one common problem which is particularly relevant to the estimation of earnings functions by gender, hence it warrants further discussion here.

The measurement of actual labour market experience is often problematic, since data sets infrequently include information on actual experience. As a result researchers are forced to use some kind of proxy, with the most common being a potential experience variable based on the age of the individual and their age when they left education. For women especially potential experience overstates actual experience, since women are far more likely to take career breaks, consequently if this particular variable is biased upwards its estimated coefficient will be biased downwards. The authoritative work by Zabalza and Arrufat, (1985), sought to address this, by predicting actual experience based upon estimates of the probability of labour market participation in different years, this imputed estimate of experience was shown to produce less biased estimates of women's experience coefficients. This can be estimated using the following method:

$$P_{it} = 1 - F(Z_{it})$$

Where P_{it} is the probability of the *i*th woman participating during year t. Z_{it} is the cumulative of a unit normal deviate defined on a linear function of a vector of economic variables and characteristics predicting participation, the independent variables taking on their values as at year t. The above function is then used to project backwards and predict the probability of participating in all years back as far as the end of their formal education. The prediction of accumulated labour market experience X_i then becomes

$$X_i = \sum_{j=0}^{E_i - 1} P_{i,t-j}$$

where E_i is the number of years since the *i*th women left school, i.e. potential experience. Additionally a variable for time outside the labour market H_i can be created from $H_i = E_i - X_i$ this allows for the possible depreciation of labour market skill whilst not working.

A further problem exists with the possibility of selectivity bias being present, in its broadest sense this means that those included in the estimation of the earnings function are not a random sample of the overall population. More specifically it implies that there is some form of correlation between the process determining employment and the process determining wages, with failure to control for this link being likely to lead to biased coefficient estimates in the earnings function. The standard technique for dealing with this is to use what has become known as the Heckman 2-step procedure (Heckman 1979). This models the two processes by firstly estimating a univariate probit which can be applied as follows;

The probit model of participation is; $Y_i{*} = Z_i{'}\gamma + \varepsilon_i$ where $Y_i{*}$ is a latent variable associated with being employed, $Z_i{'}$ is a vector of determinants of employment and γ their associated parameters.

The earnings function is of the usual form; $Y_i = X_i{'}\beta + u_i$ with Y_i being the natural log of the observed wage, $X_i{'}$ a vector of determinants and β their estimated coefficients. The error terms, ε_i and u_i, follow a bivariate normal distribution $(0,0,\sigma_\varepsilon,\sigma_u,\rho)$. The probability of being employed is given by;

$$\Pr ob(Y_i{*} > 0) = \Pr ob(\varepsilon > -Z_i{'}\gamma)$$

$$= \Phi(Z_i{'}\gamma),$$

where $\Phi(.)$ is the standard normal cumulative density function with the variance of ε normalised to 1. Wages are observed for those whom $Y_i'>0$, so that the expected wage of any individual in employment is given by;

$$E(Y_i | Y_i^* > 0) = X_i'\beta + E(u_i | \varepsilon_i > -Z_i'\gamma)$$

$$= X_i'\beta + \rho\sigma_u\lambda_i$$

$$= X_i'\beta + \theta\lambda_i$$ where $\theta = \rho\sigma_u$, $\lambda_i = \phi(Z_i'\gamma)/\Phi(Z_i'\gamma)$, and $\phi(.)$ is the standard normal density function. The estimating equation for those employed may now be presented in its more usual form as;

$$Y_i | Y_i^* > 0 = X_i'\beta + \theta\lambda_i + error$$

where earnings for those employed are estimated as a function of their productive characteristics (X_i) and (λ_i) a measure of their likelihood of being employed, often referred to as the inverse Mills ratio (IMR).

The model of participation originally suggested by Heckman is limited in that it assumes that the labour supply decision is entirely an individual one. Clearly this fits in with the neo-classical view of the labour market, however there is a very strong argument that labour supply is determined on a household, rather than individual basis. Wunderink-van Veen (1997) summarises the literature pertaining to this issue, highlighting that the individual supply decision is, within a household, a function of the different market wage rates available to the two household members and their two different productivities for work in the household. As an attempt to take at least the first of these on board it has become the norm to include household income as an explanatory variable in the participation probit. Thus controlling for the impact of a partner's earnings upon the likelihood of being employed. This does represent an improvement since it does take account of an important household factor within the labour supply decision, however there are other important factors, such as the nature of a partner's employment in terms of location, flexibility etc that are likely to impact upon labour supply. Unfortunately, in the vast majority of cases, this type of data is not available within large representative surveys.

Furthermore it also has to be accepted that there is still the possibility that omitted variable misspecification is present, even after the Heckman 2-step procedure is applied. Being employed results from two sequential decisions, firstly a participation decision by the individual and secondly a hiring decision by the employer. A number of authors, (Sorensen 1989, Krishnan 1990 and Mohanty 2001), have extended the 2-step procedure to deal with hiring and participation decisions separately and derived wage equation estimates from this double selection framework. Unfortunately the requirement for additional data relating to the demand for labour of specific types means that in many cases, this one included, it is impossible to construct meaningful estimates of the hiring function

2.3 Decomposition Issues

Turning now to the decompositions of these earnings functions, there are a number of limitations that need discussing here. The first one, mentioned in an earlier paragraph, is the inability to know what the wage structure would be in the absence of discrimination. Oaxaca's original suggestion, presented above, was to simply assume that either the existing male or female structure would prevail, clearly this is a very simplistic assumption, as well as being largely unrealistic. The next chapter will highlight that the presence of discrimination is revealed through both male overpayment and female underpayment. Therefore suggesting that one wage structure would prevail implies overpayments to both men and women if the male structure applies and underpayments to both if it is the female structure. Neither of these being particularly likely as well as both being inefficient.

As a result it is fairly clear that the absence of discrimination will not lead to the current male wage structure or current female structure prevailing, with the crudest prediction being that the non-discriminatory wage structure will lie somewhere between the existing ones. In response to the limitations of the Blinder/Oaxaca method several improved methods have been developed, one of these being the technique proposed by Cotton (1988), where the log wage gap is decomposed as follows;

$$\ln \overline{W}_m - \ln \overline{W}_f = \overline{Z}'_m (\beta_m - \beta^*) + \overline{Z}'_f (\beta^* - \beta_f) + (\overline{Z}_m - \overline{Z}_f)' \beta^* .$$

With β^* being the representation of the estimated non-discriminatory wage structure, given by; $\beta^* = \Omega \beta_m + (1 - \Omega) \beta_f$, with Ω being the proportion of the sample made up by men. The first term of the decomposition is the male overpayment, the second term is female underpayment and the final one is that which is explained by labour market characteristics. This differs from the original method in that it assumes that the non-discriminatory wage structure will be a weighted average of the existing male and female structures, rather than simply imposing one of them. It also enables the extent of male overpayment and female underpayment to be estimated.

This is still open to criticism, the choice of the weighting factor (Ω) is a fairly arbitrary process, the impossibility of knowing what the wage structure would be in the absence of discrimination is always unavoidable. However using a straightforward weighted average is fairly simplistic, since it ignores the processes that generate the unexplained differential in the first place. Neumark (1988) developed an alternative where β^* is the vector of coefficients obtained by estimating an earnings function from the combined, male and female, sample. Oaxaca and Ransom (1994) negate the need to estimate the combined earnings function. They suggest an alternative method where the weighting factor (Ω) is based upon the observation matrices, and in this case is equal to the following;

$\Omega = (X'X)^{-1}(X'_m X_m)$ where X is the observation matrix for the pooled sample of males and females and X_m is the observation matrix for the male sample. They were also able to prove that setting $\Omega = (X'X)^{-1}(X'_m X_m)$ gave identical solutions to the Neumark (1988) method.

Overall all of the techniques are very similar, the only difference boils down to the choice of weighting factor Ω. Oaxaca (1973) implies that $\Omega = 0$ or 1, depending upon whether men or women are chosen as the base group, although not mentioned previously, Reimers (1983) suggests that $\Omega = 0.5$ can be used to estimate the non-discriminatory wage structure. Cotton (1988) has Ω being equal to the proportion of males in the overall sample, whilst for Neumark (1988) and Oaxaca and Ransom (1994) $\Omega = (X'X)^{-1}(X'_m X_m)$. Some attempt has been made to establish if the estimate of discrimination is sensitive to the chosen decomposition technique. Oaxaca and Ransom (1994) as well as Silber and Weber (1999) both produce reviews of results when all of these techniques are applied to the same earnings functions. The two studies are largely contradictory with the former finding, in all cases, that discrimination was the major component of the earnings differential, whereas Silber and Weber find the explained or human capital component dominant in every case. Leading the latter work to conclude that the results obtained depend more on the type of data than the chosen decomposition technique, therefore nothing robust can be revealed as to the relative merits of each method.

One of the most serious criticisms of this type of decomposition analysis is that it does not reveal the full extent of discrimination, by definition decomposing a wage equation confines the analysis to the current earnings of those in employment. It is perfectly possible that women are discriminated against prior to joining the labour market, consequently it will only reveal the extent of discrimination after entering employment and will ignore any pre-entry factors. The implication is that if women are discriminated against in selection processes rather than in wage bargaining, the crowding hypothesis will hold, with women being over-represented in those occupations where they are treated most favourably (Bergmann 1974). As a result the occupational segregation will reveal more about discrimination than simply decomposing the wage gap.

The most common approach to this problem is to base the decomposition upon two separate estimators, firstly an estimate of the non-discriminatory occupational segregation followed by the usual earnings functions. The method of estimation is outlined below and is based upon the work of Brown et al (1980), the initial proponents of this type of approach. The first stage is to estimate occupational attainment as a function of a collection of labour supply and labour demand variables within the following multinomial logit model;

$$P_{ij} = \text{prob}(y_i = occ_j) = \frac{e^{x'_i \beta_j}}{\sum_{k=1}^{J} e^{x'_i \beta_k}} \qquad i = 1, \ldots, N;\ j = 1, \ldots, J$$

where N = sample size, J = number of occupational groups, x_i = a vector of explanatory variables influencing supply and demand decisions, with the dependent variable being a coded variable to denote each occupational group. The model is estimated separately for men and women, which then enables the hypothetical occupational distribution of women, if they faced the same allocation mechanism as men, to be predicted.

The second stage is to estimate standard gender earnings functions as outlined previously. Then the resultant wage differential can be decomposed as shown below, again following Brown et al (1980).

$$\ln\overline{W}^{m} - \ln\overline{W}^{f} = \sum_j P_j^f \overline{Z}_j^f (\hat{\beta}_j^m - \hat{\beta}_j^f) + \sum_j P_j^f \hat{\beta}_j^m (\overline{Z}_j^m - \overline{Z}_j^f)$$

$$+ \sum_j \ln\overline{W}_j^m (P_j^m - \hat{P}_j^f) + \sum_j \ln\overline{W}_j^m (\hat{P}_j^f - P_j^f)$$

Where the superscripts m and f denote males and females, P_j^f is the observed proportion of women in occupation j, with $\hat{P}_j^f$ being the proportion of women who would be in occupation j if they faced the same occupational allocation as the men.

The first term is interpreted as unexplained differences in intra-occupational wages, the second as explained differences in intra-occupational wages, the third the explained portion of the inter-occupational differential and the final term is the unexplained portion of the inter-occupational differential. A major difficulty with this decomposition technique is that each of the four terms are likely to be sensitive to the level at which occupations are separated. The most common method is to use the standard industrial classification system to separate each of the occupations, but is it correct to use one digit, two digit or three digit codes? Economic theory does not give any indication as to what the correct level should be. However it is clear that the broader the categories the greater the importance of intra-occupational factors and narrowing the categories magnifies the impact of inter-occupational factors (Miller 1987). As a consequence the empirical chapters of this thesis do not make use of this method.

All of the decomposition techniques outlined so far are predominantly used for straightforward cross-sectional analysis. However, remembering the inter-temporal and cross-country focus of this thesis, it is important to apply a technique that enables this to be carried out. This is not to say that these previous techniques are not important, since it still remains crucial to establish a cross-sectional benchmark in each case. Additionally, it has also been pointed out, initially by Juhn et al (1991), that decompositions of differences between male and female mean wages are too simplistic. There needs to be a comparison of both the male and female wage distributions to achieve a deeper understanding of gender wage differences. As a consequence Juhn et al (1991) developed their own decomposition technique based upon the male wage and residual distributions, this being of particular interest here since the technique lends itself well to both cross-country and inter-temporal analysis. Using the cross-country model as the example, the decomposition can be carried out as follows;

The wage equation for male worker i in country j is;

$$\ln W_{ij} = Z_{ij}\beta_j + \sigma_j \psi_{ij} \quad .$$

Where $\ln W_{ij}$ is the log of the hourly wage for worker i in country j.

Z_{ij} is the vector of explanatory variables.

β_j is the vector of estimated male coefficients in country j.

σ_j is the residual standard deviation of male wages in j.

ψ_{ij} is a standardised residual, with mean zero and variance 1.

The male-female wage gap for country j is;

$$D_j \equiv \ln W_{mj} - \ln W_{fj} = \delta Z_j \beta_j + \sigma_j \delta \psi_j$$

The f and m subscripts refer to male and female averages, the δ prefix signifies the average male-female difference for the immediately following variable.

The pay gap difference between two countries j and k can then be decomposed as follows;

$$D_j - D_k = (\delta Z_j - \delta Z_k)\beta_k + \delta Z_j(\beta_j - \beta_k) + (\delta\psi_j - \delta\psi_k)\sigma_k + \delta\psi_j(\sigma_j - \sigma_k)$$

This reveals that the pay gap difference between two countries is the sum of four terms. The first term being the contribution of inter-country differences in productive characteristics. The second the impact of male-female price differentials for productivity characteristics in each country. The third compares the relative positions of women when their wage residuals are ranked in the distribution of male wage residuals, this reflects differences in unmeasured characteristics. Finally the fourth term reveals inter-country differences in residual inequality, in effect it is the price of
the unobserved characteristics from term 3. Since the mean male wage residual equals zero, $\delta\psi$ can be estimated for each country by estimating female wages with the male coefficients imposed on their wage function. Then the resultant residuals are used to estimate the average female position in that country's distribution of male residuals. (Blau 1996).

This method of decomposition implies a grouping of the four separate terms into gender-specific effects and wage structure effects (Kidd and Shannon 2001). Terms 1 and 3 of the decomposition are the gender-specific factors, capturing the impact of cross-country differences in the relative male-female levels of observed and unobserved productivity characteristics. Whilst terms 2 and 4 capture the wage structure effects in that they measure the returns from these observed and unobserved characteristics. However it has to be accepted that this technique is again based upon a rather stringent assumption.

Decompositions in general are based upon the belief that given the same labour market characteristics men and women will behave in the same way. This technique goes a step further and assumes that given the same unobserved characteristics, i.e. those not observed in the model, men and women will still act in the same fashion.

More importantly a number of specific limitations of this technique are identified within the literature. Firstly, Blau and Kahn (1997) point out that the distinction between each of the four terms may not be that clear cut with wage discrimination potentially appearing within each one. Thus a change or a cross-country difference in the level of discrimination may present itself in the analysis as a change/difference in the gender specific factors or a change/difference in the wage structure. Secondly, changes in the distribution of male wage residuals is strictly interpreted as a change in the prices for unobserved characteristics, equally it could reflect measurement error, misspecification, sample composition and the distribution of unmeasured male productivity characteristics (Kunze 2000). Thirdly, the same source indicates that the decomposition assumes that prices derived from the male sample wage regression apply to women as well. Implying that the wage structure is measurable for women by the prices derived from the male sample and that inequality affects men and women equally. Fourthly, the decomposition of prices and quantities of unmeasured ability is subject to bias if percentile rankings are sensitive to changes in the standard deviation of the wage distribution. For any point approaching either tail of the wage distribution its percentile ranking in the residual distribution will change in response to any change in the dispersion of the wage distribution. Hence nothing has changed for this individual in terms of their observed characteristics and what they are actually paid for them, but the proportions assigned to unobserved characteristics and their prices will have changed. Suggesting that the decomposition of price and quantity effects for unobserved characteristics may be fairly arbitrary (Suen 1997). Finally, Fortin and Lemieux (1998) argue that the wage structure effects can be sensitive to whether the male, female or pooled sample distribution is used as the reference category.

Virtually all of these problems and limitations were either accepted or alluded to in their original work, (Juhn et al 1991). They pointed out that improvements in term 3, unobserved skills, could equally result from skill convergence across the two groups or a reduction in discrimination. With it being impossible to identify which of the two is the primary cause. They also highlight the limitations of term 4, the returns to unobserved skills. Arguing that in principle it compares the wage change for, in this case, a given man with a woman possessing the same observable characteristics. However in the presence of labour market discrimination a typical woman is compared to a less skilled man, hence the unobserved price effect is overstated. Since the wage gap decomposition is an identity any bias or overstatement in one term has to be offset by an equal and opposite change elsewhere in the decomposition. Therefore, as with most decomposition analysis, the point at which one component of the decomposition ends and the next one begins is somewhat blurred and arbitrary.

Furthermore, the importance of adjusting for the potential sample selection bias has already been outlined in the previous section. However in situations where the Heckman two-step procedure has been applied two issues need to be resolved when decomposing the selectivity adjusted earnings functions. Firstly, how to measure the central tendency of the non-linear IMR function, and secondly, how to interpret the selectivity term. Both Neuman and Oaxaca (1998) and Madden (2000) conclude that measuring the central tendency of λ as $\hat{\lambda} = \sum_{i=1}^{n} \lambda_i / n$ is the most consistent method when the Heckman two-step estimation procedure is being used. However interpretation of the selectivity term is less clear-cut.

Neuman and Oaxaca (1998) decompose the gender difference in the conditional mean error terms for the wage equations as follows;

$$\overline{E}(u_m | \varepsilon_m > -Z'_m \hat{\gamma}_m) - \overline{E}(u_f | \varepsilon_f > -Z'_f \hat{\gamma}_f) = \hat{\theta}_m \hat{\lambda}_m - \hat{\theta}_f \hat{\lambda}_f$$

$$= \hat{\theta}_m (\hat{\lambda}_f^0 - \hat{\lambda}_f) + \hat{\theta}_m (\hat{\lambda}_m - \hat{\lambda}_f^0) + (\hat{\theta}_m - \hat{\theta}_f) \hat{\lambda}_f ,$$

where $\hat{\lambda}_f^0$ is the mean value of the IMR if females face the same selection equation as the men. Within the overall decomposition it is simple to deduce that the first term is the result of discrimination, since it reflects the impact of gender differences in the estimated parameters from the participation probit on the gender wage gap, hence it should be included in the unexplained component. The second term is due to differential endowments of the characteristics that determine selectivity, so it should be deemed as explained.

Unfortunately interpretation of the final term is less straightforward, it captures the wage differential effects of gender differences in the correlation between unobservables in the selection equation and unobservables in the wage equation. Therefore it is difficult to deduce whether the term should be allocated to endowment effects or discrimination, Neuman and Oaxaca (1998) suggest a number of possibilities. Firstly, that all of the term should be deemed as an endowment effect, so that the full wage decomposition becomes;

$$\overline{Y}_m - \overline{Y}_f = \overline{X}'_f(\hat{\beta}_m - \hat{\beta}_f) + \hat{\theta}_m(\hat{\lambda}_f^0 - \hat{\lambda}_f) + (\overline{X}_m - \overline{X}_f)'\hat{\beta}_m + \hat{\theta}_m(\hat{\lambda}_m - \hat{\lambda}_f^0) + (\hat{\theta}_m - \hat{\theta}_f)\hat{\lambda}_f$$

With the wage gap being the sum of the five separate terms, the first two being the unexplained component and the last three being explained. The problem outlined above simply revolves around how to interpret the final term, $(\hat{\theta}_m - \hat{\theta}_f)\hat{\lambda}_f$. The second option, at the other extreme, is to assume that the differences are entirely due to discrimination, in which case the final term simply transfers into the unexplained portion. In both of these cases the assumptions appear to be unrealistically strong, it is implausible to suggest that all of the gender differences in the correlation between the unobserved characteristics from both equations are due to labour market discrimination. It is equally implausible to suggest that they are entirely due to endowment effects. The third option is to regard gender differences in the wage effects of selectivity as a separate selectivity contribution. In this case the final term, $(\hat{\theta}_m - \hat{\theta}_f)\hat{\lambda}_f$, is treated neither as an endowment effect nor as a discrimination effect, but as a separate selectivity effect.

Finally, it has to be accepted that decomposition analysis has a major limitation that has not yet been resolved within the literature. From any decomposition results it is impossible to establish how much of the 'unexplained' component results from discrimination. Any attempt to justify that it is entirely due to discrimination is open to criticism, since it can just as easily reflect unobserved heterogeneity or omitted variable bias. As a consequence, any decomposition results can only ever be viewed as indicative rather than being evidence in itself of wage discrimination.

2.4 Conclusion

The overall purpose of this chapter was to demonstrate the methods by which the research questions raised in the introduction could be addressed. It has been shown that by carrying out a combination of different decomposition techniques a detailed picture of gender differentials can be built up.

From decompositions it is difficult to establish the precise extent of wage discrimination, however indicative results can at least be produced. There are a number of issues such as actual experience, selectivity and non-discriminatory wage structure, leaving these indicative results potentially sensitive to the assumptions made. As a consequence it is important to establish how robust the estimates of discrimination are to each of these potential problems, the best approach being to report a range of cross-sectional decomposition results.

The empirical analysis in the later chapters will thus carry out decompositions at two distinct levels. Firstly a range of cross-sectional estimates will be produced for the UK in the most recently available year. This can then be used as the benchmark for the central issues of this thesis, cross-country and inter-temporal analysis, which is carried out by applying the Juhn et al (1991) decomposition technique outlined above.

Chapter 3

Theories of Discrimination

3.1 Introduction

The detailed review of decomposition analysis in the previous chapter highlighted the difficulties of estimating discrimination through this type of technique. Although the 'unexplained' component implies the presence of discrimination it is impossible to establish its extent, since it can also reflect other factors, particularly unobserved heterogeneity. This is largely unsatisfactory since it actually suggests that discrimination is probably present, but it cannot be confirmed, nor can its extent be estimated with any confidence. Obviously this indicates the need for further research and the development of superior techniques, in the absence of these decomposition is the best available tool.

The potentially damaging effects of wage discrimination have been highlighted earlier in this study. However the previous chapter detailed the difficulties in trying to establish empirically the presence of wage discrimination. Unfortunately this does not mean that the influence of wage discrimination can be dismissed. The absence of a smoking gun does not mean that it has no significant impact within the labour market. Consequently it is crucial to have a clear understanding of how and why gender wage discrimination may exist. This chapter outlines the major theories seeking to explain this, where necessary highlighting their limitations.

The previous chapter highlighted that estimating the extent of discrimination is a difficult task to undertake. Furthermore it is one that is made more complex by conflicting views as to how labour markets operate, these being the neo-classical and institutional schools.

Similarly the debate relating to the causes of discrimination has, throughout the history of the literature, been informed by accounts from both schools as to the most likely causes of gender discrimination. With neo-classical scholars focusing upon individuals holding a taste for prejudice and then pursuing utility maximising behaviour that is likely to involve indulging their prejudice in some form. Whilst clearly institutionalists have focused upon labour market, and other institutions, as the source of gender discrimination. Indicating factors such as institutional pay structures that replicate the occupational segregation, and more recently, a lack of transparency in pay determination as key contributors to the presence of discrimination.

Although earlier writers such as, Florence (1931), Robinson (1933) and Bronfenbrenner (1939), had been discussing issues of discrimination on an observational level, it was not until the work of Becker (1957) that a formal theory of discrimination was developed. He argued that if individuals had a taste for discrimination they would be willing to incur a cost, either through paying a higher price or a reduction in income, in order to associate with their desired group. Although this was an attempt to explain racial discrimination, it can equally be applied to the problem of gender discrimination. According to Becker the source of discrimination is the willingness of economic agents to pay in order to avoid contact with members of a particular group, and this discrimination can be revealed separately by the actions of employers, employees or consumers. Becker hypothesised that each of these led to a distinct method by which prejudice is translated into a wage differential. These formal explanations of discrimination lie very firmly within the neo-classical school with market primacy underpinning them throughout. The limitations of the neo-classical assumptions have already been discussed in Chapter 2 and don't need repeating here. However given that Becker's work can be identified as a catalyst in the analysis of discrimination, these three methods are used as the starting point for the following review of discrimination theories.

3.2 Employer Discrimination

The first of Becker's models results from the prejudices held by the employers with the basis of this employer discrimination being that firms do not simply maximise profits. They actually maximise a utility function that includes, as well as profits, the number of male and female workers employed. Defining the firm's profit function as:

$$\pi = f(M+W) - Mw_m - Ww_w, \qquad (3.1)$$

where $f(M+W)$ is output, w_m is the male wage, w_w is the female wage, and M and W are the respective numbers of male and female workers. Assuming male and female workers are perfect substitutes, capital is fixed, so that output is a function of labour only and all firms have identical utility and production functions. Each firm's utility function can be represented as:

$$U = f(M+W) - MMP_m - WMP_w. \qquad (3.2)$$

Where MP_m and MP_w are the respective marginal products of male and female workers. If there is zero discrimination and all employers are completely indifferent to employing men or women. A fully competitive labour market leads to the conclusion, where the neo-classical assumptions outlined in the previous chapter hold, that each worker will be paid according to his/her marginal product, hence;

$$MP_m = w_m, \text{ and } MP_w = w_w.$$

Obviously in this case Equation (3.1) and (3.2) are identical, maximising profit and utility amount to the same thing. Every worker is paid according to his or her marginal product thus there is no discrimination.

However if we now assume that employers hold discriminatory tastes against women, which Becker suggested could be represented in the form of a discriminatory coefficient (DC), then the net cost of employing female workers is greater than the net cost of employing equivalent men. For the sexist employer DC takes on a positive value and increases the cost of employing women through reducing the employer's level of utility. In effect the cost to the firm of employing each women becomes, $w_w + DC$ and the utility function becomes:

$$U = f(M + W) - MMP_m - W(MP_w + DC_w) \qquad (3.3)$$

The differencc between Equation (3.2) and (3.3) is the negative component, WDC_w. This in effect means that the net cost to employers of hiring female workers $[W(MP_w + DC_w)]$ has increased, through a reduction in the employer's utility, relative to the net cost of male workers $[M(MP_m)]$. As a result women are now only able to find employment with the sexist employer if they reduce their wage rate, so that $(w_w + DC_w) = w_m$. Clearly $w_m > w_w$ since male workers are paid the equivalent of their marginal productivity, whereas women are paid below. Therefore the employer discrimination is revealed through an underpayment of women workers. Although Goldberg (1982) does argue that employers actually have a positive preference for employing men, rather than a negative one against women, with this nepotism being revealed through a male overpayment.

Becker's model also gives an insight into the likely size of any wage gap within any specific industry or market for labour of a particular type. The outcome being dependent upon the prevalence and size of discriminatory tastes among employers, as well as the number of women seeking employment. Non-discriminatory employers are willing to employ women and men at the same wage rate, i.e. DC = 0. If there are a relatively large number of non-discriminatory firms they may be able to absorb the entire supply of women seeking employment in that particular industry, in which case there will be no wage discrimination. However if there is insufficient demand from non-discriminatory firms some women will be forced to find employment with the discriminatory firms. The fact that these firms are only willing to pay women the male wage less the discriminatory coefficient ensures that the market wage for women falls. Otherwise all of those women seeking work would not be able to find a job at the market wage.

The size of the gender wage gap should be positively correlated with the prevalence of both discriminatory firms and the number of women seeking employment, since an increase in either would lead more women to finding employment with the discriminatory employers. There should also be a direct link between the strength of employer's taste for discrimination, this being represented by DC in equation 3.3, and the size of the wage gap, as a higher DC will lead to a larger female underpayment.

The above theory clearly describes how a discriminatory situation can exist, however it has been highlighted, initially by Arrow (1972) and subsequently by others, that there is a cost penalty for the discriminatory firms. It is unrealistic to assume that each employer will have the same discrimination coefficient, some will be more averse and some less averse to employing women, the most averse employers will have the largest proportion of men in their workforce and the highest production costs. In a competitive market all but the least sexist firms will be earning below normal profits and will quickly be forced out of business, until the point is reached where the gender employment mix and wage differential reflects the utility of the least sexist firm. Taking this process to its natural conclusion, eventually a firm will enter the market with a discrimination coefficient of zero, this will clearly be the least sexist firm in the market and any firm seeking to pursue a taste for discrimination will be forced out of the market. The increased supply of male workers seeking employment with the non-discriminatory employers will then ensure that the wages offered to male and female workers become equal.

Consequently this model fails to explain the presence of gender wage discrimination in competitive markets, since the pursuit of any strategy which is not profit maximising cannot persist in the long run. The failure to substitute male workers with cheaper and equally productive females would be a clear example of non-profit maximising behaviour. However Becker himself speculated that employer discrimination should be inversely related to the level of competition within the industry, a proposal that has gained a certain amount of support within the literature. With Luksetich (1979), Ashenfelter and Hannan (1986) as well as Black and Strahan (1999), being able to detect this relationship. Furthermore Hellerstein et al (1997) found that within firms enjoying a high level of product market power, those employing larger proportions of women were more profitable. Indicating that where there is scope for discrimination the less discriminatory firms are able to benefit from their lower costs of production.

3.3 Employee Discrimination

The second method by which Becker argued that prejudice is transmitted into a wage differential is where one group of workers is averse to working with another group. This would lead them to seek a higher wage to compensate them for the lower level of utility experienced when having to associate with the undesired group. If a male holds discriminatory views against women and is unwilling to work with them, he will require a premium payment to induce him to do so. This payment will be equal to the male worker discriminatory coefficient, so that where a discriminatory male works with women his wage will be equal to his marginal product plus this coefficient.

One of the original conclusions of Becker was that if employees held discriminatory tastes, profit maximising employers would respond by hiring a segregated workforce. He was applying the model to the issue of race and arguing that black and white workers in the same occupation would be employed in separate single race firms. They would be paid according to their marginal products and, *ceteris paribus*, the wage would be the same in both sectors.

It is important to establish how well the model transfers to the issue of gender, since if the market is fully segregated there will be no wage discrimination. Arrow (1972) correctly points to the importance of adjustment costs as a barrier to segregation in the workforce, with any movement away from the initial position incurring a cost, be it for recruitment, screening or even firm specific training. Blau et al (2002) relate this to the issue of gender, explaining that rising female participation rates over time means that as women enter, or return to, the labour market they find men already in place in most sectors. Replacing these men would be costly and unprofitable, therefore it is almost impossible to envisage a sector where there are no firms with men and women working together.

Having established that non-segregated employers are likely to be the norm, it is important to understand the factors influencing the extent of the wage discrimination. The key relationship is between the number of employees holding discriminatory tastes, as well as the extent of their discrimination, and the relative number of women seeking employment. If both are low it is feasible that all women find employment within groups of non-discriminatory men and no wage gap occurs. However if either, or both, are large at least a proportion of women will have discriminating colleagues. This will result in those men receiving a higher wage and their female colleagues possibly receiving a lower wage to compensate. It is important to note that non-discriminating males and discriminating males not working with women will not receive this premium, so there will be greater variation in male wages.

In addition to the impact of the Beckerian discrimination coefficient, Bergmann and Darity (1981) point out that employee discrimination may have a negative impact upon the morale and productivity of discriminating male employees. This may well make firms reluctant to employ women and when they do they will pay them a lower wage. The reasoning being that their marginal productivity is lower, as it is the sum of their own addition to output less the reduction from existing male employees. Furthermore Blau et al (2002) argue that employee discrimination could impact upon female productivity through the process of on the job training. If this process normally takes place through informal discussions, from which women are excluded, their productivity and wage is likely to be lower.

Therefore in principle it is plausible for employee discrimination to persist in competitive markets. Bergmann and Darity (1981) indicate that discrimination can influence the marginal productivities. Consequently, if the neo-classical premise is accepted that the profit maximising firm will equate the wage to the marginal productivity, then wage discrimination could persist under competition. However it has to be accepted that this requires a fairly stringent assumption to hold, in that male workers have to be in place at the firm before any women are employed. Then the reduction in the male marginal productivity has to be directly attributed to the employment of women, before this can happen. More importantly reducing the women's wage rejects one of the basic principles of neo-classical economics, that which holds the individual as the central economic unit. Therefore if a man's marginal productivity falls why should the firm respond by lowering somebody else's wage? Equally the reduced female on the job training highlighted by Blau et al (2002) suggests that firms where discrimination is present will be at a cost disadvantage, since they are failing to make the best use of their female labour resource. As a result they will be unable to compete against non-discriminating firms in the long run.

There is evidence within the literature supporting the presence of employee discrimination, for example Buffum and Whaples (1995) were able to detect its presence across ethnic groups in Michigan in the 19th century. However the evidence for gender wage discrimination is fairly scant, in fact Blau (1977) finds men earning more in sex segregated firms and women earning more in sex integrated firms, the opposite of what the model would predict. However that is not to say that gender employee discrimination does not exist, it may be that firms choose to deal with it through measures other than pay. Groshen (1991) argues that firms may choose to hire on a segregated basis, whilst not being able to segregate the whole plant completely she finds that firms tend to hire only men or only women into each job category. Alternatively the prejudice may not be as straightforward as blanket unwillingness to work with women, it could be that men are perfectly willing to work with women, but their discrimination is only revealed when required to work under women (Ferber et al 1979). Consequently it could have more of an impact upon the occupational segregation with few women being promoted to supervisory or managerial positions.

3.4 Customer Discrimination

The final theory of Becker's is that of customer discrimination, the basis being that customers have a preference for commodities produced or sold by workers of a particular group. The preference is revealed through the willingness of consumers to pay a higher price in order to obtain their preferred products. Given the derived nature of labour demand, this can create two compounding effects upon the wage differential. Firstly, the higher price will increase the marginal revenue products of preferred workers, increasing demand for workers in this group, which will be transmitted into higher wages. Secondly, the lower demand for non-preferred workers may force them to crowd into other jobs, this will increase supply in those areas and force wages downwards.

If the underlying assumptions behind this theory hold, it is possible for the discrimination to continue indefinitely since the firms can operate efficiently by rewarding workers according to their marginal productivities. It is entirely plausible that there could be a continued presence of discrimination in competitive markets in the long run, making this model distinct from the previous two. However it has to be accepted that this model is only likely to be relevant where there is a lot of customer contact. It is also likely to lead to segregation within these occupations with high levels of customer contact, where firms catering for discriminatory customers will hire only from the preferred group, pay higher wages and charge higher prices. Whilst those firms attracting non-discriminatory customers will hire from the non-favoured group and be able to pay lower wages and charge lower prices. Clearly in this study men are the favoured group and there is evidence within the literature to support the presence of gender related customer discrimination, Neumark (1996) finding that higher priced restaurants paid higher wages and were less likely to employ women.

In summary, the work of Becker was an important step forward in this field. he established the principle that discrimination can occur as a result of the maximising decisions of economic agents. However its major weakness is that, within a neo-classical framework, in most cases it is unable to explain the continued presence of discrimination in the long run. The models actually predicting the disappearance of the phenomenon that they seek to explain (Arrow 1972).

3.5 Statistical Discrimination

It is clear from the previous sections that, although Becker's theories were an important step forward for the study of discrimination, its presence was entirely dependent upon individuals holding a taste for discrimination and being willing to incur a cost to indulge this taste. The work of Arrow (1972) and Phelps (1972) sought to improve on this by developing theories that were based not on individuals having prejudiced tastes but on the imperfect nature of information in the labour market, especially in the recruitment process. As a result statistical discrimination is still broadly within the neo-classical school in that market primacy is to the fore, however the assumption of perfect knowledge no longer holds. It is impossible for firms to know precisely the actual productivity of potential employees, so by making various assumptions about what is and isn't known a model of statistical discrimination can be built up.

Firstly, if only the average productivity of each group is known, obviously in the case of gender discrimination the groups are men and women, but no specific information is known about each individual's productivity. Then the actual productivity of each worker will play no part in the wage offer, which can be represented formally as:

$$g_i = \overline{\alpha} + u_i \qquad E(u) = 0 \qquad V(u) = \sigma^2$$

Where the individual productivity of each worker (g_i) is equal to the average productivity of that person's group, plus a normally distributed error term (u_i). Therefore in the absence of any specific productivity information, firms will offer workers wages equal to the mean value of their group's productivity, $W_m = \overline{\alpha}_m$ and $W_f = \overline{\alpha}_f$, the subscripts m and f represent the male and female groups. However workers will on average be paid wages equal to their marginal products, some will be overpaid and others underpaid, since women and men will be affected equally there will be individual but not group discrimination. If $\overline{\alpha}_m > \overline{\alpha}_f$, then there will be a wage differential and $\overline{W}_m > \overline{W}_f$, but workers will still be paid on average wages equal to their marginal products. Hence the higher male wages simply reflect greater productivity and group discrimination will still not be present.

Now if firms attempt to assess the productivity of individual workers before making a wage offer, the individual productivity g is estimated through the result of some test, Y. Then;

$$W_i = E(g)_i = (1-\beta)\overline{\alpha} + \beta Y_i + u_i \qquad (3.4)$$

Where the wage offered to each person is equal to the expected value of his or her individual productivity, this is estimated through a combination of their test score and the average productivity of their group. β is the coefficient of determination between g and Y, i.e. it is the degree of accuracy of the test as a predictor of actual productivity, therefore the better the test is as an indicator the greater the weight given to the test score in the wage offer. In the extreme case where the test is the perfect indicator, $\beta = 1$, $(1-\beta) = 0$ and the wage offer is based entirely on the test score, and $W_i = Y_i$.

If β is larger for men, implying that the test is a better indicator of male productivity, then for a man and a woman achieving identical test scores the wage differential will be;

$$W_m - W_f = (Y - \overline{\alpha})(\beta_m - \beta_f) \qquad (3.5)$$

assuming $\overline{\alpha}$ is the same for both groups. However this still fails to explain the presence of group discrimination, since the larger β merely implies that the wage offer curve is steeper for men. Hence above average men will be paid more than comparable women, but the converse will be true for below average workers.

Finally, if the reliability of the indicator β affects the perceived mean productivity, i.e. as β falls so does perceived $\overline{\alpha}$ for the group, then the wages offered to men and women with the same test score become;

$$W_m = \beta_m Y + (1-\beta_m)\overline{\alpha}_m \qquad (3.6) \quad \text{and } W_f = \beta_f Y + (1-\beta_f)\overline{\alpha}_f \qquad (3.7)$$

Clearly if $\beta_m > \beta_f$ and from the perceived mean productivity's $\overline{\alpha}_m > \overline{\alpha}_f$ then some below average men will be paid more than comparable women and group discrimination can exist. This implies that decision-makers in the recruitment process have less than perfect recall of past events. If their memories assign greater significance to their failures than their successes, they will have a clearer memory of the occasions when they inaccurately predicted an employee's true productivity. If the test is a poorer indicator for women, a disproportionate amount of these 'failures' will be women, therefore it may lead to a conclusion that women's mean productivity is lower than it actually is.

This does represent an improvement upon Becker's theories, since it does not require economic agents to be openly sexist, in addition to being willing to incur a cost, it merely needs past events to lead decision-makers to an inaccurate conclusion. However the original models presented by Phelps (1972) and Arrow (1972) need to be qualified slightly when being applied to the issue of gender, as with all of the original formal theories of discrimination they sought to explain racial discrimination in the USA. The fact that education at the time was to a large extent racially segregated, with better resources being allocated to the white sector, meant that white workers were likely to be more productive than blacks with the same amount of education. In most cases, certainly for the UK and Germany, the system is predominately coeducational, with males and females having similar access to the available resources, consequently education should be a much more comparable predictor of productivity across the genders. This means that for employers the biggest area of uncertainty in appointments and promotions relates to the future attachment of the individual, both to that firm and to the labour market. Consequently if on average women stay with an employer for a shorter period of time, or more importantly employers perceive this to be so, statistical discrimination will occur as outlined above. If this is the case the discrimination is likely to be a long-term phenomenon, Arrow (1972) pointed to a self-fulfilling element within employers' expectations. Employers believe that women are more likely to leave, therefore less time and resources are allocated to their firm-specific training. They are also assigned to jobs where their departure will have the smallest impact. Consequently women feel less valued by the firm and are more likely to leave. As a result the most meaningful research relating to statistical discrimination by gender has focused upon differences in job tenure and quit rates, Viscusi (1980), Blau and Kahn (1981), Sicherman (1996) and Royalty (1998) all find that women are more likely to quit their current job than men. However in each case when controlled for differences in characteristics, wages and advancement opportunities, women were no more likely to leave than a man with comparable attributes, therefore in these cases any discrimination occurs as a result of perceived, rather than real, differences in quit rates.

As with Becker's theories there are doubts relating to the ability of this model to explain the presence of long term discrimination within competitive markets. There being clear efficiency gains for firms who can identify women with a strong commitment to the labour market and those more likely to leave. Light and Ureta (1992) tested exactly this hypothesis and found no difference between the quit behaviour of men and women, implying that comparable men and women should be treated in the same fashion. There is also a wage incentive for the highly committed women to reveal themselves to potential employers. One possibility is to accept contracts that require repayment of a proportion of firm specific training costs if the employee resigns within a certain period, encouraging workers with low levels of attachment towards jobs with small amounts of firm specific training.

3.6 Crowding Model

In the models discussed so far both gender segregation and wage differentials are potential outcomes. Differences in both pay and employment are believed to result from tastes for discrimination against women or from perceived differences in average productivity or quit rates. Developing upon the earlier ideas of Fawcett (1917, 1918) and Edgeworth (1922), most specifically by giving a greater weight to the role played by employment segregation in explaining the gender wage gap, Bergmann (1974) produced a formal presentation of the crowding model. This occurs where greater supply, relative to demand, of female labour in particular sectors or occupations drives down their wages. If the labour market is separated into those sectors with predominantly female employees and those with a majority of men, Bergmann argued that as long as there are differences in the demand for labour relative to the available supply in each of the sectors a gender wage gap is inevitable. This gender wage gap still being present irrespective of whether the employment allocation results from personal preferences, social conditioning or discrimination.

As male wages are generally higher, this would suggest that there is a greater supply of labour relative to demand in the female dominated sector, forcing the market wage down below the level found in the male sector. In a fully competitive situation labour would switch from the lower paying sector to the higher paying one until the market wage was the same in both sectors. However factors such as social conditioning, leading individuals to perceive particular occupations as either 'male' or 'female'. Men and women not being perfect substitutes, i.e. women generally possessing skills more suitable to the female sector, or the possibility that women are simply discriminated against by employers in the higher paying sectors may prevent this from happening.

Finally, Bergmann (1974) gives us a clear insight into why potentially equally productive men and women are likely to be paid differently. In the female dominated sector production is likely to be more labour intensive as firms substitute cheaper labour for capital, whilst in the male sector higher labour costs mean that the process is reversed. Consequently women will be less productive, and lower paid, since they generally have less capital to work with, this hypothesis being supported by Sorenson (1990).

Although the crowding model is limited in that it focuses upon the outcomes of labour market segregation whilst only really speculating upon the initial causes. It is still important, simply because it is the first theory to highlight the potentially inflexible nature of a labour market. This being of particular significance as it allows for a greater appreciation of the institutional models that follow.

3.7 Institutional Theories

The earliest formal theories of discrimination, i.e. Becker's theories and statistical discrimination, sought to explain the presence of discrimination within a competitive structure. The major weakness being that in virtually all cases the maximising behaviour of economic agents should prevent the continued existence of wage discrimination in the long term. As a result of this what can be referred to as the institutional models of discrimination were developed, where the labour market is assumed to have inherent rigidities. These rigidities resulting from the institutional arrangements within firms, or from the monopoly power of firms in the product market and unions in the labour market. The link between the two types of theories being made by the crowding model, with Bergmann (1974) highlighting the possibility of labour market rigidities. In short the failure of labour resources to transfer from low paying sectors into high paying ones gives rise to long term occupational segregation, gender wage differentials and, if there is a discriminatory element to the segregation, wage discrimination.

The institutionalists argue that it is the arrangements within institutions, rather than independent individual actions which hold the key to explaining the presence of wage discrimination. The first formal presentation of this line of thinking results from the seminal work by Doeringer and Piore (1971). Their internal labour market (ILM) theory attempts to explain the presence of wage discrimination on a number of levels, firstly through entry to the ILM, secondly as a result of internal allocation and finally with differential wage rates.

The internal labour market is 'an administrative unit, such as a manufacturing plant, within which the pricing and allocation of labour is governed by a set of administrative rules and procedures' (Doeringer and Piore, 1971: pp 1-2). Conversely the external labour market is assumed to be competitive. The predictions of the theory are based on the movement of labour between the two markets at certain job classifications. At these classifications there are ports of entry and exit to and from the internal labour market. The remaining jobs in the internal labour market are filled by internal promotions. As such they are shielded from direct competition from the external market.

The workers employed in the internal labour market are assumed to possess a degree of monopoly power over their jobs. The firms realise the benefits from the internal labour market through reduced labour turnover costs. According to Doeringer and Piore (1971) there are three kinds of discrimination that can occur in the internal labour market, these being entry discrimination, internal allocation discrimination and wage discrimination.

Entry discrimination obviously indicates that the disadvantaged group is less able to gain access through each of the ports of entry into the internal labour market, this may well occur for a number of reasons. Firstly, hiring standards could be fixed at an artificially high level, this will make it relatively harder for workers from any group with lower productivity characteristics to gain entry. This was clearly relevant in Doeringer and Piore's (1971) original study, where blacks generally received education of lower quality, however when applied to women in the EU they are less likely to have lower productivity characteristics. The later chapters reveal that there are only minor differences in productivity characteristics between men and women in the EU, and more often than not, women actually have higher levels of education.

Alternatively the hiring procedure itself can also be discriminatory. Hiring decisions are based upon productivity characteristics and on interviews, by their nature the outcomes of interviews are dependent upon subjective opinions, these opinions may well be influenced by any prejudices held by the interviewers. The resultant level of discrimination is likely to be compounded by the uncertainty inherent in the recruitment process, since employer information is imperfect and/or incomplete employment inefficiencies may arise. This is similar to the statistical discrimination discussed in section 2.5. If employers believe that one group is on average more productive than another group, then the more productive group will be preferred. As mentioned above, this may not be relevant to gender discrimination in the EU, however if lower participation rates for women lead employers to believe that men will on average stay longer in the job, the same outcome will result.

Internal allocation discrimination occurs where one group is less successful in internal promotions between each of the ports of entry, consequently they are under represented within the higher paid and higher status positions. This may well occur because of reasons similar to those outlined in the previous paragraph. Finally wage discrimination can occur when there is an occupational segregation within the internal labour market, with women being assigned to the lower paying categories.

A derivation of this, transcending the firm operating an internal labour market, is the dual labour market model, which was again developed by Doeringer and Piore, (see Doeringer and Piore 1971 as well as Piore 1971). The model distinguishes between primary and secondary jobs, with primary jobs necessitating high levels of firm specific skills, leading to higher wages, better promotion prospects and low turnover rates. The secondary jobs have a lower requirement for firm specific skills, as a result they display low wages, poor promotion prospects and high turnover rates. The application of this model to gender discrimination merely requires that men have a higher probability of finding primary employment than comparable women.

They also argued that the dual labour market did not necessarily have to be enclosed within the same firm, i.e. along the same lines as the internal labour market, it could equally relevant on an industry basis. The fact that primary jobs are more likely to be found within monopolistic product markets enables these firms, if they desire, to indulge their preferences for employing males. Primary jobs are also more likely to be found in unionised industries, this could enable unions to exploit their monopsony and create a more unified membership by restricting the proportion of women employed in the industry.

There is very strong evidence within the literature of labour market segregation, which can obviously result from the presence of internal or dual labour markets. Most of the early work established its presence, both in terms of gender and race, in the USA (Blau and Jusenius 1976, Cain 1976 and Gordon et al 1982). McNabb and Ryan (1990) were able to establish its presence in Britain, as well as indicating its historical perspective, being able to identify it existence as far back as the mid 19^{th} century.

Overall the institutional theories are arguably a more plausible explanation of how jobs are allocated and wages set in the labour market, particularly within large firms. However a major criticism, that could easily be levelled at the Crowding Model as well, is that they focus upon the consequences without helping us to understand the causes. The resultant wage differentials and occupational segregation are clearly explained, but we are expected to simply assume that one of the possible causes is discrimination. Thus adding little to our understanding of how and why discrimination may be present. As a consequence we are still no closer to being able to solve a key dilemma in the study of wage discrimination. It is widely accepted that the occupational segregation is an important component of gender wage differentials, however it is still impossible to establish whether it results from discrimination, social conditioning or individual choices. Hence it is a clear target for future research as well as being a challenge to theorists.

3.8 Conclusion

This chapter gives an overview of the most relevant theories seeking to explain the causes of gender wage discrimination, with each of them representing an important step forward in our understanding. The original theories focused upon the behaviour of individuals, with Becker highlighting the actions of people who held prejudiced views, and statistical discrimination resulting from incomplete information. In virtually all cases these revealed a competitive advantage for non-discriminatory firms, hence predicting that discrimination would disappear in the long run. However there is no real evidence of this occurring indicating the presence of a significant level of labour market rigidities. In response to this additional theories were put forward seeking to explain the impact of these rigidities. The Crowding Model highlighting the failure of cheaper female labour to transfer into the higher paying male sector and the institutional theories indicating that not all positions were open to free and fair competition. These theories being limited as they focus on the outcomes rather than explaining the causes.

Overall this chapter reveals that there is no clear, robust and coherent explanation of gender wage discrimination, as with most areas of economics each of the different theories are relevant to a specific situation. The pessimist's conclusion to this chapter and the previous one would be that we have difficulty in explaining the presence of discrimination, and even if we could, we have problems establishing it empirically. However the market failure and inefficiency implications of discrimination indicates that it is important to address these two issues in the future. Furthermore narrowing the gender differential, whether by reducing discrimination or by other means, is in itself a desirable objective. Consequently the remainder of the thesis will focus upon what empirical evidence reveals about gender wage differentials, in the UK and the rest of the EU, and what it implies for wage discrimination. With the following chapter reviewing the existing empirical evidence.

Chapter 4

Gender Wage Differentials: Causes and Evidence.

4.1 Introduction

The major objective of this thesis is to carry out a detailed analysis of gender wage differentials and discrimination in the UK, focussing specifically upon inter-temporal and cross-country factors. This chapter therefore seeks to explain the following issues. Firstly, why do gender differentials exist in the first place, secondly why do they differ across countries and finally what causes them to change over time?. The previous chapters have paid particular attention to the relevant theoretical and estimation issues. This chapter reviews the empirical work of others, highlighting how it assists understanding of these three key issues.

The chapter adheres to the following structure. Firstly the literature is reviewed generally to identify the causes of a gender wage gap. This is used to establish the anticipated size of the UK's gap relative to Germany's, since Germany is chosen as the key country of comparison. It is also used to predict the expected path of the wage differentials over the period considered. Secondly, the country specific and cross-country literature for these two countries is reviewed highlighting important changes and developments. Finally the conclusion reaffirms the anticipated outcomes of the subsequent empirical analysis.

4.2 General Evidence: Gender Wage Differentials

The literature reveals a wide range of factors influencing the gender wage gap, with the most commonly held view being that the differential to a large extent reflects differences in human capital. An individual's stock of human capital is generally measured by their educational attainment prior to joining the labour market as well as the extent of their experience in employment. Therefore the argument is that a large proportion of the gender earnings differential is caused by the women's tendency to have lower levels of education and work experience. O'Neill and Polachek (1993) showed that a significant factor in narrowing the wage differential in the USA was successive cohorts of women closing the education and experience gap. Consequently if Germany and the UK display differences in the relative education and experience of women compared to men this should be displayed in their respective pay differentials.

Using the PACO data from 1991 the average years of education are as follows; UK, men 13.95 years and women 13.1. Germany, men 11.48 years and women 11.92. So, although average education is higher for both genders in Britain, the relative position of German women is better, and this should contribute to a narrower German differential. The reverse is true of experience. From the same source the means are; Germany, men 22.35 years and women 10.82 years. UK, men 18.06 years and women 10.98. So the relative position of UK women is clearly better, but this needs to be qualified by reiterating the point made in Chapter 3 that it is very difficult accurately to measure women's true labour market experience (Zabalza and Arrufat 1985). Also this higher participation rate may also reflect the greater prevalence of part-time work in the UK, (OECD 1992), hence the impact may not be as large as expected.

There is an additional problem with interpretation in this area, since the data available does not reveal the quality of education. Factors such as institution attended, subjects studied and final grades are routinely unavailable, this also being the case with the data used in this study. In a case where this type of information is available, McNabb et al (2002) show that although women on average perform better at university, men are more likely to obtain a first class honours degree since their distribution of outcomes is more diverse. Citing Battu et al (1999), who showed a considerably higher earnings premium for first class graduates, the authors speculate that the greater proportion of male firsts could be an important explanatory factor, at least for the graduate gender wage gap.

Consequently, for the reasons outlined above, it is difficult to predict the impact that relative differences in education and experience will have on the two countries' gender wage gaps since in both cases the data potentially hides as much information as it reveals.

The more recent literature points to the significance of wage dispersion to the gender differential. Since the work of Blau and Kahn (1992), where the important relationship between the level of wage inequality and the gender wage gap was established, there have been a number of papers highlighting this same relationship. The greater the level of wage dispersion the greater the wage gap tends to be. Blau and Kahn (1992) show that wage inequality leads to greater returns from education and experience, which disproportionately favours men over women. Using evidence from 8 OECD countries the authors clearly show the relationship between a country's wage structure and its gender pay gap.

In terms of the relative British/German position, Bishop, Formby and Smith (1991) produced Lorenz curve estimates of income and earnings inequality for 9 different countries. Some of their results were sensitive to the various definitions used, but for our area of interest Germany clearly displayed a more equal earnings distribution than the UK. Therefore it is fair to assume that the UK displays a greater level of inequality, which we would expect to be reflected in a larger UK gender differential.

Additionally, the effects of changes to the overall wage distribution have been shown to be an important element of inter-temporal wage gap movements. Blau and Kahn (1997) themselves coined the phrase 'swimming upstream', where women's wage gains in the USA were being offset within an unfavourable environment of increasing wage inequality. Blackaby et al (1997) and Harkness and Machin (1995) show that for the UK the same process was at work, following a dramatic increase in wage inequality during the 1980s (Schmitt 1995). This is potentially important for Germany as well since Gang and Yun (2002) indicate a massive rise in inequality for East Germans in the 1990s. Consequently, this issue will be a central feature of the empirical analysis.

An issue related to the level of wage inequality is the coverage of collective wage bargaining, since the level of centralisation of bargaining arrangements is likely to have an influence upon the wage gap. As previously mentioned, the larger the level of wage inequality the larger the gender differential tends to be, and as more centralised bargaining arrangements generally lead to less wage inequality, we can expect an inverse relationship between the differential and the degree of centralisation. Rosholm and Smith

(1996) show that increased decentralisation had a significant impact upon the widening of the gender differential in Denmark. In the paper by Traxler (1996) he produces a detailed analysis of the structure of collective bargaining within 18 OECD countries. His findings for Germany show a labour market dominated by multi-employer bargaining, which in many cases extends to a sectoral or central level, with the overall level of coverage of collective bargaining in the region of 80%. The situation is different in Britain, with single-employer bargaining being the norm, and the overall coverage of collective bargaining only in the region of 35%. Therefore this would suggest that the gender wage differential would be larger in the UK.

However it is not as straightforward as looking at the coverage of collective bargaining and concluding that a higher coverage will lead to a narrower wage gap. The issue is more complex than that and requires a finer analysis of the institutional arrangements of collective bargaining in each country. Rubery et al (2002) indicate a number of factors in addition to the coverage of collective bargaining that are likely to influence the gender wage gap. These are the degree and strength of unionisation, the level at which bargaining takes place, the co-ordination of wage setting across occupations, firms and sectors as well as the facility to extend bargaining agreements to non-signatories. In addition, the national mechanism for regulating low pay is also likely to have an effect upon the gender differential.

In direct comparisons between the two countries it has already been shown that, although union densities are similar in both countries, Germany has more extensive coverage of collective bargaining and that bargaining is likely to take place at a higher level. Furthermore there is very little bargaining co-ordination in Britain, with the government in recent decades taking care not to restrict management prerogative (Smith & Morton 2005). In Germany, tripartite attempts at co-ordination involving government, employers and unions have been far more prevalent, most notably through the 'Alliance for Work' (Bündis für Arbeit). Similarly within the UK there is only a small degree of extension of collective bargaining in specific sectors, predominantly in education and construction, but in Germany the extension system is formally important (Artus et al 1998). Finally there is no national minimum wage in the German economy as low pay is regulated through the extension of collective bargaining agreements. Within the UK, although there clearly is a national minimum wage, this is a relatively recent development and all of the data used in this thesis was collected prior to its introduction. Hence for the purpose of this study, aside from any adjustments made by employers in preparation for its introduction, it can be accepted that the UK had no formal mechanism for regulating low pay.

Overall the more extensive collective bargaining, co-ordination, extension and regulation of low pay would indicate a more equal wage distribution and a narrower gender wage gap for Germany. However national institutional wage setting arrangements are not set in stone, in fact they are constantly evolving. Consequently, for Germany, decreasing observance of collective bargaining deals (Streeck 2001), falling enforcement of sectoral bargains by works councils (Artus et al 1998), the growth of 'OT' (Ohne Tarif) associations where employers opt out of sectoral bargains (Streeck 2001) could be widening their wage distribution. At the same time the implementation of the national minimum wage in the UK may well mean that the two countries' wage distributions and gender wage gaps are in fact converging.

A number of studies have focussed upon social aspects of the gender wage gap, finding that male wages are positively influenced by marriage but unaffected by the presence of children. Conversely they find that female wages are negatively influenced, or unaffected in some studies, by marriage and always negatively affected by children, with the wage effect being smaller for each subsequent child. The reasoning being that marriage is viewed as a positive motivational signal for men by employers, whilst children, and to a lesser extent marriage, are seen as negative motivational factors for women. Equally, institutionalists argue that it is the way that the institutions of marriage and the household generally operate, supporting the male 'bread winner' role and placing greater domestic responsibilities on women, that leads to the positive male and negative female wage effects. Therefore, although the cause is debatable, it is apparent that marriage and children will have an impact upon the gender wage differential. For example Waldfogel (1995) estimates a female/male wage ratio of 70% and attributes over 50% of this gap to the effects of marriage and children. Similarly Dolton and Makepeace (1987) estimate that for UK graduates, men's earnings rise by 5.8% and women's fall by 4% as a result of marriage. So clearly if there are any differences in the proportion of marriages or the number and profile of births in Britain and Germany, we can expect to see these reflected in the relative gender wage gap.

Both countries appear to have experienced a fairly similar marriage trend, with 63% of women over 15 years old being married in the UK in 1968, which had fallen to 56% by 1988. Germany had marginally lower rates, over a slightly shorter period, 60% in 1968 falling to 54% in 1986 (OECD 1994). Such small inter-country differences are unlikely to have a significant impact upon their relative wage gaps. However with both countries showing a declining rate over a long period of time it is much more likely to have an effect upon the intra-country wage gap, causing it to narrow as less men are benefiting from the positive marriage wage effect.

In terms of the number of births, between 1968 and 1988 the birth rate in the UK fell by 17%, and between 1968 and 1986 it fell by 30% in Germany, (OECD 1994). As the birth rates were fairly similar in both countries in 1968 it is fair to assume that Germany now has the lower birth rate. Consequently, for both countries the birth rate should have had a narrowing effect upon the gender wage gap, with the effect being more pronounced in Germany.

There are a number of important issues relating to labour supply decisions, not just the decision to participate but how long to work for and in what type of job. The first of these, sample selection bias and its impact upon the gender wage gap, is an issue that has been largely ignored by the literature. Researchers routinely apply the Heckman (1979) procedure and adjust their estimates for the potential selectivity bias, however they rarely discuss or interpret the variables and coefficients generated by the process. Neuman and Oaxaca (1998) give clear guidance as to how this should be done, but only within a cross-sectional analysis, which does not give any assistance when trying to explain inter-temporal changes. This is potentially a key process, since the whole issue of selectivity relates to whether the sample of those in employment is a representative sample of the overall population or not. Hence, if the employed sample becomes more (or less) representative over time, this is likely to have an impact upon the gender differential, particularly if there are gender differences within these changes. Consequently it is important to be able to explain it, or at least understand it. This relationship is one that has been totally ignored by the previous literature, and as a result the analysis in later chapters will focus heavily upon it.

Secondly the prevalence of part-time work is an important explanatory factor. In a technical paper using a wage offer model, Ermisch and Wright (1993) show that the presence of part-time employment helps to generate a gender earnings gap, and a clearer understanding of the different supply decisions faced by part-timers gives a better insight into that gap. They argue that for part-time workers supply is less elastic, since a significant proportion of them are tied to finding an employer whose hours fit in with childcare arrangements or school hours. Part-timers can also be restricted to only local employers as the cost of commuting to other areas is prohibitive. In either situation there will be a cost advantage for firms employing part-time workers. The authors reason that in these cases part-time hourly wages can at best be the same as full-time, but in most cases they will be lower. This means that in hourly terms any over- representation of women amongst part-timers will contribute to a gender wage gap, but in cases where part-time employees are excluded from the analysis an understatement of the differential will result. With respect to the UK and Germany, in both countries the incidence of men working part-time is very small, but the picture is very different for female employment. In the UK nearly 44% of all women employees are part-time, (OECD 1992), whereas in Germany the figure is significantly lower at 34% (Employment in Europe 1992). So in terms of the hourly wage the gender differential is likely to be smaller in Germany.

Thirdly, the occupation that individuals choose to work in also has an impact upon the gender wage gap. The fact that this may result from discrimination has already been discussed in Chapter 2. Despite not analysing the causes of the occupational segregation in this thesis it is still of importance to the gender differential on an observational level. Within the literature there is widespread coverage of the tendency in most countries for women to be disproportionately under-represented in some occupations and over-represented in others. It is difficult to identify whether this results from pre-entry discrimination or simply from different occupational choices. However in terms of a gender pay differential it is clear that if women are over-represented in lower paying occupations an earnings gap will be present, and the size of the gap will be determined by the level of over-representation and the pay differential between occupations.

This relationship is confirmed by Miller (1987) who decomposes the UK gender wage gap into intra-occupational and inter-occupational effects, finding that around 10-15% of the differential is due to occupational segregation, implying that most of the differential is caused by lower female seniority within the same occupation. Using the same technique Brown et al (1980) find broadly similar results for the USA. Evidence of an occupational segregation in both Germany and the UK is reported by Gornick and Jacobs (1998), who also identify that women in the UK are more likely to be in a professional occupation category than their German counterparts, both in the public and private sectors. Overall this would suggest that occupational segregation is an important element of the wage gap in both countries, but to a lesser extent in the UK. However if the findings of Miller (1987) are accurate, and vertical factors are more significant than horizontal ones in the UK, then this is unlikely to have any real impact upon the relative gender wage gaps.

As an additional aspect of the occupational segregation the roles of employment and pay policy in the public sector cannot be ignored. It is not unusual to find that the mean wage for public sector employees is greater than the mean wage in the private sector, although the public sector will generally display a narrower wage distribution. (Gornick and Jacobs 1998). The public sector is particularly beneficial to people in low paid occupations, within which women are disproportionately represented; generally the public/private differential is greater for unskilled workers. In addition the public sector provides a disproportionately high number of 'good' jobs for women, and to a lesser extent men (Gornick and Jacobs 1998). However once earnings are adjusted to take account of various explanatory variables, i.e. age, education, experience, etc., the findings are generally different, more often than not the estimated coefficient assigned to the public sector dummy is negative. (Gornick and Jacobs 1998). Therefore the effects of the public sector upon the adjusted gender wage differential can be ambiguous. However if, as in most cases, there is a positive adjusted wage premium for private sector employment, the tendency for women to be over- represented in the public sector will lead to a wider gender wage gap. The level of influence exerted by the public sector upon the differential will be determined by two factors. Firstly by the relative size of the public sector, since the larger the public sector the greater the pressure to restrict their pay settlements, and secondly by the extent of female over representation.

The evidence is inconclusive as to whether public sector effects will lead to a wider or narrower gender wage gap in Germany compared to Britain. The public sector is smaller in the UK, 18% of the labour force, compared to 26% in Germany, (Gornick & Jacobs 1998), so we can expect a larger public sector wage premium in the UK. However female over-representation is greater in Germany, with almost 1/3rd of women employees being in the public sector, compared with around 1/5th in Britain (Gornick & Jacobs 1998). So the fact that fewer women benefit from the larger premium in the UK leaves the overall effect unclear.

It is far more likely that the public sector will have a much greater effect upon inter-temporal wage gap changes, since there has been a widespread trend over the last twenty or so years for governments to seek to control their spending. Policies have been targeted towards restricting the pay increases awarded to public sector employees, as well as controlling employment growth in that same sector. Therefore if women are over-represented among this group it will adversely affect the wage gap through pay and employment effects. This is confirmed by Rosholm and Smith (1996) who find that this had a significant impact upon the gender pay differential in Denmark during the 1980s.

Finally, to conclude this section on different factors of participation it is important to say a few words about participation rates themselves. The fact that women generally display lower participation rates could lead to a wage gap through signalling lower levels of labour market attachment to employers, and this may lead to statistical discrimination and lower levels of human capital investment. However any change in the female participation rate can have an ambiguous effect upon the gender differential. If the higher participation rate reflects an increase in the supply of female labour, this could depress women's wages and widen the gap. Alternatively it could reflect increases in labour demand from occupations particularly attractive to women, hence closing the wage gap. The evidence clearly shows that female participation is higher in the UK both in absolute and relative terms, with the OECD data revealing the following participation rates for 1991, UK; male 86.5%, female 70.9% and Germany; male 79.8%, female 58.2%. These figures concur with the results of Elhorst (1996), whose regional analysis of participation rates across the EU in 1989 shows a very similar picture with the UK having the highest rates for both men and women. For the reasons outlined above, it is difficult to determine what impact this is likely to have upon the British gender wage gap in comparison to the German one. More important though are the long term effects of changes in participation, since a narrowing of the gender gap in participation rates will enable the skills gap to be narrowed, as women's work experience approaches that of the men. Consequently it is of greater significance to highlight the inter-temporal impact of changes in participation.

Table 4.1: Cross-country Wage Gaps: Implications of Empirical Evidence

Factor	Impact Upon the UK Gender Differential Relative to Germany
Education	Inconclusive
Experience	Inconclusive
Wage Dispersion	Wider
Collective Bargaining	Wider
Marriage	Inconclusive
Children	Wider
Sample Selection	No Evidence
Part-time Work	Wider
Occupational Segregation	Inconclusive
Public Sector	Inconclusive
Participation Rates	Inconclusive

The stated purpose of this chapter was to highlight the causes of a gender wage gap, as well as reasons for differences across countries and time. This section has revealed that gender differentials result from a wide range of factors, those affecting human capital, the overall wage distribution, wage bargaining arrangements, social factors as well as a number of issues relating to participation. National and chronological differences in each lead to cross-country differentials and inter-temporal changes. In Table 4.1, above, the evidence from this section is summarised, in each case pointing to what the particular factor predicts for the cross-country empirical analysis in the following chapters.

Each of the individual factors are important as they form the basis for the earnings functions used later and, where it is impossible to control for a factor, the impact upon the wage gap is analysed indirectly. Clearly, in the majority of cases, it is impossible to establish in advance the overall cross-country effect of a particular factor. However, where the evidence is conclusive, it does point to a narrower German gender wage gap. In the following section the specific empirical evidence is reviewed, highlighting how closely it supports the findings of this section.

4.3 Specific Evidence: U.K.

As outlined in the previous chapters there is an ongoing theoretical and empirical debate as to the major influences upon gender discrimination and wage gaps. The neo-classical view is that the gender differentials result predominantly from human capital differences. Institutionalists, on the other hand, focus upon unequal treatment of men and women within those institutions that have an influence upon the labour market. The Oaxaca decomposition technique, upon which most of the empirical evidence is based, lies firmly within the neo-classical school. Earnings functions are estimated using various proxies for the individual's stock of human as the explanatory variables. That is not to say that institutional factors are excluded from this type of analysis. Indeed as the technique has evolved and our understanding of gender wage gaps has developed empirical studies both here in the UK and elsewhere have gradually introduced more institutional factors into the earnings functions. For example, trade union membership is often included as an explanatory variable in order to control for the impact of these institutions upon the hourly wage. Furthermore marriage and children are also routinely included to control for the possibility that the institutions of marriage and family tend to support the labour market, 'bread winning', activities of men. As a consequence it is fair to say that the estimated earnings functions tend to be a hybrid of neo-classical human capital variables and institutional factors.

Within the UK pay differentials between men and women had displayed remarkable consistency from the turn of the century until the early 1970's, (Sloane 1990 p.125), at that point there was a significant narrowing of the pay gap, which is generally attributed to the implementation of equal opportunities legislation. Since then there have been numerous estimates of the UK gender differential. The most significant of these are summarised here in Table 4.2 and discussed in greater detail in the rest of this section.

For each of the studies Table 4.2 records the data set used, the estimated wage gap measured through the ratio of the mean female to male wage, the basis upon which earnings are measured, as well as the groups for which they are measured. Finally it reports the upper estimate of discrimination revealed through the unexplained portion of the wage gap and expressed as a proportion of the female mean wage. The wide variety of data sets used, as well as differences in the chosen groups, ensures that it is difficult to achieve any consensus from these studies. This strongly supports the need for the inter-temporally robust analysis provided by this thesis. The key findings from the existing literature can only be revealed through a more detailed review of their conclusions, with the remainder of this section carrying this out.

Firstly, Chiplin and Sloane (1976) estimate the mean male wage to be 16% greater than the women's average wage. They identify unequal treatment in job level opportunities and differing returns to productive characteristics, especially experience, as the major causes of the pay gap. They also find that the differential is 96% explained by differences

Table 4.2: Summary of UK Evidence

Author	Data Set	F/M Ratio	Measure of Earnings	Unexplained Wage Gap
Chiplin & Sloane	Establishment Survey 1976	0.86	Annual	0.5% & 8.7%*
Greenhalgh	GHS 1971 GHS 1975	0.85	Hourly for singles only	4.1% 0.3%
Zabalza &Tzannatos	GHS 1975	0.62	Hourly	7%
Miller	GHS 1980	0.61	Hourly	15%
Wright & Ermisch	WES 1980	0.67	Hourly, marrieds only	17%
Sloane & Theodossiou	NES 1970 NES 1982	0.6 0.68	Hourly Hourly	No Estimate No Estimate
Harkness	GHS 1974 BHPS 1992-93	0.66 0.8	Hourly for full-timers	30% 18%
Joshi & Paci	NCDS 1991	0.83 0.71	Hourly, full-timers Hourly, all women	10.2% 11.6%
Black et al	ISSP 1989	0.57	Hourly, marrieds only	26%
Lissenburgh	BHPS 1991-95	0.82 0.75	Hourly, full-timers Hourly, all women	9% 9%
Anderson et al	WERS 1998	0.83 0.75	Hourly, full-timers Hourly, all women	5.4% 12%
Swaffield	BHPS 1991-97	0.82 0.73	Hourly, full-timers Hourly, all women	12% 12%

* Separate estimates using the male and female structures respectively as the base group.

in characteristics if it is assumed that females are paid according to the male wage equation. However it is only 38% explained if the opposite assumption is made, suggesting that the cause of discrimination lies more with nepotism and overpayments to men, rather than underpaying women. Unfortunately it is impossible to deduce how representative this is of the whole of the UK labour market, since the sample used was constructed from employees in a specific occupation within one large multi-plant concern. Furthermore, Groshen (1991) indicates that there is very little wage variation across gender for the same occupation within the same organisation, hence these results may simply reflect this.

Using a more representative sample, namely the General Household Surveys of 1971 and 1975, Greenhalgh (1980) seeks to map the effects of the equal opportunities legislation. She concentrates on the influence that marriage exerts upon gender differentials, in that there is generally a wage premium for married men, but a negative return for married women. The differentials are reported separately by marital status, without reporting the overall gender wage gap. However the impact of the legislation is clearly shown as the single female/single male wage ratio closes from 85% in 1971 to 97% by 1975 and the same ratio for married men and women narrows from 51% to 62%. There is also a similar effect upon discrimination with the portion of the single men/single women wage gap that is unexplained by characteristics falling from 24% in 1971 to 10% in 1975. The author highlights the differing motivational effects of marriage upon men and women as well as the greater likelihood of married women suffering financially through sex segregated employment, as the most significant factors behind the differentials. It is likely that the reported male/female wage gaps are overstated, since the absence of any data on overtime premia means that the estimated hourly wage is biased upwards. This upward bias will be greater for men since they show a greater tendency to work overtime (see Chiplin & Sloane 1976). Also the lack of data relating to labour market experience and education is likely to have exaggerated the unexplained wage gap, since higher male work experience and education has typically been a significant explanatory factor.

Siebert and Sloane (1981) also concentrate on the influence of marital status, using establishment data from 5 employers, all in different sectors; they report gender differentials by marital status in each of the 5 sectors. They find significant differences between the wage gaps in each sector, with engineering being the most equal and finance by far the most unequal of the distributions. However they concur with Greenhalgh (1980), as in all cases the single female/single male ratio is much higher than their married counterparts. They identify differing returns to education and tenure as the major influences upon the wage gap, the latter being the most interesting as it was not included as a variable by Greenhalgh (1980). However care must be taken if attempting to interpret these results as representative estimates of gender pay differentials. As with Chiplin and Sloane (1976), the sample used falls short of reflecting the overall labour market. Most important is the absence of any small employers, who in aggregate are by far the most significant employers of women.

The authoritative work by Zabalza and Arrufat, (1985), sought to address two problems faced by studies of earnings functions, not just here in the UK but in other countries as well. The first was a response to criticism relating to the use of potential experience in the absence of actual experience data, since potential experience, particularly for married women, is likely to be a relatively poor indicator of labour market experience, particularly for married women. They used a technique to predict actual experience based upon estimates of the probability of labour market participation in different years, this imputed estimate of experience was shown to produce less biased estimates of women's experience coefficients. Secondly the possibility of the female labour market participants not being a representative sample of the total female population, since it is possible that some of the variables included in the wage equation are also determinants of the participation decision, had been somewhat neglected in previous studies. To overcome this, the authors applied the two-stage procedure first proposed by Heckman (1979).

Using the same data set as Greenhalgh (1980), the General Household Survey of 1975, they calculate women's average hourly wages to be 62.3% of men's. They accept this to be a slight exaggeration of the true pay gap since the absence of overtime premia data has a greater impact upon the male hourly wage. However the authors refute Greenhalgh's claims that the different motivational effects of marriage are the driving forces behind gender differentials. They argue that this appears to be so when experience is inaccurately modelled by potential experience, as this overstates labour market experience and causes the estimated coefficients on married women's experience to be biased downwards. Unfortunately the absence of any actual experience data makes it impossible to determine which of these two viewpoints is the most valid. When experience is represented by imputed experience Zabalza and Arrufat find that married women's experience is rewarded similar to married men's, it is just that potential experience picks up the positive effects of work experience, as well as the negative effects of home time. The overall conclusion is that it is a lower accumulation of labour market experience, combined with the effects of home time depressing earnings capacity, which are the crucial factors in determining the wage gap.

The partial success of the equal opportunities legislation in the 1970s, (Sloane & Theodossiou 1994), led critics to search for more effective methods of narrowing the gender pay gap. To do this required the causes of the differential to be more accurately defined. More specifically it needed to be established whether occupational segregation or the gender distribution within occupations was the most important factor. Miller (1987) attempted to do this by decomposing the wage gap into its intra and inter-occupational factors, and found a differential of 39%, of which around 15 percentage points were due to discrimination, and virtually all (87%) of this wage gap was due to intra-occupational factors. Decomposing the intra-occupational factors further revealed that around 2/3rds was justified by differences in endowments and home time, whilst the remaining 1/3rd was unjustified. This suggests that in the same occupations equally qualified women suffered lower rates of pay and worse promotion prospects than their male counterparts. This indicated that future anti-discriminatory legislation should be targeted at promoting equal opportunities and pay within occupations rather than encouraging a more equal gender distribution across occupations. However care must be taken before accepting this proposal, since the relatively small number of occupational groups, only six, means that each one is a very broad category. Hence within each category some significantly different jobs are treated as being the same, i.e. lawyers and nurses in the professional category, and therefore inter-occupational factors are appearing as intra ones.

Sloane (1990) encompassed much narrower categories; the New Earnings Survey classifies respondents by industry and occupation, allowing the author to identify literally hundreds of specific categories. The vast number of results that this gives makes it difficult to examine each one individually, however in summary the author found that the gender wage differential had narrowed over the period studied, 1970-1982, although, as with Siebert and Sloane (1981), there were wide variations across groups. Obviously the equal opportunities legislation was a factor in this narrowing, but structural factors were found to be more important than previously thought. Most important was the increase of female employment in the higher paying industries, and a less influential, although still significant, role was played by the improvement in the female distribution within industries.

This certainly represents an improvement upon previous works; the greater number of occupations and industries makes it clearer that problems in the vertical, rather than the horizontal distribution, of women should be the focus of future equal opportunities legislation. In addition the NES allows for the inclusion of data on job tenure, as well as wage premia for overtime, shift work and incentive payments, which were important previous omissions. However there are major limitations. Firstly the NES is constructed from Inland Revenue records which exclude low paid workers who do not reach the floor of National Insurance payments. This is likely to affect women disproportionately and hence understate the differential within some groups. Secondly, the absence of educational variables makes it difficult to accept the findings on the relative female distributions without further examination. Finally, the further omission of marital status information makes it impossible to confirm the previous findings relating to the motivational effects of marriage (Zabalza and Arrufat 1985).

The 1980 Women and Employment Survey was the first nationally representative survey to collect detailed work histories. From this data Wright and Ermisch (1991) were able to estimate women's earnings functions using actual experience rather than potential or imputed. The inclusion of earnings data for the husbands of married women in the survey meant that comparisons could be made between the wages of married men and women. Their results show that the average hourly wage of married women is 67% of their married male counterparts. Decomposing the wage gap further reveals that 17% of it is due to differences in attributes, 25-30% to home time, and the remainder, approximately half, is unexplained. Furthermore they are able to show the validity of using imputed experience in the absence of actual data, since their results are robust to substituting an imputed term for the actual one. Unfortunately, since the analysis excludes single people, it is impossible to establish how relevant these findings are to the overall population.

Using an alternative method Sloane and Theodossiou (1994) analyse changes in women's relative earnings during the period 1970-82. Adopting a generalised Lorenz Curve approach they analyse changes in the differential estimated from the New Earnings Survey. This reveals that the female/male wage ratio narrowed during the 1970's. From a starting point of just below 0.6 in 1970 it narrowed rapidly to a peak of 0.7 by 1977, generally accepted as the effects of equal opportunities legislation. However the ratio subsequently declined gradually to reach 0.68 by 1982, and the authors argue that this is indicative of the lack of long term effectiveness of the legislation. They also argue that flat rate incomes policies and narrowing of skill differentials were unimportant, since the relative improvement of the lowest paid women was not the most marked. Furthermore they argue that the changes are multi-causal and changes in the supply and demand conditions within the labour market would have improved women's relative position, even in the absence of the legislation.

As previously mentioned, the absence of educational and marital status variables within this data set tends to limit the scope of the analysis. For example, in this case, the conclusions are valid and accurately reached from the reported results. However the data set prevents further examination into the effects of changing educational attainment and rising divorce rates over the same time period which could equally have had a significant impact upon the wage ratio.

Despite the number and breadth of studies discussed so far there are a number of issues that have not been adequately resolved. However some of the more recent work published in this area help to shed light upon a couple of these. Firstly the problem of measuring female work experience, and the limitations of potential experience as a proxy, have been recurring themes throughout the history of estimating the UK gender wage gap. However, the British Household Panel Survey now records actual labour market experience for women, with Lissenburgh (2000) and Swaffield (2000) making use of this in an attempt to establish the impact of lower female work experience upon the gender wage gap. Lissenburgh (2000) reports that each additional year of full-time experience raises the male wage rate by 3-4% and 2-3% for the women, whilst part-time experience and time out of work had a negative effect. Each additional part-time year lowered male wages by 8% and the female wage by 2% and each year out of the labour market reduced the male wage by 8% and female by 3%.

Furthermore Swaffield (2000) indicates that it is not just time out of the labour market that is important but what the individual is doing with that time. Withdrawing from the labour market for domestic responsibilities only reduces the female wage by 1% for each additional year, with all of this negative effect occurring within the first four years of non-participation. However, and more importantly for the gender wage gap, she reveals that labour market withdrawal for education had a significant negative effect upon the subsequent wage for women, but not for men.

Unfortunately in both cases there is only a limited attempt to control for occupational differences, hence some of the gender differential may result from differing typical rates of wage growth across occupations. Furthermore it clouds the distinction between what jobs women end up doing and what they earn in that occupation upon their return to the labour market.

Secondly, although the neo-classical/institutional debate has continued, it has done so within a neo-classical framework. To a large extent this reflects the dominance of individual or household data within previous empirical work. Although attempts have been made to include institutions such as marriage and trade unions within this framework there are limits. This type of data says very little about the most important labour market institution, i.e. the organisation employing the individual. In response to this Anderson at al (2001) made use of establishment data, the 1998 Workplace Employment Relations Survey, to estimate the gender wage gap within a more institutionally focussed framework. They were able to control for factors such as gender segregation within the industry, occupation and work cell, the presence of union bargaining, type of payment system etc, all of which would be impossible with household data. Their findings indicated that 10% of the 21% estimated gender wage gap is explained, with 4 and 3 percentage points of this explained gap being due to the characteristics of the job and the employer respectively.

However there is always a downside and the inclusion of more effective institutional measures comes at a price. By definition establishment data excludes those not in the labour market, hence those surveyed are not a representative sample of the overall population. Therefore the problems of biased estimates through sample selection re-appear and it is very difficult to adjust for them using establishment data.

In conclusion, the overall diversity of these studies prevents a clear conclusion being reached as to the major causes of the UK gender wage gap. However the evidence does support the importance of the majority of the anticipated factors. With differing returns to experience, education, tenure and marriage, lower levels of female work experience, erosion of skills due to home time as well as lower pay and fewer job opportunities for women within occupations variously cited as the crucial elements. This confirms the need to control for these factors when estimating gender wage gaps.

4.4 Specific Evidence: Germany

There are far fewer sources to examine the nature of, and changes in, the gender wage differential in Germany. This is simply because of the absence of appropriate data sets (Gerlach 1987). The first attempt was based upon a random sample in 1981 of all employees in the state of Bremen (Gerlach 1987). The author calculated the female/male wage ratio to be 0.68 for marrieds and 0.89 for singles; only a small proportion of this was due to differences in endowments, in both cases the unexplained portion is between 80 and 90%. Admittedly a significant part of the unexplained element may be due to the presence of potential as opposed to actual experience data. There are further problems with these estimates; firstly the author does not reveal how representative Bremen is of the overall German labour market. Secondly the postal questionnaire resulted in bias in the response rates, with unskilled workers and employees in small plants having much lower response rates. A disproportionate presence of women in these groups could lead to an underestimate of the gender wage gap. A later study, (Hubler 1991), using cross-sectional data for 1984 to 1986, reports gender wage gaps of a similar magnitude but records even higher estimates of discrimination.

More recently Kunze (2005) analyses the gender wage gap for cohorts of West German workers undertaking apprenticeship training between 1975 and 1990. She reports a wage differential around 25% upon entry into the labour market, with this remaining largely unaltered over time as each cohort builds up work experience and human capital. Only 9% of the entry wage gap is explained by observable differences in human capital, for new entrants this equates to differences in educational attainment. However a much larger proportion, 52%, is explained by occupation, i.e. men are over-represented in the higher paying occupations. The overall implication is that differences in the occupations that men and women tend to gain their occupational qualifications in result in a permanent wage disadvantage for women.

The empirical analysis makes use of administrative data collected from a sample of those undertaking apprenticeships. Consequently this leads to the sample being non-representative of the West German population; since non-apprentices are excluded the findings are not applicable to other types of workers. However this is less important than it would be in most other countries as around 50-60% of the population in Germany undertake apprenticeships (Münch 1992).

Unfortunately within the large unexplained entry wage gap there is likely to be a significant amount of unobserved educational heterogeneity. Education is measured simply by the number of years, with differences in subjects studied and attainment levels not recorded. Hence those subsequently employed in the higher paying occupations may do so because they signalled higher levels of human capital to employers through better academic performance, or else it resulted from the subjects that they opted to study. The latter is influenced by social conditioning, certain subjects being viewed as 'male' or 'female' as well as educational expectations.

There have been a number of more recent studies focusing upon the impact of transition for East Germany. Hunt (1997) found that for East Germans, between 1990 and 1994, female wages rose from 74% to 84% of the average male wage, unfortunately this was driven by a 21% fall in female employment (5% more than for men). The increase in unemployment was predominantly amongst the low skilled, where women are over-represented, therefore the narrowing of the wage gap is caused by the lowest paid women losing their jobs.

Gang and Yun (2002) established that there has been a very large increase in wage inequality in East Germany between 1990 and 2000. Given the transition from a socialist system to a market economy this was to be expected. However with the link between the gender wage gap and the level of inequality, highlighted by Blau and Kahn (1992), this is likely to have a negative impact upon the gender differential.

Clearly the previous two papers are a limited basis for making inferences on a country-wide basis, since they only cover East Germany. However, although East Germans are in the minority, they are a very significant minority within the German population and given the vast changes that they have experienced since re-unification, it is likely that they have had an important effect upon the German gender wage gap over this period.

Unfortunately the most recent data sets make it impossible to separate East Germany, so it has become difficult to examine these factors in isolation.

4.5 Specific Evidence: Cross-Country Studies

The analysis in Section 4.2 has already established that we would expect gender wage differentials to be narrower in Germany than in the UK. In this section we shall see if this has been borne out by past comparative analysis. There is a relative lack of cross-country work compared with studies of individual labour markets, particularly the USA, UK and Sweden, however the literature which is available gives inconclusive support.

The evidence that is available is summarised below in Table 4.3, where the respective wage gaps and the relevant years are recorded. This shows that in the majority, but not all, cases the anticipated narrower wage gaps were experienced in Germany. In the remainder of this section each of these is reviewed in detail to reveal the major explanatory factors. Gunderson (1989) produced a comparative study of 10 countries. For each country he reported women's earnings/men's earnings ratios for 1960 and 1980. The former gave the expected result with Germany's being 0.65 and Britain's 0.61. However by 1980 their relative positions had changed and the results were 0.72 and 0.79 respectively. In the paper the author stresses the importance of increased female participation rates to the changing earnings ratios, and there is indeed a much higher increase in Britain, a 20 percentage point rise compared to less than 10 in Germany. However it is unlikely that this alone could explain such a large narrowing of the differential, especially as 5 of the 10 countries had even larger increases in participation rates, yet Britain rose from 7th to 3rd in the overall rankings.

Table 4.3: Summary of Cross-country Results

Author	F/M Ratio Germany	F/M Ratio UK	Year
Gunderson 1989	0.65 0.72	0.61 0.79	1960 1980
Blau & Kahn 1992	0.69	0.63	1985-88
Callan et al 1996	0.75	0.71	1991
Gornick & Jacobs 1998	0.72 Public Sector 0.62 Private Sector	0.78 Public Sector 0.66 Private Sector	1989 1989
Black et al 1999	0.72 Marrieds	0.57 Marrieds	1989
Blau & Kahn 2000	0.74 Full-timers 0.76 Full-timers	0.68 Full-timers 0.75 Full-timers	1989-90 1994-98
Machin & Puhani 2003	0.72 Graduates	0.79 Graduates	1996
Employment in Europe 2002	0.81 0.89 Public Sector 0.75 Private Sector	0.76 0.80 Public Sector 0.71 Private Sector	1998

There are problems with the comparability of the data; the estimated wage ratio for the UK is based upon manual workers only, whereas for Germany all types of worker are included (Mincer 1985). This means that for the UK, service sector growth and the related rise in female employment is largely ignored. Hence the greater than expected narrowing of the differential may be explained, since a substantial number of women became employed in low paid non-manual jobs, which would clearly over-estimate the female/male wage ratio.

Using the International Social Survey Programme, Blau and Kahn (1992) estimate female/male earnings ratios, corrected for hours, for eight countries. The estimates for the UK and Germany are based upon pooled data from the 1985-88 surveys. The authors stress the importance of wage inequality in a nation's labour market to the size of the gender differential. Their results are as expected with the German ratio being 0.69 and the UK's 0.63. However there is potential bias within these results as the estimates were produced assuming a 40-hour workweek, which may have differing effects upon the mean wages of men and women. It has long been established that men tend to work more hours and are more likely to work overtime (Chiplin and Sloane 1976), hence limited data on working hours exaggerates the size of the hourly wage gap. Furthermore the higher average working hours for men in the UK (Employment in Europe 2002) is likely to make this bias more pronounced with the estimated wage gap in Britain.

Using the same data set, but restricting the time period to 1985-87, Blanchflower and Oswald (1989) produce earnings functions for a number of countries. They do not report the gender wage gaps, although it would be fair to assume that they would be similar to Blau & Kahn's (1992) above, but they do estimate discrimination to be 46% of the average wage in West Germany and 56% in Great Britain. However they do use a fairly simplistic method, running the wage regression on men and women combined, then interpreting the gender dummy as discrimination. This means that the estimated coefficients may well suffer from bias, since they are based on the combined endowments of men and women, when in truth the particular endowments of men and women separately may differ significantly. Therefore it is likely that these estimates of discrimination are higher than their true value.

Progress in the area of comparative studies had to a large extent been hampered by the absence of comparable data sets in each of the countries being studied. There were always problems with certain variables being available in one country but not in another, plus variables that on the surface seemed the same but differing definitions across countries made comparisons difficult. However the production of the Luxembourg Income Study meant that far more comparable data became available. From this source two cross-country studies have so far been attempted.

Firstly Callan et al (1996) estimate the ratio of female/male mean hourly gross wage to be 71% in the UK and 75% in Germany, both figures are for 1991. Gornick and Jacobs (1998) produced a similar study but concentrated on the relative effects of the public and private sectors, and report female/male earnings ratios for the UK; public 0.78 and private 0.66, and for Germany; public 0.72 and private 0.62. The UK estimate is produced from the same survey, (1991), and given the relative sizes of the public and private sectors, the estimates are consistent with Callan's results. However for Germany both the public and private sector ratios are lower than Callan's figure, which is clearly not consistent. The two results are not directly comparable since, for Germany, Gornick and Jacobs used the 1989 survey, but it is unlikely that this alone would account for something in the region of a 10-percentage point narrowing in the wage gap. It is most probable that differences in the choice of dependent variable led to this inconsistency; Gornick and Jacobs used gross annual earnings of the full-time labour force. The greater tendency of men to work longer hours and overtime etc. will increase their average earnings relative to women's (Chiplin & Sloane 1976). Furthermore from 1991 additional information in the surveys relating to the gross wage paid and the hours to which that wage applies, (Callan et al 1996), means that their use of gross hourly wages will lead to more accurate calculations of the gender wage ratio.

One of the most recent attempts at a cross-country study of pay by gender was by Black et al (1999). They focus on the relationship between wage protection systems and gender pay inequalities and their results give female/male ratios of the means of gross hourly earnings for married people only; UK 57% and Germany 72%. The estimates were produced from ISSP 1989 data, which allows us to compare the results with those of Blau and Kahn (1992) who used pooled data from the ISSP 1985-88 surveys. Blau and Kahn also report wage ratios separately for married and single people, their married ratios are; UK 60% and Germany 57%. The two UK estimates are clearly consistent, but again the later German estimate suggests a much larger narrowing of the pay gap than is reasonable. Once more the reasons behind this inconsistency probably lie with the construction of the earnings variable. As a result of difficulties with the work experience and home time variables Black et al had to exclude women over 44 from their analysis, leaving them with only 60 women in their German sample. If this is combined with the fact that the earnings data were banded, it may well lead to an inaccurate estimate of the mean wage. In addition if married women in Germany over the age of 44 are over-represented amongst the low paid this will cause the pay gap to be underestimated.

Finally the ISSP data records gross earnings for Britain and net earnings for Germany, which Blau and Kahn do not adjust for, whilst Black et al interpret the German tax and social security system to estimate the gross wage for each individual. However without detailed knowledge of different treatment of men and women within the German tax and social security system it is difficult to predict what effect this would have upon pay differentials.

Black et al (1999) is the only cross-country study to report discrimination coefficients. They report 61% for Great Britain and 37% for West Germany, and this means that discrimination is a crucial element of the gender differential in each country, with it accounting for 80% of the differential in Britain and 95% in Germany. The authors argue that these estimates are broadly in line with previous work, as the UK had revealed much higher discrimination coefficients when post-1980 data had been used, and the German estimate was comparable with the only previous estimate using actual experience. (Hubler 1991).

Finally Blau and Kahn (2000) highlight some of the changes in gender differentials over time for a number of countries. For Germany, over the period 1989-1990, they report a female/male weekly earnings ratio of 0.74 for full-time workers, with the same ratio being 0.68 in the UK. By the period 1994-1998, (the earlier years are for West Germany only), there had been a slight narrowing to 0.76 in the Germany, but a much stronger narrowing to 0.75 in the UK. The reasons for these changes are not discussed, since reporting results for 15 other countries as well restricts the depth of analysis. However the finding of a slight narrowing in Germany and a much larger one in the UK concurs with the findings of this thesis. These will be reported and discussed at length in later chapters.

Up to this point the major limitation has been problems with the comparability of data across countries. However more recently data has become available that is collected using the same survey in each country, rendering it more easily comparable. Machin and Puhani (2003) focus upon graduates only and, using the Labour Force Survey, estimate a graduate gender wage gap of 28% in Germany and 21% in the UK. The gap is around 50% explained in the UK by age, industry, part-time working, sector and occupation, with the explained portion rising to 70% once subject of degree is included. The same process in Germany raises the much smaller explained wage gap of 30% to only 38%. This is one of the few studies that report a narrower wage gap in the UK, although clearly the graduate gender wage gap does not necessarily reflect the position in the wider labour market. The authors speculate that this results from women in the UK being more advanced in the wage hierarchy than their counterparts in more traditional Germany.

A more significant development in the availability of comparable data was the release of the European Community Household Panel (ECHP). This recorded longitudinal data, initially in the 12 pre-1995 EU nations, using the same questionnaire in each country, thus overcoming some of the difficulties faced by earlier researchers. A major EU-wide study has been published reporting gender wage gaps for all of the ECHP countries. Employment in Europe (2002) reveals both Germany and the UK performing poorly in terms of their gender wage gaps. Female/Male average gross earnings ratios of 75.7 and

80.6 rank the UK and Germany 12th and 8th respectively out of twelve, with both countries having wage gaps significantly wider than the EU mean ratio of 83.8.

The large scale of the project makes it difficult to disentangle the reasons for the UK's position in comparison to Germany. However the EU-wide picture is that the predominance of women in smaller firms, low paying sectors, in non-supervisory positions with short experience and tenure are the key explanatory factors. However even when all of these are controlled for, plus personal and job characteristics, women are still paid significantly less than comparable men within all but one industrial sector. Importantly, the UK is the only country where part-time work has a negative effect upon hourly earnings. This, combined with the fact that it has the highest proportion of women in part-time employment means that the treatment of pert-timers is a crucial factor in the UK having the largest gender wage gap in the EU.

Overall the discussion within this section highlights the difficulty of carrying out cross-country analysis when the available data displays limited comparability. The majority of the limitations noted simply result from international differences within the variables. Consequently the need for cross-country comparisons using harmonised data is clearly shown, thus supporting one of the major objectives of this thesis.

4.6 Specific Evidence: Inter-Temporal Studies

To a large extent the empirical inter-temporal evidence has already been presented either in the country specific or cross-country sections. For example, in the UK, Greenhalgh (1980) reports a wage gap narrowing of 12 percentage points between 1971 and 1975 as a result of the implementation of equal opportunities legislation. Sloane and Theodossiou (1994) record a more conservative narrowing of 8 percentage points between 1970 and 1982, arguing that this was more to do with changes in the supply and demand conditions than any other possible factors.

In more recent times there have been a number of studies paying much closer attention to the path of the wage gap over time. Firstly, Harkness (1996) studies the path of the earnings gap from 1973 to 1993. Using the Family Expenditure Survey she identifies that the ratio of female to male average hourly earnings narrows from 0.59 in 1973 to 0.71 in 1993. Equal opportunities legislation led to a rapid narrowing to 0.67 between 1973 and 1977, this was followed by a fall back in the late 70s and early 80's and finally a gradual increase between 1982 and 1993. Further analysis using the General Household Survey (1974) and the British Household Panel Survey (1992-93) shows that for full-timers the hourly earnings ratio was 0.66 in 1974 and 0.80 in 1992-93. Closer inspection of this reveals that 3 percentage points of the overall 14 percentage point rise is explained by a narrowing of the skills gap. This means that most of the improvement is due to a fall in discrimination. However the results show that discrimination is still a major factor in the gender wage gap with over 90% of the differential being unexplained in 1974 and 1992-93.

Secondly, Blackaby et al (1997) also use the General Household Survey, this time between the years 1973 and 1991. The most important finding is that there was a strong narrowing of the wage differential post 1983, with this mainly being driven by a narrowing of the skills gap.

The extensive work by Joshi and Paci (1998) uses the National Child Development Survey and is a cohort study of those born in 1958 carried out in 1991. Within the questionnaire there is detailed information relating to education, work experience and training. They report a gender gap of 20% in hourly earnings for men over full-time women and 40% for men over all women. Initially concentrating on human capital variables they find around a quarter of these pay gaps to be explained by differences in characteristics. By extending the analysis to include data on types of firm, job and occupation the explained portion rises to 2/5ths for full-timers and 3/5ths for the overall gap. As a follow up to this Makepeace et al (1999) use the same data set and compare it with an earlier cohort study, for those born in 1945 and carried out in 1978. They found that the wage gap had narrowed from 36% in the earlier year to 18% by 1991, resulting predominantly from a significant closing of the skills gap. However these data sets only include people who at the time of survey were in their early thirties, and unfortunately there is no guarantee that the same process was present across the whole population.

From the German perspective, again some of the evidence has already been discussed, with Gunderson (1989) estimating a wage gap narrowing of 7 percentage points for West Germans between 1960 and 1980. More recently Blau and Kahn (2000) showed a small 2 percentage point narrowing for Germany between the periods 1989-90 and 1994-98. However within this small narrowing Hunt (1997) was able to isolate an interesting feature resulting from the integration process by focussing solely upon East Germany. She estimated a 10% narrowing of the wage gap for East German women during the early 1990s, with no evidence of them closing the skills gap. The narrowing resulted entirely from a large growth in unemployment for women with relatively low skill levels.

Overall a number of important features can be identified from the existing inter-temporal evidence. For the UK there is a clear indication of the gender wage gap narrowing over the last decade or so, with most of this resulting from a closing of the gender skills gap. For Germany the differential has been falling at a much slower rate, but within this there is a much stronger narrowing, at the expense of higher unemployment, in the Eastern Laender.

Finally none of the existing inter-temporal evidence has made use of panel data. They have predominantly made comparisons from 2 or more cross-sectional estimates. As highlighted earlier these techniques are limited in their ability to explain inter-temporal changes. Consequently the need to carry out inter-temporal analysis making use of the panel structure of data sets is reinforced, with this need being satisfied by the empirical analysis in Chapter 6.

4.7 Conclusion

The purpose of this chapter was to identify the reasons for a gender wage gap being present, then to establish why the gap differs across the chosen countries and time. The literature reviewed in Sections 4.2 – 4.4 highlighted a large number of factors influencing the size of the gender wage gap, it also implied that the differential should be smaller in Germany. This was largely confirmed by the cross-country literature reviewed in Section 4.5, but this also revealed the problems and difficulties in carrying out cross-country analysis when there is limited comparability within the data. Finally the inter-temporal evidence shows a narrowing of the skills gap leading to a smaller differential, particularly in the UK in more recent times. Unfortunately the existing analysis has not made use of a panel-structured data set, and therefore the ability to understand the inter-temporal processes driving the wage gap narrowing is severely limited. Consequently, the limitations within existing cross-country analysis as well as the omissions of inter-temporal analysis, gives strong support to the data and methods of analysis selected for this thesis.

CHAPTER 5

Cross-sectional Analysis

5.1 Introduction

The overall objective of this thesis is to carry out a detailed analysis of the gender wage gap in the UK, focusing specifically upon cross-country and inter-temporal issues to assist in a deepening of our understanding. The review of the existing literature carried out in the earlier chapters revealed firstly, the major determinants of the gender wage gap, these being used as the basis for selecting the explanatory variables in the econometric models. The literature review also highlighted major limitations within existing cross-country and inter-temporal analysis. This chapter begins the empirical analysis calculating the gender differential then decomposing cross-sectionally and inter-temporally, as well as carrying out a cross-country decomposition with Germany. The analysis makes use of the cross-country consistency and the panel structure of the data to produce more compatible and insightful analysis.

5.2 Data and the Model

It is clear from the conclusions of the second chapter that previous studies in this area have been hampered by the shortage of consistent data sets (Brookes et al 2001). However the presence of the recently conceived PACO data set from the Panel Comparability Project allows direct cross-country comparisons to be made, the harmonised variables overcome some of the difficulties encountered by earlier researchers. Furthermore the consistency of the variables allows for more meaningful intra-country analysis over time

The Panel Comparability (PACO) Project uses existing panel data for the individual countries, British Household Panel Study (BHPS) for the UK and Sozio-Oekonomisches Panel/Bundesrepublik Deutschland (SOEP) for Germany. The data is then re-coded and re-classified to create consistent variables and identical data structures. The UK is a fairly new addition to the project, data only being available from 1991, so the analysis will start from this point. This covers the periods 1991-1997 for the UK and 1991-1996 for Germany.[1]

In each country separate earnings functions will be estimated for men and women, using the same set of variables. These functions are of the form;

$$\ln(W)_i = \alpha + Z_i'\beta + u_i, \qquad i=1,\ldots\ldots\ldots,n$$

where; W_i = the hourly wage of the i-th worker,

α = the intercept term,

Z_i' = a vector of individual characteristics,

β = a vector of coefficients,

and u_i = a disturbance term.

The estimated function is a human capital model with the individual's stock of human capital being measured by their education and years of experience. A number of dummy variables categorising the circumstances of the individuals current employment are also included. The explanatory variables included in the vector Z are outlined below in Table 5.1.

[1] For a complete description of the data the official documentation is reproduced in Appendix 5.1.

Table 5.1: Variable Descriptions

Variable Name	Description	Purpose
Education 1	Highest level of education obtained = primary level	The impact of education upon earnings is established within the literature. These 4 educational dummies control for different levels of educational attainment. Education 2 is used as the base group.
Education 2	Highest level of education obtained = second level - first stage	
Education 3	Highest level of education obtained = second level - second stage	
Education 4	Highest level of education obtained = third level	
Experience.	A potential experience term, age minus the years of education minus 6 (or 5 for UK).	The concept of earnings following a quadratic age/earnings function is also well established in the literature. With these 2 variables controlling for that process.
Experience^2.	Experience squared.	
Part-time.	A dummy variable to identify those working less than 30 hours per week	Controlling for the negative impact of part-time work on hourly earnings.
Public.	Separates public and private sector workers, public=1, private=0.	Accounting for the possible pay differences between the 2 sectors.
Married.	A dummy variable identifying those legally married.	Picks up the possible motivational effects that marriage has upon employees.
Large Firm.	Dummy variable for those employed in firms with more than 500 employees.	Controls for the rent sharing behaviour of firms with workers in large firms(small firms) likely to be paid more (less) than workers in the base group of 50-500 employees.
Small Firm.	Dummy variable for those in firms with fewer than 50 employees.	
Outsider.	Employed by their current organisation for less than 2 years.	The effect of tenure upon earnings is well documented with wages rising as workers gain firm-specific capital. These control for this as well as the potential presence of internal labour markets. With initiated workers being used as the base group.
Initiated Worker.	Employed by current organisation for between 2 and 5 years.	
Insider.	Employed by current organisation for more than 5 years.	
East Germany	Dummy variable for those living in East Germany.	Controls for the lower levels of earnings experienced in the former East Germany.
Agriculture.	Agriculture, hunting, forestry and fishing.	A series of sector dummies to adjust for sectoral differences in pay. Manufacturing is used as the base group.
Mining.	Mining and quarrying.	
Manufacturing.	Manufacturing.	
Utilities.	Electricity, gas and water.	
Construction.	Construction.	
Services.	Wholesale and retail trade and restaurants and hotels.	
Transport.	Transport, storage and communication.	
Finance.	Financing, insurance, real estate and business service.	
Community.	Community, social and personal services.	

5.3 Method

Earnings functions are estimated for men and women separately, using the variables outlined above, in each country firstly in the most recent year and secondly in 1991. From these the gender earnings differentials can be estimated, then analysed closely to establish the relative importance of the various factors outlined in Chapter 4. A measure of discrimination can then be calculated using the various decomposition methods described in Chapter 3. There are a number of issues that need to be considered when applying decomposition analysis, these have been highlighted and discussed at length previously, also in Chapter 3. Consequently to paint as robust a picture as possible of the explained and unexplained wage gaps, decomposition results are reported using the following techniques:

Oaxaca/Blinder (1973) $\ln \overline{W}_m - \ln \overline{W}_f = (\overline{Z}_m - \overline{Z}_f)\beta_m + \overline{Z}_f(\beta_m - \beta_f)$

Cotton (1988) $\ln \overline{W}_m - \ln \overline{W}_f = \overline{Z}'_m(\beta_m - \beta^*) + \overline{Z}'_f(\beta^* - \beta_f) + (\overline{Z}_m - \overline{Z}_f)'\beta^*$.

With β^* being the representation of the estimated non-discriminatory wage structure, given by; $\beta^* = \Omega\beta_m + (1-\Omega)\beta_f$, with Ω being the proportion of the sample made up by men.

Oaxaca and Ransom (1994). Same decomposition as above but,

$\Omega = (X'X)^{-1}(X'_m X_m)$ where X is the observation matrix for the pooled sample of males and females and X_m is the observation matrix for the male sample.

Neuman and Oaxaca (1998)

$$\overline{Y}_m - \overline{Y}_f = \overline{X}'_f(\hat{\beta}_m - \hat{\beta}_f) + \hat{\theta}_m(\hat{\lambda}^0_f - \hat{\lambda}_f) + (\overline{X}_m - \overline{X}_f)'\hat{\beta}_m + \hat{\theta}_m(\hat{\lambda}_m - \hat{\lambda}^0_f) + (\hat{\theta}_m - \hat{\theta}_f)\hat{\lambda}_f$$

For this decomposition, since it is unclear how to interpret the final term $(\hat{\theta}_m - \hat{\theta}_f)\hat{\lambda}_f$, three sets of results are reported. Option 1 where this term is deemed to be unexplained, Option 2 explained, and Option 3 where it is treated as a separate selectivity effect.

Once the wage differentials have been analysed within the two countries, cross-country analysis will take place. The previous chapter identified the potential importance of differences in wage inequality and sample selection to comparative wage gaps. The first of these is analysed using the method originally devised by Juhn et al (1991). Firstly, the cross-country wage differential can be decomposed as follows:

The wage equation for male worker i in country j is;

$$\ln W_{ij} = Z_{ij}\beta_j + \sigma_j \psi_{ij} \quad .$$

Where $\ln W_{ij}$ is the log of the hourly wage for worker i in country j.

Z_{ij} is the vector of explanatory variables.

β_j is the vector of estimated male coefficients in country j.

σ_j is the residual standard deviation of male wages in j.

ψ_{ij} is a standardised residual, with mean zero and variance 1.

The male-female wage gap for country j is;

$$D_j \equiv \ln W_{mj} - \ln W_{fj} = \delta Z_j \beta_j + \sigma_j \delta \psi_j$$

The f and m subscripts refer to male and female averages, the δ prefix signifies the average male-female difference for the immediately following variable.

The pay gap difference between two countries j and k can then be decomposed as follows;

$$D_j - D_k = (\delta Z_j - \delta Z_k)\beta_k + \delta Z_j(\beta_j - \beta_k) + (\delta \psi_j - \delta \psi_k)\sigma_k + \delta \psi_j(\sigma_j - \sigma_k)$$

This reveals that the pay gap difference between two countries is the sum of four terms. The first term being the contribution of inter-country differences in productive characteristics. The second the impact of male-female price differentials for productivity characteristics in each country. The third compares the relative positions of women when their wage residuals are ranked in the distribution of male wage residuals, this reflects differences in unmeasured characteristics. Finally the fourth term reveals inter-country differences in residual inequality, in effect it is the price of the unobserved characteristics from term 3. Since the mean male wage residual equals zero, $\delta \psi$ can be estimated for each country by estimating female wages with the male coefficients imposed on their wage function. Then the resultant residuals are used to estimate the average female position in that country's distribution of male residuals. (Blau 1996).

This method of decomposition implies a grouping of the four separate terms into gender-specific effects and wage structure effects (Kidd and Shannon 2001). Terms 1 and 3 of the decomposition are the gender-specific factors, capturing the impact of cross-country differences in the relative male-female levels of observed and unobserved productivity characteristics. Whilst terms 2 and 4 capture the wage structure effects in that they measure the returns from these observed and unobserved characteristics. However it has to be accepted that it is difficult to simply accept the findings from this type of analysis. The earlier discussion in Chapter 3 highlights the limitations of the Juhn-Murphy-Pierce decomposition. Wage discrimination can in fact be incorporated into any one of the four components (Blau and Kahn 1997). Furthermore a change or difference in the distribution of male wage residuals is interpreted as a difference or change in the prices for unobserved characteristics. This is too simplistic and it could equally reflect a number of other factors, such as measurement error, misspecification etc. It assumes that inequality affects men and women equally whilst the decomposition of terms 3 and 4 is subject to potential bias if the percentile rankings are sensitive to changes in the standard deviation (Suen 1997). Finally the wage structure effects, terms 2 and 4, can be significantly different dependent upon whether the male, female or pooled sample distribution is used as the reference group. Hence the findings from this type of analysis can only ever be treated as indicative.

Secondly, cross-country sample selection differences are isolated, this is done by subtracting the Neuman and Oaxaca (1998) decomposition of one country from the other. The decomposition then becomes;

$$
\begin{aligned}
D_j - D_k = & \overline{X}'_{fj}(\hat{\beta}_{mj} - \hat{\beta}_{fj}) - \overline{X}'_{fk}(\hat{\beta}_{mk} - \hat{\beta}_{fk}) \\
& + (\overline{X}_{mj} - \overline{X}_{fj})\hat{\beta}_{mj} - (\overline{X}_{mk} - \overline{X}_{fk})\hat{\beta}_{mk} \\
& + \hat{\theta}_{mj}(\hat{\lambda}^0_{fj} - \hat{\lambda}_{fj}) - \hat{\theta}_{mk}(\hat{\lambda}^0_{fk} - \hat{\lambda}_{fk}) \\
& + \hat{\theta}_{mj}(\hat{\lambda}_{mj} - \hat{\lambda}^0_{fj}) - \hat{\theta}_{mk}(\hat{\lambda}_{mk} - \hat{\lambda}^0_{fk}) \\
& + (\hat{\theta}_{mj} - \hat{\theta}_{fj})\hat{\lambda}_{fj} - (\hat{\theta}_{mk} - \hat{\theta}_{fk})\hat{\lambda}_{fk}
\end{aligned}
$$

Where the relative cross-country wage gap is the sum of the five terms, relative cross-country differences in characteristics, treatment, explained components of participation, unexplained components of participation, as well as relative differences in selectivity.

Inter-temporal analysis is then carried out using exactly the same two decomposition techniques as for cross-country, although clearly it is a comparison of the same country in two different years, rather than two different countries. The various components can then simply be interpreted as inter-temporal changes, rather than cross-country differences, in that particular factor.

5.4 Results

i) Overview

Table 5.2 Summary of Observed Gender Wage Differentials

Country	Year	Gender	No. of Obs.	Mean Log Wage	Gender	No. of Obs.	Mean Log Wage	Female/ Male Ratio
Germ.	91	Male	2488	2.861	Fem.	1885	2.587	0.760
Germ.	96	Male	1798	3.151	Fem.	1604	2.884	0.766
UK	91	Male	2149	1.714	Fem.	2153	1.393	0.725
UK	97	Male	2106	1.896	Fem.	2130	1.652	0.784

Table 5.2, above, summarises the overall position in both countries, giving the number of observations and the mean log wage by gender for each of the years, it also displays the average female wage expressed as a proportion of the male mean. Initially the wage gap was narrower in Germany, a female/male ratio of 0.76 indicating a gender gap of 24%, compared to 27.5% in the UK. So the analysis of the earlier chapters, predicting a narrower wage gap in Germany, is initially supported by the evidence. However over the period there was a slight narrowing to 23.4% in Germany and a much larger narrowing to 21.6% in the UK. Consequently, by 1996/7 women in the UK were in a marginally more favourable position.

ii) UK 1997

Table 5.3 Earnings Functions: UK 1997

Variable	Male Mean	Male Coefficient	Male t-ratio#	Female Mean	Female Coefficient	Female t-ratio#
Constant		1.331**	31.2		1.321**	28.5
Experience	18.989	0.044**	13.1	20.433	0.030**	9.1
Experience^2	492.7	-0.001**	-9.9	563.7	-0.001**	-7.6
Education 1	0.121	-0.213**	-5.5	0.133	-0.079**	-2.2
Education 3	0.163	0.115**	3.7	0.137	0.105**	3.4
Education 4	0.461	0.281**	11.3	0.385	0.311**	12.9
Part-time	0.027	0.011	0.2	0.367	-0.153**	-7.1
Public Sector	0.194	0.054	1.3	0.377	0.257**	7.9
Large Firm	0.197	0.077**	2.8	0.179	-0.025	-0.9
Small Firm	0.414	-0.127**	-5.6	0.518	-0.136**	-6.1
Married	0.575	0.097**	4.3	0.596	0.031	1.4
Agriculture	0.015	-0.183**	-2.2	0.006	0.085	0.7
Mining	0.009	0.227**	2.2	0.004	0.272*	1.7
Utilities	0.014	0.181**	2.2	0.007	0.076	0.6
Construction	0.058	-0.021	-0.5	0.006	0.231*	1.8
Services	0.159	-0.174**	-5.6	0.222	-0.146**	-4.3
Transport	0.084	-0.029	-0.7	0.036	0.141**	2.5
Finance	0.133	0.245**	7.5	0.138	0.220**	5.9
Community	0.206	0.001	-0.1	0.449	-0.108**	-2.7
Insider	0.321	0.001	0.4	·0.329	0.059**	2.2
Outsider	0.429	-0.160**	-6.5	0.416	-0.124**	-5.1
Dep. Variable		Ln Wage			Ln Wage	
Mean		1.896			1.652	
Standard Dev.		0.562			0.526	
Observations		2106			2130	
R-squared		0.38			0.32	
RSS		411.2			402.1	
Log-Like		-1268.3			-1246.8	

** and * represents significance at the 5% and 10% levels respectively.
# reported t-ratios are based upon White's heteroscedastic consistent standard errors.

Table 5.3 reports the sample means of the explanatory variables, the estimated wage regression results and the associated t-ratios for the UK in 1997. Discussion of the results is made easier by having a log dependent variable, allowing the estimated coefficients in the regression model to be interpreted as percentages. According to the above estimates the mean work experience of males is just under 19 years, with an additional year of experience resulting, ceteris paribus, in an extra 4.4 per cent in the average wage. The equivalent analysis for females reveals that with a mean experience of 20.4 years each additional year adds only 3 per cent to the average wage.

To a large extent the regression results concur with the wage gap expectations formulated in the previous chapter. Men do on average have more education, particularly with regard to higher education. However female workers have a higher rate of return to education than male workers. Although women appear to have higher levels of work experience than men, which contradicts the expected lower participatory rates, this finding is possibly misleading, stemming from the experience term actually being a 'potential' experience term, age less age on completing education. Thus the higher figure may simply reflect women on average being a similar age to males but tending to have fewer years of education. This interpretation is confirmed by a higher rate of returns to experience for males relative to females.

The previous chapter's literature review highlighted that gender differences in the nature of employment are key determinants of the wage gap, with these being shown to be crucial again here. Firstly, with part-time workers, Ermisch and Wright (1993) illustrate the importance of predominantly female part-time employment to the wage gap. Table 5.3 reveals a much higher incidence of part-time women in the labour market (37%) relative to men (3%) and according to the female wage regression estimates part-time female employees encounter on average a 15.3 per cent wage penalty compared with full-time female workers. Additionally women are almost twice as likely to work in the public sector than men (37.7% to 19.4%). The potentially ambiguous relationship between public sector employment and the gender earnings gap (Gornick and Jacobs 1998) has been discussed in Chapter 4. However the positive and significant returns for females working in the public sector illustrates that, ceteris paribus, the gender wage differential narrows.

Table 5.3 also reveals the importance of firm size and occupational group on the respective wage rates of male and female workers and more importantly on the gender wage differential. Firstly, men are more likely to work for a large firm and less likely to work for a small one, with the rate of return from both types of employment favouring the men. Secondly, there is a clear occupational segregation along gender lines, 2/3rds of women are employed in community, social and personal services or retail, restaurants and hotels. As discussed in Chapter 4, Miller (1987) highlights the importance of this, and it is confirmed here with a significant wage penalty present in both of these sectors relative to those employed in manufacturing. The impact upon the gender wage differential is compounded by a more even distribution of the men across the occupational categories.

Finally, the different motivational signals from married men and women (Waldfogel 1995) appear to be present, the returns to being married are positive and significant for men but not for women. Although it could equally be argued that this reflects the institutional arrangements within the household supporting the male 'bread winner' role. However at the same time the effects of job tenure are at odds with expectations as they favour the women. There is no real difference in the likelihood of women being in their current job for less than 2 years and more than 5 years, but they receive a significant premium for being an insider as well as a smaller penalty for being an outsider. This may well result from the higher incidence of women in the public sector and hence the greater likelihood of them being employed within an internal labour market.

Table 5.4

Wage Gap Decompositions: UK 1997

Mean Ln Wage (Male)	1.896						
Mean Ln Wage (Female)	1.652						
Wage Gap	0.244						
Female/Male Ratio	0.784						
% Wage Gap	21.6%						
	Oaxaca/ Blinder (1973)		Cotton (1988)		Oaxaca & Ransom (1994)		
Explained	0.021	9%	0.059	24%	0.070	29%	
Unexplained	0.223	91%	0.185	76%	0.174	71%	
Male Overpayment			0.074	30%	0.082	34%	
Female Underpayment			0.111	46%	0.092	37%	

Clearly once the earnings functions have been estimated it is important to decompose the gender wage gap in order to identify the portions of that wage gap that can, and can't, be explained by differences in the observed characteristics. The discussion from Chapter 2 points to the difficulties in interpreting the unexplained term as discrimination, however the results can at least be viewed as indicative. Table 5.4 summarises the outcomes from the decomposition techniques described in the method section. The top row of the table records the observed gender wage differences and the bottom row has the wage gap separated into its recognisable categories for each of the decomposition techniques.

The results are to a certain extent sensitive to the technique used, with the explained term from the Oaxaca and Ransom (1994) method (29%) being more than three times the size of the one from the original Oaxaca/Blinder (9%). However it is clear that irrespective of the method chosen the majority of the gender wage gap is unexplained by differences in the observed characteristics. This is confirmed by Black et al (1999) who find that as the wage gap has fallen in the UK the relative size of the unexplained portion has risen.

The full decompositions are reproduced in Appendix 5.2 and closer inspection of these reveals that the explained differences are almost entirely due to higher levels of education for men as well as the much greater proportion of women working part-time. Whilst the unexplained term is mainly due to, in order of importance, lower female returns to experience, the wage premium for married men and the unfavourable occupational division of women.

Obviously the earnings functions and related decompositions used thus far are open to the possible bias as a result of sample selection. This issue, as well as the Heckman (1979) adjustment technique, has already been discussed at length in Chapter 2. This technique has been applied with firstly participation probits being estimated using age, education, marriage, number of children, children under 5, poor health and household income as the explanatory variables. Age and its square are included to control for the changing employment probabilities over a working life. The two children variables reflect the increased child care responsibilities, particularly with pre-school children, and the likely resultant reduction in participation. Household income is included as an alternative to the neo-classical view that participation decisions are made on an individual basis. It is more likely that these decisions are made on a household basis with income from sources other than the individual's earnings influencing the decision, hence this possibility is controlled for. Those recording themselves to be in poor health are identified with a dummy variable to reflect their likely lower level of labour market attachment. Finally, the education and married variables are included in both the participation probit and the earnings function. Education because a higher level of education is likely to influence both the likelihood of being employed, as well as the resultant earnings, and marriage because the institutional impact of the division of labour within the household is also likely to impact upon both participation and earnings.

The estimated regression results once this technique has been applied are reported in Table 5.5, with the adjustment term or inverse Mills ratio (λ)[2] included as an additional explanatory variable. The means of the inverse Mills ratios are higher for women (0.57) compared to men's (0.53), suggesting slightly lower employment probabilities for women, although admittedly a significant proportion of the female employment is part-time employment. The coefficient on the IMR variable is negative and significant for both men and women, indicating that those employed are less productive than the anticipated mean productivity of the overall sample (Zabalza and Arrufat 1985). When comparing the corrected and non-corrected regression estimates, i.e. Table 5.3 with Table

5.5 the most noticeable change is a fall in the absolute values and significance of the education and experience variables, as well as a rise in the intercept terms. Indicating that the sample selection adjustment renders the earnings functions flatter and that these two variables have a greater impact upon employment than earnings.

Table 5.5 Selectivity Corrected Earnings Functions: UK 1997

	Male			Female		
Variable	Mean	Coefficient	t-ratio	Mean	Coefficient	t-ratio
Constant •		2.466**	44.3		1.692**	29.7
Experience	18.989	-0.002	-0.6	20.433	0.013**	3.7
$Experience^2$	492.7	0.0005**	6.1	563.7	-0.0002**	-2.5
Education 1	0.121	-0.175**	-5.3	0.133	-0.033	-0.9
Education 3	0.163	0.208**	7.8	0.137	0.129**	4.3
Education 4	0.461	0.106**	4.7	0.385	0.267**	11.2
Part-time	0.027	0.184**	3.5	0.367	-0.081**	-3.7
Public Sector	0.194	0.019	0.5	0.377	0.253**	7.9
Large Firm	0.197	0.060**	2.6	0.179	-0.026	-0.9
Small Firm	0.414	-0.108**	-5.5	0.518	-0.124**	-5.7
Married	0.575	-0.046**	-2.3	0.596	0.010	0.5
Agriculture	0.015	-0.081	-1.1	0.006	0.119	0.9
Mining	0.009	0.169*	1.9	0.004	0.243	1.6
Utilities	0.014	0.174**	2.4	0.007	0.087	0.7
Construction	0.058	-0.026	-0.7	0.006	0.219*	1.7
Services	0.159	-0.127**	-4.8	0.222	-0.137**	-4.1
Transport	0.084	-0.045	-1.4	0.036	0.119**	2.2
Finance	0.133	0.151**	5.3	0.138	0.194**	5.3
Community	0.206	0.030	0.8	0.449	-0.099**	-2.5
Insider	0.321	0.019	0.8	0.329	0.058**	2.3
Outsider	0.429	-0.119**	-5.6	0.416	-0.108**	-4.6
λ	0.530	-1.396**	-27.1	0.572	-0.444**	-10.7
Dep. Variable		Ln Wage			Ln Wage	
Mean		1.896			1.652	
Standard Dev.		0.562			0.526	
Observations		2106			2130	
R-squared		0.542			0.352	
RSS		303.9			381.3	
Log-Like		-950.1			-1190.3	

** and * represents significance at the 5% and 10% levels respectively.
# reported t-ratios are based upon White's heteroscedastic consistent standard errors.

_ The probit estimates from which the λ variable is produced are in Appendix 5.3

Once the earnings functions have been adjusted for sample selection bias the issue of how to deal with the λ terms and their estimated coefficients within the decomposition needs to be resolved. This was discussed at length in Chapter 2, leading to the conclusion that this has largely been ignored to date, with the tendency for researchers to decompose the λ term in the same fashion as the other explanatory variables. This being the justification for one of the major objectives of this thesis, to highlight the importance of sample selection to estimated levels of discrimination, as well as its impact upon gender wage gap changes or differences.

<u>Table 5.6</u> Decomposition of Wage Differentials with Selectivity Correction.

UK 1997

Estimates of average lambdas and associated coefficients.	
$\log w_m - \log w_f$	0.244
$\hat{\lambda}_m$	0.530
$\hat{\lambda}_f$	0.572
$\hat{\lambda}_f^0$	0.556
$\hat{\theta}_m$	-1.396
$\hat{\theta}_f$	-0.444
$(\overline{X}_m - \overline{X}_f)'\hat{\beta}_m$	-0.072
$\overline{X}_f'(\hat{\beta}_m - \hat{\beta}_f)$	0.802
$\hat{\theta}_m(\hat{\lambda}_m - \hat{\lambda}_f^0)$	0.036
$\hat{\theta}_m(\hat{\lambda}_f^0 - \hat{\lambda}_f)$	0.022
$(\hat{\theta}_m - \hat{\theta}_f)\hat{\lambda}_f$	-0.544

		Contribution of		
	$\log w_m - \log w_f$	Explained	Unexplained	Selectivity
Oaxaca	0.244	-0.014 (6%)	0.258 (106%)	0.000 (0.0%)
Option 1		-0.580 (-238%)	0.824 (338%)	0.000 (0.0%)
Option 2		-0.036 (-15%)	0.280 (115%)	0.000 (0.0%)
Option 3		-0.036 (-15%)	0.824 (338%)	-0.544 (-223%)

Neuman and Oaxaca (1998) indicate how the λ term can be decomposed more effectively and this forms the basis for the decompositions recorded in Table 5.6, with the full results in Appendix 5.4 for reference. The technique breaks down the λ term into an explained employment term, $\hat{\theta}_m(\hat{\lambda}_m - \hat{\lambda}_f^0)$, an unexplained employment term, $\hat{\theta}_m(\hat{\lambda}_f^0 - \hat{\lambda}_f)$, as well as an additional selectivity component, $\hat{\theta}_m(\hat{\lambda}_f^0 - \hat{\lambda}_f)$. It is unclear whether this final term is an explained or unexplained component of the gender wage gap (Neuman and Oaxaca 1998), therefore the three options reported in Table 5.6 result from assuming this term to be explained, unexplained and a separate selectivity component respectively.

As should be expected, when the earnings functions have significant IMR variables, correcting for selectivity does have a noticeable impact upon the decomposition of the wage gap. In this case the wage gap is dwarfed by two opposing effects, the difference between the male and female intercepts being considerably larger than the overall differential and this being offset by a similar difference between the coefficients on the IMR variables. Differences between the intercept terms can be problematic since to a large extent they reflect our level of ignorance regarding the earnings functions and are generally interpreted as factors unobserved by the model. However in this case by highlighting the impact of the sample selection adjustment upon the intercept terms some conclusions can at least be reached. The inclusion of the IMR variable in both cases flattens out the earnings function by reducing the experience and education coefficients and raising the intercept, with this process being more pronounced for the men. This suggests that these variables have a greater effect upon participation than they do upon earnings. Hence they have a bigger impact upon the likelihood of finding and accepting a job and the subsequent trajectory of earnings is less sensitive to differences within the explanatory variables. Overall it suggests that, once the sample selection adjustment is made, for a given age/experience, level of education, marital status, men are likely on average to find and accept a higher paying job.

The second dwarfing factor is the difference between the male and female IMR coefficients, both are negative and significant indicating that those employed are not a representative sample of the overall population, with the lower skilled being over represented in the sample (Wright and Ermisch 1991). Dolton and Makepeace (1987) reveal that for a given level of measured human capital wage offers display considerably less variation than reservation wages, hence the reservation wage is more important to the participation decision than the potential wage offer. This implies that those with less human capital are more likely to be employed as they have a considerably lower reservation wage. The greater magnitude of the male coefficient indicates that low skilled men have a lower reservation wage relative to low skilled women. The decompositions in Table 5.6 indicate that in the absence of sample selection differences the gender wage gap would be considerably wider. This implies that removing sample selection differences would require a reduction in the reservation wage of low skilled women, thus leading them to accept lower paying employment and reducing the mean female wage.

Overall from this section four key things can be concluded. Firstly any decomposition analysis based upon unadjusted earnings functions is likely to lead to inaccurate estimates, this hardly being new as it has been widely accepted since Heckman (1979) developed his adjustment procedure. Secondly, any decomposition analysis treating the adjustment term (λ) in the same fashion as the other variables is also likely to lead to inaccurate estimates of the explained and unexplained components. Thirdly, even where the (λ) term is decomposed into its different effects the estimated components are sensitive to the assumptions made. Finally, any increase in female participation that results from a reduction in the reservation wage is, at least initially, likely to widen the gender wage gap as low-skilled women are encouraged into paid employment.

iii) Germany 1996

The unadjusted earnings functions for German men and women are reported in Table 5.7, as before the means, estimated coefficients and t-ratios are recorded for each explanatory variable. The returns from virtually all of the explanatory variables favour the women, although admittedly only marginally in most cases, with the only exceptions being for part-time and married workers. There are a smaller number of female part-timers in Germany, 27.4% compared to 36.7% in the UK, and although they incur a wage penalty of 7.4%, it is around half the size of the 15% UK penalty. By far the largest impact upon the gender wage gap comes from the treatment of married men and women in employment, with married men receiving a premium close to 11% over comparable singletons and married women incurring a penalty close to 7.2% in comparison to their unmarried counterparts.

Also it is important to note that clear differences still exist between the former East Germany and the rest of the country. There are much lower rates of pay in the eastern landau, with both men and women experiencing a large pay cut in comparison to those in the West. Interestingly, although overall female participation rates are, as expected, lower in Germany than in the UK, this is not the case in the former East Germany with women making up 54% of the employed sample in East Germany.

Table 5.7 Earnings Functions: Germany 1996

	Male			Female		
Variable	Mean	Coefficient	t-ratio	Mean	Coefficient	t-ratio
Constant		2.681**	58.4		2.424**	44.3
Experience	20.710	0.030**	7.9	19.973	0.037**	8.4
Experience^2	540.3	-0.001**	-7.6	513.6	-0.001**	-7.6
Education 1	0.038	0.078	1.5	0.037	0.057	0.9
Education 3	0.648	0.123**	4.1	0.627	0.156**	4.5
Education 4	0.217	0.392**	11.3	0.203	0.458**	10.5
Part-time	0.021	0.159**	2.6	0.274	-0.074**	-2.8
Public Sector	0.247	0.005	0.1	0.392	0.069**	2.0
Large Firm	0.545	0.098**	4.8	0.468	0.133**	5.0
Small Firm	0.170	-0.175**	-6.6	0.252	-0.126**	-4.1
Married	0.715	0.108**	5.0	0.658	-0.072**	-2.7
Agriculture	0.018	-0.150**	-2.3	0.017	-0.129	-1.5
Mining	0.011	-0.057	-0.7	0.001	0.500	1.2
Utilities	0.019	0.124*	1.9	0.008	0.209*	1.7
Construction	0.127	0.031	1.1	0.024	0.014	0.2
Services	0.082	-0.128**	-3.8	0.183	-0.056	-1.5
Transport	0.076	-0.072*	-1.8	0.049	-0.080	-1.4
Finance	0.051	0.074*	1.8	0.085	0.159**	3.4
Community	0.203	-0.004	-0.1	0.438	0.057	1.4
East Germany	0.195	-0.414**	-17.9	0.311	-0.318**	-11.8
Dep. Variable		Ln Wage			Ln Wage	
Mean		3.151			2.884	
Standard Dev.		0.448			0.497	
Observations		1798			1604	
R-squared		0.360			0.260	
RSS		230.61			292.9	
Log-Like		-704.9			-912.4	

** and * represents significance at the 5% and 10% levels respectively.
# reported t-ratios are based upon White's heteroscedastic consistent standard errors.

This higher female employment rate is of importance when analysing the decompositions, the results are summarised in Table 5.8. The full results are reproduced in Appendix 5.5 and inspection of these reveals that the greater proportion of female employment in the East, but unfortunately at lower rates of pay, accounts for over 2/3rds of the explained difference. Overall these decompositions are far less sensitive to the chosen technique than those for the UK, with all three methods calculating unexplained terms in the region of two thirds to three quarters of the wage gap. Closer examination of the decompositions reveals three key factors. Firstly, the decompositions are overwhelmed by the intercept term. The difference between the male and female intercepts at 0.257 log points is almost as large as the total wage gap, suggesting that it results from factors not observed within the model.

<u>Table 5.8</u>

Wage Gap Decompositions: Germany 1996

Mean Ln Wage (Male)	3.151						
Mean Ln Wage (Female)	2.884						
Wage Gap	0.267						
Female/Male Ratio	0.766						
% Wage Gap	23.4%						
	Oaxaca (1973)		Cotton (1988)		Oaxaca & Ransom (1994)		
Explained	0.062	23%	0.067	25%	0.087	33%	
Unexplained	0.205	77%	0.200	75%	0.180	67%	
Male Overpayment			0.092	34%	0.080	30%	
Female Underpayment			0.108	41%	0.100	37%	

Secondly, the majority of the estimated coefficients actually favour women, most notably the returns to education, experience and public sector employment have a significant narrowing effect upon the wage gap. As flagged earlier the only variables widening the differential are marriage and part-time employment, with these contributing in the region of 12% and 6% respectively to the unexplained gender wage gap. Finally, there is no evidence at all of the occupational segregation widening the wage gap. The degree of segregation is similar to that in the UK, but there is not the same level of differential gender wage penalties/premiums within the sectors. This presumably results from the more extensive coverage of collective bargaining and the resultant narrower wage distribution.

Obviously these wage equations need to be adjusted for the possibility of sample selection bias, this has been done with the results shown below in Table 5.9, the participation probit estimates are in Appendix 5.6. The major features identified when carrying out this same process for the UK are once again present here. There is a flattening of the earnings function with an increase in the intercept terms combined with a reduction in the size of the education and experience terms, the impact upon the experience coefficients being far more pronounced for the men in this case. Overall this confirms the finding for the UK that these variables play a bigger part in the likelihood of being employed than in the wages subsequently earned. Interestingly, the previously negative returns for married women become insignificant, indicating that marriage has a bigger impact upon the participation decision.

Table 5.9 Selectivity Corrected Earnings Functions: Germany 1996

Variable	Male Mean	Male Coefficient	Male t-ratio	Female Mean	Female Coefficient	Female t-ratio
Constant		3.767**	71.2		2.996**	42.3
Experience	20.710	-0.018**	-5.0	19.973	0.008*	1.7
Experience^2	540.3	0.0004**	5.7	513.6	-0.0001	-1.0
Education 1	0.038	-0.038	-0.9	0.037	0.138**	2.2
Education 3	0.648	-0.012**	-0.5	0.627	0.082**	2.4
Education 4	0.217	0.215**	7.4	0.203	0.339**	7.9
Part-time	0.021	0.245	4.9	0.274	0.002	0.1
Public Sector	0.247	0.043	1.5	0.392	0.066**	2.0
Large Firm	0.545	0.063**	3.7	0.468	0.110**	4.3
Small Firm	0.170	-0.079**	-3.6	0.252	-0.115**	-3.9
Married	0.715	0.002**	0.1	0.658	-0.021	-0.8
Agriculture	0.018	-0.082**	-1.5	0.017	-0.097	-1.1
Mining	0.011	-0.022	-0.3	0.001	0.448	1.1
Utilities	0.019	0.023**	0.4	0.008	0.200*	1.7
Construction	0.127	0.031	1.3	0.024	-0.030	-0.4
Services	0.082	-0.117**	-4.3	0.183	-0.045	-1.3
Transport	0.076	-0.092*	-2.9	0.049	-0.074	-1.3
Finance	0.051	-0.023	-0.7	0.085	0.099**	2.2
Community	0.203	-0.043	-1.4	0.438	0.042	1.1
East Germany	0.195	-0.297**	-15.3	0.311	-0.251**	-9.5
λ	0.520	-0.923**	-29.2	0.691	-0.461**	-12.0
Dep. Variable		Ln Wage			Ln Wage	
Mean		3.151			2.884	
Standard Dev.		0.448			0.497	
Observations		1798			1604	
R-squared		0.568			0.322	
RSS		155.7			268.4	
Log-Like		-351.8			-842.2	

** and * represents significance at the 5% and 10% levels respectively.
# reported t-ratios are based upon White's heteroscedastic consistent standard errors.

Once the adjusted earnings functions are decomposed the same key features as for the UK again become apparent, the decompositions are summarised in Table 5.10 with the full results in Appendix 5.7 for reference. However, the results for Germany do differ in that their female mean IMR is clearly higher than the men's, 0.69 to 0.52, as there is a negative relationship between the IMR and the likelihood of participating this reflects the lower participation rates of German women. The rest of the results largely concur with the UK, there is a clear impact upon the wage gap from the explained and unexplained components of the participation functions, 0.027 and 0.132 respectively, suggesting a significant narrowing of the wage gap by 14 percentage points in their absence. The most striking feature is again the large negative selectivity component dwarfing the other effects, thus again confirming that trying to indicate the extent of discrimination through decomposing selectivity adjusted earnings functions is sensitive to the assumptions made. In this case the unexplained term ranges from 40% to 209%. The relative positions of the male and female correlation coefficients (ρ) and residual wage inequality (σ_u) are the same as in the UK. However, given the lower female participation rates in Germany the impact of those out of employment is of greater importance in this case. Hunt (1997) showed for East Germany rising unemployment had disproportionately affected unskilled women, with the result that those women being out of work rather than earning low wages had narrowed the wage gap. These decomposition results suggest that increasing the participation rates to that of the men would involve employing a lot of currently out of work women at below average wages, with the whole process leading to massive increase in the gender wage gap. As also found in the UK both coefficients on the IMR variable are negative and significant, indicating that those in employment tend to be less skilled than the mean of the overall population. The difference is not as pronounced as in the UK but the size of the male coefficient is much larger than the female one, once again suggesting that lower skilled women tend to have a higher reservation wage than similar men. Consequently, as found in the UK, these less productive women who remain out of employment have a strong narrowing effect upon the gender wage gap.

Table 5.10 Decomposition of Wage Differentials with Selectivity Correction. Germany 1996

Estimates of average lambdas and associated coefficients.	
$\log w_m - \log w_f$	0.267
$\hat{\lambda}_m$	0.520
$\hat{\lambda}_f$	0.692
$\hat{\lambda}_f^0$	0.549
$\hat{\theta}_m$	-0.923
$\hat{\theta}_f$	-0.461
$(\overline{X}_m - \overline{X}_f)'\hat{\beta}_m$	0.002
$\overline{X}_f'(\hat{\beta}_m - \hat{\beta}_f)$	0.426
$\hat{\theta}_m(\hat{\lambda}_m - \hat{\lambda}_f^0)$	0.027
$\hat{\theta}_m(\hat{\lambda}_f^0 - \hat{\lambda}_f)$	0.132
$(\hat{\theta}_m - \hat{\theta}_f)\hat{\lambda}_f$	-0.320

		Contribution of		
	$\log w_m - \log w_f$	Explained	Unexplained	Selectivity
Oaxaca	0.267	0.161 (60%)	0.107 (40%)	0.000 (0.0%)
Option 1		-0.291 (-109%)	0.558 (209%)	0.000 (0.0%)
Option 2		0.029 (11%)	0.238 (89%)	0.000 (0.0%)
Option 3		0.029 (11%)	0.558 (209%)	-0.320 (-120%)

iv) Comparative Results 1996/7

One of the major objectives of this thesis is to highlight what can be learned about gender wage gaps through making cross-country comparisons. This is done by carrying out a Juhn et al (1991) decomposition upon Germany and the UK using the most recently available years, i.e. 1997 for the UK and 1996 for Germany. This type of decomposition shows what would happen to the gender wage gap if you imposed another country's relative endowment of characteristics, returns to those characteristics as well as their wage distributions. Although admittedly the limitations of this technique highlighted in the previous chapter suggests that any subsequent findings resulting from these decompositions need to be tempered accordingly. As can be seen from Table 5.2, by 1997 the UK gender wage gap had narrowed to such an extent that it was slightly smaller than Germany's, 21.4% compared to 23.4%. This 1.8 percentage point disadvantage for German women is decomposed using the Juhn et al (1991) method, revealing the results shown in Table 5.11 below.

Table 5.11

Year	Term 1 $(\delta Z_j - \delta Z_k)\beta_k$	Term 2 $\delta Z_j(\beta_j - \beta_k)$	Term 3 $(\delta\psi_j - \delta\psi_k)\sigma_k$	Term 4 $\delta\psi_j(\sigma_j - \sigma_k)$	Total
1996/7	0.233 (18.1%)	-0.058 (-4.6%)	-0.119 (-9.3%)	-0.031 (-2.4%)	0.023 (1.8%)

The method section from earlier in this chapter shows that the four terms reflect cross-country differences in the relative endowment of observed characteristics, the prices paid to these characteristics, the relative endowment of unobserved characteristics and their prices respectively. The small relative gender wage gap difference of 1.8 percentage points translates to a difference of 0.233 log points. The relative wage gap widens, i.e. German women are worse off, by 0.062 log points as a result of their productive and employment characteristics. However, they are also 0.058 better off because of the prices paid to these characteristics. German women are able to narrow the gap as a result of the factors unobserved by the earnings functions. They are 0.119 log points better off due to their unobserved characteristics and 0.031 better off from the returns paid to these characteristics.

By analysing the full decomposition, in Appendix 5.8, a number of factors become apparent. Each of the four separate terms are all of greater magnitude than the relative gender wage gap, so the relatively small cross-country difference of 1.8% is in fact the outcome of some larger but opposing factors. By far the largest factor influencing the size of the cross-country relative wage gap is the impact of differences in selectivity, with this in total leading to a narrower UK differential of 0.1 or around 8%. This in itself results from 2 offsetting factors, firstly the much smaller UK difference in the means of the IMR variable indicates that UK women transmit their endowment of factors determining participation into actual employment at a similar rate to the men. This improves the position of UK women relative to German by 0.181 log points. Secondly, the greater magnitude of the coefficient on the UK male IMR worsens their position relative to Germany by 0.081 log points. The two male IMR means are virtually identical, 0.52 in Germany and 0.53 in the UK, suggesting that men with the same participation characteristics are equally likely to be in employment in both countries. At the same time both the IMR coefficients are negative indicating that those in employment tend to be below average compared to the overall population. The much lower UK coefficient, –1.396 compared to –0.923, suggests that the lower skilled workers in the UK have a lower reservation wage than their German counterparts, with this widening the UK gender wage gap relative to Germany's.

Taking the selectivity factors away leaves much smaller differences in the productivity characteristics and their prices. Firstly a more favourable endowment for UK women improves their position by 0.052 log points, or around 4%, with virtually all of this resulting from relative differences in the distribution of experience. Women employed in the UK tend to have around 18 months more experience than the men (20.4 years compared to 18.9 years), but German women tend to have about 9 months less (19.9 years compared to 20.7 years). Admittedly as this is a potential experience term it reflects differences in both experience as well as age. In terms of the prices paid for these characteristics, ignoring selectivity factors, UK women are treated more equitably to the tune of 0.033 log points. However, this almost exactly matches the impact upon the German wage gap of women working in East Germany. Therefore it could be said that the returns for UK women appear to be more favourable simply because none of them suffer the wage penalty of being employed in the East German labour market, whilst the returns from the remaining characteristics are largely similar.

Turning to the unobserved elements of the decompositions. When placed within the male residual distribution UK women achieve a lower position than their German counterparts, they are ranked at 14% compared to 25%. German women make differential gains of 9.3 percentage points as a result of this relatively more favourable endowment of unobserved characteristics. There is also less wage inequality within the German labour market, the residual standard deviations from the male earnings functions are .296 for Germany and .382 for the UK. The relative gain from this for German women is 2.4 percentage points.

Combining the terms into the productivity effects and the wage inequality effects, as recommended by Kidd and Shannon (2001), reveals the following results;

Productivity = term 1 + term 3 = 0.233 – 0.119 = 0.114

Wage Inequality = term 2 + term 4 = -0.058 – 0.031 = -0.089.

Showing that UK women are in a more favourable position in that their relative endowment of observed and unobserved characteristics is closer to the male endowment in their country. Whilst the German women receive more equitable returns from their endowment of skills, thus confirming one of the propositions of this chapter. Wage inequality has a negative impact upon the gender wage gap (Blau and Kahn 1992) and given the analysis in Chapter 3 it was anticipated that there would be less wage inequality in Germany, hence that should have a positive impact upon its wage gap comparative to the UK.

A second major objective of this thesis is to reveal the impact that differences in the sample of employed people, i.e. selectivity differences, have to cross-country differentials. This is done by calculating the cross-country differences in the Neuman and Oaxaca (1998) decompositions, these are shown in Table 5.11, below. The German and UK values are from the original decompositions reported in Tables 5.5 and 5.9 respectively, then the difference is simply the UK value subtracted from the German one.

Table 5.12

	Germany 1996	**UK 1997**	**Difference**
$(\overline{X}_m - \overline{X}_f)'\hat{\beta}_m$	0.002	-0.072	0.074
$\overline{X}_f'(\hat{\beta}_m - \hat{\beta}_f)$	0.426	0.802	-0.376
$\hat{\theta}_m(\hat{\lambda}_m - \hat{\lambda}_f^0)$	0.027	0.036	-0.009
$\hat{\theta}_m(\hat{\lambda}_f^0 - \hat{\lambda}_f)$	0.132	0.022	0.11
$(\hat{\theta}_m - \hat{\theta}_f)\hat{\lambda}_f$	-0.320	-0.544	0.224
Wage Gap	**0.267**	**0.244**	**0.023**

As reported above, the relative position of German women is slightly worse than their UK counterparts, with their wage gap being 1.8% wider. Terms 1 and 3, $(\overline{X}_m - \overline{X}_f)'\hat{\beta}_m$ and $\hat{\theta}_m(\hat{\lambda}_m - \hat{\lambda}_f^0)$, reflect the factors explained in both the wage and participation equations, these two combined reveal that German women are 0.065 log points (0.074 - 0.009) worse off as a result of these. All of this is being due to the variables explaining wages as German women have a slightly more favourable endowment of the factors explaining participation. This concurs with the earlier finding that the endowment of labour market characteristics for UK women is far closer to the men's than it is in Germany. Terms 2 and 4, $\overline{X}_f'(\hat{\beta}_m - \hat{\beta}_f)$ and $\hat{\theta}_m(\hat{\lambda}_f^0 - \hat{\lambda}_f)$, combined show that German women are 0.266 log points better off as a result of factors unexplained in the wage and participation functions. As outlined earlier the inclusion of the sample selection term has the effect of flattening out the earnings function and raising the intercept, because age/experience and education have a bigger impact upon participation than earnings. For both countries the more marked increase in the male intercept then dominates the decomposition. The gender difference in the intercept term being significantly greater than the wage gap. In this cross-country comparison the German women are shown to be better off as the flattening process is less pronounced in their case and they retain more favourable returns to their experience. Indicating that where German women remain in employment they can expect to narrow the gender wage gap over time.

Finally, the selectivity term, $(\hat{\theta}_m - \hat{\theta}_f)\hat{\lambda}_f$, treats German women in a less beneficial fashion. The earlier analysis highlighted some common features relating to selectivity, with it having a strong narrowing effect upon the gender wage gap in both countries. For men and women in Germany as well as in the UK the coefficient on the sample selection term is negative. Indicating that in all four cases those in employment tend to be below the average in terms of measured characteristics. This then leads to a narrower gender wage gap in both countries as the low skilled men have a lower reservation wage than comparable women. In short, low skilled men tend to accept low paid employment whilst low skilled women have a greater tendency to remain outside of paid employment. When it comes to making a cross-country comparison of this it is simply more pronounced in the UK. Although UK women are closer to the men in terms of participation, which widens the relative gender wage gap, this is more than offset by a larger difference in the male and female sample selection coefficients. This indicates that in the UK the gap between the male and female low skilled reservation wage tends to be larger and it improves the relative wage differential position of UK women by 0.224 log points.

v) Inter-temporal Analysis:

A third major objective of this thesis is to use the greater compatibility and panel structure of the data to highlight the causes of inter-temporal changes. With the first step in the process being to repeat the earlier analysis using the data for 1991. In the same manner as previously the unadjusted estimates and decompositions have been carried out, but in the interests of brevity and clarity they are included in Appendix 5.9. Table 5.13 reports the results from the earnings functions corrected for selectivity bias, the related probit estimates are in Appendix 5.10. As a result of the adjustment the changes are very similar to those in 1997, with the education and experience variables falling in value and losing some of their significance. This is translated into the decomposition with differential returns to experience being the dominant factor, in this case around 75% of the unexplained term is due to lower female returns to experience. The IMR variable is once again negative and significant in both cases, but once again the much lower male value suggests a lower reservation wage for men.

Table 5.14 shows the various decompositions with selectivity included, for reference the full decomposition is in Appendix 5.11. As with 1997 the decomposition is dominated by two features. Firstly, a large unexplained component from the earnings functions predominantly made up of differences in the intercept terms, although differing returns to experience are also important in this year. Secondly, the large narrowing effect of the selectivity term reflecting the lower male reservation wage.

Table 5.13 Selectivity Corrected Earnings Functions: UK 1991

	Male			Female		
Variable	Mean	Coefficient	t-ratio	Mean	Coefficient	t-ratio
Constant		2.163**	35.8		1.461**	29.4
Experience	19.981	0.015**	4.8	20.944	0.010*	3.1
Experience^2	543.8	-0.0001**	-1.0	591.2	-0.0001	-1.9
Education 1	0.183	0.014	0.5	0.205	-0.099**	-3.4
Education 3	0.157	0.123**	4.7	0.103	0.113**	3.6
Education 4	0.413	0.261**	11.7	0.343	0.284**	12.4
Part-time	0.020	0.118	1.9	0.377	-0.070**	-3.3
Public Sector	0.201	0.007	0.2	0.381	0.240**	7.9
Large Firm	0.220	0.039**	1.7	0.158	0.007	0.3
Small Firm	0.391	-0.094**	-4.8	0.524	-0.144**	-7.0
Married	0.665	-0.093**	-4.1	0.642	0.019	0.9
Agriculture	0.016	-0.259**	-3.7	0.005	-0.328**	-2.6
Mining	0.020	0.161**	2.6	0.004	0.186*	1.3
Utilities	0.026	0.130**	2.4	0.006	0.325**	2.8
Construction	0.061	-0.019	-0.5	0.006	0.048	0.4
Services	0.133	-0.097**	-3.4	0.202	-0.094**	-3.1
Transport	0.094	-0.060	-1.9	0.028	0.059	1.0
Finance	0.109	0.170**	5.6	0.127	0.244**	7.2
Community	0.195	0.007	0.2	0.467	-0.116**	-3.2
Insider	0.359	-0.003	-0.1	0.279	0.002	0.1
Outsider	0.357	-0.110**	-5.2	0.408	-0.121**	-5.7
λ	0.580	-1.227**	-20.3	0.599	-0.333**	-9.0
Dep. Variable		Ln Wage			Ln Wage	
Mean		1.714			1.393	
Standard Dev.		0.515			0.497	
Observations		2149			2153	
R-squared		0.441			0.340	
RSS		318.5			350.6	
Log-Like		-997.8			-1101.2	

** and * represents significance at the 5% and 10% levels respectively.
# reported t-ratios are based upon White's heteroscedastic consistent standard errors.

Table 5.14 Decomposition of Wage Differentials with Selectivity Correction.

UK 1991

Estimates of average lambdas and associated coefficients.	
$\log w_m - \log w_f$	0.321
$\hat{\lambda}_m$	0.580
$\hat{\lambda}_f$	0.599
$\hat{\lambda}_f^0$	0.592
$\hat{\theta}_m$	-1.227
$\hat{\theta}_f$	-0.333
$(\overline{X}_m - \overline{X}_f)'\hat{\beta}_m$	-0.012
$\overline{X}_f'(\hat{\beta}_m - \hat{\beta}_f)$	0.846
$\hat{\theta}_m(\hat{\lambda}_m - \hat{\lambda}_f^0)$	0.015
$\hat{\theta}_m(\hat{\lambda}_f^0 - \hat{\lambda}_f)$	0.008
$(\hat{\theta}_m - \hat{\theta}_f)\hat{\lambda}_f$	-0.536

		Contribution of		
	$\log w_m - \log w_f$	Explained	Unexplained	Selectivity
Oaxaca	0.321	0.012 (4%)	0.310 (96%)	0.000 (0.0%)
Option 1		-0.533 (-166%)	0.854 (266%)	0.000 (0.0%)
Option 2		0.003 (1%)	0.318 (99%)	0.000 (0.0%)
Option 3		0.003 (1%)	0.854 (266%)	-0.536 (-167%)

For ease of comparison the decomposition results for both years are summarised together in Table 5.15. Over the period considered the differential narrows by 5.9 percentage points, this being consistent with Kingsmill (2003), who reports from cross-sectional data a narrowing of 5 percentage points during the 1990's. The very strong narrowing of the wage gap in the UK is mainly due to two factors, the results show that the overall narrowing of 0.077 log points is actually exceeded by improvements solely within the factors determining earnings, there is actually a slight worsening in the factors influencing participation. Closer inspection of the decomposition reveals that more equitable returns to education and a more favourable age/experience distribution for women in employment as the major determinants of the improvements in the unexplained and explained differentials respectively.

Table 5.15 UK Sample Selection Decomposition Summary

	1991	1997	Difference
$(\bar{X}_m - \bar{X}_f)'\hat{\beta}_m$	-0.12	-0.072	0.060
$\bar{X}_f'(\hat{\beta}_m - \hat{\beta}_f)$	0.846	0.802	0.044
$\hat{\theta}_m(\hat{\lambda}_m - \hat{\lambda}_f^0)$	0.015	0.036	-0.021
$\hat{\theta}_m(\hat{\lambda}_f^0 - \hat{\lambda}_f)$	0.008	0.022	-0.014
$(\hat{\theta}_m - \hat{\theta}_f)\hat{\lambda}_f$	-0.536	-0.544	0.008
Wage Gap	**0.321**	**0.248**	**0.077**

Finally, in order to highlight the impact of any changes within the wage distributions the Juhn et al (1991) inter-temporal decomposition is applied, this being summarised in Table 5.16, the full set of results are in Appendix 5.12.

Table 5.16 UK Juhn et al Decomposition Summary

Year	Term 1 $(\delta Z_j - \delta Z_k)\beta_k$	Term 2 $\delta Z_j(\beta_j - \beta_k)$	Term 3 $(\delta\psi_j - \delta\psi_k)\sigma_k$	Term 4 $\delta\psi_j(\sigma_j - \sigma_k)$	Total
1991/97	-0.003 (-0.2%)	0.029 (2.2%)	0.047 (3.6%)	0.004 (0.3%)	0.077 (5.9%)

Remembering that the terms can be combined into the endowment effects (term 1 + term 3) and the wage structure effects (term 2 + term 4) (Kidd and Shannon 2001), these reveal that the narrowing is due to a strong endowment effect, (-0.003 + 0.047 = 0.044). With this revealing women closing the gap in terms of unobserved characteristics but there has been a marginal worsening in observed characteristics. The wage structure effects, terms 2 and 4, are both positive, (0.029 + 0.004 = 0.033), hence unlike the 1980's there is no evidence of rising inequality. This concurs with Prasad (2002) who found that UK wage inequality has been fairly steady since the early 1990's. Thus UK women have continued in then 1990's, as they did in the 1980's, to close the skills gap (Blau and Kahn 1996), however they are no longer 'swimming upstream' against the tide of rising inequality.

5.5 Conclusion

This chapter set out to use decomposition analysis as a tool to explore the gender wage gaps in the UK and Germany. This analysis was used to indicate the extent of discrimination in both countries, as well as highlighting what is revealed by cross-country and inter-temporal comparisons. In all cases a clear majority of the wage gap was shown to be unexplained by the chosen variables. Whilst accepting the difficulties of estimating discrimination with any precision using decomposition techniques, it does at least suggest that gender wage discrimination is still present in both countries.

In terms of the broader investigation of the wage gaps the UK differential was shown to be largely 'explained' by men having more education and the high proportion of women working part-time. Whilst being predominantly 'unexplained' by differential returns to experience, marriage as well as an unfavourable occupational segregation. In Germany the 'explained' component was dominated by higher female employment rates in the low paying East, with the 'unexplained' term being mainly due to differential returns to marriage.

By the end of the period studied the UK gender gap was marginally narrower than Germany's. It was anticipated that the UK gap would be wider and this was indeed the case initially. The eventual smaller UK differential was entirely due to a narrower UK skills gap, this being offset by higher levels of inequality in the UK. The inter-temporal analysis revealed that the UK narrowed the wage gap very strongly during the 1990's. Changes in selectivity were shown to have a major positive effect upon the gender differential and in the UK this was compounded by a narrowing of the skills gap and a halt to rising wage inequality.

From both the cross-country and inter-temporal analysis it is clear that once comparisons are being made across countries or time the issue of selectivity takes on heightened significance. In cross-sectional studies the issue is merely one of removing possible sample selection bias. However, in comparative studies selectivity differences raise important issues, such as why is the employed sample more (or less) representative of the overall population in one period than another? With the resolution of such issues leading to a much clearer understanding of the gender wage gap and its causes.

In this analysis the impact of sample selection has a massive effect upon the gender wage gap in both countries. Common features being that those in employment tend to be below average compared to the overall population in terms of their labour supply characteristics. Also for those with lower levels of labour market skills reservation wages tend to be relatively low. It is shown in both the UK and Germany that this last feature is more pronounced for the men leading to a strong narrowing effect upon the gender wage gap. This resulting from low skilled women being more likely to remain outside of employment and low skilled men being more likely to accept relatively poorly paying job offers.

Given that differences in sample selection have been shown here to be crucial to the size of the gender wage gap. It is not unreasonable to assume that any changes to the characteristics of those employed in comparison to the overall population and/or changes to the relationship between labour supply characteristics and the reservation wage are likely to lead to movements in the gender wage gap. It has already been highlighted that this has been largely ignored within the literature, consequently the following chapter will explore this issue in detail to reveal the driving forces behind these selectivity changes.

CHAPTER 6

Gender Earnings Mobility

6.1 Introduction

In situations where there has been a narrowing of the gender wage gap it is commonplace to explain this in terms of either an improvement in women's relative endowment of the factors determining wages, i.e. skills etc., or else more equitable returns from these factors. The inter-temporal analysis of the previous chapter highlights an extra dimension to this in that it reveals changes in sample selection as another possibly important component. Within cross-sectional analysis sample selection merely represents a potential source of bias and requires the necessary adjustment to remove that bias. However within an inter-temporal framework changes to the population of employed people can obviously have an impact upon the gender wage gap.

Between two points in time if women in general attain a better endowment of the factors determining employment, or become more successful in translating those factors into higher wages, or there is a reduction in residual inequality, there will be a narrowing of the gender wage gap. With this improvement being revealed, in decomposition analysis, through changes to the selectivity term. Admittedly this is not too dissimilar to saying that women's skill endowments or their returns from these endowments have improved. However, what is significantly different, is that by making use of panel data it is possible to separate any wage differential change into the contribution from those women in employment throughout the period considered and those who found employment after that date. With this being of critical importance for policy makers since if the former are shown to be the main source of the wage gap narrowing, this would imply that policies promoting female participation would be the most likely to have a positive effect upon the gender differential. Whilst if it is the latter this would pinpoint female human capital accumulation prior to joining, or rejoining, the labour market as the most fruitful policy target. Consequently the purpose of this chapter is to develop a clearer understanding of the inter-temporal wage gap changes highlighted in Chapter 5. This being done by focusing separately upon the impact of women who were already in employment at the start of the analysis in 1991 compared to those finding employment at a later date.

If changes within the employed population are going to raise the mean female wage relative to the men's it implies that either the characteristics of those women employed has moved further up the distribution of characteristics for the whole population. Or else for a given endowment of characteristics, women have become more successful in translating these into higher earnings.

The population of people in employment is a stock and flow concept with, over any period, some people remaining employed for the entire period, others leaving and some people finding a job. This allows any sample selection changes, revealed through an inter-temporal decomposition, to be separated into 4 possibilities. It has occurred either because those women who have remained in employment have improved their endowment of productive characteristics relative to those men also remaining in employment, or they have received more equitable treatment for their characteristics. Alternatively those women moving into jobs may be relatively higher skilled than those moving out, or again they may simply be receiving fairer treatment. In any inter-temporal analysis this separation is important since problems in each of the four areas require a different policy response. For example if there is a gender skills gap amongst those entering employment that would raise issues relating to educational provision, if there was inequitable treatment of those new entrants that would point to the recruitment processes. Whilst the same features within those continuing in employment would flag up access to on the job training and promotion respectively.

Since cross-sectional data would use completely separate samples in each period this type of approach would be impossible. As a result this chapter makes use of the panel structure of the data to separate those in employment into these two identifiable groups, then carries out analysis of their impact upon the gender wage gap independently. This is done by exploring earnings mobility for those remaining in employment and by using decomposition of earnings functions for the rest. With the results highlighting the relative importance of each of the four factors outlined above to gender wage gap changes.

6.2 Backgroung to Earnings Mobility

As earnings mobility differs from the analysis undertaken so far it is important to establish in advance the factors likely to influence it. Clearly the rate at which women, compared to men, move up (and down) the earnings distribution will have a significant impact upon inter-temporal wage gap changes. Whilst earnings mobility is not as rich a source within the literature as decomposition analysis, there are a number of key sources for the UK and Germany.

Firstly, in a static analysis Sloane and Theodossiou (1994) establish that, for the UK, the probability of being high paid increases significantly for married men, highly educated and those employed in larger establishments. With being a women by far the most important factor influencing the probability of appearing in the low paid category. Dynamic studies of the UK by Gregory and Elias (1994), and Stewart and Swaffield (1998) indicate that education, training, firm size, and, for men only, being under 25 and marriage have the most significant impact upon the likelihood of moving out of the low pay category. The reverse position of being more likely to remain in low pay is most significantly affected by service sector and part-time employment, as well as being female.

Studies of earnings mobility in Germany are far less prevalent, but DiPrete and McManus (1996) do identify age and education as the most important explanatory factors. With changing jobs also having a positive impact upon mobility.

The historical empirical evidence points to there being two consistent factors present, however the results detailed in the previous chapter suggest that they may not be as applicable to more recent times. Firstly past evidence indicated that women would be at a disadvantage in terms of earnings mobility when compared to men. In single country studies of earnings mobility Burkhauser, Holtz-Eakin and Rhody (1996) confirmed this for West German women in the 1980's, with Sloane and Theodossiou (1996) revealing the same for British women. However, with both countries narrowing the wage gap, as shown in the previous chapter, this may not be the case for this period. Secondly, for a range of reasons outlined below, past evidence suggests that the level of this disadvantage would be less acute for German women, but again the much stronger narrowing within the UK indicates that this may not be the case for the 1990's.

In their study of OECD countries Keese, *et al* (1998) found that the low paid tend to be the low skilled, under 25's and women. With the exception of the under 25's the incidence of people in these groups being low paid is higher in the UK than in Germany. Furthermore UK workers are found to be more likely to move down into low pay and less likely to move out. Researchers have already established that the gender wage gap has generally been narrower in Germany than in the UK, (Brookes 1999, Brookes, Hinks and Watson 1999, Blau and Kahn 1992, Callan 1996, Black, Trainor and Spencer 1999). This in itself would suggest that female relative mobility has been more favourable in Germany, but the large UK narrowing during the period under study, highlighted in the previous chapter, means that this is unlikely to be so for this period.

In addition the level of earnings inequality has been shown to be greater in the UK, (Gottschalk and Smeeding 1997), this is important here because, Dickens (2000) detects an inverse relationship between earnings inequality and earnings mobility. As inequality rises the wage distribution widens and individuals then have to increase (or decrease) their wage by a greater amount to move up or down the distribution by the same proportion. The overall picture is that UK women have been shown to be in a less favourable position than their German counterparts, they also have to increase (or decrease) their earnings by a greater proportion to display the same level of earnings mobility because of the greater inequality.

The remainder of this chapter calculates a descriptive measure of individual earnings mobility across the two countries, before estimating the impact of various explanatory factors upon the likelihood of upward and downward mobility. These estimates are then used to establish the level of advantage/disadvantage that women face in each country. To a large extent the initial expectations are rejected by the results, so the later sections attempt to reconcile the results with the expectations. The focus then switches to the short term participants with the results showing that changes within this group have a much larger impact upon the gender wage gap, especially in the UK.

6.3 Method

The purpose of this chapter is to develop a deeper understanding of the factors generating an inter-temporal narrowing of the gender wage gap, most specifically those factors which had appeared as sample selection changes in the empirical analysis of the previous chapter. In order to facilitate this it is necessary to separate the sample into two groups. Firstly those who are in paid employment at the start of the period being studied as well as at the end, or long term participants. And secondly, those only observed to be employed in one of those years, with this group being referred to as short term participants. The analysis then proceeds by focusing intially upon the long term participants and then concluding with the short term.

The years used in the analysis are 1991-1996 inclusive for both countries. This differs from the period studied in the last chapter as it is crucial to make comparisons using the same period because mobility is likely to rise over time. Using this data the chapter begins by considering the long term participants, analysing gender mobility in the UK and Germany and making a comparative analysis.

To get a measure of mobility we follow Fabig (1998) and compute a relative earnings position for each individual by dividing hourly earnings for that person by the population mean. The distribution of earnings is then calibrated into decile groups and individuals are assigned to their relevant group in each year. Relative mobility is then measured by the extent of movement over the decile groups. This can be formalised through the calculation of a Batholomex Index (Batholomew 1973). A matrix is constructed showing each individuals decile ranking in years i and j, and the conditional probabilities of being in each decile group in the subsequent year given that the individual was in a particular group in the previous year are calculated. The values outside of the main diagonal of this transition matrix are then weighted by the probability of being in that decile group in the initial period, the sum of these estimates gives the Bartholemew Index.[3]

Adopting the notation used by Fabig (1998) gives;

[3] See Bartholomew 1973 and Boudon 1973 for fuller coverage of the index and transition matrices respectively.

$$BI = \sum_{i=1}^{n} \sum_{j=1}^{n} p_i . p_{ij} |i - j|$$

where p_i is the probability of being in decile group i in the first year and

p_{ij} is the probability of being in decile group j in the later year given the initial year decile group i. The greater the level of mobility the lower will be the values along the main diagonal and the greater the value of the index. In the extreme case where there is no mobility BI=0. Overall earnings mobility is made up of both upward and downward movements, therefore it is important to separate the two since they have the opposite effect upon the mean wage. Fabig (1998) indicates how this can be done by producing two truncated indices, this merely requires splitting the initial index into the section above the leading diagonal and the section below. Thus allowing for upward mobility and downward mobility to be measured separately.

Ordered probit models are estimated for both countries to estimate the impact of the key explanatory factors, highlighted in the previous section, upon earnings mobility. The dependent variable takes on a value of 0 if the individual is in a lower decile group in 1996 than in 1991, 1 for the same group and 2 for a higher group. Since the values of the dependent variable have a clear ranking an ordered probit technique is adopted. (Greene 2000).

The model is estimated from the equation; $y^* = \beta' x + \varepsilon$, y* is unobserved but we do observe;

y = 0 if $y^* \leq 0$, y = 1 if $0 < y^* \leq \mu_1$ and y = 2 if $\mu_1 < y^* \leq \mu_2$

The $\mu's$ are unknown parameters to be estimated with β. The probabilities of the three outcomes are;

$$\Pr ob(y=0) = 1-\phi(\beta' x)$$

$$\Pr ob(y=1) = \phi(\mu_1 - \beta' x) - \phi(-\beta' x)$$

$$\Pr ob(y=2) = 1-\phi(\mu_1 - \beta' x)$$

ϕ is the standardised normal distribution. From these probabilities the marginal effects of changes in the regressors are;

$$\text{Marginal Effect } (0) = -\phi(\beta' x)\beta$$

$$\text{Marginal Effect } (1) = [\phi(-\beta' x) - \phi(\mu_1 - \beta' x)]\beta$$

$$\text{Marginal Effect } (2) = \phi(\mu_1 - \beta' x)\beta.$$

(Greene 2000).

In addition, to allow cross-country comparisons to be made, the restriction that the female coefficients are equal to the male coefficients is imposed upon the female equations. The 3 probabilities are then re-calculated to show the differences in the likelihood of upward and downward mobility for equally endowed men and women. This reveals a percentile mobility advantage/disadvantage for women in one country which can be directly compared with the same estimate from another country.

Finally, in order to facilitate analysis of the impact of those workers whose earnings mobility cannot be calculated, i.e. those in employment in 1991 but not in 1996 and vice versa, the focus switches to the short term participants. As earnings mobility cannot be established for this group decomposition analysis is applied. The same technique is used as in the previous chapter, where earnings functions are estimated separately for each gender in both of the relevant years, then any changes in the gender wage gap are decomposed inter-temporally using the Juhn et al (1991) method.

6.4 Chosen Variables : Ordered Probit Model

The dependent variable is created from each individual's decile position in the two chosen years, the decile positions are based upon the distribution of the log of gross hourly earnings of the combined male and female sample in each year. The following explanatory variables are included within the ordered probit model, as those most likely to explain an individuals earnings mobility over time:

Age 1, 2, 3 and 4. Different age categories of 16-24, 25-34, 35-49 and 50+ respectively. Seeks to map the age-earnings profile and pick up the effects of upward mobility in the early parts of the working life and the likely downward mobility in the later stages. Age 3 is used as the base group.

Education 1,2,3 and 4. Dummy variables for the highest level of education obtained, being, primary level, second level - first stage, second level - second stage and third level respectively. Education 2 is used as the base group in each case. These seek to highlight the impact of education upon the trajectory of the earnings profile. More education indicates a higher skill level upon entry into the labour market, i.e. a higher starting salary, this could in itself limit the scope for future upward mobility. However it could also indicate a higher propensity to acquire human capital throughout their working life, hence making the age-earnings profile steeper for those with higher levels of education.

Part-time. A dummy variable to identify those working less than 30 hours per week. For part-timers it is likely that they will not be able to acquire human capital at the same rate as full-timers, consequently they will be more likely to slip down the earnings distribution over time.

Health. Identifies those reporting to be in poor health at the time of the survey. Highlighting any adverse effects upon their work performance.

East Germany. Dummy variable for those living in East Germany. It is likely that as the two economies integrate over time, factors such as, collective bargaining agreements spreading to include employees in the former East German state, will have a positive impact upon earnings mobility for these workers.

One of the problems with dynamic analysis of this type is the potential for individuals to change their state during the period being considered, this is covered in detail by Stewart and Swaffield (1998). Relating it to this situation, the above variables identify the various states at the outset which are most likely to have an impact upon upward or downward mobility, however how can, for example, a part-timer finding full-time employment be taken account of? Consequently the following variables are included to pick up the effects of any changes to the individual's state over the time period.

Unemployed. This dummy variable identifies any workers from the 1991 survey who experience a spell of unemployment, before returning to paid employment at some point prior to the 1996 survey. Mincer and Ofek (1983) identify the relationship between unemployment and earnings mobility, with erosion of human capital whilst unemployed increasing the probability of returning to work at a wage below the exit wage. Then once back in employment there is a rapid repair to the human capital, as old skills are quickly re-learned, leading to a sharp wage increase. Consequently, although it is important to control for the impact of unemployment, the sign of the estimated coefficient is ambiguous depending upon which of the two effects is dominant.

Part-time - Full-time and *Full-time - Part-time.* If the relationship between time at work and human capital accumulation holds, clearly moving from one state to the other will affect the rate at which capital is accumulated, hence influencing the probability of upward or downward mobility.

Health Improves and *Health Declines.* Dummy variables identifying those that move into or out of the poor health category.

Job Change. A dummy variable to identify those who change job without experiencing a period of unemployment. There are two potentially opposing factors at work here depending upon whether the individual has quit or been laid off from their original job. A quit would indicate finding a new, probably more lucrative job, whilst a lay off would suggest having to accept a job offer, in many cases lower paid, as the existing job disappears.

East - West. A dummy variable for anyone living in East Germany in 1991 who, by 1996, had moved to the West. There are no examples of individuals moving from West to East, so the reverse dummy could not be constructed.

Previous Unemployment. Unemployment has a lasting effect upon earnings, therefore it is likely that anyone unemployed prior to the start of the study will have different earnings mobility probabilities. Therefore a dummy variable is created for anyone experiencing a spell of unemployment in the two years prior to 1991. However this could not be done for the UK since 1991 is the first year where the data is available.

In principle this type of analysis seeks to establish the trajectory of an individual's earnings over time and estimate the impact of the various explanatory variables upon that trajectory. Fundamentally it assumes that the rate of increase in earnings for a particular period is influenced by the rate of increase in previous periods. A potential problem with this is that when the analysis begins, in this case a fairly arbitrary date of 1991, individuals have already embarked upon a particular trajectory. If earnings mobility is influenced by earnings growth in previous periods, what about the periods prior to 1991? With this data giving us little or no information about that. This 'initial conditions problem' can be traced back to Heckman (1981) and more recently Stewart and Swaffield (1999) have developed upon this and argued that initial conditions are endogenous, hence omitting them from the analysis leads to biased estimates. Although it has to be accepted that Cappellari (2002) reaches a conflicting conclusion using Italian data. The important thing being here that the relatively limited attempts to control for initial conditions could possibly lead to biased estimates. This indicates that any gender differences in earnings mobility may simply reflect individuals being already linked to particular trajectories prior to the commencement of the analysis. Hence, with the limited amount of adjustment for the initial conditions, the resultant findings need to be tempered accordingly.

In addition to the above variables, Sloane and Theodossiou (1996) show that marriage and children have a significant impact upon upward and downward mobility respectively, so these variables were included in the model. However as they were insignificant in every single case they were therefore omitted for clarity and ease of analysis.

6.5 Results

The purpose of this empirical analysis is to isolate the impact of earnings mobility, as well as people moving into, and out of, employment upon the gender wage gap. Before this can be done it requires firstly, a description of the wage distributions, since these are the basis for quantifying earnings mobility, and secondly, splitting the samples into their short term and long term participants.

Table 6.1 Descriptive Statistics (Combined)

	Observations	Combined Mean	St. Dev.	Male Mean	Female Mean	F/M Ratio
Germany 91	4137	2.902	0.488	2.962	2.672	0.749
Germany 96	3247	3.121	0.477	3.187	2.907	0.756
UK 91	4505	1.57	0.521	1.705	1.385	0.726
UK 96	4599	1.85	0.527	1.877	1.661	0.806

The necessary information to carry out the first of these is reproduced in Table 6.1. This records, firstly, the overall wage distribution with men and women combined, this is the basis upon which each individuals earnings decile ranking is established. Secondly, it records the gender means separately and their resultant wage gaps. These concur with the findings from the previous chapter, with a smaller narrowing in Germany and a very large one in the UK.

The second stage of the process is to separate the data into the long term labour market participants, i.e. those working in both years and able to be included in the ordered probit model, and those who are earning in only one of the two chosen years.

Table 6.2 Descriptive Statistics (Long Term and Short Term Participants)

	Male		Female		
	Observations	Mean	Observations	Mean	F/M Ratio
Long Term					
Germany 91	1451	3.013	930	2.731	0.754
Germany 96	1451	3.223	930	2.962	0.770
UK 91	1333	1.734	1339	1.415	0.727
UK 96	1333	2.001	1339	1.705	0.744
Short Term					
Germany 91	997	2.908	759	2.612	0.744
Germany 96	400	3.061	466	2.794	0.766
UK 91	934	1.666	899	1.345	0.725
UK 96	926	1.714	1001	1.614	0.905

Table 6.2 gives the means and the wage gaps for each of the eight different categories. The most striking result is the large improvement of female short term participants in the UK, with a very large narrowing of the wage gap from 27.5% to 9.5%. Germany displays a relatively minor change, when compared to the UK, resulting from similar

improvements from both the short term and the long term participants, 2.2 and 1.6% respectively. In the UK however the significant reduction of the gender wage gap is the result of factors within the short term group (18%), the narrowing in the long term group is of a similar magnitude to their counterparts in Germany (1.7%). This in itself is a highly significant finding. The analysis from Chapter 5 revealed that sample selection changes were an important component of the wage gap narrowing in the UK. However it left a number of questions unanswered as to what the causes of these changes might be, but these results give a clear insight into what those causes actually are.There is a striking difference between the men and women in the labour market in 1991 but not in 1996 and those reporting earnings in 1996 but not in 1991, or else a difference in the way they are treated by the labour market, with this being the basis for most of the sample selection changes.

Table 6.3. Earnings Mobility Statistics

Area	Group	Movers	Bartholomew Index	Truncated Index	Observations
Germany	Men	473 up (32.6%) 529 down (36.5%)	0.793	0.369 up 0.423 down	1451
Germany	Women	343 up (36.9%) 313 down (33.6%)	0.817	0.433 up 0.385 down	933
UK	Men	452 up (33.9%) 533 down (40.0%)	0.812	0.361 up 0.451 down	1333
UK	Women	480 up (35.8%) 494 down (36.9%)	0.821	0.416 up 0.405 down	1339

These results also indicate that the long term participants played a relatively minor role in the narrowing of the gender differential, this once again questions whether promoting female participation will necessarily have much of an impact upon the wage gap.

Consequently the empirical analysis will focus initially upon the long term participants before returning to the short term participants later.

In order to establish the extent of earnings mobility within the long term group transition matrices are calculated for each gender in both countries, these matrices are reproduced for reference in Appendices 6.1 - 6.4. The resulting Bartholomew indices and the raw movement numbers are given in Table 6.3 above. This indicates both countries are fairly similar in terms of the amount of mobility with similar movement numbers, the Bartholomew indices show male and female overall mobility of similar magnitude in both countries. However once upward and downward mobility is separated, the proportions show that women are more likely to move up the earnings distribution and less likely to move down, a finding which is supported by the truncated indices in both countries. This reveals that in both countries over this period women displayed more favourable levels of earnings mobility which is likely to have a positive impact upon the gender wage gap. However it is important to understand the key factors behind any gender differences in earnings mobility, i.e. to what extent does it reflect the relative endowments of those factors determining mobility and to what extent does it reflect the returns from those factors. Consequently quantitative models seeking to estimate the likelihood of individuals moving up or down the earnings distribution are applied.

For both countries ordered probit models of earnings mobility are estimated for men and women seperately, with Table 6.4 recording the estimates for Germany. With longitudinal analysis of this type there is always the possibility of sample selection bias, (see Asplund, Sloane and Theodossiou 1998 p.8.), consequently the Heckman 2 step procedure (Heckman 1979) has been applied. However for Germany the resultant inverse Mills ratio is insignificant for both genders. Suggesting that, at least in terms of earnings mobility, the observed sample is representative of the overall population.

The coefficients in Table 6.4 reveal that for men earnings mobility follows the age-earnings profile very closely, with strong upward mobility from the younger workers and downward mobility from those workers over 50. The female equation follows a fairly similar pattern, except that their coefficient on the late 20's early 30's dummy is insignificant, reflecting the greater likelihood of this group taking on child care responsibilities. Outside of age there are very few of the explanatory variables which reach significance, education has a positive impact upon earnings mobility but only at the highest level, those whose health became poor were adversely affected and East Germans experienced very strong upward mobility, presumably as the coverage of collective bargaining agreements extended into the former communist state.

Hunt (1997) suggests that two of the resultant features of the re-unification have been a sharp increase in unemployment rates in the East combined with a rise in the earnings of those managing to retain employment. As clearly this sample only includes those East Germans in the latter group it is to be expected that for those individuals there would have been positive and significant earnings mobility. This positive effect is significantly greater for women, since the female coefficient is higher than the men's. Again Hunt (1997) reveals the cause of this with the growth of East German unemployment not affecting men and women in the same fashion. For women becoming unemployed it has disprortionately been those with lower levels of skill, whilst for the men it has tended to be predominantly manual workers with considerably higher levels of skill. The outcome being that for those women in employment their average skill level and scope for earnings mobility has increased, but for men in employment they have decreased relative to the women

Table 6.4.

Ordered Probit Results: Germany

	Male			Female		
Variable	Coeff.	t-ratio	Mean	Coeff.	t-ratio	Mean
Constant	0.10	1.02	1.00	0.17	1.56	1.00
Age 16-24	0.30**	2.73	0.09	0.45**	3.40	0.11
Age 25-34	0.34**	4.77	0.31	0.13	1.43	0.30
Age 50+	-0.33**	-3.39	0.13	-0.20*	-1.57	0.11
Education 1	-0.05	-0.27	0.04	-0.01	-0.08	0.05
Education 3	0.11	1.04	0.66	0.12	1.12	0.62
Education 4	0.37**	3.12	0.19	0.50**	3.37	0.14
Part-time	-0.09	-0.27	0.01	-0.10	-1.08	0.29
Health	-0.25	-0.94	0.04	0.36	1.48	0.07
Unemployed	-0.14	-1.01	0.05	-0.37**	-2.40	0.07
Part-time - Full-time	-0.82	-1.39	0.004	-0.19	-1.14	0.07
Full-time - Part-time	0.11	0.33	0.01	-0.10	-0.63	0.07
Health Improves	0.49	1.55	0.03	-0.11	-0.36	0.04
Health Declines	-0.43**	-3.37	0.06	-0.32*	-1.91	0.05
East - West	6.53	0.00	0.001	-0.30	-0.45	0.003
Job Change	-0.05	-0.50	0.10	0.22*	1.78	0.11
Previous Unemployment	-0.33*	-1.60	0.02	0.41**	2.11	0.04
East Germany	0.80**	7.98	0.13	1.00**	7.55	0.14
Lambda	-0.20	-1.04	1.01	-0.22	-1.01	1.25
μ		0.84			0.83	
Obs.		1451			930	
Chi sq.(17)		159.6			143.8	
Iterations		17			16	
Log Like.		-1510.7			-945.1	
Rest.Log Like.		-1590.5			-1017.1	

* and ** denotes significance at the 10% and 5% levels respectively.

The earnings mobility of those returning after unemployment is interesting since the unemployed variable is insignificant for men but negative and significant for women. Whilst for those unemployed prior to 1991 it is significant in both cases, but positive for women and negative for men. The overall implication being that although unemployment has a smaller impact on earnings mobility initially for men, the effect is longer lasting, suggesting that women are more able to catch up in human capital accumulation.

Table 6.5.

Ordered Probit Results: UK

	Male			Female		
Variable	Coeff.	t-ratio	Mean	Coeff.	t-ratio	Mean
Constant	0.67**	2.71	1.00	-0.003	0.21	1.00
Age 16-24	0.96**	8.75	0.001	0.50**	4.11	0.01
Age 25-34	0.19**	2.50	0.11	0.07	0.91	0.13
Age 50+	-0.07	-0.47	0.19	-0.33**	-2.36	0.17
Education 1	0.80	0.78	0.14	0.24	0.57	0.13
Education 3	-0.10	-0.93	0.34	0.06	0.59	0.29
Education 4	-0.02	-0.16	0.10	0.24**	2.56	0.10
Part-time	-0.30	-0.69	0.02	-0.21**	-2.67	0.37
Health	-0.83*	-1.88	0.03	0.20	0.52	0.05
Unemployed	-0.60**	-4.35	0.07	-0.53**	-3.16	0.04
Part-time - Full-time	-0.09	-0.17	0.01	0.17	1.43	0.09
Full-time - Part-time	0.33	1.43	0.02	-0.04	-0.36	0.10
Job Change	-0.20**	-2.90	0.32	-0.30**	-4.29	0.30
Health Improves	0.76	1.56	0.02	-0.29	-0.70	0.04
Health Declines	-0.20	-1.00	0.03	0.07	0.42	0.04
Lambda	-0.47**	-1.98	0.98	0.43**	1.97	1.00
μ		0.70			0.72	
Obs.		1333			1339	
Chi sq.(15)		122.2			87.9	
Iterations		15			15	
Log Like.		-1382.1			-1414.6	
Rest.Log Like.		-1443.2			1458.6	

* and ** denotes significance at the 10% and 5% levels respectively.

Table 6.5, above, reproduces the ordered probit results for the UK, in this case the inverse Mills ratio variables from the Heckman procedure are significant. Once again earnings mobility follows the age-earnings profile fairly closely, although for men it is flat after the mid-30's peak with no significant evidence of downward mobility for the over 50's. For women, as was the case in Germany, there is no significant mobility for those women in their late 20's and early 30's. Education has no effect at all upon earnings mobility for men and only has a significant impact at the highest level for women.

The lower capital accumulation of part-timers has the expected negative impact for women. The effects of unemployment are more universal than in Germany, with both men and women having their likely return to work earnings lowered by a similar magnitude. The impact of changing jobs is also fairly universal, in both cases the coefficient is negative and significant, indicating that lay offs rather than quits are the more likely dominant cause of job change. Finally, looking at the IMR variable, it is significant in both cases, but positive for women and negative for men. This indicates that better qualified women, in terms of the factors explaining participation, are actually less likely to move up the earnings distribution. Possibly suggesting that for these women it is relatively easy to find employment, but they have much greater difficulties in obtaining subsequent significant pay increases.

Now, if the restriction that the female coefficients are equal to the male ones is imposed, the parameters can be re-estimated and values can be assigned to the extent of female mobility advantage/disadvantage in each case. In essence it simply estimates the difference between women's mobility performance over the period and how they would have performed if they received the same treatment as the men.

Table 6.6. Ordered Probit: Key Parameters

Germany					
	μ	$\beta'x$	**Prob. (y=0)** $1-\Phi(\beta'x)$	**Prob. (y=2)** $1-\Phi(\mu-\beta'x)$	**Prob. Advantage**
Male	0.838	0.391	34.8%	32.6%	
Female	0.827	0.485	31.8%	36.7%	7.1%
Imposed Female	0.838	0.331	37.1%	30.5%	-4.4%
UK					
	μ	$\beta'x$	**Prob. (y=0)** $1-\Phi(\beta'x)$	**Prob. (y=2)** $1-\Phi(\mu-\beta'x)$	**Prob. Advantage**
Male	0.701	0.267	39.4%	33.4%	
Female	0.721	0.35	36.3%	35.6%	5.3%
Imposed Female	0.701	0.165	43.4%	29.5%	-7.9%

Table 6.6, above, summarises the key parameters from the ordered probit estimates. The first row reveals the German model prediction that 34.8% of the men will move down the distribution and 32.6% will move up, this compares with 31.8% down and 36.7% up for the women. As a rough guide we can take this as a 7.1% mobility advantage for women, since they are 3% less likely to move down and 4.1% more likely to move up. Obviously this results from a combination of differential treatment, revealed through the estimated coefficients, plus different endowments of the explanatory factors, which can be described as an endowment effect. Imposing the male coefficients upon the female equation removes any differential treatment, with the results of this appearing in the final row of Table 6.6, consequently any remaining gender differences can be assigned to the

endowment effect. Applying this to German women moves both of the parameters rightward, suggesting that they are more likely to move down and less likely to move up, the parameters actually move beyond the male ones to 37.1% down and 30.5% up. This implies that the women actually have a poorer endowment of the explanatory factors since the model predicts that they should perform less well than the men in terms of mobility. Based on their endowments alone, and assuming equal treatment, comparing the first and third rows of Table 6.6 shows that they would be 2.3% more likely to move down and 2.1% less likely to move up. The fact that they perform better must all result from more favourable mobility returns from these explanatory factors. Although it must be accepted that the inability of the data to pick up any additional training during the period masks an important potential cause. Closer inspection of the coefficients, see Table 6.4, reveals that the most important factor is stronger mobility from the East German women, so although the process of integration is raising wages in East Germany generally, it is clearly happening at a faster rate for the women. With this resulting, as outlined earlier, from the changing relative skill levels of the men and women in employment.

The results from carrying out the same process for the UK are in the bottom section of Table 6.6, with these revealing a similar pattern within the UK, women have a probability advantage of 5.3%, (3.1% less likely to move down and 2.2% more likely to move up). Imposing the male coefficients upon the female equation predicts that women would have significantly poorer earnings mobility. Consequently all of this probability advantage is due to differential treatment, since as with Germany they have a poorer endowment of the explanatory factors. Analysing the estimated coefficients shows that by far the most significant factor is the behaviour of the IMR variable, this concurs with the findings from the previous chapter, confirming for the UK that the relationship between the error terms from the participation probit and the estimated model play an important role in gender wage gap movements. The interpretation in this case is that women predicted not to participate who actually do are more likely to move up the earnings distribution, and men in the same category are more likely to move down.

In an attempt to quantify the impact of this stronger female mobility upon the gender wage gap, Table 6.2 shows that for long term participants the gender wage gap narrowed by 1.6% and 1.7% for Germany and the UK respectively. Consequently it is fair to conclude that even when one gender has a clear advantage in terms of earnings mobility, it only has a relatively minor impact upon the gender wage gap over this type of period.

Finally it needs to be established how these results can be reconciled with previous estimates, as they are clearly at odds with expectations. For example Burkhauser *et al* (1996) find a mobility disadvantage for West German women in the 1980's, identifying random permanent yearly earnings shocks for men and more transitory shocks for women. Clearly with the case of Germany it is quite likely that the re-integration of the East German economy has had a major impact upon these results. It appears that the very strong mobility shown by East German women has been the key to their mobility exceeding that of the men. One would expect that as integration progresses the relative performances both across the genders and across the whole country will become more similar. Furthermore, a large proportion of the strong female mobility in East Germany has been caused by public sector wage growth, since a significant majority of East German women in the sample are public employees. This can be attributed to public sector pay in the East being brought in line with the West. Clearly when this process is completed the two differing levels of mobility will converge.

Similarly for the UK, the results are obviously at odds with the previous study by Sloane and Theodossiou (1996), who find a clear probability advantage for men both in terms of moving out of low pay and in terms of dropping into it. However Dickens (2000) did find marginally higher levels of female mobility in the 1990's. Consequently it may well be that improvements in female earnings mobility are simply one of a number of factors enabling the wage gap to narrow so strongly over this period.

The overall picture in terms of earnings mobility may in fact reflect changes in the structural composition of the UK labour market over the period considered. The principle of polarisation within modern labour markets where skill-based technical change is taking place and improving the position of skilled workers, whilst worsening the position of unskilled workers, is well documented within the literature, (see Katz and Autor 1999 for a detailed review). However more recent research suggests that this is too simplistic and the relationship between technical change and labour skill is more nuanced than this. Autor et al (2003) argue that for routine tasks technology can replace human labour irrespective of the skill level, but it cannot replace labour in non-routine tasks even if they are relatively low skill tasks. The consequence being that relative demand for labour will fall in routine tasks as technology supplants labour, but it will increase in non-routine tasks. As a result the scope for earnings mobility is likely to be higher amongst those workers performing non-routine tasks. Goos and Manning (2003) explore this relationship at length for the Uk labour market and find that some of the jobs most likely to be 'female jobs' such as care assistants, hospital ward assistants, nursery nurses and flight attendants are the ones displaying some of the highest growth levels. Whilst some traditional 'male jobs' such as coal mining, machine setter-operators and labourers in engineering and foundries are the ones showing the largest decline. Hence if the impact of this technical change effects women more favourably than men over this period it can plausibly explain the greater female earnings mobility.

The detailed analysis so far has focused entirely upon the long term participants within the sample, however as Table 6.2 reveals the short term participants play at least as important a role in wage gap changes. Table 6.7, below reports the gender means and gender wage ratios from the combined and separated samples. There is a narrowing of the gender wage gap in both countries, a very large one in the UK and a much smaller one in Germany, in each case the narrowing from the short term participants exceeds that of the long term participants. For any narrowing of the gender wage gap for these short term participants to take place, the women in this group in 1996 must be either more favourably endowed with productive characteristics, compared to the men, than their counterparts in 1991. Or else they must be more favourably treated within the labour market. The following analysis seeks to estimate the impact of each by applying the same technique as used in the previous chapter. Firstly estimating earnings functions seperately by gender in each of the years, then decomposing inter-temporally to reveal changes in the relative endowments of productive characteristics as well as inequality.

Table 6.7. Descriptive Statistics

Germany 1991	Male			Female			
	Observations	Mean	St. Dev.	Observations	Mean	St. Dev.	F/M Ratio
Combined	2448	2.962	0.474	1689	2.672	0.506	0.749
Long Term	1451	3.013	0.455	930	2.731	0.488	0.754
Short Term	997	2.908	0.497	759	2.612	0.508	0.744
Germany 1996	**Male**			**Female**			
	Observations	Mean	St. Dev.	Observations	Mean	St. Dev.	F/M Ratio
Combined	1851	3.187	0.464	1396	2.907	0.517	0.767
Long Term	1451	3.223	0.439	930	2.962	0.5	0.770
Short Term	400	3.061	0.523	466	2.794	0.53	0.766
UK 1991	**Male**			**Female**			
	Observations	Mean	St. Dev.	Observations	Mean	St. Dev.	F/M Ratio
Combined	2267	1.705	0.523	2238	1.385	0.498	0.726
Long Term	1333	1.734	0.502	1339	1.415	0.483	0.727
Short Term	934	1.666	0.549	899	1.345	0.521	0.725
UK 1996	**Male**			**Female**			
	Observations	Mean	St. Dev.	Observations	Mean	St. Dev.	F/M Ratio
Combined	2259	1.877	0.554	2340	1.661	0.543	0.806
Long Term	1333	2.001	0.508	1339	1.705	0.502	0.744
Short Term	926	1.714	0.569	1001	1.614	0.59	0.905

Table 6.8, below, summarises the results from carrying out this process for Germany, the narrowing of the differential by 2.2 percentage points is the outcome of two conflicting factors. Remembering from the previous chapter that terms 1 and 3 are the effects of observed and unobserved characteristics respectively and that terms 2 and 4 are the impact of wage and residual inequality. There is very clear evidence of a narrowing of the

skills gap, particularly unobserved characteristics, since both terms 1 and 3 had a positive effect upon the wage gap. However there is also clear evidence of rising inequality with terms 2 and 4 being negative. Therefore the 'swimming upstream against the tide of rising inequality' (Blau and Kahn 1996) highlighted in the previous chapter is also present for short term participants.

Table 6.8. Decomposition Summary: Germany 1991-1996

Year	Term 1 $(\delta Z_j - \delta Z_k)\beta_k$	Term 2 $\delta Z_j(\beta_j - \beta_k)$	Term 3 $(\delta\psi_j - \delta\psi_k)\sigma_k$	Term 4 $\delta\psi_j(\sigma_j - \sigma_k)$	Total
1991/96	0.029 (2.2%)	-0.056 (-4.2%)	0.089 (6.7%)	-0.033 (-2.5%)	0.029 (2.2%)

The earnings functions are included in Appendix 6.2 and the full decompositions are in Appendix 6.3, closer inspection of these reveal that the major factor behind the closing of the skills gap is a large shift in the average experience in each sample. For 1991 the average years of experience are 23.34 for men and 20.82 for women, by 1996 these had become 14.71 and 16.29 respectively. Obviously as some older workers had left the labour market they had been replaced in the sample by younger workers. As this process was more marked within the male sample, by 1996 the experience profile of the short term sample now favoured the women. Interestingly the IMR variable is insignificant in all 4 cases, this is also so for the UK, clearly changes in sample selection which played such an important role previously, are not relevant to changes in the gender wage gap for these short term participants.

Table 6.9. Decomposition Summary: UK 1991-1996

Year	Term 1 $(\delta Z_j - \delta Z_k)\beta_k$	Term 2 $\delta Z_j(\beta_j - \beta_k)$	Term 3 $(\delta\psi_j - \delta\psi_k)\sigma_k$	Term 4 $\delta\psi_j(\sigma_j - \sigma_k)$	Total
1991/96	0.092 (7.5%)	-0.127 (-10.3%)	0.289 (23.5%)	-0.033 (-2.7%)	0.221 (18.0%)

Table 6.9, above, summarises the same results for the UK, as already noted there is an exceedingly large narrowing of the wage gap for those short term participants of 18 percentage points. This results from the same two opposing factors as found with the German short term participants, although obviously in this case they are far more pronounced. These being a very large closing of the skills gap, again predominantly unobserved characteristics, overall this equated to an improvement of 31 percentage points. This being offset to the tune of 13 percentage points by an increase in inequality. So although there is no evidence of rising inequality within the cross-sectional sample used in Chapter 5 it is clearly a factor within the short term participants.

Closer inspection of the the earnings functions in Appendix 6.4 and the decompositions in Appendix 6.5. reveals that in both years they are dominated by the intercept terms. The male intercept is significantly higher in 1991, yet significantly lower in 1996, clearly indicating a major change. Differences in the intercept terms are tricky to interpret and are generally assumed to result from factors unobserved in the model. However in this case as experience is the only continuous variable it results from pre-entry factors. Over the last decade the popular press has made us fully aware of two educational facts, firstly girls now now consistently outperform boys at GCSE level, and secondly for the first time in history women make up the majority of undergraduates. Therefore this pre-entry change simply relects these factors feeding into the labour market.

Additionally as the change is such a large one, such a gradual change may not be sufficient to fully explain it. Consequently a major shift within the labour market needs to be identified. By far the most fundamental change to the nature of work during the 1990's was the burgeoning use and reliance upon information and communication technology. Hence this major reduction in the short-term wage gap may reflect women bringing a better mix of ICT skills, with these becoming more highly valued by employers over this period. Overall this indicates that changes in the gender wage gap are as much to do with changes in the relative supply and demand for labour as with any policy initiative. Historically the supply relative to demand has been higher in female dominated occupations than in male dominated ones and over time gradual changes to this have narrowed the wage differential. This was first highlighted in the UK by Sloane and Theodossiou (1994) who found that the wage gap narrowing following the equal opportunities legislation of the 1970's was as much to do with changes in the demand for labour as it was with the legislation. Consequently it is important not to lose sight of the fact that for any policy designed to narrow the wage gap there is the potential for it to be negated by unfavourable supply or demand changes.

6.6 Conclusion

This chapter set out to achieve a deeper understanding of the strong narrowing effect upon the gender wage gap, found in both the UK and Germany, as a result of changes revealed through the sample selection adjustment. This was done by separating the employed sample into its long and short-term participants. Then applying an ordered probit model to the former and decomposition analysis to the latter. The hypothesis being that any inter-temporal wage gap narrowing is due to improvements in the skills and treatment of women in the long term group and similar improvements within the short term group. With the empirical analysis highlighting which of the four possibilities has been the most important.

The results revealed that for Germany there was a fairly similar improvement from both groups. With the 1.6% narrowing from the long-term group having nothing to do with the skill mix, but predominantly caused by wage gains made by East German women. Unfortunately this was only achieved at the expense of higher unemployment (Hunt 1997). Whilst within the short term participants there was evidence of a narrowing of the skills gap, although this was mainly in areas not observed by the data.

For the UK the much stronger wage gap narrowing was almost entirely due to the short-term sample. The very large 18% narrowing was caused by a closing of the skills gap, again predominantly unobserved charateristics, but this was partially offset by a rise in inequality for this group. However within the long-term sample there was a much more conservative narrowing of 1.8% this is shown, as in Germany, to be nothing to do with skill endowments, but results from more favourable returns from these characteristics. This feature being dominated by the sample selection adjustment, suggesting that women are improving in their ability to translate those characteristics keeping them in employment into higher earnings, implying fairer treatment. So overall the strong wage gap narrowing in the UK was caused by an improved skill endowment from those women entering the labour market and fairer treatment for the long term participants. With the size of the improvement suggesting that both of these factors had been supported by favourable changes in labour demand.

At the outset the importance of this separation between long and short-term participants was shown to be important, since it allowed for wage gap changes to be placed into four different categories. The crucial factor being that each potential problem required a different policy response.

For Germany there was some evidence of fairer treatment for the long-term group, there was also evidence of a closing of the skills gap, but there was no indication of fairer treatment for those entering or re-entering the labour market. This could well suggest that a review of selection procedures may well be in order.

Similarly, for the UK, there was also evidence of fairer long-term treatment and skill gap narrowing. However there was no real indication of unfair treatment for those women in the short-term sample, what was more worrying was the rising level of inequality within this group. The importance of wage inequality to wage differentials is well known (Blau and Kahn 1992) and the previous chapter showed that the UK's gender wage gap position worsened, compared to Germany, as a result of its higher level of inequality. This was countered to a certain extent because the same chapter revealed that the differential narrowing during the 1990's was aided by static inequality.

Unfortunately for the UK this may prove to be a short term phenomenon, since the increased inequality amongst entrants suggests increasing future inequality across the whole population. Consequently the final empirical chapter seeks to highlight the importance of inequality to the gender differential and place the UK's position in a much wider context against a greater number of countries.

CHAPTER 7

Gender Differentials and Discrimination: An EU-wide Perspective

7.1 Introduction

The issue of wage inequality and its importance to the UK gender wage gap has been a recurring theme throughout this thesis. Blau and Kahn (1992) initially highlighted that wage inequality is a fundamental component of the gender wage differential with this being confirmed by the earlier findings in this thesis. Inequality reflects the wage penalty for being below average in the labour market and as women tend to have less education, less work experience, as well as being more likely to be employed in low paying occupations, it disproportionately affects them.

This chapter makes use of 11 of the 12 pre-1995 EU members, Germany being excluded as the absence of a regional variable prevents the separation of East and West Germany and hence the estimation of meaningful earnings functions. By taking advantage of the greater comparability within the ECHP data set it is possible to place the level of UK inequality in a much wider context. The analysis takes account of the whole of the EU, highlighting what would happen to the UK gender differential if the wage distribution was similar to these other countries.

7.2 Data

The analysis makes use of wave 3 (1996) of the European Community Household Panel (ECHP), a large longitudinal database incorporating 60,500 nationally representative households, approximately 130,000 adults, across the 12 member states in 1994. This data set is particularly attractive, not just because of its panel structure and the large number of countries included, but because it is the only example of a cross-country data set where the same questionnaire is applied in each country, consequently making cross-country comparisons far easier and more meaningful.[4] Previously available data sets, such as PACO, have taken existing national data sets and as far as possible harmonised the variables within those data sets. Clearly using the same variables as the starting point is less likely to lead to any data problems.

7.3 Method

In an attempt to achieve consistency with the analysis in Chapter 5, as far as the data allows, earnings functions identical to those used previously are estimated separately by gender for each of the 11 countries. The variables used are as follows;

Experience. A potential experience term created by subtracting the age at which the individual started their working life from their current age.

Experience^2. The square of the experience term.

HED. A dummy variable to identify those with higher level of education. Based on the International Standard Classification of Education (ISCED) codes, it equates to those with a university degree or a vocational qualification of a comparable standard.

SED. Again based on the ISCED coding, a dummy variable for those with the second stage of secondary education as their highest level of education.

[4] For a complete description of the data the official documentation is reproduced in Appendix 7.1

These two education dummies imply that those with no further education beyond the first stage of secondary education are the base group, which equates to the end of compulsory education for most countries.

Public Sector. A dummy variable for those employed in the public sector.

Married. 1 = legally married, 0 = not married.

Unit >50 but <500. Is for those people employed in medium sized firms with between 50 and 500 employees.

Unit >500. Large firm employees where the firm size is above 500 employees. This leaves those employed in small firms with less than 50 employees as the base group.

Outsider. A proxy for those workers considered as outsiders in an internal labour market, this is judged to be those who have been with their current employer for less than 2 years.

Insider. Dummy variable for those seen as insiders, more than 5 years with their current employer. The intermediate category of tenure between 2 and 5 years is the base group.

The ECHP data set only allows for the broadest of sectoral differentiation, so *Agriculture* and *Industry* are dummies created to identify those sectors, with *Services* as the base group. However, unlike PACO, the ECHP data set includes an occupational variable, so dummies are created for the following categories;

Manager. Legislators, senior officials and managers.

Professional.	Professional occupations.
Associate Professional.	Technicians and associate professionals.
Clerks.	Clerks.
Service.	Service workers and shop and market sales workers.
Skilled Agricultural.	Skilled agricultural and fishery workers.
Crafts.	Craft and related trades workers.
Semi-skilled.	Plant and machine operators and assemblers.
Unskilled.	Elementary occupations. Also used as the base group.

Unfortunately with the ECHP data there is a lack of clarity in the definition of part-time employment, consequently the models used in this chapter are for full-timers only. As before the dependent variable is the natural log of the gross hourly wage, in this case, for transparency and ease of comparison, the hourly wage has already been converted from the national currency into purchasing power parity ECUs.

Earnings functions are estimated for men and women separately, using the variables outlined above, in each country the most recent available year 1996 is used. From these the gender earnings differentials can be estimated, then analysed closely to establish the relative importance of the various factors outlined above. To quantify the impact of differences in characteristics, treatment and inequality decomposition analysis similar to that in Chapter 5 is applied.

Firstly a measure of discrimination can then be calculated using the Oaxaca (1973) method. Where the earnings functions are; $\ln W_i = Z_i'\beta + u_i$ with u_i being a normally distributed error term. The differential can then be decomposed into the portion explained by the model and its unexplained part, which is generally interpreted as the upper limit of discrimination, using the following method:

$$\ln \overline{W}_m - \ln \overline{W}_f = (\overline{Z}_m - \overline{Z}_f)\beta_m + \overline{Z}_f(\beta_m - \beta_f)$$

The subscripts m and f are to represent males and females. The unexplained earnings differential (d) is then given by; $d = \exp(\overline{Z}_f(\beta_m - \beta_f)) - 1$.

In order to deal with the possibility of sample selection bias, covered in detail in Chapter 4, the Heckman 2-step procedure (Heckman 1979) is applied. A probit model of participation is estimated in the following form; $Y_i^* = Z_i'\gamma + \varepsilon_i$ where Y_i^* is a latent variable associated with being employed, Z_i' is a vector of determinants of employment and γ their associated parameters. The inverse Mills ratio (IMR) is then added to the wage equation as an additional explanatory variable. As before age, age^2, household income, health, number of children, marriage and education are deemed to be the most important factors explaining labour market participation.

To establish the impact of cross-country differences in characteristics and treatment decomposition analysis is applied, since the UK is the major focus of the thesis it is used as a benchmark for the EU, the decomposition results are then reported for each country in comparison to the UK. So the cross-country decomposition becomes;

$$D_{uk} - D_i = (Z_{muk} - Z_{fuk})\beta_{muk} - (Z_{mi} - Z_{fi})\beta_{mi}$$

$$+ Z_{fuk}(\beta_{muk} - \beta_{fuk}) - Z_{fi}(\beta_{mi} - \beta_{fi})$$

With D_{uk} being the gender wage gap in the UK and D_i being the gender wage gap in the comparison country. The first line is then equal to cross-country differences in relative productive characteristics and the second line being cross-country differences in the relative labour market treatment for women.

As the major purpose of this chapter is to establish the extent of relative wage inequality in the UK, and its impact upon the cross-country wage gaps, the Juhn et al (1991) decomposition technique is applied, with once more the UK being used as the base country. The decomposition being;

$$D_j - D_k = (\delta Z_j - \delta Z_k)\beta_k + \delta Z_j(\beta_j - \beta_k) + (\delta\psi_j - \delta\psi_k)\sigma_k + \delta\psi_j(\sigma_j - \sigma_k)$$

With, as shown in Chapter 5, terms 2 and 4 being the overall impact of differences in inequality.

7.4 Results

As a starting point for the discussion of EU wide relative gender wage gaps the key results and statistics are recorded and ranked ordinally. Table 7.1 below summarises the main results from the earnings functions and their related decompositions, the rankings, from highest to lowest for the means and from narrowest to widest when relating to the

Table 7.1 Key Indicators

	Male Mean	Female Mean	F/M Ratio	Wage Gap	Explained	Unexplained	
	Ecus p/h	Ecus p/h		Ecus p/h	% of Total Gap	Ecus p/h	% of Fem. Mean
Denmark	7.514 (6)	6.028 (4)	0.81 (7=)	1.486 (6)	40.90% (3)	0.88 (2)	14.6% (2)
Netherlands*	8.345 (3)	6.352 (3)	0.76 (11)	1.993 (10)	45.10% (2)	1.09 (6)	17.2% (4)
Belgium	8.491 (2)	6.813 (2)	0.82 (5=)	1.678 (8)	20.30% (8)	1.34 (10)	19.6% (7)
Luxembourg*	11.641 (1)	9.378 (1)	0.78 (10)	2.263 (11)	50.90% (1)	1.11 (7)	11.8% (1)
France	7.632 (5)	5.995 (6)	0.81 (7=)	1.637 (7)	21.50% (7)	1.29 (9)	21.4% (8)
UK	7.969 (4)	6.013 (5)	0.80 (9)	1.956 (9)	25.70% (4)	1.45 (11)	24.2% (9)
Ireland	7.033 (7)	5.812 (7)	0.84 (2=)	1.221 (4)	16.70% (9)	1.02 (4)	17.5% (5)
Italy	6.738 (8)	5.385 (8)	0.82 (5=)	1.353 (5)	23.60% (6)	1.03 (5)	19.2% (6)
Greece	5.305 (10)	4.434 (10)	0.89 (1)	0.871 (2)	-32.50% (10)	1.15 (8)	26% (10)
Spain	6.292 (9)	5.211 (9)	0.83 (4)	1.081 (3)	23.90% (5)	0.82 (1)	15.8% (3)
Portugal*	4.154 (11)	3.429 (11)	0.84 (2=)	0.725 (1)	-39.00% (11)	1.01 (3)	29.5% (11)

* For these countries where the IMR is significant (Heckman 1979) the final selectivity component is included as part of the unexplained term (Neuman & Oaxaca 1998).

wage gap, are displayed in brackets. The first two columns show the mean wage by country for men and women respectively in ecus per hour. The overall distribution is fairly wide with, for both genders, the lowest mean wage being only around 1/3rd of the highest. The two countries concerned are however particularly extreme cases, with the female mean wage in the highest paying country, Luxembourg, greater than the mean wage for males in any other country. Plus the male mean wage in Portugal, the lowest paying country, lower than the female mean wage in all other countries. Ignoring these two outliers gives an overall distribution which is much narrower, with the mean wage in Greece, the next lowest payer after Portugal, being around 2/3rds of the mean wage in Belgium, the next highest payer after Luxembourg, for both men and women. The rankings of countries average wages are largely consistent across gender, with the highest three and the lowest three being the same in both cases. There is however a certain amount of movement amongst the middle ranking countries, with the most significant being Danish female wages which are two places higher than the Danish ranking for the average male wage.

Focusing on the gender wage gap it is expressed in absolute terms through the difference in average earnings per hour, and in relative terms through the ratio of the female mean wage to the male mean wage. One would expect these rankings to be sensitive to the size of the mean wage, with a similar absolute wage gap being much smaller in relative terms for the higher paying nations. However the rankings are reasonably consistent across the two measures, with only Ireland and Belgium changing their position by more than one place. It is fairly safe to conclude that the lower paying nations have the smallest wage gaps, since the five nations with the lowest mean male wage have the five lowest wage gaps, both in absolute and relative terms. The female/male ratios are fairly tightly grouped, with the exception of Greece who have a gender wage gap of only 11%, all of the countries lie within 76% and 84% of their male mean. From the perspective of the UK the relative size of the gender wage gap is consistent with previous estimates. Kingsmill (2003) and Barth et al (2002) report differences in the mean wages of men and women for a number of European countries, with both finding that the UK had the widest gender differential with the exception of the Netherlands. In neither case did they record results for Luxembourg, the other nation with a larger wage gap.

Moving to the final three columns, the first one shows the percentage of the wage gap that is explained by gender differences in characteristics. These all result from the Oaxaca (1973) decompositions which are discussed in general below. For reference the full decompositions are shown country by country in Appendix 7.3 to Appendix 7.13, along with a more detailed discussion of each country's results. The most striking results are for Greece and Portugal where, despite having the two narrowest wage gaps, there is evidence of significant labour market inefficiencies. Women have more favourable endowments of productive characteristics but are still being paid less than the men. The last two columns give a measure of the potential extent of gender discrimination both in absolute and relative terms, the first one showing the actual monetary cost of this wage penalty and the second its size relative to their mean wage. Using the relative measure as an indicator of the extent of discrimination would suggest that it is the lowest in Luxembourg, Denmark and Spain. Whilst in Greece and Portugal the negative impact of the labour market inefficiencies is confirmed as there estimates of discrimination are the highest in relative terms.

Table 7.2 Variable Significance Summary

	Denmark		Netherlands		Belgium		Luxembourg		France		UK		Ireland		Italy		Greece		Spain		Portugal	
	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.
Constant	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
Exp.	++	++	++	++	++	++	++		++	++	++		++	++	++	++	++	++	++	++	++	++
Exp^2	--	--	--	--	--	--	--		--	--	--		--	--	--	--	--		--	--	--	--
HED	++	++	++	++	++	++			++	++	++	++	++	++	++	++	++	++	++	++	++	++
SED	++								+	++		++	++	+	++	++	++	++	++		++	++
Public	--									++			++	++			++	+		++		++
Married	++	++	++	++			++		+		+		++		++		+	+	++	++	++	
Manager	++	++	++	++	+	+	++	++	++	++	++		++	++	++				++	+	++	++
Prof.	++	++	++	++	+	++	++	++	++	++	++		++	++	++	++	++	++	++	++	++	++
Ass.Prof.	++	++	++	++	++		++	++	++	++	++		++	++	++	++	+	++	++	++	++	++
Clerks		+	++	++		++	++	++					+	++	++	++	++	++	++	++	++	++
Service																+		++	-	++		
Skilleg.												--							++			
Crafts		+		++									++								++	
Semiskill													++		++	++					++	-
50-500	++	+	++		++	++	+	++	++	++	++	++	++	++	++	++	++		++	++	++	++
>500	++	+	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++		++	++	++	++
Outsider	--	--	--	--	-	--		--	--	--			--	--	--	--	--	--	--	--	--	--
Insider		+		++	+		++						+	++			++	++	++	++	++	++
Agric	--	--									--		--		--	--	--	-	--	--	--	
Industry	++		++						+				++	++			+	++	++	++		
IMR			-	--				+													++	++

++ and + denotes positive and significant at the 5% and 10% levels respectively.

-- and - denotes negative and significant at the 5% and 10% levels respectively.

In an attempt to achieve a deeper understanding of these wage gaps earnings functions are estimated by country for each gender separately, a summary of the variable significance is given above in Table 7.2, with a full table of the descriptive statistics appearing in Appendix 7.2. Looking at the overall significance of the variables shows that the earnings functions display the anticipated features. The experience terms along with the education dummies are predominantly positive and significant, whilst the squared experience terms are always negative and only insignificant on odd occasions. The Manager, Professional, Associate Professional and Clerks occupational dummies are almost always positive and significant, but those in the remaining four categories are rarely able to raise their wages significantly above those of unskilled workers. There is clear evidence of workers extracting rent from their employers, with large and medium sized employers almost unfailingly showing positive and significant returns. Also there is some support for the presence of internal labour markets, with the outsider term being negative and significant in all cases except within the UK and Luxembourg. The results from the insider dummy are less strong, but they are positive and significant in the majority of cases. Finally the differential treatment of married men and women, identified in Chapter 5, is also seen to be present across most of the rest of the EU. The married dummy is positive and significant for men in all cases excepting Belgium, whilst for women it is in the majority of cases insignificant. Consequently most of the features displayed earlier in the earnings functions for the UK and Germany are shown to be present across the rest of the EU.

The analysis thus far has been broadly observational. The key objectives of this chapter are firstly, to establish how women in the UK differ from the rest of the EU in terms of their relative skill endowments. Secondly, how the UK labour market performs in remunerating women for these skills and finally, to establish the extent and impact of wage inequality. The first two of these issues are addressed by subtracting each country's Oaxaca (1973) decomposition from the UK's decomposition, the results of this being shown in Table 7.3, with for reference the full decompositions being reported by country in Appendices 7.2 – 7.12.

Table 7.3 Oaxaca (1973) Decompositions Vs. UK

Country	Differences in Characteristics	Differences in Unexplained Terms	Total Difference	Lng Wage Gap
Denmark	-0.0312	0.0386	0.0075	0.2183
Netherlands	-0.1102	0.0668	-0.0433	0.2691
Belgium	0.0172	0.0072	0.0245	0.2013
Luxembourg	0.1075	-0.1324	-0.0248	0.2506
France	0.0125	0.0012	0.0137	0.2121
Ireland	0.0293	0.0246	0.054	0.1718
Italy	0.0117	0.0182	0.03	0.1958
Greece	0.0938	0.0218	0.1156	0.1102
Spain	0.0134	0.0254	0.0389	0.1869
Portugal	0.1819	-0.126	0.056	0.1698
UK				0.2258

Negative values indicate where women in that country are in a poorer position compared to women in the UK, obviously positive values suggest a stronger position. For example the first row of Table 7.5 reveals that Danish women are on average .0312 log points worse off as a result of their relative endowment of characteristics, as well as benefiting to the tune of .0386 log points due to lower levels of estimated discrimination. Overall Danish women are on average .0075 log points better off than their UK counterparts, this being equal to the Danish gender wage gap subtracted from the UK one.

Taking an overview of Table 7.3 indicates that the decentralised and deregulated labour market leads to some fairly poor outcomes for UK women. We already know from Table 7.2 that the UK has one of the widest wage gaps, being exceeded only by Netherlands and Luxembourg. However these results also show that the relative endowment of labour market characteristics is only seen to be worse in Denmark and the Netherlands. In addition the UK has the highest levels of estimated discrimination, with the exceptions of Luxembourg and Portugal.

The third major objective is to highlight the impact of wage inequality and reveal to what extent UK women are disadvantaged relative to the rest of the EU. This being achieved by applying the Juhn et al (1991) decompositions, with the results of this process summarized in Table 7.4.

Table 7.4 Juhn et al (1991) Decompositions Vs. UK

Country	Term 1 $(\delta Z_j - \delta Z_k)\beta_k$	Term 2 $\delta Z_j(\beta_j - \beta_k)$	Term 3 $(\delta\psi_j - \delta\psi_k)\sigma_k$	Term 4 $\delta\psi_j(\sigma_j - \sigma_k)$	Characteristics (Term 1 + Term 3)	Inequality (Term 2 + Term 4)	Total
Denmark	0.012	-0.041	-0.019	0.056	-0.007	0.015	0.008
Netherlands	-0.101	0.006	0.001	0.066	-0.1	0.072	-0.043
Belgium	-0.002	0.023	-0.035	0.04	-0.037	0.063	0.025
Luxembourg	0.092	0.019	-0.197	0.065	-0.105	0.084	-0.025
France	0.046	-0.027	-0.048	0.049	-0.002	0.022	0.014
Ireland	0.068	-0.034	-0.024	0.049	0.044	0.015	0.054
Italy	-0.007	0.017	-0.027	0.045	-0.034	0.062	0.03
Greece	0.063	0.048	0.001	0.02	0.064	0.068	0.116
Spain	0.038	-0.028	-0.019	0.044	0.019	0.016	0.039
Portugal	0.153	0.042	-0.181	0.055	-0.028	0.097	0.056

Term 1 reflects differences in observed characteristics, term 2 prices paid to these characteristics, term 3 is the unobserved characteristics and term 4 their prices. Characteristics records the overall impact of the observed and unobserved characteristics, whilst inequality is the effects of cross-country differences in their relative prices. UK women fair much better as a result of their unobserved characteristics, using their endowments and the male coefficients places them on average at 38.6% within the male residual distribution. This is the highest position of all the countries, with only Greece and the Netherlands equalling it, indicating that these 3 countries have the smallest gender differential in terms of the endowment of characteristics not observed within the model.

When the effects of both sets of characteristics (Terms 1 and 3) are combined it reveals that UK women are quite well placed in terms of their relative endowment, being bettered only by Ireland, Greece and Spain. However the combination of terms 2 and 4 paints a much poorer picture for the UK. Without fail all of the other countries' women fair better as a result of inequality, indicating that the penalty for being below average is greater than in any other EU country. The findings from Chapter 5 revealed that the end to rising inequality had played a key role in the narrowing of the UK gender wage gap during the 1990's. However when this is placed within an EU-wide context it is clear that the UK position is still relatively poor. Applying UK levels of inequality to the other countries widens their wage gaps by between 1 and 9 percentage points. Consequently if the UK could achieve a wage distribution similar to most of the other EU countries this would imply a significantly smaller gender wage gap.

Unfortunately it has to be accepted that this conclusion can only be reached as a result of simply accepting the results from the decomposition analysis. The earlier discussion in Chapter 2 highlights the limitations of the Juhn et al technique, particularly how the divisions between each of the four terms are somewhat blurred. The possibility of labour market discrimination affecting any one of the four decomposed terms to a greater or lesser degree means that these findings need to be tempered by a note of caution.

Even if these findings are accurate and the wider UK gender wage gap results from greater inequality, for a number of reasons this may still prove difficult to address. Firstly, it may not be that straightforward a task to narrow the wage distribution. It is most likely that the greater inequality in the UK results from the lower coverage of collective bargaining and given the current political climate within the UK it is unlikely that actions seeking to widen its coverage would gain widespread popularity. Secondly it is also possible that policies targeting wage inequality may not have the anticipated impact upon the gender wage gap, for example Robinson (2002) finds that the implementation of the national minimum wage in the UK has only had a negligible effect upon the pay differential.

In addition it must also be noted that policies narrowing the wage distribution, i.e. minimum wage legislation or extending the coverage of collective bargaining, can only ever have a limited impact upon the differential. Factors such as higher education and experience, the occupational segregation and lower female status within occupations, among others, are the causes of the wage differential. The level of inequality merely determines the size of that gap. Seeking to narrow the distribution is in effect approaching the problem from the wrong direction and is the equivalent of treating the symptoms rather than the cause. In order to gain the increased productivity from making more effective use of the female labour resource legislators need to address those factors mentioned above, especially the occupational segregation and lower female status within occupations. The most effective way of achieving this would be to remove any gender bias within the recruitment and promotion processes. Once this has been achieved, assuming that it can be done through legislation, the level of inequality is incidental and has no negative impact upon the gender wage gap or productivity.

7.5 Conclusion

This chapter set out to place the UK in an EU wide context in terms of its gender wage gap, as well as the impact of inequality upon that wage gap. Cross-country decomposition techniques revealed that the UK had one of the largest gender wage gaps in the EU being exceeded only by the Netherlands and Luxembourg. It also showed that UK women are fairly poorly placed in terms of their relative endowment of productive characteristics, although their position significantly improves when factors unobserved within the model are considered. Wage inequality was confirmed as being crucial to the size of the wage gap, with UK women operating within the most unequal distribution and suffering a penalty between 1 and 9 percentage points in comparison to the other countries.

Overall this is a worrying feature since it implies that the UK is poorly placed, in comparison to its major trading partners, in terms of its ability to make more effective use of its scarce female labour resource. This is likely to become increasingly important as demographic changes reduce the pool of available labour. Consequently failure to make more effective use of female labour is likely to have a negative impact upon growth in the future, hence policies addressing this problem are required as a matter of urgency.

Finally, however, it was pointed out that although inequality is important to the size of the wage gap it should not become the primary target for policy. Narrowing the wage distribution may well have some impact upon the size of the differential, but it does not address the causes. Consequently policies targeting the actual causes, issues such as equity in recruitment and promotions are far more likely to have a long-term impact upon the gender wage gap.

CHAPTER 8

Conclusion

8.1 Conclusion

This thesis set out to undertake a broad analysis of gender wage differentials and discrimination particularly within the UK but also making comparisons with other EU countries. The limitations of existing cross-country and inter-temporal research were highlighted and these were improved upon by making use of the greater comparability within the PACO and ECHP data sets. Using predominantly decomposition analysis the three empirical chapters pointed to a number of important conclusions.

The initial empirical analysis focussed upon the UK and used Germany as the basis for cross-country analysis. There was implicit evidence of wage discrimination being present, with the unexplained term being a major component of the wage gap. There was also some evidence of men having more skills. This then became one of the major sources of the strong wage gap narrowing in the 1990's, as women closed the skills gap during a period of static inequality. Additionally, this more favourable gender skills mix was the cause of the UK wage gap being marginally smaller than in Germany. Although the effects were largely offset by German women being more favourably treated within their labour market.

When decomposed inter-temporally it was revealed in both countries that sample selection changes had a large narrowing effect upon the wage gap in both countries. In Germany this was shown to result from rising unemployment disproportionately affecting unskilled women, however within the UK the reasons were initially less obvious. Chapter 6 set out to explore the underlying causes of these changes in selectivity using a combination of decomposition and ordered probit analysis. This required separating the employed sample into those employed at the start of the period of study and those who had found employment since. From this some evidence of fairer treatment for women remaining in employment was found in both countries. However the key finding was that for the UK the strong wage gap narrowing was almost entirely due to a more effective skills mix from those women finding employment after 1991. This was viewed as resulting from the relationship between technical change, labour skill and the nature of tasks. With non-routine tasks it is more difficult to replace labour with technology and this led to an increase in labour demand for a wide range of 'female' jobs.

The final empirical chapter then used ten other countries as comparators against the UK in order to place the UK gender pay performance in a much wider context. The analysis revealed no discernible relationship between the type of bargaining regime and the size of the wage gap or the extent of discrimination. Furthermore the UK was shown to have the highest level of wage inequality of all the countries considered. The results revealing that the UK gap is widened by between 1 and 9 percentage points compared to the other countries.

The introduction to this thesis highlighted the crucial link between narrowing the gender wage gap and making more effective use of under utilised female labour. It also outlined four major areas having a key impact upon the size of the gender wage gap. These being pre-entry factors, participation, unequal treatment and the wage distribution, with the most important contribution of this work being how the findings outlined above relate to these four areas.

Clearly for the UK pre-entry factors and the wider wage distribution have been shown to have the biggest impact upon the gender wage gap. With the more favourable gender skill mix having narrowed the wage gap significantly. Whilst, at the same time, the high level of wage inequality widens the UK gap in comparison to the rest of the EU. However the scope for further narrowing of the wage gap through these routes are somewhat limited. Firstly, the former, to a large extent, results from girls outperforming boys educationally during the late 1980's and 1990's. Unfortunately this says as much about the failure of boys as it does about girls' successes. Consequently on efficiency grounds it is more important to address the issue of disaffected boys than allow the lop-sided educational outcomes to gradually narrow the wage gap. Secondly, wage inequality has been shown to be a symptom rather than the cause of the gender wage gap, as a result any policy addressing this will only have a superficial effect. Zabalza and Arrufat (1985) argued that the equal opportunities legislation of the mid 1970's led to a one-off narrowing of the gender differential and had little subsequent impact, reducing inequality is likely to be the equivalent of this.

It has been argued that the most effective policies addressing the gender wage gap are those promoting female participation (Kingsmill 2003). The conventional wisdom being that women work less over their lifetimes due to childcare and domestic responsibilities. This allows men to build up more extensive work experience and hence earn more. Therefore if you enable women to match male work experience it should have a positive effect upon the wage gap. Unfortunately this thesis says little about the likely impact of policies influencing participation, this is left to future research since it requires more complex analysis using the panel structure of the data. The construction of detailed work histories from panel data sets longer than those that currently exist for European countries would allow for more precise estimation of the effects of career breaks, hence indicating the likely effectiveness of participation policies. However this thesis does at least observe that despite the UK having the highest female participation rates in the EU it has one of the widest wage gaps. Suggesting that the relationship between participation and wage differentials may not be as straightforward as others imply, in fact promoting participation may, at least initially, widen the wage gap as low-skilled women who previously could not obtain childcare return to paid employment.

Therefore it is clear that the most potentially fruitful target for future wage gap narrowing is that of differential treatment within the labour market. Despite over thirty years of equal opportunities legislation it still remains that women are less likely to be employed than equally qualified men and when they are employed their earnings are on average significantly lower than similar men. Although difficult to measure within the data used in this thesis the implication is that women tend to be employed in lower status occupations and at lower seniority levels than men with similar skills and qualifications. This view being supported by the inverse relationship between the gender differential and its unobserved component. As observed in the UK, as the wage gap falls so does the proportion explained by measurable productivity differences. Consequently, although the closing of the gender skills gap in the 1990's is to be welcomed, the root causes of the differential still remain. As a result, until society is able to de-gender human resource decisions within organisations, and gender becomes unimportant in appointments, promotions and work-based training. The gender wage gap will still remain at a significant level and a large proportion of the potential gains will be denied to the UK economy.

From the outset this thesis set out to establish the most significant causal factors behind any narrowing of the gender wage gap. Potential causes were grouped into one of four broad categories, those influencing pre-entry factors, those compressing the wage distribution, those promoting female participation and finally those seeking to achieve fairer treatment for women in the labour market. The empirical findings were then interpreted from the perspective of each type of factor.

For the UK over the period considered pre-entry factors were shown to be crucial to the strong wage gap narrowing. Unfortunately this does not indicate that policies in this area will continue to deliver reductions in the gender differential since they reflect changes in demand relative to supply for different types of labour. It is perfectly plausible that similar pre-entry factors in subsequent periods, coupled with less favourable labour demand shifts, could equally deliver a future widening of the gender wage gap. As technology advances and it becomes more effective at carrying out non-routine tasks, the gains made during the 1990's could be reversed in future decades. Furthermore the strong educational performance by girls compared to boys raises as many issues relating to male under-performance as it does about female improvements. Consequently even though the wage gap may be narrowing it does not necessarily suggest that it will continue to narrow in the future.

It was also shown that the greater level of wage inequality in the UK compared to other EU nations was an important component of the UK's gender wage gap. Narrowing the wage distribution to the same level as any of the other EU nations would close the UK's gap significantly. However once more this is not viewed as a particularly lucrative source of future narrowing in the gender wage gap. Firstly, on practical grounds, it is difficult to envisage government policies that target a narrowing of the wage distribution gaining support within the current liberal free market dominated political environment in the UK. But secondly, and more importantly, because it addresses the symptoms rather than the causes of the problem. With the level of inequality reflecting the penalty of being below average and/or disadvantaged within the labour market. Narrowing the wage distribution simply reduces this penalty without addressing the issues of lower female capital accumulation and discrimination.

Finally, it is the conventional wisdom, that a large element of the gender wage gap results from higher levels of male work experience, consequently if female participation is promoted over time the experience gap and the wage gap will narrow. However the evidence suggests that increased female participation draws large numbers of low-skilled women into employment, this has an immediate negative impact upon the earnings differential. With this being likely to persist in subsequent periods as the extent of crowding into 'female' occupations increases. Hence any initiatives seeking to promote female participation, at least in the short to medium term, are just as likely to widen the wage gap as narrow it.

Overall reducing gender inequalities prior to labour market entry, the extent of wage inequality and raising female participation are laudible objectives and should be welcomed in most cases. However in isolation they fail to deliver the key objective of a smaller gender wage gap. Consequently the only way to ensure a significant improvement in the gender wage is to meaningfully address the issues of female disadvantage in recruitment, promotion and wage setting decisions. Therefore addressing transparency in pay and the make up of selection panels etc. as argued for in the Kingsmill Review (Kingsmill 2003) are of fundamental importance. In their absence the success of improvements in pre-entry and participation factors ensure that there are more women in the labour market, with these in the main being better qualified that their predecessors. However they are being released into a labour market that treats them unfairly. Hence until a position is reached where these key HR decisions are de-gendered then the UK economy will always be failing to make the best use of its female labour resource.

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APPENDICES

Appendix 5.1 PACO Data Documentation

Comparative Research on Household Panel Studies

PACO

Document n° 9

1995

PACO USER GUIDE

by

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\. Introduction and Overview on Panel Studies Included in the PACO)atabase

'he aim of the PACO (PAnel COmparability) project is the creation of a harmonized and tandardized micro-database from existing longitudinal studies on living conditions of ouseholds.

'he project team involved researchers from France, Germany, Hungary, Ireland, the United (ingdom, Luxembourg, Poland and Spain. The coordination was held at the CEPS institute ו Luxembourg.

'he project was partly funded by the European Commission from 1993 to 1995

;urrently the following panel studies are included:

3HPS:	British Household Panel Study (1991 - 1993, ongoing)
:SEML :	Enquete Socio-Economique des Menages en Lorraine! France (1985 - 1990, study ended in 1990)
IHP:	Hungarian Household Panel Study (1992-1994,ongoing)
'HP:	Polish Household Panel Study (1987 -1990,ongoing)
'SELL :	Panel Socio-Economique Liewen zu Letzebuerg / Luxembourg (1985 - 1992, ongoing)
'SID:	Panel Study of Income Dynamics / USA (1983 - 1987; the panel was started in 1968, but in order to cover more or less comparable ranges of years, only waves from 1983 onwards were included.)
;OEP:	Sozio-Oekonomisches Panel / Bundesrepublik Deutschland (1984 - 1991, ongoing)

'urther waves will be added in future.

<u>The Starting Point</u>

Vithout a harmonized database cross-national comparative studies on panel data are easible only by teams involving members of the domestic panel staffs. This is due to the omplexity and to the differences in the organization of the panel databases.

The main differences can be summarized as follows:

uestions concerning the same topics are asked in different manners. Even if the questions ıre comparable, different categories are built. Even standard demographic variables are oded in different ways. Missing values are also coded differently.
ıe levels on which information is collected differs. In one panel study a question might be ısked on the individual level whereas in another study a similar question is asked on the ıousehold level. In the Luxembourg and Lorraine panel there is a third level - the income ıroup: In a household in which several persons have individual income, different economic ırrangements are possible. An income group is a group of persons within a household, vho constitute an economic unit. In the PSID most information on the individual level is ollected only for the head of the household and the spouse.
fferent storage formats or database systems are used:
ASCII (PSI D), SIR (SOEP, BHPS), SAS (SOEP public use version), SPSS(PSELL), ŚYBASE (ESEML)
ıe files are structured differently:
The most simple but also space consuming structure is set up by two longitudinal files, one omprising all the households and the other comprising all individuals who ever took part in he panel (PSID).
The PSELL is stored in three files per wave, one file for households, the second for ndividuals and the third file is set up by the income groups
The SOEP and BHPS have a more complex structure. On both the household and ndividual level the information which is obtained directly from answers to questions in the ıuestionnaire is separated from fieldwork information and also from additional generated nformation, i.e. updated information on questions which are asked only if a change has ıccurred. The data on children up to the age of 15, who are not interviewed, but on whom nformation is collected via the household questionnaire, are also stored in an extra file. Additional longitudinal files for households and individuals are supplied containing one ecord per household or individual, respectively, by which the trajectories can be followed. Files containing job history data and biography data are also supplied.

The naming conventions are different in the different panels:
The PSID simply enumerates all the variables over all the years. In the PSELL system the variable names remain constant over the waves whenever the question has remained the ıame. Only a wave indicator is added. In the SOEP the names of variables which are elated directly to questions are made up of the question number and a wave indicator, vhich means that they differ from wave to wave, since the order in the questionnaires does ıot remain the same. The names of fieldwork and generated variables are so-called "speaking" names, but they are speaking German. In the BHPS all the names are created o be "speaking" (English speaking) but the length is limitated to 8 characters so the ıbbreviations are of limited value only.

In order to overcome the problems linked to the differences listed above, the PACO team ɿas undertaken all efforts to standardize and harmonize the different data-bases in the ollowing way:

Technical issues:

1. The Luxembourg way of data storage and naming conventions were adopted, which means:
The variable names are constant except for a year indicator.
The first character indicates the level of information: (P = Person, G = Income Group (Luxembourg and Lorraine), H = Household
The data are stored as SPSS-files. For each country and each year one file for individuals (including children), and one file for households was created. For Luxembourg and Lorraine a file for income groups was created for each year as well. The file names contain nformation on the year, the country and the level of information (household, income group, or individual).
n addition to that there are cross-year files containing time independent information.

2. Variables were recoded or categories were regrouped in order to obtain common
- variables for the different countries. This includes also the recoding of missing values.
3. The information is supplied on the lowest possible level, which means the most detailed evel.
The income variables are also aggregated to higher levels (income group, household), in order to supply comparable variables when the level of information was different in the different countries.

deally the analysis can be performed as follows:
Once a program *for* data analysis has been written for one country, it can be run for the other countries in the same way (if all the information is available in all the countries; see explanations below).

Contents

The following topics are covered:

1 Income variables
2 Demographic variables
3 Labour Force and Work history variables
4 Education _md Family background variables
4 Housing variables
6 Time Use
7 Weighting variables
8 Organizational (Link) variables and Territorial Devision

The income variables are very detailed (there are 66 of these). The list was set up in order not to loose any information which is available in at least two countries. For the other topics, the selection is less detailed. One can say that in general a compromise was made between not loosing too much information on the one hand and not keeping too much detailed information and ending up in keeping variables which are available for one country only, on the other hand.

The PACO team tried to use standardized coding schemes whenever these were available. For example the ISIC and ISCO codes were applied to the employment sector and the type of occupation, respectively.

The OECD classification was used for the education variables because this scheme covers the USA as well. Since this scheme is very global, an additional variable was included to keep more details for countries to which they apply.

In addition to the variables which have been extracted from the original panel data, other variables were added to the dataset.

A variable which provides a tool to apply the Random Group or Jackknife Method for variance estimation was generated for each country.

Furthermore a set of macro-economic indicators is provided together with variables that indicate the country and the year, so that these variables can be linked easily to the micro-data.

3 PACO Database Definition

3.1 General Remarks

Introduction

The PACO DATA BASE contains harmonized and consistent variables and identical data structures for each country included. It can therefore increase the accessibility and use of panel data for research. The PACO DATA BASE can be used to ease comparative cross-national and longitudinal research and to study processes and dynamics of policy issues such as labour force participation, income distribution, poverty, problems of the elderly and so on.

PACO DATA BASE

PACO adds value to the original panel data by creating Compatibility and Comparability. The process of making data comparable is realized by creating harmonized and consistent variables and files. The PACO Data Base contains comparable variables transformed according to a common plan and was built by using standardized international classifications where available. Information in these files is available (a) for households and individuals on the micro level, (b) for single years and (c) as longitudinal information. Such a comparative approach results in a (common) PACO Data Base, currently containing the data from seven countries (additional countries being included later). All files are held in a relational Data Base Structure. The data are stored as system files for the statistical package SPSS for Windows: containing identical variable names, labels, values and data structures. Each country file is adequately anonymized and can therefore be rated as a public use file. The complete data base has a size of 250 MB and is available on CD-Rom.

Advantages of PACO

The PACO approach - using highly standardarized variables and files - facilitates the analysis of cross-national panel data: a) Macro utilities enable the user to retrieve and to match the PACO data more easily. b) The PACO data structure allows to write global analyses programs. c) Standard analyses programs can be run for different countries and different periods with no need to modify the underlying SPSS (Macro) programs. d) The processing of PACO files is easier than analysing the original panel studies. e) The researcher has not to be familiarized with the individual panel's data organization.

Moreover, the PACO user has the possibility of processing those original variables in the panel studies that have not been made comparable. The researcher can simultaneously access original variables from original panel studies and the harmonized variables from the PACO DATA BASE.

Documentation

:ach PACO variable is fully documented including information on the algorithms used in ariable creation and an indication of the comparative reliability of each variable. This locumentation can be find in the national variable documentation (not included in this 'ACO User guide).

'he PACO DATA BASE can be linked with a collection of macro data. A set of macro ariables were extracted from the EUROSTAT CD of year 1993 and other statistical ources. The macro data is accessible from SPSS and can be matched with the PACO iles.

'he relevant parts of the MISSOC publications about Social Security have been compiled ınd integrated into the PACO Documentation system. The available information allows to ink original variables from national panel studies with the MISSOC data; on the other hand t is possible to retrieve the MISSOC information about selected PACO variables. The /IISSOC-PACO link enables the interpretation of results from cross-national research with he PACO DATA BASE.

3. 2 Definition of Units

a) Definition of Households

A household consists of all persons who live together in a dwelling unit (house, apartment, group of rooms or single room). Persons within a household can be related to each other or not. Included are unmarried couples, if the couple is living in a fairly permanent arrangement. A household may consists of more than one family, if the persons are related to each other. Excluded are lodgers, conventional roommates, or employees who share the housing unit.

b) Definition of Income groups

n a household in which several persons have individual income, different economic arrangements are possible. An Income group is a group of persons within a household who constitute an economic unit because they share their incomes. The concept is put into effect in accordance with strict rules and according to responses from household members n the interview.

examples:

- If a household consists of a couple with minor children **without** own incomes than there is only **one** income group in the household, because it is a priori assumed that partners in a household share their incomes.

- if a household consists of a couple with one adult children **with** own income than there may be **two** income groups: The first income group is assembled by the parners of the couple, the second income group by the adult children.

The concept of Income groups is originally only used within the French(Lorraine, ESEML) panel and the Luxembourg panel (PSELL).

Due to the data structure of the American PSID files some income variables are only available as a sum for head and spouse together, other income variables are available only as a sum for all other family members (not head or spouse). For those type of variables two artificial income groups have been created.

APPENDIX 5.2 Cross-sectional Decomposition UK 1997

Variable	β Male	β Female	Male Mean	Female Mean	Explained	Unexplained	
Constant	1.331	1.321			0.000	0.009	
Experience	0.044	0.030	18.989	20.433	-0.064	0.297	
Experience^2	-0.001	-0.001	492.666	563.664	0.053	-0.108	
Education 1	-0.213	-0.079	0.121	0.133	0.003	-0.018	
Education 3	0.115	0.105	0.163	0.137	0.003	0.001	
Education 4	0.281	0.311	0.461	0.385	0.021	-0.012	
Part-time	0.011	-0.153	0.027	0.367	-0.004	0.060	
Public Sector	0.054	0.257	0.194	0.377	-0.010	-0.076	
Large Firm	0.077	-0.025	0.197	0.179	0.001	0.018	
Small Firm	-0.127	-0.136	0.414	0.518	0.013	0.005	
Married	0.097	0.031	0.575	0.596	-0.002	0.040	
Agriculture	-0.183	0.085	0.015	0.006	-0.002	-0.002	
Mining	0.227	0.272	0.009	0.004	0.001	0.000	
Utilities	0.181	0.076	0.014	0.007	0.001	0.001	
Construction	-0.021	0.231	0.058	0.006	-0.001	-0.001	
Services	-0.174	-0.146	0.159	0.222	0.011	-0.006	
Transport	-0.029	0.141	0.085	0.036	-0.001	-0.006	
Finance	0.245	0.220	0.133	0.138	-0.001	0.003	
Community	0.001	-0.108	0.206	0.449	0.000	0.049	
Insider	0.010	0.059	0.321	0.329	0.000	-0.016	
Outsider	-0.160	-0.124	0.429	0.416	-0.002	-0.015	
Total					0.021	0.223	0.244

Variable	β* (Cotton 1988)	Explained	Male Overpayment	Female Underpeyment		β* (Oaxaca & Rensom 1994)	Explained	Male Overpayment	Female Underpayment	
Constant	1.326	0.000	0.005	0.005		1.326	0.000	0.004	0.005	
Experience	0.037	-0.053	0.139	0.148		0.037	-0.053	0.142	0.145	
Experience^2	-0.001	0.046	-0.048	-0.054		-0.001	0.046	-0.049	-0.052	
Education 1	-0.146	0.002	-0.008	-0.009		-0.141	0.002	-0.009	-0.008	
Education 3	0.110	0.003	0.001	0.001		0.110	0.003	0.001	0.001	
Education 4	0.296	0.022	-0.007	-0.006		0.296	0.022	-0.007	-0.006	
Part-time	-0.072	0.024	0.002	0.030		-0.135	0.046	0.004	0.007	
Public Sector	0.156	-0.029	-0.020	-0.038		0.181	-0.033	-0.024	-0.029	
Large Firm	0.026	0.000	0.010	0.009		0.029	0.001	0.009	0.010	
Small Firm	-0.132	0.014	0.002	0.002		-0.132	0.014	0.002	0.002	
Merried	0.064	-0.001	0.019	0.020		0.063	-0.001	0.020	0.019	
Agriculture	-0.049	0.000	-0.002	-0.001		-0.105	-0.001	-0.001	-0.001	
Mining	0.250	0.001	0.000	0.000		0.240	0.001	0.000	0.000	
Utilities	0.128	0.001	0.001	0.000		0.147	0.001	0.000	0.000	
Construction	0.106	0.006	-0.007	-0.001		0.006	0.000	-0.002	-0.001	
Services	-0.160	0.010	-0.002	-0.003		-0.161	0.010	-0.002	-0.003	
Transport	0.057	0.003	-0.007	-0.003		0.024	0.001	-0.004	-0.004	
Finance	0.233	-0.001	0.002	0.002		0.234	-0.001	0.001	0.002	
Community	-0.054	0.013	0.011	0.024		-0.059	0.014	0.012	0.022	
Insider	0.034	0.000	-0.008	-0.008		0.035	0.000	-0.008	-0.008	
Outsider	-0.142	-0.002	-0.008	-0.007		-0.142	-0.002	-0.008	-0.007	
Totel		**0.059**	**0.074**	**0.111**	**0.244**		**0.070**	**0.082**	**0.092**	**0.244**

APPENDIX 5.3 Probit Estimates of Participation. UK 1997

Female

Variable	Coefficient	t-ratio	Mean
Constant	-2.89	-12.5	
Age	0.191	13.7	36.86
Age^2	-0.003	-14.0	1508.74
Education 1	-0.292	-4.3	0.18
Education 3	-0.203	-3.0	0.15
Education 4	-0.035	-0.6	0.33
Married	0.032	0.6	0.55
No. of Kids	-0.253	-9.9	0.89
Child under 5	-0.491	-7.6	0.18
Poor Health	-0.669	-8.4	0.09
Household Income	0.0002	11.7	1590.3
Dep. Variable	Participation		
Mean	0.566		
Observations	3817		
Iterations	5		
Log-likelihood	-2195.5		
Restricted Log-like.	-2612.2		

Male

Variable	Coefficient	t-ratio	Mean
Constant	-2.25	-9.7	
Age	0.145	10.5	36.57
Age^2	-0.002	-11.6	1488.5
Education 1	-0.147	-2.0	0.16
Education 3	-0.197	-2.9	0.19
Education 4	0.092	1.5	0.39
Married	0.167	2.7	0.52
No. of Kids	-0.162	-6.3	0.81
Child under 5	0.096	1.3	0.16
Poor Health	-0.526	-5.5	0.06
Household Income	0.0002	12.4	1707.3
Dep. Variable	Participation		
Mean	0.609		
Observations	3507		
Iterations	5		
Log-likelihood	-2010.6		
Restricted Log-like.	-2347.2		

APPENDIX 5.4 Selectivity Corrected Decomposition. UK 1997

Variable	β Male	β Female	Male Mean	Female Mean	Explained	Unexplained	
Constant	2.466	1.692			0.000	0.774	
Experience	-0.002	0.013	18.989	20.433	0.003	-0.307	
$Experience^2$	0.0005	-0.0002	492.666	563.664	-0.034	0.378	
Education 1	-0.175	-0.033	0.121	0.133	0.002	-0.019	
Education 3	0.208	0.129	0.163	0.137	0.006	0.011	
Education 4	0.106	0.267	0.461	0.385	0.008	-0.062	
Part-time	0.184	-0.081	0.027	0.367	-0.062	0.097	
Public Sector	0.019	0.253	0.194	0.377	-0.003	-0.088	
Large Firm	0.060	-0.026	0.197	0.179	0.001	0.015	
Small Firm	-0.108	-0.124	0.414	0.518	0.011	0.008	
Married	-0.046	0.010	0.575	0.596	0.001	-0.034	
Agriculture	-0.081	0.119	0.015	0.006	-0.001	-0.001	
Mining	0.169	0.243	0.009	0.004	0.001	0.000	
Utilities	0.174	0.087	0.014	0.007	0.001	0.001	
Construction	-0.026	0.220	0.058	0.006	-0.001	-0.001	
Services	-0.127	-0.137	0.159	0.222	0.008	0.002	
Transport	-0.045	0.119	0.085	0.036	-0.002	-0.006	
Finance	0.151	0.194	0.133	0.138	-0.001	-0.006	
Community	0.030	-0.099	0.206	0.449	-0.007	0.058	
Insider	0.019	0.058	0.321	0.329	0.000	-0.013	
Outsider	-0.119	-0.108	0.429	0.416	-0.002	-0.005	
Total					-0.072	0.802	0.730

PENDIX 5.5: Cross-sectional Decomposition. Germany 1996

ariable	β Male	β Female	Male Mean	Female Mean	Explained	Unexplained	
Constant	2.681	2.424	1.000	1.000	0.000	0.257	
Experience	0.030	0.037	20.710	19.973	0.022	-0.127	
Experience^2	-0.001	-0.001	540.269	513.581	-0.017	0.057	
Education 1	0.078	0.057	0.038	0.037	0.00003	0.001	
Education 3	0.123	0.156	0.648	0.627	0.003	-0.021	
Education 4	0.392	0.456	0.217	0.203	0.006	-0.013	
Part-time	0.159	-0.074	0.021	0.274	-0.040	0.064	
ublic Sector	0.005	0.070	0.247	0.392	-0.001	-0.025	
Large Firm	0.098	0.133	0.545	0.468	0.008	-0.016	
Small Firm	-0.175	-0.127	0.170	0.252	0.014	-0.012	
Married	0.108	-0.072	0.715	0.658	0.006	0.118	
Agriculture	-0.150	-0.129	0.018	0.017	-0.0002	-0.0003	
Mining	-0.057	0.500	0.011	0.001	-0.001	-0.0003	
Utilities	0.124	0.209	0.019	0.008	0.001	-0.001	
onstruction	0.031	0.014	0.127	0.024	0.003	0.0004	
Services	-0.128	-0.056	0.082	0.183	0.013	-0.013	
Transport	-0.072	-0.080	0.076	0.049	-0.002	0.0004	
Finance	0.074	0.159	0.051	0.085	-0.003	-0.007	
Communtiy	-0.004	0.057	0.204	0.438	0.001	-0.027	
ast Germany	-0.414	-0.318	0.195	0.311	0.048	-0.030	
Total					0.062	0.205	0.267

Variable	β* (Cotton 1988)	Explained	Male Overpayment	Female Underpayment		β* (Oaxaca & Ransom 1994)	Explained	Male Overpayment	Female Underpayment	
Constant	2.560	0.000	0.121	0.136		2.575	0.000	0.106	0.151	
Experience	0.033	0.025	-0.062	-0.067		0.033	0.024	-0.057	-0.072	
Experience^2	-0.001	-0.018	0.028	0.030		-0.001	-0.018	0.025	0.033	
Education 1	0.068	0.00003	0.0004	0.0004		0.070	0.000	0.000	0.000	
Education 3	0.139	0.003	-0.010	-0.011		0.137	0.003	-0.009	-0.012	
Education 4	0.422	0.006	-0.006	-0.007		0.417	0.006	-0.005	-0.008	
Part-time	0.049	-0.012	0.002	0.034		-0.036	0.009	0.004	0.011	
ublic Sector	0.035	-0.005	-0.008	-0.013		0.038	-0.005	-0.008	-0.013	
Large Firm	0.114	0.009	-0.009	-0.009		0.111	0.009	-0.007	-0.010	
Small Firm	-0.152	0.013	-0.004	-0.006		-0.154	0.013	-0.004	-0.007	
Married	0.023	0.001	0.060	0.062		0.035	0.002	0.052	0.070	
Agriculture	-0.140	-0.0002	-0.0002	-0.0002		-0.143	0.000	0.000	0.000	
Mining	0.205	0.002	-0.003	-0.0002		-0.038	0.000	0.000	0.000	
Utilities	0.164	0.002	-0.001	-0.0004		0.142	0.002	0.000	-0.001	
onstruction	0.023	0.002	0.001	0.0002		0.029	0.003	0.000	0.000	
Services	-0.094	0.009	-0.003	-0.007		-0.096	0.010	-0.003	-0.007	
Transport	-0.076	-0.002	0.0003	0.0002		-0.074	-0.002	0.000	0.000	
Finance	0.114	-0.004	-0.002	-0.004		0.111	-0.004	-0.002	-0.004	
Community	0.025	-0.006	-0.006	-0.014		0.025	-0.006	-0.006	-0.014	
ast Germany	-0.369	0.043	-0.009	-0.016		-0.374	0.043	-0.008	-0.017	
Total		0.067	0.092	0.109	0.267		0.087	0.080	0.100	0.267

'PENDIX 5.6 Probit Estimates of Participation. Germany 1996

male

Variable	Coefficient	t-ratio	Mean
Constant	-3.25	-12.4	
Age	0.159	10.5	38.28
Age^2	-0.002	-10.7	1609.6
Education 1	-0.277	-2.8	0.08
Education 3	0.093	1.6	0.60
Education 4	0.068	0.9	0.14
Married	-0.429	-7.8	0.66
No. of Kids	-0.170	-6.5	0.82
Child under 5	-0.742	-10.3	0.14
Poor Health	-0.281	-3.8	0.08
ousehold Income	0.0002	23.4	4485.4
Dep. Variable	Participation		
Mean	0.427		
Observations	4563		
Iterations	5		
Log-likelihood	-2459.4		
estricted Log-like.	-3113.9		

ale

Variable	Coefficient	t-ratio	Mean
Constant	-3.067	-11.3	
Age	0.122	7.9	38.66
Age^2	-0.001	-7.8	1639.6
Education 1	0.041	0.4	0.05
Education 3	0.106	1.5	0.65
Education 4	-0.253	-2.9	0.17
Married	-0.093	-1.5	0.63
No. of Kids	-0.004	-0.1	0.77
Child under 5	0.283	4.0	0.14
Poor Health	-0.333	-4.3	0.08
ousehold Income	0.0002	27.8	4658.0
Dep. Variable	Participation		
Mean	0.556		
Observations	4437		
Iterations	5		
Log-likelihood	-2299.2		
estricted Log-like.	-3048.0		

PPENDIX 5.7 Selectivity Corrected Decomposition. Germany 1996

Variable	β Male	β Female	Male Mean	Female Mean	Explained	Unexplained	
Constant	3.767	2.996			0.000	0.771	
Experience	-0.018	0.008	20.710	19.973	-0.013	-0.522	
Experience^2	0.0004	-0.0001	540.269	513.581	0.012	0.283	
Education 1	-0.038	0.138	0.038	0.037	0.000	-0.007	
Education 3	-0.012	0.082	0.648	0.627	0.000	-0.058	
Education 4	0.215	0.339	0.217	0.203	0.003	-0.025	
Part-time	0.245	0.002	0.021	0.274	-0.062	0.067	
ublic Sector	0.043	0.066	0.247	0.392	-0.006	-0.009	
Large Firm	0.063	0.110	0.545	0.468	0.005	-0.022	
Small Firm	-0.079	-0.115	0.170	0.252	0.007	0.009	
Married	0.002	-0.021	0.715	0.658	0.000	0.015	
Agriculture	-0.082	-0.097	0.018	0.017	0.000	0.000	
Mining	-0.022	0.448	0.011	0.001	0.000	0.000	
Utilities	0.023	0.200	0.019	0.008	0.000	-0.001	
Construction	0.031	-0.030	0.127	0.024	0.003	0.002	
Services	-0.117	-0.045	0.082	0.183	0.012	-0.013	
Transport	-0.092	-0.074	0.076	0.049	-0.003	-0.001	
Finance	-0.023	0.099	0.051	0.085	0.001	-0.010	
Community	-0.043	0.042	0.204	0.438	0.010	-0.037	
ast Germany	-0.297	-0.251	0.195	0.311	0.034	-0.014	
Total					**0.002**	**0.426**	**0.428**

PPENDIX 5.8 Cross-country Decomposition. Germany 1996/UK 1997

Variable	Male mean (Germany)	Fem. mean (Germany)	β male (Germany)	β male (UK)	Male mean (UK)	Fem. Mean (UK)	Term 1	Term 2
Constant	1.000	1.000	3.767	2.466	1.000	1.000	0.000	0.000
Experience	20.710	19.973	-0.018	-0.002	18.989	20.433	-0.004	-0.012
Experience^2	540.269	513.581	0.0004	0.0005	492.666	563.664	0.047	-0.001
Education 1	0.038	0.037	-0.038	-0.175	0.121	0.133	-0.002	0.000
Education 3	0.648	0.627	-0.012	0.208	0.163	0.137	-0.001	-0.005
Education 4	0.217	0.203	0.215	0.106	0.461	0.385	-0.006	0.002
Part-time	0.021	0.274	0.245	0.184	0.027	0.367	0.016	-0.015
ublic Sector	0.247	0.392	0.043	0.019	0.194	0.377	0.001	-0.004
Large Firm	0.545	0.468	0.063	0.060	0.197	0.179	0.004	0.000
Small Firm	0.170	0.252	-0.079	-0.108	0.414	0.518	-0.002	-0.002
Married	0.715	0.658	0.002	-0.046	0.575	0.596	-0.004	0.003
Agriculture	0.018	0.017	-0.082	-0.081	0.015	0.006	0.001	0.000
Mining	0.011	0.001	-0.022	0.169	0.009	0.004	0.001	-0.002
Utilities	0.019	0.008	0.023	0.174	0.014	0.007	0.001	-0.002
onstruction	0.127	0.024	0.031	-0.026	0.058	0.006	-0.001	0.006
Services	0.082	0.183	-0.117	-0.127	0.159	0.222	0.005	-0.001
Transport	0.076	0.049	-0.092	-0.045	0.085	0.036	0.001	-0.001
Finance	0.051	0.085	-0.023	0.151	0.133	0.138	-0.004	0.006
Community	0.204	0.438	-0.043	0.030	0.206	0.449	0.000	0.017
st Germany	0.195	0.311	-0.297	0	0	0	0.000	0.034
Insider	0	0	0.000	0.019	0.321	0.329	0.000	0.000
Outsider	0	0	0	-0.119	0.429	0.416	0.002	0.000
λ	0.520	0.692	-0.923	-1.396	0.530	0.572	0.181	-0.081
Total							**0.233**	**-0.058**

Term 1 = $(\delta Z_j - \delta Z_k)\beta_k$

Term 2 = $\delta Z_j(\beta_j - \beta_k)$

Term 3 = $(\delta\psi_j - \delta\psi_k)\sigma_k$ = (.363 - .675).382 = -.119

Term 4 = $\delta\psi_j\,(\sigma_j - \sigma_k)$ = .363(.296 - .382) = -.031

PPENDIX 5.9 1991 Results UK

Variable	Male			Female		
	Mean	Coefficient	t-ratio	Mean	Coefficient	t-ratio
Constant		1.178	30.1		1.194	29.4
Experience	19.982	0.040	13.0	20.944	0.021	7.3
Experience^2	543.8	-0.001	-10.4	591.2	-0.0004	-6.0
Education 1	0.183	-0.182	-5.7	0.205	-0.133	-4.5
Education 3	0.157	0.080	2.7	0.103	0.104	3.3
Education 4	0.413	0.276	11.3	0.343	0.305	13.1
Part-time	0.020	0.008	0.1	0.377	-0.133	-6.5
ublic Sector	0.201	0.024	0.6	0.381	0.255	8.2
Large Firm	0.220	0.063	2.6	0.158	0.005	0.2
Small Firm	0.391	-0.095	-4.4	0.524	-0.145	-6.9
Married	0.665	0.094	4.2	0.642	0.009	-0.4
Agriculture	0.016	-0.284	-3.8	0.005	-0.345	-2.7
Mining	0.020	0.218	3.2	0.004	0.200	1.4
Utilities	0.026	0.195	3.3	0.006	0.329	2.8
Construction	0.061	-0.027	-0.6	0.006	0.056	0.5
Services	0.133	-0.095	-3.1	0.202	-0.098	-3.1
Transport	0.094	-0.029	-0.8	0.028	0.067	1.2
Finance	0.109	0.240	7.3	0.127	0.260	7.5
Community	0.195	0.013	0.3	0.467	-0.131	-3.6
Insider	0.359	-0.012	-0.5	0.279	0.008	0.3
Outsider	0.357	-0.126	-5.4	0.408	-0.123	-5.7
ep. Variable		Ln Wage			Ln Wage	
Mean		1.714			1.393	
tandard Dev.		0.515			0.497	
bservations		2149			2153	
R-squared		0.333			0.315	
RSS		380.2			364.0	
Log-Like		-1188.1			-1141.7	

** and * represents significance at the 5% and 10% levels respectively.
# reported t-ratios are based upon White's heteroscedastic consistent standard errors.

he above table reports the earnings function estimates for the UK in 1991. Not surprisingly most of e features displayed in 1997 were also present in the earlier year, part-time and public sector nployment have negative and positive impacts respectively upon female earnings, whilst neither is a significant effect upon male wages. Both marriage and large firm employment display a wage emium for men but no significant impact for women, small firm employment impacts negatively on male and female earnings but the penalty is larger for women. Finally there is again higher turns from potential experience for the men.

owever there has been a few interesting changes across the two years. Firstly in 1997 the returns om education did not appear to favour either gender, but in 1991 all three of the education ımmies show better returns for women. In addition Education 1 is negative and significant in both ses, having been insignificant in 1997, indicating that in the earlier year there was a wage penalty r those not completing formal education. There are no significant returns from being an insider, hich is to be expected due to the flexibility of the UK labour market, (Brookes et al 2002), but by 97 there are positive and significant returns for female insiders. Suggesting, for women at least, though the reasons aren't clear, a reduction in the level of flexibility.

'age Gap Decompositions: UK 1991

ean Ln Wage (Male)	1.714					
ean Ln Wage (Female)	1.393					
age Gap	0.321					
male/Male Ratio	0.725					
Wage Gap	27.5%					
	Oaxaca (1973)		Cotton (1988)		Oaxaca & Ransom (1994)	
plained	0.038	12%	0.073	23%	0.088	27%
nexplained	0.283	88%	0.248	77%	0.233	73%
ale Overpayment			0.107	33%	0.118	37%
male Underpayment			0.141	44%	0.115	36%

Cross-sectional Decomposition. UK 1991

/ariable	β Male	β Female	Male Mean	Female Mean	Explained	Unexplained	
Constant	1.178	1.194			0.000	-0.017	
:xperience	0.040	0.021	19.982	20.944	-0.038	0.389	
:xperience^2	-0.001	-0.0004	543.773	591.180	0.032	-0.177	
:ducation 1	-0.182	-0.133	0.183	0.205	0.004	-0.010	
:ducation 3	0.080	0.104	0.157	0.103	0.004	-0.003	
:ducation 4	0.276	0.305	0.413	0.343	0.019	-0.010	
Part-time	0.008	-0.133	0.020	0.377	-0.003	0.053	
ıblic Sector	0.024	0.255	0.201	0.381	-0.004	-0.088	
.arge Firm	0.063	0.005	0.220	0.158	0.004	0.009	
;mall Firm	-0.095	-0.145	0.391	0.524	0.013	0.026	
Married	0.094	0.009	0.665	0.642	0.002	0.055	
\griculture	-0.284	-0.345	0.016	0.005	-0.003	0.0003	
Mining	0.218	0.200	0.020	0.004	0.003	0.0001	
Utilities	0.195	0.329	0.026	0.006	0.004	-0.001	
onstruction	-0.027	0.056	0.061	0.006	-0.001	-0.0005	
Services	-0.095	-0.098	0.133	0.202	0.007	0.0005	
Transport	-0.029	0.067	0.094	0.028	-0.002	-0.003	
Finance	0.240	0.260	0.109	0.127	-0.004	-0.002	
;ommunity	0.013	-0.131	0.195	0.467	-0.003	0.067	
Insider	-0.012	0.008	0.359	0.279	-0.001	-0.006	
Outsider	-0.126	-0.123	0.357	0.408	0.006	-0.001	
Total					**0.038**	**0.283**	**0.321**

ırning to the wage decomposition, the wage gap of 28.2% is in the region of 20% explained by fferences in characteristics. This explained term is greater than in 1997 which concurs with Black al (1999), who find that as the wage gap narrows the proportion unexplained rises. Irrespective of e method chosen there is clear evidence of both male overpayment and female underpayment ·ing present.

PPENDIX 5.10 Probit Estimates for Participation. UK 1991

emale

Variable	Coefficient	t-ratio	Mean
Constant	-2.389	-10.7	
Age	0.169	12.7	36.9
Age^2	-0.002	-13.4	1507.5
Education 1	-0.279	-4.7	0.25
Education 3	-0.139	-1.9	0.11
Education 4	-0.075	-1.4	0.32
Married	-0.078	-1.4	0.62
No. of Kids	-0.244	-10.2	0.93
Child under 5	-0.707	-11.5	0.20
Poor Health	-0.395	-4.9	0.08
lousehold Income	0.0002	10.8	1298.4
Dep. Variable	Participation		
Mean	0.551		
Observations	4031		
Iterations	5		
Log-likelihood	-2366.3		
estricted Log-like.	-2773.3		

lale

Variable	Coefficient	t-ratio	Mean
Constant	-1.590	-7.4	
Age	0.105	8.3	36.30
Age^2	-0.001	-8.9	1469.0
Education 1	-0.328	-4.9	0.22
Education 3	-0.111	-1.6	0.16
Education 4	-0.120	-2.1	0.39
Married	0.338	5.4	0.59
No. of Kids	-0.174	-7.3	0.88
Child under 5	-0.017	-0.2	0.17
Poor Health	-0.516	-5.3	0.05
lousehold Income	0.0002	9.3	1379.9
Dep. Variable	Participation		
Mean	0.592		
Observations	3748		
Iterations	5		
Log-likelihood	-2296.4		
estricted Log-like.	-2534.0		

PPENDIX 5.11 Selectivity Corrected Decomposition. UK 1991

Variable	β Male	β Female	Male Mean	Female Mean	Explained	Unexplained	
Constant	2.163	1.461			0.000	0.702	
Experience	0.015	0.010	19.982	20.944	-0.014	0.102	
Experience^2	-0.0001	-0.0001	543.773	591.180	0.003	0.037	
Education 1	0.014	-0.099	0.183	0.205	0.000	0.023	
Education 3	0.129	0.113	0.157	0.103	0.007	0.002	
Education 4	0.261	0.284	0.413	0.343	0.018	-0.008	
Part-time	0.118	-0.070	0.020	0.377	-0.042	0.071	
Public Sector	0.007	0.240	0.201	0.381	-0.001	-0.089	
Large Firm	0.039	0.008	0.220	0.158	0.002	0.005	
Small Firm	-0.094	-0.144	0.391	0.524	0.012	0.026	
Married	-0.093	0.019	0.665	0.642	-0.002	-0.072	
Agriculture	-0.259	-0.328	0.016	0.005	-0.003	0.000	
Mining	0.161	0.186	0.020	0.004	0.003	0.000	
Utilities	0.130	0.325	0.026	0.006	0.003	-0.001	
Construction	-0.019	0.048	0.061	0.006	-0.001	0.000	
Services	-0.097	-0.094	0.133	0.202	0.007	-0.001	
Transport	-0.060	0.059	0.094	0.028	-0.004	-0.003	
Finance	0.170	0.244	0.109	0.127	-0.003	-0.009	
Community	0.008	-0.116	0.195	0.467	-0.002	0.058	
Insider	-0.003	0.002	0.359	0.279	0.000	-0.001	
Outsider	-0.110	-0.121	0.357	0.408	0.006	0.004	
Total					**-0.012**	**0.846**	**0.833**

PPENDIX 5.12 Inter-temporal Decomposition. UK 1991-1997

Variable	Male mean 1991	Fem. mean 1991	β male 1991	β male 1997	Male mean 1997	Fem. Mean 1997	Term 1	Term 2
Constant	1.000	1.000	2.163	2.466	1.000	1.000	0.000	0.000
Experience	19.982	20.944	0.015	-0.002	18.989	20.433	-0.001	-0.016
Experience2	543.773	591.180	-0.0001	0.0005	492.666	563.664	0.011	0.026
Education 1	0.183	0.205	0.014	-0.175	0.121	0.133	0.002	-0.004
Education 3	0.157	0.103	0.129	0.208	0.163	0.137	0.006	-0.004
Education 4	0.413	0.343	0.261	0.106	0.461	0.385	-0.001	0.011
Part-time	0.020	0.377	0.118	0.184	0.027	0.367	-0.003	0.023
Public Sector	0.201	0.381	0.007	0.019	0.194	0.377	0.000	0.002
Large Firm	0.220	0.158	0.039	0.060	0.197	0.179	0.003	-0.001
Small Firm	0.391	0.524	-0.094	-0.108	0.414	0.518	0.003	-0.002
Married	0.665	0.642	-0.093	-0.046	0.575	0.596	-0.002	-0.001
Agriculture	0.016	0.005	-0.259	-0.081	0.015	0.006	0.000	-0.002
Mining	0.020	0.004	0.161	0.169	0.009	0.004	0.002	0.000
Utilities	0.026	0.006	0.130	0.174	0.014	0.007	0.002	-0.001
Construction	0.061	0.006	-0.019	-0.026	0.058	0.006	0.000	0.000
Services	0.133	0.202	-0.097	-0.127	0.159	0.222	0.001	-0.002
Transport	0.094	0.028	-0.060	-0.045	0.085	0.036	-0.001	-0.001
Finance	0.109	0.127	0.170	0.151	0.133	0.138	-0.002	0.000
Community	0.195	0.467	0.008	0.030	0.206	0.449	-0.001	0.006
Insider	0.359	0.279	-0.003	0.019	0.321	0.329	0.002	-0.002
Outsider	0.357	0.408	-0.110	-0.119	0.429	0.416	0.008	0.000
λ	0.580	0.599	-1.227	-1.396	0.530	0.572	-0.031	-0.003
Total							**-0.003**	**0.029**

Term 1 = $(\delta Z_j - \delta Z_k)\beta_k$

Term 2 = $\delta Z_j(\beta_j - \beta_k)$

Term 3 = $(\delta\psi_j - \delta\psi_k)\sigma_k$ = (.800 - .675).382 = 0.047

Term 4 = $\delta\psi_j\ (\sigma_j - \sigma_k)$ = .800(.387 - .382) = 0.004

PPENDIX 5.13 Cross-sectional Decomposition. Germany 1991

Variable	β Male	β Female	Male Mean	Female Mean	Explained	Unexplained	
Constant	2.642	2.459			0.000	0.183	
Experience	0.025	0.024	20.316	19.282	0.026	0.015	
$Experience^2$	-0.001	-0.001	531.665	493.947	-0.020	0.006	
Education 1	0.014	0.033	0.036	0.048	-0.00017	-0.001	
Education 3	0.129	0.139	0.680	0.633	0.006	-0.006	
Education 4	0.335	0.421	0.178	0.168	0.003	-0.015	
Part-time	0.225	-0.012	0.013	0.236	-0.050	0.056	
ublic Sector	-0.071	0.064	0.239	0.378	0.010	-0.051	
Large Firm	0.058	0.041	0.594	0.490	0.006	0.008	
Small Firm	-0.146	-0.145	0.143	0.217	0.011	0.000	
Married	0.060	-0.048	0.756	0.685	0.004	0.074	
Agriculture	-0.175	-0.017	0.033	0.020	-0.0024	-0.0031	
Mining	-0.007	0.104	0.020	0.004	0.000	-0.0005	
Utilities	0.157	0.083	0.023	0.005	0.003	0.000	
onstruction	0.040	0.072	0.122	0.016	0.004	-0.0005	
Services	-0.174	-0.087	0.072	0.193	0.021	-0.017	
Transport	-0.078	-0.021	0.075	0.050	-0.002	-0.0029	
Finance	0.115	0.121	0.033	0.065	-0.004	0.000	
Community	0.014	0.034	0.166	0.375	-0.003	-0.008	
ast Germany	-0.639	-0.600	0.316	0.372	0.036	-0.014	
Total					**0.049**	**0.224**	**0.273**

Variable	β* (Cotton 1988)	Explained	Male Overpayment	Female Underpayment		β* (Oaxaca & Ransom 1994)	Explained	Male Overpayment	Female Underpayment	
Constant	2.563	0.000	0.079	0.104		2.569	0.000	0.073	0.110	
Experience	0.025	0.026	0.007	0.008		0.025	0.026	0.006	0.009	
$Experience^2$	-0.001	-0.020	0.003	0.004		-0.001	-0.020	0.003	0.004	
Education 1	0.022	-0.00027	-0.0003	-0.0005		0.022	0.000	0.000	-0.001	
Education 3	0.133	0.006	-0.003	-0.004		0.133	0.006	-0.003	-0.004	
Education 4	0.372	0.004	-0.007	-0.008		0.369	0.003	-0.006	-0.009	
Part-time	0.123	-0.027	0.001	0.032		0.017	-0.004	0.003	0.007	
ublic Sector	-0.013	0.002	-0.014	-0.029		-0.004	0.001	-0.016	-0.026	
Large Firm	0.051	0.005	0.004	0.005		0.052	0.005	0.004	0.005	
Small Firm	-0.145	0.011	0.000	0.000		-0.145	0.011	0.000	0.000	
Married	0.013	0.001	0.035	0.042		0.014	0.001	0.035	0.042	
Agriculture	-0.107	-0.0015	-0.0023	-0.0018		-0.132	-0.002	-0.001	-0.002	
Mining	0.041	0.001	-0.001	-0.0003		0.006	0.000	0.000	0.000	
Utilities	0.125	0.002	0.001	0.0002		0.147	0.003	0.000	0.000	
onstruction	0.054	0.006	-0.002	-0.0003		0.043	0.005	0.000	0.000	
Services	-0.137	0.017	-0.003	-0.010		-0.129	0.016	-0.003	-0.008	
Transport	-0.053	-0.001	-0.0019	-0.0016		-0.057	-0.001	-0.002	-0.002	
Finance	0.118	-0.004	0.000	0.000		0.118	-0.004	0.000	0.000	
Community	0.023	-0.005	-0.001	-0.004		0.024	-0.005	-0.002	-0.004	

ast Germany	-0.622	0.035	-0.005	-0.008		-0.626	0.035	-0.004	-0.009	
Total		**0.056**	**0.090**	**0.127**	**0.273**		**0.076**	**0.086**	**0.112**	**0.273**

robit Estimates of Participation. Germany 1991

emale

Variable	Coefficient	t-ratio	Mean
Constant	-3.284	-14.6	
Age	0.169	12.5	37.2
Age^2	-0.002	-12.5	1530.8
Education 1	0.008	0.1	0.06
Education 3	0.074	1.5	0.60
Education 4	0.106	1.6	0.14
Married	-0.447	-8.8	0.68
No. of Kids	-0.118	-5.2	0.87
Child under 5	-0.381	-6.6	0.18
Poor Health	-0.172	-2.5	0.08
Iousehold Income	0.0002	21.5	3729.8
Dep. Variable	Participation		
Mean	0.437		
Observations	5260		
Iterations	5		
Log-likelihood	-3086.9		
estricted Log-like.	-3603.4		

Iale

Variable	Coefficient	t-ratio	Mean
Constant	-3.650	-17.5	
Age	0.204	17.1	37.4
Age^2	-0.003	-16.8	1550.9
Education 1	0.018	0.2	0.04
Education 3	-0.059	-1.0	0.67
Education 4	-0.230	-3.3	0.18
Married	0.389	7.6	0.65
No. of Kids	-0.055	-2.8	0.84
Child under 5	-0.017	-0.2	0.17
Poor Health	-0.516	-5.3	0.05
Iousehold Income	0.0002	9.3	1379.9
Dep. Variable	Participation		
Mean	0.580		
Observations	5339		
Iterations	5		
Log-likelihood	-3299.5		
estricted Log-like.	-3631.6		

electivity Corrected Decomposition. Germany 1991

Variable	Male	Female	Male Mean	Female Mean	Explained	Unexplained	
Constant	2.838	3.126			0.000	-0.288	
Experience	0.016	-0.009	20.316	19.282	0.017	0.484	
Experience2	-0.0003	0.0002	531.665	493.947	-0.012	-0.267	
Education 1	-0.003	0.025	0.036	0.048	0.000	-0.001	
Education 3	0.128	0.058	0.680	0.633	0.006	0.045	
Education 4	0.349	0.272	0.178	0.168	0.003	0.013	
Part-time	0.230	0.069	0.013	0.236	-0.051	0.038	
Public Sector	-0.071	0.064	0.239	0.378	0.010	-0.051	
Large Firm	0.058	0.026	0.594	0.490	0.006	0.016	
Small Firm	-0.145	-0.138	0.143	0.217	0.011	-0.001	
Married	0.024	0.011	0.756	0.685	0.002	0.009	
Agriculture	-0.175	0.007	0.033	0.020	-0.002	-0.004	
Mining	-0.005	0.077	0.020	0.004	0.000	0.000	
Utilities	0.159	0.010	0.023	0.005	0.003	0.001	
Construction	0.042	0.039	0.122	0.016	0.004	0.000	
Services	-0.172	-0.093	0.072	0.193	0.021	-0.015	
Transport	-0.078	-0.011	0.075	0.050	-0.002	-0.003	
Finance	0.113	0.052	0.033	0.065	-0.004	0.004	
Community	0.015	0.023	0.166	0.375	-0.003	-0.003	
:ast Germany	-0.638	-0.418	0.316	0.372	0.036	-0.082	
Total					**0.044**	**-0.106**	**-0.062**

Variable	Male Mean	Male Coefficient	Male t-ratio	Female Mean	Female Coefficient	Female t-ratio
Constant		2.642	74.4		2.459	56.4
Experience	20.316	0.025	8.3	19.282	0.024	6.8
Experience^2	531.665	-0.001	-7.5	493.947	-0.001	-6.3
Education 1	0.036	0.014	0.3	0.048	0.033	0.7
Education 3	0.680	0.129	5.2	0.633	0.139	4.9
Education 4	0.178	0.335	11.2	0.168	0.421	11.3
Part-time	0.013	0.225	3.4	0.236	-0.012	-0.5
Public Sector	0.239	-0.071	-2.2	0.378	0.064	2.0
Large Firm	0.594	0.058	3.2	0.490	0.041	1.9
Small Firm	0.143	-0.146	-5.9	0.217	-0.145	-5.3
Married	0.756	0.060	3.1	0.685	-0.048	-2.1
Agriculture	0.033	-0.175	-4.1	0.020	-0.017	-0.2
Mining	0.020	-0.007	-0.1	0.004	0.104	0.7
Utilities	0.023	0.157	3.1	0.005	0.083	0.6
Construction	0.122	0.040	1.6	0.016	0.072	0.9
Services	0.072	-0.174	-5.8	0.193	-0.087	-3.0
Transport	0.075	-0.078	-2.0	0.050	-0.021	-0.4
Finance	0.033	0.115	2.7	0.065	0.121	2.9
Community	0.166	0.014	0.4	0.375	0.034	0.9
East Germany	0.316	-0.639	-37.9	0.372	-0.600	-25.9
Dep. Variable		Ln Wage			Ln Wage	
Mean		2.861			2.587	
Standard Dev.		0.494			0.497	
Observations		2488			1885	
R-squared		0.47			0.349	
RSS		319.8			303.1	
Log-Like		-978.0			-952.3	

** and * represents significance at the 5% and 10% levels respectively.
# reported t-ratios are based upon White's heteroscedastic consistent standard errors.

he earnings functions are then re-estimated using the 1991 data, the results are reproduced in table bove. As with 1996 women benefit from public sector employment, however on this occasion it is ot so clear cut that the public sector is a disproportionately high source of 'good' jobs for women. he female coefficient being insignificant, whilst for men their coefficient is negative and gnificant. Both genders display a premium from employment in large firms, but with the male remium being clearly higher. There is also a wage penalty from small firm employment for both en and women, with the two coefficients being virtually identical.

s in 1996 employers appear to view marriage as a much clearer motivational signal for men, with it ving a positive and significant impact upon the male wage. Finally, as with 1996, there is a clear sadvantage to being employed in East Germany. However for both men and women the coefficient around twice the size of its 1996 value, indicating that the gradual process of integration has rrowed the gap between East and West German wages.

'age Gap Decompositions: Germany 1991

ean Ln Wage (Male)		2.861					
ean Ln Wage (Female)		2.587					
age Gap		0.273					
emale/Male Ratio		0.760					
Wage Gap		24.0%					
	Oaxaca (1973)		Cotton (1988)		Oaxaca & Ransom (1994)	
xplained	0.049	18%	0.056	21%	0.076	28%
nexplained	0.224	82%	0.217	79%	0.198	72%
ale Overpayment			0.090	33%	0.086	31%
emale Underpayment			0.127	46%	0.112	41%

urning to the decompositions of the wage gap, irrespective of the chosen method of decomposition, ound a quarter of the 24% gap is explained by differences in characteristics. Both female nderpayment and male overpayment are important contributors to the remaining unexplained ortion, however which is the most significant is dependent upon which weighting factor is used. nce again differences in the intercept terms are the dominant factor within the decomposition, though not to such a large extent as in 1996. However over 85% of the unexplained term is still ssigned to this single element.

Variable	Male			Female		
	Mean	Coefficient	t-ratio	Mean	Coefficient	t-ratio
Constant		2.838	20.4		3.126	49.0
Experience	20.316	0.016	2.4	19.282	-0.009	-2.1
Experience2	531.66	-0.0003	-2.0	493.95	0.0002	2.3
Education 1	0.036	-0.003	-0.1	0.048	0.025	0.5
Education 3	0.680	0.128	5.2	0.633	0.058	2.1
Education 4	0.178	0.349	11.1	0.168	0.272	7.3
Part-time	0.013	0.230	3.5	0.236	0.069	2.9
Public Sector	0.239	-0.071	-2.2	0.378	0.064	2.1
Large Firm	0.594	0.058	3.2	0.490	0.026	1.2
Small Firm	0.143	-0.145	-5.9	0.217	-0.138	-5.3
Married	0.756	0.024	0.8	0.685	0.011	0.5
Agriculture	0.033	-0.175	-4.1	0.020	0.007	0.1
Mining	0.020	-0.005	-0.1	0.004	0.077	0.6
Utilities	0.023	0.159	3.1	0.005	0.010	0.1
Construction	0.122	0.042	1.7	0.016	0.039	0.5
Services	0.072	-0.172	-5.8	0.193	-0.093	-3.4
Transport	0.075	-0.078	-2.0	0.050	-0.011	-0.2
Finance	0.033	0.113	2.7	0.065	0.052	1.3
Community	0.166	0.015	0.4	0.375	0.023	0.7
East Germany	0.316	-0.638	-37.9	0.372	-0.418	-16.3
λ	0.606	-0.160	-1.5	0.766	-0.564	-13.8
Dep. Variable		Ln Wage			Ln Wage	
Mean		2.861			2.587	
Standard Dev.		0.494			0.497	
Observations		2488			1885	
R-squared		0.473			0.41	
RSS		319.5			275.1	
Log-Like		-976.9			-860.7	

** and * represents significance at the 5% and 10% levels respectively.
# reported t-ratios are based upon White's heteroscedastic consistent standard errors.

APPENDIX 5.14 Inter-temporal Decomposition. Germany 1991-1996

Variable	Male mean 1991	Fem. mean 1991	β mele 1991	β male 1996	Male mean 1996	Fem. Mean 1996	Term 1	Term 2
Constant	1.000	1.000	2.838	3.767	1.000	1.000	0.000	0.000
Experience	20.316	19.282	0.016	-0.018	20.710	19.973	-0.005	0.035
Experience2	531.665	493.947	-0.0003	0.0004	540.269	513.581	0.005	-0.029
Education 1	0.036	0.048	-0.003	-0.038	0.038	0.037	0.000	0.000
Education 3	0.680	0.633	0.128	-0.012	0.648	0.627	0.000	0.007
Education 4	0.178	0.168	0.349	0.215	0.217	0.203	-0.001	0.001
Part-time	0.013	0.236	0.230	0.245	0.021	0.274	0.007	0.003
Public Sector	0.239	0.378	-0.071	0.043	0.247	0.392	0.000	0.016
Large Firm	0.594	0.490	0.058	0.063	0.545	0.468	0.002	0.000
Small Firm	0.143	0.217	-0.145	-0.079	0.170	0.252	-0.001	0.005
Married	0.756	0.685	0.024	0.002	0.715	0.658	0.000	0.002
Agriculture	0.033	0.020	-0.175	-0.082	0.018	0.017	-0.001	-0.001
Mining	0.020	0.004	-0.005	-0.022	0.011	0.001	0.000	0.000
Utilities	0.023	0.005	0.159	0.023	0.019	0.008	0.000	0.002
Construction	0.122	0.016	0.042	0.031	0.127	0.024	0.000	0.001
Services	0.072	0.193	-0.172	-0.117	0.082	0.183	0.002	0.007
Transport	0.075	0.050	-0.078	-0.092	0.076	0.049	0.000	0.000
Finance	0.033	0.065	0.113	-0.023	0.051	0.085	0.000	-0.004
Community	0.166	0.375	0.015	-0.043	0.204	0.438	-0.001	-0.012
East Germany	0.316	0.372	-0.638	-0.297	0.195	0.311	-0.018	0.019
λ	0.606	0.766	-0.160	-0.923	0.520	0.692	-0.010	-0.122
Total							**-0.020**	**-0.071**

Term 1 = $(\delta Z_j - \delta Z_k)\beta_k$

Term 2 = $\delta Z_j(\beta_j - \beta_k)$

Term 3 = $(\delta\psi_j - \delta\psi_k)\sigma_k$ = (.566 - .363).296 = 0.060

Term 4 = $\delta\psi_j\,(\sigma_j - \sigma_k)$ = .566(.360 - .296) = 0.037

ppendix 6.1.

1996 Germany: Female

1991	1-dec.	2-dec.	3-dec.	4-dec.	5-dec.	6-dec.	7-dec.	8-dec.	9-dec.	10-dec.	Total	%
1-dec.	56	29	19	13	10	6	4	1	1	1	**140**	
2-dec.	18	22	21	5	15	8	4	2	1	2	**98**	
3-dec.	12	16	28	22	15	14	4	1	1	0	**113**	
4-dec.	11	11	26	34	18	9	5	4	1	2	**121**	
5-dec.	13	3	6	25	33	18	8	5	1	1	**113**	
6-dec.	8	4	4	13	28	30	21	7	2	3	**120**	
7-dec.	4	3	3	8	9	27	19	11	4	1	**89**	
8-dec.	2	2	1	2	3	5	9	27	15	3	**69**	
9-dec.	1	1	0	0	3	1	8	9	12	5	**40**	
10-dec.	1	0	1	1	2	2	0	2	5	13	**27**	
Total	**126**	**91**	**109**	**123**	**136**	**120**	**82**	**69**	**43**	**31**	**930**	

	1-dec.	2-dec.	3-dec.	4-dec.	5-dec.	6-dec.	7-dec.	8-dec.	9-dec.	10-dec.	Total	%
1-dec.	**40.000**	20.714	13.571	9.286	7.143	4.286	2.857	0.714	0.714	0.714	100	15.054
2-dec.	18.367	**22.449**	21.429	5.102	15.306	8.163	4.082	2.041	1.020	2.041	100	10.538
3-dec.	10.619	14.159	**24.779**	19.469	13.274	12.389	3.540	0.885	0.885	0.000	100	12.151
4-dec.	9.091	9.091	21.488	**28.099**	14.876	7.438	4.132	3.306	0.826	1.653	100	13.011
5-dec.	11.504	2.655	5.310	22.124	**29.204**	15.929	7.080	4.425	0.885	0.885	100	12.151
6-dec.	6.667	3.333	3.333	10.833	23.333	**25.000**	17.500	5.833	1.667	2.500	100	12.903
7-dec.	4.494	3.371	3.371	8.989	10.112	30.337	**21.348**	12.360	4.494	1.124	100	9.570
8-dec.	2.899	2.899	1.449	2.899	4.348	7.246	13.043	**39.130**	21.739	4.348	100	7.419
9-dec.	2.500	2.500	0.000	0.000	7.500	2.500	20.000	22.500	**30.000**	12.500	100	4.301
10-dec.	3.704	0.000	3.704	3.704	7.407	7.407	0.000	7.407	18.519	**48.148**	100	2.903
Total	13.548	9.785	11.720	13.226	14.624	12.903	8.817	7.419	4.624	3.333	100	100

	1-dec.	2-dec.	3-dec.	4-dec.	5-dec.	6-dec.	7-dec.	8-dec.	9-dec.	10-dec.	Total
1-dec.	**23.391**	16.169	15.881	12.371	12.723	8.976	4.954	2.548	1.459	1.529	100
2-dec.	16.858	**13.243**	15.037	13.229	15.455	11.696	6.264	3.785	2.175	2.258	100
3-dec.	13.810	11.589	**16.049**	16.626	16.341	12.501	6.719	3.521	1.541	1.303	100
4-dec.	12.713	10.420	15.830	**18.012**	15.899	11.749	6.386	4.574	2.294	2.122	100
5-dec.	12.588	7.437	10.617	17.438	**18.510**	14.203	8.660	6.007	2.572	1.967	100
6-dec.	10.059	5.840	7.612	14.187	18.021	**17.702**	11.749	8.000	3.841	2.988	100
7-dec.	8.250	5.452	6.587	11.614	15.770	18.317	**13.850**	11.214	5.968	2.977	100
8-dec.	5.517	4.194	3.637	5.728	9.208	10.918	14.184	**22.941**	16.666	7.006	100
9-dec.	5.253	3.438	2.820	5.203	9.511	11.505	14.346	19.499	**17.256**	11.169	100
10-dec.	6.018	2.750	4.747	6.545	10.476	8.491	6.881	11.573	16.361	**26.158**	100

1	0.115		0.115		0.000
2	0.091		0.074		0.018
3	0.102		0.071		0.031
4	0.107		0.056		0.051
5	0.099		0.041		0.058
6	0.106		0.034		0.072
7	0.082		0.019		0.063
8	0.057		0.018		0.040
9	0.036		0.005		0.031
10	0.021		0.000		0.021
B.I. =	**0.817**	**Up=**	**0.433**	**Down=**	0.385

991

1996 Germany: Male

	1-dec.	2-dec.	3-dec.	4-dec.	5-dec.	6-dec.	7-dec.	8-dec.	9-dec.	10-dec.	Total	%
1-dec.	22	12	18	16	7	5	5	2	0	0	87	
2-dec.	7	14	11	12	10	3	3	1	1	0	62	
3-dec.	7	7	11	12	12	7	3	2	3	0	64	
4-dec.	3	4	10	19	16	16	13	6	3	1	91	
5-dec.	10	8	10	28	30	31	19	12	2	1	151	
6-dec.	8	4	9	31	37	70	47	17	3	2	228	
7-dec.	5	5	5	18	21	60	59	50	12	6	241	
8-dec.	3	2	1	4	13	27	52	68	34	6	210	
9-dec.	0	3	2	5	2	5	22	42	77	31	189	
10-dec.	3	1	0	0	2	3	7	5	28	79	128	
Total	68	60	77	145	150	227	230	205	163	126	1451	

	1-dec.	2-dec.	3-dec.	4-dec.	5-dec.	6-dec.	7-dec.	8-dec.	9-dec.	10-dec.	Total	%
1-dec.	**25.287**	13.793	20.690	18.391	8.046	5.747	5.747	2.299	0.000	0.000	100	5.996
2-dec.	11.290	**22.581**	17.742	19.355	16.129	4.839	4.839	1.613	1.613	0.000	100	4.273
3-dec.	10.938	10.938	**17.188**	18.750	18.750	10.938	4.688	3.125	4.688	0.000	100	4.411
4-dec.	3.297	4.396	10.989	**20.879**	17.582	17.582	14.286	6.593	3.297	1.099	100	6.272
5-dec.	6.623	5.298	6.623	18.543	**19.868**	20.530	12.583	7.947	1.325	0.662	100	10.407
6-dec.	3.509	1.754	3.947	13.596	16.228	**30.702**	20.614	7.456	1.316	0.877	100	15.713
7-dec.	2.075	2.075	2.075	7.469	8.714	24.896	**24.481**	20.747	4.979	2.490	100	16.609
8-dec.	1.429	0.952	0.476	1.905	6.190	12.857	24.762	**32.381**	16.190	2.857	100	14.473
9-dec.	0.000	1.587	1.058	2.646	1.058	2.646	11.640	22.222	**40.741**	16.402	100	13.025
10-dec.	2.344	0.781	0.000	0.000	1.563	2.344	5.469	3.906	21.875	**61.719**	100	8.822
Total	4.686	4.135	5.307	9.993	10.338	15.644	15.851	14.128	11.234	8.684	100	100

	1-dec.	2-dec.	3-dec.	4-dec.	5-dec.	6-dec.	7-dec.	8-dec.	9-dec.	10-dec.	Total
1-dec.	**11.708**	10.342	14.146	17.786	14.546	12.760	9.891	5.668	2.639	0.515	100
2-dec.	9.344	**10.528**	12.903	17.898	15.808	13.337	10.137	5.981	3.270	0.793	100
3-dec.	8.266	8.069	**11.053**	16.763	15.315	15.235	11.723	7.533	4.642	1.401	100
4-dec.	5.418	5.227	7.866	**14.808**	14.757	18.800	15.311	10.449	5.101	2.263	100
5-dec.	6.035	5.425	7.925	14.958	**14.781**	19.208	15.567	10.281	4.138	1.682	100
6-dec.	4.672	3.834	5.974	13.464	14.188	**22.013**	17.879	11.725	4.242	2.010	100
7-dec.	3.545	3.012	4.194	10.088	11.484	20.145	**19.459**	16.188	7.971	3.914	100
8-dec.	2.488	2.203	2.512	6.725	8.387	16.557	19.973	**20.971**	14.048	6.135	100
9-dec.	1.488	1.921	1.707	3.984	4.636	8.904	15.174	19.819	**24.575**	17.790	100
10-dec.	2.482	1.604	1.183	2.252	2.920	5.102	9.080	10.037	23.382	**41.959**	100

1	0.053		0.053		0.000
2	0.038		0.034		0.004
3	0.039		0.032		0.007
4	0.053		0.042		0.012
5	0.089		0.053		0.036
6	0.123		0.056		0.066
7	0.134		0.047		0.087
8	0.114		0.029		0.085
9	0.098		0.023		0.075
10	0.051		0.000		0.051
B.I. =	**0.793**	**Up=**	**0.369**	**Down=**	**0.423**

1996 UK: Female

1991

	1-dec.	2-dec.	3-dec.	4-dec.	5-dec.	6-dec.	7-dec.	8-dec.	9-dec.	10-dec.	Total	%
1-dec.	62	34	21	18	11	13	4	3	1	1	168	
2-dec.	56	57	26	25	11	5	1	7	3	1	192	
3-dec.	28	41	43	32	17	11	12	3	1	2	190	
4-dec.	11	31	29	36	26	9	4	4	1	3	154	
5-dec.	2	12	19	33	41	21	17	5	5	4	159	
6-dec.	8	9	4	10	24	31	18	9	4	4	121	
7-dec.	2	4	2	4	6	24	15	30	5	3	95	
8-dec.	3	2	3	5	5	9	16	23	19	7	92	
9-dec.	1	6	2	1	2	11	3	29	37	19	111	
10-dec.	3	2	2	4	2	0	1	7	16	20	57	
Total	176	198	151	168	145	134	91	120	92	64	1339	

	1-dec.	2-dec.	3-dec.	4-dec.	5-dec.	6-dec.	7-dec.	8-dec.	9-dec.	10-dec.	Total	%
1-dec.	36.905	20.238	12.500	10.714	6.548	7.738	2.381	1.786	0.595	0.595	100	12.547
2-dec.	29.167	29.688	13.542	13.021	5.729	2.604	0.521	3.646	1.563	0.521	100	14.339
3-dec.	14.737	21.579	22.632	16.842	8.947	5.789	6.316	1.579	0.526	1.053	100	14.190
4-dec.	7.143	20.130	18.831	23.377	16.883	5.844	2.597	2.597	0.649	1.948	100	11.501
5-dec.	1.258	7.547	11.950	20.755	25.786	13.208	10.692	3.145	3.145	2.516	100	11.875
6-dec.	6.612	7.438	3.306	8.264	19.835	25.620	14.876	7.438	3.306	3.306	100	9.037
7-dec.	2.105	4.211	2.105	4.211	6.316	25.263	15.789	31.579	5.263	3.158	100	7.095
8-dec.	3.261	2.174	3.261	5.435	5.435	9.783	17.391	25.000	20.652	7.609	100	6.871
9-dec.	0.901	5.405	1.802	0.901	1.802	9.910	2.703	26.126	33.333	17.117	100	8.290
10-dec.	5.263	3.509	3.509	7.018	3.509	0.000	1.754	12.281	28.070	35.088	100	4.257
Total	13.144	14.787	11.277	12.547	10.829	10.007	6.796	8.962	6.871	4.780	100	100

	1-dec.	2-dec.	3-dec.	4-dec.	5-dec.	6-dec.	7-dec.	8-dec.	9-dec.	10-dec.	Total
1-dec.	22.869	19.593	13.378	13.442	10.005	8.415	4.616	4.081	1.993	1.608	100
2-dec.	22.764	21.089	14.130	13.990	9.292	6.642	3.810	4.077	2.507	1.699	100
3-dec.	17.011	19.134	14.549	14.903	11.056	8.464	5.452	5.213	2.256	1.962	100
4-dec.	13.799	18.169	14.713	16.403	13.150	8.235	5.659	4.610	2.768	2.493	100
5-dec.	7.595	12.957	11.783	15.251	15.348	12.308	8.449	8.112	4.537	3.660	100
6-dec.	8.390	10.409	8.087	11.692	14.266	15.377	10.341	11.012	6.046	4.381	100
7-dec.	5.942	7.080	5.260	8.161	10.837	15.547	12.931	17.055	11.144	6.043	100
8-dec.	5.189	6.900	5.257	7.200	7.985	12.925	10.258	19.301	15.698	9.287	100
9-dec.	5.027	6.314	4.075	5.543	5.904	9.686	8.025	19.255	21.943	14.228	100
10-dec.	6.565	7.631	5.842	7.437	5.464	6.002	4.710	15.837	22.095	18.418	100

1	0.097		0.097		0.000
2	0.113		0.081		0.033
3	0.121		0.070		0.051
4	0.096		0.042		0.054
5	0.101		0.044		0.057
6	0.076		0.029		0.048
7	0.062		0.024		0.037
8	0.055		0.017		0.038
9	0.065		0.012		0.053
10	0.035		0.000		0.035
B.I. =	**0.821**	**Up=**	**0.418**	**Down=**	**0.405**

1996 **UK: Male**

1991

	1-dec.	2-dec.	3-dec.	4-dec.	5-dec.	6-dec.	7-dec.	8-dec.	9-dec.	10-dec.	Total	%
1-dec.	9	15	10	12	7	3	6	3	2	2	69	
2-dec.	5	7	23	13	11	7	1	2	1	3	73	
3-dec.	6	15	18	17	7	5	10	4	1	0	83	
4-dec.	5	15	30	16	19	12	10	5	1	1	114	
5-dec.	7	6	15	14	20	24	20	8	5	4	123	
6-dec.	4	8	11	23	23	23	26	11	7	2	138	
7-dec.	2	3	10	12	16	27	51	33	6	8	168	
8-dec.	7	3	6	5	7	15	42	44	41	8	178	
9-dec.	3	2	3	6	7	10	19	57	66	36	209	
10-dec.	0	2	3	3	5	8	4	10	49	94	178	
Total	48	76	129	121	122	134	189	177	179	158	1333	

	1-dec.	2-dec.	3-dec.	4-dec.	5-dec.	6-dec.	7-dec.	8-dec.	9-dec.	10-dec.	Total	%
1-dec.	**13.043**	21.739	14.493	17.391	10.145	4.348	8.696	4.348	2.899	2.899	100	5.176
2-dec.	6.849	**9.589**	31.507	17.808	15.068	9.589	1.370	2.740	1.370	4.110	100	5.476
3-dec.	7.229	18.072	**21.687**	20.482	8.434	6.024	12.048	4.819	1.205	0.000	100	6.227
4-dec.	4.386	13.158	26.316	**14.035**	16.667	10.526	8.772	4.386	0.877	0.877	100	8.552
5-dec.	5.691	4.878	12.195	11.382	**16.260**	19.512	16.260	6.504	4.065	3.252	100	9.227
6-dec.	2.899	5.797	7.971	16.667	16.667	**16.667**	18.841	7.971	5.072	1.449	100	10.353
7-dec.	1.190	1.786	5.952	7.143	9.524	16.071	**30.357**	19.643	3.571	4.762	100	12.603
8-dec.	3.933	1.685	3.371	2.809	3.933	8.427	23.596	**24.719**	23.034	4.494	100	13.353
9-dec.	1.435	0.957	1.435	2.871	3.349	4.785	9.091	27.273	**31.579**	17.225	100	15.679
10-dec.	0.000	1.124	1.685	1.685	2.809	4.494	2.247	5.618	27.528	**52.809**	100	13.353
Total	3.601	5.701	9.677	9.077	9.152	10.053	14.179	13.278	13.428	11.853	100	100

	1-dec.	2-dec.	3-dec.	4-dec.	5-dec.	6-dec.	7-dec.	8-dec.	9-dec.	10-dec.	Total
1-dec.	**6.020**	10.863	18.798	14.304	12.272	10.092	11.167	7.366	4.661	4.456	100
2-dec.	5.888	**11.887**	18.398	15.448	12.213	10.229	11.621	6.155	4.209	3.972	100
3-dec.	5.652	10.987	**19.240**	14.787	12.452	10.559	12.696	7.668	3.467	2.491	100
4-dec.	5.534	10.490	17.751	**14.907**	12.513	11.382	13.454	7.454	3.801	2.715	100
5-dec.	4.456	7.806	12.840	12.572	**12.166**	12.575	16.263	10.174	6.387	4.761	100
6-dec.	4.125	7.134	13.210	11.923	12.424	**12.954**	16.698	10.949	6.438	4.146	100
7-dec.	3.214	4.803	8.949	9.412	10.227	12.789	**20.330**	14.661	9.443	6.171	100
8-dec.	3.047	3.785	6.367	7.038	7.566	10.182	18.435	**18.710**	15.837	9.033	100
9-dec.	2.446	2.599	4.570	4.908	5.711	8.038	14.462	18.990	**21.797**	16.479	100
10-dec.	1.206	2.023	3.472	3.849	4.639	6.209	7.367	13.031	24.997	**33.207**	100

1	0.049		0.049		0.000
2	0.048		0.045		0.003
3	0.050		0.040		0.010
4	0.073		0.044		0.029
5	0.081		0.046		0.035
6	0.090		0.040		0.051
7	0.100		0.038		0.062
8	0.109		0.033		0.075
9	0.123		0.026		0.097
10	0.089		0.000		0.089
B.I. =	**0.812**	**Up=**	**0.361**	**Down=**	**0.451**

ppendix 6.2. Earnings Functions: Germany (Short term)

ermany: Short term 1991

Variable	Male Mean	Male Coefficient	Male t-ratio	Female Mean	Female Coefficient	Female t-ratio
Constant	1.00	2.54**	36.5	1.00	2.48**	34.33
Experience	23.34	0.03**	5.2	20.82	0.02**	3.11
Experience^2	699.34	-0.001**	-4.9	595.36	-0.0004**	-3.05
Education 1	0.05	0.01	0.1	0.07	0.04	0.71
Education 3	0.64	0.13**	3.5	0.59	0.14**	3.04
Education 4	0.16	0.33**	6.4	0.12	0.39**	5.34
Part-time	0.01	0.16	1.1	0.23	-0.0002	-0.003
Public Sector	0.22	-0.08	-1.5	0.33	0.12**	2.06
Large Firm	0.57	0.07**	2.2	0.44	0.004	0.11
Small Firm	0.19	-0.12**	-2.5	0.27	-0.14**	-2.98
Married	0.73	0.09**	2.6	0.65	-0.06*	-1.74
Agriculture	0.03	-0.10	-1.5	0.01	0.23	1.56
Utilities	0.02	0.28**	4.2	0.00	0.09	1.56
Construction	0.12	0.04	0.9	0.01	-0.11	-1.03
Services	0.09	-0.19**	-2.8	0.21	-0.07	-1.33
Transport	0.08	-0.07	-1.0	0.05	0.03	0.32
Finance	0.04	0.21**	3.3	0.06	0.16**	2.22
Community	0.17	0.08	1.4	0.36	-0.01	-0.20
East Germany	0.18	-0.64**	-18.3	0.19	-0.52**	-12.07
Dep. Variable		Ln Wage			Ln Wage	
Mean		2.908			2.612	
Standard Dev.		0.497			0.508	
Observations		997			759	
R-squared		0.39			0.212	
RSS		150.4			154.4	
Log-Like		-471.8			-472.6	
D-W Stat.		1.85			1.94	
Breusch-Pagan		217.5			91.88	

** and * represents significance at the 5% and 10% levels respectively.

iermany: Short term 1996

Variable	Male Mean	Male Coefficient	Male t-ratio	Female Mean	Female Coefficient	Female t-ratio
Constant	1.00	2.68**	22.1	1.00	2.58**	25.0
Experience	14.71	0.03**	3.9	16.29	0.02**	2.7
Experience^2	331.85	-0.001**	-3.2	373.09	-0.001**	-2.6
Education 1	0.03	-0.02	-0.1	0.03	0.17	1.3
Education 3	0.67	0.07	0.7	0.67	0.08	1.2
Education 4	0.24	0.44**	3.7	0.17	0.37**	4.4
Part-time	0.03	0.01	0.1	0.33	0.01	0.2
Public Sector	0.24	0.08	0.9	0.39	0.12*	1.8
Large Firm	0.47	0.11**	2.5	0.38	0.15**	2.6
Small Firm	0.23	-0.16**	-2.3	0.36	-0.07	-1.2
Married	0.49	0.04	0.8	0.58	-0.14**	-2.5
Agriculture	0.01	-0.23**	-2.1	0.02	-0.53**	-2.8
Utilities	0.03	-0.01	0.0	0.00	0.20	0.9
Construction	0.11	-0.14*	-1.6	0.04	-0.07	-0.7
Services	0.13	-0.15**	-2.0	0.18	-0.17**	-2.0
Transport	0.09	-0.24**	-2.7	0.03	-0.38**	-2.2
Finance	0.08	0.03	0.4	0.09	0.05	0.4
Community	0.20	-0.23**	-2.3	0.47	-0.04	-0.5
:ast Germany	0.13	-0.17**	-2.2	0.18	-0.13**	-2.2
Dep. Variable		Ln Wage			Ln Wage	
Mean		3.061			2.794	
;tandard Dev.		0.523			0.53	
Observations		400			466	
R-squared		0.296			0.209	
RSS		76.7			103.2	
Log-Like		-237.3			-310.1	
D-W Stat.		1.87			2.02	
ıreusch-Pagan		77.5			92.9	

** and * represents significance at the 5% and 10% levels respectively.

ppendix 6.3. Inter-temporal Decomposition Germany 1991-1996

ermany 1991

Variable	β Male	β Female	Male Mean	Female Mean	β* Oaxaca & Ransom (1994)	Explained	Male Overpay ment	Female Underpay ment	
Constant	2.544	2.477	1.000	1.000	2.511	0.000	0.032	0.035	
Experience	0.028	0.019	23.339	20.825	0.024	0.061	0.099	0.110	
Experience^2	-0.001	-0.0004	699.343	595.365	-0.0005	-0.052	-0.047	-0.054	
Education 1	0.006	0.043	0.051	0.074	0.027	-0.001	-0.001	-0.001	
Education 3	0.129	0.142	0.642	0.594	0.134	0.006	-0.003	-0.005	
Education 4	0.331	0.391	0.161	0.116	0.351	0.016	-0.003	-0.005	
Part-time	0.161	0.000	0.013	0.232	0.019	-0.004	0.002	0.004	
Public Sector	-0.081	0.117	0.225	0.328	0.010	-0.001	-0.020	-0.035	
Large Firm	0.071	0.004	0.573	0.439	0.043	0.006	0.016	0.017	
Small Firm	-0.118	-0.144	0.189	0.273	-0.130	0.011	0.002	0.004	
Married	0.092	-0.065	0.732	0.653	0.018	0.001	0.054	0.054	
Agriculture	-0.101	0.227	0.033	0.013	-0.042	-0.001	-0.002	-0.004	
Utilities	0.276	0.095	0.020	0.003	0.179	0.003	0.002	0.000	
Construction	0.038	-0.112	0.122	0.013	0.018	0.002	0.002	0.002	
Services	-0.186	-0.067	0.088	0.208	-0.111	0.013	-0.007	-0.009	
Transport	-0.068	0.028	0.080	0.050	-0.029	-0.001	-0.003	-0.003	
Finance	0.207	0.164	0.038	0.062	0.189	-0.004	0.001	0.002	
Community	0.080	-0.013	0.165	0.365	0.039	-0.008	0.007	0.019	
ast Germany	-0.643	-0.522	0.180	0.194	-0.595	0.008	-0.009	-0.014	
Total						**0.056**	**0.122**	**0.117**	**0.298**

ermany 1996

Variable	β Male	β Female	Male Mean	Female Mean	β* Oaxaca & Ransom (1994)	Explained	Male Overpay ment	Female Underpay ment	
Constant	2.685	2.580	1.000	1.000	2.624	0.000	0.061	0.044	
Experience	0.034	0.025	14.705	16.292	0.030	-0.047	0.070	0.079	
Experience^2	-0.001	-0.001	331.850	373.094	-0.001	0.025	-0.011	-0.014	
Education 1	-0.019	0.174	0.028	0.028	0.110	0.000	-0.004	-0.002	
Education 3	0.072	0.076	0.673	0.670	0.075	0.000	-0.002	-0.001	
Education 4	0.438	0.365	0.235	0.172	0.390	0.025	0.011	0.004	
Part-time	0.009	0.009	0.025	0.328	0.009	-0.003	0.000	0.000	
Public Sector	0.075	0.116	0.238	0.388	0.100	-0.015	-0.006	-0.006	
Large Firm	0.109	0.151	0.473	0.376	0.124	0.012	-0.007	-0.010	
Small Firm	-0.159	-0.069	0.230	0.365	-0.108	0.014	-0.012	-0.014	
Married	0.044	-0.141	0.485	0.575	-0.045	0.004	0.043	0.055	
Agriculture	-0.229	-0.530	0.008	0.021	-0.301	0.004	0.001	0.005	
Utilities	-0.007	0.196	0.025	0.004	0.074	0.002	-0.002	-0.001	
Construction	-0.135	-0.071	0.105	0.043	-0.110	-0.007	-0.003	-0.002	
Services	-0.150	-0.169	0.125	0.182	-0.158	0.009	0.001	0.002	
Transport	-0.242	-0.376	0.085	0.034	-0.270	-0.014	0.002	0.004	
Finance	0.028	0.052	0.075	0.094	0.034	-0.001	-0.001	-0.002	
Community	-0.234	-0.039	0.203	0.468	-0.114	0.030	-0.024	-0.035	
East Germany	-0.170	-0.127	0.128	0.182	-0.143	0.008	-0.003	-0.003	
Total						**0.047**	**0.115**	**0.105**	0.266

Variable	Male mean 1991	Fem. mean 1991	β male 1991	β male 1996	Male mean 1996	Fem. Mean 1996	Term 1	Term 2
Constant	1.000	1.000	2.544	2.685	1.000	1.000	0.000	0.000
Experience	23.339	20.825	0.028	0.034	14.705	16.292	0.141	-0.015
Experience2	699.343	595.365	-0.001	-0.001	331.850	373.094	-0.093	0.008
Education 1	0.051	0.074	0.006	-0.019	0.028	0.028	0.000	-0.001
Education 3	0.642	0.594	0.129	0.072	0.673	0.870	0.003	0.003
Education 4	0.161	0.116	0.331	0.438	0.235	0.172	-0.008	-0.005
Part-time	0.013	0.232	0.161	0.009	0.025	0.328	0.001	-0.033
ᵖublic Sector	0.225	0.328	-0.081	0.075	0.238	0.388	0.004	0.016
Large Firm	0.573	0.439	0.071	0.109	0.473	0.376	0.004	-0.005
Small Firm	0.189	0.273	-0.118	-0.159	0.230	0.365	-0.008	-0.003
Married	0.732	0.653	0.092	0.044	0.485	0.575	0.007	0.004
Agriculture	0.033	0.013	-0.101	-0.229	0.008	0.021	-0.008	0.003
Utilities	0.020	0.003	0.276	-0.007	0.025	0.004	0.000	0.005
Construction	0.122	0.013	0.038	-0.135	0.105	0.043	-0.006	0.019
Services	0.088	0.208	-0.186	-0.150	0.125	0.182	0.009	0.004
Transport	0.080	0.050	-0.068	-0.242	0.085	0.034	0.005	0.005
Finance	0.038	0.062	0.207	0.028	0.075	0.094	0.000	-0.004
Community	0.165	0.365	0.080	-0.234	0.203	0.468	-0.015	-0.063
ːast Germany	0.180	0.194	-0.643	-0.170	0.128	0.182	-0.007	0.007
Total							0.029	-0.056

Term 1 = $(\delta Z_j - \delta Z_k)\beta_k$

Term 2 = $\delta Z_j(\beta_j - \beta_k)$

Term 3 = $(\delta\psi_j - \delta\psi_k)\sigma_k = (.629 - .425).441 = 0.089$

Term 4 = $\delta\psi_j\ (\sigma_j - \sigma_k) = .629(.392 - .441) = -0.033$

ppendix 6.4. Earnings Functions: UK (Short term)

K: Short term 1991

Variable	Male			Female		
	Mean	Coefficient	t-ratio	Mean	Coefficient	t-ratio
Constant	1.00	-0.21	-1.0	1.00	-0.63**	-3.51
Experience	23.73	0.05**	10.2	22.60	0.02**	3.37
Experience^2	751.13	-0.001**	-8.0	689.93	-0.0002	-1.58
Education	10.82	0.12**	6.4	10.93	0.16**	10.32
Part-time	0.03	0.12	0.6	0.40	-0.14**	-4.06
Public Sector	0.18	0.07	1.1	0.34	0.22**	4.24
Large Firm	0.20	0.09**	2.2	0.17	0.04	0.842
Small Firm	0.44	-0.08**	-2.1	0.54	-0.15**	-4.47
Married	0.66	0.10**	2.7	0.62	0.07**	1.97
Agriculture	0.01	-0.29**	-2.8	0.003	-0.40*	-1.92
Utilities	0.03	0.24**	4.1	0.01	0.44**	4.65
Construction	0.08	-0.02	-0.4	0.01	-0.11	-0.38
Services	0.14	-0.15**	-2.6	0.21	-0.10**	-2.19
Transport	0.10	-0.10*	-1.6	0.03	0.11	1.29
Finance	0.09	0.19**	2.9	0.13	0.24**	4.30
Community	0.18	-0.07	-0.9	0.45	-0.11*	-1.82
Dep. Variable		Ln Wage			Ln Wage	
Mean		1.666			1.345	
Standard Dev.		0.549			0.521	
Observations		934			899	
R-squared		0.279			0.305	
RSS		202.6			169.2	
Log-Like		-611.6			-524.9	
D-W Stat.		1.89			2	
Breusch-Pagan		225			57.5	

** and * represents significance at the 5% and 10% levels respectively.

JK: Short term 1996

Variable	Male Mean	Male Coefficient	Male t-ratio	Female Mean	Female Coefficient	Female t-ratio
Constant	1.00	1.09**	10.1	1.00	1.60**	14.40
Experience	23.36	0.04**	4.1	23.65	-0.002	-0.25
Experience^2	671.56	-0.0004**	-2.6	671.22	0.0002	1.06
Education	3.79	0.02**	3.9	4.30	0.01**	3.01
Part-time	0.11	-0.15**	-2.1	0.29	-0.19**	-3.67
Public Sector	0.22	0.37**	5.9	0.29	0.35**	5.45
Large Firm	0.18	0.11**	2.3	0.18	0.07	1.38
Small Firm	0.46	-0.07*	-1.8	0.51	-0.09**	-2.29
Married	0.43	0.07*	1.9	0.49	0.09**	2.35
Agriculture	0.01	-0.19*	-1.9	0.01	-0.24*	-1.60
Utilities	0.01	0.29**	2.8	0.01	0.09	1.27
Construction	0.03	0.08	0.7	0.02	0.08	0.64
Services	0.21	-0.20**	-3.7	0.23	-0.12**	-2.20
Transport	0.06	-0.02	-0.4	0.05	-0.01	-0.08
Finance	0.15	0.19**	3.1	0.15	0.21**	3.29
Community	0.26	-0.22**	-3.4	0.35	-0.15**	-2.11
Dep. Variable		Ln Wage			Ln Wage	
Mean		1.714			1.614	
Standard Dev.		0.569			0.59	
Observations		926			1001	
R-squared		0.199			0.175	
RSS		239.9			287.3	
Log-Like		-688.6			-795.7	
D-W Stat.		1.9			1.94	
Breusch-Pagan		113.8			67.7	

** and * represents significance at the 5% and 10% levels respectively.

ppendix 6.5. Inter-temporal Decomposition: UK 1991-1996

K 1991

Variable	β Male	β Female	Male Mean	Female Mean	β* Oaxaca & Ransom (1994)	Explained	Male Overpay ment	Female Underpay ment	
Constant	-0.215	-0.633	1.000	1.000	-0.452	0.000	0.237	0.181	
Experience	0.049	0.017	23.728	22.596	0.034	0.038	0.358	0.378	
Experience^2	-0.001	0.000	751.133	689.931	0.000	-0.030	-0.214	-0.225	
Education	0.117	0.160	10.816	10.934	0.142	-0.017	-0.273	-0.202	
Part-time	0.120	-0.140	0.031	0.402	-0.132	0.049	0.008	0.003	
ublic Sector	0.066	0.223	0.183	0.340	0.158	-0.025	-0.017	-0.022	
Large Firm	0.091	0.039	0.202	0.169	0.068	0.002	0.005	0.005	
Small Firm	-0.080	-0.151	0.438	0.543	-0.119	0.013	0.017	0.017	
Married	0.098	0.067	0.662	0.622	0.082	0.003	0.011	0.009	
Agriculture	-0.288	-0.403	0.013	0.003	-0.311	-0.003	0.000	0.000	
Utilities	0.244	0.442	0.026	0.007	0.300	0.006	-0.001	-0.001	
onstruction	-0.021	-0.111	0.082	0.007	-0.024	-0.002	0.000	0.001	
Services	-0.147	-0.105	0.139	0.208	-0.122	0.008	-0.003	-0.004	
Transport	-0.098	0.107	0.101	0.031	-0.026	-0.002	-0.007	-0.004	
Finance	0.188	0.241	0.092	0.130	0.218	-0.008	-0.003	-0.003	
Community	-0.068	-0.109	0.177	0.448	-0.094	0.025	0.005	0.007	
Total						**0.058**	**0.123**	0.140	**0.321**

K 1996

Variable	β Male	β Female	Male Mean	Female Mean	β* Oaxace & Ransom (1994)	Explained	Male Overpay ment	Female Underpay ment	
Constant	1.086	1.602	1.000	1.000	1.336	0.000	-0.250	-0.266	
Experience	0.036	-0.002	23.356	23.651	0.017	-0.005	0.450	0.443	
Experience^2	0.000	0.000	671.557	671.220	0.000	0.000	-0.206	-0.190	
Education	0.016	-0.013	3.789	4.299	0.002	-0.001	0.051	0.066	
Part-time	-0.147	-0.185	0.112	0.291	-0.172	0.031	0.003	0.004	
ublic Sector	0.374	0.350	0.224	0.292	0.362	-0.025	0.003	0.004	
Large Firm	0.109	0.070	0.181	0.180	0.090	0.000	0.003	0.004	
Small Firm	-0.070	-0.091	0.464	0.510	-0.080	0.004	0.005	0.005	
Married	0.073	0.089	0.434	0.495	0.081	-0.005	-0.003	-0.004	
Agriculture	-0.186	-0.236	0.013	0.009	-0.201	-0.001	0.000	0.000	
Utilities	0.289	0.093	0.010	0.008	0.158	0.000	0.001	0.001	
onstruction	0.083	0.084	0.033	0.022	0.083	0.001	0.000	0.000	
Services	-0.195	-0.124	0.207	0.228	-0.162	0.003	-0.007	-0.009	
Transport	-0.024	-0.006	0.060	0.046	-0.017	0.000	0.000	-0.001	
Finance	0.186	0.214	0.147	0.148	0.199	0.000	-0.002	-0.002	
Community	-0.220	-0.153	0.263	0.351	-0.190	0.017	-0.008	-0.013	
Total						**0.019**	**0.039**	**0.042**	**0.0998**

Variable	Male mean 1991	Fem. mean 1991	β male 1991	β male 1996	Male mean 1996	Fem. Mean 1996	Term 1	Term 2
Constant	1.000	1.000	-0.215	1.086	1.000	1.000	0.000	0.000
Experience	23.728	22.596	0.049	0.036	23.356	23.651	0.051	0.015
Experience2	751.133	689.931	-0.001	0.000	671.557	671.220	-0.026	-0.022
Education	10.816	10.934	0.117	0.016	3.789	4.299	0.006	-0.012
Part-time	0.031	0.402	0.120	-0.147	0.112	0.291	0.028	-0.099
Public Sector	0.183	0.340	0.066	0.374	0.224	0.292	-0.033	0.048
Large Firm	0.202	0.169	0.091	0.109	0.181	0.180	0.003	-0.001
Small Firm	0.438	0.543	-0.080	-0.070	0.464	0.510	0.004	0.001
Married	0.662	0.622	0.098	0.073	0.434	0.495	0.007	0.001
Agriculture	0.013	0.003	-0.288	-0.186	0.013	0.009	-0.001	-0.001
Utilities	0.026	0.007	0.244	0.289	0.010	0.008	0.005	-0.001
Construction	0.082	0.007	-0.021	0.083	0.033	0.022	0.005	-0.008
Services	0.139	0.208	-0.147	-0.195	0.207	0.228	0.009	-0.003
Transport	0.101	0.031	-0.098	-0.024	0.060	0.046	-0.001	-0.005
Finance	0.092	0.130	0.188	0.186	0.147	0.148	-0.007	0.000
Community	0.177	0.448	-0.068	-0.220	0.263	0.351	0.040	-0.041
Total							0.092	-0.127

Term 1 = $(\delta Z_j - \delta Z_k)\beta_k$

Term 2 = $\delta Z_j(\beta_j - \beta_k)$

Term 3 = $(\delta\psi_j - \delta\psi_k)\sigma_k = (.749 - .186).513 = 0.289$

Term 4 = $\delta\psi_j\,(\sigma_j - \sigma_k) = .749(.469 - .513) = -0.033$

ppendix 7.1. ECHP Data ; Official Documentation

UROPEAN COMMISSION EUROSTAT

OC. PAN 168/2003-12

ECHP UDB manual

European Community Household Panel LongitudinalUsers'Database

Waves 1 to 8 Survey years 1994 to 2001

ecember 2003

'able of Contents

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ITRODUCTION

.1.

\ few words about the ECHP...

n 1991, Eurostat, the Statistical Office of the European Communities, set up a Task Force on Iousehold Incomes in order to respond to the strong demand for information on household and ndividual income. The Task Force was mandated to assess, together with EU Member States, the ncome data in registers and existing national household surveys, and to check whether the vailable outputs could be satisfactorily harmonised ex-*post*.

\fter the failure of this "output approach", the decision was taken to launch a specific EU survey, ne European Community Household Panel (ECHP), to adopt an input-oriented approach rather nan strictly try to harmonise existing outputs. Although the questionnaire was designed centrally at :urostat, in close consultation with the Member States, it allowed for some flexibility for adaptation o national systems. .

'he ECHP forms therefore the most closely co-ordinated component of the European system of ocial surveys. It has been given a central place in the development of comparable social statistics icross Member States on income (including social transfers etc.), labour, poverty and social xclusion, housing, health, as well as various other social indicators conceming living conditions of rivate households and persons. The multi-dimensional and multi-purpose nature of the survey also nables the study of the interrelationships between these dimensions.

'he longitudinal, 'panel' design of the ECHP makes it possible to follow up and interview the same et of private households and persons over several consecutive years. In contrast to a cross-ectional survey, it supplies data on EU social dynamics i.e. it provides information on relationships ind transitions over time at the micro level.

:CHP data are collected by "National Data Collection Units" - "NDUs", either National Statistical Institutes NSIs) or research centres depending on the country (see annex 6 for addresses of NDUs). In the rst wave (in 1994) a sample of some 60,500 nationally representative households - i.e. ipproximately 130,000 adults aged 16 years and over - were interviewed in the then 12 Member States. Austria (in 1995) and Finland (1996) have joined the project since then. From 1997 nwards, similar data is available for Sweden. In fact, ECHP UDB variables were derived from the Swedish Living Conditions Survey and are now included in the ECHP UDB. In wave 2, EU-13 amples totalled some 60,000 households and 129,000 adults.

'or the fourth wave of the ECHP, i.e. in 1997, the original ECHP surveys were stopped in three ountries, namely Germany, Luxembourg and in the United Kingdom. In these countries, existing ational panels were then used and comparable data were derived from the German and UK urvey back from 1994 onwards, and for the Luxembourg survey back from 1995 onwards. Consequently two sets of data are available for the years 1994 to 1996 for Germany and the UK, ind 1995-1996 for Luxembourg.

:urostat recommends the use of the original ECHP data for any analysis covering only the years 994-1996 for countries with two different datasets for the same year. However, for longitudinal ınalysis covering more years, the converted datasets should be used.

'or a detailed description of the ECHP methodology and questionnaires, please see "The European Community Household Panel (ECHP): Volume 1 - Survey methodology and Implementation" and The European Community Household Panel (ECHP): Volume 1 - Survey questionnaires: Naves 1-3" - Theme 3, Series E, Eurostat, OPOCE, Luxembourg, 1996.

.2.

'he need for a longitudinal users' database

3ince the first ECHP results became available, there has been an increasing demand from inside ınd outside the Commission for ECHP based statistics. Many researchers and other users have ılso expressed strong interest in having direct access to the data. In view of this, Eurostat decided o develop, together with NDUs, a set of rules allowing for easier direct access to "anonymised" :CHP micro-data, without jeopardising both the necessary conditions of data confidentiality and the value of the data.

n this context, Eurostat proposed to NDUs in November 1997 to create a userfriendly and widely locumented "longitudinal users' database" (hereinafter referred to as the "users' database" or simply "UDB") that would meet various "objective anonymisation criteria". By "objective", it is meant hat once these criteria are applied to the various ECHP files, there should be no risk that an ndividual statistical unit could be identified through "all the means that might reasonably be used by ı third party to identify the said statistical unit" (EU Council regulation N° 322/97 of 17/2/97 on Community statistics, also referred to as the 'Statistical Law').

Provided that all of these anonymisation criteria are met, ECHP data should thus be considered as non-confidential" in the sense of the "Statistical Law". However, it is essential that direct access to uch anonymised micro-data be restricted by means of contracts stipulating the strict conditions of ıse and access (see section 3 on contracts; see also the related contract that links users and/or users' organisations, on the one hand, and Eurostat, on the other).

t is clearly in the interest of the ECHP project to be widely used and visible through interesting and ıseful analyses and publications. In this respect Eurostat would like to thank all national ECHP partners for supporting this major breakthrough in ECHP data availability.

:urostat would be grateful if users could inform the ECHP team of any errors and omissions found n the data or in the documentation. Any information, comments or suaaestions for further morovement would be welcome.

2.

THE ECHP DATA

For each wave of the ECHP, a codebook, as well as a list of variables are available (wave 1: Doc.PAN. 15; wave 2: Doc.PAN. 30; wave 3: Doc.PAN. 65; wave 4: Doc.PAN. 81; wave 5: Doc.PAN. 97; wave 6: Doc.PAN. 112; wave 7: Doc.PAN. 151; wave 8: Doc.PAN. 159). These documents contain the "Community" question wording and corresponding variable names (questionnaire variables) which are necessary for data processing. National questionnaires are based on this common version.

The information collected by means of these questionnaires is checked by the National Data collection Units (NDUs) and by Eurostat. NDUs provide Eurostat with the results of the interviews. This information is stored in the so-called 'Production' data base (PDB). Based on this PDB, an anonymised user-friendly longitudinal user data base (UDB) is constructed.

2.1.

The 'Production' data base (PDB)

The PDB consists of micro-data files that are sent to Eurostat in a format that is very close to the EU questionnaire. For each wave there are four cross-sectional files (D, H, Rand P file).

All the work relating to data checking (both cross-sectional and longitudinal) is done in this production database.

2.2.

Data checking

The data has been checked as thoroughly as possible, both at micro and aggregated levels, and longitudinally between waves. However, further checking and refinements are required. The ECHP is a dynamic project, i.e. the data are "never" completely final: panel data must be continuously updated using information collected in subsequent waves - it is an ongoing backwards and forwards process. Therefore it is hoped that users will promptly inform Eurostat of any errors found.

2.3.

The 'User' database (UDB)

The PDB contains information considered 'confidential' in terms of the EU 'Statistical law'. Its structure is very complex and thus extremely difficult to use outside, but also inside Eurostat. This also increases the risk of errors through the use of the data. For these reasons, access to the original data had to be more restrictive than what would be desirable to exploit the full potential of the data.

However, in view of the increasing demand for ECHP data, Eurostat has constructed an anonymised user-friendly "longitudinal users' database", the ECHP UDB.

?.3.1. *Anonymisation*

For confidentiality reasons, the UDB needs to meet various "objective anonymisation criteria" as lescribed earlier. Eurostat has developed appropriate anonymisation criteria in close consultation vith the NDUs. Provided that all these criteria are met. the ECHP data can be considered 'non-:onfidential' in terms of the 'Statistical law' and made more widely available. (see Doc.PAN.105 for nore information on the anonymisation of ECHP data).

Iowever, access to such anonymised micro-data still needs to be restricted by means of contracts tipulating the strict conditions of use (see section 3 'Contractual Arrangements') .

?.3.2. *User friendliness*

'he major changes from the 'Production' to the Users' database are as follows: . A link file which illows tracing of individuals across waves has been set up.

he variables have been fully reorganised, grouped together and standardised, which means that hey no longer reflect the structure of the questionnaire. Analytical variables derived from original 'ariables have also been added. One important change is that the variable names are now identical n each wave.

or questions asked only to individuals interviewed for the first time, or to those that have undergone ı significant change since the previous wave (e.g. in their labour force status), the information is orwarded to the following waves, thus permitting independent cross-sectional analysis of each vave.

Iere are 2 concrete illustrations of the differences between the household and personal files in the roduction and users' database, as well as some short information on imputation and weighting:

n the employment section of the PDB, one list of questions is asked to people who normally work 5 hours and more, and another one to those who worked less than 15 hours in a reference week. Although most of the information asked to those two groups is identical, it is presented in two lifferent variables in the production database, reflecting the questionnaire structure, which depends on the amount of hours worked, i.e. 15 hours and more or less than 15 hours. These are combined nto a single set of variables in the UDB covering both groups of respondents.

n the UDB, income components have been defined at a higher level of aggregation than the letailed enumeration given in the PDB. While the latter is required to obtain as complete a picture of the household income as possible, such a degree of detail is not suitable for analytical purposes, specially for the purpose of comparative cross-country analysis. The same structure is followed at he household and person levels. Detailed items of income specified in the questionnaire are ıggregated into intermediate level components for each interviewed person in the household; they ıre also converted to annual net amounts as required.

Missing information on income is imputed (see Doc.PAN.164 for detailed explanation of imputation of income). Eurostat wishes to thank the Survey Research Center at the University of Michigan, and specifically Dr Raghunathan and Dr Solenberger, for their software for data imputation.

Veights to be applied in the analysis of the data have been added to the basic data (see Annex" for short description of sample weights and on how to use these weights, and Doc.PAN.165 for the onstruction of weights).

he UDB consists of the following data files:

.3.3. *The country file*

his file contains the following information for each wave and country:

population figures (number of private households in the country, number of persons living in rivate households, number of persons aged 16+ living in private households) for grossing-up and order to aggregate over countries.

purchasing power parities for converting national currencies in PPS

exchange rates for converting national currencies in ECU/EURO

he country file also contains the fixed exchange rates for the 'Eurozone' countries (after 1.1.1999).

.3.4. *The longitudinal link-file*

includes data from all the waves and assigns a record to every person that ever appeared in the CHP. The first section contains data asked only once (when the person entered the panel or when e/she became eligible). The second section, which is repeated in each wave, contains all the nformation required to rebuild the "longitudinal status" of the person from the beginning to the end f the panel, derived from the personal and household registers. Each person has an identification umber (PID) that is fixed across waves.

.3.5. *The four cross-sectional files for each wave*

.3.5.1. *The "register file"*

covers all persons currently living in households with a completed household interview in each vave.

.3.5.2. *The "relationship file"*

has been derived from the relationship matrix in the household register file (R-file of the PDB). Its ecords have the format "person X has relationship R with person Y". It gives a record of all possible elationships of every person in a household. Hence, there is one record for each pair of persons in he same household, specifying their relationship. The following rule is used in specifying the ariables corresponding to X, Rand Y:

the relationship is between an ascendant and a descendant, 'R' (variable 'Relation') always pecifies the descendant side of the relationship (e.g. the child, grandchild etc.). Variable PID1 is he fixed identification number (PID) of the ascendant, and variable PID2 is the fixed identification umber (PID) of the descendant.

part from its much simpler structure than the original relationship matrix, the relationship file has he major advantage that individuals are identified in terms of their fixed PIDs, rather than the wave-specific 'line numbers' in the matrix, so that the consistency and evolution of relationships can be traced over waves.

2.3.5.3. *The "household file"*

This file contains one record for each household interview. The information is grouped into 7 sections.

- general information
- demographic information
- household income
- household financial situation
- accommodation
- durables, and
- children.

2.3.5.4. The "personal file"

This file contains one record for each person with a completed personal interview. The information is grouped into 13 sections:

- general information
- demographic information
- current employment
- unemployment
- search for a job
- previous job
- calendar of activities
- income
- education and training
- health
- social relations
- migration, and
- satisfaction with various aspects of life.

2.3.6. *Data description*

The document 'ECHP UDS description of variables' (Doc. PAN. 166) lists the variables in the ECHP UDS. It also provides the codes and labels for these variables, as well as an overview of the differences between the waves and the countries.

The document 'ECHP UDS construction of variables' (Doc.PAN. 167) describes the linkage between the questionnaire variables and the UDS variables.

Data is provided in comma separated value files (CSV-files).

2.4. Sample structure variables

To compute sampling errors, at least the following four variables are required to define the sample structure:

HGO04: Sample weight (or PGO02 for personal interviews, RGO02 for the population, etc.)

HGO05: Stratum

HGO06: Primary sampling units (PSU)

HGO07: Indicator of whether the PSUs were selected withi n strata systematically from an ordered list, and if so, the order of selection.

An additional variable could be the variable defining major domains in the country for which separate sampling error results may be required, e.g. major regions in the country such as NUTS 1.

Apart from being used for the weighting procedure (discussed in DOC.PAN. 165), variables HGO05-HGO07 define the essential aspects of the structure of the sample needed for the valid computation of sampling errors, which take that structure into account. These variables have been constructed from original variables in the PDS D-file (e.g. for the 1994 wave: D01POINT, D01NUTS3 and D01SMST1D01SMST4), together with additional information provided by NDUs as necessary. Since the objective of HGO05-HGO07 is merely to provide structural information on the sample, with no relationship to the actual geographical locations, the original variables have been anonymised through randomisation.

The sample structure variables HGO05-HGO07 are strictly defined only once for a household, i.e. the first time it appears in the survey. These household variables are assigned to each member of the household, and then remain associated with each person even if the person moves to a different location or to a different household in subsequent waves. New 'non-sample' persons entering a household receive the variables from the sample persons in the household. (In the rare case when the household contains sample persons from more than one original household, these variables are defined by the person who defines the basic part (DOiHHID) of the household identification number HID = (DOiHHID *100) + DOiSPLIT).

Most ECHP samples use two-stage sample designs, in which case HGO06 defines the sample clusters, and HGO05 defines the explicit strata within each of which the clusters were selected independently. Most ECHP surveys also involve the selection of PSUs with systematic sampling from ordered lists, which amounts to additional 'implicit' stratification. Variable HGO07 identifies the order in which the clusters were selected, so that this feature can be taken into account in sampling error computations. The variable is given a 'not-applicable' code (-8) if systematic sampling was not involved. For samples selected in a single stage (direct sampling of households or persons as in Denmark and Ireland), all sample structure variables receive the 'not-applicable' code.

Appendix 7.2 Mean Values and Other Descriptive Statistics

	Denmark		Netherlands		Belgium		Luxembourg		France		UK		Ireland		Italy		Greece		Spain		Portugal	
	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.
Exp.	21.4	18.6	19.9	14.3	19.0	14.9	20.5	15.1	20.7	18.9	23.85	21.2	17.51	12.6	18.5	14.4	18.2	12.3	21.29	15.3	21.16	17.3
Exp^2	600	476	521	303	468.8	309	525	333	547.5	475	709	586	455.9	265	477.1	317	473.6	244	614.8	359	639.3	456
HED	0.32	0.35	0.17	0.21	0.36	0.49	0.18	0.14	0.20	0.27	0.30	0.21	0.20	0.26	0.07	0.06	0.21	0.36	0.20	0.31	0.04	0.06
SED	0.44	0.42	0.60	0.53	0.36	0.33	0.26	0.41	0.47	0.42	0.35	0.43	0.40	0.54	0.40	0.47	0.32	0.32	0.19	0.26	0.09	0.15
Public	0.08	0.29	0.06	0.16	0.06	0.08	0.04	0.06	0.03	0.06	0.04	0.08	0.05	0.17	0.06	0.09	0.08	0.10	0.05	0.12	0.05	0.08
Married	0.54	0.49	0.69	0.39	0.72	0.63	0.73	0.52	0.66	0.56	0.72	0.58	0.55	0.41	0.68	0.56	0.71	0.59	0.71	0.53	0.66	0.66
Manager	0.11	0.02	0.15	0.07	0.08	0.04	0.07	0.04	0.07	0.04	0.20	0.12	0.11	0.05	0.03	0.01	0.05	0.02	0.04	0.02	0.03	0.01
Prof.	0.14	0.11	0.14	0.12	0.14	0.16	0.08	0.09	0.07	0.06	0.14	0.13	0.09	0.16	0.03	0.06	0.10	0.13	0.07	0.14	0.03	0.03
Ass.Prof.	0.15	0.25	0.17	0.29	0.12	0.16	0.15	0.13	0.18	0.20	0.07	0.07	0.10	0.12	0.10	0.09	0.05	0.08	0.10	0.12	0.06	0.07
Clerks	0.05	0.27	0.09	0.25	0.16	0.38	0.10	0.35	0.06	0.31	0.09	0.37	0.05	0.22	0.17	0.30	0.09	0.27	0.08	0.22	0.08	0.16
Service	0.04	0.16	0.06	0.17	0.05	0.11	0.04	0.18	0.05	0.19	0.05	0.13	0.07	0.22	0.07	0.14	0.10	0.20	0.11	0.21	0.11	0.27
Skillag.	0.02	0.01	0.01	0.004	0.01	0	0.02	0	0.02	0.01	0.01	0.002	0.02	0.004	0.03	0.01	0.04	0.02	0.03	0.01	0.06	0.02
Crafts	0.26	0.03	0.21	0.02	0.17	0.03	0.29	0.04	0.26	0.02	0.24	0.04	0.24	0.03	0.34	0.20	0.31	0.13	0.31	0.09	0.36	0.18
Semiskill	0.14	0.07	0.13	0.04	0.12	0.03	0.19	0.04	0.24	0.11	0.13	0.06	0.17	0.14	0.10	0.05	0.16	0.05	0.13	0.03	0.14	0.07
50-500	0.32	0.30	0.37	0.34	0.27	0.28	0.40	0.26	0.31	0.32	0.23	0.24	0.29	0.35	0.25	0.23	0.09	0.13	0.21	0.23	0.20	0.26
>500	0.16	0.17	0.28	0.27	0.28	0.21	0.23	0.13	0.20	0.12	0.39	0.38	0.10	0.13	0.11	0.10	0.02	0.01	0.17	0.12	0.06	0.07
Outsider	0.41	0.48	0.28	0.38	0.23	0.27	0.20	0.31	0.20	0.23	0.24	0.32	0.37	0.49	0.26	0.33	0.35	0.36	0.36	0.42	0.28	0.29
Insider	0.45	0.38	0.57	0.40	0.64	0.57	0.62	0.49	0.63	0.57	0.58	0.48	0.47	0.34	0.59	0.52	0.49	0.44	0.54	0.43	0.56	0.51
Agric	0.04	0.02	0.02	0.01	0.02	0.002	0.02	0	0.02	0.01	0.03	0.004	0.06	0.004	0.05	0.04	0.05	0.02	0.06	0.02	0.10	0.05
Industry	0.48	0.25	0.39	0.16	0.52	0.26	0.52	0.12	0.52	0.27	0.46	0.28	0.52	0.27	0.56	0.40	0.49	0.30	0.50	0.22	0.51	0.33
IMR	0.55	0.86	0.65	1.05	0.77	1.04	0.59	0.89	0.98	1.26	0.73	1.07	0.89	0.87	0.92	0.97	1.08	1.07	0.75	0.95	0.74	0.88
No. Obs.	1056	618	1517	563	839	427	366	168	1320	652	994	471	953	520	1932	923	985	470	2042	785	1786	1028
Avg.Wage	1.915	1.7	2.005	1.74	2.022	1.82	2.339	2.09	1.886	1.67	1.865	1.64	1.803	1.63	1.76	1.56	1.482	1.37	1.665	1.48	1.257	1.09
Wage Gap	0.218		0.269		0.202		0.25		0.212		0.225		0.172		0.196		0.11		0.187		0.17	
M/F Ratio	1.244		1.309		1.224		1.284		1.236		1.252		1.188		1.217		1.116		1.206		1.185	

Appendix 7.3 Denmark

Denmark - Male

Variable	Coefficient	t-ratio	Mean
Constant	1.254	18.34	
Experience	0.035	8.25	21.39
Experience^2	-0.001	-7.64	599.78
Higher Educ.	0.186	4.51	0.32
Secondary Ed.	0.106	3.25	0.44
Public Sector	-0.093	-2.00	0.08
Married	0.081	2.82	0.54
Manager	0.270	4.51	0.11
Professional	0.255	4.16	0.14
Associate Prof.	0.182	3.26	0.15
Clerks	-0.031	-0.45	0.05
Service	0.013	0.18	0.04
Skilled Agric.	0.114	0.97	0.02
Crafts	0.068	1.34	0.26
Semi-skilled	0.031	0.59	0.14
Unit >50&<500	0.116	4.14	0.32
Unit >500	0.148	4.14	0.16
Outsider	-0.114	-3.00	0.41
Insider	-0.001	-0.02	0.45
Agriculture	-0.276	-3.32	0.04
Industry	0.070	2.32	0.48
Dep. Var.	ECU Wage		
Mean	1.915		
Stan. Dev.	0.468		
Observations	1056		
R-squared	0.338		
Log-like.	-479.3		
Rest. Log-like.	-696.8		
Durbin-Watson	1.84		

Denmark – Female

Variable	Coefficient	t-ratio	Mean
Constant	1.269	12.91	
Experience	0.021	3.37	18.65
Experience^2	-0.0004	-2.69	475.61
Higher Educ.	0.169	3.00	0.35
Secondary Ed.	0.044	0.91	0.42
Public Sector	0.019	0.38	0.29
Married	0.088	2.30	0.49
Manager	0.301	2.23	0.02
Professional	0.198	2.18	0.11
Associate Prof.	0.192	2.43	0.25
Clerks	0.128	1.71	0.27
Service	0.094	1.14	0.16
Skilled Agric.	0.137	0.78	0.01
Crafts	0.225	1.80	0.03
Semi-skilled	0.002	0.03	0.07
Unit >50&<500	0.075	1.80	0.30
Unit >500	0.091	1.81	0.17
Outsider	-0.218	-3.77	0.48
Insider	0.103	1.82	0.38
Agriculture	-0.439	-2.83	0.02
Industry	-0.060	-1.19	0.25
Dep. Var.	ECU Wage		
Mean	1.697		
Stan. Dev.	0.487		
Observations	618		
R-squared	0.273		
Log-like.	-332.9		
Rest. Log-like.	-431.3		
Durbin-Watson	2.08		

Oaxaca (1973) Decomposition - Denmark

Variable	Fem. Coeff.	Fem. Mean	Male Coeff.	Male Mean	Explained	Unexplained	
Constant	1.2688	1.0000	1.2540	1.0000	0.0000	-0.0148	
Experience	0.0209	18.6456	0.0347	21.3911	0.0954	0.2591	
Experience^2	-0.0004	475.6068	-0.0006	599.7794	-0.0777	-0.1242	
HEO	0.1693	0.3544	0.1858	0.3182	-0.0067	0.0058	
SED	0.0439	0.4239	0.1063	0.4375	0.0014	0.0264	
Public Sector	0.0190	0.2913	-0.0933	0.0843	0.0193	-0.0327	
Married	0.0881	0.4887	0.0806	0.5360	0.0038	-0.0037	
Manager	0.3012	0.0227	0.2696	0.1089	0.0232	-0.0007	
Professional	0.1981	0.1133	0.2553	0.1420	0.0073	0.0065	
Associate Professional	0.1920	0.2540	0.1820	0.1515	-0.0187	-0.0025	
Clerks	0.1283	0.2702	-0.0308	0.0549	0.0066	-0.0430	
Service	0.0944	0.1553	0.0134	0.0388	-0.0016	-0.0126	
Skilled Agricultural	0.1369	0.0129	0.1141	0.0208	0.0009	-0.0003	
Crafts	0.2253	0.0275	0.0681	0.2585	0.0157	-0.0043	
Semi-skilled	0.0024	0.0696	0.0311	0.1439	0.0023	0.0020	
Unit >50 but <500	0.0753	0.2977	0.1159	0.3239	0.0030	0.0121	
Unit >500	0.0907	0.1748	0.1481	0.1572	-0.0026	0.0100	
Outsider	-0.2184	0.4822	-0.1137	0.4081	0.0084	0.0505	
Insider	0.1031	0.3786	-0.0009	0.4545	-0.0001	-0.0394	
Agriculture	-0.4392	0.0162	-0.2759	0.0436	-0.0076	0.0026	
Industry	-0.0603	0.2476	0.0698	0.4830	0.0164	0.0322	
Total					0.0892	0.1291	0.2183

There are lower returns for women from education, especially secondary, there are also lower returns for women from medium and large firm employment. There is a smaller penalty for male outsiders, but female insiders are actually better off with a higher premium. However all of these are unimportant when compared to the impact of work experience. There are higher returns for men from experience and this alone accounts for all of the unexplained differential.

Juhn et al (1991) Decomposition - UK vs. Denmark

Variable	Male mean UK	Fem. mean UK	β male UK	β male Denmark	Male mean Denmark	Fem. mean Denmark	Term 1	Term 2
Constant	1.00	1.00	1.10	1.25	1.00	1.00	0.000	0.000
Experience	23.85	21.15	0.02	0.03	21.39	18.65	-0.002	-0.026
Experience2	708.97	585.66	-0.0004	0.00	599.78	475.61	0.001	0.025
HED	0.30	0.21	0.221	0.19	0.32	0.35	0.023	0.003
SED	0.35	0.43	0.02	0.11	0.44	0.42	-0.010	0.006
Public Sector	0.04	0.08	-0.03	-0.09	0.08	0.29	-0.016	-0.002
Married	0.72	0.58	0.08	0.08	0.54	0.49	0.008	-0.001
Manager	0.20	0.12	0.42	0.27	0.11	0.02	-0.001	0.012
Professional	0.14	0.13	0.24	0.26	0.14	0.11	-0.006	0.000
Associate Professional	0.07	0.07	0.29	0.18	0.15	0.25	0.018	0.000
Clerks	0.09	0.37	0.09	-0.03	0.05	0.27	0.002	-0.034
Service	0.05	0.13	0.02	0.01	0.04	0.16	0.001	0.000
Skilled Agricultural	0.01	0.00	-0.14	0.11	0.02	0.01	0.000	-0.003
Crafts	0.24	0.04	0.06	0.07	0.26	0.03	-0.003	-0.001
Semi-skilled	0.13	0.06	0.08	0.03	0.14	0.07	0.000	0.004
Unit >50 but <500	0.23	0.24	0.28	0.12	0.32	0.30	-0.004	-0.002
Unit >500	0.39	0.38	0.45	0.15	0.16	0.17	0.003	0.001
Outsider	0.24	0.32	-0.09	-0.11	0.41	0.48	0.001	-0.002
Insider	0.58	0.48	-0.01	0.00	0.45	0.38	0.000	-0.001
Agriculture	0.03	0.00	-0.35	-0.28	0.04	0.02	0.001	-0.002
Industry	0.46	0.28	-0.01	0.07	0.48	0.25	-0.004	-0.016
Lambda	0	0	0	0	0	0	0.000	0.000
Total							**0.012**	**-0.041**

Term 1 = $(\delta Z_j - \delta Z_k)\beta_k$

Term 2 = $\delta Z_j(\beta_j - \beta_k)$

Term 3 = $(\delta\psi_j - \delta\psi_k)\sigma_k$ = (.289 - .336).385 = -0.019

Term 4 = $\delta\psi_j\,(\sigma_j - \sigma_k)$ = .289(.581 - .385) = 0.013

Appendix 7.4 Netherlands

Netherlands - Male

Variable	Coefficient	t-ratio	Mean
Constant	1.375	15.05	
Experience	0.038	10.33	19.86
Experience^2	-0.001	-7.77	521.14
Higher Educ.	0.204	5.56	0.17
Secondary Ed.	-0.011	-0.42	0.60
Public Sector	-0.012	-0.30	0.06
Married	0.128	5.20	0.69
Manager	0.226	4.55	0.15
Professional	0.309	6.02	0.14
Associate Prof.	0.185	3.85	0.17
Clerks	0.139	2.66	0.09
Service	0.088	1.56	0.06
Skilled Agric.	0.020	0.19	0.01
Crafts	0.010	0.20	0.21
Semi-skilled	0.025	0.50	0.13
Unit >50&<500	0.057	2.53	0.37
Unit >500	0.130	5.33	0.28
Outsider	-0.140	-4.67	0.28
Insider	0.040	1.39	0.57
Agriculture	0.011	0.13	0.02
Industry	0.062	2.84	0.39
Lambda	-0.143	-1.72	0.65
Dep. Var.	ECU Wage		
Mean	2.005		
Stan. Dev.	0.457		
Observations	1517		
R-squared	0.407		
Log-like.	-566.8		
Rest. Log-like.	-963.2		
Durbin-Watson	1.93		

Netherlands - Female

Variable	Coefficient	t-ratio	Mean
Constant	1.309	10.82	
Experience	0.024	3.72	14.31
Experience^2	-0.0005	-2.70	303.33
Higher Educ.	0.187	3.54	0.21
Secondary Ed.	0.018	0.46	0.53
Public Sector	0.070	1.48	0.16
Married	0.106	2.63	0.39
Manager	0.340	3.29	0.07
Professional	0.386	4.00	0.12
Associate Prof.	0.297	3.40	0.29
Clerks	0.230	2.65	0.25
Service	0.044	0.49	0.17
Skilled Agric.	0.065	0.20	0.004
Crafts	0.364	2.51	0.02
Semi-skilled	0.141	1.19	0.04
Unit >50&<500	0.057	1.52	0.34
Unit >500	0.136	3.37	0.27
Outsider	-0.166	-3.75	0.38
Insider	0.116	2.65	0.40
Agriculture	-0.151	-0.88	0.01
Industry	-0.035	-0.74	0.16
Lambda	-0.134	-2.30	1.05
Dep. Var.	ECU Wage		
Mean	1.736		
Stan. Dev.	0.456		
Observations	563		
R-squared	0.363		
Log-like.	-229.6		
Rest. Log-like.	-356.6		
Durbin-Watson	2.08		

Oaxaca (1973) Decomposition - Netherlands

Variable	Fem. Coeff.	Fem. Mean	Male Coeff.	Male Mean	Expleined	Unexplained	
Constant	1.3087	1.0000	1.3751	1.0000	0.0000	0.0664	
Experience	0.0243	14.3055	0.0377	19.8642	0.2096	0.1923	
Experience^2	-0.0005	303.3322	-0.0007	521.1444	-0.1423	-0.0524	
HED	0.1869	0.2060	0.2036	0.1734	-0.0067	0.0035	
SED	0.0178	0.5293	-0.0112	0.6032	-0.0008	-0.0153	
Public Sector	0.0702	0.1599	-0.0123	0.0587	0.0012	-0.0132	
Married	0.1063	0.3890	0.1284	0.6935	0.0391	0.0086	
Manager	0.3403	0.0657	0.2257	0.1477	0.0185	-0.0075	
Professional	0.3858	0.1243	0.3089	0.1397	0.0048	-0.0096	
Associate Professional	0.2969	0.2895	0.1854	0.1688	-0.0224	-0.0323	
Clerks	0.2298	0.2540	0.1393	0.0903	-0.0228	-0.0230	
Service	0.0440	0.1705	0.0880	0.0600	-0.0097	0.0075	
Skilled Agricultural	0.0648	0.0036	0.0200	0.0145	0.0002	-0.0002	
Crafts	0.3641	0.0178	0.0096	0.2050	0.0018	-0.0063	
Semi-skilled	0.1407	0.0355	0.0248	0.1259	0.0022	-0.0041	
Unit >50 but <500	0.0575	0.3375	0.0567	0.3672	0.0017	-0.0003	
Unit >500	0.1356	0.2735	0.1300	0.2835	0.0013	-0.0015	
Outsider	-0.1661	0.3766	-0.1396	0.2762	0.0140	0.0100	
Insider	0.1160	0.4014	0.0397	0.5748	0.0069	-0.0306	
Agriculture	-0.1507	0.0124	0.0112	0.0198	0.0001	0.0020	
Industry	-0.0355	0.1599	0.0623	0.3929	0.0145	0.0156	
Total					**0.1113**	**0.1096**	**0.2209**
Lambda	-0.1343	1.0508	-0.1426	0.6516	0.0569	-0.0087	**0.0483**
Total					**0.1682**	**0.1009**	**0.2691**

Decomposition of Wage Differentials with Selectivity Correction.

Netherlands 1996

Estimates of average lambdas and associated coefficients.	
log w_m - log w_f	0.2691
$\hat{\lambda}_m$	0.6516
$\hat{\lambda}_f$	1.0508
$\hat{\lambda}_f^0$	0.7219
$\hat{\theta}_m$	-0.1426
$\hat{\theta}_f$	-0.1343
$(\overline{X}_m - \overline{X}_f)'\hat{\beta}_m$	0.1113
$\overline{X}_f'(\hat{\beta}_m - \hat{\beta}_f)$	0.1096
$\hat{\theta}_m(\hat{\lambda}_m - \hat{\lambda}_f^0)$	0.0100
$\hat{\theta}_m(\hat{\lambda}_f^0 - \hat{\lambda}_f)$	0.0469
$(\hat{\theta}_m - \hat{\theta}_f)\hat{\lambda}_f$	-0.0087

		Contribution of		
	log w_m - log w_f	Explained	Unexplained	Selectivity
Oaxaca	0.2691	0.168 (62.5%)	0.101 (37.5%)	0.000 (0.0%)
Option 1		0.113 (41.8%)	0.156 (58.2%)	0.000 (0.0%)
Option 2		0.121 (45.1%)	0.148 (54.9%)	0.000 (0.0%)
Option 3		0.121 (45.1%)	0.156 (58.2%)	-0.009 (-3.3%)

There is a smaller penalty for male outsiders, but similar to Denmark, female insiders have the larger coefficient. The estimates are adjusted for sample selection bias, and the resulting IMR variable has an important effect upon both the explained and unexplained components. Again all of these are relatively unimportant in comparison to the impact of experience, in this case it actually exceeds the total unexplained differential, with almost 140% of the unexplained differential being assigned to differential returns to experience.

Juhn et al (1991) Decomposition - UK vs. Netherlands

Variable	Male mean UK	Fem. mean UK	β male UK	β male Neth.	Male mean Neth.	Fem. mean Neth.	Term 1	Term 2
Constant	1.00	1.00	1.10	1.38	1.00	1.00	0.000	0.000
Experience	23.85	21.15	0.02	0.04	19.86	14.31	-0.108	-0.035
Experience2	708.97	585.66	-0.0004	0.00	521.14	303.33	0.066	0.037
HED	0.30	0.21	0.221	0.20	0.17	0.21	0.024	0.001
SED	0.35	0.43	0.02	-0.01	0.60	0.53	0.002	-0.003
Public Sector	0.04	0.08	-0.03	-0.01	0.06	0.16	-0.001	0.001
Married	0.72	0.58	0.08	0.13	0.69	0.39	-0.021	-0.008
Manager	0.20	0.12	0.42	0.23	0.15	0.07	0.000	0.016
Professional	0.14	0.13	0.24	0.31	0.14	0.12	-0.003	0.000
Associate Professional	0.07	0.07	0.29	0.19	0.17	0.29	0.022	0.000
Clerks	0.09	0.37	0.09	0.14	0.09	0.25	-0.016	0.014
Service	0.05	0.13	0.02	0.09	0.06	0.17	0.003	0.005
Skilled Agricultural	0.01	0.00	-0.14	0.02	0.01	0.00	0.000	-0.002
Crafts	0.24	0.04	0.06	0.01	0.21	0.02	0.000	0.010
Semi-skilled	0.13	0.06	0.08	0.02	0.13	0.04	0.000	0.004
Unit >50 but <500	0.23	0.24	0.28	0.06	0.37	0.34	-0.002	-0.003
Unit >500	0.39	0.38	0.45	0.13	0.28	0.27	-0.001	0.001
Outsider	0.24	0.32	-0.09	-0.14	0.28	0.38	-0.003	-0.004
Insider	0.58	0.48	-0.01	0.04	0.57	0.40	-0.003	-0.005
Agriculture	0.03	0.00	-0.35	0.01	0.02	0.01	0.000	-0.009
Industry	0.46	0.28	-0.01	0.06	0.39	0.16	-0.003	-0.014
Lambda	0	0	0	-0.14	0.65	1.05	-0.057	0.000
Total							**-0.101**	**0.006**

Term 1 = $(\delta Z_j - \delta Z_k)\beta_k$

Term 2 = $\delta Z_j(\beta_j - \beta_k)$

Term 3 = $(\delta\psi_j - \delta\psi_k)\sigma_k$ = (.289 - .285).354 = 0.001

Term 4 = $\delta\psi_j\ (\sigma_j - \sigma_k)$ = .289(.581 - .354) = 0.066

Appendix 7.5 Belgium

Belgium - Male

Variable	Coefficient	t-ratio	Mean
Constant	1.364	17.00	
Experience	0.037	6.71	19.00
Experience^2	-0.001	-6.80	468.85
Higher Educ.	0.149	2.81	0.36
Secondary Ed.	-0.007	-0.17	0.36
Public Sector	0.053	0.73	0.06
Married	0.054	1.42	0.72
Manager	0.130	1.78	0.08
Professional	0.110	1.62	0.14
Associate Prof.	0.142	2.15	0.12
Clerks	0.062	1.05	0.16
Service	-0.111	-1.34	0.05
Skilled Agric.	-0.171	-0.75	0.01
Crafts	-0.047	-0.87	0.17
Semi-skilled	0.068	1.15	0.12
Unit >50&<500	0.175	4.64	0.27
Unit >500	0.297	7.60	0.28
Outsider	-0.097	-1.77	0.23
Insider	0.094	1.91	0.64
Agriculture	-0.013	-0.08	0.02
Industry	0.046	1.34	0.52
Dep. Var.	ECU Wage		
Mean	2.022		
Stan. Dev.	0.511		
Observations	839		
R-squared	0.282		
Log-like.	-487.9		
Rest. Log-like.	-627.2		
Durbin-Watson	2.01		

. **Belgium - Female**

Variable	Coefficient	t-ratio	Mean
Constant	1.354	12.00	
Experience	0.023	2.70	14.85
Experience^2	-0.0005	-2.23	309.14
Higher Educ.	0.156	2.23	0.49
Secondary Ed.	0.032	0.49	0.33
Public Sector	0.066	0.77	0.08
Married	-0.028	-0.64	0.63
Manager	0.231	1.75	0.04
Professional	0.257	2.66	0.16
Associate Prof.	0.126	1.36	0.16
Clerks	0.164	2.00	0.38
Service	-0.056	-0.60	0.11
Crafts	-0.117	-0.81	0.03
Semi-skilled	0.064	0.44	0.03
Unit >50&<500	0.146	2.95	0.28
Unit >500	0.165	2.98	0.21
Outsider	-0.237	-3.49	0.27
Insider	0.101	1.59	0.57
Agriculture	0.155	0.36	0.00
Industry	0.005	0.10	0.26
Dep. Var.	ECU Wage		
Mean	1.82		
Stan. Dev.	0.483		
Observations	427		
R-squared	0.277		
Log-like.	-225.2		
Rest. Log-like.	-294.4		
Durbin-Watson	1.91		

Oaxaca (1973) Decomposition - Belgium

Veriable	Fem. Coeff.	Fem. Mean	Male Coeff.	Male Mean	Explained	Unexplained	
Constant	1.3541	1.0000	1.3639	1.0000	0.0000	0.0099	
Experience	0.0231	14.8525	0.0370	19.0036	0.1537	0.2065	
Experience^2	-0.0005	309.1429	-0.0008	468.8486	-0.1292	-0.1017	
HEO	0.1563	0.4941	0.1493	0.3623	-0.0197	-0.0035	
SEO	0.0317	0.3326	-0.0071	0.3635	-0.0002	-0.0129	
Public Sector	0.0657	0.0796	0.0535	0.0560	-0.0013	-0.0010	
Married	-0.0283	0.6276	0.0536	0.7235	0.0051	0.0514	
Manager	0.2307	0.0375	0.1300	0.0787	0.0054	-0.0038	
Professional	0.2569	0.1593	0.1098	0.1430	-0.0018	-0.0234	
Associate Professional	0.1257	0.1616	0.1423	0.1180	-0.0062	0.0027	
Clerks	0.1638	0.3841	0.0617	0.1597	-0.0138	-0.0392	
Service	-0.0557	0.1148	-0.1105	0.0489	0.0073	-0.0063	
Skilled Agricultural	0.0000	0.0000	-0.1713	0.0083	-0.0014	0.0000	
Crafts	-0.1173	0.0258	-0.0474	0.1692	-0.0068	0.0018	
Semi-skilled	0.0640	0.0258	0.0679	0.1192	0.0063	0.0001	
Unit >50 but <500	0.1459	0.2834	0.1754	0.2718	-0.0020	0.0084	
Unit >500	0.1649	0.2061	0.2966	0.2825	0.0227	0.0271	
Outsider	-0.2366	0.2693	-0.0968	0.2265	0.0041	0.0377	
Insider	0.1013	0.5691	0.0945	0.6436	0.0070	-0.0039	
Agriculture	0.1545	0.0023	-0.0128	0.0179	-0.0002	-0.0004	
Industry	0.0051	0.2646	0.0465	0.5173	0.0117	0.0109	
Total					0.0408	0.1605	0.2013

There is a slightly higher return from higher education for women and more women having attained education at this level, 49% compared to 36%. Conversely there are higher returns for men from large firm employment and more favourable returns to male insiders and outsiders. Once more these factors are trivial in comparison to the impact experience, with in this case 2/3 of the unexplained wage gap being assigned to differential returns to experience.

Juhn et al (1991) Decomposition - UK vs. Belgium

Variable	Male mean UK	Fem. mean UK	β male UK	β male Belgium	Male mean Belgium	Fem. mean Belgium	Term 1	Term 2
Constant	1.00	1.00	1.10	1.36	1.00	1.00	0.000	0.000
Experience	23.85	21.15	0.02	0.04	19.00	14.85	-0.054	-0.033
Experience2	708.97	585.66	-0.0004	0.00	468.85	309.14	0.029	0.049
HED	0.30	0.21	0.221	0.15	0.36	0.49	0.032	0.006
SED	0.35	0.43	0.02	-0.01	0.36	0.33	0.001	-0.002
Public Sector	0.04	0.08	-0.03	0.05	0.06	0.08	-0.001	0.003
Married	0.72	0.58	0.08	0.05	0.72	0.63	0.003	0.003
Manager	0.20	0.12	0.42	0.13	0.08	0.04	0.005	0.024
Professional	0.14	0.13	0.24	0.11	0.14	0.16	0.002	0.001
Associate Professional	0.07	0.07	0.29	0.14	0.12	0.16	0.006	0.000
Clerks	0.09	0.37	0.09	0.06	0.16	0.38	-0.004	-0.008
Service	0.05	0.13	0.02	-0.11	0.05	0.11	0.001	-0.010
Skilled Agricultural	0.01	0.00	-0.14	-0.17	0.01	0.00	-0.001	0.000
Crafts	0.24	0.04	0.06	-0.05	0.17	0.03	-0.002	0.021
Semi-skilled	0.13	0.06	0.08	0.07	0.12	0.03	-0.002	0.001
Unit >50 but <500	0.23	0.24	0.28	0.18	0.27	0.28	0.000	-0.001
Unit >500	0.39	0.38	0.45	0.30	0.28	0.21	-0.021	0.001
Outsider	0.24	0.32	-0.09	-0.10	0.23	0.27	0.004	-0.001
Insider	0.58	0.48	-0.01	0.09	0.64	0.57	0.002	-0.011
Agriculture	0.03	0.00	-0.35	-0.01	0.02	0.00	0.000	-0.009
Industry	0.46	0.28	-0.01	0.05	0.52	0.26	-0.003	-0.011
Lambda	0	0	0	0	0	0	0.000	0.000
Total							-0.002	0.023

Term 1 = $(\delta Z_j - \delta Z_k)\beta_k$

Term 2 = $\delta Z_j(\beta_j - \beta_k)$

Term 3 = $(\delta\psi_j - \delta\psi_k)\sigma_k$ = (.289 - .366).439 = -0.035

Term 4 = $\delta\psi_j\,(\sigma_j - \sigma_k)$ = .289(.581 - .439) = 0.040

Appendix 7.6 Luxembourg

Luxembourg - Male

Variable	Coefficient	t-ratio	Mean
Constant	1.176	4.40	
Experience	0.023	2.56	20.50
Experience^2	-0.001	-2.13	524.98
Higher Educ.	0.093	0.43	0.18
Secondary Ed.	-0.072	-0.44	0.26
Public Sector	0.164	1.48	0.04
Married	0.299	3.09	0.73
Manager	0.394	3.54	0.07
Professional	0.585	5.30	0.08
Associate Prof.	0.392	3.96	0.15
Clerks	0.299	3.00	0.10
Service	-0.012	-0.09	0.04
Skilled Agric.	-0.328	-1.27	0.02
Crafts	0.047	0.55	0.29
Semi-skilled	0.126	1.41	0.19
Unit >50&<500	0.085	1.82	0.40
Unit >500	0.156	2.85	0.23
Outsider	-0.081	-1.25	0.20
Insider	0.112	1.99	0.62
Agriculture	-0.036	-0.17	0.02
Industry	0.065	1.27	0.52
Lambda	0.655	1.42	0.59
Dep. Var.	ECU Wage		
Mean	2.339		
Stan. Dev.	0.492		
Observations	366		
R-squared	0.503		
Log-like.	-131.1		
Rest. Log-like.	-258.9		
Durbin-Watson	1.93		

Luxembourg - Female

Variable	Coefficient	t-ratio	Mean
Constant	1.077	4.74	
Experience	0.017	1.36	15.06
Experience^2	-0.0004	-1.26	332.87
Higher Educ.	0.026	0.22	0.14
Secondary Ed.	0.141	1.59	0.41
Public Sector	0.156	1.03	0.06
Married	0.105	1.36	0.52
Manager	0.761	3.58	0.04
Professional	0.798	5.28	0.09
Associate Prof.	0.384	2.80	0.13
Clerks	0.452	3.84	0.35
Service	0.173	1.40	0.18
Crafts	0.232	1.19	0.04
Semi-skilled	-0.058	-0.27	0.04
Unit >50&<500	0.199	2.40	0.26
Unit >500	0.305	2.83	0.13
Outsider	-0.237	-2.29	0.31
Insider	0.139	1.52	0.49
Agriculture	0.007	0.06	0.12
Industry	0.372	1.69	0.89
Dep. Var.	ECU Wage		
Mean	2.089		
Stan. Dev.	0.546		
Observations	168		
R-squared	0.484		
Log-like.	-80.6		
Rest. Log-like.	-136.2		
Durbin-Watson	1.97		

Oaxaca (1973) Decomposition - Luxembourg

Variable	Fem. Coeff.	Fem. Mean	Male Coeff.	Male Mean	Explained	Unexplained	
Constant	1.0770	1.0000	1.1757	1.0000	0.0000	0.0987	
Experience	0.0170	15.0595	0.0227	20.4973	0.1237	0.0869	
Experience^2	-0.0004	332.8691	-0.0005	524.9836	-0.0977	-0.0383	
HED	0.0255	0.1429	0.0930	0.1803	0.0035	0.0096	
SED	0.1407	0.4107	-0.0715	0.2596	0.0108	-0.0872	
Public Sector	0.1563	0.0595	0.1640	0.0383	-0.0035	0.0005	
Married	0.1048	0.5238	0.2985	0.7295	0.0614	0.1015	
Manager	0.7611	0.0357	0.3943	0.0738	0.0150	-0.0131	
Professional	0.7985	0.0893	0.5849	0.0792	-0.0059	-0.0191	
Associate Professional	0.3843	0.1310	0.3925	0.1530	0.0087	0.0011	
Clerks	0.4518	0.3452	0.2991	0.0984	-0.0738	-0.0527	
Service	0.1729	0.1786	-0.0117	0.0355	0.0017	-0.0330	
Skilled Agricultural	0.0000	0.0000	-0.3281	0.0164	-0.0054	0.0000	
Crafts	0.2321	0.0417	0.0472	0.2869	0.0116	-0.0077	
Semi-skilled	-0.0583	0.0357	0.1263	0.1913	0.0196	0.0066	
Unit >50 but <500	0.1995	0.2619	0.0853	0.4016	0.0119	-0.0299	
Unit >500	0.3051	0.1250	0.1561	0.2350	0.0172	-0.0186	
Outsider	-0.2367	0.3095	-0.0807	0.1967	0.0091	0.0483	
Insider	0.1390	0.4940	0.1123	0.6202	0.0142	-0.0132	
Agriculture	0.0000	0.0000	-0.0363	0.0246	-0.0009	0.0000	
Industry	0.0072	0.1190	0.0649	0.5219	0.0261	0.0069	
Total					**0.1473**	**0.0473**	**0.1946**
Lambda	0.3720	0.8918	0.6554	0.5918	-0.1968	0.2528	**0.0560**
Total					**-0.0495**	0.3001	**0.2508**

Decomposition of Wage Differentials with Selectivity Correction.

Luxembourg 1996

Estimates of average lambdas and associated coefficients.	
$\log w_m - \log w_f$	0.2506
$\hat{\lambda}_m$	0.5916
$\hat{\lambda}_f$	0.8918
$\hat{\lambda}_f^0$	0.6219
$\hat{\theta}_m$	0.6554
$\hat{\theta}_f$	0.3720
$(\overline{X}_m - \overline{X}_f)'\hat{\beta}_m$	0.1473
$\overline{X}_f'(\hat{\beta}_m - \hat{\beta}_f)$	0.0473
$\hat{\theta}_m(\hat{\lambda}_m - \hat{\lambda}_f^0)$	-0.0198
$\hat{\theta}_m(\hat{\lambda}_f^0 - \hat{\lambda}_f)$	-0.1769
$(\hat{\theta}_m - \hat{\theta}_f)\hat{\lambda}_f$	0.2527

		Contribution of		
	$\log w_m - \log w_f$	Explained	Unexplained	Selectivity
Oaxaca	0.2506	-0.05 (-19.8%)	0.300 (119.8%)	0.000 (0.0%)
Option 1		0.380 (151.7%)	-0.130 (-51.7%)	0.000 (0.0%)
Option 2		0.127 (50.9%)	0.123 (49.1%)	0.000 (0.0%)
Option 3		0.127 (50.9%)	-0.130 (-51.7%)	0.253 (100.8%)

There are higher returns from education for men, although women benefit from higher returns to medium and large firm employment, as well as a larger premium for female insiders. In terms of the unexplained wage gap, all of the usual suspects play a key role, with 16%, 34% and 33% of this gap being due to experience, marriage and the intercept term respectively.

Juhn et al (1991) Decomposition - UK vs. Luxembourg

Variable	Male mean UK	Fem. mean UK	β male UK	β male Lux.	Male mean Lux.	Fem. mean Lux.	Term 1	Term 2
Constant	1.00	1.00	1.10	1.18	1.00	1.00	0.000	0.000
Experience	23.85	21.15	0.02	0.02	20.50	15.08	-0.082	0.006
Experience2	708.97	585.66	-0.0004	0.00	524.98	332.87	0.034	0.012
HED	0.30	0.21	0.221	0.09	0.18	0.14	0.004	0.011
SED	0.35	0.43	0.02	-0.07	0.26	0.41	-0.005	-0.007
Public Sector	0.04	0.08	-0.03	0.16	0.04	0.06	-0.002	0.007
Married	0.72	0.58	0.08	0.30	0.73	0.52	-0.019	-0.032
Manager	0.20	0.12	0.42	0.39	0.07	0.04	0.017	0.002
Professional	0.14	0.13	0.24	0.58	0.08	0.09	0.009	-0.002
Associate Professional	0.07	0.07	0.29	0.39	0.15	0.13	-0.009	0.000
Clerks	0.09	0.37	0.09	0.30	0.10	0.35	-0.010	0.059
Service	0.05	0.13	0.02	-0.01	0.04	0.18	-0.001	-0.002
Skilled Agricultural	0.01	0.00	-0.14	-0.33	0.02	0.00	0.001	0.002
Crafts	0.24	0.04	0.06	0.05	0.29	0.04	-0.002	0.003
Semi-skilled	0.13	0.06	0.08	0.13	0.19	0.04	-0.011	-0.003
Unit >50 but <500	0.23	0.24	0.28	0.09	0.40	0.26	-0.013	-0.002
Unit >500	0.39	0.38	0.45	0.16	0.24	0.13	-0.017	0.001
Outsider	0.24	0.32	-0.09	-0.08	0.20	0.31	-0.003	0.000
Insider	0.58	0.48	-0.01	0.11	0.62	0.49	-0.003	-0.012
Agriculture	0.03	0.00	-0.35	-0.04	0.02	0.00	0.000	-0.008
Industry	0.46	0.28	-0.01	0.06	0.52	0.12	-0.014	-0.015
Lambda	0	0	0	0.66	0.59	0.89	0.197	0.000
Total							0.092	0.019

Term 1 = $(\delta Z_j - \delta Z_k)\beta_k$

Term 2 = $\delta Z_j(\beta_j - \beta_k)$

Term 3 = $(\delta\psi_j - \delta\psi_k)\sigma_k$ = (.289 - .840).357 = -0.197

Term 4 = $\delta\psi_j\,(\sigma_j - \sigma_k)$ = .289(.581 - .357) = 0.065

Appendix 7.7 **France**

France - Male

Variable	Coefficient	t-ratio	Mean
Constant	1.206	17.00	
Experience	0.036	7.87	20.70
Experience^2	-0.001	-7.16	547.48
Higher Educ.	0.245	5.78	0.20
Secondary Ed.	0.044	1.62	0.47
Public Sector	0.016	0.24	0.03
Married	0.048	1.78	0.66
Manager	0.460	6.47	0.07
Professional	0.452	6.18	0.07
Associate Prof.	0.254	4.22	0.18
Clerks	0.105	1.52	0.06
Service	0.022	0.30	0.05
Skilled Agric.	-0.051	-0.32	0.02
Crafts	0.042	0.73	0.26
Semi-skilled	0.044	0.76	0.24
Unit >50&<500	0.172	6.38	0.31
Unit >500	0.246	7.72	0.20
Outsider	-0.323	-8.23	0.20
Insider	0.018	0.54	0.63
Agriculture	0.040	0.26	0.02
Industry	0.047	1.78	0.52
Dep. Var.	ECU Wage		
Mean	1.886		
Stan. Dev.	0.534		
Observations	1320		
R-squared	0.417		
Log-like.	-688.4		
Rest. Log-like.	-1044.9		
Durbin-Watson	1.97		

France - Female

Variable	Coefficient	t-ratio	Mean
Constant	1.228	14.24	
Experience	0.021	3.53	18.88
Experience^2	-0.0004	-2.85	475.46
Higher Educ.	0.310	5.96	0.27
Secondary Ed.	0.105	2.66	0.42
Public Sector	0.244	3.50	0.06
Married	0.012	0.36	0.56
Manager	0.352	3.44	0.04
Professional	0.247	2.56	0.06
Associate Prof.	0.250	3.34	0.20
Clerks	0.110	1.58	0.31
Service	-0.091	-1.28	0.19
Skilled Agric.	0.083	0.38	0.01
Crafts	-0.072	-0.55	0.02
Semi-skilled	-0.035	-0.43	0.11
Unit >50&<500	0.088	2.44	0.32
Unit >500	0.176	3.46	0.12
Outsider	-0.382	-7.61	0.23
Insider	0.062	1.45	0.57
Agriculture	-0.117	-0.66	0.01
Industry	-0.016	-0.37	0.27
Dep. Var.	ECU Wage		
Mean	1.674		
Stan. Dev.	0.507		
Observations	652		
R-squared	0.414		
Log-like.	-306.7		
Rest. Log-like.	-481.2		
Durbin-Watson	1.95		

Oaxaca (1973) Decomposition - France

Variable	Fem. Coeff.	Fem. Mean	Male Coeff.	Male Mean	Explained	Unexplained	
Constant	1.2278	1.0000	1.2058	1.0000	0.0000	-0.0220	
Experience	0.0213	18.8819	0.0358	20.6992	0.0651	0.2749	
Experience^2	-0.0004	475.4555	-0.0007	547.4750	-0.0494	-0.1407	
HED	0.3102	0.2715	0.2449	0.1962	-0.0184	-0.0177	
SED	0.1050	0.4233	0.0442	0.4697	0.0020	-0.0257	
Public Sector	0.2444	0.0583	0.0183	0.0295	-0.0005	-0.0133	
Married	0.0121	0.5613	0.0484	0.6614	0.0048	0.0204	
Manager	0.3517	0.0414	0.4595	0.0735	0.0147	0.0045	
Professional	0.2474	0.0552	0.4520	0.0735	0.0083	0.0113	
Associate Professional	0.2500	0.1979	0.2542	0.1765	-0.0054	0.0008	
Clerks	0.1096	0.3144	0.1054	0.0629	-0.0265	-0.0013	
Service	-0.0913	0.1887	0.0218	0.0538	-0.0029	0.0213	
Skilled Agricultural	0.0827	0.0077	-0.0514	0.0167	-0.0005	-0.0010	
Crafts	-0.0720	0.0184	0.0422	0.2568	0.0101	0.0021	
Semi-skilled	-0.0354	0.1120	0.0437	0.2379	0.0055	0.0089	
Unit >50 but <500	0.0880	0.3236	0.1722	0.3114	-0.0021	0.0272	
Unit >500	0.1757	0.1242	0.2459	0.1962	0.0177	0.0087	
Outsider	-0.3819	0.2347	-0.3225	0.2030	0.0102	0.0139	
Insider	0.0617	0.5675	0.0178	0.6318	0.0011	-0.0249	
Agriculture	-0.1166	0.0107	0.0403	0.0152	0.0002	0.0017	
Industry	-0.0161	0.2745	0.0474	0.5167	0.0115	0.0174	
Total					0.0455	0.1665	0.2121

Women receive greater returns from higher education as well as there being more women benefiting, there are also positive returns for women in the public sector, whilst there are higher returns for men from large and medium sized firm employment. Experience is once again the key factor in the unexplained wage gap with over three-quarters of it resulting from differential returns to experience.

Juhn et al (1991) Decomposition - UK vs. France

Variable	Male mean UK	Fem. mean UK	β male UK	β male France	Male mean France	Fem. mean France	Term 1	Term 2
Constant	1.00	1.00	1.10	1.21	1.00	1.00	0.000	0.000
Experience	23.85	21.15	0.02	0.04	20.70	18.88	0.032	-0.029
Experience2	708.97	585.66	-0.0004	0.00	547.48	475.46	-0.036	0.037
HED	0.30	0.21	0.221	0.24	0.20	0.27	0.039	-0.002
SED	0.35	0.43	0.02	0.04	0.47	0.42	-0.005	0.002
Public Sector	0.04	0.08	-0.03	0.02	0.03	0.06	0.000	0.002
Married	0.72	0.58	0.08	0.05	0.66	0.56	0.002	0.004
Manager	0.20	0.12	0.42	0.46	0.07	0.04	0.023	-0.004
Professional	0.14	0.13	0.24	0.45	0.07	0.06	-0.006	-0.001
Associate Professional	0.07	0.07	0.29	0.25	0.18	0.20	0.005	0.000
Clerks	0.09	0.37	0.09	0.11	0.06	0.31	-0.003	0.004
Service	0.05	0.13	0.02	0.02	0.05	0.19	0.001	0.000
Skilled Agricultural	0.01	0.00	-0.14	-0.05	0.02	0.01	0.000	-0.001
Crafts	0.24	0.04	0.06	0.04	0.26	0.02	-0.002	0.004
Semi-skilled	0.13	0.06	0.08	0.04	0.24	0.11	-0.002	0.003
Unit >50 but <500	0.23	0.24	0.28	0.17	0.31	0.32	0.000	-0.001
Unit >500	0.39	0.38	0.45	0.25	0.20	0.12	-0.017	0.001
Outsider	0.24	0.32	-0.09	-0.32	0.20	0.23	0.016	-0.019
Insider	0.58	0.48	-0.01	0.02	0.63	0.57	0.001	-0.003
Agriculture	0.03	0.00	-0.35	0.04	0.02	0.01	0.001	-0.010
Industry	0.46	0.28	-0.01	0.05	0.52	0.27	-0.003	-0.012
Lambda	0	0	0	0	0	0	0.000	0.000
Total							**0.046**	**-0.027**

Term 1 = $(\delta Z_j - \delta Z_k)\beta_k$

Term 2 = $\delta Z_j(\beta_j - \beta_k)$

Term 3 = $(\delta\psi_j - \delta\psi_k)\sigma_k$ = (.289 - .405).411 = -0.048

Term 4 = $\delta\psi_j\ (\sigma_j - \sigma_k)$ = .289(.581 - .411) = 0.049

Appendix 7.8 United Kingdom

United Kingdom - Male

Variable	Coefficient	t-ratio	Mean
Constant	1.097	9.74	
Experience	0.025	3.56	23.85
Experience^2	-0.0004	-3.43	708.97
Higher Educ.	0.220	3.83	0.30
Secondary Ed.	0.024	0.52	0.35
Public Sector	-0.029	-0.29	0.04
Married	0.075	1.62	0.72
Manager	0.415	4.74	0.20
Professional	0.241	2.47	0.14
Associate Prof.	0.287	2.75	0.07
Clerks	0.091	0.93	0.09
Service	0.019	0.17	0.05
Skilled Agric.	-0.139	-0.78	0.01
Crafts	0.061	0.72	0.24
Semi-skilled	0.081	0.91	0.13
Unit >50&<500	0.279	5.52	0.23
Unit >500	0.452	9.91	0.39
Outsider	-0.086	-1.38	0.24
Insider	-0.011	-0.22	0.58
Agriculture	-0.353	-2.78	0.03
Industry	-0.015	-0.36	0.46
Dep. Var.	ECU Wage		
Mean	1.865		
Stan. Dev.	0.674		
Observations	994		
R-squared	0.272		
Log-like.	-860.3		
Rest. Log-like.	-1018.4		
Durbin-Watson	1.9		

United Kingdom - Female

Variable	Coefficient	t-ratio	Mean
Constant	1.034	8.06	
Experience	0.007	0.86	21.15
Experience^2	-0.00001	-0.07	585.66
Higher Educ.	0.412	4.84	0.21
Secondary Ed.	0.177	3.08	0.43
Public Sector	0.057	0.58	0.08
Married	-0.042	-0.82	0.58
Manager	0.089	0.79	0.12
Professional	0.199	1.59	0.13
Associate Prof.	-0.017	-0.13	0.07
Clerks	0.090	0.94	0.37
Service	-0.105	-0.95	0.13
Skilled Agric.	-1.025	-1.99	0.00
Crafts	-0.072	-0.50	0.04
Semi-skilled	0.056	0.43	0.06
Unit >50&<500	0.337	5.27	0.24
Unit >500	0.480	8.10	0.38
Outsider	0.037	0.49	0.32
Insider	0.013	0.20	0.48
Agriculture	-0.301	-0.83	0.00
Industry	-0.045	-0.73	0.28
Dep. Var.	ECU Wage		
Mean	1.64		
Stan. Dev.	0.58		
Observations	471		
R-squared	0.28		
Log-like.	-334.4		
Rest. Log-like.	-411.6		
Durbin-Watson	1.9		

Oaxaca (1973) Decomposition - UK

Variable	Fem. Coeff.	Fem. Mean	Male Coeff.	Male Mean	Explained	Unexplained	
Constant	1.0338	1.0000	1.0971	1.0000	0.0000	0.0633	
Experience	0.0070	21.1507	0.0249	23.8481	0.0671	0.3781	
Experience^2	-0.00001	585.6561	-0.0004	708.9708	-0.0547	-0.2521	
HEO	0.4125	0.2102	0.2205	0.2958	0.0189	-0.0404	
SED	0.1766	0.4289	0.0241	0.3521	-0.0019	-0.0654	
Public Sector	0.0571	0.0786	-0.0292	0.0433	0.0010	-0.0068	
Married	-0.0420	0.5754	0.0755	0.7183	0.0108	0.0676	
Manager	0.0887	0.1168	0.4152	0.1992	0.0342	0.0381	
Professional	0.1985	0.1338	0.2406	0.1398	0.0015	0.0056	
Associate Professional	-0.0169	0.0722	0.2870	0.0704	-0.0005	0.0219	
Clerks	0.0903	0.3694	0.0910	0.0875	-0.0257	0.0003	
Service	-0.1053	0.1253	0.0185	0.0503	-0.0014	0.0155	
Skilled Agricultural	-1.0251	0.0021	-0.1390	0.0141	-0.0017	0.0019	
Crafts	-0.0715	0.0425	0.0614	0.2354	0.0119	0.0056	
Semi-skilled	0.0562	0.0616	0.0815	0.1328	0.0058	0.0016	
Unit >50 but <500	0.3368	0.2378	0.2795	0.2254	-0.0035	-0.0136	
Unit >500	0.4799	0.3843	0.4518	0.3883	0.0018	-0.0108	
Outsider	0.0366	0.3206	-0.0860	0.2394	0.0070	-0.0393	
Insider	0.0126	0.4820	-0.0114	0.5825	-0.0011	-0.0116	
Agriculture	-0.3010	0.0042	-0.3532	0.0292	-0.0088	-0.0002	
Industry	-0.0452	0.2781	-0.0149	0.4628	-0.0027	0.0084	
Total					0.0580	0.1677	0.2258

The insider and outsider dummies are insignificant in both cases. There are higher returns for female education as well as higher returns for women in large and medium sized firm employment. However all of these are overwhelmed by the impact of more favourable returns for men from marriage and experience, the male marriage coefficient is positive whilst the female one is negative and the male experience returns are significantly higher. This translates to two thirds of the unexplained differential being due to experience and one third to marriage.

Appendix 7.9 Ireland

Ireland - Male

Variable	Coefficient	t-ratio	Mean
Constant	1.109	16.68	
Experience	0.025	4.93	17.51
Experience^2	-0.0004	-4.13	455.93
Higher Educ.	0.209	4.24	0.20
Secondary Ed.	0.133	4.13	0.40
Public Sector	0.210	3.24	0.05
Married	0.209	5.43	0.55
Manager	0.310	4.91	0.11
Professional	0.337	4.79	0.09
Associate Prof.	0.340	5.32	0.10
Clerks	0.124	1.72	0.05
Service	0.041	0.62	0.07
Skilled Agric.	0.093	0.85	0.02
Crafts	0.120	2.43	0.24
Semi-skilled	0.106	2.05	0.17
Unit >50&<500	0.167	5.13	0.29
Unit >500	0.252	5.33	0.10
Outsider	-0.185	-4.49	0.37
Insider	0.078	1.87	0.47
Agriculture	-0.309	-4.39	0.06
Industry	0.083	2.49	0.52
Dep. Var.	ECU Wage		
Mean	1.803		
Stan. Dev.	0.556		
Observations	953		
R-squared	0.466		
Log-like.	-494.7		
Rest. Log-like.	-793.3		
Durbin-Watson	1.94		

Ireland - Female

Variable	Coefficient	t-ratio	Mean
Constant	1.107	9.66	
Experience	0.019	2.80	12.64
Experience^2	-0.0004	-2.60	265.02
Higher Educ.	0.267	3.93	0.26
Secondary Ed.	0.093	1.70	0.54
Public Sector	0.182	3.05	0.17
Married	0.047	1.03	0.41
Manager	0.231	1.99	0.05
Professional	0.402	4.12	0.16
Associate Prof.	0.279	2.88	0.12
Clerks	0.244	2.79	0.22
Service	0.033	0.37	0.22
Skilled Agric.	-0.361	-1.01	0.00
Crafts	-0.059	-0.46	0.03
Semi-skilled	-0.057	-0.62	0.14
Unit >50&<500	0.091	2.07	0.35
Unit >500	0.228	3.73	0.13
Outsider	-0.188	-3.52	0.49
Insider	0.184	3.08	0.34
Agriculture	-0.028	-0.08	0.00
Industry	0.126	2.04	0.27
Dep. Var.	ECU Wage		
Mean	1.631		
Stan. Dev.	0.518		
Observations	520		
R-squared	0.368		
Log-like.	-275.7		
Rest. Log-like.	-395.1		
Durbin-Watson	1.76		

Oaxaca (1973) Decomposition - Ireland

Variable	Fem. Coeff.	Fem. Mean	Male Coeff.	Male Mean	Explained	Unexplained	
Constant	1.1069	1.0000	1.1091	1.0000	0.0000	0.0022	
Experience	0.0191	12.6442	0.0248	17.5121	0.1208	0.0718	
Experience^2	-0.0004	265.0212	-0.0004	455.9297	-0.0775	0.0036	
HED	0.2668	0.2635	0.2088	0.1983	-0.0136	-0.0153	
SED	0.0933	0.5385	0.1330	0.4019	-0.0182	0.0214	
Public Sector	0.1819	0.1654	0.2100	0.0504	-0.0242	0.0046	
Married	0.0472	0.4077	0.2085	0.5498	0.0296	0.0657	
Manager	0.2310	0.0481	0.3102	0.1112	0.0196	0.0038	
Professional	0.4024	0.1635	0.3369	0.0934	-0.0236	-0.0107	
Associate Professional	0.2785	0.1154	0.3405	0.0976	-0.0061	0.0071	
Clerks	0.2441	0.2173	0.1240	0.0535	-0.0203	-0.0261	
Service	0.0330	0.2173	0.0411	0.0745	-0.0059	0.0018	
Skilled Agricultural	-0.3613	0.0038	0.0928	0.0189	0.0014	0.0017	
Crafts	-0.0588	0.0327	0.1198	0.2445	0.0254	0.0058	
Semi-skilled	-0.0571	0.1385	0.1064	0.1658	0.0029	0.0226	
Unit >50 but <500	0.0907	0.3500	0.1675	0.2865	-0.0106	0.0269	
Unit >500	0.2284	0.1288	0.2518	0.1039	-0.0063	0.0030	
Outsider	-0.1880	0.4904	-0.1845	0.3683	0.0225	0.0017	
Insider	0.1838	0.3404	0.0784	0.4722	0.0103	-0.0359	
Agriculture	-0.0279	0.0038	-0.3090	0.0619	-0.0179	-0.0011	
Industry	0.1255	0.2731	0.0826	0.5194	0.0203	-0.0117	
Totel					0.0287	0.1431	0.1718

Greater retums for female higher education as well female insiders, compared to better retums for men from medium and large sized firm employmcnt. The unexplained differential is dominated by a combination of experience and marriage, higher retums for men from marriage and experience, this both make up about 50% of the total.

Juhn et al (1991) Decomposition - UK vs. Ireland

Variable	Male mean UK	Fem. mean UK	β male UK	β male Ireland	Male mean Ireland	Fem. mean Ireland	Term 1	Term 2
Constant	1.00	1.00	1.10	1.11	1.00	1.00	0.000	0.000
Experience	23.85	21.15	0.02	0.02	17.51	12.64	-0.054	0.000
Experience2	708.97	585.66	-0.0004	0.00	455.93	265.02	0.027	0.000
HED	0.30	0.21	0.221	0.21	0.20	0.26	0.031	0.001
SED	0.35	0.43	0.02	0.13	0.40	0.54	0.008	0.008
Public Sector	0.04	0.08	-0.03	0.21	0.05	0.17	0.017	0.008
Married	0.72	0.58	0.08	0.21	0.55	0.41	0.000	-0.019
Manager	0.20	0.12	0.42	0.31	0.11	0.05	0.006	0.009
Professional	0.14	0.13	0.24	0.34	0.09	0.16	0.026	-0.001
Associate Professional	0.07	0.07	0.29	0.34	0.10	0.12	0.005	0.000
Clerks	0.09	0.37	0.09	0.12	0.05	0.22	-0.015	0.009
Service	0.05	0.13	0.02	0.04	0.07	0.22	0.003	0.002
Skilled Agricultural	0.01	0.00	-0.14	0.09	0.02	0.00	0.000	-0.003
Crafts	0.24	0.04	0.06	0.12	0.24	0.03	-0.002	-0.011
Semi-skilled	0.13	0.06	0.08	0.11	0.17	0.14	0.005	-0.002
Unit >50 but <500	0.23	0.24	0.28	0.17	0.29	0.35	0.009	-0.001
Unit >500	0.39	0.38	0.45	0.25	0.10	0.13	0.007	0.001
Outsider	0.24	0.32	-0.09	-0.18	0.37	0.49	-0.008	-0.008
Insider	0.58	0.48	-0.01	0.08	0.47	0.34	-0.002	-0.009
Agriculture	0.03	0.00	-0.35	-0.31	0.06	0.00	0.010	-0.001
Industry	0.46	0.28	-0.01	0.08	0.52	0.27	-0.005	-0.018
Lambda	0	0	0	0	0	0	0.000	0.000
Totel							0.068	-0.034

Term 1 = $(\delta Z_j - \delta Z_k)\beta_k$

Term 2 = $\delta Z_j(\beta_j - \beta_k)$

Term 3 = $(\delta\psi_j - \delta\psi_k)\sigma_k = (.289 - .348).411 = -0.024$

Term 4 = $\delta\psi_j\,(\sigma_j - \sigma_k) = .289(.581 - .411) = 0.049$

Appendix 7.10 Italy

Italy - Male

Variable	Coefficient	t-ratio	Mean
Constant	1.305	29.23	
Experience	0.030	8.61	18.50
Experience^2	-0.001	-7.25	477.06
Higher Educ.	0.309	6.26	0.07
Secondary Ed.	0.090	3.70	0.40
Public Sector	0.051	1.15	0.06
Married	0.069	2.68	0.68
Manager	0.367	5.76	0.03
Professional	0.203	2.79	0.03
Associate Prof.	0.193	4.32	0.10
Clerks	0.229	5.85	0.17
Service	-0.029	-0.63	0.07
Skilled Agric.	0.057	0.73	0.03
Crafts	0.024	0.71	0.34
Semi-skilled	0.100	2.43	0.10
Unit >50&<500	0.099	4.16	0.25
Unit >500	0.192	5.85	0.11
Outsider	-0.309	-9.59	0.26
Insider	0.014	0.47	0.59
Agriculture	-0.274	-4.78	0.05
Industry	-0.010	-0.41	0.56
Dep. Var.	ECU Wage		
Mean	1.76		
Stan. Dev.	0.529		
Observations	1932		
R-squared	0.363		
Log-like.	-1076.9		
Rest. Log-like.	-1512.4		
Durbin-Watson	1.98		

Italy - Female

Variable	Coefficient	t-ratio	Mean
Constant	1.063	16.55	
Experience	0.036	6.85	14.35
$Experience^2$	-0.001	-5.62	317.02
Higher Educ.	0.231	3.05	0.06
Secondary Ed.	0.112	3.02	0.47
Public Sector	0.047	0.89	0.09
Married	0.002	0.05	0.56
Manager	0.130	0.72	0.01
Professional	0.332	3.92	0.06
Associate Prof.	0.272	4.09	0.09
Clerks	0.351	6.93	0.30
Service	0.091	1.63	0.14
Skilled Agric.	-0.147	-0.93	0.01
Crafts	0.081	1.55	0.20
Semi-skilled	0.168	2.16	0.05
Unit >50&<500	0.145	4.13	0.23
Unit >500	0.251	5.02	0.10
Outsider	-0.239	-5.39	0.33
Insider	-0.015	-0.34	0.52
Agriculture	-0.390	-4.16	0.04
Industry	0.015	0.40	0.40
Dep. Var.	ECU Wage		
Mean	1.564		
Stan. Dev.	0.516		
Observations	923		
R-squared	0.352		
Log-like.	-497.6		
Rest. Log-like.	-697.9		
Durbin-Watson	1.92		

Oaxaca (1973) Decomposition - Italy

Variable	Fem. Coeff.	Fem. Mean	Male Coeff.	Male Mean	Explained	Unexplained	
Constant	1.0628	1.0000	1.3050	1.0000	0.0000	0.2422	
Experience	0.0356	14.3532	0.0304	18.4974	0.1261	-0.0738	
Experience^2	-0.0007	317.0228	-0.0005	477.0554	-0.0875	0.0574	
HED	0.2312	0.0628	0.3090	0.0657	0.0009	0.0049	
SED	0.1121	0.4713	0.0898	0.3991	-0.0065	-0.0105	
Public Sector	0.0474	0.0943	0.0509	0.0569	-0.0019	0.0003	
Married	0.0016	0.5569	0.0694	0.6760	0.0083	0.0377	
Manager	0.1301	0.0065	0.3671	0.0326	0.0096	0.0015	
Professional	0.3325	0.0563	0.2032	0.0259	-0.0062	-0.0073	
Associate Professional	0.2721	0.0867	0.1926	0.0973	0.0020	-0.0069	
Clerks	0.3509	0.3023	0.2291	0.1713	-0.0300	-0.0368	
Service	0.0913	0.1419	-0.0288	0.0740	0.0020	-0.0170	
Skilled Agricultural	-0.1469	0.0108	0.0569	0.0254	0.0008	0.0022	
Crafts	0.0813	0.1983	0.0236	0.3354	0.0032	-0.0114	
Semi-skilled	0.1681	0.0477	0.0999	0.0999	0.0052	-0.0033	
Unit >50 but <500	0.1452	0.2319	0.0994	0.2479	0.0016	-0.0106	
Unit >500	0.2506	0.0964	0.1924	0.1139	0.0034	-0.0056	
Outsider	-0.2385	0.3261	-0.3088	0.2624	0.0197	-0.0229	
Insider	-0.0146	0.5190	0.0145	0.5947	0.0011	0.0151	
Agriculture	-0.3898	0.0368	-0.2743	0.0512	-0.0040	0.0043	
Industry	0.0151	0.4041	-0.0097	0.5606	-0.0015	-0.0101	
Total					**0.0463**	**0.1495**	**0.1958**

There are higher returns to men from marriage and higher education, but women perform better in terms of their payments for large and medium sized firm employment, there is also a smaller penalty for female outsiders. In terms of the unexplained differential it is overwhelmed by the difference between the two intercept terms, the gap between the two is significantly wider than the overall gender wage gap. Differential intercept coefficients are generally interpreted as differences in factors unobserved by the model, these appear to be far more prevalent in Italy than in any of the other countries.

Juhn et al (1991) Decomposition - UK vs. Italy

Variable	Male mean UK	Fem. mean UK	β male UK	β male Italy	Male mean Italy	Fem. mean Italy	Term 1	Term 2
Constant	1.00	1.00	1.10	1.31	1.00	1.00	0.000	0.000
Experience	23.85	21.15	0.02	0.03	18.50	14.35	-0.044	-0.015
Experience2	708.97	585.66	-0.0004	0.00	477.06	317.02	0.018	0.012
HED	0.30	0.21	0.221	0.31	0.07	0.06	0.026	-0.008
SED	0.35	0.43	0.02	0.09	0.40	0.47	0.000	0.005
Public Sector	0.04	0.08	-0.03	0.05	0.06	0.09	0.000	0.003
Married	0.72	0.58	0.08	0.07	0.68	0.56	0.002	0.001
Manager	0.20	0.12	0.42	0.37	0.03	0.01	0.021	0.004
Professional	0.14	0.13	0.24	0.20	0.03	0.06	0.007	0.000
Associate Professional	0.07	0.07	0.29	0.19	0.10	0.09	-0.002	0.000
Clerks	0.09	0.37	0.09	0.23	0.17	0.30	-0.035	0.039
Service	0.05	0.13	0.02	-0.03	0.07	0.14	0.000	-0.004
Skilled Agricultural	0.01	0.00	-0.14	0.06	0.03	0.01	0.000	-0.002
Crafts	0.24	0.04	0.06	0.02	0.34	0.20	0.001	0.007
Semi-skilled	0.13	0.06	0.08	0.10	0.10	0.05	0.002	-0.001
Unit >50 but <500	0.23	0.24	0.28	0.10	0.25	0.23	-0.003	-0.002
Unit >500	0.39	0.38	0.45	0.19	0.11	0.10	-0.003	0.001
Outsider	0.24	0.32	-0.09	-0.31	0.26	0.33	0.005	-0.018
Insider	0.58	0.48	-0.01	0.01	0.59	0.52	0.000	-0.003
Agriculture	0.03	0.00	-0.35	-0.27	0.05	0.04	-0.003	-0.002
Industry	0.46	0.28	-0.01	-0.01	0.56	0.40	0.000	-0.001
Lambda	0	0	0	0	0	0	0.000	0.000
Total							**-0.007**	**0.017**

Term 1 = $(\delta Z_j - \delta Z_k)\beta_k$

Term 2 = $\delta Z_j(\beta_j - \beta_k)$

Term 3 = $(\delta\psi_j - \delta\psi_k)\sigma_k$ = (.289 - .352).425 = -0.027

Term 4 = $\delta\psi_j\,(\sigma_j - \sigma_k)$ = .289(.581 - .425) = 0.045

Appendix 7.11 **Greece**

Greece - Male

Variable	Coefficient	t-ratio	Mean
Constant	0.967	11.23	
Experience	0.028	4.89	18.20
Experience^2	-0.0005	-3.70	473.60
Higher Educ.	0.424	7.10	0.21
Secondary Ed.	0.203	4.70	0.32
Public Sector	0.137	1.99	0.08
Married	0.082	1.88	0.71
Manager	-0.128	-1.36	0.05
Professional	0.210	2.25	0.10
Associate Prof.	0.181	1.89	0.05
Clerks	0.168	2.07	0.09
Service	0.023	0.29	0.10
Skilled Agric.	-0.119	-0.77	0.04
Crafts	-0.003	-0.05	0.31
Semi-skilled	0.060	0.87	0.16
Unit >50&<500	0.145	2.52	0.09
Unit >500	0.316	2.50	0.02
Outsider	-0.294	-5.88	0.35
Insider	0.025	0.49	0.49
Agriculture	-0.348	-2.43	0.05
Industry	0.069	1.62	0.49
Dep. Var.	ECU Wage		
Mean	1.482		
Stan. Dev.	0.605		
Observations	985		
R-squared	0.302		
Log-like.	-724.6		
Rest. Log-like.	-901.6		
Durbin-Watson	1.78		

Greece - Female

Variable	Coefficient	t-ratio	Mean
Constant	0.768	9.23	
Experience	0.017	2.49	12.31
Experience^2	-0.0002	-1.23	243.65
Higher Educ.	0.309	4.99	0.36
Secondary Ed.	0.201	3.75	0.32
Public Sector	0.112	1.72	0.10
Married	0.064	1.63	0.59
Manager	0.028	0.18	0.02
Professional	0.439	4.83	0.13
Associate Prof.	0.332	3.64	0.08
Clerks	0.220	2.88	0.27
Service	0.160	2.14	0.20
Skilled Agric.	0.249	0.61	0.02
Crafts	0.043	0.56	0.13
Semi-skilled	0.075	0.73	0.05
Unit >50&<500	0.056	1.03	0.13
Unit >500	-0.034	-0.23	0.01
Outsider	-0.226	-4.34	0.36
Insider	0.176	3.56	0.44
Agriculture	-0.657	-1.70	0.02
Industry	0.169	3.09	0.30
Dep. Var.	ECU Wage		
Mean	1.372		
Stan. Dev.	0.488		
Observations	470		
R-squared	0.419		
Log-like.	-201.1		
Rest. Log-like.	-328.9		
Durbin-Watson	1.97		

Oaxaca (1973) Decomposition - Greece

Variable	Fem. Coeff.	Fem. Mean	Male Coeff.	Male Mean	Explained	Unexplained	
Constant	0.7679	1.0000	0.9674	1.0000	0.0000	0.1994	
Experience	0.0167	12.3149	0.0283	18.1980	0.1668	0.1439	
Experience^2	-0.0002	243.6511	-0.0005	473.6031	-0.1036	-0.0540	
HED	0.3090	0.3553	0.4237	0.2102	-0.0615	0.0407	
SED	0.2013	0.3191	0.2027	0.3178	-0.0003	0.0004	
Public Sector	0.1119	0.1043	0.1368	0.0772	-0.0037	0.0026	
Married	0.0640	0.5872	0.0822	0.7117	0.0102	0.0107	
Manager	0.0276	0.0170	-0.1280	0.0497	-0.0042	-0.0026	
Professional	0.4388	0.1319	0.2103	0.0954	-0.0077	-0.0301	
Associate Professional	0.3321	0.0787	0.1807	0.0528	-0.0047	-0.0119	
Clerks	0.2200	0.2681	0.1683	0.0914	-0.0297	-0.0139	
Service	0.1605	0.2000	0.0233	0.1015	-0.0023	-0.0274	
Skilled Agricultural	0.2487	0.0170	-0.1185	0.0447	-0.0033	-0.0063	
Crafts	0.0434	0.1319	-0.0035	0.3117	-0.0006	-0.0062	
Semi-skilled	0.0754	0.0489	0.0599	0.1645	0.0069	-0.0008	
Unit >50 but <500	0.0565	0.1277	0.1446	0.0934	-0.0050	0.0113	
Unit >500	-0.0339	0.0149	0.3163	0.0173	0.0007	0.0052	
Outsider	-0.2263	0.3574	-0.2936	0.3482	0.0027	-0.0241	
Insider	0.1764	0.4426	0.0248	0.4904	0.0012	-0.0671	
Agriculture	-0.6575	0.0191	-0.3479	0.0508	-0.0110	0.0059	
Industry	0.1692	0.2979	0.0688	0.4893	0.0132	-0.0299	
Total					-0.0358	0.1459	0.1102

Greater returns for men from higher education, marriage and large and medium sized firm employment, whilst there are lower returns for male insiders. Again the impact of these is dwarfed by the intercept coefficients, with the gap between the two being much larger than the overall wage gap. The effects of differential returns to experience are also important, these making up almost two thirds of the unexplained wage gap. Clearly the unexplained differential is then reduced by a large proportion of fairly small, negative factors.

Juhn et al (1991) Decomposition - UK vs. Greece

Variable	Male mean UK	Fem. mean UK	β male UK	β male Greece	Male mean Greece	Fem. mean Greece	Term 1	Term 2
Constant	1.00	1.00	1.10	0.97	1.00	1.00	0.000	0.000
Experience	23.85	21.15	0.02	0.03	18.20	12.31	-0.090	-0.009
Experience2	708.97	585.66	-0.0004	0.00	473.60	243.65	0.053	0.012
HED	0.30	0.21	0.221	0.42	0.21	0.38	0.098	-0.017
SED	0.35	0.43	0.02	0.20	0.32	0.32	-0.015	0.014
Public Sector	0.04	0.08	-0.03	0.14	0.08	0.10	-0.001	0.006
Married	0.72	0.58	0.08	0.08	0.71	0.59	0.002	-0.001
Manager	0.20	0.12	0.42	-0.13	0.05	0.02	-0.006	0.045
Professional	0.14	0.13	0.24	0.21	0.10	0.13	0.009	0.000
Associate Professional	0.07	0.07	0.29	0.18	0.05	0.08	0.004	0.000
Clerks	0.09	0.37	0.09	0.17	0.09	0.27	-0.018	0.022
Service	0.05	0.13	0.02	0.02	0.10	0.20	0.001	0.000
Skilled Agricultural	0.01	0.00	-0.14	-0.12	0.04	0.02	0.002	0.000
Crafts	0.24	0.04	0.06	0.00	0.31	0.13	0.000	0.013
Semi-skilled	0.13	0.06	0.08	0.06	0.16	0.05	-0.003	0.002
Unit >50 but <500	0.23	0.24	0.28	0.14	0.09	0.13	0.003	-0.002
Unit >500	0.39	0.38	0.45	0.32	0.02	0.01	0.001	0.001
Outsider	0.24	0.32	-0.09	-0.29	0.35	0.36	0.021	-0.017
Insider	0.58	0.48	-0.01	0.02	0.49	0.44	0.001	-0.004
Agriculture	0.03	0.00	-0.35	-0.35	0.05	0.02	0.002	0.000
Industry	0.46	0.28	-0.01	0.07	0.49	0.30	0.000	-0.015
Lambda	0	0	0	0	0	0	0.000	0.000
Total							**0.063**	**0.048**

Term 1 = $(\delta Z_j - \delta Z_k)\beta_k$

Term 2 = $\delta Z_j(\beta_j - \beta_k)$

Term 3 = $(\delta\psi_j - \delta\psi_k)\sigma_k = (.289 - .286).510 = 0.001$

Term 4 = $\delta\psi_j\,(\sigma_j - \sigma_k) = .289(.581 - .510) = 0.020$

Appendix 7.12 Spain

Spain - Male

Variable	Coefficient	t-ratio	Mean
Constant	1.092	21.92	
Experience	0.027	8.30	21.29
Experience^2	-0.0004	-7.27	614.80
Higher Educ.	0.209	6.63	0.20
Secondary Ed.	0.122	4.46	0.19
Public Sector	0.053	1.19	0.05
Married	0.107	4.15	0.71
Manager	0.526	9.28	0.04
Professional	0.411	7.76	0.07
Associate Prof.	0.200	4.53	0.10
Clerks	0.164	3.61	0.08
Service	-0.070	-1.69	0.11
Skilled Agric.	0.147	1.99	0.03
Crafts	0.038	1.15	0.31
Semi-skilled	0.047	1.24	0.13
Unit >50&<500	0.169	6.85	0.21
Unit >500	0.342	11.96	0.17
Outsider	-0.284	-8.30	0.36
Insider	0.070	2.03	0.54
Agriculture	-0.330	-5.80	0.06
Industry	0.049	2.02	0.50
Dep. Var.	ECU Wage		
Mean	1.665		
Stan. Dev.	0.593		
Observations	2042		
R-squared	0.487		
Log-like.	-1150.5		
Rest. Log-like.	-1831.5		
Durbin-Watson	1.91		

Spain - Female

Variable	Coefficient	t-ratio	Mean
Constant	0.948	14.26	
Experience	0.023	4.83	15.26
$Experience^2$	-0.0004	-3.88	359.40
Higher Educ.	0.129	2.54	0.31
Secondary Ed.	0.017	0.41	0.26
Public Sector	0.152	2.81	0.12
Married	0.133	4.11	0.53
Manager	0.188	1.73	0.02
Professional	0.636	8.70	0.14
Associate Prof.	0.418	6.26	0.12
Clerks	0.289	5.02	0.22
Service	0.140	2.58	0.21
Skilled Agric.	0.261	1.21	0.01
Crafts	-0.087	-1.12	0.09
Semi-skilled	-0.091	-0.90	0.03
Unit >50&<500	0.088	2.30	0.23
Unit >500	0.238	4.85	0.12
Outsider	-0.369	-7.92	0.42
Insider	0.113	2.30	0.43
Agriculture	-0.319	-2.46	0.02
Industry	0.125	2.41	0.22
Dep. Var.	ECU Wage		
Mean	1.478		
Stan. Dev.	0.596		
Observations	785		
R-squared	0.508		
Log-like.	-428.2		
Rest. Log-like.	-706.7		
Durbin-Watson	1.99		

Oaxaca (1973) Decomposition - Spain

Variable	Fem. Coeff.	Fem. Mean	Male Coeff.	Male Mean	Explained	Unexplained	
Constant	0.9484	1.0000	1.0923	1.0000	0.0000	0.1439	
Experience	0.0234	15.2611	0.0267	21.2919	0.1608	0.0503	
Experience^2	-0.0004	359.4013	-0.0004	614.8041	-0.1115	-0.0053	
HED	0.1286	0.3108	0.2087	0.2013	-0.0229	0.0249	
SED	0.0174	0.2586	0.1223	0.1871	-0.0087	0.0271	
Public Sector	0.1516	0.1159	0.0526	0.0548	-0.0032	-0.0115	
Married	0.1326	0.5261	0.1075	0.7120	0.0200	-0.0132	
Manager	0.1884	0.0242	0.5259	0.0426	0.0097	0.0082	
Professional	0.6362	0.1401	0.4112	0.0656	-0.0306	-0.0315	
Associate Professional	0.4179	0.1185	0.2003	0.0960	-0.0045	-0.0258	
Clerks	0.2888	0.2217	0.1641	0.0798	-0.0233	-0.0276	
Service	0.1396	0.2115	-0.0702	0.1058	0.0074	-0.0444	
Skilled Agricultural	0.2613	0.0064	0.1470	0.0294	0.0034	-0.0007	
Crafts	-0.0874	0.0917	0.0379	0.3056	0.0081	0.0115	
Semi-skilled	-0.0913	0.0344	0.0468	0.1317	0.0046	0.0047	
Unit >50 but <500	0.0878	0.2293	0.1691	0.2120	-0.0029	0.0186	
Unit >500	0.2382	0.1236	0.3422	0.1665	0.0147	0.0129	
Outsider	-0.3687	0.4178	-0.2837	0.3634	0.0155	0.0355	
Insider	0.1129	0.4331	0.0699	0.5367	0.0072	-0.0186	
Agriculture	-0.3194	0.0191	-0.3299	0.0583	-0.0129	-0.0002	
Industry	0.1253	0.2153	0.0487	0.4985	0.0138	-0.0165	
Total					0.0446	0.1423	0.1869

There are higher returns for men from medium and large sized firm employment as well as a smaller penalty for male outsiders. However there are positive and significant returns for women in the public sector and a larger premium for female insiders. The most significant factor for the unexplained wage gap is the difference between the intercept coefficients, all of the unexplained differential can be assigned to this factor.

Juhn et al (1991) Decomposition - UK vs. Spain

Variable	Male mean UK	Fem. mean UK	β male UK	β male Spain	Male mean Spain	Fem. mean Spain	Term 1	Term 2
Constant	1.00	1.00	1.10	1.09	1.00	1.00	0.000	0.000
Experience	23.85	21.15	0.02	0.03	21.29	15.26	-0.089	-0.005
Experience2	708.97	585.66	-0.0004	0.00	614.80	359.40	0.053	0.000
HED	0.30	0.21	0.221	0.21	0.20	0.31	0.041	0.001
SED	0.35	0.43	0.02	0.12	0.19	0.26	-0.001	0.008
Public Sector	0.04	0.08	-0.03	0.05	0.05	0.12	0.001	0.003
Married	0.72	0.58	0.08	0.11	0.71	0.53	-0.005	-0.005
Manager	0.20	0.12	0.42	0.53	0.04	0.02	0.034	-0.009
Professional	0.14	0.13	0.24	0.41	0.07	0.14	0.033	-0.001
Associate Professional	0.07	0.07	0.29	0.20	0.10	0.12	0.004	0.000
Clerks	0.09	0.37	0.09	0.16	0.08	0.22	-0.023	0.021
Service	0.05	0.13	0.02	-0.07	0.11	0.21	-0.002	-0.007
Skilled Agricultural	0.01	0.00	-0.14	0.15	0.03	0.01	-0.002	-0.003
Crafts	0.24	0.04	0.06	0.04	0.31	0.09	-0.001	0.005
Semi-skilled	0.13	0.06	0.08	0.05	0.13	0.03	-0.001	0.002
Unit >50 but <500	0.23	0.24	0.28	0.17	0.21	0.23	0.001	-0.001
Unit >500	0.39	0.38	0.45	0.34	0.17	0.12	-0.013	0.000
Outsider	0.24	0.32	-0.09	-0.28	0.36	0.42	0.008	-0.016
Insider	0.58	0.48	-0.01	0.07	0.54	0.43	0.000	-0.008
Agriculture	0.03	0.00	-0.35	-0.33	0.06	0.02	0.005	-0.001
Industry	0.46	0.28	-0.01	0.05	0.50	0.22	-0.005	-0.012
Lambda	0	0	0	0	0	0	0.000	0.000
Total							**0.038**	**-0.028**

Term 1 = $(\delta Z_j - \delta Z_k)\beta_k$

Term 2 = $\delta Z_j(\beta_j - \beta_k)$

Term 3 = $(\delta\psi_j - \delta\psi_k)\sigma_k$ = (.289 - .333).427 = -0.019

Term 4 = $\delta\psi_j\,(\sigma_j - \sigma_k)$ = .289(.581 - .427) = 0.044

Appendix 7.13 Portugal

Portugal - Male

Variable	Coefficient	t-ratio	Mean
Constant	0.579	6.26	
Experience	0.019	6.81	21.16
$Experience^2$	-0.0005	-6.98	639.31
Higher Educ.	0.380	4.77	0.04
Secondary Ed.	0.105	2.50	0.09
Public Sector	0.067	1.50	0.05
Married	0.072	3.03	0.66
Manager	0.728	10.86	0.03
Professional	0.698	7.79	0.03
Associate Prof.	0.443	8.93	0.06
Clerks	0.323	7.37	0.08
Service	0.060	1.47	0.11
Skilled Agric.	0.051	0.92	0.06
Crafts	0.079	2.54	0.36
Semi-skilled	0.163	4.49	0.14
Unit >50&<500	0.156	6.38	0.20
Unit >500	0.283	6.89	0.06
Outsider	-0.135	-4.54	0.28
Insider	0.056	2.01	0.56
Agriculture	-0.274	-5.67	0.10
Industry	-0.026	-1.07	0.51
Lambda	0.459	3.13	0.74
Dep. Var.	ECU Wage		
Mean	1.257		
Stan. Dev.	0.528		
Observations	1786		
R-squared	0.463		
Log-like.	-837.7		
Rest. Log-like.	-1392.4		
Durbin-Watson	1.81		

Portugal - Female

Variable	Coefficient	t-ratio	Mean
Constant	0.489	6.37	
Experience	0.018	5.95	17.28
Experience^2	-0.0004	-6.71	456.20
Higher Educ.	0.670	10.68	0.06
Secondary Ed.	0.190	5.08	0.15
Public Sector	0.141	3.24	0.08
Married	-0.001	-0.03	0.66
Manager	0.244	2.44	0.01
Professional	0.262	3.20	0.03
Associate Prof.	0.326	5.76	0.07
Clerks	0.336	7.91	0.16
Service	0.016	0.46	0.27
Skilled Agric.	-0.051	-0.55	0.02
Crafts	-0.018	-0.39	0.18
Semi-skilled	-0.106	-1.82	0.07
Unit >50&<500	0.120	4.39	0.26
Unit >500	0.291	6.36	0.07
Outsider	-0.180	-5.55	0.29
Insider	0.070	2.30	0.51
Agriculture	-0.039	-0.60	0.05
Industry	0.041	1.06	0.33
Lambda	0.307	3.61	0.88
Dep. Var.	ECU Wage		
Mean	1.087		
Stan. Dev.	0.498		
Observations	1028		
R-squared	0.53		
Log-like.	-353.7		
Rest. Log-like.	-742.1		
Durbin-Watson	1.92		

Oaxaca (1973) Decomposition - Portugal

Variable	Fem. Coeff.	Fem. Mean	Male Coeff.	Male Mean	Explained	Unexplained	
Constant	0.4894	1.0000	0.5794	1.0000	0.0000	0.0900	
Experience	0.0184	17.2802	0.0191	21.1585	0.0742	0.0126	
Experience^2	-0.0004	456.1984	-0.0005	639.3108	-0.0845	-0.0097	
HED	0.6698	0.0632	0.3804	0.0370	-0.0100	-0.0183	
SED	0.1896	0.1488	0.1054	0.0929	-0.0059	-0.0125	
Public Sector	0.1414	0.0837	0.0666	0.0526	-0.0021	-0.0063	
Married	-0.0007	0.6556	0.0723	0.6646	0.0006	0.0479	
Manager	0.2441	0.0126	0.7278	0.0258	0.0095	0.0061	
Professional	0.2620	0.0321	0.6982	0.0274	-0.0033	0.0140	
Associate Professional	0.3262	0.0739	0.4427	0.0610	-0.0057	0.0086	
Clerks	0.3358	0.1576	0.3225	0.0812	-0.0246	-0.0021	
Service	0.0161	0.2704	0.0599	0.1086	-0.0097	0.0119	
Skilled Agricultural	-0.0513	0.0224	0.0508	0.0610	0.0020	0.0023	
Crafts	-0.0185	0.1819	0.0788	0.3567	0.0138	0.0177	
Semi-skilled	-0.1059	0.0691	0.1634	0.1394	0.0115	0.0186	
Unit >50 but <500	0.1204	0.2597	0.1563	0.1988	-0.0095	0.0093	
Unit >500	0.2910	0.0671	0.2830	0.0594	-0.0022	-0.0005	
Outsider	-0.1798	0.2870	-0.1351	0.2772	0.0013	0.0128	
Insider	0.0699	0.5117	0.0560	0.5649	0.0030	-0.0071	
Agriculture	-0.0387	0.0545	-0.2740	0.0985	-0.0121	-0.0128	
Industry	0.0413	0.3317	-0.0260	0.5146	-0.0047	-0.0223	
Total					**-0.0584**	**0.1601**	**0.1017**
Lambda	0.3072	0.8829	0.4586	0.7399	-0.0655	0.1336	**0.0681**
Total					-0.1239	0.2937	**0.1698**

Decomposition of Wage Differentials with Selectivity Correction.

Portugal 1996

Estimates of average lambdas and associated coefficients.	
$\log w_m - \log w_f$	0.1698
$\hat{\lambda}_m$	0.7399
$\hat{\lambda}_f$	0.8829
$\hat{\lambda}_f^0$	0.7571
$\hat{\theta}_m$	0.4586
$\hat{\theta}_f$	0.3072
$(\overline{X}_m - \overline{X}_f)'\hat{\beta}_m$	-0.0584
$\overline{X}_f'(\hat{\beta}_m - \hat{\beta}_f)$	0.1601
$\hat{\theta}_m(\hat{\lambda}_m - \hat{\lambda}_f^0)$	-0.0079
$\hat{\theta}_m(\hat{\lambda}_f^0 - \hat{\lambda}_f)$	-0.0577
$(\hat{\theta}_m - \hat{\theta}_f)\hat{\lambda}_f$	0.1337

		Contribution of		
	$\log w_m - \log w_f$	Explained	Unexplained	Selectivity
Oaxaca	0.1698	-0.124 (-73.0%)	0.294 (173.0%)	0.000 (0.0%)
Option 1		0.067 (39.7%)	0.102 (60.3%)	0.000 (0.0%)
Option 2		-0.066 (-39.0%)	0.236 (139.0%)	0.000 (0.0%)
Option 3		-0.066 (-39.0%)	0.102 (60.3%)	0.134
(78.7%)				

Unusually, for this study at least, there are very similar returns from experience for men and women. There is a smaller penalty for male outsiders, but women insiders enjoy a greater premium as well as receiving a better return from higher education. Selectivity differences and the intercept coefficients are the crucial factors behind the unexplained wage gap, with over 30% of it being due to the intercept terms.

Juhn et al (1991) Decompositioa - UK vs. Portugal

Variable	Male mean UK	Fem. mean UK	β male UK	β male Portugal	Male mean Portugal	Fem. mean Portugal	Term 1	Term 2
Constant	1.00	1.00	1.10	0.58	1.00	1.00	0.000	0.000
Experience	23.85	21.15	0.02	0.02	21.16	17.28	-0.023	0.016
Experience2	708.97	585.66	-0.0004	0.00	639.31	456.20	0.030	0.012
HED	0.30	0.21	0.221	0.38	0.04	0.06	0.043	-0.014
SED	0.35	0.43	0.02	0.11	0.09	0.15	-0.002	0.006
Public Sector	0.04	0.08	-0.03	0.07	0.05	0.08	0.000	0.003
Married	0.72	0.58	0.08	0.07	0.66	0.66	0.010	0.000
Manager	0.20	0.12	0.42	0.73	0.03	0.01	0.050	-0.026
Professional	0.14	0.13	0.24	0.70	0.03	0.03	0.007	-0.003
Associate Professional	0.07	0.07	0.29	0.44	0.06	0.07	0.005	0.000
Clerks	0.09	0.37	0.09	0.32	0.08	0.16	-0.066	0.065
Service	0.05	0.13	0.02	0.06	0.11	0.27	0.005	0.003
Skilled Agricultural	0.01	0.00	-0.14	0.05	0.06	0.02	-0.001	-0.002
Crafts	0.24	0.04	0.06	0.08	0.36	0.18	0.001	-0.003
Semi-skilled	0.13	0.06	0.08	0.16	0.14	0.07	0.000	-0.006
Unit >50 but <500	0.23	0.24	0.28	0.16	0.20	0.26	0.008	-0.002
Unit >500	0.39	0.38	0.45	0.28	0.06	0.07	0.003	0.001
Outsider	0.24	0.32	-0.09	-0.14	0.28	0.29	0.010	-0.004
Insider	0.58	0.48	-0.01	0.06	0.56	0.51	0.003	-0.007
Agriculture	0.03	0.00	-0.35	-0.27	0.10	0.05	0.005	-0.002
Industry	0.46	0.28	-0.01	-0.03	0.51	0.33	0.000	0.002
Lambda	0	0	0	0.46	0.74	0.88	0.066	0.000
Total							**0.153**	**0.042**

Term 1 = $(\delta Z_j - \delta Z_k)\beta_k$

Term 2 = $\delta Z_j(\beta_j - \beta_k)$

Term 3 = $(\delta\psi_j - \delta\psi_k)\sigma_k$ = (.289 - .755).389 = -0.181

Term 4 = $\delta\psi_j\,(\sigma_j - \sigma_k)$ = .289(.581 - .389) = 0.055