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JEL-Classification: J31; J24; J16

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Abstract

Germany's occupational and sectoral change towards a knowledge-based economy calls for high returns to education. Nevertheless, female graduates are paid much less than their male counterparts. We wonder whether overeducation affects sexes differently and whether this might answer for part of the gender pay gap. We decompose total year of schooling in years of over- (O), required (R), and undereducation (U). As ORU earnings estimations based on German SOEP cross-section and panel data indicate, overeducation pays off less than required education in the current job even when unobserved heterogeneity is taken into account. Moreover, analyses of job satisfaction and self-assessed overeducation point to some real mismatch. However, overeducation does not matter for the gender pay gap. By contrast, women's fewer years of required education reasonably do, answering for 7.61 pp. of the East German (18.79 %) and 2.22 pp. of the West German (32.98 %) approximate gap. Moreover, job biography and the household context affect the gap more seriously in the old Bundesländer than in the new ones. Overall, the West German pay gap almost doubles the East German one, and different endowments answer for roughly three quarters of the approximate gap in the Western but only for two thirds in the Eastern part. We conclude that the gendered earnings gap among German graduates is rather shaped by an employment behaviour suiting traditional gender roles and assigned gender stereotypes than being subject to gendered educational inadequacy.

Acknowledgements

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1 | Introduction

After 2020 the replacement need of German academics will increase markedly due to the retirement of baby-boom generations (Helmrich et al. 2012). The situation is aggravated by newly generated needs by means of the ongoing economic and occupational change. Admittedly, higher educational aspirations together with a higher employment inclination of women and elderly actually help to balance demand and supply on the graduates' labor market. But with younger cohorts being too small to capture the overall need conditional on demographic and structural development the skill gap is foreseeable (Bundesagentur für Arbeit 2012). To avoid future skilled labor shortages it will become more and more important to have an eye to the full exploitation of resources in terms of a productive use of acquired qualifications in proper job matches. Apparently, overeducation is adverse to this aim. Overeducation occurs if a person attained a higher level of education than is required to perform his or her current job.

Various *theoretical frameworks* deal with the phenomenon of overeducation and its earnings consequences (for an overview see Büchel 2001). Search theories (Stigler 1961, Mortensen 1987) postulate that overeducation may temporarily arise due to labor market frictions in the context of incomplete information. Search costs hinder proper matches only in the short term, but as long as the mismatch subsists it goes along with diminished returns to education. Career mobility theory (Sicherman and Galor 1990) as well considers overeducation to be of limited duration, even though differently motivated. According to this theory, overeducation in the early career stage and associated earnings losses are individually rational from a life course perspective since the mismatch spell entails outstanding upward income mobility later in the career (see e. g. Dekker et al. 2002 for confirming results in internal labor markets). Furthermore, overeducation may arise in the context of labor market distortions. Job competition theory (Thurow 1975) predicts that an excess supply of graduates on the labor market causes persisting overeducation of graduates whereas lower educated persons become unemployed. The privileging of graduates has its origins in lower training costs for employers. The same conclusion is drawn from assignment theory (Tinbergen 1956, Sattinger 1975; 1993): Assuming job requirements being more heterogeneous than educational degrees and production technologies not being capable to adapt to offered qualifications, wages are determined solely by job requirements.

Human capital theory (Ben Porath 1967), in its earnings aspects commonly specified in a Mincerian wage equation (Mincer 1974), postulates that wages are exclusively determined by supplied human capital. The latter comprises schooling investment as well as job-specific skills derived from training-on-the-job. The focus on attained education grounds on Say's theorem that postulates that each unit of supplied human capital generates its own market demand and is therefore equally remunerated. How-

ever, beyond the restrictive assumption of labor demand being perfectly flexible, the supply sided identity of attained education and an individual's productive capacity has also to be questioned. If a person uses his excess education to compensate for deficient human capital in other respects to perform the job, he is less productive than his properly matched colleagues with the same amount of education (Korpi and Tåhlin 2009 name this the "human capital compensation hypothesis"[1]). In this case, educational mismatch is not due to labor market imperfections but points to hidden abilities. Returns from overeducation are underestimated in this case.

Unobserved heterogeneity not in abilities but in preferences is the issue that Frank's theory of differential overeducation deals with (Frank 1978). According to this theory, job mismatch is regarded as an outcome of union decisions of couples. Women may prioritize the optimization of the male partners' job match due to men's higher earnings capacities and/or traditional gender roles. Hence, female partners willingly refrain from exploiting their earnings capacity. In this case, female partners behave like 'tied movers' and 'tied stayers' on the labor market (Mincer 1978). Without being the fault of the educational system in this case, returns to overeducation are likewise downward biased. Frank postulates that this behavior is the more likely if partners are married.

Hence, conceptual issues in the field of educational mismatch research are challenging. The question as to by which means obstacles of proper matches can be removed turns out to be at the top of the political agenda. That is, isolating 'external factors' that are subject of political action requires tackling omitted variable bias. What if people willingly agree to a job that they are formally overeducated for but that exactly meets their true abilities or preferences?

International empirical evidence widely confirms this view. As many studies suggest, results on overeducation prevalence and its earnings consequences heavily depend on the applied model specification, particularly with regard to unobserved heterogeneity (e. g. Allen and Van der Velden 2001, Bauer 2002, McGuinness and Bennett 2007, Korpi and Tåhlin 2009, Leuven and Oosterbeek 2011, Blázquez Cuesta and Budría 2011, Andersson Joona et al. 2012).[2] Moreover, results vary considerably with the chosen operationalization of overeducation (Groot and Maassen van den Brink 2000, Mendes de Oliveira et al. 2000, Bauer 2002, Chiswick and Miller 2009, Nielsen 2011). Furthermore, results differ due to heterogeneous meta-variables like i. a. labor market structure, business cycle, trade-union density and structure of academic funding (Davia et al. 2010, Verhaest and van der Velden 2013).[3] The composition of the sample also matters: Overeducation frequency is lower if the self-employed are includ-

[1] Korpi and Tåhlin (2009:184).

[2] As a result, Jensen et al. (2006) consider overeducation solely with regard to earnings issues.

[3] Davia et al. (2010) conclude from a multinational analysis that an excess supply of graduates raises the risk of being overeducated whereas higher education fees lower it.

ed (Blázquez Cuesta and Budría 2011) and varies with the type of graduates and of universities (Davia et al. 2010).

For Germany, a vast majority of empirical studies relies on the Socio-Economic Panel (SOEP; see Wagner et al. 2007). As survey persons report individually assessed job requirements the construction of the variable "self-assessed overeducation" is easily done. Thus, the method is appealing and widely used (Duncan and Hoffman 1981, Sicherman 1991, Büchel 1996, Vahey 2000, McGuinness and Bennett 2007, Rukwid 2012). The majority of studies report a higher prevalence among women than men (e. g. Büchel 1996, Daly et al. 2000, Büchel 2001, Szillik 1996 for West Germany, Rukwid 2012). With the same dataset, Büchel and Battu (2002) find partial support for Frank's theory of differential overeducation. Moreover, Plicht et al. (1994) although applying a different specification relying on microcensus data report a higher prevalence of overeducation among female graduates than among male graduates. A study of 2009 based on the Higher Education Information System (HIS) data that employs a combined specification of vertical and horizontal (occupational) adequacy finds that one year after examination, bachelor graduates suffer higher rates of overeducation than graduates of master studies, though not differenciating between genders (Autorengruppe Bildungsberichterstattung 2012). Own analyses show that according to individual self-assessment, one out of five medium educated women and even one out of four (three) West (East) female graduates had been overeducated in 2011 (Boll/Leppin 2014).

What are the earnings consequences of overeducation? The literature usually indicates positive but smaller returns to overeducation compared to adequate education that correctly meets job requirements. That is, overeducated workers earn more than their correctly matched job colleagues but less than correctly matched workers with similar education. This contradicts not only assignment and job competition theory which both postulate zero returns of overeducation but also human capital theory that predicts equal returns to excess, deficit and adequate education. Daly et al. (2000) confirm this finding for Germany with SOEP wave 1984, using OLS estimation techniques. Bauer (2002) also supports the common finding with SOEP waves 1984-1996 as long as OLS is used; according to his study, however, the human capital hypothesis can no longer be rejected in the case of women if panel estimation techniques are used.

To our knowledge, there is no empirical evidence on the issue of gendered earnings effects of overeducation for Germany in the recent past. This is astonishing, the more so as since many years, Germany exhibits a severe and persistent gender pay gap. Graduates at the upper end of the educational scale are supposed to be most heavily affected by overeducation. At the same time, they are most severely harmed by gendered pay: Whereas the unadjusted gender pay gap amounted to 11 % and 19 % for the lowly and the medium skilled, respectively, German graduates recently experienced a wage drift of 27 % (Statistisches Bundesamt 2012b relying on the German Structure of Earnings Survey (GSES) of

the year 2010). Hence, the question arises whether overeducation answers for (part of) the observed gender pay gap among German graduates. The only study that deals with the decomposition of the gender pay gap in the German East/West context relies on the German Structure of Earnings Survey (GSES) of the year 2006 (Statistisches Bundesamt 2006). However, the calculation and decomposition of the gap in the study of 2006 does not stratify educational levels, and the issue of educational inadequacy is not addressed at all.

The *aim of this paper* is twofold. First, we attempt to estimate the returns to overeducation of West and East German graduates. Secondly, we intend to analyse whether a gendered distribution of educational inadequacy contributes to the gender pay gap in the German regions and furthermore, what else drives the gap. Referring to earnings estimations, we employ the standard ORU model for estimating the returns of overeducation that is specified according to a realized matches approach. We estimate standard OLS models first, relying on pooled observations from waves 2009 and 2010. In a second step, we use Random Effects (RE) models in order to check the robustness of results when unobserved heterogeneity is taken into account. The RE estimator exploits the panel structure of the data from waves 1992 to 2011. Within each model category, we run separate regressions for women and men and East and West Germany to allow for gender and region specific wage effects of covariates.

Our findings indicate that the ORU model fits the data better than the standard Mincerian wage equation, assigning overeducation a lower return than required education for both genders. According to panel estimation results and indicators for job satisfaction and subjective overeducation, unobserved heterogeneity is part of but not the essence of the story. Therefore, we use OLS estimates for decomposing the gender pay gap in the second part of our analysis. We find an overall unadjusted gender pay gap among German graduates of approximate 32.98 % in the Western and 18.79 % in the Eastern part. For East Germany, the gap is largely driven by different characteristics of men and women, they answer for roughly three quarters (13.91 pp.) of the approximate gap. By contrast, a gendered distribution of remunerations and interactions of characteristics and remunerations play a higher role in the Western than in the Eastern part of Germany. In more detail, overeducation does not matter for the gap, but women's fewer years of required education answer for 7.61 pp. of the Eastern and 2.22 pp. of the Western gap. Furthermore, job biography and household context variables play a higher role for the West German than the East German wage drift. We conclude that the gendered earnings gap among German graduates is rather shaped by an employment behaviour suiting traditional gender roles and assigned gender stereotypes than being subject to gendered educational inadequacy.

The *outline of the paper* is the following: In Section 2, the underlying models for income estimation and decomposition are presented. Section 3 depicts the employed data and variables. Section 4 reports and discusses the empirical results and Section 5 concludes.

2 | Models

In order to test if demand side or supply side or both determine the market returns on education, we split attained education into its three components overeducation, required education and undereducation, according to job-specific requirements (Hartog 2000). We thereby follow the ORU[4] approach established by Duncan and Hoffman (1981). We deploy the ORU model by running standard ordinary least squares regressions for women and men and East and West Germany separately to allow for gender and region specific effects on earnings.

In detail, the log-wage y_i is estimated by

$$y_i = x_i'\beta + \gamma_1 UE_i + \gamma_2 RE_i + \gamma_3 OE_i + u_i \quad (1a)$$

where x_i denote the exogenous variables except schooling. OE_i depicts the years of surplus education, RE_i years of required education and OE_i years of deficit education. u_i indicates the error term.

Returns to education are misleading if the employed systematically differ from the unemployed in unobserved but wage relevant characteristics. If latent factors impact both on an individual's earnings capacity and his or her participation propensity the job experience variables in the earnings equation turn out to be endogenous. Technically spoken, the error terms of the earnings and the participation equation are correlated. The participation decision may be formulated as a binary choice to work (z=1) or not to work (z=0). Work is observed if the latent variable, z*, exceeds a certain threshold that is usually set at zero. The notation of the probit model is the following:

$$z_i^* = w_i'\delta + \varepsilon_i \quad (1b)$$

$$z_i = \begin{cases} 1 \text{ if } z_i^* > 0 \\ 0 \; otherwise \end{cases} \quad (1c)$$

where w_i' denotes a set of the individual's job biography and household characteristics which are suggested to impact on his reservation wage; ε_i depicts the error term and δ the vector of coefficients in question.

In a second step of this Two-step Heckman procedure (Heckman 1979), the inverse of the derived Mill's ratio is added as an additional regressor into the earnings function. If the correction term proves to be significantly associated with the endogeneous variable it has to be assumed that wages and employment are correlated in the indicated direction. Otherwise, wages are suggested to not be affected by employment propensity. The estimated wage regression with sample selection correction is

$$y_i = x_i'\beta + \gamma_1 UE_i + \gamma_2 RE_i + \gamma_3 OE_i + \beta_\lambda \lambda\left(w_i'\hat{\delta}\right) + u_i. \quad (1d)$$

[4] Overeducation/Required education/Undereducation

Beyond employment itself, people might select themselves into distinct employment and workplace-related features like public sector employment, part-time work, industries etc. Even the educational match might be subject to selection. The aforementioned empirical literature gives a hint to the fact that results on overeducation heavily depend on the employed model. We deal with unobserved heterogeneity in different ways.

First, we deploy a Random Effects model with individual means following the approach from Mundlak (1978). In this model, parts of the unobserved individual fixed effects are captured by individual means of covariates over time. We control for individual means of all time-variant covariates in the regression that are suggested to be potentially subject to such latent factors. This allows us to interpret the point estimates as being pure within-person effects.[5] We generate individual means for all time-variant covariates except of education variables. Due to the sample prerequisite of yet having finished education, attained education is time-invariant and a change of one's educational matching category may solely arise in the context of a job change. If the job change entails a change in required education this induces a proportional shift of under- and overeducation, respectively. That is, in a within-person framework either required education and overeducation or required education and undereducation are perfectly collinear. For this reason, we refrain from using a full Fixed Effects model. Instead, we follow the approach of Mundlak (1978) and refer to a Random Effects model with individual means of time-variant covariates.[6] The notation of the estimated wage equation is

$$y_{it} = x'_{it}\beta + \gamma_1 UE_{it} + \gamma_2 RE_{it} + \gamma_3 OE_{it} + \alpha_i + u_{it} \qquad (1e)$$

where α_i, the individual heterogeneity, is assumed to be a linear function of the mean of time-variant variables in x.

In the second part of our analysis, we analyse the impact of overeducation on the gender pay gap among graduates. To this end, we use the threefold decomposition introduced by Winsborough and Dickenson (1971) to decompose the observable differential in log-wages between men and women into an endowment effect, a price (evaluation) effect and an interaction effect. We opt for the threefold decomposition rather than the more common twofold decomposition originating in the work of Oaxaca (1973) and Blinder (1973) since it allows us to isolate the interaction effect that would otherwise be arbitrarily attributed to the endowment and the price effect (Biewen 2012). The decomposition of the wage gap is made according to the following equation[7]:

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[5] For a similar procedure, see Andersson Joona et al. (2012).

[6] However, it cannot be ruled out that time-invariant variables are correlated with unobserved heterogeneity which would result in biased estimated coefficients.

[7] We use the procedures from Jann (2008) in Stata.

$$\overline{\ln(w_M)} - \overline{\ln(w_F)} = (\bar{X}_M - \bar{X}_F)\beta_F + (\beta_M - \beta_F)\bar{X}_F + (\bar{X}_M - \bar{X}_F)(\beta_M - \beta_F) \quad (2)$$

The term on the left hand side of the equation denotes the difference in expected values of the female and male gross hourly wage rate, which equals the mean differential. The first term on the right hand side depicts the endowment effect since it indicates the hypothetical wage gain of women if they exhibited men's features. The second term on the right hand side captures the price effect of the wage gap – it displays the hypothetical wage gain of women if their own features were remunerated like men's. The third term captures the interaction of differences in endowments and coefficients. A negative interaction effect means that characteristics as to which women have a lead over men pay off less for women and/or vice versa.

3 | Data

We employ data from the German Socio-economic Panel (SOEP). The SOEP is a yearly repeated representative longitudinal survey of households and persons living in Germany that started 1984. The SOEP covers a broad range of questions addressing socio-economic status and further topics like health or life satisfaction (see Wagner et al. 2007 for more details). Actually, roughly 22,000 persons from more than 10,000 households are interviewed each year. For the OLS earnings estimations, we pooled the information from waves 2009 and 2010, for the panel estimations we exploit the panel character of the data using waves 1992-2011[8]. Following Cappellari und Jenkins (2008a; 2008b), we apply the RE estimator to our unbalanced panel assuming that panel attrition is random. In both samples, only persons aged 20 to 55 are considered. Persons in education, retirement, civil or military service as well as self-employed persons are excluded. The sample is restricted to women and men with academic exams. Information from persons with lower educational levels is solely used to generate the required educational matching variables.We refer to overeducation as a vertical inadequacy (overschooling).[9] That is, attained years of education are compared to years required for the job. According to the international standard classification of educational degrees (ISCED), higher education (ISCED 5a+6) encompasses six academic degrees that differ in years of education.[10] Table 1 denotes the gendered and regional distribution of academic degrees.

[8] In favour of a high number of observations, we pooled the information of waves 2009 and 2010. We refrained from using wave 2011 since it contains a fewer amount of observations than wave 2009. Furthermore, wages are adjusted for bonus payments and wave 2011 is lost for persons with a job change in 2011. This may have caused non-random panel attrition. We suggest this aspect being negligible for the panel estimation sample 1992-2011.

[9] By contrast, overskilling may be interpreted as horizontal inadequacy in terms of a partial non-use of attained occupational skills in the actual job (Quintini 2011).

[10] Graduates furthermore differ in fields of subject. However, we may not differentiate between fields of study since this information is not annually surveyed, and for the sake of consistency, too many observations would have to be eliminated. Anyway, empirical evidence suggests a decreasing impact of field of study on income over the career: Multivariate analyses from Dolton and Vignoles (2000) show for the United Kingdom, that – apart from arts fields – fields of study have lost their income effect six years after exam.

Table 1

Degrees of higher education (ISCED 5a+6), by gender and region

	East Germany		West Germany	
	Women	Men	Women	Men
	%	%	%	%
2009–2010				
Professional/technical college (East Germany)	21.39	8.91	1.48	0.52
University/university of applied sciences (East Germany)	7.46	11.63	0.27	0.26
University/university of applied sciences abroad	0.25	1.55	2.01	1.30
University of applied sciences (West Germany)	32.84	25.19	31.54	36.96
University/technical university (West Germany)	37.56	52.71	64.70	59.92
Doctoral and postdoctoral qualification	0.50	0	0	1.04
1992–2011				
Professional/technical college (East Germany)	44.06	20.93	1.66	0.29
University/university of applied sciences (East Germany)	15.02	24.92	1.11	0.70
University/university of applied sciences abroad	0.25	0.20	1.94	1.50
University of applied sciences (West Germany)	19.39	17.32	28.40	33.62
University/technical university (West Germany)	21.21	36.55	66.86	63.70
Doctoral and postdoctoral qualification	0.06	0.07	0.04	0.20

Sources: SOEP v28, 1992-2011; HWWI.

As Table 1 shows, in the recent past (2009-2010) men more often held university exams in the Eastern part of Germany, whereas the opposite applied to the Western part. East German women quite often graduated from professional or technical colleges, while almost three quarters of East German inhabitants hold degrees from West German universities.

We explicitly refrain from using methods of subjective self-assessment of overeducation in the issue of earnings estimation this paper focuses on. As aforementioned, the subjective method is appealing due to its simple application and because, from a theoretical point of view, a survey person's knowledge is closest to his or her individual job requirements. However, it is its core property of being subjective that prevents the method from being appropriate to deal with earnings consequences of overeducation. Empirical evidence suggests that self-assessed overeducation is subject to other job features like occupational status and particularly income (Dolton and Vignoles 2000). Survey persons may be inclined to exaggerate educational requirements of their job for various reasons (Borghans and de Grip 2000). Furthermore, self-assessed overeducation might be gender biased (Leuven and Oosterbeek 2011).[11]

[11] The first best method to deal with overeducation would surely be an objective evaluation of occupation-specific required education by professional job analysts. However, those approaches as well rely to some extent on arbitrary definitions and moreover, they fail to adapt to the dynamics of occupational and educational change (Eckaus 1964).

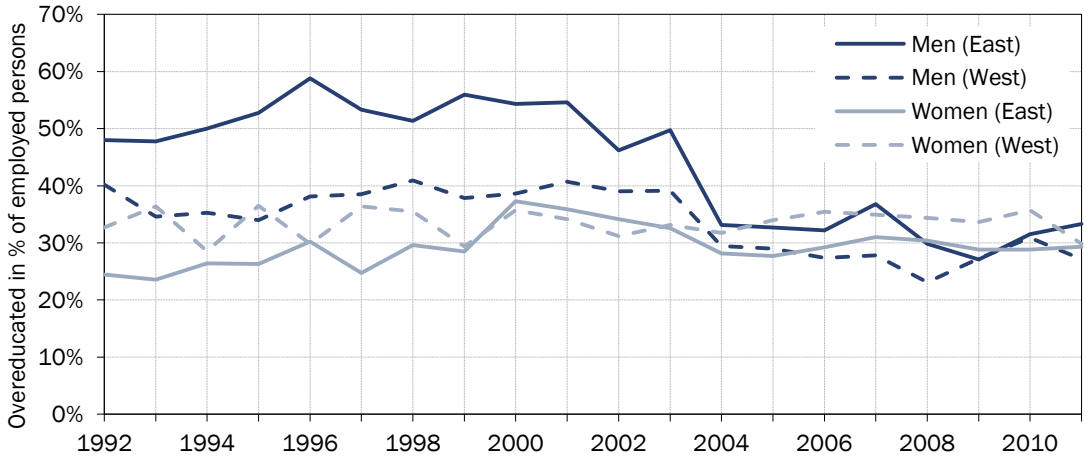
Instead, we follow the *realised matches approach*. This framework (Verdugo and Verdugo 1989 relying on the mean value, Kiker et al. 1997 relying on the modal value) lets markets decide upon the educational standards of jobs. The educational standard refers to the mean value of education in the occupational benchmark group, that is, the occupational affiliation of a person that is validated by occupational status information. The educational standard of this status-specific occupational benchmark is updated on a regular basis to capture changing educational requirements over time.[12] Deploying the mean value secures a procedure that is sensitive even to small deviations between demanded and supplied education. One drawback of this method is that it is prone to outliers (Kiker et al. 1997). However, we suggest the mode value being inferior to the mean since it may be located at the outer range of the distribution.

According to the realized matches framework, overeducation is defined as a positive deviation, undereducation as a negative deviation and required education as the perfect congruence with the standard. Persons with excess education for the currently performed job are regarded as overeducated, those with deficit education as undereducated and those with the required amount of education as correctly matched.[13]

Figure 1 illustrates the prevalence of overeducation for East and West German male and female graduates in our sample in the time span 1992–2011.

Figure 1

Overeducation Prevalence* 1992–2011, by Gender and Region



*Realized Matches (Mean with 1 std.dev.)

Sources: SOEP v28, 1992-2011; HWWI.

[12] In detail, we exploit 28 occupational groups provided by 2-digit international standard classification of occupations (ISCO) and 11 occupational statuses stored in the SOEP data set. The yielded job/status combinations (job cells) are kept if they contain at least 10 observations. The computation of the average education in a distinct job cell is repeated in four years-time intervals to account for an educational upgrading of occupations. The time intervals are 1984-1987, 1988-1991, 1992-1995, 1996-1999, 2000-2003, 2004-2007, 2008-2011.

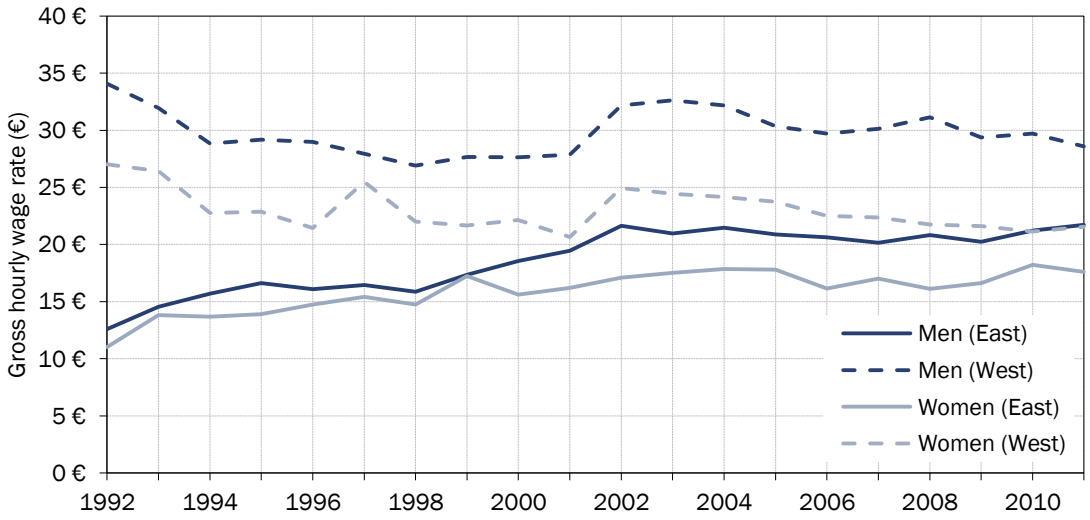
[13] Empirical analyses show that estimation results of the ORU model are qualitatively independent from the chosen measurement method. In more detail, results do not change substantially if one switches from a Realized Matches approach to a measurement method that relies upon subjective self-assessment of overeducation (Chiswick and Miller 2009). Moreover, Nielsen (2011) shows that deploying the mean instead of the mode of average education does not cause a substantial change of results.

As figure 1 indicates, male graduates had a lead over female graduates for many years. Women outperformed men for the first time 2008 (East) and 2004 (West), respectively. In 2011, roughly 3 out of ten West and East German female and West German male graduates and 3.5 out of ten East German male graduates have been affected by this type of educational mismatch.

We use the (log of) the gross hourly wage rate including fringe benefits as our endogenous variable. SOEP based analyses for Germany show that fringe benefits like Christmas or vacation allowances are more often granted to men even after controlling for the hourly wage rate (Frick et al. 2007). We prorate fringe benefits according to the previous year's ratio of overall fringe and regular income payments.[14] For 2011, the hourly wage rate amounted to 21.6 Euro (28.6Euro) for West German female (male) graduates and to 17.6 Euro (21.7 Euro) for East German female (male) graduates.

Figure 2

Real Gross Hourly Wage Rates 1992–2011, by gender and region



Sources: SOEP v28, 1992-2011; HWWI.

Figure 2 displays deflated[15] gross hourly earnings in our sample during the time span 1992-2011. Unlike overeducation incidence, when it comes to earnings West Germans have had a lead over East Germans throughout observed years, and male graduates' wage has dominated the female one without interruption. East Germans' wages exhibited a rapid increase in the first decade after reunification. However, in the early years of the new millenium the process of wage recovery receded and wages of men and women started to drift apart. Most recently, East German men's wage rate covered that of West German women. However, the gendered wage differential has been more

[14] In case of a job change we exploit the information of most recent months in the new job.

[15] The base year is 2011.

pronounced in the Western part of Germany throughout years. This may be partly due to the increased returns on experience in the public sector in combination with the increased share of East German women working in this sector during the ninetees (Franz and Steiner 1999).

Table 2 depicts the summary statistics of the core variables this article focuses on, namely the education variables and the wage variable. The last four columns on the right hand side refer to the pooled observations of waves 2009 and 2010 which are subject of the deployed OLS estimations of the ORU model. The first four columns refer to the sample underlying the panel estimations.

Table 2

Summary Statistics of Wage and Education Variables, by Sample, Gender, and Region

	1992–2011				2009–2010			
	Men		Women		Men		Women	
Variables	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
West Germany								
Log of gross hourly wage (€)	3.2985	0.4559	2.9969	0.5079	2.9357	0.4953	3.2655	0.4935
Required Education (years)	15.4386	1.6610	15.3148	2.1320	15.2239	2.0559	15.4483	1.5763
Surplus Education (years)	1.6541	1.5369	1.7785	1.7634	1.8153	1.7300	1.6149	1.4525
Deficit Education (years)	0.1768	0.5393	0.1152	0.4545	0.1165	0.4617	0.1885	0.5796
Attained education (years)	16.9159	1.5185	16.9780	1.5071	16.9227	1.4733	16.8747	1.5426
East Germany								
Log of gross hourly wage (€)	2.8194	0.4923	2.6535	0.4599	2.7080	0.5082	2.8959	0.5400
Required Education (years)	14.6832	1.9160	13.8968	2.0142	14.2444	1.9091	15.0463	1.8365
Surplus Education (years)	2.0683	1.7886	1.5891	1.7570	1.6584	1.6785	1.8017	1.6561
Deficit Education (years)	0.3108	0.8177	0.3323	0.8972	0.1966	0.6438	0.2702	0.7365
Attained education (years)	16.4407	2.1007	15.1536	2.2813	15.7062	2.2262	16.5779	1.9684

Years of attained education encompass years of schooling and subsequent years in vocational training, referring to the $BILZEIT information provided by the dataset at hand.

Sources: SOEP v28, 1992-2011; HWWI.

As can be seen from Table 2, West German women most recently exhibited a slightly higher amount of years of attained and required education. Compared to the 19-year span 1992-2011, this turns out to be a quite new phenomenon that is furthermore supplemented with a lead in earnings. For East German women the opposite holds: They have lost their lead in attained and required education and also their earnings ad-

vantage in the recent past. As a time constant fact, men exhibit more years of surplus education in both regions. The East-West comparison highlights the higher amount of attained education of West German graduates in recent years compared to their East German counterparts. It becomes obvious that East Germans' educational endowment decreased between 1992–2011 whereas that of West Germans remained stable. Following human capital theory and ignoring demand side, the earnings lead of West Germans turns out to be more justified for the recent than the prior past.

Apart from education, following the empirical literature we control for a large set of covariates that have proved to impact notably on earnings, namely employment biography, workplace and household related variables, parental home factors and migration background. Parental home is shaped by parent's educational level and labor market participation when the child had been 15 years old. We expect that a higher education and labor market attachment of parents reflecting high parental aspirations with regard to earnings at that time, positively impacts on their offspring's educational matches. As to the household variables, we refer to the same list that has been used to model the employment propensity. Some graduates passed a vocational training before attending college. This is the case for the half (51,7 %) of East German women but only for 41.8 % of East German men. West Germany exhibits gender differences of reverse direction and on a lower level. A vocational training in addition to a graduate degree does not alter the individual's highest educational level and is therefore controlled for by a separate dummy. We suppose that this extra education increases the individual's general or specific human capital that should be associated with an earnings advantage, although some empirical evidence points to detrimental effects (Büchel and Helberger 1995. Detailed summary statistics of the deployed variables are to be found in table A1 in the appendix.

4 | Results

In what follows, we report the results of earnings estimations, referring to Table 3 below.

Table 3

Summary Statistics of Wage and Education Variables, by Sample, Gender, and Region

	Ordinary Least Squares Model	Random Effects Model with Mundlak Correction
	2009–2010	1992–2011
Model Category	1	2
West German Female Graduates		
RE	9.90	9.64
OE	2.62	5.38
UE	-6.40	-6.76
R^2 (%)	44.27	33.75
West German Male Graduates		
RE	10.04	6.89
OE	3.46	4.60
UE	n.s.	-3.18
R^2 (%)	37.32	32.49
East German Female Graduates		
RE	9.50	7.07
OE	3.23	3.90
UE	n.s.	-5.33
R^2 (%)	39.12	41.44
East German Male Graduates		
RE	9.85	5.32
OE	n.s.	3.12
UE	n.s.	-4.06
R^2 (%)	53.34	31.2

Sources: SOEP v28, 1992-2011; HWWI.

4.1 | Results from OLS earnings estimations

We start with reporting results of the OLS model (model type 1). First, compared to a model of a more 'Mincerian style' that differs from the ORU model solely by the use of the aggregate variable of attained education instead of decomposing it in its ORU components, the ORU model proves to be more reliable in terms of explained variance. Throughout samples, R2 exceeds the corresponding value in the 'Mincerian style' model by 3-4 percentage points. This increase in the model's validity solely originating in the insertion of ORU variables is quite reasonable. With respect to point estimates, the findings show that one year of required education yields a return of 9.9 % (9.5 %)

for West (East) German women and of 10.04 % (9.85 %) for West (East) German men. One year of excess education comes up with 2.62 % (3.23 %) for West (East) German women and of 3.46 % for West German men. For East German men, overeducation does not yield significant returns. The results differ from earlier findings from Vahey (2000) who reports equal returns of overeducation for male and female graduates. By contrast, our findings are in line with those from Daly et al. (2000) who also find gendered returns of overeducation. Furthermore, our findings indicate that overeducated graduates of both genders (except East German men who lack evidence) earn more than their properly matched colleagues in the occupational benchmark group but less than properly matched graduates. This is in line with the findings of most previous studies. Moreover, West German women experience a wage loss of 6.40% per year from deficit education whereas East German women and men of both regions are not penalized when bringing less than the educational standard to the job. That is, if a West German woman holds a degree from a technical college whereas the standard in her occupational group is defined by a technical university exam this woman is even paid less than her colleagues whereas a man in the same situation would be equal off. The gender asymmetry in wage returns to under-education is contrary to the results of Daly et al. (2000) who find a higher penalty for men although the magnitude of the penalty is quite similar.

The findings from OLS estimations are contrary to the hypotheses of job competition as well as assignment theory which imply zero returns of overeducation. Obviously, the labor market is at least partly capable to absorb excess qualification by adapting production techniques in an income generating way. Moreover, since descriptive statistics reveals that overeducated graduates feature a reasonable amount of employment experience, the phenomenon may be hardly thought of as being primarily associated with labor market entry as career mobility theory postulates. Last but not least, different returns to education depending on job requirements are neither in line with human capital theory. However, we suggest that this theory may not be clearly rejected by our findings. It may not be excluded that different returns to education partly reflect a self-selection into educationally inadequate employment, e. g. driven by unaccounted preferences, disabilities, or health status. This particularly applies to female graduates since employed women are a more selective group than employed men. Whereas 96.2 % (94.57 %) of West (East) German men in the sample 2009-10 were employed, this this holds only for 86.84 % (88.06 %) of West (East) German women.

Two implications are drawn from the results so far. First, we test if women and men self-select differently into the labor market and if this affects earned wages differently. As Fortin et al. (2010) point out, an appropriate correction procedure for the mean wages when decomposing the gender pay gap is required in this case. Second, we deal with the hypothesis that unobserved individual features affect a person's employment

characteristics beyond the employment decision itself by deploying panel estimation techniques when estimating the earnings equation.

Referring to the first point, we estimate a probit model of the employment propensity with the intention to add the derived inverse of the Mill's ratio as an additional regressor in the earnings function to correct for selection bias. In detail, we model the employment propensity of a woman to depend on household characteristics, her partner's educational level and her job biography, since we suggest these variables to shape the woman's reservation wage, preferences and earnings capacity.[16] We find that the Mill's ratio proves significance only in the sample of East German women, at this only at the 9% level. That is, the error terms of the wage and the employment equation do not prove to be correlated in a statistically significant manner. We conclude that whereas employed women differ from the unemployed in household context variables that drive their employment decision, this does not come with a reasonable earnings advantage of the former. Apparently, the employment decision of female graduates is driven by aspects beyond opportunity costs. This result does not come as a surprise, since the bipolar sorting of West German academic women is a well-known phenomenon. They either take up a job or they opt for being out-of-the-labor-force. The deliberate decision in the latter case is reflected by the fact that they do neither seek for a job nor are they short-term available to take-up one. The pattern also applies to East German women even though to a lower extent. Hence, the data do not support the hypothesis that gendered selection into employment affects wages of men and women differently. Thus, we do not pursue the selection correction of OLS estimates further on.

The second concern points to unobserved heterogeneity. As mentioned above, it is likely that unobserved individual features affect a person's employment characteristics beyond the employment decision itself. For instance, the propensity to work part-time or to be employed in the public sector might be subject to those unobserved individual effects. As aforementioned, the empirical evidence of the prevalence of unobserved heterogeneity in the context of overeducation is manifold. To account for the latter, panel estimation techniques shall be deployed in what follows, exploiting the panel nature of the data at hand. Accordingly, subsequent earnings estimations refer to a sample derived from an unbalanced panel of the waves 1992-2011 as described above in Section 3

[16] More specifically, the covariates deployed are partner earnings, nonwage household income, pre-school child in the household, the partner's educational level, the employment and unemployment experience of the woman. Whereas job biography also impacts on wages, the household variables are regarded as being suitable to identify the selection equation. Indeed, partner's earnings prove to be significantly correlated with the female employment propensity but are not significantly associated to female earnings. Hence, the partner's earnings serves as identification variable in the selection equation.

4.2 | Results from Random Effects estimations

Model 2 in Table 3 controls for between-person effects in all time-variant variables except education variables. (The within variation in the education variables of either required education and surplus education or required education and deficit education would be collinear.) That is, coefficients of all time-variant variables except education variables might be interpreted as pure within-person effects, whereas coefficients of education variables comprise both within- and between-person effects. On the other hand, time-invariant variables are pure between-person effects probably mixed with unobserved heterogeneity. The findings indicate that although different remunerations of components of attained education do not completely vanish when unobserved heterogeneity is taken into account, differences are less pronounced: Being properly matched pays off less in the Random Effects model than in the OLS model whereas overeducation pays off more. In the new methodological setting, one year of required education yields a return of 9.64 % (7.07 %) for West (East) German women and of 6.89 % (5.32 %) for West (East) German men. One year of excess education comes up with 5.38 % (3.90 %) for West (East) German women and with 4.60 % (3.12 %) for West (East) German men. Furthermore, it is interesting that men's rewards are more similar to women's now. This is the more so as – adverse to the outcome in OLS estimations – adequate education pays off more for women than for men now. This holds for both German regions. Put differently: Our findings suggest that selection accounts for a reasonable part of gendered pay. We will feed back to this point later on.

We conclude that the difference in returns reported by the OLS model is at least partly driven by unobserved heterogeneity. Furthermore, deficit education which did no harm to men in the cross-sectional context, comes up with a negative impact on men's wages now.

Educational mismatch and job satisfaction

As discussed, educational mismatch may be the result of (a) hidden disabilities, of (b) of revealed preferences related to distinct job attributes except educational adequacy and maybe earnings, or of (c) true mismatch, motivated by person-external factors like labor market rigidities. As to (b), women might prefer a family-compatible work situation over a job with higher earnings but less time flexibility or higher commuting distances. Labor market withdrawals with their likely earnings shortcomings refer to preferences as well as long as disabilities do not matter in this context – that is, if productivity equaled formal education in the job entry phase prior to the withdrawal. Furthermore, according to Frank's theory of differential overeducation, women face less job options than their male partners and might therefore suffer true mismatch (c). We would expect that correctly matched persons are rather satisfied with their jobs. As to overeducation, we expect both genders being similarly affected by motivation (a)

and women clearly more strongly affected by reasons (b) and (c). Thus, it is not clear a priori what should be the implication for the association of overeducation and job satisfaction in the case of women. As OLS regressions 1992-2011 of job satisfaction on over-, under-, required education and employment experience indicate , required education is indeed positively associated to job satisfaction at the 1%-level for both genders and regions. However, overeducation is negatively correlated with job satisfaction in the case of women in both German regions. This particularly holds for West German women. By contrast, educational inadequacy is not significantly associated to job satisfaction in case of men. Apparently, women suffer more often from overeducation than men. Our findings correspond – in the case of women – with those from Korpi and Tåhlin (2009) who reported a negative association of overeducation and job satisfaction for both genders. However, our interpretation is less optimistic. We think that this does not necessarily mean that women – and especially the West German ones – are more subject to "true" mismatch than men. The evidence on gender biased self-reporting and the potential endogeneity of overeducation to earnings raise concerns of severe misinterpretation. The same problem applies to job satisfaction (Clark and Oswald 1996, Sloane and Williams 2000, Hoffmann and Jensen 2013). We conclude that the challenging relationships of job satisfaction, overeducation and earnings is worthwhile further research.

4.3 | Conclusions from earnings estimations with implications for the subsequent gender pay gap decomposition

All in all, we conclude that proper matches pay off more in the Western than in the Eastern part of Germany and for women more than for men. The higher returns of required education compared to overeducation that are derived both from the OLS and the RE model imply that the importance of proper job matches is overrated as long as unobserved heterogeneity is ignored. However, the latter does not seem to tell the whole story neither: although smaller, the differences in returns to required education and overeducation remain significant even in the RE model and are even more pronounced for undereducation. Furthermore, overeducation is negatively associated to job satisfaction in case of women whereas being properly matched is positively correlated with job satisfaction for both genders. The question arises if there is some "true" educational mismatch beyond selection effects. However, in our view there is no method at hand that is superior to the employed realized matches framework when it comes to evaluating the earnings consequences of overeducation.[17],[18]

[17] Korpi and Tåhlin (2009) provide evidence that deficit education entails significant wage penalties even when a fixed effects estimator is used. As their results from OLS estimation indicate, undereducation is related to a wage penalty of 2.6% (not gender specific) whereas the corresponding return derived from a Fixed Effects specification amounts to 1.8%. A similar magnitude of returns but with reversed sign is

As a result, our findings suggest that different components of attained education yield different returns, and that returns furthermore differ between sexes particularly with respect to undereducation. Required education pays off more than overeducation, and undereducation yields a lower wage penalty for men than for women. This overall pattern proves to be robust against changes in the underlying model setting and holds for both German regions. Thus, we adhere to OLS estimation results in the subsequent decomposition of the gender pay gap.

4.4 | Results from the Gender Pay Gap decomposition

Due to the nonlinearity of logarithms, the gross hourly wage differential has to be denoted by approximation. Results on the decomposition can be found in the appendix in table A2 for West Germany and table A3 for East Germany.

For West Germany, the overall earnings gap of 32.98 log points can be decomposed into an endowment effect of 23.68 pp., a coefficient effect of 20.92 pp. and an interaction effect of -11.62 pp.[19] That is, the endowment effect answers for roughly 72 % of the gap whereas coefficient and interaction effect together account for 28 % (residual effect).All three components are significant at the 1 %-level. For East Germany, the unadjusted gap only amounts to 18.79 log points. As in the Western part, the gap is largely driven by gendered endowments (13.91 pp.) that answer for three quarters (74 %) of the gap. Neither the coefficient effect (2.50 pp.) nor the interaction effect (2.38 pp.) is significant on the aggregate level.

The coefficient effect must not be considered as discrimination for two reasons. First, it might be harder for women to access highly remunerated job attributes (Daymont and Andrisani 1984); in this case, even the endowment effect encompasses some discrimination and the discrimination signaled by the price effect would be biased downward. Second, the discrimination displayed by the price effect may be upward biased due to selection effects. As discussed in Section 4.1 in more detail, the coefficients of earnings estimations that provide the basis for the decomposition capture

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retrieved for overeducation. The low level of coefficients presumably may be attributed to the fact that all educational levels are taken into account in this study. Probably more relevant, the authors had access to metric information on self-assessed educational (mis-)match.

[18] A further aspect has to be considered. Beyond gendered effects of unobserved heterogeneity, gendered returns to education might point to demand side factors like gender differences in assigned productivity. For example, employers might suggest that solely with regard to women, a deficit education signals a lack of productivity whereas men are expected to fill the gap with higher training investments and effort.

[19] That is, ignoring the negative (positive) interaction effect in a twofold decomposition following the standard approach would have led to an arbitrarily lower (higher) endowment or coefficient effect. While the endowment effect solely accounts for changes in the variables (how much female graduates would earn more if they had males' endowments) and the coefficient effect for changes in the coefficients (how much female graduates would earn more if they had males' remunerations), the interaction effect captures the effect of simultaneous variation of both. To set an example: Female graduates would earn less if they had the same coverage of public sector employment than male graduates and they also would earn less if they shared men's returns to public sector employment. However, the results indicate that women would earn more if they featured both items simultaneously. Therefore, the overall effect of the public sector on wage differentials consists of three single effects.

both within- and between-person effects. Furthermore, and most important, the coefficient effects mainly consists of differences in the constant term which captures unexplained parts of the wage differential. In West Germany, the constant term "explains" three quarters of the overall coefficient effect which leaves only 5.15 pp. for other influences. Likewise forEast Germany: The constant term covers 2.31 pp. of the overall coefficient effect., leaving only 0.18 pp. for estimated coefficients. The positive value of the constant terms both in West and East Germany indicate that apart from other factors that the evaluation effect controls for, female graduates earn less money per hour than male graduates. Looking at results in more detail, education plays a significant role for explaining the gap even though only required education matters. Women's fewer years of required education answers for 2.22 pp. of the gap in the Western part and 7.61 pp. in the Eastern part of Germany.[20] As summary statistics for East Germany shows (see Table 2), the gender gap in required education amounts to four months (0.34 years). Different endowments with excess education do not answer for the earnings gap among German graduates. This does not come as a surprise since Figure 1 pointed out that female graduates approached their male counterparts with respect to overeducation incidence in recent years if the educational standard in the occupational benchmark group is taken as a reference. Moreover, the finding is congruent with the empirical evidence (Vahey 2000, Leuze and Strauß 2009, Li and Miller 2012). Furthermore, neither gendered endowments with deficit education nor gendered remunerations of acquired schooling answer considerably for the pay gap. Not even the reasonable wage penalty from deficit education which has been derived from earnings estimations for West German women impacts on the West German earnings gap. Gendered endowments and rewards of a vocational training do not contribute to the gap either.

Instead, West German women earn less than men because they work more often in part time jobs with 16-25 weekly working hours and moreover and of even higher pay gap relevance, because they are paid worse than men in these jobs.[21] Whereas this status entails a wage premium for men, it comes up with a wage penalty for women in the Western part of Germany. Furthermore, women exhibit more years of labor market withdrawal which is penalized more severely in case of women than men. As can be derived from the earnings estimations, spells out of the labor market for family or other reasons which are not associated with an unemployment registration lead to significant wage cuts only for West German women. The severe earnings losses of German women associated with intermittent employment careers are well documented in the literature (e. g. Boll 2011). West German women providing fewer years of employment

[20] As the mean value of years of required education is slightly higher for West German females than for males, this result has to be attributed to the higher standard deviation of the mean in the case of females.

[21] The hourly wage rates for part-time employed (16-34 weekly working hours) versus full-time employed in our sample come close to the (not sex-differentiated) figures based on the Structure of Earnings Survey of the German Federal Statistical Office. In our sample, the median value of the gross hourly wage rate amounts to 19.20 Euro for part-time and to 21.18 Euro for full-time employed persons. The wage rate refers to de facto weekly working hours. This might explain why the figures derived from the Structure of Earnings Survey are somewhat higher (21.38 Euro and 23.97 Euro, respectively; see Statistisches Bundesamt 2012a).

experience accounts for 5.06 more pp. of the West German earnings gap while gendered effects of experience do not matter for the East German pay gap. The fact that women experience more years of unemployment in their job biography accounts for 1.30 pp. of the gap in West Germany. With 1.89 pp. this effect is more pronounced in the new Bundesländer. However, the wage penalty from unemployment is higher for men than for women. Put differently, if East German women were equally worse off from unemployment than their male counterparts this would have caused the gap to increase by more than 14 pp. (14.32). For East Germans, the part-time status does not impact on wages and thus does not contribute to the pay gap.

Women in both parts of Germany earn less than men because they work more often in small enterprises up to 200 employees and less often in the banking and insurances sector (West) and more often in the service sector (East), respectively.[22] The higher prevalence of East German women in the public sector reduces the East German pay gap by 2.95 pp. This points to the different importance of the public sector affiliation for the earnings structure in both German regions. For West Germany, the findings indicate that being employed in the public sector pays off more for female graduates than for males; in the absence of this gendered remuneration benefitting women, the West German gap increased by 5.89 pp.[23] Despite the overall lower pay of SME's compared to big enterprises with more than 2000 employees, West German women who are working in small or medium sized firms are better off than their male colleagues. The two effects affect the gender pay gap differently.

With regard to household characteristics, the gendered remuneration of parenthood answers for more than 21 pp. of the pay gap in East Germany, representing by far the strongest single effect for East Germany's pay gap decomposition. However, this effect proves to be significant only at the 10% level and thus should not be overrated. Whereas for West Germany no analogous effect may be observed, the higher prevalence of pre-school children in the households of West German male graduates account for 1.12 pp. of the gap. The latter effect reflects the selective employment behavior of West German women who are less likely to be employed when their kids are young. By contrast, East German women are habituated to work even in the presence of young children. Being less benefitted from parenthood in terms of wages, East German women experience different assignments and/or wage relevant traits related to parenthood than men. 1.70 more pp. of the West German pay gap relate to on average higher earnings of women's partners than men's partners. This is plausible since findings derived from the earnings estimations indicate that high partner earnings are to the detriment of women's wages but not vice versa; this provides evidence for Franks 'tied movers tied stayers'-hypothesis. Furthermore, household asset income that is positively related

[22] The sector effects are significant only at the 10%-level, though.

[23] However, the latter solely applies to white collar workers since the gap is enlarged by 0,70 pp. due to the higher prevalence of women among clerks.

to wages pays off more for West German men than for their female counterparts. This answers for 4.64 more pp. of the pay gap. Last but not least, a highly educated father impacts positively on women's earnings but negatively on men's. This reduces the West German pay gap by 3.34 more pp. None of the discussed household variables significantly affect the East German pay gap at least at the 5%-level. Particularly from the absence of a spousal earnings effect we derive the conclusion that different attitudes in East and West Germany are still in force when it comes to women's (and especially mothers') labor market involvement. Whereas the latter being taken for granted in the Eastern part, participation still seems to be one option among others in the Western part.

5 | Conclusion

Our findings suggest that different components of attained education yield different returns, and that returns furthermore differ between sexes particularly with respect to undereducation. The findings are contrary to human capital theory and to assignment theory. This overall pattern proves to be robust against changes in the underlying model setting and holds for both German regions. However, overeducation does not matter for the pay gap among graduates. Instead, women's fewer years of required education reasonably do. As educational investment decisions preceding employment biography are also subject to prevailing gender roles, the gender gap with respect to required education has to be regarded as being subject to gender stereotypes as well. This particularly applies to East Germany where this aspect of gendered endowments answers for a noticeable part of the pay gap. From panel estimations of the earnings equation and supplementing job satisfaction analyses we conclude that unobserved heterogeneity is part of but not the essence of the story of different returns to education, supporting the findings of Korpi and Tåhlin (2009).[24]

Apart from education, gendered job biographies crucially impact on the pay gap in West Germany whereas they are of minor importance in the Eastern part. Descriptive statistics and empirical evidence indicate that this is mainly due to a rather similar employment behavior of women and men in the Eastern part of Germany while the Western part is shaped by persistent gender stereotypes answering for gendered career profiles. The negligible impact of household characteristics in the Eastern part whereas some of these context variables seriously impact on the gap in the Western part, supports this view. From the far higher overall magnitude of the West German pay gap we conclude that apart from hidden abilities, the gendered earnings gap among German graduates is rather shaped by an employment behaviour suiting traditional gender roles and assigned gender stereotypes than being subject to gendered educational in-

[24] Unlike Korpi and Tåhlin (2009), we do not analyse heterogeneity in jobs in this article.

adequacy. Moreover and preceding employment, traditional gender roles become manifest in educational investment decisions, with women exhibiting fewer years of education than men. Most likely also fields of study impact on overeducation and earnings – a subject that could not be addressed empirically in this study due to the above mentioned data constraints. Tackling these obstacles for equal pay remains on the top of the political agenda and sets up the basis for future research.

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Annex

ANNEX - Table A1

Descriptive statistics of cross-section data used for OLS earnings estimations (pooled waves 2009-2010)

	West Germany				East Germany			
*=Dummy	Female Graduates		Male Graduates		Female Graduates		Male	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Endogenous variable								
Log gross hourly wage rate	2.93574	0.49528	3.26552	0.49348	2.70804	0.50817	2.89591	0.53997
Exogenous variables								
Education								
Attained education (years)	16.9227	1.47326	16.8747	1.54262	15.7062	2.22619	16.5779	1.96839
Required education (years)	15.2239	2.0559	15.4483	1.5763	14.2444	1.90908	15.0463	1.83651
Superfluous education (years)	1.81529	1.73002	1.61487	1.4525	1.65843	1.67847	1.80174	1.65613
Deficit education (years)	0.11651	0.46171	0.18847	0.57961	0.19661	0.64384	0.2702	0.73653
Employment biography								
Full-time employment* (self-assessment of survey person) (*Reference*)	0.65379	0.47613	0.94205	0.23381	0.74576	0.43605	0.94262	0.23304
Part-time employment (16-25h)* (self-assessment of survey person)	0.17311	0.37863	0.02965	0.16973	0.09605	0.29507	0.0123	0.11043
Part-time employment (26-35h)* (self-assessment of survey person)	0.09737	0.29669	0.02426	0.15396	0.14124	0.34876	0.04098	0.19866
Vocational Training*	0.28748	0.45294	0.33019	0.4706	0.51695	0.50042	0.41803	0.49425
Employment experience (full-time + part-time, years)	14.419	7.97562	16.8067	7.99765	18.8963	8.74815	18.8385	9.26177
OLF experience (years out of the labor force for family or other reasons)	2.56929	4.64508	0.18374	1.30641	1.2161	1.83184	0.13866	0.93043
Unemployment experience (registered UE, years)	0.32782	0.92636	0.18612	0.55305	0.63927	1.3687	0.34426	0.76115
Job features								
Primary sector, energy, mining*	0.02628	0.16008	0.031	0.17343	0.0226	0.14883	0.04098	0.19866
Manufacturing* (*Reference*)	0.06955	0.25459	0.13208	0.3388	0.07062	0.25655	0.12295	0.32906
Construction*	0.05719	0.23238	0.17116	0.3769	0.02825	0.16592	0.13934	0.34702
Trade*	0.04946	0.21699	0.031	0.17343	0.05932	0.23656	0.08197	0.27488
Transport*	0.03555	0.18531	0.03369	0.18056	0.0339	0.18122	0.05738	0.23304
Banking and insurances*	0.04328	0.20364	0.06739	0.25086	0.03672	0.18835	0.03279	0.17844

*=Dummy	West Germany				East Germany			
	Female Graduates		Male Graduates		Female Graduates		Male	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Other services* (business services, public administration, social insurance carriers)	0.7187	0.44998	0.53369	0.4992	0.74859	0.43444	0.52459	0.50042
Civil servant*(*Reference: otherwise dependently employed*)	0.2442	0.42995	0.16577	0.37212	0.0904	0.28715	0.11066	0.31435
Public sector* (*Reference: Private sector*)	0.48686	0.50021	0.28032	0.44946	0.4774	0.5002	0.33197	0.47189
Big enterprise* (2000 or more employees) (*Reference*)	0.28903	0.45366	0.35984	0.48028	0.21186	0.40921	0.2418	0.42906
Medium-size enterprise* (200-199 employees)	0.19011	0.39269	0.21563	0.41154	0.21469	0.41119	0.27459	0.44722
Small enterprise* (less than 200 employees)	0.52087	0.49995	0.42453	0.4946	0.57345	0.49528	0.48361	0.50076
Partner- and household context								
Single* (without partner or not living together with a partner)	0.30912	0.46249	0.21698	0.41247	0.26271	0.44073	0.17213	0.37827
Married* (living together with husband/wife)	0.5425	0.49858	0.66038	0.4739	0.5904	0.49246	0.65164	0.47743
Cohabiting * (living together but not married)	0.14838	0.35575	0.12264	0.32825	0.14689	0.3545	0.17623	0.3818
Partner's gross wage income (per month, Euro)	3520.82	4189.95	1557.95	2035.32	2414.96	2674.28	1664.81	1607.3
Partner is highly educated* (ISCED 6)	0.46213	0.49895	0.4124	0.4926	0.36723	0.48273	0.51639	0.50076
Partner is medium educated* (ISCED 3-5)	0.21175	0.40886	0.3531	0.47826	0.33333	0.47207	0.30738	0.46236
Partner is lowly educated* (ISCED <3)	0.017	0.12938	0.01752	0.13129	0.03672	0.18835	0.0041	0.06402
Nonwage income of the household (interest, rent, dividend, redistributive income, Euro)	341.757	1129.17	315.109	670.964	180.624	599.015	155.02	508.182
Parenthood* (referring to births; reference= childlessness)	0.53941	0.49883	0.62264	0.48505	0.80791	0.3945	0.78279	0.4132
Child aged 7 or older* (Reference)	0.46059	0.49883	0.50539	0.50031	0.71469	0.4522	0.62705	0.48458
Child aged 6 or younger*	0.14065	0.34793	0.22507	0.41791	0.15537	0.36277	0.25	0.4339
Household size (persons)	2.60742	1.21414	3.01348	1.39493	2.71469	1.09102	3.0123	1.31619
Residence in North Germany* (Hamburg, Schleswig-Holstein, Bremen, Niedersachsen)	0.17002	0.37594	0.16981	0.37572	0	0	0	0

*=Dummy	West Germany				East Germany			
	Female Graduates		Male Graduates		Female Graduates		Male	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Residence in East Germany* (Sachsen, Sachsen-Anhalt, Thüringen, Brandenburg, Mecklenburg-Vorpommern, Berlin)	0	0	0	0	1	0	1	0
Residence in West Germany* (Nordrhein-Westfalen, Rheinland-Pfalz, Saarland)	0.33694	0.47303	0.28571	0.45206	0	0	0	0
Residence in South Germany* (Bayern, Baden-Württemberg, Hessen)	0.49304	0.50034	0.54447	0.49835	0	0	0	0
Parents' home characteristics								
Mother is highly educated* (ISCED 6)	0.14219	0.34952	0.12129	0.32669	0.23446	0.42426	0.2541	0.43625
Father is highly educated* (ISCED 6)	0.3153	0.465	0.31806	0.46604	0.34463	0.47592	0.44262	0.49772
Mother is employed* (at age 15 of survey person)	0.49768	0.50038	0.41105	0.49236	0.35028	0.47773	0.47951	0.50061
Father is employed* (at age 15 of survey person)	0.92581	0.26228	0.9124	0.2829	0.91808	0.27463	0.95902	0.19866
Nationality/migration background								
No migration background*	0.85471	0.35266	0.89623	0.30517	0.96045	0.19517	0.96721	0.17844
Indirect migration background* (at least one parent born abroad)	0.05719	0.23238	0.04717	0.21214	0.00847	0.0918	0.01639	0.12724
Direct migration background* (survey person born abroad)	0.0881	0.28366	0.0566	0.23124	0.03107	0.17376	0.01639	0.12724

Sources: SOEP v28, 2009-2010; HWWI.

ANNEX - Table A2

Decomposition of the mean Gender Pay Gap among West German graduates

Blinder-Oaxaca decomposition	Number of obs	=	1389
	Model	=	linear
Group 1 (male graduates):	N of obs 1	=	742
Group 2 (female graduates):	N of obs 2	=	647

	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
Overall						
Log hourly wage rate of male graduates	3.2655	0.0184	177.57	0.0000	3.2295	3.3016
Log hourly wage rate of female graduates	2.9357	0.0198	148.48	0.0000	2.8970	2.9745

	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
Difference in Log- hourly wage rates	0.3298	0.0270	12.21	0.0000	0.2768	0.3827
- thereof endowment effect	0.2368	0.0282	8.4000	0.0000	0.1816	0.2920
- thereof evaluation effect (price effect) (including the constant term)	0.2092	0.0429	4.8800	0.0000	0.1252	0.2932
- thereof interaction effect	-0.1162	0.0441	-2.64	0.0080	-0.2026	-0.0299
Composition of the endowment effect						
Employment biography						
Part-time employment (26-35h)	0.0031	0.0039	0.7900	0.4310	-0.0046	0.0107
Part-time employment (16-25h)	0.0162	0.0065	2.4900	0.0130	0.0034	0.0289
Employment experience	0.0506	0.0107	4.7500	0.0000	0.0297	0.0715
OLF experience	0.0329	0.0101	3.2600	0.0010	0.0131	0.0527
Unemployment experience	0.0130	0.0045	2.9000	0.0040	0.0042	0.0218
Vocational Training	-0.0049	0.0033	-1.5100	0.1310	-0.0113	0.0015
Required education	0.0222	0.0103	2.1500	0.0310	0.0020	0.0424
Superfluous education	-0.0052	0.0038	-1.3900	0.1640	-0.0126	0.0021
Deficit education	-0.0046	0.0030	-1.5100	0.1300	-0.0106	0.0014
Job features						
Primary sector. energy. mining	-0.0001	0.0005	-0.1100	0.9140	-0.0011	0.0010
Construction	0.0183	0.0103	1.7800	0.0750	-0.0018	0.0384
Trade	0.0018	0.0020	0.9100	0.3630	-0.0021	0.0056
Transport	-0.0001	0.0006	-0.1800	0.8580	-0.0012	0.0010
Banking and insurances	0.0094	0.0053	1.7800	0.0750	-0.0009	0.0198
Other services	0.0171	0.0120	1.4300	0.1540	-0.0064	0.0407
Civil servant	0.0070	0.0041	1.7000	0.0880	-0.0011	0.0151
Public sector	0.0047	0.0088	0.5300	0.5970	-0.0127	0.0220
Medium-size enterprise	0.0001	0.0012	0.0600	0.9550	-0.0023	0.0024
Small enterprise	0.0135	0.0053	2.5400	0.0110	0.0031	0.0239
Partner- and household context						
Married	0.0110	0.0065	1.6900	0.0920	-0.0018	0.0239
Cohabiting	-0.0012	0.0018	-0.6600	0.5080	-0.0046	0.0023
Partner's gross wage income	0.0170	0.0100	1.7100	0.0880	-0.0025	0.0365
Partner is highly educated	-0.0124	0.0064	-1.9500	0.0520	-0.0249	0.0001
Partner is medium educated	0.0000	0.0002	-0.0700	0.9430	-0.0005	0.0005
Nonwage income of the household	-0.0007	0.0015	-0.5100	0.6130	-0.0036	0.0021
Parenthood	0.0047	0.0044	1.0600	0.2870	-0.0039	0.0132
Child aged 6 or younger	0.0112	0.0052	2.1400	0.0320	0.0009	0.0215
Household size	0.0083	0.0076	1.0900	0.2780	-0.0067	0.0233
Residence in South Germany	0.0039	0.0030	1.2900	0.1960	-0.0020	0.0097
Residence in West Germany	-0.0027	0.0027	-1.0000	0.3170	-0.0079	0.0025
Parents' home characteristics						
Mother is highly educated	0.0009	0.0013	0.7000	0.4820	-0.0016	0.0034
Father is highly educated	0.0002	0.0018	0.1100	0.9120	-0.0032	0.0036
Mother employed	0.0003	0.0027	0.1100	0.9100	-0.0050	0.0056

	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
Father employed	-0.0008	0.0012	-0.6700	0.5000	-0.0031	0.0015
Nationality/migration background						
Indirect migration background	-0.0005	0.0009	-0.5300	0.5980	-0.0023	0.0013
Direct migration background	0.0027	0.0022	1.2500	0.2120	-0.0015	0.0069
Composition of the evaluation effect (price effect)						
Employment biography						
Part-time employment (26-35h)	-0.0063	0.0109	-0.5800	0.5650	-0.0277	0.0151
Part-time employment (16-25h)	0.0476	0.0179	2.6600	0.0080	0.0125	0.0827
Employment experience	-0.0142	0.0494	-0.2900	0.7730	-0.1111	0.0826
OLF experience	0.0840	0.0318	2.6400	0.0080	0.0218	0.1463
Unemployment experience	-0.0005	0.0107	-0.0400	0.9640	-0.0215	0.0205
Vocational Training	0.0216	0.0150	1.4400	0.1490	-0.0077	0.0509
Required education	0.0207	0.3155	0.0700	0.9480	-0.5976	0.6391
Superfluous education	0.0152	0.0403	0.3800	0.7050	-0.0637	0.0942
Deficit education	0.0083	0.0054	1.5300	0.1250	-0.0023	0.0189
Job features						
Primary sector. energy. mining	-0.0030	0.0039	-0.7800	0.4320	-0.0106	0.0045
Construction	-0.0070	0.0060	-1.1700	0.2430	-0.0187	0.0047
Trade	0.0039	0.0066	0.6000	0.5490	-0.0089	0.0168
Transport	-0.0057	0.0050	-1.1400	0.2520	-0.0155	0.0041
Banking and insurances	-0.0143	0.0058	-2.4800	0.0130	-0.0256	-0.0030
Other services	0.0143	0.0585	0.2400	0.8060	-0.1003	0.1290
Civil servant	-0.0058	0.0184	-0.3100	0.7530	-0.0417	0.0302
Public sector	-0.0589	0.0325	-1.8100	0.0700	-0.1227	0.0048
Medium-size enterprise	-0.0222	0.0120	-1.8500	0.0640	-0.0457	0.0013
Small enterprise	-0.0449	0.0277	-1.6200	0.1050	-0.0993	0.0094
Partner- and household context						
Married	0.0050	0.0450	0.1100	0.9110	-0.0832	0.0933
Cohabiting	-0.0036	0.0132	-0.2700	0.7860	-0.0294	0.0222
Partner's gross wage income	0.0279	0.0359	0.7800	0.4380	-0.0426	0.0983
Partner is highly educated	0.0224	0.0121	1.8500	0.0640	-0.0013	0.0462
Partner is highly educated	-0.0011	0.0029	-0.3700	0.7120	-0.0068	0.0046
Nonwage income of the household	0.0464	0.0111	4.1900	0.0000	0.0247	0.0681
Parenthood	-0.0250	0.0392	-0.6400	0.5250	-0.1019	0.0519
Child aged 6 or younger	-0.0043	0.0098	-0.4500	0.6560	-0.0235	0.0148
Household size	-0.0257	0.0649	-0.4000	0.6920	-0.1529	0.1015
Residence in South Germany	-0.0014	0.0296	-0.0500	0.9610	-0.0594	0.0565
Residence in West Germany	-0.0068	0.0219	-0.3100	0.7550	-0.0497	0.0361
Parents' home characteristics						
Mother is highly educated	0.0052	0.0101	0.5100	0.6100	-0.0147	0.0250
Father is highly educated	-0.0334	0.0163	-2.0500	0.0410	-0.0654	-0.0014
Mother employed	0.0219	0.0218	1.0000	0.3160	-0.0209	0.0647
Father employed	0.0040	0.0741	0.0500	0.9570	-0.1413	0.1492

	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
Nationality/migration background						
Indirect migration background	-0.0043	0.0058	-0.7500	0.4550	-0.0157	0.0071
Direct migration background	-0.0085	0.0077	-1.1000	0.2700	-0.0236	0.0066
constant	0.1577	0.3687	0.4300	0.6690	-0.5650	0.8804
Composition of the interaction effect						
Employment biography						
Part-time employment (26-35h)	0.0047	0.0082	0.5700	0.5660	-0.0114	0.0208
Part-time employment (16-25h)	-0.0395	0.0151	-2.6100	0.0090	-0.0691	-0.0098
Employment experience	-0.0024	0.0082	-0.2900	0.7740	-0.0184	0.0137
OLF experience	-0.0780	0.0296	-2.6300	0.0080	-0.1361	-0.0200
Unemployment experience	0.0002	0.0046	0.0400	0.9640	-0.0089	0.0093
Vocational Training	0.0032	0.0029	1.1100	0.2670	-0.0025	0.0089
Required education	0.0003	0.0047	0.0700	0.9480	-0.0088	0.0094
Superfluous education	-0.0017	0.0045	-0.3700	0.7090	-0.0105	0.0071
Deficit education	0.0051	0.0038	1.3500	0.1780	-0.0023	0.0126
Job features						
Primary sector. energy. mining	-0.0005	0.0012	-0.4400	0.6600	-0.0030	0.0019
Construction	-0.0139	0.0119	-1.1700	0.2420	-0.0371	0.0094
Trade	-0.0015	0.0026	-0.5700	0.5690	-0.0065	0.0036
Transport	0.0003	0.0016	0.1900	0.8520	-0.0029	0.0034
Banking and insurances	-0.0080	0.0049	-1.6100	0.1070	-0.0176	0.0017
Other services	-0.0037	0.0151	-0.2400	0.8070	-0.0332	0.0258
Civil servant	0.0019	0.0059	0.3100	0.7540	-0.0097	0.0135
Public sector	0.0250	0.0141	1.7700	0.0770	-0.0027	0.0527
Medium-size enterprise	-0.0030	0.0030	-1.0000	0.3180	-0.0088	0.0029
Small enterprise	0.0083	0.0056	1.4800	0.1390	-0.0027	0.0193
Partner- and household context						
Married	0.0011	0.0098	0.1100	0.9110	-0.0181	0.0203
Cohabiting	0.0006	0.0023	0.2700	0.7900	-0.0039	0.0052
Partner's gross wage income	-0.0155	0.0201	-0.7700	0.4390	-0.0549	0.0238
Partner is highly educated	0.0150	0.0084	1.7800	0.0740	-0.0015	0.0314
Partner is highly educated	0.0000	0.0005	-0.0700	0.9420	-0.0009	0.0009
Nonwage income of the household	-0.0036	0.0069	-0.5200	0.6020	-0.0172	0.0100
Parenthood	-0.0039	0.0062	-0.6200	0.5330	-0.0160	0.0083
Child aged 6 or younger	-0.0026	0.0059	-0.4400	0.6580	-0.0141	0.0089
Household size	-0.0040	0.0101	-0.3900	0.6930	-0.0239	0.0159
Residence in South Germany	-0.0002	0.0031	-0.0500	0.9610	-0.0062	0.0059
Residence in West Germany	0.0010	0.0034	0.3100	0.7570	-0.0056	0.0076
Parents' home characteristics						
Mother is highly educated	-0.0008	0.0016	-0.4700	0.6410	-0.0039	0.0024
Father is highly educated	-0.0003	0.0027	-0.1100	0.9120	-0.0055	0.0049
Mother employed	-0.0038	0.0040	-0.9600	0.3380	-0.0116	0.0040
Father employed	-0.0001	0.0011	-0.0500	0.9580	-0.0022	0.0021

	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
Nationality/migration background						
Indirect migration background	0.0008	0.0014	0.5600	0.5760	-0.0019	0.0034
Direct migration background	0.0030	0.0030	1.0000	0.3190	-0.0029	0.0090

The decomposition relies on OLS estimation results partially reported in Table 3 in the text.
Sources: SOEP v28, 2009-2010; HWWI.

ANNEX - Table A3

Decomposition of the mean Gender Pay Gap among East German graduates

Blinder-Oaxaca decomposition	Number of obs	=	1389
	Model	=	linear
Group 1 (male graduates):	N of obs 1	=	244
Group 2 (female graduates):	N of obs 2	=	354

	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
Overall						
Log hourly wage rate of male graduates	2.8959	0.0357	81.17	0.0000	2.8260	2.9658
Log hourly wage rate of female graduates	2.7080	0.0278	97.45	0.0000	2.6536	2.7625
Difference in Log- hourly wage rates	0.1879	0.0452	4.15	0.0000	0.0992	0.2765
- thereof endowment effect	0.1391	0.0423	3.29	0.0010	0.0561	0.2221
- thereof evaluation effect (price effect) (including the constant term)	0.0250	0.0674	0.3700	0.7110	-0.1071	0.1571
- thereof interaction effect	0.0238	0.0703	0.34	0.7360	-0.1141	0.1616
Composition of the endowment effect						
Employment biography						
Part-time employment (26-35h)	0.0011	0.0072	0.1500	0.8780	-0.0130	0.0152
Part-time employment (16-25h)	-0.0036	0.0069	-0.5200	0.6060	-0.0171	0.0100
Employment experience	-0.0007	0.0097	-0.0800	0.9390	-0.0197	0.0182
OLF experience	-0.0091	0.0159	-0.5700	0.5660	-0.0403	0.0220
Unemployment experience	0.0189	0.0079	2.4000	0.0160	0.0035	0.0343
Vocational Training	0.0007	0.0055	0.1300	0.8940	-0.0100	0.0114
Required education	0.0761	0.0205	3.7200	0.0000	0.0360	0.1163
Superfluous education	0.0046	0.0051	0.9100	0.3610	-0.0053	0.0145
Deficit education	-0.0032	0.0039	-0.8300	0.4090	-0.0108	0.0044
Job features						
Primary sector. energy. mining	-0.0021	0.0036	-0.5900	0.5570	-0.0091	0.0049
Construction	-0.0047	0.0184	-0.2600	0.7970	-0.0407	0.0313
Trade	-0.0060	0.0064	-0.9400	0.3500	-0.0185	0.0065
Transport	-0.0035	0.0044	-0.7900	0.4300	-0.0120	0.0051
Banking and insurances	0.0004	0.0016	0.2400	0.8100	-0.0027	0.0035
Other services	0.0419	0.0230	1.8200	0.0680	-0.0032	0.0869

	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
Civil servant	-0.0023	0.0033	-0.6800	0.4970	-0.0088	0.0043
Public sector	-0.0295	0.0117	-2.5300	0.0110	-0.0523	-0.0066
Medium-size enterprise	-0.0102	0.0075	-1.3600	0.1730	-0.0248	0.0044
Small enterprise	0.0285	0.0142	2.0000	0.0450	0.0006	0.0564
Partner- and household context						
Married	0.0113	0.0091	1.2500	0.2130	-0.0065	0.0291
Cohabiting	0.0032	0.0043	0.7300	0.4660	-0.0053	0.0117
Partner's gross wage income	0.0100	0.0091	1.1000	0.2710	-0.0078	0.0277
Partner is highly educated	0.0033	0.0052	0.6300	0.5260	-0.0069	0.0136
Partner is medium educated	0.0036	0.0045	0.8000	0.4240	-0.0053	0.0125
Nonwage income of the household	-0.0019	0.0035	-0.5400	0.5890	-0.0087	0.0049
Parenthood	0.0037	0.0055	0.6700	0.5040	-0.0071	0.0144
Child aged 6 or younger	-0.0004	0.0080	-0.0500	0.9610	-0.0162	0.0154
Household size	0.0053	0.0091	0.5800	0.5590	-0.0125	0.0231
Parents' home characteristics						
Mother is highly educated	-0.0005	0.0015	-0.3400	0.7360	-0.0034	0.0024
Father is highly educated	0.0046	0.0056	0.8100	0.4150	-0.0065	0.0156
Mother employed	-0.0036	0.0071	-0.5100	0.6100	-0.0174	0.0102
Father employed	0.0001	0.0035	0.0300	0.9740	-0.0068	0.0070
Nationality/migration background						
Indirect migration background	0.0027	0.0039	0.7100	0.4800	-0.0048	0.0103
Direct migration background	0.0002	0.0019	0.1300	0.8980	-0.0035	0.0040
Composition of the evaluation effect (price effect)						
Employment biography						
Part-time employment (26-35h)	-0.0149	0.0215	-0.6900	0.4890	-0.0571	0.0273
Part-time employment (16-25h)	-0.0234	0.0237	-0.9900	0.3230	-0.0698	0.0230
Employment experience	-0.0744	0.1208	-0.6200	0.5380	-0.3112	0.1624
OLF experience	0.0111	0.0385	0.2900	0.7740	-0.0644	0.0866
Unemployment experience	-0.1432	0.0302	-4.7400	0.0000	-0.2024	-0.0840
Vocational Training	0.0416	0.0430	0.9700	0.3330	-0.0426	0.1258
Required education	0.0512	0.4104	0.1200	0.9010	-0.7532	0.8556
Superfluous education	-0.0320	0.0467	-0.6800	0.4940	-0.1236	0.0596
Deficit education	0.0003	0.0111	0.0300	0.9790	-0.0214	0.0220
Job features						
Primary sector. energy. mining	-0.0027	0.0054	-0.4900	0.6220	-0.0133	0.0079
Construction	-0.0058	0.0058	-1.0000	0.3180	-0.0171	0.0055
Trade	0.0015	0.0104	0.1400	0.8860	-0.0189	0.0219
Transport	-0.0007	0.0068	-0.1100	0.9150	-0.0140	0.0126
Banking and insurances	-0.0022	0.0082	-0.2700	0.7870	-0.0182	0.0138
Other services	-0.0161	0.0981	-0.1600	0.8690	-0.2085	0.1762
Civil servant	-0.0056	0.0124	-0.4500	0.6510	-0.0299	0.0187
Public sector	-0.0163	0.0453	-0.3600	0.7180	-0.1051	0.0724
Medium-size enterprise	0.0238	0.0222	1.0700	0.2830	-0.0196	0.0672

	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
Small enterprise	0.0654	0.0534	1.2300	0.2200	-0.0392	0.1701
Partner- and household context						
Married	-0.0201	0.0797	-0.2500	0.8010	-0.1764	0.1362
Cohabiting	-0.0153	0.0220	-0.7000	0.4860	-0.0585	0.0278
Partner's gross wage income	0.0432	0.0553	0.7800	0.4340	-0.0651	0.1516
Partner is highly educated	0.0173	0.0298	0.5800	0.5630	-0.0412	0.0758
Partner is highly educated	0.0067	0.0153	0.4300	0.6640	-0.0234	0.0367
Nonwage income of the household	0.0114	0.0116	0.9800	0.3250	-0.0113	0.0342
Parenthood	0.2113	0.1093	1.9300	0.0530	-0.0029	0.4255
Child aged 6 or younger	-0.0055	0.0185	-0.3000	0.7650	-0.0418	0.0307
Household size	-0.0344	0.1075	-0.3200	0.7490	-0.2451	0.1763
Parents' home characteristics						
Mother is highly educated	-0.0089	0.0226	-0.3900	0.6930	-0.0531	0.0353
Father is highly educated	0.0363	0.0272	1.3400	0.1810	-0.0169	0.0896
Mother employed	-0.0145	0.0277	-0.5200	0.6010	-0.0687	0.0398
Father employed	-0.0694	0.1471	-0.4700	0.6370	-0.3578	0.2189
Nationality/migration background						
Indirect migration background	-0.0021	0.0033	-0.6500	0.5170	-0.0085	0.0043
Direct migration background	-0.0117	0.0086	-1.3600	0.1730	-0.0286	0.0051
constant	0.0231	0.5165	0.0400	0.9640	-0.9892	1.0355
Composition of the interaction effect						
Employment biography						
Part-time employment (26-35h)	0.0106	0.0154	0.6900	0.4920	-0.0196	0.0407
Part-time employment (16-25h)	0.0204	0.0208	0.9800	0.3270	-0.0203	0.0611
Employment experience	0.0002	0.0030	0.0800	0.9390	-0.0056	0.0061
OLF experience	-0.0098	0.0341	-0.2900	0.7740	-0.0767	0.0571
Unemployment experience	0.0661	0.0229	2.8900	0.0040	0.0213	0.1109
Vocational Training	-0.0080	0.0089	-0.9000	0.3690	-0.0253	0.0094
Required education	0.0029	0.0231	0.1200	0.9010	-0.0424	0.0482
Superfluous education	-0.0028	0.0048	-0.5700	0.5680	-0.0122	0.0067
Deficit education	0.0001	0.0041	0.0300	0.9790	-0.0080	0.0082
Job features						
Primary sector. energy. mining	-0.0022	0.0047	-0.4600	0.6430	-0.0114	0.0070
Construction	-0.0226	0.0221	-1.0200	0.3060	-0.0659	0.0207
Trade	0.0006	0.0040	0.1400	0.8870	-0.0073	0.0084
Transport	-0.0005	0.0047	-0.1100	0.9160	-0.0097	0.0087
Banking and insurances	0.0002	0.0013	0.1900	0.8510	-0.0022	0.0027
Other services	0.0048	0.0294	0.1600	0.8690	-0.0527	0.0624
Civil servant	-0.0013	0.0032	-0.3900	0.6930	-0.0075	0.0050
Public sector	0.0050	0.0139	0.3600	0.7190	-0.0222	0.0321
Medium-size enterprise	0.0066	0.0073	0.9100	0.3650	-0.0077	0.0210
Small enterprise	-0.0103	0.0096	-1.0700	0.2850	-0.0291	0.0086
Partner- and household context						

	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
Married	-0.0021	0.0084	-0.2500	0.8040	-0.0185	0.0144
Cohabiting	-0.0031	0.0054	-0.5600	0.5730	-0.0137	0.0076
Partner's gross wage income	-0.0134	0.0174	-0.7700	0.4410	-0.0476	0.0207
Partner is highly educated	-0.0013	0.0031	-0.4400	0.6620	-0.0074	0.0047
Partner is highly educated	-0.0059	0.0136	-0.4300	0.6650	-0.0327	0.0208
Nonwage income of the household	-0.0016	0.0033	-0.4900	0.6240	-0.0081	0.0049
Parenthood	-0.0066	0.0095	-0.6900	0.4870	-0.0251	0.0120
Child aged 6 or younger	-0.0034	0.0113	-0.3000	0.7660	-0.0256	0.0188
Household size	-0.0038	0.0119	-0.3200	0.7510	-0.0270	0.0195
Parents' home characteristics						
Mother is highly educated	-0.0007	0.0023	-0.3200	0.7490	-0.0053	0.0038
Father is highly educated	0.0103	0.0088	1.1700	0.2410	-0.0069	0.0276
Mother employed	-0.0053	0.0103	-0.5200	0.6060	-0.0256	0.0149
Father employed	-0.0031	0.0067	-0.4600	0.6450	-0.0163	0.0101
Nationality/migration background						
Indirect migration background	-0.0020	0.0037	-0.5400	0.5930	-0.0092	0.0053
Direct migration background	0.0055	0.0060	0.9300	0.3520	-0.0061	0.0172

Sources: SOEP v28, 2009-2010; HWWI.

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