Human capital depreciation during family-related career interruptions in male and female occupations

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Abstract

This study investigates the relation between human capital depreciation during family-related career interruptions and occupational choice of women in the West German labour market. In contrast to other studies that do not explicitly focus on family-related career interruptions, we find that human capital depreciation during these career interruptions is significantly lower in female occupations than in male occupations. This holds especially for low-skilled occupations. Our findings support for the self-selection hypothesis with respect to occupational sex segregation, i.e. women might deliberately choose female occupations because of lower wage penalties for family-related career interruptions.

Introduction

In the past decades, many studies analysed the occupational segregation between male and female workers (see for example Beller, 1982; Karmel & Maclachlan, 1988; Boisso, 1994). Occupational segregation by gender could actually reflect efficiency reasons (Jacobsen, 1998) and individual preferences (see for example Bender, Donohue, & Heywood, 2005). However, it is also responsible for a large part of the gender wage gap because women are overrepresented in lower paying occupations (see for example Fain, 1998; Filer, 1985; Reed & Dahlquist, 1994; Jurajda & Harmgart, 2003). Moreover, there are less career opportunities in female occupations than in male occupations (Jacobsen, 1998). For these latter reasons, it is often argued that occupational segregation is due to discrimination of female workers.

However, occupational segregation by gender may also be caused by self-selection. Bender, Donohue & Heywood (2005) found that job satisfaction of women is higher in workplaces dominated by female workers. The relevance of self-selection is supported by Borghans & Groot (1999) who found that educational segregation is a major cause of occupational segregation by gender. It is interesting to see that also public policies particularly attempt to tackle occupational sex segregation by affecting educational pre-sorting. A prominent example in many countries is the effort taken to encourage interest in technical studies among girls. Such policies implicitly assume that women choose female occupations out of interest or due to a lack of information about male occupations.

Self-selection of workers may be due to economic and *non*-economic reasons.[1] The latter is confirmed by some studies which found that women self-select into female occupations because these occupations offer more pleasant working conditions, flexibility (Bender et al., 2005; Filer, 1985), and more family-friendly human resource policies (Datta Gupta & Smith, 2000; Skyt Nielsen et al., 2004).[2] However, other studies did not find any evidence for self-selection motivated by non-economic reasons, despite significant differences in working conditions (Reed & Dahlquist, 1994; Trappe and Rosenfeld, 2004). Yet, there may be a major economic reason for self-selection: women may choose for female occupations because of lower wage "penalties" for career interruptions, i.e. the wage decrease resulting from human capital depreciation during a possible career interruption for family reasons may be lower in female occupation than in male occupations (cf. Polachek, 1981; McDowell, 1982).

In this paper, we will analyze whether human capital depreciation during family-related career interruptions is lower in female occupations than in male occupations on the (West) German labour market. If this is the case, it indicates that occupation-specific depreciation rates during family-related career breaks may affect occupational sex segregation by self-selection. The depreciation rates of six different occupational groups will be estimated by means of a random-effects model using the four panel waves 1998-

[1] Since female occupations feature a lower pay level, it seems that women trade in a part of their wage for more amenities, which are not enjoyed in male occupations. Consequently, the latter theory is also coined the theory of compensating wages.

[2] See also Lewis and Shorten (1991), Fain (1998), and Hansen and Wahlberg (2000) who again find support for the self-selection theory, using Australian, U.S., and Swedish data, respectively. Moreover, McDowell (1982) finds support for the self-selection argument, by looking at lifetime publication profiles of male and female professors. Female professors are more often found in the humanities where knowledge depreciates more slowly during a career interruption. Note that, although these three studies support the self-selection theory, they do not distinguish between economic and non-economic reasons for it.

2001 from the German Socio-Economic Panel (GSOEP). The six occupational groups distinguish between male, integrated, and female occupations with high and low skill requirements, respectively.

Our study contributes to the literature in several ways. *First*, unlike other studies (e.g. England, 1982; Kunze, 2002; Mincer & Polachek, 1978; Polachek, 1981), we only focus on the effects of human capital deprecation during family-related career interruptions. We do this because only interruptions due to family reasons can influence a person's occupational choice *ex ante*, as these interruptions are the only type of interruptions that can be anticipated to a large extent. Moreover, family-related career interruptions are the main difference in male and female patterns of labour market participation nowadays (Datta Gupta & Smith, 2002). *Second*, we analyse depreciation rates of both men and women, while others concentrate either on women only (for instance Beblo & Wolf, 2000), or do not analyse human capital depreciation during *family*-related career interruptions for men (Kunze, 2002). However, in the German labour market men have a low but sizeable amount of family-related career interruptions. This enables us to analyze whether men and women face different human capital depreciation rates in male or in female dominated occupations. *Third*, we analyse whether human capital depreciation rates differ between high and low skilled occupations, whereas other studies either focus on one occupational level only (Kunze, 2002), or on human capital depreciation rates related to the worker's level of schooling, instead of the skill level of the *occupation* (Mincer & Polachek, 1974). Distinguishing between low-skilled and high-skilled occupations is more sensible in our context as the individual level of schooling is not necessarily connected to occupational choice (see for example Groot

& Maassen van den Brink, 2000). *Fourth*, opposite to other studies (England, 1982; Polachek, 1981), we distinguish between short- and long-run human capital depreciation effects of career interruptions, as both effects might influence the decision to interrupt the career differently.

Our main finding is that, in many cases, human capital depreciation during family-related career interruptions is significantly lower in female occupations than in male occupations. This holds especially for low-skilled occupations. Our results are consistent with Polachek's (1981) hypothesis that occupational sex segregation is the result of women's self-selection into female occupations on the basis of anticipated human capital depreciation rates. Moreover, we find that short-time depreciation rates after a career break for family reasons are smaller than after unemployment or career breaks for other reasons. However, particularly men who are employed in a high-skilled male occupation face large short-run wage penalties when they have a career break, which may indicate that these men are stigmatised as being less motivated and career-oriented.

Prior Research

Workers with career interruptions may be subject to technical and economic obsolescence of their human capital (De Grip & Van Loo, 2002).[3] In other words, a worker's skills may depreciate because they may not be using or updating them during the interruption. A common way to measure the actual rate of this human capital

[3] More precisely, workers with intermittent careers may face atrophy (loss of skill due to limited or non-use), skills obsolescence due to technological and organisational developments (loss in the value of a worker's skill due to non-updating), and firm-specific human capital obsolescence (loss in the value of the worker's skill due to firm change).

depreciation is to extend Mincer's (1974) earnings function, so that it can account for heterogeneous employment histories of workers, and therefore incorporates information on possible career interruptions (see for example Mincer & Ofek, 1974; Polachek, 1981; Light & Ureta, 1995; Beblo & Wolf, 2003).

In its simplest form, the earnings equation allowing for human capital depreciation looks as follows (Mincer & Ofek, 1974):

$$\ln E_t = \ln E_0 + \sum_{i=o}^{t-1} (rk_i - \delta_i), \qquad (1)$$

where E_t is a person's earnings potential at time t, E_0 is initial earnings potential, r is the rate of return to human capital investment, k_i is the *gross* human capital investment ratio in period i (i.e. human capital investment divided by earnings in period i), and δ_i measures the depreciation rate. This equation implies that human capital cannot only be built up, but also depreciates at a rate δ_i. Note that δ might vary over i, i.e. it might be different at different points in time.

In order to make equation (1) estimable, Mincer and Ofek (1974) include periods of career interruptions:

$$\ln E_t = \ln E_0 + (rs - \delta_s) + (rk_1 - \delta_1)e_1 + (rk_h - \delta_h)h + (rk_2 - \delta_2)e_2, \qquad (2)$$

where r_s is return to schooling and δ_s is the depreciation rate of the schooling, e_1 is the duration of the working spell before the interruption, h is the duration of the career interruption, and e_2 is the working spell after the interruption. If it is assumed that human capital investment k_h is zero during home time h, the regression coefficient of h (i.e. [rk_h-δ_h]) is an estimator of the human capital depreciation rate. It is important to keep in mind here that the estimate of the depreciation rate obtained in such models only measures depreciation net of investment.

As expected, Mincer and Polachek (1978) find that the coefficient for home time is negative for women on the U.S. labour market.[4] Furthermore, their results show that depreciation rates are much higher for higher educated women than for uneducated women, for whom the coefficient is statistically insignificant. Finally, Mincer and Polachek find that atrophy varies by occupation: for workers in the high-skilled occupations career interruptions are most costly.[5]

According to Mincer and Ofek (1982), human capital depreciation rates can be different depending on the point in time when these rates are measured, i.e. there are *short-term and long-term depreciation rates*. In their study, they distinguish four phases in a worker's career: (1) the working spell before the interruption, (2) the non-working spell, (3) the so-called restoration period, and (4) the post-restoration period. Directly after a career interruption, the wage of the worker is considerably lower than before. Moreover, post-interruption wages are lower the longer is the interruption. However, wages increase rapidly during the restoration period, because during this phase previously eroded human capital is restored and such a process is quicker and less costly than building up completely new human capital. Eventually, wage growth slows down and continues to grow at a rate similar to that of a continuous worker.

Mincer and Ofek (1982) distinguish between two career interruptions at two different points in time. Their model looks as follows:

$$\ln w_T = \alpha s + \beta e_0 + \delta_2 h_0 + \delta_1 h_1 + \mu x_T, \qquad (3)$$

where e_0 represents the duration of past labour force participation, and h_0 and h_1 denote

[4] After criticism by Sandell and Shapiro (1978), Mincer and Polachek (1978) repeated their 1974-study with a different and newer data set, so that we report the 1978 results here.
[5] Note that Mincer and Polachek (1974, 1978) did not account for unobserved heterogeneity and endogeneity (Kim & Polachek, 1994).

the duration of past and recent spells of career interruption, respectively. Note that, considering a time line, h_0 is the first spell in this setup, followed by e_0, then followed by h_1, which is the interruption just completed at time T. This specification enables Mincer and Ofek to determine the long- and short-run effect of a career interruption, since home time spell h_0 lies longer in the past than home time spell h_1. When the equation is estimated at time T, the coefficient β measures the long-run effect of experience, and δ_2 and δ_1 are the long- and short-run depreciation rates during non-participation spells, respectively.[6] The variables s and x represent schooling, and variables such as tenure, dummies for layoff, unemployment, marriage, or children, respectively. The empirical results of Mincer and Ofek support their hypothesis that there is a restoration period, as depreciation rates appear to be higher in the short run than in the long run.

Light and Ureta (1995) refine the work by Mincer and Ofek (1974, 1978). Their *work history* model includes experience variables that measure "the fraction of time worked and *not* worked in the last year, 2 years ago, 3 years ago, and so forth, back to the beginning of the career" (p. 129-30). The *work history* model proves to be superior to the traditional models, which only use one variable for either potential or actual experience.[7] The estimation results of Light and Ureta show that early-career wage growth estimates are downward biased in the standard models, because negative wage effects of career interruptions are included in the estimates.

Obviously, career interruptions do not only take place due to family reasons, but also due to unemployment, sick leave, or other events. Different types of career

[6] Provided that there is no human capital investment during the non-working spell.
[7] Potential experience is calculated as workers' age minus the duration of their schooling minus 6. Actual experience is the cumulative sum of years in employment.

interruptions may lead to different magnitudes of the wage effect, because there might be a signalling or stigma effect connected to certain types of interruptions. For example, a period on parental leave may convey a more positive signal to a potential employer than a period of unemployment. Moreover, the former may differ between men and women. Albrecht et al. (1999) find a negative stigma effect after parental leave for Swedish men, while parental leave has no effect on women's wages.[8] In a similar study for Germany, Beblo and Wolf (2002; 2003) extend the *work history* model with different types of breaks. They find that parental leave has a stronger negative effect on women's wages than other types of interruptions.[9] Note, that their findings on the effects of parental leave for women stand in stark contrast to the results of Albrecht et al. (1999) in Sweden, although the models used in the two studies are similar. This indicates that the wage effects of career interruption may be highly related to different national labour market institutions or cultural values.

Polachek (1981) suggests a direct link between human capital depreciation rates and occupational choice. He argues that women, who expect to interrupt their careers in order to take care of the family, will choose occupations where the penalty for their absence due to human capital depreciation is lowest, as this will maximise their lifetime income. If female occupations have the lowest human capital depreciation rates, and women indeed sort themselves into these jobs, human capital depreciation rates could be part of the explanation for occupational sex segregation. Polachek (1981) indeed found that human capital depreciation rates are highest in professional and managerial

[8] They include parental leave, household time, other time out, unemployment, and military leave. Interruptions other than parental leave affected both men's and women's wages negatively.
[9] They were not able to estimate the effect of parental leave on men's wages, because too few men had been on parental leave.

occupations, which are predominantly male occupational groups, while human capital of workers doing e.g. household work (a female dominated occupation) hardly depreciates at all.[10]

A major problem with Polachek's conclusions is that he does not directly test the influence of depreciation rates on occupational sex segregation, because his choice of occupational groups does not reflect the extent of segregation in these groups (England, 1982). England corrected for this by changing the construction of occupational groups according to the degree of "femaleness", and did not find any evidence for occupational self-selection motivated by lower depreciation rates.[11] Moreover, England shows that not only women with career interruptions work in female occupations, but also those in continuous employment. Accordingly, she argues that human capital theory fails to account for occupational segregation, so that she proposes discrimination as the culprit. Kunze (2002) conducts a similar study for "young skilled workers" in Germany and did not find support for Polachek's theory, either. In contrast to England, she analysed depreciation rates for different types of interruptions and found that women on parental leave experience lower depreciation rates in male and integrated occupations. Consequently, she concluded that occupational sex segregation does not result from self-selection motivated by lower depreciation rates.

[10] Although Polachek (1981) refers to the atrophy rate, his estimate of human capital depreciation might also measure skills obsolescence due to technological change.

[11] Remarkably, England found significantly higher human capital depreciation rates in occupations with a high fraction of females.

Hypotheses

This study examines the role, which family-related career interruptions can play in occupational sex segregation. For this purpose, we test whether human capital depreciation rates during family-related career interruptions are lower in female occupations than in male occupations, which might be a motivation for women who expect a career interruption for family reasons to deliberately select female occupations. Opposite to the above-mentioned studies on Polachek (1981), England (1982) and Kunze (2002), we explicitly focus on the wage effects of family-related career interruptions. We limit our focus on family-related interruptions because – unlike other types of career interruptions – *family-related* interruptions are voluntary and can be anticipated.[12] Moreover, family-related career interruptions often take place rather early in a worker's career. This early stage might imply that mothers are able to take it into account at the time of their occupational choice (cf. Beblo & Wolf, 2000).

Furthermore, career interruptions due to family reasons might be especially important for the question at hand, because German legislation offers a rather liberal system with long potential *formal* parental leave.[13] Hence, unlike in some other countries, parental leave and thus family-related career interruptions are of special importance in the German labour market, for both men and women, and might therefore have a significant influence on occupational choice.

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[12] A career interruption due to unemployment can also be voluntary, but we assume here that unemployment is often involuntary. Another voluntary type of career interruptions are sabbaticals, but sabbaticals hardly occur in our sample.

[13] While maternity leave in the U.S. only spans over 12 weeks (Hashimoto et al., 2004), it varies from 12 weeks to 3 years in European countries (Ruhm, 1996). In Germany, parents (thus both mothers and fathers) are entitled to parental leave until the third birthday of their child with full guarantee to return to their old workplace (Ondrich et al., 2002).

Moreover, the wage effects of formal parental leave are probably different from the effects of other types of career interruptions, because special costs and benefits are connected to it. On the benefit side, parental leave policies encourage continued labour force attachment of women and retain specific human capital for the firm (Hashimoto, Percy, Schoellner, & Weinberg, 2004; Ondrich et al., 2002). On the cost side, such policies decrease labour market flexibility, and raise labour costs, because a firm might need to hire and train temporary workers. These costs might be passed on to the returning mother in form of lower wages (Ondrich et al., 2002).

We follow Kunze (2002) in defining occupational groups according to the percentage of women employed in it. We will distinguish three categories of occupations: male occupations, integrated occupations, and female occupations. However, according to Mincer and Polachek (1978) and Neuman and Weiss (1995), skill level requirements of an occupation can influence the size of the depreciation rate as well. Hence, it is necessary to distinguish between high- and low-skilled occupations. This leaves us with six occupational groups: male, integrated, and female occupations with *high* skill requirements, and male, integrated, and female occupations with *low* skill requirements.

If women self-select into female occupations on basis of lower depreciation rates, we expect significantly lower depreciation rates in female occupations, as compared to male occupations. A validation of the hypotheses 1 and 2 below would thus be support for the theory of self-selection on basis of deprecation rates (Polachek, 1981).

Hypothesis 1:

The depreciation rate of human capital in high-level male occupations is larger than the depreciation rate in high-level female occupations:

$$\delta_{H,\ male} > \delta_{H,\ fem}.$$

Hypothesis 2:

The depreciation rate of human capital in low-level male occupations is larger than the depreciation rate in low-level female occupations:

$$\delta_{L,\ male} > \delta_{L,\ fem}.$$

We will test these hypotheses for both short- and long-run depreciation rates, because it is not clear *a priori*, which of the two is taken into account for occupational choice. This might in fact be dependent on individual preferences.

Data

The analysis will be based on data from the German Socio-Economic Panel (GSOEP). GSOEP offers detailed data on the individual's employment history distinguishing between full-time employment, part-time employment, unemployment spells, and spells during which one was off the labour market due to family reasons. We will use the four panel waves from 1998 until 2001.[14] The sample will be restricted to those living in West Germany, as the East German labour market still has characteristics very different from the West German market when it comes to career interruptions due to family reasons (see e.g. Rosenfeld, Trappe, & Gornick, 2004).

[14] Although newer data from 2002 is available as well, the analysis will be restricted to the years before 2002, because there was a major change in German family policy in 2001. Therefore, after that date people might display diverging patterns of career interruptions, which makes a comparison to earlier waves difficult.

Our sample contains all men and women from the age of 20 to 55 who were employed in one or more of the years 1998-2001. All self-employed persons are excluded, as well as those with incomplete data. The sample consists of 9,257 observations, made up of 3,273 individuals from which 1,384 are present in all four waves. All other persons are present in at least one other wave. Descriptive statistics of the variables are shown in table 1.

[Insert table 1 here]

Description and Construction of Variables

Hourly wages are reported in Euro and are deflated by the CPI with the year 2000 as reference year (Federal Statistics Office, 2005). Unfortunately, the monthly wage, which is reported by the individuals in the GSOEP questionnaire, *includes* overtime pay. Since we calculate the hourly wage rate by dividing reported monthly wages by the number of working hours as set in individual contracts, we control for possible overtime pay by including the hours worked overtime in the regressions.

Several standard "Mincer variables" are included. The variable *experience* counts the years of actual work experience, where every year of full-time employment accumulates the variable value by 1, and every year in part-time employment accumulates it by 0.5 (cf. Beblo & Wolf, 2000). In order to capture the generally higher wage for workers in high-skilled occupations, a dummy for being employed in an

occupation with *high skill requirements* is included.[15] Similarly, in order to capture general wage differences between male, integrated, and female occupations, dummies are included (female occupations serve as base level). Furthermore, a dummy for male workers in included. Wages also differ between sectors of employment. Accordingly, a dummy for public sector employment is introduced. Moreover, firm size dummies are introduced, with firms employing 1 to 19 employees serving as base level. Finally, a dummy indicates a worker's change of firms in the year at hand.

Construction of Occupational Groups

We construct six occupational groups according to the occupation's skill level and according to the degree of segregation. In the *skill dimension*, the occupations are categorised on basis of the reported ISCO-88 codes. The one-digit ISCO codes correspond to certain skill levels as can be seen in table 2. In the literature, it seems to be a common approach to classify occupations that require technical college or university education as high-skilled occupations (3rd and 4th skill level), while jobs requiring a vocational degree and jobs that do not require any degree are classified as medium- and low-skilled occupations, respectively (1st and 2nd skill level) (see for example Fitzenberger, Schnabel, & Wunderlich, 2004). However, due to the very low number of low-skilled occupations, we pool medium- and low-skilled occupations and denote them together as low-skilled occupations. The skill levels of legislators and members of the armed forces vary, but are here classified as high- and low-skilled, respectively (cf. Fitzenberger et al., 2004).

[15] Note that the dummy does not say anything about the worker's education, but only about the level of the occupation she is working in.

With respect to the *occupational segregation dimension*, there seems to be a consensus in literature to classify occupations that are comprised of more than two-thirds of female workers as female occupations, occupations with less than one-third as male occupations, and the rest as integrated occupations (cf. Hansen & Wahlberg, 2000).

[Insert table 2 here]

Note that, in order to classify occupations by their predominant gender, they first have to be distinguished at a particular level of aggregation. This is done on the basis of the *three*-digit ISCO codes (see table A-1 in the Appendix).

Demarcation of Short- and Long-Run Depreciation Rates

As found by Mincer and Ofek (1982), wages increase quite rapidly after a career interruption (restoration phase), and settle down to the average level after a while. Therefore, it is sensible to define the short-run as the period starting right after the interruption, and ending when the restoration phase is over. Unfortunately, the existing literature does not offer a consistent estimate of the duration of the restoration phase. Estimates range from recovery after one year (Hesselius, 2003; Light & Ureta, 1995), to recovery after five years (Mincer & Ofek, 1982; Nielsen, Simonsen, & Verner, 2004). Therefore, it is necessary to inspect our own data on these recovery effects. Interestingly, the two German studies (Beblo & Wolf, 2002; Kunze, 2002) do not find any evidence of recovery of *women's* wages after formal parental leave. The interruptions continue to have a negative wage effect even after several years.

In line with Mincer and Ofek (1982), table 3 displays the current mean hourly wage of those workers who experienced a career interruption due to family reasons in the last five years. The left-hand column shows how many years are foregone since the last employment break. The data show that, although wage growth in the years following an interruption is not as pronounced as in Mincer and Ofek (1982), the average wage is increasing slightly within the first five years (except for the first year) after the career break, After that period, growth levels off, which indicates the end of the restoration phase. Therefore, we define the short-run as the first five years after the career interruption.[16]

[Insert table 3 here]

Construction of Career Interruption Variables

We distinguish between three different kinds of career interruptions: (1) career interruptions due to family reasons, (2) career interruptions due to unemployment, and (3) career interruptions due to other reasons. We define "family reasons" as an aggregate of *formal parental leave* periods and *household time*. Career interruptions due to other reasons include sabbaticals, periods of sick leave, or care for elderly family members. Unemployment and other interruption periods are included mainly as controls, but also to compare their wage effects to those of family-related interruptions.

[16] The difference in the length of restoration phase to the other German studies (Beblo & Wolf, 2002; Kunze, 2002) is remarkable, but possibly due to a different dataset and method. Using the IAB employment panel and the work-history model, they do not find recovery effects of women's wages after parental leave. Note the important difference to our study in measuring the length of the restoration phase: while Beblo & Wolf and Kunze find that the coefficient for a parental leave spell is significantly negative even several years after the interruption (thus measuring the long-run *depreciation effect* of parental leave), we look at *wage growth* after the interruption (thus accurately measuring restoration, incorporating new experience of the worker).

For all three interruption types, a short-run and long-run variable is constructed (e.g. fam_{sr} and fam_{lr}); where the short-run variable contains the number of years, during which a person was on leave within the most recent five years, and the long-run variable contains the number of years, during which a person was on leave before that time. Note that each career interruption appears only once, i.e. either in the short- or long-run variable. We obtain separate estimates for the six occupational groups by interacting fam_{sr} and fam_{lr} with the dummies for high-skilled and low-skilled occupations, and with the dummies for male, integrated, and female occupations.

Some Stylised Facts

The GSOEP data show us that in West Germany 88.2% of all family-related employment breaks within the most recent five years were taken by women.[17] Indeed, hardly any men interrupt their careers: only 4.7% of all working men took an employment break for family reasons within the last five years, compared to 39.8% of all working women.

Next, it is interesting to check in which occupations the workers who interrupt their careers are working. Table 4 shows that the highest fraction of workers with a recent career interruption is indeed found in female occupations. Interestingly, this holds for both women and men.[18] Whereas 40.1% of the women employed in the high-skilled female occupations had a family-related career interruption in the last five years, only 29.1% of the women employed in the high-skilled male occupations had a career break.

[17] Composition effects should not occur here, since the number of men and women in the sample is almost equal.
[18] The only exception are the career interruptions of women in the low-skilled occupations

For the male workers who are employed in these occupations these rates are 7.1% and 3.9%, respectively. Particularly the latter indicates that indeed some features of female occupations may stimulate career interruptions.

[Insert table 4 here]

We also calculate the Duncan index of dissimilarity for the different occupations in our sample (see Duncan & Duncan, 1955). We find an index value of 55.9, which means that either 55.9% of the female workforce would have to switch jobs to male occupations or the other way around in order to achieve complete gender integration in all occupations. Table 5 lists the most highly segregated occupations per gender and therefore represents a good overview of which occupations can be considered "male" or "female".

[Insert table 5 here]

Model

We estimate the following panel empirical model:

$$\ln W_{it} = \beta_0 + \sum_{j=1}^{6} \delta_{1j} fam_{it}^{sr} + \sum_{j=1}^{6} \delta_{2j} fam_{it}^{lr} + \eta_1 unem_{it}^{sr} + \eta_2 unem_{it}^{lr} + \gamma_1 oth_{it}^{sr} + \gamma_2 oth_{it}^{lr} + \beta_1 X_{it} + \alpha_i + \varepsilon_{it} \quad (4)$$

where W_{it} is the gross hourly wage of individual i at time t. δ_{1j} represents the human capital depreciation rate of a career interruption due to family reasons in the short-run (i.e. within the last five years) in each of the j occupational groups, as distinguished in hypotheses 1 and 2. Thus, the coefficient δ_{11} for example, is the depreciation rate of an interruption in a high-skilled male occupation. The coefficient δ_{2j} represents the

depreciation rate of an interruption in the long-run (i.e. the depreciation effect of career interruptions longer than five years ago) in the *j*-th occupational group.[19] The coefficients η_1 and η_2 measure the human capital depreciation rates of an unemployment spell in the short- or long-run, respectively, and γ_1 and γ_2 measure the short- and long-run depreciation rate of a career interruption due to other reasons, respectively. Note that all coefficients of depreciation rates only measure *net* depreciation, i.e. it has to be assumed that the interruption periods are not used for further skill-enhancing education.

X is a vector of control variables, which includes overtime hours, gender, age, experience, firm size, public or private sector employment, being employed in an occupation with high or low skill requirements, and being employed in a male, female or integrated occupation. Moreover, we included a dummy for firm change. This controls for firm-specific skills obsolescence and occupational mobility. The parameter α_i captures individual specific effects, such as ability and motivation, and is randomly distributed (IID) (Verbeek, 2004).

A crucial assumption of the random effects model is that the individual effect α_i is uncorrelated to any of the explanatory variables (Wooldridge, 2003). Since some explanatory variables already control for individual effects, e.g. skill level of occupation and overtime work (as proxy for motivation), it is reasonable to assume that the effect, which is picked up by α_i is random (Verbeek, 2004). An alternative estimation method without the crucial assumption of the uncorrelated individual effect and explanatory variables would be a *fixed effects* estimation. However, a fixed effects estimation leads to inefficient estimators when variables vary only very little over time (Datta Gupta &

[19] A career interruption only appears in either the short-run or the long-run variable. Therefore, multicollinearity is prevented.

Smith, 2002). Almost every variable in our sample varies very little indeed (e.g. the dummies, experience, age, years of interruption) so that a fixed effects estimation would lead to highly inefficient estimators in our case. Moreover, the estimators of the fixed effects estimations are similar to the estimators of the random effects model presented here.[20]

Results

We estimated three versions of the model presented above, with different variables for family-related career interruptions. Model 1 neither distinguishes between male, integrated, and female occupations in estimating the depreciation rates of family-related career interruptions, nor between the skill levels of the occupations (i.e. high or low skill requirements). This specification will help to show Mincer and Ofek's (1982) restoration effect, and allows comparisons to the coefficients of career interruptions due to unemployment and other reasons. Model 2 *does* distinguish between skill levels, but does not yet distinguish between male, integrated, and female occupations. This specification will show interesting gender differences in depreciation rates. Finally, model 3 represents the full model of equation (4).[21]

The estimation results are shown in table 6. The estimation results of model 1 show the overall wage effect of career interruptions. All regression coefficients have the expected signs. Short-term effects of career interruptions are higher than the effect of

[20] The coefficients are identical in direction and relation to each other. Yet, the coefficients for career interruptions lying more than 5 years in the past are insignificant in the fixed effects estimation.

[21] Individuals with hourly wage rates higher than 100 Euros are excluded from the regressions because their data are likely to be unreliable. Moreover, everybody who reported a family-related career interruption but has never worked before is excluded from the regressions as well.

career interruptions lying longer in the past. This supports Mincer and Ofek's (1982) observation of a restoration phase.

It is also interesting to compare the depreciation rates during family-related career interruptions with the depreciation rates during unemployment and other career interruptions. The estimation results show that the short-term depreciation rate after a career break due to family reasons is smaller than the short-term depreciation rate after career breaks due to unemployment or other reasons. Moreover, the differences between short- and long-run effects are much more pronounced after unemployment and career breaks for other reasons. While the negative long-run effects after unemployment and career breaks for other reasons are only slightly stronger than for family-related interruptions, *short-term* effects are much stronger (e.g. -6.3% for unemployment). These results contradict the findings by Beblo and Wolf (2002, 2003) and Kunze (2002) who find that formal parental leave has a stronger wage effect than other types of interruptions.[22] Beblo and Wolf interpret this result as a negative stigma effect attached to parental leave. Yet, our results suggest a stigma effect attached to *unemployment* periods, which makes more sense intuitively because a period of unemployment conveys a much more negative signal to employers than a period on parental leave (cf. Albrecht et al., 1999). Although unemployed persons may not suffer from stronger skills obsolescence due to the career interruption than workers on family-related leave, their wages decline much more in the short-run because employers may stigmatise unemployed people as less

[22] A possible explanation for this difference in results seems to lie in the different data sets used. Beblo & Wolf and Kunze use the IAB employment panel, which includes only full-time employees in the private sector, while our GSOEP data includes also part-time employees and public sector employees. If we expect lower wage penalties in the public sector, this might explain our lower depreciation rates. Yet, running separate regressions for the private and public sector shows that there are hardly any significant differences in depreciation between the sectors.

qualified. The same argument may apply to interruptions due to other reasons. However, the strong negative wage effect – and thus the stigmatisation – vanishes as the worker becomes re-integrated into workforce, as can be read off from the lower long-run effects. Obviously, the much smaller difference between the short-term and long-term wage effects of family-related career interruption indicates that there is hardly any stigma effect for this type of interruption. This means that the effects measured show the true effect of human capital obsolescence due to the career interruption.

Model 2 to enables us to distinguish between depreciation rates in occupations with high and low skill requirements. It is not clear whether human capital depreciation should be higher in high- or in low-skilled occupations.[23] This unclarity is supported by the estimation results, as there are no differences in *short-run* depreciation between high- and low-skilled occupations. Nonetheless, workers in high-skilled occupations seem to suffer from stronger depreciation in the *long-run*, compared to their colleagues in low-skilled occupations (2.7% vs. 2.1%). Comparing men and women shows that family-related interruptions affect women in low-skilled occupations stronger than women in high-skilled occupations, while the opposite is true for men. These results particularly indicate that employers might initially stigmatise men employed in high-skilled jobs who

[23] On the one hand, depreciation in occupations with high skill requirements might be higher, because high-skilled workers simply have more human capital to lose (Beblo & Wolf, 2000), and might be more strongly exposed to technological change (Neuman & Weiss, 1995). On the other hand, depreciation in occupations with low skill requirements could be higher, especially if one takes into account that workers employed in low-skilled occupations in our sample still need a certain amount of skills. Due to the high coverage of vocational training in Germany, their skills are often specific to their occupation, and may therefore be more vulnerable to depreciation during career interruptions than the *general* skills of workers in high-skilled occupations. In addition, the market value of their skills is probably strongly affected by technological change, since IT application in (low-skilled) manufacturing and office jobs plays an utterly important role nowadays.

interrupt their careers for family reasons as being less motivated and career-oriented (cf. Albrecht et al., 2001).

[Insert table 6 here]

Model 3 enables us to test hypotheses 1 and 2. The estimation results show that - in occupations with high-skill requirements - the *short-run* depreciation rate for an additional year of family-related absence is estimated to be 2 percentage-points higher in male occupations than in female occupations. Yet, we can reject the null hypothesis of equal coefficients at a 14%-level only, i.e. the difference is statistically insignificant. The estimation results for occupations with low skill requirements are similar: short-run depreciation rate in male occupations is 2.5 percentage-points higher than in female occupations. Here, the difference is significant. Hence, the empirical results for *short-run* depreciation rates are supportive for hypothesis 2.

The estimation results for *long-run* depreciation rates are similar, although the differences are less pronounced. In occupations with high-skill requirements, an additional year of family-related interruption costs a worker in a male occupation 0.3 percentage points more than a worker in a female occupation. However, this difference is not significant. The depreciation rate of 2.1% in female high-skilled occupations may initially be puzzling because it is higher than in the short-run, but considering that wages at re-entry are governed by government regulation, it might indicate that the true wage penalty is only faced when this "protection" is over (cf. Beblo & Wolf, 2002). The estimation results for the low-skilled occupations show that in male occupations the depreciation rate is 0.6 percentage-points higher than in female occupations. The

difference is weakly significant. Although the differences of the coefficients are all in the expected direction, we do not find significant support for hypothesis 1 in the long-run, whereas hypothesis 2 is confirmed.

When we look at short-term depreciation rates during family-related career interruptions in the *female sub sample*, we do not find any differences between short-run depreciation rates in male and female high-skilled occupations. However, for women employed in low-skilled occupations the short-run human capital deprecation due to family-related career breaks is 4.3 percentage-points higher in male occupations than in female occupations. This difference is statistically significant. For *female workers*, there are also significant differences in long-run depreciation rates between male and female occupations. In high-skilled occupations, the depreciation rate in male occupations is 0.8 percentage-points higher than in female occupations, whereas in low-skilled occupations the depreciation rate in male occupations is 0.7 percentage-points higher than in female occupations. Accordingly, except for short-run depreciation rates in high-skilled occupations, we find support for hypotheses 1 and 2 for female workers. These results support Polachek's (1981) hypothesis of occupational self-selection due to differences in human capital depreciation rates.

Probably due to the low number of men with family-related career interruptions, most coefficients for the depreciation rates resulting from these career breaks are insignificant. However, we find that particularly men who are employed in a high-skilled male occupation face a large short-run wage penalty when they have a career break. This may indicate that these men are stigmatised as being less motivated and career-oriented,

which might explain the reluctance of most men employed in these jobs to have a family-related career interruption.

Conclusions and Discussion

In this paper we estimated human capital depreciation rates due to career interruptions for family reasons on the West German labour market. Opposite to other studies, we focus on human capital depreciation during career interruptions due to family reasons. The rationale for this confinement is that interruptions due to family reasons are the only type of career interruption, which can be taken into account when women choose their occupational field. Moreover, our study differs from most others by estimating both short- and long-run human capital depreciation rates.

We estimated a random effects model on data on West Germany from the German Socio-economic Panel (GSOEP), and estimated depreciation rates for six occupational groups (male, integrated, and female occupations with high and low skill requirements, respectively). In *low-skilled* occupations, we found that both short- and long-run depreciation rates due to family-related career interruptions are significantly lower in female occupations than in male occupations. In *high-skilled* occupations, the difference between depreciation rates in male and female occupations was statistically insignificant in the short- and long-run, although the size of the coefficients points into the right direction. Note however, that this result holds for the overall sample only. In the sample of female workers we *do* find significant differences in long-run depreciation rates for high-skilled occupations.

These findings show that different human capital depreciation rates in the various occupational fields can explain at least part of the occupational sex segregation in Germany, as our findings support the theory of occupational self-selection, which says that women who anticipate career interruptions for family reasons take account of the wage penalties related to such a break when they choose their occupational field, i.e. women select occupations where human capital deprecation during a career interruption is the lowest.

Our estimation results contradict the findings by England (1982) and Kunze (2002). Both authors find that depreciation rates are *higher* in female occupations. England's results may be different because she included all types of career interruptions, whereas we focus on interruptions due to family reasons. Moreover, her analysis referred the U.S. where the institutional setting and tradition for family leave is different to Germany's. The differences with Kunze's study are more surprising, however, because she also analysed family-related career interruptions on the German labour market. Using a different data set, she found very pronounced negative wage effects for women in female occupations on *formal* parental leave. Probably, some differences stem from our broader, yet in our context more sensible, definition of family-related career interruptions. Besides that, Kunze focuses on "young skilled workers" only (excluding those with technical college or university education). Finally, Kunze's sample contains only full-time employees in the private sector, while we include also part-time employees and employees in the public sector. This might be responsible for the lower wage penalty.

It should be noted that our analysis did not address the question of causality between differences in human capital depreciation rates and occupational self-selection,

i.e. our results only support the occupational self-selection theory when women who expect career interruptions due to family reasons take depreciation rates into account *ex ante*, i.e. before they choose an occupation. Yet, it might as well be that women only "discover" *ex post*, i.e. after having made the choice, that depreciation rates in their occupation are low, and for that reason more easily decide to go on family leave. Furthermore, it could be that depreciation rates in female occupations are that low precisely *because* so many workers in these jobs go have family-related career breaks. On the flipside, such an interpretation would imply that we do not observe true skills obsolescence, but that the observed wage effects are rather mirroring the adjustment costs to the employers (cf. Ondrich et al., 2002). However, some of our evidence speaks against this last point, as we found that workers with a career break due to unemployment face a much larger short-run wage penalty than those with a family-related career break. Moreover, the much smaller difference between the short-term and long-term wage effects for family-related career interruption indicates that the effects measured show the true effect of human capital obsolescence due to the career interruption.

For future research it would be interesting to estimate depreciation rates, which are truly occupation-specific, i.e. estimating separate depreciation rates for teachers, secretaries, physicians, etc. With those results, one could make even stronger conclusions about the connection between depreciation rates and occupational sex segregation.

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Table 1 – Descriptive Statistics

Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
	A. Overall		B. Men		C. Women	
Continous Variables						
Gross hourly wage rate (2000 prices)	14.50	7.32	16.42	7.87	12.12	5.74
Hours of overtime work	2.41	3.53	3.05	3.97	1.60	2.67
Age	37.55	8.95	37.83	8.61	37.20	9.34
Age^2	1490.08	682.54	1505.26	663.79	1471.22	704.78
Years of experience	14.15	8.94	15.73	9.36	12.19	7.97
Years of experience^2	280.16	302.78	334.83	329.18	212.20	250.25
Dummy Variables						
Firm size: 1-19 employees	0.21	0.41	0.16	0.37	0.28	0.45
Firm size: 20-99 employees	0.10	0.30	0.09	0.29	0.11	0.31
Firm size: 100-199 employees	0.05	0.21	0.05	0.22	0.04	0.20
Firm size: 200-1999 employees	0.23	0.42	0.25	0.43	0.22	0.41
Firm size: more than 2000 employees	0.26	0.44	0.30	0.46	0.21	0.41
Public sector employment	0.28	0.45	0.25	0.43	0.33	0.47
Firm change	0.14	0.35	0.12	0.32	0.17	0.37
Working in high-skilled occupation	0.46	0.50	0.45	0.50	0.47	0.50
Gender (male)	0.55	0.50				
Working in predominantly male occupation	0.40	0.49	0.63	0.48	0.11	0.31
Working in integrated occupation	0.28	0.45	0.26	0.44	0.31	0.46
Working in predominantly female occupation	0.32	0.47	0.11	0.31	0.58	0.49
Interruption Variables						
Unemployment spells during most recent 5 yrs. (short run)	0.27	0.75	0.28	0.79	0.26	0.69
Unemployment spells longer than 5 yrs. ago (long run)	0.59	1.44	0.59	1.55	0.59	1.29
Other interruption spells (short run)	0.07	0.30	0.06	0.28	0.08	0.31
Other interruption spells (long run)	0.38	1.13	0.21	0.90	0.59	1.33
Family-related interruption spells (short run)	0.60	1.35	0.09	0.45	1.23	1.77
Family-related interruption spells (long run)	1.91	4.53	0.20	1.04	4.04	6.05
Family-related interruption spells in:						
High-skilled occupation (short run)	0.26	0.93	0.04	0.30	0.54	1.31
Low-skilled occupation (short run)	0.34	1.06	0.05	0.35	0.69	1.47
High-skilled occupation (long run)	0.77	2.97	0.09	0.78	1.62	4.21
Low-skilled occupation (long run)	1.14	3.68	0.11	0.71	2.43	5.17
High-skilled male occupation (short run)	0.03	0.30	0.02	0.19	0.05	0.39
High-skilled integrated occupation (short run)	0.09	0.56	0.01	0.16	0.19	0.82
High-skilled female occupation (short run)	0.14	0.71	0.01	0.17	0.30	1.02
Low-skilled male occupation (short run)	0.04	0.34	0.03	0.27	0.05	0.40
Low-skilled integrated occupation (short run)	0.08	0.54	0.01	0.17	0.17	0.78
Low-skilled female occupation (short run)	0.22	0.89	0.01	0.15	0.48	1.27
High-skilled male occupation (long run)	0.09	0.93	0.05	0.65	0.14	1.20
High-skilled integrated occupation (long run)	0.25	1.73	0.02	0.35	0.53	2.54
High-skilled female occupation (long run)	0.43	2.30	0.02	0.27	0.95	3.36
Low-skilled male occupation (long run)	0.11	1.09	0.06	0.49	0.18	1.53
Low-skilled integrated occupation (long run)	0.28	1.88	0.03	0.40	0.58	2.75
Low-skilled female occupation (long run)	0.75	3.07	0.02	0.32	1.66	4.42
# of observations	9257		5130		4127	

Note: Interruption variables distinguish between short- and long-run. Short-run spells show the number of years in which the individual had an interruption spell

Table 2 - Skill levels for the one-digit ISCO code

Level	Skill Level	ISCO	Description	Education
Less skilled	1st	9	Elementary occupations	primary
	2nd	4-8	Clerks; Service workers and shop/market sales worker; Skilled agricultural and fishery workers; Craft and related trades worker; Plant and machine operators and assemblers	vocational
	Varying	0	Armed forces	
Highly skilled	3rd	3	Technicians and associate professionals	technical college
	4th	2	Professionals	university
	Varying	1	Legislators	

Table 3 - Wage development after a career interruption

Years since last interruption (employed afterwards)	Current average hourly wage (2000 prices)	Percentage Change	Obs.
1	12.43		1044
2	12.38	0%	1057
3	12.73	3%	931
4	12.95	2%	863
5	13.36	3%	774
6	13.44	1%	688
7	13.58	1%	601
8	13.41	-1%	559

Table 4 - Incidence of family-related career interruptions by occupational group

	Interruption (%)	Total (#)	Interruption (%)	Total (#)	Interruption (%)	Total (#)
	A. Overall		B. Women		C. Men	
High-skilled male occupation	8.7	539	29.1	103	3.9	436
High-skilled integrated occupation	20.3	497	35.5	245	5.6	252
High-skilled female occupation	32.8	445	40.1	347	7.1	98
Low-skilled male occupation	7.5	707	45.0	60	4.0	647
Low-skilled integrated occupation	20.8	438	35.4	223	5.6	215
Low-skilled female occupation	39.7	647	44.5	564	7.2	83
Total	*21.2*	*3,273*	*39.8*	*1,542*	*4.7*	*1,731*

Table 5 - Most highly segregated occupations

ISCO	Description	ISCO	Description
	Male occupations		Female occupations
723	Machinery mechanics and fitters	419	Other office clerks
713	Building finishers and related trades workers	513	Personal care and related workers
214	Architects, engineers and related professionals	343	Administrative associate professionals
311	Physical and engineering science technicians	522	Shop, stall and market salespersons and demonstrators
213	Computing professionals	913	Domestic and related helpers, cleaners and launderers
832	Motor vehicle drivers	412	Numerical clerks
724	Electrical and electronic equipment mechanics and fitters	323	Nursing and midwifery associate professionals
712	Building frame and related trades workers	411	Secretaries and keyboard-operating clerk
722	Blacksmiths, tool-makers and related trades workers	344	Customs, tax and related government associate professionals

Table 6 - Results of regression on log gross hourly wage (random effects estimation) - Note: p-values in parantheses

	A. Overall						B. Female						C. Male					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
Gender male	0.148	(0.000)	0.147	(0.000)	0.142	(0.000)												
Hours overtime	0.008	(0.000)	0.008	(0.000)	0.008	(0.000)	0.009	(0.000)	0.009	(0.000)	0.009	(0.000)	0.008	(0.000)	0.008	(0.000)	0.008	(0.000)
High-skilled occ.	0.122	(0.000)	0.115	(0.000)	0.115	(0.000)	0.126	(0.000)	0.109	(0.000)	0.102	(0.000)	0.106	(0.000)	0.104	(0.000)	0.106	(0.000)
Male occ.	0.056	(0.000)	0.056	(0.000)	0.072	(0.000)	0.040	(0.063)	0.043	(0.048)	0.092	(0.001)	0.056	(0.000)	0.055	(0.000)	0.062	(0.000)
Integrated occ.	0.065	(0.000)	0.065	(0.000)	0.069	(0.000)	0.080	(0.000)	0.081	(0.000)	0.088	(0.000)	0.054	(0.000)	0.053	(0.000)	0.056	(0.000)
Public sector	-0.006	(0.529)	-0.006	(0.513)	-0.006	(0.553)	0.056	(0.000)	0.056	(0.000)	0.056	(0.000)	-0.068	(0.000)	-0.069	(0.000)	-0.071	(0.000)
Change of firm	-0.013	(0.061)	-0.013	(0.066)	-0.012	(0.087)	-0.030	(0.011)	-0.029	(0.012)	-0.027	(0.020)	0.002	(0.822)	0.002	(0.830)	0.003	(0.741)
Age	0.057	(0.000)	0.057	(0.000)	0.057	(0.000)	0.053	(0.000)	0.053	(0.000)	0.052	(0.000)	0.056	(0.000)	0.057	(0.000)	0.056	(0.000)
Age ^ 2	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)	-0.001	(0.000)	-0.001	(0.000)	-0.001	(0.000)	0.000	(0.103)	0.000	(0.097)	0.000	(0.124)
Firm size 20-99	0.022	(0.007)	0.022	(0.007)	0.021	(0.009)	0.025	(0.066)	0.025	(0.073)	0.023	(0.102)	0.016	(0.090)	0.016	(0.089)	0.014	(0.134)
Firm size 100-199	0.040	(0.000)	0.041	(0.000)	0.038	(0.001)	0.042	(0.045)	0.042	(0.044)	0.035	(0.099)	0.036	(0.004)	0.036	(0.004)	0.033	(0.008)
Firm size 200-1999	0.074	(0.000)	0.074	(0.000)	0.074	(0.000)	0.102	(0.000)	0.101	(0.000)	0.103	(0.000)	0.042	(0.000)	0.042	(0.000)	0.044	(0.000)
Firm size 2000+	0.105	(0.000)	0.105	(0.000)	0.105	(0.000)	0.144	(0.000)	0.145	(0.000)	0.142	(0.000)	0.071	(0.000)	0.072	(0.000)	0.072	(0.000)
Experience	0.015	(0.000)	0.015	(0.000)	0.015	(0.000)	0.014	(0.009)	0.014	(0.009)	0.015	(0.006)	0.009	(0.093)	0.008	(0.095)	0.008	(0.118)
Experience ^2	-0.001	(0.000)	-0.001	(0.000)	-0.001	(0.000)	0.000	(0.018)	0.000	(0.018)	0.000	(0.013)	-0.001	(0.000)	-0.001	(0.000)	-0.001	(0.000)
Fam SR	-0.025	(0.000)					-0.022	(0.000)					-0.027	(0.018)				
Fam LR	-0.022	(0.000)					-0.014	(0.000)					-0.011	(0.077)				
Fam SR High			-0.022	(0.000)					-0.015	(0.010)					-0.036	(0.014)		
Fam SR Low			-0.021	(0.000)					-0.027	(0.000)					-0.016	(0.256)		
Fam LR High			-0.027	(0.000)					-0.014	(0.000)					-0.003	(0.731)		
Fam LR Low			-0.021	(0.000)					-0.014	(0.000)					-0.023	(0.008)		
Fam SR High male					-0.035	(0.005)					-0.015	(0.373)					-0.081	(0.000)
Fam SR High integ.					-0.024	(0.001)					-0.016	(0.079)					-0.026	(0.254)
Fam SR High fem.					-0.015	(0.014)					-0.014	(0.061)					0.100	(0.012)
Fam SR Low male					-0.055	(0.000)					-0.074	(0.000)					-0.005	(0.805)
Fam SR Low integ.					-0.008	(0.262)					-0.006	(0.475)					-0.072	(0.009)
Fam SR Low fem.					-0.030	(0.000)					-0.031	(0.000)					0.033	(0.236)
Fam LR High male					-0.024	(0.000)					-0.020	(0.002)					-0.009	(0.383)
Fam LR High integ.					-0.020	(0.000)					-0.013	(0.000)					0.003	(0.829)
Fam LR High fem.					-0.021	(0.000)					-0.012	(0.000)					-0.049	(0.044)
Fam LR Low male					-0.026	(0.000)					-0.019	(0.000)					-0.024	(0.044)
Fam LR Low integ.					-0.026	(0.000)					-0.020	(0.000)					-0.002	(0.896)
Fam LR Low fem.					-0.020	(0.000)					-0.012	(0.000)					-0.040	(0.020)
Unemployed SR	-0.063	(0.000)	-0.063	(0.000)	-0.063	(0.000)	-0.051	(0.000)	-0.051	(0.000)	-0.051	(0.000)	-0.075	(0.000)	-0.075	(0.000)	-0.077	(0.000)
Unemployed LR	-0.027	(0.000)	-0.027	(0.000)	-0.026	(0.000)	-0.021	(0.001)	-0.021	(0.001)	-0.020	(0.002)	-0.034	(0.000)	-0.033	(0.000)	-0.033	(0.000)
Other SR	-0.053	(0.000)	-0.053	(0.000)	-0.053	(0.000)	-0.039	(0.070)	-0.039	(0.068)	-0.040	(0.061)	-0.067	(0.000)	-0.067	(0.000)	-0.064	(0.000)
Other LR	-0.024	(0.000)	-0.024	(0.000)	-0.024	(0.000)	-0.007	(0.248)	-0.007	(0.251)	-0.007	(0.301)	-0.057	(0.000)	-0.057	(0.000)	-0.058	(0.000)
Constant	1.632	(0.000)	1.633	(0.000)	1.637	(0.000)	1.770	(0.000)	1.781	(0.000)	1.795	(0.000)	1.711	(0.000)	1.705	(0.000)	1.714	(0.000)
R^2 within	0.059		0.058		0.061		0.039		0.039		0.044		0.092		0.094		0.1	
R2 between	0.433		0.434		0.435		0.337		0.34		0.344		0.427		0.427		0.427	
R^2 overall	0.407		0.408		0.409		0.305		0.307		0.311		0.394		0.394		0.395	
# of observations	8130		8130		8130		3548		3548		3548		4582		4582		4582	

Table A-1 Frequency of occurrence and classification of ISCO codes

ISCO	Description	Freq. all	Freq. male	Freq. fem.	% female	Classification
11	Legislators and senior officials	19	19		0	male
111	Legislators and senior government officials	1	1		0	male
114	Senior officials of special-interest organisations	3	3		0	male
120	Corporate managers	15	9	6	40	integ
121	Directors and chief executives	20	10	10	50	integ
122	Production and operations managers	42	37	5	11.9	male
123	Other specialist managers	44	26	18	40.9	integ
130	General managers	5	1	4	80	female
131	Managers of small enterprises	12	8	4	33.3	male
211	Physicists, chemists and related professionals	6	4	2	33.3	male
212	Mathematicians, statisticians and related professionals	2		2	100	female
213	Computing professionals	57	49	8	14	male
214	Architects, engineers and related professionals	128	111	17	13.3	male
221	Life science professionals	7	5	2	28.6	male
222	Health professionals (except nursing)	21	11	10	47.6	integ
231	College, university and higher education	11	7	4	36.4	integ
232	Secondary education teaching professionals	58	21	37	63.8	integ
233	Primary and pre-primary education teaching professionals	14		14	100	female
234	Special education teaching professionals	6	3	3	50	integ
235	Other teaching professionals	12	5	7	58.3	integ
240	Other professionals	3	3		0	male
241	Business professionals	44	30	14	31.8	male
242	Legal professionals	12	8	4	33.3	male
243	Archivists, librarians and related information professionals	3		3	100	female
244	Social science and related professionals	31	14	17	54.8	integ
245	Writers and creative or performing artists	15	9	6	40	integ
246	Religious professionals	3	2	1	33.3	male
247	Public service administrative professionals	78	49	29	37.2	integ
311	Physical and engineering science technicians	116	84	32	27.6	male
312	Computer associate professionals	37	30	7	18.9	male
313	Optical and electronic equipment operators	8	4	4	50	integ
314	Ship and aircraft controllers and technicians	5	5		0	male
315	Safety and quality inspectors	14	13	1	7.1	male
321	Life science technicians and related associate professionals	7	1	6	85.7	female
322	Health associate professionals (except nursing)	25	6	19	76	female
323	Nursing and midwifery associate professionals	89	19	70	78.7	female
332	Pre-primary education teaching associate professionals	37	5	32	86.5	female
333	Special education teaching associate professionals	3	2	1	33.3	male
334	Other teaching associate professionals	12	7	5	41.7	integ
341	Finance and sales associate professionals	145	67	78	53.8	integ
342	Business services agents and trade brokers	21	10	11	52.4	integ
343	Administrative associate professionals	154	40	114	74	female
344	Customs, tax and related government associate professionals	69	22	47	68.1	female
345	Police inspectors and detectives	27	22	5	18.5	male
346	Social work associate professionals	31	4	27	87.1	female
347	Artistic, entertainment and sports associate professionals	5		5	100	female
348	Religious associate professionals	4		4	100	female
411	Secretaries and keyboard-operating clerks	48		48	100	female
412	Numerical clerks	144	55	89	61.8	integ
413	Material-recording and transport clerks	115	68	47	40.9	integ
414	Library, mail and related clerks	16	8	8	50	integ
419	Other office clerks	148	25	123	83.1	female
421	Cashiers, tellers and related clerks	24	10	14	58.3	integ

Table A-1 (contd.)

ISCO	Description	Freq. all	Freq. male	Freq. fem.	% female	Classification
422	Client information clerks	31	4	27	87.1	female
511	Travel attendants and related workers	3	2	1	33.3	male
512	Housekeeping and restaurant services workers	56	16	40	71.4	female
513	Personal care and related workers	105	7	98	93.3	female
514	Other personal services workers	21	1	20	95.2	female
516	Protective services workers	44	34	10	22.7	male
522	Shop, stall and market salespersons and demonstrators	126	22	104	82.5	female
610	Market-oriented skilled agricultural and fishery workers	2	1	1	50	integ
611	Market gardeners and crop growers	17	4	13	76.5	female
612	Animal producers and related workers	3		3	100	female
614	Forestry and related workers	2	2		0	male
711	Miners, shotfirers, stone cutters and carvers	5	5		0	male
712	Building frame and related trades workers	36	36		0	male
713	Building finishers and related trades workers	90	88	2	2.2	male
714	Painters, building structure cleaners and related trades	25	23	2	8	male
721	Metal moulders, welders, sheet-metal workers, and related	35	31	4	11.4	male
722	Blacksmiths, tool-makers and related trades workers	37	37		0	male
723	Machinery mechanics and fitters	100	96	4	4	male
724	Electrical and electronic equipment mechanics amd fitters	49	47	2	4.1	male
731	Precision workers in metal and related materials	24	15	9	37.5	integ
732	Potters, glass-makers and related trades workers	5	3	2	40	integ
734	Craft printing and related trades workers	18	13	5	27.8	male
741	Food processing and related trades workers	18	16	2	11.1	male
742	Wood treaters, cabinet-makers and related trades workers	31	30	1	3.2	male
743	Textile, garment and related trades workers	15	2	13	86.7	female
744	Pelt, leather and shoemaking trades workers	4	1	3	75	female
811	Mining and mineral-processing-plant operators	2	2		0	male
812	Metal-processing plant operators	5	5		0	male
814	Wood-processing- and papermaking-plant operators	8	5	3	37.5	integ
815	Chemical-processing-plant operators	25	22	3	12	male
816	Power-production and related plant operators	7	6	1	14.3	male
821	Metal- and mineral-products machine operators	26	18	8	30.8	male
822	Chemical-products machine operators	5	2	3	60	integ
823	Rubber- and plastic-products machine operators	12	10	2	16.7	male
825	Printing-, binding- and paper-products m	2	2		0	male
826	Textile-, fur- and leather-products machine operators	6	3	3	50	integ
827	Food and related products machine operators	7	5	2	28.6	male
828	Assemblers	11	1	10	90.9	female
829	Other machine operators not elsewhere classified	6	5	1	16.7	male
831	Locomotive engine drivers and related workers	6	6		0	male
832	Motor vehicle drivers	54	48	6	11.1	male
833	Agricultural and other mobile plant operators	20	19	1	5	male
834	Ships' deck crews and related workers	1	1		0	male
913	Domestic and related helpers, cleaners and launderers	60		60	100	female
914	Building caretakers, window and related cleaners	20	15	5	25	male
915	Messengers, porters, doorkeepers and related workers	8	4	4	50	integ
916	Garbage collectors and related labourers	1	1		0	male
921	Agricultural, fishery and related labourers	5	3	2	40	integ
931	Mining and construction labourers	8	8		0	male
932	Manufacturing labourers	41	16	25	60.98	integ
933	Transport labourers and freight handlers	27	24	3	11.11	male
991	Unknown (GSOEP specific)	1		1	100	female
993	Unknown (GSOEP specific)	1		1	100	female
997	Unknown (GSOEP specific)	3	3		0	male
998	Unknown (GSOEP specific)	17	9	8	47.06	integ

Note: Table A-1 is made using the *pooled* cross-section of the four panel waves. That way, every individual appears in the sample only once, in contrast to using the complete panel, where some individuals appear several times and would thereby distort the picture.