TRAINING IN EUROPE – ARE INEQUALITIES OF OPPORTUNITIES EQUAL ACROSS DIFFERENT COUNTRIES?

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ABSTRACT

Despite laws and regulations fostering equality in the EU, inequality of opportunities in education and development persist in European countries. One important part of employee development is company training. Empirical studies conclude that previous education and gender are two important factors that influence participation in continuous training, thereby possibly discriminating against different groups of employees. However, while the EU tries to fight inequality of opportunities by a one-fits-all-approach, little is known about the impact of deep-rooted national institutions that may promote these inequalities by giving incentives for employers or employees to invest less in continuous training.

The aim of this study is to shed light on the individual and institutional determinants of training. Analysing training data from 22 European countries it can be shown that not only individual characteristics but also national institutions like labour markets and educational systems are linked to employees' training participation. In fact, multilevel analyses suggest that these institutions do not only have a direct effect on training, but also moderate the impact of individual employee characteristics on training participation to a certain extent. The analyses imply that the effects of previous education and gender may differ, depending on the institutional setting. More specifically, in countries with strong vocational systems females seem to be disadvantages compared to men. Employees with lower education appear to be especially disadvantaged in countries with long mean tenure. More generally, the results indicate that in countries with high levels of female training, employees without a university degree get relatively less training and vice versa.

INTRODUCTION

The unequal distribution of employment opportunities and socioeconomic rewards between men and women is widely recognized and one of the main issues in the on-going inequality debate (see e.g. European Commission 2011, Charles 2005 or Gornick 1999). In the discourse of potential causes of gender inequalities in labour market outcomes, continuous training is discussed of being one of the explanatory factors (e.g. Tomaskovic-Devey & Skaggs 2002 or Evertsson 2004). This is because continuous training is strongly connected with career-perspectives as well as wage premiums (Melero 2010; Görlitz 2011). Since women are supposed to take part in less training due to higher levels of family responsibilities, more frequent employment interruptions and discriminatory employer practices, the resulting training gap might explain part of the observed gender differences in occupational success (Becker 1985; Estevez-Abe 2005).

The ground for personal success in the labour market is laid at early ages. There is consistent evidence that education begets education. One reason for this is that many skills are complementary and individuals that already possess certain skills can acquire others more easily (Cunha & Heckman 2009). Therefore, investment in human capital of more educated individuals generates higher productivity returns than educational investment in less educated individuals (Heckman 2000). Consequently, economic actors are more inclined to invest in highly educated employees. Not surprisingly, literature on continuous training typically associates people of lower education with lower levels of continuous training (Mure 2007). However, technological progress means a high risk of skill obsolescence for employees that do not train continuously after finishing their initial education. In addition, certain skills are more efficiently learned at the workplace. Thus, continuous investments in human capital are crucial for nearly every worker's productivity and labour market participation. Nonetheless, instead of balancing the educational difference between higher and lower educated employees continuous training appears to further widen the educational gap.

To overcome the training gap between men and women as well as between people with different educational backgrounds, it is not sufficient to consider the structure of companies but also to understand the national setting in which companies are acting. These settings may be different across countries and thus may give disparate incentives to invest in training. Bassanini et al. (2007) confirm that country effects account for almost half of the explained variation they find in training participation across Europe. A considerable part of this variation could be explained by differences in the institutional framework. However, until now, there are only few systematic cross-country comparisons that include national characteristics as possible explanatory factors for training variance. For the lack of comparable cross-country data, existing studies are usually qualitative or based on case studies (e.g. Brockmann, Clarke & Winch 2008; Finegold, Wagner & Mason 2000; Hashimoto 1994; Ichniowski & Shaw 1999). Here, the study of Arulampalam, Booth & Bryan (2004) is one of the few quantitative exceptions. The authors find significant differences in national training practices. More specifically, their results suggest gender and previous education to have differing effects across countries. However, the aim of their study is to detect differences, rather than to explain them. Therefore the authors do not systematically trace their observations back to certain country characteristics. Dieckhoff & Steiber (2011) analyse differing gender effects on training across European countries. The authors find a somewhat smaller gender training gap in Scandinavian countries than in the rest of Europe. They explain this result with unique Nordic characteristics like the combination of high female labour market participation and a modern gender culture as well as the social-democratic background. However, they do not measure these institutions as such but include a dummy for Nor-

dic countries in their models. Consequently, the documented effects cannot be clearly ascribed to particular national characteristics. Beck, Kabst & Walgenbach (2009) trace cross-country-differences in training back to institutional features of the educational system. They find continuous training to be more common in countries that do not have a strong initial training system. Moreover, they conclude that training is distributed differently across different hierarchical levels depending on the national context. Edlund & Grönlund (2008) study the effect labour market institutions on human capital by analysing the individuals' stock of firm-specific skills in different countries. Their results indicate that employees' firm-specific skills differ depending on the labour market regime of a country. Bassanini et al. (2007) analyses individual and institutional determinants of training in Europe and find the effects of gender and previous education on training to differ across countries. Further, they find training to vary depending on the stratification of the schooling system (sorting of pupils into general and vocational school tracks). The authors also analyse the link between training and labour market institutions. They find unions to be somewhat positively related to training and employment protection to be negatively linked to training of temporary workers. Brunello (2004) analyses labour market institutions and the complementarity between education and training in different European countries. For most countries he finds higher educated individuals to participate in more training. However, the strength of this link varies significantly across countries. Analysing the indirect effects of stratified schooling systems the author finds the impact of educational attainment on training to be lower in more stratified schooling systems. Looking at the direct effects of institutions on training, he finds a higher training probability in countries with a greater supply of educated workers. Further, he finds the training incidence to be linked to characteristics of the labour market.

Although the labour market and the educational system were found relevant for individual training participation, only few studies include these institutional factors in their analyses and even fewer analyse both simultaneously. A simultaneous analysis, however, draws a broader picture of the processes influencing participation in continuous training since national institutions are supposed to complement each other (Amable 2000). More importantly, labour markets and educational systems might have dissimilar effects on training of different groups of employees. In particular, the effects of gender and previous education are discussed to interact with these institutions (e.g. Estevez-Abe 2005; Pischke 2005). Thus, institutional features might not only have an impact on training in general but also influence inequality in terms of training depending on gender and previous education. This could explain the differing effects of gender and education across different countries found in previous empirical studies. Therefore, this study analyses factors of the labour market and the educational system as well as individual characteristics and moderating effects of institutions on individual characteristics. Using data from the Adult Education Survey (AES), a comparison between 22 European countries is performed. Different multilevel regression models are run to examine the individual and institutional determinants of training.

DETERMINANTS OF CONTINUOUS TRAINING: INDIVIDUAL CHARACTERISTICS, NATIONAL INSTITUTIONS AND THEIR INTERACTIONS

Studies on gender differences in training provide ambiguous results. While Dieckhoff & Steiber (2011), Evertsson (2004), Pischke (2001) and Lynch (1992) find that men take part in more training, Thangavelu et al. (2011) , Draca & Green (2004), Green & Zanchi (1997) and Veum (1996) only postu-

late minor or insignificant differences in training participation between men and women. On the contrary, Jones, Latreille & Sloane (2008) and Simpson & Stroh (2002) conclude that women take part in more training than men. Some of these differences in the empirical results could be explained by dissimilar methodological approaches in controlling for differences in characteristics like e.g. occupation, industry and sector. However, taking into account national settings could uncover yet unrecognized contributory factors of gender inequality and might help to interpret the differing results in a more adequate way. This appears reasonable since previous studies suggest differing gender effects across different countries (e.g. Arulampalam, Booth & Bryan 2004 or Bassanini et al. 2007). Soskice (2005) states that the skill system and the wage determination are two main-factors helping to explain cross-country gender differences, especially when it comes to occupational segregation, income distribution and labour market participation. In line with that I assume that the effect of gender on training participation is moderated by the labour market as well as the educational system of a country. In other words I suppose the gender training gap to vary, depending on these institutions.

Hypothesizing the patterns of gender differences, I take into account the classical argument that women are less likely to invest in specific human capital, due to their higher probability of career interruptions and the limited market-value of specific training outside the training firm (Polachek 1981). By the same token, it could be reasonable to assume employers to be more reluctant to invest in training of female employees since the probability of losing this investment could be higher compared to investments in male human capital. Empirical results seem to support these ideas. Edlund & Grönlund (2008) find men to have more specific skills than women.

These employee and employer preferences could be an important factor explaining gender differences in training if specific training was valued differently depending on national institutions. Indeed, the Varieties of Capitalism approach postulates specific human capital to be of high importance in coordinated labour markets. Actors in coordinated labour markets depend on non-market-relationships as they coordinate their activities. In these countries wages are often set by collective bargaining instead of market mechanisms. Employment relations are long-term and production strategies concentrate on incremental innovations. For these reasons, coordinated labour markets focus on specific human capital. On the contrary, liberal labour markets rather focus on general human capital. These countries are characterized by competitive arm's-length relationships between the actors that result in rather short-term employments. They usually have a high demand for general human capital as this fosters employee mobility and supports the radical innovation strategies pursued by these countries (Hall & Soskice 2001). Consequently, it can be inferred that in countries with coordinated labour markets, where specific human capital is of high importance, women's preferences are at odds with the human capital demands of the labour market. It could be assumed that in those countries men are able to meet these demands more readily than women, which would lead to female disadvantage in training participation in coordinated labour markets. In other words: *Coordinated labour markets hamper training participation of female employees (Hypothesis 1).*

Concerning the influence of the educational system on training participation, there are contradictory theories about the link between the initial training system and continuous training. On the one hand, it can be deduced from the Varieties of Capitalism literature that the focus on specific training in countries with a strong vocational training system continues throughout an employee's career and results in a focus on specific continuous training. By the same token, countries with an emphasis on initial training at universities, that generates rather general human capital, would focus on general

continuous training afterwards (Hall & Soskice 2001). On the other hand, there is some empirical evidence that suggests initial and continuous training to be compensating which could result in a change of focus from initial to continuous training (Beck, Kabst & Walgenbach 2009; Goergen, Brewster & Wood 2009; Backes-Gellner 1999). In this case employers and employees in countries with a strong vocational system would focus on general continuous training to complement their specific human capital generated by the initial training system. In contrast, in countries with university systems the focus would be on specific continuous training to complement the general human capital generated at universities.

If the focus of continuous training was in line with the focus of the initial training system, more general continuous training would be conducted in countries with strong university systems and more specific training in countries with strong vocational systems. Hence, training in vocational systems would be less likely to meet women's preferences than training in university systems. However, if training was complementary and university education was compensated by high levels of specific instead of general training, these systems would be worde in meeting women's preferences in terms of training. Depending on the actual link to the educational system, two contradictory hypotheses are deduced: *Strong vocational systems hamper training participation of female employees (Hypothesis 2a).* And: *Strong university systems hamper training participation of female employees (Hypothesis 2b).*

Most studies on continuous training find a strong positive relationship between previous education and continuous training (Mure 2007). However, the effect of previous education seems to differ between countries (Brunello 2004). Moderating effects of institutions on the impact of previous education could be one explanation for these findings. Following Pischke (2005) it is argued that certain labour market characteristics can foster training for employees of lower education. Pischke (2005) suggests that labour market coordination can give incentives for employers to invest in training of low-skilled employees since these measures lead to wage compression and thereby cause relatively high wages for the low-skilled. Thus, it is assumed that *coordinated labour markets favour training participation of lower educated employees (Hypothesis 3).*

The moderating effect of the educational system cannot be predicted unambiguously by literature. If the focus was in line with the focus of the initial training system, more on-the-job training would be conducted in countries with vocational systems, since on-the-job training is most likely to result in specific human capital (Becker 1993). Goergen, Brewster & Wood (2009) argue that training for low-skilled employees is rather on-the-job (hence more specific) than in the form of courses or seminars (which is usually more general) because the former type of training tends to be cheaper than the latter. Consequently, if continuous training was in line with initial training, vocational systems would mitigate the positive effect of education on training since on-the-job training (which is provided to the low-skilled employees more extensively than training in courses) is more important. People of lower education would then be less disadvantaged in vocational systems. However, if training was complementary, specific (mostly on-the-job) training would be more important in countries with a strong university system. In this case it would be the university system that reduces the training gap between high- and low-educated employees. Again this leads to two contradicting hypotheses: *Strong vocational systems favour training participation of lower educated employees (Hypothesis 4a).* And: *Strong university systems favour training participation of lower educated employees (Hypothesis 4b).*

Taking into account the previous hypotheses leads to the general assumption of the paper: *Institutions that favour training for females hamper training for lower educated employees (Hypothesis 5).* Table 1 provides an overview of the hypothesis.

Table 1: Summary of the hypotheses

	Female	**Lower educated**
Labour market		
Coordinated	- (H1)	+ (H3)
Educational system		
Strong vocational	- (H2a)	+ (H4a)
or	*or*	*or*
Strong university	- (H2b)	+ (H4b)
	(H5)	

DATA AND METHOD

To test the hypotheses, training data from the Adult Education Survey (AES), which is part of the EU statistics on lifelong learning, is analysed. This household sample survey contains information on training participation of individuals aged 25 to 64 and has been carried out in the EU, EFTA and candidate countries between 2005 and 2008. In the survey individuals were asked about their training participation in the past twelve months. Training includes courses, private lessons, seminars, workshops, and courses conducted through open or distance education as well as guided on-the-job training. Since the aim of the paper is detect inequalities in labour market opportunities, the following analyses only take into account training that individuals defined as work related. The AES states the total number of training incidents in the previous twelve months. However, training participation is considered as a binary variable as there is a substantial number of employees that did not take part in any training at all. The survey covers demographic information as well as data on previous education and provides occupational details like the type of contract an employee has (full-time or part-time), his/her occupation as well as the industry and size of the employing firm. Further, information on the year of the interview, the degree of urbanization and the interview method is provided. Data for the following countries is publicly available by now: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, the Netherlands, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden and the United Kingdom. Due to data restrictions Italy, the Netherlands, Croatia and Slovenia are not included in the analyses. This leads to a dataset containing complete information on 89,028 employees from 22 countries.[1]

[1] In the following analyses only those employees are taken into account on that full information on all model variables is available. None of the results hinges on this sample reduction.

In addition to the AES, macro-data on the different national institutions is taken into account. If available, data for 2006 is used since most national surveys were conducted in 2006 and 2007 and therefore (at least partly) refer to training incidents in 2006. To cover the characteristics of the labour market, the mean tenure of employees in a country and the union density is considered.[2] Mean tenure gives an insight into the relationship between employees and employers. High mean tenure is a sign of prevailing long-term orientation of the labour market actors. Union density is a measure of union strength in a country. Unions serve as an instrument of bringing together employee and employer interest. Strong unions can therefore be interpreted as a signal for labour market coordination. On the contrary, low mean tenure and union density describe a more market driven, liberal labour market with short-term relationships between the actors. To depict the educational system the ratio of graduates from tertiary education as well as the ratio of students in the vocational programmes is considered.[3] A high ratio of tertiary educated individuals is assumed to characterize a strong university system while a high ratio of vocational students is taken as a sign for a strong vocational system.

The individual characteristics gender and previous education serve as explanatory variables. In terms of previous education, individuals with and without tertiary education are distinguished. The variables *mean tenure*, *union density, university system* and *vocational system* represent national institutions of the labour market and the educational system. Since I expect a direct as well as a moderating impact of the institutional factors, interaction terms with individual variables are included, too. These interaction terms are supposed to determine the impact of the labour market and the educational system on the effect of being female or having no tertiary education. Further, the individual's age (and its square, both centred at 25), a dummy for part-time employment, the individual's occupation, as well as the industry and size of the employing firm are included as control variables. To control for economic trends and possible selection bias, the year of the interview, the degree of urbanisation and the interview method are included.

A multilevel approach is chosen to analyse the data. This is important because the theoretical models include assumptions on characteristics at individual as well as at country-level. Since individuals living in one country are likely to be more similar in unobserved characteristics than randomly chosen individuals from different countries, errors terms within a country are likely to be correlated. In this case, a simple logit-estimation, that assumes individual observations to be independent, would lead to biased standard errors. More specifically, standard errors would be underestimated, when it comes to purely between cluster covariates where the between cluster variance is zero. On the other hand, standard errors are overestimated, when looking at purely within cluster covariates where the between cluster variance is zero. Thus, using ordinary logit-models with data that is in fact multilevel could result in too small or too large standard errors and therefore biased p-values (Rabe-Hesketh & Skrondal 2008, p. 130).

Another method to challenge the problems caused by the data structure would be to use clustered standard errors. However, this method treats the structure of data as a nuisance and not as a matter

[2] The average tenure of a country was calculated on the basis of the AES data. It is the arithmetic mean of the tenure of all economically active individuals of a country that participated in the survey. Union density is taken from Visser (2011) and is defined as "net union membership as a proportion wage and salary earners in employment". Union density data for Estonia is for 2008.

[3] The ratio of tertiary graduates is taken from Eurostat (2011) and defined as sum of all tertiary graduates (ISCED 5-6) per 1000 inhabitants aged 20-29. The ratio of vocational students is defined as "Technical/vocational enrolment in ISCED 2 and 3 as % of total enrolment in ISCED 2 and 3 in 2006". This data is taken from UNESCO.

of interest. It delivers the correct standard errors and accounts for the fact that lower level units are not independent. Still, it does not allow for examination of the residual between-cluster variability or within-cluster dependence in the model. On the contrary, multilevel analysis not only takes into account the clustered nature of the data but also allows to investigate the possible sources of variations within and across clusters. It provides the possibility to describe which variables predict individual differences, allows describing which variables predict cluster level differences and exploring variation across and within clusters. Moreover, because multilevel analysis explicitly models the clustered nature of the data, it can correctly estimate standard errors and lead to more accurate inferential decisions. This way, it is possible to investigate variance within and across clusters (Carle 2009). To sum up, multilevel analyses is chosen because it permits to consider the micro-macro structure of the data and distinguish individual and national characteristics in one empirical model.

RESULTS

DESCRIPTIVE STATISTICS

Table 2 shows the proportion of employees who took part in work related training by country and employee group. The incidence of training obviously varies to a great extent between the countries. Employees in Scandinavia are the ones who are most likely to receive training. In the previous twelve month 80% of the Swedish employees in the sample received training. These findings are very similar to the ones of Bassanini (2007). On the contrary, in Romania, Hungary and Greece, only a small minority of employees received any training (8%, 14%, 18%). In most countries women are more likely to participate in training than men. The female training advantage is especially pronounced in Nordic countries like Latvia, Lithuania and Finland (0.49 vs. 0.28, 0.49 vs. 0.35 and 0.69 vs. 0.57). Nonetheless, in the Czech and the Slovak Republic, France and Bulgaria the share of male employees trained in the past twelve months is higher than the share of females. Hence, figures show that the link between gender and training participation differs across European countries. The same is true for education. While in Bulgaria and the UK training participation of employees with and without a university degree differs by 9 and 12 percentage points respectively, the difference in participation in Portugal and Lithuania is as high as 39 and 37 percentage points. Additional descriptive statistics on all model variables and correlations of the main variables are provided in the appendix.

Table 2: Participation in work related training by country and employee group

Country	Training participation					Sample size
	All employees	Female	Male	No uni. degree	Uni. degree	
Austria	0.51	0.52	0.50	0.45	0.71	2,639
Belgium	0.47	0.47	0.46	0.34	0.61	2,550
Bulgaria	0.55	0.55	0.56	0.53	0.62	3,030
Cyprus	0.49	0.50	0.47	0.37	0.68	2,655
Czech Republic	0.47	0.43	0.51	0.43	0.67	5,633
Denmark	0.48	0.49	0.46	0.39	0.61	2,108
Estonia	0.49	0.53	0.42	0.39	0.66	2,550
Finland	0.63	0.69	0.57	0.52	0.77	2,452
France	0.44	0.43	0.45	0.36	0.62	9,415
Germany	0.55	0.57	0.54	0.49	0.72	3,468
Greece	0.18	0.21	0.16	0.12	0.32	2,711
Hungary	0.14	0.17	0.12	0.12	0.25	4,106
Latvia	0.38	0.49	0.28	0.29	0.65	1,387
Lithuania	0.43	0.49	0.35	0.30	0.67	2,243
Norway	0.61	0.63	0.59	0.55	0.71	2,213
Poland	0.28	0.33	0.25	0.20	0.54	11,482
Portugal	0.29	0.31	0.27	0.23	0.62	5,082
Romania	0.08	0.09	0.08	0.06	0.18	6,430
Slovak Republic	0.55	0.53	0.57	0.52	0.66	3,126
Spain	0.36	0.39	0.34	0.28	0.51	9,101
Sweden	0.80	0.83	0.77	0.72	0.93	2,481
United Kingdom	0.50	0.53	0.47	0.45	0.57	2,166
Overall	0.40	0.42	0.37	0.32	0.58	89,028

Table 3 shows that about 40% of all employees in the sample took part in training in the past twelve months.[4] Looking separately at different types of training shows, that participation in courses is higher than in training on-the-job. While 31% of the employees participated in courses or similar training events only 21% were trained on-the-job. The dataset includes 44,172 female and 44,856 male employees. Figures show that the proportion of women who participated in training in the past twelve month is higher than the proportion of men who were trained. The female training advantage is most pronounced when it comes to training in courses. While the proportion of men and women who were trained on-the-job is both around 21%, only 27% of the male employees participated in courses compared to 35% of the females. This could be an indication of female preferences for general training. However, the higher training rates of women do not necessarily display an effect of gender on training but might also originate from different employment situations of men and women.

Looking at previous education shows that the proportion of employees who took part in training is 81% higher among tertiary educated than among non-tertiary educated employees (58% vs. 32%). The training difference becomes even more pronounced when looking at training that is imparted in courses. While 53% of the highly educated employees took part in this type of training the same is true for only 22% of the employees without tertiary education. In terms of training on-the-job there is still a training advantage for people with a university degree, however it is considerably smaller. Almost 28% of tertiary educated took part in on-the-job-training compared to 18% of the non-tertiary educated. Hence, the earlier assumption that lower educated employees have a (relatively) stronger focus on on-the-job training than highly educated finds some support in this data. Neverthe-

[4] Training participation in the complete AES dataset (110,913 employees from 26 countries) is similar to the participation in the sample. A table for training participation of all employees in the AES is provided in the appendix.

less, this relationship might also be caused by specific employment characteristics of higher and lower educated employees.

Table 3: Participation in work related training by employee group

Group	Training	Obs.	Mean	Std. dev.	Min	Max
	All types	89,028	0.3961113	0.4890908	0	1
All employees	**Courses**	89,028	0.3097902	0.4624096	0	1
	On-the-job	89,028	0.2089792	0.4065818	0	1
	All types	44,172	0.4200625	0.4935742	0	1
Female	**Courses**	44,172	0.3471883	0.4760816	0	1
	On-the-job	44,172	0.2121253	0.4088178	0	1
	All types	44,856	0.3725254	0.4834826	0	1
Male	**Courses**	44,856	0.2729624	0.4454866	0	1
	On-the-job	44,856	0.205881	0.4043485	0	1
	All types	63,146	0.3191651	0.4661568	0	1
No uni. degr.	**Courses**	63,146	0.2200139	0.414259	0	1
	On-the-job	63,146	0.1806607	0.3847398	0	1
	All types	25,882	0.5838421	0.4929299	0	1
Uni. degr.	**Courses**	25,882	0.5288231	0.4991782	0	1
	On-the-job	25,882	0.2780697	0.4480566	0	1

MULTILEVEL ANALYSIS

Table 4 shows the results of the multilevel logit-regressions for training participation. The results are displayed in in odds ratios. These exponentiated logit-coefficients provide the proportion by which the explained variable changes for a unit change in an explanatory variable. The effects are presented on a multiplicative scale and allow for a straightforward interpretation of the interaction effects (Buis 2010). Coefficients between 0 and 1 are interpreted as negative effects, coefficients >1 as positive effects.

Model 1 depicts the baseline model with random intercepts clustered by country. It indicates that the overall odds for training are 0.652 to 1. The standard deviation corresponding to the random intercept is 0.753. Model 2 considers variables at the individual level, more specifically gender and education (represented by a dummy for females and a dummy for employees without tertiary education) as well as controls for age, age² (both centred at 25), part-time employment, occupation, industry, firm-size, degree of urbanization, year of the interview and interview method. Including variables on the individual level in model 2 reduces the standard deviation. This reflects the fact that the inclusion of individual variables account for some of the deviation in training participation. The model further suggests that, in contradiction to the impression given by the descriptive statistics, being a woman does not result in a higher probability of training participation. Odds ratios even point to a negative link between females and training participation. For every male that takes part in training, 0.936 females take training. Thus, the fact that female employees participate in more training than men appears to be caused by gender-differences in other individual or firm characteristics like occupation, industry or firm-size. Despite controlling for other variables, employees without university education still seem to be clearly disadvantaged when it comes to training. Only 0.693 employees without tertiary education take training for every tertiary educated employee. This difference is high

but nonetheless considerably lower than the difference of 81% suggested by the descriptive statistics. Other individual characteristics included in the model seem to correlate with previous education and cause part of the training difference between higher and lower educated employees observed in the descriptive analysis. Model 3 includes random slopes for the female and the non-tertiary educated dummy. The level 2 standard deviation of these variables is highly significant, indicating that the effect of being a female and the effect of having no university degree vary significantly across countries. The inclusion of these random slopes reduced the standard deviation of the constant, which indicates that some cross country variation in training is in fact explained by differing effects of gender and education. Moreover, the inclusion of the random slopes leads to a non-significant coefficient of the female dummy. It seems that being a woman does not have a negative effect on training per se. Instead, the association between being female and training participation varies considerably across countries and causes differing gender effects. On the contrary, the inclusion of the random slope for the educational dummy does not rule out the significant relationship in the fixed part. Although the significant random slope indicate a differing relationships between education and training across European countries, the significant educational dummy in the fixed part of the model still suggest a strong positive overall effect of education on training. Model 4 allows for the covariances to vary. As Snijders & Bosker (2011, p. 77) state, this is important because "the origin of most variables in the social sciences is arbitrary." Therefore, covariances are free parameters estimated from the data, and not a priori constrained to the value 0. However, since only the correlation between the two random slopes turns out to be significant, correlations between the intercept and the slopes are not considered here (results of the estimation including these correlations are shown in in model 4 in Table 9 in the appendix). The significantly negative relationship between the slopes indicates, that in countries where there is a relatively high ratio of females that train, the ratio of non-university educated that who is relatively low. Model 5 includes the institutional variables mean tenure, union density, ratio of university graduates and ratio of participants in vocational training. The considerable drop in the standard deviation of the intercept suggests that these institutions explain part of the international differences in work related training. Mean tenure and vocational participation seem to have significant impact on training participation: A growth of one year in mean tenure lowers the odds to train by the factor 0.836. On the contrary strong vocational systems seem to facilitate training. A rise of one percentage point in the ratio of vocational students is linked to a growth in an individual's odds to train by factor 1.039. The results do not reveal any significant influence of union density or the university system on training.

Models 6 to 13 include interaction effects between the main explanatory variables at individual and institutional level. To reduce complexity and not to lose too many degrees of freedom at the country level, interaction terms are introduced one by one in different models. Models 6 to 9 consider interactions for females. In these models the odds ratios of the institutional variables depict the change in odds for men only. The difference in the effect of an institution on male and female employees is represented by the interaction effect between the gender dummy for females and the respective institution. The impact of mean tenure does not differ significantly between men and women. Both seem to be hampered in their training participation. Union density and the ratio of university graduates seem to have neither a direct nor an indirect effect on individual training participation. In contrast, model 9 reveals a significant coefficient for the interaction of female and the ratio of vocational participation. The presence of a high rate of vocational students is positively linked to training participation for men as their training odds grow by the factor 1.04 for every percentage point the vocational student ratio grows. However, females do not benefit to the same extent from this situation.

Compared to men they are disadvantaged as their odds are lowered by the factor 0.993. Thus, for women, a one unit growth in the vocational ratio results in an increase of the odds by only 1.033 (1.04*0.993). In addition, model 9 shows a somewhat lower standard deviation for the random slope of the female dummy than the previous models. This indicates that part of the variation in the training effect of being a female can be explained by the interaction of gender and the training system.

Models 10 to 13 analyse interactions of previous education and the institutions. The odds for the single institutions now describe their link to training of employees with university education. The differences in the institutional impact between tertiary educated and non-tertiary is represented by the interaction terms. While the link between high mean tenure and training of employees with a university degree is negative (a rise in one year of mean tenure lowers the odds of training by the factor 0.84), this negative relationship is even stronger for employees without a university degree. Compared to university graduates their odds are further lowered by the factor 0.958. Hence for every rise of a year in mean tenure their odds shrink by 0.804. Looking at the standard deviation of the slope for non-tertiary educated indicates that the interaction term between education and mean tenure explains some of the cross country variation in the effect of education on training, since the standard deviation of the random effect is reduced. In contrast, the relationships of union density and the educational system and training do not differ significantly between employees of different levels of education.

To sum up, the analyses clearly show that the relationships between gender and training as well as between education and training vary across European countries. The negative correlation between the slopes indicates that countries with high levels of female training tend to show lower levels of training of lower educated employees. However, only two of the eight interaction terms show significant coefficients. These coefficients indicate that female training is less advantaged in countries with high mean tenure while training for lower educated employees is especially low in countries with high mean tenure. The remaining interactions were not able to explain any differences in training for the different employee groups. Therefore, the suggested contradictory effects of country characteristics on gender and education cannot be extensively explained by the analysed institutions.

Table 4: Participation in work related training, odds ratios[5]

	1.[6]	2.[7]	3.[8]	4.[9]	5.[10]	6.[11]	7.[12]	8.[13]	9.[14]	10.[15]	11.[16]	12.[17]	13.[18]
FIXED PART													
Female		0.936***	0.976	0.974	0.973	0.969	0.973	0.972	0.957	0.974	0.974	0.974	0.974
No university degree		0.693***	0.709***	0.707***	0.706***	0.706***	0.706***	0.706***	0.707***	0.699***	0.706***	0.708***	0.713***
Mean tenure					0.836***	0.838***	0.836***	0.836***	0.836***	0.840***	0.835***	0.835***	0.835***
Union density					1.006	1.006	1.006	1.006	1.006	1.006	1.005	1.006	1.006
University system					0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.999	0.998
Vocational system					1.039***	1.039***	1.039***	1.039***	1.040***	1.040***	1.039***	1.039***	1.039***
Interaction with mean tenure						0.981				0.958*			
Interaction with union density							1.000				1.002		
Interaction with university system								1.002				0.997	
Interaction with vocational system									0.993*				1.004
Constant	0.652***	0.915	0.932	0.927	0.801	0.797	0.801	0.800	0.801	0.797	0.801	0.801	0.802
RANDOM PART													
Stand. dev. intercept	0.753*	0.702**	0.676**	0.673***	0.431***	0.429***	0.431***	0.432***	0.432***	0.428***	0.430***	0.432***	0.432***
Stand. dev. slope: female			0.190***	0.190***	0.191***	0.194***	0.191***	0.184***	0.168***	0.192***	0.190***	0.191***	0.191***
Stand. dev. slope: no university			0.317***	0.318***	0.311***	0.311***	0.311***	0.311***	0.310***	0.296***	0.306***	0.302***	0.301***
Correlation female – no university				-0.515*	-0.546*	-0.613*	-0.547*	-0.510*	-0.487*	-0.597*	-0.546*	-0.520*	-0.502*
Observations	89,028	89,028	89,028	89,028	89,028	89,028	89,028	89,028	89,028	89,028	89,028	89,028	89,028
Groups	22	22	22	22	22	22	22	22	22	22	22	22	22

*** p<0.01, ** p<0.05, * p<0.1

[5] Models 2 – 13 control for age, age² (both centred at 25), part-time employment, occupation, industry, firm-size, degree of urbanization, year of the interview and interview method. The complete regression table (including standard errors) is provided in the appendix.
[6] Zero Model.
[7] Model with level 1 variables.
[8] Model with level 1 variables and random slopes for female and no university degree.
[9] Model with level 1 variables, random slopes for female and no university degree and unstructured covariance only for slopes.
[10] Model with level 1 and 2 variables, random slopes for female and no university degree and unstructured covariance only for slopes.
[11] Model with level 1 and 2 variables and interaction between female and mean tenure, random slopes for female and no university degree and unstructured covariance only for slopes.
[12] Model with level 1 and 2 variables and interaction between female and union density, random slopes for female and no university degree and unstructured covariance only for slopes.
[13] Model with level 1 and 2 variables and interaction between female and university, random slopes for female and no university degree and unstructured covariance only for slopes.
[14] Model with level 1 and 2 variables and interaction between female and vocational participation, random slopes for female and no university degree and unstructured covariance for slopes.
[15] Model with level 1 and 2 variables and interaction between no university degree and mean tenure, random slopes for female and no university degree and unstructured covariance for slopes.
[16] Model with level 1 and 2 variables and interaction between no university degree and union density, random slopes for female and no university degree and unstructured covariance for slopes.
[17] Model with level 1 and 2 variables and interaction between no university degree and university, random slopes for female and no university degree and unstructured covariance for slopes.
[18] Model with level 1 and 2 variables and interaction between no university degree and vocational participation, random slopes for female and no university degree and unstructured covariance for slopes.

DISCUSSION

Descriptive statistics show that training participation differs to a great extend across Europe. Moreover, difference in training participation between men and women as well as between tertiary and non-tertiary educated are different across countries. In general, employees are more likely to participate in training in courses than in training on-the-job. This is especially true for females and indicates that females have a higher preference for training in courses than men. Further, the educational training gap is less pronounced when it comes to training on-the-job. Hence, the previous assumptions about differences in training preferences and possibilities of females and males as well as higher and lower educated find support in the data.

The multilevel models suggest that institutional characteristics can have a systematic impact on individual training participation. Moreover, the significant interactions found between individual and institutional variables indicate that national institutions can also moderate the effect of individual characteristics on training participation.

Long mean tenure appears to have a negative overall effect on training. However, this seems to affect men and women to a similar extend. Moreover, analyses were not able to detect any direct or indirect effect of unions on training participation. Based on this, hypothesis 1 can neither be supported nor clearly be rejected. Looking at the educational system training participation is found to be higher in countries with a strong vocational system. Nevertheless, women appear not to benefit to the same extend than men. Compared to men they seem to have a training disadvantage in countries with strong vocational systems. This finding supports hypotheses 2a. Conversely, the presence of a strong university system appears to have no significant influence on continuous training, neither direct nor indirect. Thus, the analyses do not support hypothesis 2b.

The negative effect of tenure appears to be more pronounced for employees without tertiary education than for people that received university education. This finding clearly contradicts hypothesis 3. The reason for this unexpected result might originate from the negative overall effect of mean tenure on training. Since training is extensively provided after (or shortly before) job changes, a negative effect of tenure on training is quite understandable. This effect might be especially pronounced for lower educated employees since their chances for promotion are lower than the chances of highly educated employees. This makes job changes less frequent for lower educated employees and can therefore result in a stronger effect of mean tenure for these employees. Strong unions do not seem to differ in their influence on training of employees with different educational background. The same appears to be true for the institutions depicting the educational system: Neither a strong university system nor a strong vocational system is associated with higher levels of training for the lower educated. Hence, neither hypotheses 4a nor 4b finds support in the data.

In summary, analyses suggest opposing country effects for females and people without university education which provides some support for hypothesis 5. Although, these opposing effects cannot be traced back to specific institutions, since most of the interaction terms turn out to be insignificant, the negatively correlated slopes hinge to the existence of these relationships. Table 5 gives an overview of the results and their implications for hypotheses 1-5.

Table 5: Overview of the results for training participation

Hypotheses			Test
1:	Coordinated labour markets hamper training participation of female employees	Mean tenure	0
		Union density	0
2a:	Strong vocational systems hamper training participation of female employees	Vocational system	✓
2b:	Strong university systems hamper training participation of female employees.	University system	0
3:	Coordinated labour markets favour training participation of lower educated employees.	Mean tenure	X
		Union density	0
4a:	Strong vocational systems favour training participation of lower educated employees	Vocational system	0
4b:	Strong university systems favour training participation of lower educated employees	University system	0
5:	Institutions that favour training for females hamper training for lower educated employees		✓

✓ results support hypothesis, 0 no significant effects, X results oppose hypothesis

CONCLUSION

Although the analyses provide mixed support for the initial hypotheses, the multilevel models point out some interesting insights into the determinants of training that should be considered in the discussion of inequality in the labour market. On the whole, the results propose that in countries with a female advantage in training, lower educated employees tend to get less training and vice versa. However, these opposed relationships cannot be entirely explained by the institutions included in the model. Though results indicate that strong vocational systems are associated with a training disadvantage of women compared to men, the interaction between the vocational system and previous education does not turn out to be significant (but positive). On the other hand, high mean tenure appears to reduce training especially for the lower educated but does not seem to differ in the effect on men and women. Therefore clearly opposing institutional effects cannot be revealed by the models. Part of this might be due to the fact that the analyses are based on 22 countries only which results in few degrees of freedom at the country level. Analyses looking at a greater number of countries would be desirable to further analyse the relationships.

The results further suggest a female preference for training that is imparted in courses and a smaller educational training gap when it comes to on-the-job-training. However, these results may occur due to other individual characteristics. Therefore, separate analyses of training that is provided in courses and training that is done on-the-job could give a clearer picture of the underlying inequality between the different employee groups. Since on-the-job-training is supposed to include a higher share of firm-specific skills it should be less attractive or less available for women. Consequently, any male advantage in training should be most pronounced for training on-the-job. On the other hand, courses and seminars tend to be more expensive than on-the-job-training. Therefore employers should be especially reluctant to provide courses to low-skilled employees. This would make the training gap between low- and high-skilled employees especially marked when looking at courses. However, these analyses go beyond of the scope of this paper and should be addressed in subsequent studies.

Anyway, in the aim to encourage training participation females and lower educated employees, it could be helpful to be aware institutional factors that may influence differences in training participation of different employee groups. To implement measures against inequality in the labour market, further research should be dedicated to uncover the underlying processes that lead to these results and to find out if these differences reflect preferences of employees or employers. This might enable policy makers to encourage more training low-skilled employees and females where necessary.

The study contributes to the discussion of gender inequality in terms of training. Though descriptive statistics suggest a female advantage in training participation at first sight, this relationship disappears when controlled for further individual characteristics like education, age, part-time employment, occupation, firm-size, and industry. Hence, the female training advantage seems to be driven by differing gender-characteristics and not directly by an employee's gender. More generally, the previous analyses indicate that institutional characteristics have a systematic impact on training participation and that individual variables to some extend interact with national institutions. Therefore, institutional characteristics and their possibly differing effects on different groups of employees should be taken into account when analysing training participation.

APPENDIX

Table 6: Descriptive statistics of all model variables

	Obs.	Mean	Std. dev.	Min.	Max.
Work related training					
All	89028	0.3961113	0.4890908	0	1
Courses	89028	0.3097902	0.4624096	0	1
On-the-job	89028	0.2089792	0.4065818	0	1
Institutions					
Mean tenure (mean-centred)	89028	0.385239	2.593119	-3.539457	7.99001
Union density (mean-centred)	89028	-5.287726	18.32184	-23.856	42.944
University system (mean-centred)	89028	1.579824	17.13832	-25.23462	33.66539
Vocational system (mean-centred)	89028	-2.5188	9.044574	-19.57766	14.52891
Individual characteristics					
Female	89028	0.4961585	0.4999881	0	1
No university degree	89028	0.7092825	0.454096	0	1
Age	89028	42.07139	10.01303	25	64
Part-time employed	89028	0.0976547	0.2968488	0	1
Occupation					
Armed forces	89028	0.0069978	0.0833601	0	1
Legislators, senior officials managers	89028	0.0571281	0.2320885	0	1
Professionals	89028	0.1561082	0.3629599	0	1
Technicians and associate professionals	89028	0.1629937	0.369362	0	1
Clerks	89028	0.1121108	0.3155045	0	1
Service & shop & market sales workers	89028	0.1255672	0.3313629	0	1
Skilled agricultural and fishery workers	89028	0.011019	0.1043921	0	1
Craft and related trades workers	89028	0.1572988	0.3640843	0	1
Plant & machine operators & assemblers	89028	0.1036977	0.3048697	0	1
Elementary occupations	89028	0.1070787	0.309215	0	1
Industry					
Agriculture, hunting and forestry	89028	0.0248686	0.1557254	0	1
Manufacturing	89028	0.2219414	0.4155543	0	1
Electricity, gas water supply	89028	0.016478	0.1273052	0	1
Construction	89028	0.0782787	0.2686112	0	1
Wholesale & retail trade; repair	89028	0.1204677	0.3255095	0	1
Hotels and restaurants	89028	0.0334951	0.1799264	0	1
Transport, storage & communication	89028	0.066114	0.2484827	0	1
Financial intermediation	89028	0.0285304	0.1664833	0	1
Real estate, renting & business activities	89028	0.0612504	0.2397904	0	1
Pub. admin. & defence; social security	89028	0.0942175	0.2921328	0	1
Education	89028	0.0986768	0.2982293	0	1
Health and social work	89028	0.1025071	0.3033157	0	1
Community, social & personal services	89028	0.0415038	0.1994534	0	1
Activities of households	89028	0.0108505	0.1035997	0	1
Extra territorial organizations and bodies	89028	0.00082	0.0286235	0	1
Firm-size					
≤10 employees	89028	0.2196949	0.4140423	0	1
11-49 employees	89028	0.3469583	0.476005	0	1
≥50 employees	89028	0.4333468	0.4955402	0	1

Table 7: Correlation between main model variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.
Training	1								
Mean tenure	-0.1848	1							
Union density	0.1231	0.0929	1						
Univers. syst.	-0.0089	-0.085	-0.1595	1					
Voc. syst.	0.0584	0.2786	0.3143	-0.1434	1				
Female	0.0486	-0.0406	-0.0009	0.0232	-0.0207	1			
No uni. degree	-0.2457	0.0679	-0.0798	-0.0394	0.0395	-0.0883	1		
Age	-0.0441	-0.0235	0.0386	-0.0238	0.0058	0.0025	0.0889	1	
Part-time	-0.0001	-0.0349	0.0266	0.0336	0.0091	0.2197	0.0116	0.0379	1

Table 8: All employees in the AES

Group	Training	Obs.	Mean	Std. dev.	Min	Max
	All types	110913	0.3840397	0.4863696	0	1
All employees	**Courses**	110913	0.3071416	0.4613107	0	1
	On-the-job	110913	0.2009142	0.4006858	0	1
	All types	53996	0.4124935	0.4922876	0	1
Female	**Courses**	53996	0.3469516	0.4760046	0	1
	On-the-job	53996	0.2064227	0.4047412	0	1
	All types	56917	0.3570462	0.4791328	0	1
Male	**Courses**	56917	0.2693747	0.4436389	0	1
	On-the-job	56917	0.1956885	0.3967332	0	1
	All types	80321	0.3081137	0.4617167	0	1
No uni. degr.	**Courses**	80321	0.2209509	0.4148901	0	1
	On-the-job	80321	0.1727817	0.3780608	0	1
	All types	30592	0.5833878	0.4930055	0	1
Uni. degr.	**Courses**	30592	0.5334401	0.4988887	0	1
	On-the-job	30592	0.2747777	0.4464095	0	1

Table 9: Complete table on participation in work related training, odds ratios

	1.[19]	2.[20]	3.[21]	4.[22]	5.[23]	6.[24]	7.[25]	8.[26]	9.[27]	10.[28]	11.[29]	12.[30]	13.[31]	14.[32]
FIXED PART														
Female		0.936***	0.976	0.974	0.974	0.973	0.969	0.973	0.972	0.957	0.974	0.974	0.974	0.974
		(0.0170)	(0.0442)	(0.0442)	(0.0442)	(0.0443)	(0.0448)	(0.0443)	(0.0429)	(0.0403)	(0.0445)	(0.0442)	(0.0442)	(0.0443)
No university degree		0.693***	0.709***	0.707***	0.707***	0.706***	0.706***	0.706***	0.706***	0.707***	0.699***	0.706***	0.708***	0.713***
		(0.0150)	(0.0509)	(0.0505)	(0.0507)	(0.0497)	(0.0497)	(0.0497)	(0.0497)	(0.0497)	(0.0473)	(0.0489)	(0.0485)	(0.0501)
Age		1.014***	1.017***	1.017***	1.017***	1.017***	1.017***	1.017***	1.017***	1.017***	1.017***	1.017***	1.017***	1.017***
		(0.00294)	(0.00297)	(0.00297)	(0.00297)	(0.00297)	(0.00297)	(0.00297)	(0.00297)	(0.00297)	(0.00297)	(0.00297)	(0.00297)	(0.00297)
Age^2		0.999***	0.999***	0.999***	0.999***	0.999***	0.999***	0.999***	0.999***	0.999***	0.999***	0.999***	0.999***	0.999***
		(7.93e-05)	(7.97e-05)	(7.97e-05)	(7.97e-05)	(7.96e-05)	(7.96e-05)	(7.97e-05)	(7.96e-05)	(7.96e-05)	(7.96e-05)	(7.97e-05)	(7.96e-05)	(7.96e-05)
Part time		0.792***	0.778***	0.780***	0.779***	0.779***	0.779***	0.779***	0.779***	0.780***	0.779***	0.779***	0.779***	0.778***
		(0.0224)	(0.0226)	(0.0227)	(0.0226)	(0.0226)	(0.0226)	(0.0226)	(0.0226)	(0.0227)	(0.0226)	(0.0226)	(0.0226)	(0.0226)
≤10 employees		0.610***	0.609***	0.609***	0.609***	0.609***	0.609***	0.609***	0.609***	0.609***	0.609***	0.609***	0.609***	0.609***
		(0.0138)	(0.0138)	(0.0138)	(0.0138)	(0.0138)	(0.0138)	(0.0138)	(0.0138)	(0.0138)	(0.0138)	(0.0138)	(0.0138)	(0.0138)
11-49 employees		0.781***	0.776***	0.776***	0.776***	0.776***	0.776***	0.776***	0.776***	0.776***	0.776***	0.776***	0.776***	0.776***
		(0.0142)	(0.0141)	(0.0141)	(0.0141)	(0.0141)	(0.0141)	(0.0141)	(0.0141)	(0.0141)	(0.0141)	(0.0141)	(0.0141)	(0.0141)
Industry 1		0.561**	0.544**	0.543**	0.543**	0.543**	0.543**	0.543**	0.543**	0.542**	0.543**	0.543**	0.543**	0.543**
		(0.142)	(0.138)	(0.138)	(0.138)	(0.138)	(0.138)	(0.138)	(0.138)	(0.138)	(0.138)	(0.138)	(0.138)	(0.138)
Industry 2		0.515***	0.501***	0.501***	0.501***	0.500***	0.500***	0.500***	0.501***	0.500***	0.500***	0.500***	0.500***	0.500***
		(0.127)	(0.124)	(0.124)	(0.124)	(0.124)	(0.124)	(0.124)	(0.124)	(0.124)	(0.124)	(0.124)	(0.124)	(0.124)
Industry 3		0.905	0.895	0.895	0.895	0.894	0.894	0.894	0.894	0.893	0.894	0.893	0.894	0.893
		(0.229)	(0.227)	(0.227)	(0.227)	(0.227)	(0.227)	(0.227)	(0.227)	(0.227)	(0.227)	(0.227)	(0.227)	(0.227)
Industry 4		0.463***	0.452***	0.452***	0.452***	0.451***	0.452***	0.451***	0.452***	0.451***	0.451***	0.451***	0.452***	0.451***
		(0.115)	(0.113)	(0.112)	(0.112)	(0.112)	(0.112)	(0.112)	(0.112)	(0.112)	(0.112)	(0.112)	(0.112)	(0.112)
Industry 5		0.483***	0.472***	0.471***	0.471***	0.471***	0.471***	0.471***	0.471***	0.470***	0.471***	0.470***	0.471***	0.470***

[19] Zero Model.
[20] Model with level 1 variables.
[21] Model with level 1 variables and random slopes for female and no university degree.
[22] Model with level 1 variables, random slopes for female and no university degree and unstructured covariance.
[23] Model with level 1 variables, random slopes for female and no university degree and unstructured covariance only for slopes.
[24] Model with level 1 and 2 variables, random slopes for female and no university degree and unstructured covariance only for slopes.
[25] Model with level 1 and 2 variables and interaction between female and mean tenure, random slopes for female and no university degree and unstructured covariance only for slopes.
[26] Model with level 1 and 2 variables and interaction between female and union density, random slopes for female and no university degree and unstructured covariance only for slopes.
[27] Model with level 1 and 2 variables and interaction between female and university, random slopes for female and no university degree and unstructured covariance only for slopes.
[28] Model with level 1 and 2 variables and interaction between female and vocational participation, random slopes for female and no university degree and unstructured covariance for slopes.
[29] Model with level 1 and 2 variables and interaction between no university degree and mean tenure, random slopes for female and no university degree and unstructured covariance for slopes.
[30] Model with level 1 and 2 variables and interaction between no university degree and union density, random slopes for female and no university degree and unstructured covariance for slopes.
[31] Model with level 1 and 2 variables and interaction between no university degree and university, random slopes for female and no university degree and unstructured covariance for slopes.
[32] Model with level 1 and 2 variables and interaction between no university degree and vocational participation, random slopes for female and no university degree and unstructured covariance for slopes.

	(0.120)	(0.117)	(0.117)	(0.117)	(0.117)	(0.117)	(0.117)	(0.117)	(0.117)	(0.117)	(0.117)	(0.117)	(0.117)
Industry 6	0.472***	0.459***	0.458***	0.459***	0.458***	0.458***	0.458***	0.459***	0.457***	0.458***	0.458***	0.458***	0.458***
	(0.118)	(0.115)	(0.115)	(0.115)	(0.115)	(0.115)	(0.115)	(0.115)	(0.115)	(0.115)	(0.115)	(0.115)	(0.115)
Industry 7	0.638*	0.623*	0.622*	0.623*	0.622*	0.622*	0.622*	0.622*	0.621*	0.622*	0.622*	0.622*	0.622*
	(0.158)	(0.155)	(0.155)	(0.155)	(0.155)	(0.155)	(0.155)	(0.155)	(0.155)	(0.155)	(0.155)	(0.155)	(0.155)
Industry 8	1.106	1.077	1.076	1.076	1.075	1.075	1.075	1.076	1.074	1.074	1.075	1.076	1.075
	(0.277)	(0.270)	(0.270)	(0.270)	(0.269)	(0.269)	(0.269)	(0.269)	(0.269)	(0.269)	(0.269)	(0.269)	(0.269)
Industry 9	0.555**	0.550**	0.549**	0.549**	0.548**	0.548**	0.548**	0.549**	0.548**	0.548**	0.548**	0.548**	0.548**
	(0.138)	(0.137)	(0.137)	(0.137)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)
Industry 10	0.826	0.809	0.809	0.809	0.808	0.808	0.808	0.809	0.807	0.808	0.808	0.808	0.808
	(0.204)	(0.201)	(0.200)	(0.200)	(0.200)	(0.200)	(0.200)	(0.200)	(0.200)	(0.200)	(0.200)	(0.200)	(0.200)
Industry 11	0.752	0.735	0.734	0.734	0.733	0.733	0.733	0.733	0.732	0.733	0.733	0.733	0.733
	(0.186)	(0.182)	(0.182)	(0.182)	(0.182)	(0.182)	(0.182)	(0.182)	(0.182)	(0.182)	(0.182)	(0.182)	(0.182)
Industry 12	0.802	0.793	0.792	0.792	0.791	0.791	0.791	0.791	0.791	0.791	0.790	0.791	0.790
	(0.199)	(0.197)	(0.196)	(0.196)	(0.196)	(0.196)	(0.196)	(0.196)	(0.196)	(0.196)	(0.196)	(0.196)	(0.196)
Industry 13	0.643*	0.628*	0.628*	0.628*	0.627*	0.627*	0.627*	0.627*	0.626*	0.627*	0.627*	0.627*	0.627*
	(0.160)	(0.157)	(0.157)	(0.157)	(0.156)	(0.157)	(0.156)	(0.157)	(0.156)	(0.157)	(0.156)	(0.157)	(0.156)
Industry 14	0.276***	0.272***	0.271***	0.271***	0.271***	0.271***	0.271***	0.271***	0.270***	0.271***	0.271***	0.271***	0.271***
	(0.0770)	(0.0760)	(0.0756)	(0.0758)	(0.0756)	(0.0757)	(0.0756)	(0.0757)	(0.0753)	(0.0757)	(0.0756)	(0.0756)	(0.0756)
Occupation 1	2.522***	2.524***	2.525***	2.524***	2.523***	2.523***	2.523***	2.522***	2.527***	2.523***	2.523***	2.524***	2.522***
	(0.234)	(0.235)	(0.235)	(0.235)	(0.235)	(0.235)	(0.235)	(0.235)	(0.235)	(0.235)	(0.235)	(0.235)	(0.235)
Occupation 2	3.790***	3.808***	3.806***	3.807***	3.804***	3.806***	3.804***	3.804***	3.806***	3.808***	3.803***	3.803***	3.803***
	(0.170)	(0.172)	(0.172)	(0.172)	(0.172)	(0.172)	(0.172)	(0.172)	(0.172)	(0.172)	(0.172)	(0.172)	(0.172)
Occupation 3	4.036***	3.935***	3.934***	3.935***	3.936***	3.936***	3.936***	3.936***	3.938***	3.934***	3.937***	3.937***	3.935***
	(0.160)	(0.157)	(0.157)	(0.157)	(0.157)	(0.157)	(0.157)	(0.157)	(0.157)	(0.157)	(0.157)	(0.157)	(0.157)
Occupation 4	3.351***	3.397***	3.397***	3.398***	3.398***	3.398***	3.398***	3.397***	3.398***	3.399***	3.398***	3.398***	3.397***
	(0.119)	(0.121)	(0.121)	(0.121)	(0.121)	(0.121)	(0.121)	(0.121)	(0.121)	(0.121)	(0.121)	(0.121)	(0.121)
Occupation 5	2.479***	2.515***	2.516***	2.517***	2.517***	2.517***	2.517***	2.517***	2.517***	2.518***	2.516***	2.517***	2.516***
	(0.0923)	(0.0943)	(0.0942)	(0.0943)	(0.0943)	(0.0943)	(0.0943)	(0.0943)	(0.0943)	(0.0943)	(0.0943)	(0.0943)	(0.0943)
Occupation 6	2.069***	2.060***	2.064***	2.062***	2.063***	2.062***	2.063***	2.062***	2.063***	2.062***	2.062***	2.063***	2.062***
	(0.0770)	(0.0772)	(0.0773)	(0.0772)	(0.0772)	(0.0772)	(0.0773)	(0.0772)	(0.0773)	(0.0772)	(0.0772)	(0.0773)	(0.0772)
Occupation 7	1.318***	1.302***	1.303***	1.302***	1.303***	1.303***	1.303***	1.303***	1.304***	1.303***	1.303***	1.303***	1.303***
	(0.122)	(0.122)	(0.122)	(0.122)	(0.122)	(0.122)	(0.122)	(0.122)	(0.122)	(0.122)	(0.122)	(0.122)	(0.122)
Occupation 8	1.531***	1.550***	1.550***	1.551***	1.551***	1.551***	1.551***	1.550***	1.552***	1.552***	1.551***	1.551***	1.550***
	(0.0586)	(0.0599)	(0.0599)	(0.0599)	(0.0599)	(0.0599)	(0.0599)	(0.0599)	(0.0599)	(0.0599)	(0.0599)	(0.0599)	(0.0599)
Occupation 9	1.751***	1.753***	1.753***	1.754***	1.754***	1.755***	1.754***	1.754***	1.755***	1.755***	1.754***	1.754***	1.754***
	(0.0696)	(0.0703)	(0.0704)	(0.0704)	(0.0704)	(0.0705)	(0.0704)	(0.0704)	(0.0705)	(0.0705)	(0.0704)	(0.0704)	(0.0704)
2005	1.396	1.335	1.606	1.351	1.612*	1.621*	1.613*	1.613*	1.613*	1.623*	1.613*	1.609*	1.609*
	(0.412)	(0.388)	(0.479)	(0.391)	(0.429)	(0.430)	(0.429)	(0.430)	(0.430)	(0.430)	(0.429)	(0.428)	(0.428)
2006	1.168	1.135	1.345	1.147	1.336	1.343	1.337	1.338	1.338	1.344	1.337	1.333	1.334
	(0.327)	(0.313)	(0.379)	(0.316)	(0.336)	(0.336)	(0.336)	(0.336)	(0.336)	(0.336)	(0.335)	(0.335)	(0.335)
2007	1.411	1.369	1.619*	1.384	1.573*	1.580*	1.573*	1.575*	1.575*	1.581*	1.573*	1.570*	1.570*
	(0.386)	(0.369)	(0.447)	(0.372)	(0.386)	(0.387)	(0.386)	(0.387)	(0.387)	(0.386)	(0.386)	(0.386)	(0.386)
Densely populated	0.969	0.958**	0.958**	0.958**	0.958**	0.958**	0.958**	0.958**	0.958**	0.958**	0.958**	0.958**	0.958**
	(0.0188)	(0.0187)	(0.0187)	(0.0187)	(0.0187)	(0.0187)	(0.0187)	(0.0187)	(0.0187)	(0.0187)	(0.0187)	(0.0187)	(0.0187)
Interm. populated	1.085***	1.078***	1.078***	1.078***	1.078***	1.078***	1.078***	1.078***	1.078***	1.078***	1.078***	1.078***	1.078***

		(0.0246)	(0.0246)	(0.0246)	(0.0246)	(0.0246)	(0.0246)	(0.0246)	(0.0246)	(0.0246)	(0.0246)	(0.0246)	(0.0246)	(0.0246)
Interview method 1		0.517***	0.519***	0.518***	0.518***	0.518***	0.519***	0.518***	0.518***	0.521***	0.519***	0.518***	0.519***	0.518***
		(0.0454)	(0.0461)	(0.0460)	(0.0460)	(0.0460)	(0.0460)	(0.0460)	(0.0460)	(0.0462)	(0.0460)	(0.0459)	(0.0460)	(0.0459)
Interview method 2		0.494**	0.482**	0.486**	0.482**	0.552**	0.553**	0.552**	0.551**	0.553**	0.552**	0.552**	0.552**	0.552**
		(0.155)	(0.147)	(0.138)	(0.146)	(0.139)	(0.138)	(0.139)	(0.139)	(0.139)	(0.138)	(0.138)	(0.139)	(0.139)
Interview method 3		1.124	1.114	1.112	1.113	1.140	1.140	1.140	1.140	1.141	1.139	1.139	1.140	1.139
		(0.121)	(0.119)	(0.119)	(0.119)	(0.121)	(0.121)	(0.121)	(0.121)	(0.122)	(0.121)	(0.121)	(0.121)	(0.121)
Interview method 4		0.595***	0.589***	0.589***	0.588***	0.593***	0.593***	0.593***	0.593***	0.593***	0.593***	0.593***	0.593***	0.593***
		(0.0545)	(0.0538)	(0.0538)	(0.0538)	(0.0540)	(0.0539)	(0.0540)	(0.0540)	(0.0540)	(0.0539)	(0.0539)	(0.0540)	(0.0539)
Mean tenure						0.836***	0.838***	0.836***	0.836***	0.836***	0.840***	0.835***	0.835***	0.835***
						(0.0354)	(0.0354)	(0.0354)	(0.0355)	(0.0355)	(0.0354)	(0.0353)	(0.0354)	(0.0354)
Union density						1.006	1.006	1.006	1.006	1.006	1.006	1.005	1.006	1.006
						(0.00581)	(0.00578)	(0.00582)	(0.00582)	(0.00582)	(0.00577)	(0.00580)	(0.00582)	(0.00582)
University system						0.998	0.998	0.998	0.998	0.998	0.998	0.998	0.999	0.998
						(0.00598)	(0.00595)	(0.00598)	(0.00600)	(0.00600)	(0.00594)	(0.00597)	(0.00600)	(0.00599)
Vocational system						1.039***	1.039***	1.039***	1.039***	1.040***	1.040***	1.039***	1.039***	1.039***
						(0.0123)	(0.0123)	(0.0123)	(0.0124)	(0.0124)	(0.0123)	(0.0123)	(0.0123)	(0.0124)
Int. with mean tenure							0.981				0.958*			
							(0.0165)				(0.0225)			
Int. with union density								1.000				1.002		
								(0.00190)				(0.00286)		
Int. with uni. system									1.002				0.997	
									(0.00235)				(0.00360)	
Int. with voc. system										0.993*				1.004
										(0.00391)				(0.00694)
Constant	0.652***	0.915	0.932	0.811	0.927	0.801	0.797	0.801	0.800	0.801	0.797	0.801	0.801	0.802
	(0.105)	(0.370)	(0.372)	(0.324)	(0.369)	(0.290)	(0.288)	(0.290)	(0.290)	(0.290)	(0.288)	(0.290)	(0.290)	(0.291)
RANDOM PART														
Stand. dev. intercept	0.753*	0.702**	0.676**	0.683**	0.673***	0.431***	0.429***	0.431***	0.432***	0.432***	0.428***	0.430***	0.432***	0.432***
	(0.114)	(0.107)	(0.104)	(0.106)	(0.104)	(0.0687)	(0.0684)	(0.0687)	(0.0688)	(0.0688)	(0.0682)	(0.0686)	(0.0688)	(0.0688)
St. dev. slope: female			0.190***	0.190***	0.190***	0.191***	0.194***	0.191***	0.184***	0.168***	0.192***	0.190***	0.191***	0.191***
			(0.0345)	(0.0344)	(0.0345)	(0.0346)	(0.0356)	(0.0346)	(0.0337)	(0.0323)	(0.0347)	(0.0345)	(0.0345)	(0.0346)
St. dev. slope: no uni.			0.317***	0.316***	0.318***	0.311***	0.311***	0.311***	0.311***	0.310***	0.296***	0.306***	0.302***	0.301***
			(0.0517)	(0.0516)	(0.0518)	(0.0508)	(0.0508)	(0.0508)	(0.0508)	(0.0507)	(0.0490)	(0.0501)	(0.0503)	(0.0512)
Corr. female – no uni.				-0.501*	-0.515*	-0.546*	-0.613*	-0.547*	-0.510*	-0.487+	-0.597*	-0.546*	-0.520*	-0.502*
				(0.189)	(0.186)	(0.179)	(0.167)	(0.181)	(0.194)	(0.205)	(0.168)	(0.180)	(0.192)	(0.207)
Corr. female – intercept				-0.396										
				(0.214)										
Corr. no uni – intercept				0.104										
				(0.224)										
Observations	89,028	89,028	89,028	89,028	89,028	89,028	89,028	89,028	89,028	89,028	89,028	89,028	89,028	89,028
Groups	22	22	22	22	22	22	22	22	22	22	22	22	22	22

*** p<0.01, ** p<0.05, * p<0.1

Standard errors in parentheses

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